



# Release Notes for Cisco XR 12000 Series Router for Cisco IOS XR Software Release 4.0.0

---

April 24, 2013

Cisco IOS XR Software Release 4.0.0

Text Part Number OL-23351-02

These release notes describe the features provided in the Cisco IOS XR Software Release 4.0.0 for the Cisco XR 12000 Series Router and are updated as needed.



**Note**

---

For information on the Cisco XR 12000 Series Router running Cisco IOS XR Software Release 4.0.0, see the [“Important Notes” section on page 27](#).

---

You can find the most current Cisco IOS XR software documentation at

[http://www.cisco.com/en/US/products/ps6342/tsd\\_products\\_support\\_series\\_home.html](http://www.cisco.com/en/US/products/ps6342/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”](#).

For a list of software caveats that apply to Cisco IOS XR Software Release 4.0.0, see the [“Caveats” section on page 32](#). The caveats are updated for every release and are described at [www.cisco.com](http://www.cisco.com).

We recommend that you view the field notices for this release located at the following URL to see if your software or hardware platforms are affected:

[http://www.cisco.com/public/support/tac/fn\\_index.html](http://www.cisco.com/public/support/tac/fn_index.html)



---

**Americas Headquarters:**

Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

# Contents

These release notes contain the following sections:

- 
- Step 1** [Introduction, page 2](#)
- [System Requirements, page 3](#)
  - [Determining Your Software Version, page 15](#)
  - [New Features in Cisco IOS XR Software Release 4.0.0, page 23](#)
  - [Important Notes, page 27](#)
  - [Minimum Flash Disk Requirements When Upgrading to Release 4.0.0, page 30](#)
  - [Caveats, page 32](#)
  - [Upgrading Cisco IOS XR Software, page 37](#)
  - [Troubleshooting, page 37](#)
  - [Related Documentation, page 37](#)
  - [Obtaining Documentation and Submitting a Service Request, page 36](#)

## 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 running on the Cisco XR 12000 Series Router 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).
- **Multicast**—Provides comprehensive IP Multicast software including Source Specific Multicast (SSM) and Protocol Independent Multicast (PIM) in Sparse Mode only.
- **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 is used to configure QoS features.
- **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 messages.

- **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 management 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. 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) and OSPF
  - Path Computation Element (PCE) capability for traffic engineering
- **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 the Cisco XR 12000 Series Router for Cisco IOS XR Software Release 4.0.0, see the [“New Features in Cisco IOS XR Software Release 4.0.0” section on page 23](#) in this document.

## System Requirements

This section describes the system requirements for Cisco IOS XR Software Release 4.0.0 supported on the Cisco XR 12000 Series Router. The system requirements include the following information:

- [Feature Set Table, page 4](#)
- [Memory Requirements, page 6](#)
- [Hardware Supported, page 7](#)
- [Software Compatibility, page 11](#)

- [Other Firmware Support, page 13](#)

To determine the software versions or levels of your current system, see the “[Determining Your Software Version](#)” section on page 15.

## 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 4.0.0 features.

[Table 1](#) lists the Cisco IOS XR software feature set matrix (PIE files) and associated filenames available for Cisco IOS XR Software Release 4.0.0, supported on the Cisco XR 12000 Series Router.

**Table 1** *Cisco XR 12000 Series Router Supported Feature Set (Cisco IOS XR Software Release 4.0.0 PIE Files)*

Feature Set	Filename	Description
<b>Composite Package</b>		
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini.pie-4.0.0	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-4.0.0	Contains the required core packages including OS, Admin, Base, Forwarding, and Routing SNMP Agent, and Alarm Correlation.
<b>Optional Individual Packages<sup>1</sup></b>		
Cisco IOS XR Manageability Package	c12k-mgbl.pie-4.0.0	CORBA <sup>2</sup> agent, XML Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	c12k-mpls.pie-4.0.0	MPLS-TE, <sup>3</sup> LDP, <sup>4</sup> MPLS Forwarding, MPLS OAM, <sup>5</sup> LMP, <sup>6</sup> OUNI, <sup>7</sup> and RSVP. <sup>8</sup>
Cisco IOS XR Multicast Package	c12k-mcast.pie-4.0.0	Multicast Routing Protocols (PIM, <sup>9</sup> MSDP, <sup>10</sup> IGMP, <sup>11</sup> Auto-RP, BSR <sup>12</sup> ), Tools (SAP MTrace, MRINFO), and Infrastructure (MRIB, <sup>13</sup> MURIB, <sup>14</sup> MFWD) <sup>15</sup> .
Cisco IOS XR Security Package	c12k-k9sec.pie-4.0.0	Support for Encryption, Decryption, IPsec <sup>16</sup> , SSH, <sup>17</sup> SSL, <sup>18</sup> and PKI. <sup>19</sup> Software based IPsec support: maximum of 500 tunnels
Cisco IOS XR Standby RP Boot Image	mbiprp-rp.vm-4.0.0	Support for booting the Standby RP on a Cisco XR 12000 Series Router.

**Table 1** *Cisco XR 12000 Series Router Supported Feature Set (Cisco IOS XR Software Release 4.0.0 PIE Files) (continued)*

Feature Set	Filename	Description
Cisco IOS XR FPD Package	c12k-fpd.pie-4.0.0	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-4.0.0	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	c12k-doc.pie-4.0.0	.man pages for Cisco IOS XR software on the Cisco XR 12000 Series Router chassis.

1. Packages are installed individually
2. 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 2 lists the Cisco XR 12000 Series Router TAR files.

**Table 2** Cisco XR 12000 Series Router Supported Feature Sets (Cisco IOS XR Software Release 4.0.0 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	XR12000-iosxr-4.0.0.tar	<ul style="list-style-type: none"> <li>• Cisco IOS XR IP Unicast Routing Core Bundle</li> <li>• Cisco IOS XR Manageability Package</li> <li>• Cisco IOS XR MPLS Package</li> <li>• Cisco IOS XR Multicast Package</li> </ul>
Cisco IOS XR IP/MPLS Core Software 3DES	XR12000-iosxr-k9-4.0.0.tar	<ul style="list-style-type: none"> <li>• Cisco IOS XR IP Unicast Routing Core Bundle</li> <li>• Cisco IOS XR Manageability Package</li> <li>• Cisco IOS XR MPLS Package</li> <li>• Cisco IOS XR Multicast Package</li> <li>• Cisco IOS XR Security Package</li> </ul>

## Memory Requirements



### 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 a Cisco XR 12000 Series Router running Cisco IOS XR Software Release 4.0.0 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

## 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 6.

[Table 3](#) 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 15.

**Table 3** Cisco XR 12000 Series Router Supported Hardware and Minimum Software Requirements

Component	Part Number	Support from Version
<b>Cisco XR 12000 Series Router Series Router Systems</b>		
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
<b>Cisco XR 12000 Series Router Chassis Hardware</b>		
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
<b>Cisco XR 12000 Series Router Fabric Hardware</b>		
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

**Table 3** Cisco XR 12000 Series Router Supported Hardware and Minimum Software Requirements (continued)

<b>Component</b>	<b>Part Number</b>	<b>Support from Version</b>
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
<b>Cisco XR 12000 Series Route Processor Hardware</b>		
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
<b>Cisco XR 12000 Series General Chassis Hardware</b>		
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 8GB Memory (2X4GB DIMM)	MEM-PRP3-8G	3.8
<b>Cisco XR 12000 Series SPA Interface Processor Hardware</b>		
Multirate 2.5G IP Services Engine (Modular)	12000-SIP-401	3.3
Multirate 5G IP Services Engine (Modular)	12000-SIP-501	3.3



**Table 3 Cisco XR 12000 Series Router Supported Hardware and Minimum Software Requirements (continued)**

<b>Component</b>	<b>Part Number</b>	<b>Support from Version</b>
Multirate 10G IP Services Engine (Modular)	12000-SIP-601	3.3
Cisco XR 12000 Series SPA Interface Processor 10G	12000-SIP-600	3.2
<b>Cisco XR 12000 Series Router SONET Interface Modules and SPAs</b>		
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 3 Cisco XR 12000 Series Router Supported Hardware and Minimum Software Requirements (continued)**

<b>Component</b>	<b>Part Number</b>	<b>Support from Version</b>
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
<b>Ethernet Interface Modules and SPAs</b>		
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
<b>Cisco XR 12000 Series Router T3 and E3 Interface Modules and SPAs</b>		
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
<b>Cisco XR 12000 Series Router Channelized Line Cards</b>		
Cisco 1-Port Channelized OC-48 line card	CHOC48/DS3-SR-SC	3.6

**Table 3** Cisco XR 12000 Series Router Supported Hardware and Minimum Software Requirements (continued)

Component	Part Number	Support from Version
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 4.0.0 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 [“Other Firmware Support” section on page 13](#).

Check the firmware needed by running the **show fpd package** command in admin mode.

```
RP/0/0/CPU0:PE6_C12406 (admin)#show fpd package
Thu Sep 09 22:44:46.312 DST
```

```
=====
                          Field Programmable Device Package
=====
Card Type          FPD Description          Type Subtype    SW      Min Req  Min Req
=====          =====
E3-OC12-ATM-4     Mickey FPGA              1c  fpga2    40971.00    0.0     0.0
                  IOB FPGA                 1c  fpga3    41091.00    0.0     0.0
                  SAF 0 FPGA               1c  fpga4    45586.00    0.0     0.0
                  Mouse FPGA               1c  fpga1    40977.00    0.0     0.0
-----
```

E3-OC3-ATM-4	Mickey FPGA	lc	fpga2	40971.00	0.0	0.0
	IOB FPGA	lc	fpga3	41091.00	0.0	0.0
	SAF 0 FPGA	lc	fpga4	45586.00	0.0	0.0
	Mouse FPGA	lc	fpga1	40977.00	0.0	0.0
-----						
12000-ServEngCard	TREX FPGA	lc	fpga2	162.45	0.0	0.0
	TREX FPGA	lc	fpga1	0.41257	0.0	0.0
-----						
12000-SIP	HABANERO FPGA	lc	fpga2	240.03	0.0	0.0
	JALAPENO FPGA	lc	fpga5	240.13	0.0	0.0
	JALAPENO FPGA	lc	fpga5	240.13	0.0	0.0
	JALAPENO FPGA	lc	fpga1	255.23	0.0	0.0
-----						
E3-OC12-CH-1	Shiver FPGA	lc	fpga1	1.01	0.0	0.0
-----						
SPA-IPSEC-2G	Sequoia	spa	fpga2	1.01	0.0	1.0
	Lodi	spa	fpga1	1.22	0.0	1.0
	SPA PROM	spa	rommon	1.01	0.0	1.0
-----						
SPA-4XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.0	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.0	0.0
	SPA I/O FPGA	spa	fpga1	1.01	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.0
-----						
SPA-2XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.0	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.0	0.0
	SPA I/O FPGA	spa	fpga1	1.01	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.0
-----						
SPA-4XCT3/DS0	SPA T3 Subrate FPGA	spa	fpga2	0.11	0.0	0.100
	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.0	0.200
	SPA I/O FPGA	spa	fpga1	2.08	0.0	0.100
	SPA ROMMON	spa	rommon	2.12	0.0	0.100
-----						
SPA-2XCT3/DS0	SPA T3 Subrate FPGA	spa	fpga2	0.11	0.0	0.100
	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.0	0.200
	SPA I/O FPGA	spa	fpga1	2.08	0.0	0.100
	SPA ROMMON	spa	rommon	2.12	0.0	0.100
-----						
SPA-1XCHSTM1/OC3	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.0	0.0
	SPA I/O FPGA	spa	fpga1	1.08	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.0
-----						
SPA-2CHT3-CE-ATM	SPA T3 Subrate FPGA	spa	fpga2	1.10	0.0	1.0
	SPA I/O FPGA	spa	fpga1	2.22	0.0	1.0
	SPA ROMMON	spa	rommon	1.04	0.0	1.0
-----						
SPA-IPSEC-2G-2	Sequoia	spa	fpga2	1.01	0.0	1.0
	Lodi	spa	fpga1	1.22	0.0	1.0
	SPA PROM	spa	rommon	1.01	0.0	1.0
-----						
SPA-1XCHOC48/DS3	SPA I/O FPGA	spa	fpga2	1.00	0.0	0.49
	SPA I/O FPGA	spa	fpga3	1.00	0.0	0.52
	SPA I/O FPGA	spa	fpga1	1.36	0.0	0.49
	SPA ROMMON	spa	rommon	2.02	0.0	0.49
-----						
SPA-1XCHOC12/DS0	SPA I/O FPGA	spa	fpga2	1.00	0.0	0.49
	SPA I/O FPGA	spa	fpga1	1.36	0.0	0.49
	SPA ROMMON	spa	rommon	2.02	0.0	0.49
-----						
SPA-OC192POS	SPA FPGA swv1.2	spa	fpga1	1.02	0.0	0.0
-----						
SPA-8XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.5
-----						

SPA-8XCHT1/E1	SPA I/O FPGA SPA ROMMON	spa fpga1 spa rommon	2.08 2.12	0.0 0.0	0.0 0.140
SPA-OC192POS-XFP	SPA FPGA swv1.2 SPA FPGA swv1.2 hrv2	spa fpga1 spa fpga1	1.02 1.02	0.0 0.0	0.0 2.0
SPA-10X1GE	SPA FPGA swv1.10	spa fpga1	1.10	0.0	0.0
SPA-5X1GE	SPA FPGA swv1.10	spa fpga1	1.10	0.0	0.0
SPA-2XOC48POS/RPR	SPA FPGA swv1.0	spa fpga1	1.00	0.0	0.0
SPA-1XTENGE-XFP	SPA FPGA swv1.9	spa fpga1	1.09	0.0	0.0
SPA-8X1FE	SPA FPGA swv1.1	spa fpga1	1.01	0.0	0.0
SPA-1XOC48POS/RPR	SPA FPGA swv1.2	spa fpga1	1.02	0.0	0.0
SPA-8XOC3-POS	SPA FPGA swv1.0	spa fpga1	1.00	0.0	0.5
SPA-2XOC12-POS	SPA FPGA swv1.0	spa fpga1	1.00	0.0	0.5
SPA-4XOC12-POS	SPA FPGA swv1.0	spa fpga1	1.00	0.0	0.5
SPA-10X1GE-V2	SPA FPGA swv1.10	spa fpga1	1.10	0.0	0.0
SPA-8X1GE-V2	SPA FPGA swv1.10	spa fpga1	1.10	0.0	0.0
SPA-5X1GE-V2	SPA FPGA swv1.10	spa fpga1	1.10	0.0	0.0
SPA-2X1GE-V2	SPA FPGA swv1.1	spa fpga1	1.01	0.0	0.0
SPA-1X10GE-L-V2	SPA FPGA swv1.11	spa fpga1	1.11	0.0	0.0
SPA-8X1FE-V2	SPA FPGA swv1.1	spa fpga1	1.01	0.0	0.0
SPA-4XOC3-POS-V2	SPA FPGA swv1.0	spa fpga1	1.00	0.0	0.5
SPA-1XOC3-ATM-V2	TATM SPA IOFPGA	spa fpga1	2.02	0.0	0.0
SPA-2XOC3-ATM-V2	SPA TATM IOFPGA	spa fpga1	2.02	0.0	0.0
SPA-3XOC3-ATM-V2	SPA TATM IOFPGA	spa fpga1	2.02	0.0	0.0
SPA-1XOC12-ATM-V2	SPA TATM IOFPGA	spa fpga1	2.02	0.0	0.0

RP/0/0/CPU0:PE6\_C12406(admin)#

## Other Firmware Support

The Cisco XR 12000 Series Router supports the following firmware code:

- Line cards (LCs)

For Engine 3 line card:

- Maintenance Bus (MBUS) Agent Software-RAM version 04.06, ROM version 04.06
- ROM Monitor version 17.1

- Fabric Downloader - RAM version 8.0, ROM version 8.0 (The ROM version will be the same as the RAM version if upgraded.)

For Engine 5 line card:

- Maintenance Bus (MBUS) Agent Software-RAM version 04.06, ROM version 04.06
- ROM Monitor version 17.1
- Fabric Downloader - RAM version 6.1, ROM version 4.7 (The ROM version will be the same as the RAM version if upgraded.)

- Route processors (RPs)

For Performance Route Processor 2 (PRP-2):

- Maintenance Bus (MBUS) Agent Software-RAM version 04.06, ROM version 04.06
- ROM Monitor version 1.24

For Performance Route Processor 3 (PRP-3):

- Maintenance Bus (MBUS) Agent Software-RAM version 04.06, ROM version 04.06
- ROM Monitor version 1.4.0

## Minimum Firmware Requirement

- After completing an RMA the newly-received linecard may not have appropriate IOS XR firmware installed.

Depending on the type of firmware that needs upgrading the symptoms can vary as follows:

- |                                |   |
|--------------------------------|---|
| - ROMMON needs updating        | the linecard will not boot up                     |
| - MBUS needs updating          | the linecard may fail to boot or keeps reloading  |
| - Fabric Loader needs updating | the linecard will take long time to boot          |
| - FPD needs updating           | the linecard experiences packet corruption / drop |



### Note

The FPD PIE has to be installed in order to upgrade to the latest FPD image. Refer to the Upgrading FPD on Cisco IOS XR Software chapter of the *Cisco IOS XR System Management Command Reference for the Cisco XR 12000 Router* online.

## RMA Card Firmware Upgrade Procedure:

To upgrade the fabric-downloader, ROMMON, Mbus, and current field-programmable device (FPD) image package on a single RMA linecard or on all modules installed in a router, use the **upgrade all** command in administration EXEC mode.

**upgrade all location** {*node-id* | **all**} [**force**]

Where **location** *node-id* specifies that all ROM images will be upgraded on the physical location of the line card received through RMA defined by the *node-id* argument. The *node-id* argument is entered in the rack/slot/module notation.

The **upgrade all location all** command upgrades all ROM images on all line cards (LCs) that are installed in the router.

For an RMA linecard firmware upgrade you'll want to use the **upgrade all location** {*node-id*} command.

The optional force parameter skips the version check and forces an upgrade.

- 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](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](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](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 for the Cisco XR 12000 Router* for the **upgrade all** command syntax:  
[http://www.cisco.com/en/US/docs/routers/xr12000/software/xr12k\\_r40/system\\_management/command/reference/yr40xr12k\\_chapter7.html](http://www.cisco.com/en/US/docs/routers/xr12000/software/xr12k_r40/system_management/command/reference/yr40xr12k_chapter7.html)

### Requirement of Cisco IOS Image Level and Boot Helper Version 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 4.0.0:

- Cisco IOS image—12.0(32)S
- Cisco IOS Boot helper—12.0(32)S0a

If you have an earlier version of this system, you must upgrade to the minimum supported level before performing a migration. Otherwise, your migration fails. For more information, see the *Migrating from Cisco IOS to Cisco IOS XR Software on the Cisco XR 12000 Series Router* document.

## 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.

```
RP/0/0/CPU0:PE6_C12406# show version
Thu Sep 09 22:12:10.719 DST

Cisco IOS XR Software, Version 4.0.0[00][Default]
Copyright (c) 2010 by Cisco Systems, Inc.

ROM: ROMMON System Bootstrap, Version 1.4(0), RELEASE SOFTWARE

PE6_C12406 uptime is 2 weeks, 1 day, 20 hours, 5 minutes
System image file is "compactflash:c12k-os-mbi-4.0.0[00]/mbiprp-rp.vm"

cisco 12406/PRP (8641D) processor with 4194304K bytes of memory.
8641D processor at 1330Mhz, Revision 2.1

1 Cisco 12000 Series Performance Route Processor 3
1 Cisco 12000 Series - Multi-Service Blade Controller
```

```

1 Cisco 12000 4-Port ISE ATM Over SONET OC3/STM-1 Controller (4 ATM)
1 Cisco 12000 Series SPA Interface Processor-601/501/401
1 Cisco 12000 Series SPA Interface Processor-600
2 Management Ethernet
6 PLIM_QOS
1 MgmtMultilink
5 SONET/SDH
2 T3
3 Multilink network interface(s)
28 T1
21 E1
21 Serial network interface(s)
5 GigabitEthernet/IEEE 802.3 interface(s)
4 Asynchronous Transfer Mode
895k bytes of non-volatile configuration memory.
3515M bytes of compact flash card.
76170M bytes of hard disk.
3600048k bytes of disk0: (Sector size 512 bytes).

Configuration register on node 0/0/CPU0 is 0x102
Boot device on node 0/0/CPU0 is compactflash:
Package active on node 0/0/CPU0:
c12k-fwding, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fwding-4.0.0[00]
    Built on Fri Sep 10 19:49:57 DST 2010
    By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-doc, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-doc-4.0.0[00]
    Built on Fri Sep 10 20:59:21 DST 2010
    By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-security, V 4.0.0[00][Default], Cisco Systems, at
compactflash:iosxr-security-4.0.0[00]
    Built on Fri Sep 10 20:09:54 DST 2010
    By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-mps, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-mps-4.0.0[00]
    Built on Fri Sep 10 20:09:23 DST 2010
    By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-mgbl, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-mgbl-4.0.0[00]
    Built on Fri Sep 10 20:09:45 DST 2010
    By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-mcast, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-mcast-4.0.0[00]
    Built on Fri Sep 10 20:09:31 DST 2010
    By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-doc-supp, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-doc-supp-4.0.0[00]
    Built on Fri Sep 10 20:58:47 DST 2010
    By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-docs, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-docs-4.0.0[00]
    Built on Fri Sep 10 20:58:44 DST 2010
    By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-routing, V 4.0.0[00][Default], Cisco Systems, at
compactflash:iosxr-routing-4.0.0[00]
    Built on Fri Sep 10 19:45:56 DST 2010
    By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-infra, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-infra-4.0.0[00]
    Built on Fri Sep 10 19:43:17 DST 2010
    By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

```



iosxr-fwding, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-fwding-4.0.0[00]  
Built on Fri Sep 10 19:44:42 DST 2010  
By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-diags, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-diags-4.0.0[00]  
Built on Fri Sep 10 19:46:10 DST 2010  
By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-sbc, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-sbc-4.0.0[00]  
Built on Fri Sep 10 20:59:17 DST 2010  
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-ipsec-service, V 4.0.0[00][Default], Cisco Systems, at  
compactflash:c12k-ipsec-service-4.0.0[00]  
Built on Fri Sep 10 20:59:19 DST 2010  
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-fpd-supp, V 4.0.0[00][Default], Cisco Systems, at  
compactflash:c12k-fpd-supp-4.0.0[00]  
Built on Fri Sep 10 20:58:50 DST 2010  
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-fpd, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fpd-4.0.0[00]  
Built on Fri Sep 10 20:59:20 DST 2010  
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-firewall, V 4.0.0[00][Default], Cisco Systems, at  
compactflash:c12k-firewall-4.0.0[00]  
Built on Fri Sep 10 20:59:18 DST 2010  
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-diags, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-diags-4.0.0[00]  
Built on Fri Sep 10 20:44:34 DST 2010  
By sjce-gf-056 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-k9sec-supp, V 4.0.0[00][Default], Cisco Systems, at  
compactflash:c12k-k9sec-supp-4.0.0[00]  
Built on Fri Sep 10 20:10:00 DST 2010  
By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-k9sec, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-k9sec-4.0.0[00]  
Built on Fri Sep 10 20:59:15 DST 2010  
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mgbl-supp, V 4.0.0[00][Default], Cisco Systems, at  
compactflash:c12k-mgbl-supp-4.0.0[00]  
Built on Fri Sep 10 20:09:50 DST 2010  
By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mgbl, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-mgbl-4.0.0[00]  
Built on Fri Sep 10 20:59:14 DST 2010  
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mcast-supp, V 4.0.0[00][Default], Cisco Systems, at  
compactflash:c12k-mcast-supp-4.0.0[00]  
Built on Fri Sep 10 20:09:41 DST 2010  
By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mcast, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-mcast-4.0.0[00]  
Built on Fri Sep 10 20:59:13 DST 2010  
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mpls, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-mpls-4.0.0[00]

```

Built on Fri Sep 10 20:59:12 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-rout, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-rout-4.0.0[00]
  Built on Fri Sep 10 20:59:10 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-lc, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-lc-4.0.0[00]
  Built on Fri Sep 10 20:59:07 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-fwdg, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fwdg-4.0.0[00]
  Built on Fri Sep 10 20:59:08 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-admin, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-admin-4.0.0[00]
  Built on Fri Sep 10 20:59:06 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-base, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-base-4.0.0[00]
  Built on Fri Sep 10 19:49:45 DST 2010
  By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-os-mpi, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-os-mpi-4.0.0[00]
  Built on Fri Sep 10 19:49:36 DST 2010
  By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

Boot device on node 0/2/CPU0 is mem:
Package active on node 0/2/CPU0:
c12k-fwding, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fwding-4.0.0[00]
  Built on Fri Sep 10 19:49:57 DST 2010
  By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-security, V 4.0.0[00][Default], Cisco Systems, at
compactflash:iosxr-security-4.0.0[00]
  Built on Fri Sep 10 20:09:54 DST 2010
  By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-mppls, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-mppls-4.0.0[00]
  Built on Fri Sep 10 20:09:23 DST 2010
  By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-mcast, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-mcast-4.0.0[00]
  Built on Fri Sep 10 20:09:31 DST 2010
  By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-routing, V 4.0.0[00][Default], Cisco Systems, at
compactflash:iosxr-routing-4.0.0[00]
  Built on Fri Sep 10 19:45:56 DST 2010
  By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-infra, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-infra-4.0.0[00]
  Built on Fri Sep 10 19:43:17 DST 2010
  By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-fwding, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-fwding-4.0.0[00]
  Built on Fri Sep 10 19:44:42 DST 2010
  By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-diags, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-diags-4.0.0[00]
  Built on Fri Sep 10 19:46:10 DST 2010
  By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-sbc, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-sbc-4.0.0[00]

```

```

Built on Fri Sep 10 20:59:17 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-ipsec-service, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-ipsec-service-4.0.0[00]
  Built on Fri Sep 10 20:59:19 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-fpd-suppl, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-fpd-suppl-4.0.0[00]
  Built on Fri Sep 10 20:58:50 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-fpd, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fpd-4.0.0[00]
  Built on Fri Sep 10 20:59:20 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-firewall, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-firewall-4.0.0[00]
  Built on Fri Sep 10 20:59:18 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-diags, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-diags-4.0.0[00]
  Built on Fri Sep 10 20:44:34 DST 2010
  By sjce-gf-056 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-k9sec-suppl, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-k9sec-suppl-4.0.0[00]
  Built on Fri Sep 10 20:10:00 DST 2010
  By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-k9sec, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-k9sec-4.0.0[00]
  Built on Fri Sep 10 20:59:15 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mcast-suppl, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-mcast-suppl-4.0.0[00]
  Built on Fri Sep 10 20:09:41 DST 2010
  By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mcast, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-mcast-4.0.0[00]
  Built on Fri Sep 10 20:59:13 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mpis, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-mpis-4.0.0[00]
  Built on Fri Sep 10 20:59:12 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-rout, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-rout-4.0.0[00]
  Built on Fri Sep 10 20:59:10 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-lc, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-lc-4.0.0[00]
  Built on Fri Sep 10 20:59:07 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-fwdg, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fwdg-4.0.0[00]
  Built on Fri Sep 10 20:59:08 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-admin, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-admin-4.0.0[00]
  Built on Fri Sep 10 20:59:06 DST 2010
  By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

```

```

c12k-base, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-base-4.0.0[00]
  Built on Fri Sep 10 19:49:45 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-os-mpi, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-os-mpi-4.0.0[00]
  Built on Fri Sep 10 19:49:36 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

Boot device on node 0/3/CPU0 is mem:
Package active on node 0/3/CPU0:
c12k-fwding, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fwding-4.0.0[00]
  Built on Fri Sep 10 19:49:57 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-security, V 4.0.0[00][Default], Cisco Systems, at
compactflash:iosxr-security-4.0.0[00]
  Built on Fri Sep 10 20:09:54 DST 2010
  By sjce-gf-073 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-mpis, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-mpis-4.0.0[00]
  Built on Fri Sep 10 20:09:23 DST 2010
  By sjce-gf-073 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-mcast, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-mcast-4.0.0[00]
  Built on Fri Sep 10 20:09:31 DST 2010
  By sjce-gf-073 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-routing, V 4.0.0[00][Default], Cisco Systems, at
compactflash:iosxr-routing-4.0.0[00]
  Built on Fri Sep 10 19:45:56 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-infra, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-infra-4.0.0[00]
  Built on Fri Sep 10 19:43:17 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-fwding, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-fwding-4.0.0[00]
  Built on Fri Sep 10 19:44:42 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-diags, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-diags-4.0.0[00]
  Built on Fri Sep 10 19:46:10 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-sbc, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-sbc-4.0.0[00]
  Built on Fri Sep 10 20:59:17 DST 2010
  By iox24 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-ipsec-service, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-ipsec-service-4.0.0[00]
  Built on Fri Sep 10 20:59:19 DST 2010
  By iox24 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-fpd-supp, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-fpd-supp-4.0.0[00]
  Built on Fri Sep 10 20:58:50 DST 2010
  By iox24 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-fpd, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fpd-4.0.0[00]
  Built on Fri Sep 10 20:59:20 DST 2010
  By iox24 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-firewall, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-firewall-4.0.0[00]

```

```

Built on Fri Sep 10 20:59:18 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-diags, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-diags-4.0.0[00]
Built on Fri Sep 10 20:44:34 DST 2010
By sjce-gf-056 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-k9sec-suppl, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-k9sec-suppl-4.0.0[00]
Built on Fri Sep 10 20:10:00 DST 2010
By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-k9sec, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-k9sec-4.0.0[00]
Built on Fri Sep 10 20:59:15 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mcast-suppl, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-mcast-suppl-4.0.0[00]
Built on Fri Sep 10 20:09:41 DST 2010
By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mcast, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-mcast-4.0.0[00]
Built on Fri Sep 10 20:59:13 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mpls, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-mpls-4.0.0[00]
Built on Fri Sep 10 20:59:12 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-rout, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-rout-4.0.0[00]
Built on Fri Sep 10 20:59:10 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-lc, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-lc-4.0.0[00]
Built on Fri Sep 10 20:59:07 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-fwldg, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fwldg-4.0.0[00]
Built on Fri Sep 10 20:59:08 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-admin, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-admin-4.0.0[00]
Built on Fri Sep 10 20:59:06 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-base, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-base-4.0.0[00]
Built on Fri Sep 10 19:49:45 DST 2010
By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-os-mpi, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-os-mpi-4.0.0[00]
Built on Fri Sep 10 19:49:36 DST 2010
By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

Boot device on node 0/4/CPU0 is mem:
Package active on node 0/4/CPU0:
c12k-fwldg, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fwldg-4.0.0[00]
Built on Fri Sep 10 19:49:57 DST 2010
By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

iosxr-security, V 4.0.0[00][Default], Cisco Systems, at
compactflash:iosxr-security-4.0.0[00]
Built on Fri Sep 10 20:09:54 DST 2010
By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

```

```

iosxr-mps, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-mps-4.0.0[00]
  Built on Fri Sep 10 20:09:23 DST 2010
  By sjce-gf-073 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-mcast, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-mcast-4.0.0[00]
  Built on Fri Sep 10 20:09:31 DST 2010
  By sjce-gf-073 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-routing, V 4.0.0[00][Default], Cisco Systems, at
compactflash:iosxr-routing-4.0.0[00]
  Built on Fri Sep 10 19:45:56 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-infra, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-infra-4.0.0[00]
  Built on Fri Sep 10 19:43:17 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-fwding, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-fwding-4.0.0[00]
  Built on Fri Sep 10 19:44:42 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

iosxr-diags, V 4.0.0[00][Default], Cisco Systems, at compactflash:iosxr-diags-4.0.0[00]
  Built on Fri Sep 10 19:46:10 DST 2010
  By sjce-gf-050 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-sbc, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-sbc-4.0.0[00]
  Built on Fri Sep 10 20:59:17 DST 2010
  By iox24 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-ipsec-service, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-ipsec-service-4.0.0[00]
  Built on Fri Sep 10 20:59:19 DST 2010
  By iox24 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-fpd-supp, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-fpd-supp-4.0.0[00]
  Built on Fri Sep 10 20:58:50 DST 2010
  By iox24 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-fpd, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fpd-4.0.0[00]
  Built on Fri Sep 10 20:59:20 DST 2010
  By iox24 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-firewall, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-firewall-4.0.0[00]
  Built on Fri Sep 10 20:59:18 DST 2010
  By iox24 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-diags, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-diags-4.0.0[00]
  Built on Fri Sep 10 20:44:34 DST 2010
  By sjce-gf-056 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-k9sec-supp, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-k9sec-supp-4.0.0[00]
  Built on Fri Sep 10 20:10:00 DST 2010
  By sjce-gf-073 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-k9sec, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-k9sec-4.0.0[00]
  Built on Fri Sep 10 20:59:15 DST 2010
  By iox24 in /auto/ioxbuid5/production/4.0.0/c12k/workspace for pie

c12k-mcast-supp, V 4.0.0[00][Default], Cisco Systems, at
compactflash:c12k-mcast-supp-4.0.0[00]
  Built on Fri Sep 10 20:09:41 DST 2010

```

```

By sjce-gf-073 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mcast, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-mcast-4.0.0[00]
Built on Fri Sep 10 20:59:13 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-mpis, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-mpis-4.0.0[00]
Built on Fri Sep 10 20:59:12 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-rout, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-rout-4.0.0[00]
Built on Fri Sep 10 20:59:10 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-lc, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-lc-4.0.0[00]
Built on Fri Sep 10 20:59:07 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-fwdg, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-fwdg-4.0.0[00]
Built on Fri Sep 10 20:59:08 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-admin, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-admin-4.0.0[00]
Built on Fri Sep 10 20:59:06 DST 2010
By iox24 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-base, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-base-4.0.0[00]
Built on Fri Sep 10 19:49:45 DST 2010
By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

c12k-os-mbi, V 4.0.0[00][Default], Cisco Systems, at compactflash:c12k-os-mbi-4.0.0[00]
Built on Fri Sep 10 19:49:36 DST 2010
By sjce-gf-050 in /auto/ioxbuild5/production/4.0.0/c12k/workspace for pie

RP/0/5/CPU0:PE22_C12406#

```

## New Features in Cisco IOS XR Software Release 4.0.0

The following sections contain information on new features and enhancements in Cisco IOS XR Software Release 4.0.0:

- [New Software Features Supported on all Platforms, page 24](#)
- [Cisco XR 12000 Series Router-Specific Software Features, page 25](#)
- [New Hardware Features for the Cisco XR 12000 Series Router, page 27](#)



### Note

Cisco Session Border Controller (SBC) is not supported on any platform in Cisco IOS XR Software Release 4.0.0. Cisco IOS XR Software Release 3.7 is the last release that supports SBC.



### Note

When upgrading the Cisco IOS XR Software Release 3.9.2 to Cisco IOS XR Software Release 4.0.0, IOS XR directories are also created on the boot disk (disk0) along with the XR 12000 directories.

## New Software Features Supported on all Platforms

The following new software features in Cisco IOS XR Software Release 4.0.0 are supported on all platforms:

- SSH Remote Command Execution
- Non-default SSM Range
- MPLS features
  - Automatic Backup Tunnels
  - SRLG

### MPLS-TE SRLG CLI Migration Steps from pre Release 4.0 to Release 4.0

In Cisco IOS XR Software Release 4.0.0 the MPLS TE SRLG command has been moved from MPLS TE config to Global level config. Other protocols can now use the SRLG configuration.

SRLG command syntax in releases prior to Release 4.0:

```
mpls traffic-eng
  interface GigabitEthernet0/3/0/0
    srlg 400
    srlg 401
    srlg 402
```

SRLG command syntax in releases prior to Release 4.0:

```
srlg
  interface GigabitEthernet0/3/0/0
    value 400
    value 401
    value 402
```

### Migration Steps

- 
- Step 1** Load the new 4.0 image
  - Step 2** Execute the show run mpls traffic-eng command
  - Step 3** Delete all the SRLG values under the interface in MPLS Traffic-eng configuration using the no srlg command

```
config t
mpls traffic-eng
int GigabitEthernet0/3/0/0
  no srlg 400
  no srlg 401
  no srlg 402
commit
```

- Step 4** Add the SRLG values in the new configuration using the srlg and value commands

```
config t <enter>
  srlg <enter>
    interface GigabitEthernet0/3/0/0 <enter>
      value 400 <enter>
      value 401 <enter>
      value 402 <enter>
commit
```

---



- MPLS OAM

For more information on these new MPLS features, refer to the Implementing MPLS Traffic Engineering module and the Implementing MPLS OAM module of the *Cisco IOS XR MPLS Configuration Guide for the Cisco XR 12000 Series Router, Release 4.0*.

## Cisco XR 12000 Series Router-Specific Software Features

The following new software features were introduced in Cisco IOS XR Software Release 4.0.0 on the Cisco XR 12000 Series Router platform:

- iBGP Multipath Load Sharing
- MVPNv6 Extranet
- Ethernet OAM Phase 1
- L2TPv3 support on the 4-Port Channelized OC12 Engine3 Line Card

Cisco IOS XR Software Release 4.0.0 on the Cisco XR 12000 Series Router platform adds support for multiple Layer 2 encapsulations, including 802.1Q virtual LAN (VLAN), Cisco High-Level Data Link Control (HDLC), Ethernet, Frame Relay, Packet over SONET (POS), and Point-to-Point Protocol (PPP) support on the 4-Port Channelized OC12 Engine3 line card.

Support was added for the following features to implement L2TPv3 over 4 Port Channelized OC12 Engine 3 line cards:

- IP Interworking (Frame Relay DLCI-to-ATM, Frame Relay DLCI-to-Ethernet (VLAN) and Frame Relay DLCI-to-Ethernet Port)
- Frame Relay PVC DLCI Like-to-Like Pseudowires
- PPP/HDLC Like-to-Like Pseudowires

For more information on these features, refer to the *Cisco IOS XR Interface and Hardware Component Command Reference for the Cisco XR 12000 Series Router, Release 4.0*, the *Cisco IOS XR Interface and Hardware Component Configuration Guide for the Cisco XR 12000 Series Router, Release 4.0* and the *Cisco IOS XR Virtual Private Network Configuration Guide for the Cisco XR 12000 Series Router, Release 4.0*.

- Lawful Intercept for IPv6

The Lawful Intercept feature which was introduced in Cisco IOS XR Software Release 3.7 has been enhanced in Cisco IOS XR Software Release 4.0.0 to add the capability to intercept IPv6 and 6PE packets (MPLS). The number of taps supported is also being enhanced to 100 IPv4 and 100 IPv6 taps per system.

For more information on these enhancements, refer to the *Cisco IOS XR System Security Command Reference for the Cisco XR 12000 Series Router, Release 4.0* and the *Cisco IOS XR System Security Configuration Guide for the Cisco XR 12000 Series Router, Release 4.0*.

- show controllers pse commands

The show controllers pse and show controllers pse mem commands are introduced in Cisco IOS XR Software Release 4.0.0 on the Cisco XR 12000 Series Router platform

To display packet switching engine (PSE) information in the egress or the ingress stage, use the show controllers pse egress command in EXEC mode. To display external memory information for the packet switching engine (PSE), use the show controllers pse mem command in EXEC mode.

- 8-Port T1/E1 SPA Low speed Protocol Support

Support has been added in Cisco IOS XR Software Release 4.0.0 on the Cisco XR 12000 Series Router platform for low speed protocols on the 8-Port T1/E1 SPA.

For more information on these features, refer to the *Cisco Interface and Hardware Component Configuration Guide for the Cisco XR 12000 Series Router, Release 4.0*

- Hub & Spoke and MVPNv6 data MDT support

Support has been added in Cisco IOS XR Software Release 4.0.0 on the Cisco XR 12000 Series Router platform for Hub & Spoke and MVPNv6 data MDT.

- Netflow - Sampled IPv6 and MPLS-Aware IPv6

Support has been added in Cisco IOS XR Software Release 4.0.0 on the Cisco XR 12000 Series Router platform for Sampled IPv6 and MPLS-Aware IPv6 Netflow.

For more information on these features, refer to the *NetFlow Commands on Cisco IOS XR Software* module of the *Cisco IOS XR Netflow Command Reference for the Cisco XR 12000 Series Router, Release 4.0*.

- QinQ/QinAny support for L2TPv3

Support has been added in Cisco IOS XR Software Release 4.0.0 on the Cisco XR 12000 Series Router platform for QinQ or QinAny Attachment Circuits over L2TPv3 core on the Engine 5 line cards.

For more information on these features, refer to the *Implementing Layer 2 Tunnel Protocol Version 3 on Cisco IOS XR Software* module of the *Cisco IOS XR Virtual Private Network Configuration Guide for the Cisco XR 12000 Series Router, Release 4.0*.

- SPRAS items

- CSCei80028

Updated the following command in the *Cisco IP Addresses and Services Command Reference for the Cisco XR 12000 Series Router, Release 4.0*:

```
show adjacency detail hardware
```

The update adds loq details for remote adjacencies

- CSCsg75249

The command “show controller pse precam hardware 2 lufifo/lureg” has been updated and enhanced to display more information like ACE, VMR corresponding to the profile word. For more information, refer to the *Cisco IP Addresses and Services Command Reference for the Cisco XR 12000 Series Router, Release 4.0*

- CSCsj93430

New command added for setting MRQ counter utilization thresholds.

Added the following new command in the *Cisco QoS Command Reference for the Cisco XR 12000 Series Router, Release 4.0*:

```
hw-module mrq-polling
```

- CSCsx72689

Ingress QoS on MLPPP channelized connections was not accounting Layer 2 overhead properly

Added the following new command in the *Cisco QoS Command Reference for the Cisco XR 12000 Series Router, Release 4.0*:

```
hw-module qos
```

- CSCsy99095

New commands added to switch between “class service rate” or interface.

Added the following new commands in the *Cisco QoS Command Reference for the Cisco XR 12000 Series Router, Release 4.0*:

```
hw-module qos class-rate/if-rate enable location
show qos class-rate/if-rate
```

– CSCsz74901

Added monitoring of fabriq freeQ depletion.

Added the following new commands in the *Cisco QoS Command Reference for the Cisco XR 12000 Series Router, Release 4.0*:

```
show controller sanity
hw-module sanity
```

– CSCsz82405

In the *Upgrading and Downgrading Boothelper and ROM Monitor on Cisco XR 12000 Series Routers* module, added the following note in the “Upgrading or Downgrading ROM Monitor” section:




---

**Note** The upgrade process continues on the card, even if you press Ctrl-C when the upgrade is in progress.

---

## New Hardware Features for the Cisco XR 12000 Series Router

No new hardware features were introduced in Cisco IOS XR Software Release 4.0.0 on the Cisco XR 12000 Series Router.

For detailed information on the shared port adapters (SPAs) and SPA interface processors (SIPs), see the following documents:

- *Cisco XR 12000 Series Router SIP and SPA Hardware Installation Guide*
- *Cisco Interface and Hardware Component Configuration Guide for the Cisco XR 12000 Series Router, Release 4.0*




---

**Note** Contact [gsr-pm@cisco.com](mailto:gsr-pm@cisco.com) for hardware availability.

---

## Important Notes

- **Default timestamp setting**—The timestamp prompt that precedes console output is enabled by default in Cisco IOS XR Release 3.8. To disable the timestamp prompt, use the **no service timestamp** command. For more information, refer to the *Cisco IOS XR System Management Command Reference for the Cisco XR 12000 Series Router*.
- From Cisco IOS XR Software Release 3.6.0, WRED statements are collapsed in 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 **show running config**. 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 the Cisco XR 12000 Series Router* 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
```

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

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

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

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




---

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

---

- **Per-interface Internet Control Message Protocol (ICMP) disable** feature is not supported on the Cisco XR 12000 Series Router.
- **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.





# 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.

This section contains caveats that are generic to the Cisco IOS XR Release 4.0.0 software and those specific to the Cisco XR 12000 Series Router.

## Cisco IOS XR Caveats

The following open caveats apply to Cisco IOS XR Software Release 4.0.0 and are not platform specific:

- **CSCte01589**

**Basic Description:**

xml\_tty\_agent coredump during XML polling

**Symptom:**

The xml\_tty\_agent process will coredump on a DRP card.

**Conditions:**

This symptom occurs when querying the diagnostic xml schema.

**Workaround:**

None.

- **Recovery:**

None needed, the process will restart properly

- **CSCti30460**

**Basic Description:**

length and width not reflected in newly opened vty session

**Symptom:**

length and width size not reflected newly opened vty session instead it take in to effect on already opened vty

**Conditions:**

we may see this issue after configuring length and width config in vty by template

**Workaround:**

None.

**Recovery:**

None.

- **CSCti40614**

**Basic Description:**

4.0.0 :29C: sh tech l2vpn file not able to untar/corrupted

**Symptom:**

1. The file created cannot be untarred properly. Indicates a corrupted file



2. The show tech takes a VERY long time

**Conditions:**

On a large scale system, with show tech l2vpn, it is possible to exceed the max supported tar file size.

**Workaround:**

This was the reason for adding a few new show tech l2vpn options in 4.0:

1. show tech l2vpn [control | platform ]

This option essentially allows the show tech to be either PI specific (control option) or it can be PD specific (platform option)

This essentially split the normal full show tech output in two. This reduces the chance of exceeding the current 2Gig limit for the show tech. It also allow a faster collection of show tech if it is knows in which area the problem exists.

2. show tech l2vpn location 0/0/CPU0

This option collects general system information and information specific to only the slot specified.

This greatly reduces the size of the output and also greatly speeds up the execution of the show tech. This is recommended on large system with lot of card specially Multi chassis configuration.

The source of the problem needs to be pinpointed. In not then this commands can still be executed serially for each cards in the system.

- **CSCth81761**

**Basic Description:**

%ROUTING-BGP-3-NEGCOUNTER msgs after router reload or APS switchover

**Symptom:**

%ROUTING-BGP-3-NEGCOUNTER msgs seen on console

**Conditions:**

The error messages were seen on performing a router reload or during APS switchover

**Workaround:**

None.

- **CSCtg40080**

**Basic Description:**

Show mrib route does not show proper “Flag” output for ExtranetV6

**Symptom:**

Flag field is incorrect in “show mrib route”

**Conditions:**

When you have IPv6 MVPN enabled.

**Workaround:**

There is no work around. It is a show command issue.

**Further Problem Description:**

None.

- **CSCti48713**

**Basic Description:**

SONET\_SDH xml does not bind to correct path for history stats

**Symptom:**

'PM get path data failed : Invalid argument ' message will be displayed on the console

**Conditions:**

This symptom is observed when querying the SONET\_SDH xml schema.

**Workaround:**

None.

**Recovery:**

None.

- **CSCti67148**

**Basic Description:**

Optional task-maps not downloaded as part of exec authorization & Service exec tasks received from the TACACS server are not processed during AAA authorization

**Symptom:**

Command authorization fails:

```
RP/0/RP0/CPU0:router#show int desc
% This command is not authorized
RP/0/RP0/CPU0:router#
```

**Conditions:**

This happens:

- On a router running IOS XR 3.9.2 or 4.0.0. These are the only 2 versions affected. It did not happen before and it's fixed afterwards.
- Tacacs authorization is enabled.
- Router is supposed to retrieve its list of usergroup/taskgroup/task from the tacacs server through a service exec (optional) task configured on the tacacs server.

The problem with this bug is that the service exec tasks received from the tacacs server are not processed during aaa authorization with tacacs. So the user ends up with no task on the router and no command is authorized. Even though the command is permitted on the tacacs server.

**Workaround:**

Instead of using wild cards, explicitly name each package to be activated.

**Recovery:**

The way to make tacacs authorization work in 3.9.2 or 4.0.0 is through a privilege level:

- If privilege level 15 is assigned on the tacacs server, then user will end up with the tasks/commands of the group root-system.
- If privilege level 14 is assigned on the tacacs server, then user will end up with the tasks/commands of the group owner-sdr.
- If a privilege level between 1 and 13 (let's call it X), then we can configure a usergroup 'privX' on the router and the user will inherit the list of tasks of that group. For instance, if we want to have a user with all commands available, we can assign privilege level 13 on the router and configure this usergroup on the router:

```

usergroup priv13
  taskgroup root-system
  taskgroup cisco-support

```

- **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 XR 12000 Series Router

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

- **CSCti81797**

**Basic Description:**

Line protocol is down in POS interface after executing a shut/unshut command on the controller.

**Symptom:**

The POS interface line protocol goes down after executing a shut/unshut command on the controller.

**Conditions:**

Occurs after user executes a shut/unshut command on the controller

**Workaround:**

None.

**Recovery:**

Perform a shut/no shut of the SONET controller after the issue is seen to recover from the issue.

- **CSCti23140**

**Basic Description:**

vpls multicasting is not happening if IPHC configured on core-facing LC

**Symptom:**

VPLS multicast does not function appropriately.

**Conditions:**

This is observed on a Cisco 12000 series router with IPHC configured on same line card slot on which a vpls core facing interface is present.

**Workaround:**

None, do not configure IPHC on the same slot with a core facing SPA

**Recovery:**

None.

- **CSCth07758**

**Basic Description:**

ipv4\_mfwd\_partner process crashed during downgrade from 3.9.1

**Symptom:**

The ipv4\_mfwd\_partner process exits ungracefully.

**Conditions:**

This symptom is observed while downgrading from IOS XR Release 4.0.0 to Release 3.9.1.

**Workaround:**

None.

**Recovery:**

Recovery action is not needed here. The process will recover on its own with no impact to traffic.

- **CSCtf48225**

**Basic Description:**

XR fdiags Superfish TFIA To FFIA Fabric Pkt Test fails on 12404E chassis

**Symptom:**

XR fdiags Superfish TFIA To FFIA Fabric Pkt Test fails on 12404E chassis

**Conditions:**

No service impact.

**Workaround:**

None.

**Recovery:**

None.

## 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](http://www.cisco.com/web/Cisco_IOS_XR_Software/index.html)

## Troubleshooting

For information on troubleshooting Cisco IOS XR software, refer to the *Cisco IOS XR Troubleshooting Guide for the Cisco XR 12000 Series Router* and the *Cisco IOS XR Getting Started Guide for the Cisco XR 12000 Series Router*.

## Related Documentation

The most current Cisco XR 12000 Series Router hardware documentation is located at the following URL:

[http://www.cisco.com/en/US/products/ps6342/prod\\_installation\\_guides\\_list.html](http://www.cisco.com/en/US/products/ps6342/prod_installation_guides_list.html)

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 4.0* for a list of Cisco IOS XR Release 4.0.0 software documentation.

The most current Cisco XR 12000 Series Router software documentation is located at the following URL:

[http://www.cisco.com/en/US/products/ps6342/tsd\\_products\\_support\\_series\\_home.html](http://www.cisco.com/en/US/products/ps6342/tsd_products_support_series_home.html)

# 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>.

Subscribe to *What's New in Cisco Product Documentation*, which lists all new and revised Cisco technical documentation, as an RSS feed and deliver content directly to your desktop using a reader application. The RSS feeds are a free service.

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

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: [www.cisco.com/go/trademarks](http://www.cisco.com/go/trademarks). Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

© 2010 Cisco Systems, Inc. All rights reserved.