



# Release Notes for Cisco XR 12000 Series Router for Cisco IOS XR Software Release 4.1.1

---

February 6, 2013

Cisco IOS XR Software Release 4.1.1

Text Part Number OL-25406-01

These release notes describe the features provided in the Cisco IOS XR Software Release 4.1.1 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 4.1.1, see the [“Important Notes” section on page 29](#).

---

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 4.1.1, 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)

## Contents

These release notes contain the following sections:

- [Introduction, page 2](#)
- [System Requirements, page 3](#)
- [Determining Your Software Version, page 16](#)
- [New Features in Cisco IOS XR Software Release 4.1.1, page 19](#)



---

**Americas Headquarters:**

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

- [Important Notes, page 29](#)
- [Minimum Flash Disk Requirements When Upgrading to Release 4.1.1, page 32](#)
- [Caveats, page 32](#)
- [Upgrading Cisco IOS XR Software, page 35](#)
- [Troubleshooting, page 35](#)
- [Related Documentation, page 35](#)
- [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 4.1.1, see the [“New Features in Cisco IOS XR Software Release 4.1.1” section on page 19](#) in this document.

## System Requirements

This section describes the system requirements for Cisco IOS XR Software Release 4.1.1 supported on the Cisco XR 12000 Series Router. The system requirements include the following information:

- [Feature Set Table, page 3](#)
- [Memory Requirements, page 6](#)
- [Hardware Supported, page 6](#)
- [Software Compatibility, page 11](#)
- [Other Firmware Support, page 14](#)

To determine the software versions or levels of your current system, see the [“Determining Your Software Version” section on page 16](#).

## 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 4.1.1 features.

[Table 1](#) lists the Cisco IOS XR software feature set matrix (PIE files) and associated filenames available for Cisco IOS XR Software Release 4.1.1, supported on the Cisco XR 12000 Series Router.

**Table 1** *Cisco XR 12000 Series Router Supported Feature Set (Cisco IOS XR Software Release 4.1.1 PIE Files)*

Feature Set	Filename	Description
<b>Composite Package</b>		
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini.pie-4.1.1	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-4.1.1	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-4.1.1	CORBA <sup>2</sup> agent, XML Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	c12k-mpls.pie-4.1.1	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-4.1.1	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-4.1.1	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-4.1.1	Support for booting the Standby RP on a Cisco XR 12000 Series Router.
Cisco IOS XR FPD Package	c12k-fpd.pie-4.1.1	Firmware for shared port adapters (SPA) and for fixed port line cards supported in Cisco IOS XR.

**Table 1** *Cisco XR 12000 Series Router Supported Feature Set (Cisco IOS XR Software Release 4.1.1 PIE Files) (continued)*

Feature Set	Filename	Description
Cisco IOS XR Diagnostic Package	c12k-diags.pie-4.1.1	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	c12k-doc.pie-4.1.1	.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 4.1.1 TAR Files)*

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	XR12000-iosxr-4.1.1.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-k9-4.1.1.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 4.1.1 consist of the following:

- 2-GB route memory on performance route processor 2 (PRP-2)  
However, a 4-GB route memory on PRP-2 is required if BGP is enabled or other applications are running on the router.
- 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 16](#).

**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
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

**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>
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)

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 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
1-Port Channelized OC-3 ATM CEoP SPA	SPA-1CHOC3-CE-ATM	4.1.1
<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
Cisco 1-Port 10-Gigabit Ethernet IPoDWDM Shared Port Adapter	SPA-1X10GE-L-ITUC	4.1.1
<b>Cisco XR 12000 Series Router T/1T3 and E1/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
Cisco 8-Port Channelized T1/E1 Shared Port Adapter	SPA-8XCHT1/E1	3.6
2-Port Channelized T3/E3 ATM CEoP SPA	SPA-2CHT3-CE-ATM	3.7
24-Port Channelized T1/E1 ATM CEoP SPA	SPA-24CHT1-CE-ATM	4.0.1

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

Component	Part Number	Support from Version
<b>Cisco XR 12000 Series Router Channelized Line Cards</b>		
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 4.1.1 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 14.

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

```
RP/0/6/CPU0:router(admin)# show fpd package
Thu Jul 28 04:21:26.115 PDT
```

```
=====
                                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	1.02	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 0.100  0.200  0.100  0.100	SPA T3 Subrate FPGA	spa	fpga2	0.11	0.0	
	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.0	
	SPA I/O FPGA	spa	fpga1	2.08	0.0	
	SPA ROMMON	spa	rommon	2.12	0.0	
SPA-2XCT3/DS0 0.100  0.200  0.100  0.100	SPA T3 Subrate FPGA	spa	fpga2	0.11	0.0	
	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.0	
	SPA I/O FPGA	spa	fpga1	2.08	0.0	
	SPA ROMMON	spa	rommon	2.12	0.0	
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-24CHT1-CE-ATM	SPA T3 Subrate FPGA	spa	fpga2	1.10	0.0	1.0
	SPA I/O FPGA	spa	fpga1	2.32	0.0	1.0
	SPA ROMMON	spa	rommon	1.03	0.0	1.0
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-1CHOC3-CE-ATM	SPA OC3 Subrate FPGA	spa	fpga2	1.00	0.0	2.0
	SPA I/O FPGA	spa	fpga1	2.23	0.0	2.0
	SPA ROMMON	spa	rommon	1.04	0.0	2.0

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 0.49	SPA I/O FPGA	spa fpga2	1.00	0.0	
	SPA I/O FPGA	spa fpga3	1.00	0.0	
	SPA I/O FPGA	spa fpga1	1.36	0.0	
	SPA ROMMON	spa rommon	2.02	0.0	
SPA-1XCHOC12/DS0 0.49	SPA I/O FPGA	spa fpga2	1.00	0.0	
	SPA I/O FPGA	spa fpga1	1.36	0.0	
	SPA ROMMON	spa rommon	2.02	0.0	
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 0.140	SPA I/O FPGA	spa fpga1	2.08	0.0	0.0
	SPA ROMMON	spa rommon	2.12	0.0	
SPA-OC192POS-XFP	SPA FPGA swv1.2	spa fpga1	1.02	0.0	0.0
	SPA FPGA swv1.2 hwr2	spa fpga1	1.02	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-4XOC48POS/RPR	SPA FPGA swv1.0	spa fpga1	1.00	0.0	0.0
SPA-1XTENGE-XFP	SPA FPGA swv1.11	spa fpga1	1.11	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-1X10GE-L-IT	SPA FPGA swv1.0	spa fpga1	1.00	0.0	0.0
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

## 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 4.7, ROM version 4.7
- ROM Monitor version 19.0
- Fabric Downloader - RAM version 10.1 , ROM version 10.1 (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 4.7, ROM version 4.7
- ROM Monitor version 19.0
- Fabric Downloader - RAM version 6.1, ROM version 6.1 (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 4.7, ROM version 4.7
- ROM Monitor version 1.24

For Performance Route Processor 3 (PRP-3):

- Maintenance Bus (MBUS) Agent Software-RAM version 4.7, ROM version 4.7
- 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 Boothelper version to support Release 4.1.1:

- Cisco IOS image—12.0(32)S
- Cisco IOS Boothelper—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/0/6/CPU0:router#show version
Tue Jul 26 01:17:59.268 PDT
```

```
Cisco IOS XR Software, Version 4.1.1[Default]
Copyright (c) 2011 by Cisco Systems, Inc.
```

```
ROM: System Bootstrap, Version 12.00(20100127:230559) [skumarss-33s 1.24] RELEASE SOFTWARE
Copyright (c) 1994-2010 by cisco Systems, Inc.
```

```
MSE-PE1 uptime is 1 hour, 30 minutes
System image file is "disk0:c12k-os-mbi-4.1.1.CSCt145563-1.0.0/mbiprp-rp.vm"
```

```
cisco 12416/PRP (7457) processor with 3670016K bytes of memory.
7457 processor at 1266Mhz, Revision 1.2
Cisco 12416 320 Gbps
```

```
1 4 Port ISE Packet Over SONET OC-12c/STM-4 Controller (4 POS)
6 Cisco 12000 Series SPA Interface Processor-601/501/401
2 Cisco 12000 Series - Multi-Service Blade Controllers
2 1 Port ISE Packet Over SONET OC-48c/STM-16 Controllers (2 POS)
1 Cisco 12000 4 Port Gigabit Ethernet Controller (4 GigabitEthernet)
2 Cisco 12000 Series Performance Route Processors
1 1 Port ISE OC12 Channelized to DS1/E1 Single Mode/IR LC connector Controller (1 SONET)
6 Management Ethernet
4 MgmtMultilink
2 TenGigE
85 T3
53 Serial network interface(s)
21 SONET/SDH
25 PLIM_QOS
194 Multilink network interface(s)
840 T1
909 Serial network interface(s)
19 GigabitEthernet/IEEE 802.3 interface(s)
8 FastEthernet
16 Packet over SONET/SDH
2 MgmtIMA
7 Asynchronous Transfer Mode
1 Asynchronous Transfer Mode
1018k bytes of non-volatile configuration memory.
1642176k bytes of disk0: (Sector size 512 bytes).
1642176k bytes of disk1: (Sector size 512 bytes).
65536k bytes of Flash internal SIMM (Sector size 256k).
```

```
Boot device on node 0/0/CPU0 is mem:
Package active on node 0/0/CPU0:
iosxr-ce, V 4.1.1[00], Cisco Systems, at disk0:iosxr-ce-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie
```

```
c12k-fwding, V 4.1.1[00], Cisco Systems, at disk0:c12k-fwding-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie
```



```

c12k-fwding-4.1.1.CSCt145563, V 1.0.0[SMU], Cisco Systems, at
disk0:c12k-fwding-4.1.1.CSCt145563-1.0.0
  Built on Mon Jul 25 08:01:34 PDT 2011
  By iox40 in /auto/smu_archive2/SMU_BLD_WS/r41x_164627_CSCt145563_110725060231 for pie

c12k-ce, V 4.1.1[00], Cisco Systems, at disk0:c12k-ce-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-mpls, V 4.1.1[00], Cisco Systems, at disk0:iosxr-mpls-4.1.1
  Built on Fri Jul 22 22:34:48 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-mcast, V 4.1.1[00], Cisco Systems, at disk0:iosxr-mcast-4.1.1
  Built on Fri Jul 22 22:34:55 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-routing, V 4.1.1[00], Cisco Systems, at disk0:iosxr-routing-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-infra, V 4.1.1[00], Cisco Systems, at disk0:iosxr-infra-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-fwding, V 4.1.1[00], Cisco Systems, at disk0:iosxr-fwding-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-diags, V 4.1.1[00], Cisco Systems, at disk0:iosxr-diags-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-fpd-sup, V 4.1.1[00], Cisco Systems, at disk0:c12k-fpd-sup-4.1.1
  Built on Fri Jul 22 23:04:06 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-mcast-sup, V 4.1.1[00], Cisco Systems, at disk0:c12k-mcast-sup-4.1.1
  Built on Fri Jul 22 22:34:55 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-base, V 4.1.1[00], Cisco Systems, at disk0:c12k-base-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-base-4.1.1.CSCt145563, V 1.0.0[SMU], Cisco Systems, at
disk0:c12k-base-4.1.1.CSCt145563-1.0.0
  Built on Mon Jul 25 08:01:34 PDT 2011
  By iox40 in /auto/smu_archive2/SMU_BLD_WS/r41x_164627_CSCt145563_110725060231 for pie

c12k-os-mbi, V 4.1.1[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.1
  Built on Fri Jul 22 22:36:40 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-os-mbi-4.1.1.CSCt145563, V 1.0.0[SMU], Cisco Systems, at
disk0:c12k-os-mbi-4.1.1.CSCt145563-1.0.0
  Built on Mon Jul 25 08:03:09 PDT 2011
  By iox40 in /auto/smu_archive2/SMU_BLD_WS/r41x_164627_CSCt145563_110725060231 for pie

Boot device on node 0/1/CPU0 is mem:
Package active on node 0/1/CPU0:
iosxr-ce, V 4.1.1[00], Cisco Systems, at disk0:iosxr-ce-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011

```

```

By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-fwding, V 4.1.1[00], Cisco Systems, at disk0:c12k-fwding-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-fwding-4.1.1.CSctl45563, V 1.0.0[SMU], Cisco Systems, at
disk0:c12k-fwding-4.1.1.CSctl45563-1.0.0
  Built on Mon Jul 25 08:01:34 PDT 2011
  By iox40 in /auto/smu_archive2/SMU_BLD_WS/r41x_164627_CSctl45563_110725060231 for pie

c12k-ce, V 4.1.1[00], Cisco Systems, at disk0:c12k-ce-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-mpls, V 4.1.1[00], Cisco Systems, at disk0:iosxr-mpls-4.1.1
  Built on Fri Jul 22 22:34:48 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-mcast, V 4.1.1[00], Cisco Systems, at disk0:iosxr-mcast-4.1.1
  Built on Fri Jul 22 22:34:55 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-routing, V 4.1.1[00], Cisco Systems, at disk0:iosxr-routing-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-infra, V 4.1.1[00], Cisco Systems, at disk0:iosxr-infra-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-fwding, V 4.1.1[00], Cisco Systems, at disk0:iosxr-fwding-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

iosxr-diags, V 4.1.1[00], Cisco Systems, at disk0:iosxr-diags-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-fpd-suppl, V 4.1.1[00], Cisco Systems, at disk0:c12k-fpd-suppl-4.1.1
  Built on Fri Jul 22 23:04:06 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-mcast-suppl, V 4.1.1[00], Cisco Systems, at disk0:c12k-mcast-suppl-4.1.1
  Built on Fri Jul 22 22:34:55 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-base, V 4.1.1[00], Cisco Systems, at disk0:c12k-base-4.1.1
  Built on Fri Jul 22 22:35:18 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

c12k-base-4.1.1.CSctl45563, V 1.0.0[SMU], Cisco Systems, at
disk0:c12k-base-4.1.1.CSctl45563-1.0.0
  Built on Mon Jul 25 08:01:34 PDT 2011
  By iox40 in /auto/smu_archive2/SMU_BLD_WS/r41x_164627_CSctl45563_110725060231 for pie

c12k-os-mpi, V 4.1.1[00], Cisco Systems, at disk0:c12k-os-mpi-4.1.1
  Built on Fri Jul 22 22:36:40 PDT 2011
  By iox-bld2 in /auto/srcarchive5/production/4.1.1/all/workspace for pie

```

```
c12k-os-mpi-4.1.1.CSCt145563, V 1.0.0[SMU], Cisco Systems, at
disk0:c12k-os-mpi-4.1.1.CSCt145563-1.0.0
Built on Mon Jul 25 08:03:09 PDT 2011
By iox40 in /auto/smu_archive2/SMU_BLD_WS/r41x_164627_CSCt145563_110725060231 for pie
```

## New Features in Cisco IOS XR Software Release 4.1.1

The following sections contain information on new features and enhancements in Cisco IOS XR Software Release 4.1.1:

- [New Software Features on the Cisco XR 12000 Series Router, page 19](#)
- [New Hardware Features on the Cisco XR 12000 Series Router, page 29](#)



### Note

Cisco Session Border Controller (SBC) is not supported on any platform in Cisco IOS XR Software Release 4.1.1. Cisco IOS XR Software Release 3.7 is the last release that supports SBC.

## New Software Features on the Cisco XR 12000 Series Router

This section contains the new software features that were introduced in Cisco IOS XR Software Release 4.1.1 on the Cisco XR 12000 Series Router platform:

### Event Dampening

The restart-penalty option was added to the **dampening** command to avoid unnecessary re-convergence.

In a MPLS-TE environment, sometimes after boot up, the head-end router fails to select the first explicit-path option, and the second path-option is used. The goal of the behavior after bootup is to establish the TE tunnels immediately. But, unnecessary re-optimization is required to use the first path.

If the dampening restart-option is configured on the backup interface, the IGP adjacencies on the primary interface come up first. And, the first path-option is always picked after reboot.

**dampening** [*<half-life>*] [*<reuse>*] [*<suppress>*] [*<max suppress>*] [*<restart penalty>*]

### Syntax Description

<i>restart-penalty</i>	Penalty to applied to the interface when it comes up for the first time after the router reloads. The configurable range is from 1 to 20000 penalties. The default is 2000 penalties. This argument is not required for any other configurations.
------------------------	---

To manually configure the timer for the restart-penalty argument, the value for all other arguments must be manually entered.

For more information about the other optional arguments of the **dampening** command, refer to the Global Interface Commands on the Cisco IOS XR Software section of the *Cisco IOS XR Interface and Hardware Component Command Reference for the Cisco XR 12000 Series Router*.

## BGP Accept Own

This feature allows movement from a PE-Based service provisioning model to a centralized router reflector (RR)-based service provisioning model. With this feature, you can define route TO service-VRF mapping within a centralized route reflector and then propagate this information down to all the PE clients of that RR. Without this feature, you would define the route TO service VRF mapping in all PE devices, thereby incurring a high configuration overhead, which could result in more errors.

This feature enables a route reflector (RR) to modify the Route Target (RT) list of a VPN route that is distributed by the RR, enabling the RR to control how a route originated within one VRF is imported into other VRFs.

For this feature, the RR adds the accept-own community and modifies the set of RTs before sending this new accept-own route to the attached PEs, including the originator, possibly through intervening RRs. The route is modified through RPL, for example:

```
route-policy rrl-ao-1
  set extcommunity rt (100:1, 100:2)
  set community (10:1, accept-own)
end-policy
```

The accept-own community keyword is new for this feature. You can modify these attributes through inbound or outbound neighbor policy.

## BFD IPv6 Support

BFD support is extended for IPv6 addresses on the Cisco IOS XR 12000 Series Router. This includes support for static, BGP, and OSPFv3 clients. This feature also supports BFD V6 over VRF interfaces and link bundles (through inheritance mode).

The following example shows BFD IPv6 Protocol configurations. They are to be configured under protocol configuration submode of a specific address family type. It is up to those processes to request BFD of either IPv4 sessions or IPv6 sessions accordingly.

```
RP/0/0/CPU0:router(config-ospfv3)# router ospfv3 100
RP/0/0/CPU0:router(config-ospfv3)# address-family ipv6
RP/0/0/CPU0:router(config-ospfv3)# bfd fast-detect [disable]
RP/0/0/CPU0:router(config-ospfv3)# bfd minimum-interval <15-30000>
RP/0/0/CPU0:router(config-ospfv3)# bfd multiplier <2-50>
```

The following echo mode configurations associate interfaces to be under certain BFD mode (for example, async or echo). Because this is related to interfaces and not with address family types, these configurations do not change. When an interface is operating under certain BFD mode, all sessions for that interface, regardless of address family type, operate under that mode.

```
RP/0/0/CPU0:router(config-bfd)# echo disable
RP/0/0/CPU0:router(config-bfd-if)# echo [disable]
```

For more information about BFD, refer to the Configuring Bidirectional Forwarding Detection on Cisco IOS XR Software section of the *Cisco IOS XR Interface and Hardware Component Configuration Guide for the Cisco XR 12000 Series Router*.

## Label Switched Multicast (LSM) Multicast Label Distribution Protocol (mLDP) based Multicast VPN (mVPN) Support

Label Switch Multicast (LSM) is MPLS technology extensions to support multicast using label encapsulation. CRS next generation MVPN is based on Multicast Label Distribution Protocol (mLDP), which can be used to build P2MP and MP2MP LSPs through a MPLS network. These LSPs can be used for transporting both IPv4 and IPv6 multicast packets, either in the global table or VPN context. mLDP is complementary to the Cisco LSM strategy.

For more information about this feature, refer to the Implementing Layer-3 Multicast Routing on Cisco IOS XR Software section of the *Cisco IOS XR Software Multicast Configuration Guide for the Cisco XR 12000 Series Router*.

## Pseudowire Headend

The Pseudowire Headend (PWHE) feature allows you to replace a two node solution with a single node.

Pseudowires (PWs) enable payloads to be transparently carried across IP/MPLS packet-switched networks (PSNs). Service providers are now extending PW connectivity into the access and aggregation regions of their networks. PWs are regarded as simple and manageable lightweight tunnels for returning customer traffic into core networks.

The PWHE feature provides a Layer 3 (L3) virtual interface representation of a PW on an service provider edge (PE), that allows the backhaul of customer packets over PWs and the application of L3 features, such as QoS (for example: policing and shaping), and access lists (ACLs) on customer packets on the PW.

### PWHE Configuration Restrictions

These are the configuration restrictions for PWHE:

- Up to 3600 PWHE interfaces per box (only pw-ether).
- Up to eight interface lists per peer.
- Up to four L3 links per interface list.
- VLAN ID (tag-impose) can be configured only in xconnects which have pw-ether interfaces.
- VLAN ID (tag-impose) can only be configured under VC type 4 pw-ether interfaces.
- Interface lists can accept POS, GigabitEthernet, TenGigabitEthernet; other interfaces are rejected.
- No support for features such as pseudowire redundancy, preferred path, local switching or L2TP for xconnects configured with PWHE.
- Address family, Cisco Discovery Protocol (CDP) and MPLS configurations are not allowed on PWHE interfaces.

### Configuring PWHE Interfaces

Perform this task to configure PWHE interfaces.

#### Summary Steps

1. **configure**
2. **interface pw-ether** *id*
3. **attach generic-interface-list** *interface\_list\_name*

4. **end**  
or  
**commit**

#### Detailed Steps

	Command or Action	Purpose
<b>Step 1</b>	<b>configure</b>  <b>Example:</b> RP/0/RSP0/CPU0:router# configure RP/0/RSP0/CPU0:router(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>interface pw-ether id</b>  <b>Example:</b> RP/0/0/CPU0:router(config)# interface pw-ether <id>	Configures the PWHE interface and enters the interface configuration mode.
<b>Step 3</b>	<b>attach generic-interface-list interface_list_name</b>  <b>Example:</b> RP/0/0/CPU0:router(config-if)# attach generic-interface-list interfacelist1	Attaches the interface to a specified interface list.
<b>Step 4</b>	<b>end</b> or <b>commit</b>  <b>Example:</b> RP/0/0/CPU0:router(config-if)# end or RP/0/0/CPU0:router(config-if)# commit	Saves configuration changes. <ul style="list-style-type: none"><li>When you issue the <b>end</b> command, the system prompts you to commit changes: <pre>Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]:</pre><ul style="list-style-type: none"><li>Entering <b>yes</b> saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.</li><li>Entering <b>no</b> exits the configuration session and returns the router to EXEC mode without committing the configuration changes.</li><li>Entering <b>cancel</b> leaves the router in the current configuration session without exiting or committing the configuration changes.</li></ul></li><li>Use the <b>commit</b> command to save the configuration changes to the running configuration file and remain within the configuration session.</li></ul>

#### Restrictions for Configuring PWHE Interfaces

These are the restrictions for configuring PWHE interfaces:

- Neighbor and pw-ID pair must be unique in L2VPN.
- pw-ether interfaces have to be VC type 4 or 5.

- The VLAN ID is allowed only if VC type is 4.
- MPLS protocols (MPLS-TE, LDP, RSVP) cannot be configured on PW-HE.
- No interface list configuration is accepted on non-PWHE platforms.

## Configuring PWHE Interface Parameters

Perform this task to configure PWHE interface parameters.

### Summary Steps

1. **configure**
2. **interface pw-ether** *id*
3. **attach generic-interface-list** *interface\_list\_name*
4. **l2overhead** *bytes*
5. **load-interval** *seconds*
6. **dampening** *decay-life*
7. **logging events link-status**
8. **mac-address** *MAC address*
9. **mtu** *interface\_MTU*
10. **end**  
or  
**commit**

### Detailed Steps

	Command or Action	Purpose
<b>Step 1</b>	<b>configure</b>  <b>Example:</b> RP/0/0/CPU0:router# configure RP/0/0/CPU0:router(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>interface pw-ether</b> <i>id</i>  <b>Example:</b> RP/0/0/CPU0:router(config)# interface pw-ether <id>	Configures the PWHE interface and enters the interface configuration mode.
<b>Step 3</b>	<b>attach generic-interface-list</b> <i>interface_list_name</i>  <b>Example:</b> RP/0/0/CPU0:router(config-if)# attach generic-interface-list interfacelist1	Attaches the interface to a specified interface list.

	Command or Action	Purpose
<b>Step 4</b>	<b>l2overhead</b> <i>bytes</i>  <b>Example:</b> RP/0/0/CPU0:router(config-if)#l2overhead 20	Sets layer 2 overhead size.
<b>Step 5</b>	<b>load-interval</b> <i>seconds</i>  <b>Example:</b> RP/0/0/CPU0:router(config-if)#load-interval 90	Specifies interval, in seconds, for load calculation for an interface. The number of seconds: <ul style="list-style-type: none"> <li>• Can be set to 0 [0 disables load calculation]</li> <li>• If not 0, interval must be specified in multiples of 30 between 30 and 600.</li> </ul>
<b>Step 6</b>	<b>dampening</b> <i>decay-life</i>  <b>Example:</b> RP/0/0/CPU0:router(config-if)#dampening 10	Configures state dampening on the given interface (in minutes).
<b>Step 7</b>	<b>logging events link-status</b>  <b>Example:</b> RP/0/0/CPU0:router(config-if)#logging events link-status	Configures per interface logging.
<b>Step 8</b>	<b>mac-address</b> <i>MAC address</i>  <b>Example:</b> RP/0/0/CPU0:router(config-if)#mac-address aaaa.bbbb.cccc	Sets the MAC address (xxxx.xxxx.xxxx) on an interface.



	Command or Action	Purpose
<b>Step 9</b>	<code>mtu interface_MTU</code>  <b>Example:</b> <code>RP/0/0/CPU0:router(config-if)#mtu 128</code>	Sets the MTU on an interface.
<b>Step 10</b>	<code>end</code> or <code>commit</code>  <b>Example:</b> <code>RP/0/0/CPU0:router(config-if)# end</code> or <code>RP/0/0/CPU0:router(config-if)# commit</code>	Saves configuration changes. <ul style="list-style-type: none"> <li>When you issue the <b>end</b> command, the system prompts you to commit changes:  Uncommitted changes found, commit them before exiting(yes/no/cancel)?  [cancel]: <ul style="list-style-type: none"> <li>Entering <b>yes</b> saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.</li> <li>Entering <b>no</b> exits the configuration session and returns the router to EXEC mode without committing the configuration changes.</li> <li>Entering <b>cancel</b> leaves the router in the current configuration session without exiting or committing the configuration changes.</li> </ul> </li> <li>Use the <b>commit</b> command to save the configuration changes to the running configuration file and remain within the configuration session.</li> </ul>

## Configuring PWHE Cross-connect

Perform this task to configure PWHE cross-connects.

### Summary Steps

- configure**
- l2vpn**
- xconnect group** *group-name*
- p2p** *xconnect-name*
- interface pw-ether** *id*
- neighbor** *A.B.C.D* **pw-id** *value*
- pw-class** *class-name*
- end**  
or  
**commit**

## Detailed Steps

	Command or Action	Purpose
Step 1	<b>configure</b>  <b>Example:</b> RP/0/0/CPU0:router# configure RP/0/0/CPU0:router(config)#	Enters global configuration mode.
Step 2	<b>l2vpn</b>  <b>Example:</b> RP/0/0/CPU0:router(config)# l2vpn	Enters Layer 2 VPN configuration mode.
Step 3	<b>xconnect group group-name</b>  <b>Example:</b> RP/0/0/CPU0:router(config-l2vpn)# xconnect group MS-PW1	Configures a cross-connect group name using a free-format 32-character string.
Step 4	<b>p2p xconnect-name</b>  <b>Example:</b> RP/0/0/CPU0:router(config-l2vpn-xc)# p2p ms-pw1	Enters P2P configuration submode.
Step 5	<b>interface pw-ether id</b>  <b>Example:</b> RP/0/0/CPU0:router(config-l2vpn-xc-p2p)# interface pw-ether 100	Configures the PWHE interface.
Step 6	<b>neighbor A.B.C.D pw-id value</b>  <b>Example:</b> RP/0/0/CPU0:router(config-l2vpn-xc-p2p) # neighbor 10.165.200.25 pw-id 100	Configures a pseudowire for a cross-connect. The IP address is that of the corresponding PE node. The <b>pw-id</b> must match the <b>pw-id</b> of the PE node.

	Command or Action	Purpose
<b>Step 7</b>	<p><b>pw-class</b> <i>class-name</i></p> <p><b>Example:</b>  RP/0/0/CPU0:router(config-l2vpn-xc-p2p-pw)# pw-class dynamic_mpls</p>	Enters pseudowire class submode, allowing you to define a pseudowire class template.
<b>Step 8</b>	<p><b>end</b> or <b>commit</b></p> <p><b>Example:</b>  RP/0/0/CPU0:router(config-if)# end or  RP/0/0/CPU0:router(config-if)# commit</p>	<p>Saves configuration changes.</p> <ul style="list-style-type: none"> <li>When you issue the <b>end</b> command, the system prompts you to commit changes:  <pre>Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:</pre> <ul style="list-style-type: none"> <li>Entering <b>yes</b> saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.</li> <li>Entering <b>no</b> exits the configuration session and returns the router to EXEC mode without committing the configuration changes.</li> <li>Entering <b>cancel</b> leaves the router in the current configuration session without exiting or committing the configuration changes.</li> </ul> </li> <li>Use the <b>commit</b> command to save the configuration changes to the running configuration file and remain within the configuration session.</li> </ul>

## Pseudowire Redundancy

This feature is supported for an AToM instance on the Cisco XR 12000 Series Router.

For more information, refer to the Implementing Virtual Private LAN Services section of the *Cisco IOS XR Virtual Private Network Configuration Guide for the Cisco XR 12000 Series*.

## TE Auto-tunnel Mesh

This feature introduces dynamically generated tunnel interfaces to reduce config scale. Rather than configuring each tunnel interface under LDP, you can configure only mesh groups in LDP. LDP dynamically learns the tunnel interfaces belonging to each auto-tunnel mesh group. It minimizes both the initial configuration and tunnels' addition that results from network growth.

Each of these dynamically learned tunnel interfaces are treated exactly the same as if it was configured under LDP.

The following example shows how to configure the auto-tunnel mesh unused timer value:

```
router(config)# mpls traffic-eng
router(config-mpls-te)# auto-tunnel mesh
router(config-te-auto-mesh)# timers removal unused <0-10080>
```

The unused timer value is in minute. Zero (0) means disable the timer. The unused destinations are never removed.

The following example shows how to configure an auto-tunnel mesh group:

```
router(config)# mpls traffic-eng
router(config-mpls-te)# auto-tunnel mesh
router(config-te-auto-mesh)# group <0-4294967295>
router(config-te-mesh-group)# disable
router(config-te-mesh-group)# destination-list dl-30
router(config-te-mesh-group)# attribute-set auto-mesh am-30
```

The following example shows sample output for the attribute-set:

```
router# show mpls traffic-eng attribute-set [auto-mesh [attribute-set name]]
[private]
Attribute Set Name: am-30 (Type: auto-mesh)
  Bandwidth: 100 kbps (CT0)
  Affinity: 0x0/0xffff
  Priority: 7 7 (Default)
  AutoRoute Announce: Disabled
  Auto-bw: Disabled
  Fast Reroute: Enabled, Protection Desired: Any
  Record-route: Disabled
  Logging: insufficient-bw, reroute, reoptimize, state,
  List of Mesh Groups (count 1)
    30
  List of tunnel IDs (count 4)
    40004,40005,40006,40007
```

The following example show a summary of the auto-tunnel mesh group.

```
router# show mpls traffic-eng auto-tunnel mesh [group_id] [summary] [private]
Auto-tunnel Mesh Global Configuration:
  Unused removal timeout: 1h 0m 0s
  Configured tunnel number range: 40000-40500

Auto-tunnel Mesh Groups Summary:
  Mesh Groups count: 1
  Mesh Groups Destinations count: 4
  Mesh Groups Tunnels count:
    4 created, 4 up, 0 down, 4 FRR enabled
Mesh Group: 30 (4 Destinations)
  Status: Enabled
  Destination-list: dl-30
  Attribute-set: am-30
  Recreate timer: Not running
```

Destination	Tunnel ID	State	Unused timer
1.1.1.1	40004	up	Not running
3.3.3.3	40005	up	Not running
11.11.1.1	40006	up	Not running
33.33.1.1	40007	up	Not running

```

Displayed 4 tunnels, 4 up, 0 down, 4 FRR enabled

Auto-mesh Cumulative Counters:
  Last cleared: Wed Jun  2 17:05:35 2010 (5d02h ago)
                        Total
Created:                4
Connected:              4
Removed (unused):       0
Removed (in use):       0
Range exceeded:         0
```

## ICMPv6 Source Selection Knobs

**ICMPv6 Source Selection**—This feature allows for flexible source IP address selection in the Internet Control Message Protocol (ICMP) response packet in response to a failure.

The following command is introduced in this release to support this feature:

**icmp [ipv4 | ipv6] source [ vrf | rfc]**

- icmp ipv6 source vrf

This policy selects the source address corresponding to strict vrf in outgoing IPv6 ICMP packets.

- icmp ipv6 source rfc

This policy selects the source address corresponding to RFC 3484 in outgoing IPv6 ICMP packets.

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

The following new hardware features were introduced in Cisco IOS XR Software Release 4.1.1 on the Cisco XR 12000 Series Router platform:

- 1-Port 10GE IPoDWDM SPA
- 1-Port Channelized OC-3 ATM CCoP SPA

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*



**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
!
end
```

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-4OC-3-POS-SM	4 Port Packet Over SONET OC-3c/STM-1	80
4OC3X/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.
- Enabling the Lawful Interface feature triggers the L2-PRECAM-2-HW\_RESOURCE\_FAILURE message on Engine-3 linecards. This error reflects that your configuration has used up all available look-up registers (LUREGs).

There is no direct workaround for this issue as its a hardware limitation. Only way to recover from this issue is to reduce feature scale. You need to identify the features which use LUREG at PreCAM1 and remove one or more of the features depending on LUREG requirements of the feature being added.

- **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.
- **Disable/Enable RSVP Message Checksum** Starting with Cisco IOS XR Software Release 4.0.2, RSVP will, by default, compute and set the checksum field in all outgoing RSVP messages. Also, RSVP will verify the checksum field on all RSVP messages received to insure RSVP message integrity.

A CLI is provided to override this Cisco IOS XR Software Release 4.0.2 default behavior and go back to pre Cisco IOS XR Software Release 4.0.2 behavior such that RSVP neither computes/sets the RSVP checksum on outgoing RSVP messages, nor verifies the checksum on received RSVP messages. The command to execute to revert to the pre-Cisco IOS XR Software Release 4.0.2 behavior is:

```
router(config)# rsvp signalling checksum disable
```

**Note**

When the `rsvp signalling checksum disable` command is configured, RSVP sets a zero checksum in all outgoing RSVP messages, and ignores the checksum field on all received RSVP incoming messages.

- For Cisco IOS XR software Release 4.0.0 and above the **hw-module location <LOC> reload warm** command has been disabled. This means that the warm reload feature has been disabled.

## Minimum Flash Disk Requirements When Upgrading to Release 4.1.1

Cisco IOS XR Software Release 4.1.1 requires a 2-GB Flash Disk as a minimum. If your 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 4.1.1. The PCMCIA 1-GB Flash Disk was the default size for the Cisco XR 12000 Series Router running Cisco IOS XR Software Release 3.6 and earlier.

In Cisco IOS XR Software Release 3.6 and later releases, disk partitioning is supported. Partitioning of a 2-GB disk is possible but not required. Partitioning of a 4-GB disk is required.

A 4-GB Flash Disk can be installed instead of the 2-GB for greater disk storage.

To upgrade from a 1-GB flash disk to a 2-GB or greater flash disk, refer to the *Flash Disk Upgrade Tasks* link on the following Cisco XR 12000 Series Router Installation and Upgrade 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)

## 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 4.1.1 software and those specific to the Cisco XR 12000 Series Router.

### Cisco IOS XR Caveats

- CSCto72695**

**Basic Description:**

RR sending full vpn table to PE though no route-refresh from PE.

**Symptom:**

RR sends a full vpn table although RT Constraint is configured between RR and PE.

On the RR, the "show bgp neighbor" counters for advertised prefixes increment correspondingly to reflect a large number of prefixes advertised to PE.



**Conditions:**

This issue occurs when a VRF on the PE is unconfigured and reconfigured within a short interval.

**Workaround:**

Have a interval of approximately one minute before reconfiguring a VRF after unconfiguring it.

**Recovery:**

No recovery is necessary if the workaround is used.

- **CSCto99989**

**Basic Description:**

SNMP bulk config, or load from saved config, or rollback will show error

**Symptom:**

SNMP bulk configuration, or load from saved configuration, or rollback (which include multiple SNMP commands) can cause following messages to print on console.

```
RP/0/RSP0/CPU0:Apr 27 19:26:59.446 : snmpd[1112]:
%SNMP-SNMP-4-VIEWOID_NOT_FOUND : The command "snmp view li-view ifMIB included"
could not be applied at this time because the oid "ifMIB" does not belong to a known MIB module.
```

```
RP/0/RSP0/CPU0:Apr 27 19:26:59.481 : snmpd[1112]:
%SNMP-SNMP-4-VIEWOID_NOT_FOUND : The command "snmp view li-view ciscoTap2MIB
included" could not be applied at this time because the oid "ciscoTap2MIB" does not belong to a
known MIB module.
```

```
RP/0/RSP0/CPU0:Apr 27 19:26:59.495 : snmpd[1112]:
%SNMP-SNMP-4-VIEWOID_NOT_FOUND : The command "snmp view li-view ciscoIpTapMIB
included" could not be applied at this time because the oid "ciscoIpTapMIB" does not belong to a
known MIB module.
```

**Conditions:**

SNMP bulk configuration, or load from saved configuration, or rollback (which include multiple SNMP commands) can cause the error messages.

This behaviour is observed since MIB is not loaded and the OID translation is not in place.

After few seconds, this get resolved and you could query the MIB successfully.

**Workaround:**

None. When this behavior observed during SNMP configuration for lawful intercept; it still allowed adding taps and lawful intercept functionality did not impact in any manner.

**Recovery:**

None. These are harmless messages and does not impact any functionality

- **CSCtr78557**

**Basic Description:**

MPP SNMP out-of-band not working

**Symptom:**

1. snmp pkts coming on out-of-band interface got dropped.
2. when "snmp-server host trap source-port <port>" config was removed, snmp inform pkts were not received.

**Conditions:**

inform notification packets coming on MPP out-of-band interface.

**Workaround:**

snmpd process restart

- **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:

- **CSCtk60785**

**Basic Description:**

Multicast-Aware CoS transparency does not work on E3(set action in core)

**Symptom:**

If MVPN GRE packet is marked via policer action at ingress policy, and at egress if packet is matched on remarked tunnel precedence, this egress match does not happen.

**Conditions:**

This happens for MVPN GRE packet and ingress LC is an E3 card.

**Workaround:**

None.

**Recovery:**

None.

# 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.

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 the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the *What's New in Cisco Product Documentation* as an RSS feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service. Cisco currently supports RSS Version 2.0.

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)

© 2011 Cisco Systems, Inc. All rights reserved.

