Release Notes for Cisco XR 12000 Series Router for Cisco IOS XR Software Release 4.2

October 22, 2012

Cisco IOS XR Software Release 4.2

Text Part Number OL-26125-01

These release notes describe the features provided in the Cisco IOS XR Software Release 4.2 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 4.2, see the "Important Notes" section on page 41.

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

These electronic documents may contain updates and modifications. For more information on obtaining Cisco documentation, see the "This document is to be used in conjunction with the documents listed in the "Related Documentation" section.".

For a list of software caveats that apply to Cisco IOS XR Software Release 4.2, see the "Caveats" section on page 44. The caveats are updated for every release and are described at 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

Contents

These release notes contain the following sections:

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Introduction

Cisco IOS XR Software is a distributed operating system designed for continuous system operation combined with service flexibility and high performance.

Cisco IOS XR Software running on the Cisco XR 12000 Series Router provides the following features and benefits:

- **IP and Routing**—This 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**—This 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)**—This 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)—**This 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—**This 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—**This 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—**This 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**—This delivers IPv6 traffic over an IPv4/MPLS core with IPv6 provider edge router (6PE) support.
- **IPv6 VPN over MPLS (6VPE) support**—This delivers IPv6 VPN over MPLS (IPv6) VPN traffic over an IPv4 or MPLS core with 6VPE support.
- **6VPE over L2TPv3 support**—This 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 4.2, see the "New Features in Cisco IOS XR Software Release 4.2" section on page 35 in this document.

System Requirements

This section describes the system requirements for Cisco IOS XR Software Release 4.2 supported on the Cisco XR 12000 Series Router. The system requirements include the following information:

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 4.2 features.

Table 1 lists the Cisco IOS XR Software feature set matrix (PIE files) and associated filenames available for Cisco IOS XR Software Release 4.2, supported on the Cisco XR 12000 Series Router.

Table 1 Cisco XR 12000 Series Router Supported Feature Set (Cisco IOS XR Software Release 4.2 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini.pie-4.2.0	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-4.2.0	Contains the required core packages including OS, Admin, Base, Forwarding, and Routing SNMP Agent, and Alarm Correlation.
Optional Individual Packages[1]		
Cisco IOS XR Manageability Package	c12k-mgbl.pie-4.2.0	CORBA[2] agent, XML Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	c12k-mpls.pie-4.2.0	MPLS-TE,[3] LDP, [4]MPLS Forwarding, MPLS OAM,[5] LMP,[6] OUNI,[7] and RSVP.[8]
Cisco IOS XR Multicast Package	c12k-mcast.pie-4.2.0	Multicast Routing Protocols (PIM,[9] MSDP,[10] IGMP,[11] Auto-RP, BSR[12]), Tools (SAP MTrace, MRINFO), and Infrastructure (MRIB,[13] MURIB,[14] MFWD)[15].
Cisco IOS XR Security Package	c12k-k9sec.pie-4.2.0	Support for Encryption, Decryption, IPSec[16], SSH,[17] SSL,[18] and PKI.[19] Software based IPSec support: maximum of 500 tunnels
Cisco IOS XR Standby RP Boot Image	mbiprp-rp.vm-4.2.0	Support for booting the Standby RP on a Cisco XR 12000 Series Router.
Cisco IOS XR FPD Package	c12k-fpd.pie-4.2.0	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 4.2 PIE Files) (continued)

Feature Set	Filename	Description
Cisco IOS XR Diagnostic Package	c12k-diags.pie-4.2.0	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	c12k-doc.pie-4.1	.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 4.2 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	XR12000-iosxr-4.2.0.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package
Cisco IOS XR IP/MPLS Core Software 3DES	XR12000-iosxr-k9-4.2.0.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package • Cisco IOS XR Security Package

Memory Requirements

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

The minimum memory requirements for a Cisco XR 12000 Series Router running Cisco IOS XR Software Release 4.2 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 bgp is enabled on the router or if any other application is 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 15.

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

Component	Part Number	Support from Version
Cisco XR 12000 Series Router Series Router Systems		
Cisco XR 12000 Series 4-slot chassis	XR-12000/4	3.3
Cisco XR 12000 Series 6-slot chassis	XR-12000/6	3.3
Cisco XR 12000 Series 10-slot chassis	XR-12000/10	3.3
Cisco XR 12000 Series 16-slot chassis	XR-12000/16	3.3
Cisco XR 12000 Series Router Chassis Hardware		
4-slot chassis & backplane, 1 Blower, 2 AC	12000/4-AC	3.3
4-slot chassis & backplane, 1 Blower, 2 DC	12000/4-DC	3.3
6-slot chassis & backplane, 2 Alarm, 1 Blower, 2 AC	12000/6-AC	3.3
6-slot chassis & backplane, 2 Alarm, 1 Blower, 2 DC	12000/6-DC	3.3
10-slot chassis & backplane, 2 Alarm, 1 Blower, 2 AC	12000/10-AC	3.3
10-slot chassis & backplane, 2 Alarm, 1 Blower, 2 DC	12000/10-DC	3.3
16-slot chassis & backplane, 2 Alarm, 2 Blower, 3 AC	12000/16-AC3	3.3
16-slot chassis & backplane, 2 Alarm, 2 Blower, 4 DC	12000/16-DC	3.3
16-slot chassis & backplane, 2 Alarm, 2 Blower, 4 AC	12000/16-AC4	3.3
Cisco XR12000 16-slots; 2 Alarms, Advanced 2 Blowers, up to 8 DC	12000E/16-DC	3.8
Cisco XR12000 16-slots; 2 Alarms, Advanced 2 Blowers, up to 8 AC	12000E/16-AC	3.8
Cisco XR 12000 Series Router Fabric Hardware		
Enhanced 20 Gbps Fabric & Alarm card for Cisco 12004	12004E/20	3.6
Enhanced 80 Gbps Fabric & Alarm card for Cisco 12404	12404E/80	3.6
Enhanced 30 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12006	12006E/30	3.6
Enhanced 120 Gbps Fabric (2xCSC and 3xSFC) for Cisco 12406	12406E/120	3.6

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

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

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

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

Table 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 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
24-Port Channelized T1/E1 ATM CEoP SPA	SPA-24CHT1-CE-ATM	4.0.1
1-Port Channelized OC-3 ATM CEoP SPA	SPA-1CHOC3-CE-ATM	4.1.1
Ethernet Interface Modules and SPAs		
Cisco XR 12000 Series 4xGE with SFP optics	4GE-SFP-LC	3.2
Cisco 5-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-5X1GE-V2	3.4
Cisco 8-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-8X1GE-V2	3.4
Cisco 8-Port 10BASE-T/100BASE-TX Fast Ethernet Shared Port Adapter, Version 2	SPA-8X1FE-TX-V2	3.4
Cisco 8-Port 100BASE-TX Fast Ethernet Shared Port Adapter	SPA-8XFE-TX	3.3
Cisco 10-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-10X1GE-V2	3.4
Cisco 1-Port Ten Gigabit Ethernet Shared Port Adapter, Version 2	SPA-1X10GE-L-V2	3.4
Cisco 5-Port Gigabit Ethernet Shared Port Adapter with SFP optics	SPA-5X1GE	3.2
Cisco 10-Port Gigabit Ethernet Shared Port Adapter with SFP optics	SPA-10X1GE	3.2
Cisco 1-Port 10 Gigabit Ethernet Shared Port Adapter with XFP optics	SPA-1XTENGE-XFP	3.2
Cisco 2-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-2X1GE-V2	3.4.1
Cisco XR 12000 Series Router T3 and E3 Interface Modules and SPAs		
2-port Channelized T3 to DS0 Shared Port Adapter	SPA-2XCT3/DS0	3.3
4-port Channelized T3 to DS0 Shared Port Adapter	SPA-4XCT3/DS0	3.3
2-port Clear Channel T3/E3 Shared Port Adapter	SPA-2XT3/E3	3.3
4-port Clear Channel T3/E3 Shared Port Adapter	SPA-4XT3/E3	3.3
Cisco XR 12000 Series Router Channelized Line Cards		

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-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 4.2 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/0/2/CPU0:router(admin)#show fpd package

=============================== ================================================
                                        Field Programmable Device Package
                                ================================================
                                                                SW      Min Req   Min Req
Card Type                FPD Description              Type Subtype   Version    SW Ver    HW Vers
==================== ========================== ==== ======= =========== ======== ========
E3-OC12-ATM-4           Mickey FPGA                 lc    fpga2    40971.00        0.00       0.0
                        IOB FPGA                    lc    fpga3    41091.00        0.00       0.0
                        SAF 0 FPGA                  lc    fpga4    45586.00        0.00       0.0
                        Mouse FPGA                  lc    fpga1    40977.00        0.00       0.0
--------------------------------------------------------------------------------------------
E3-OC3-ATM-4            Mickey FPGA                 lc    fpga2    40971.00        0.00       0.0
```

	IOB FPGA	lc	fpga3	41091.00	0.00	0.0
	SAF 0 FPGA	lc	fpga4	45586.00	0.00	0.0
	Mouse FPGA	lc	fpga1	40977.00	0.00	0.0
12000-ServEngCard	TREX FPGA	lc	fpga2	162.45	0.00	0.0
	TREX FPGA	lc	fpga1	0.41257	0.00	0.0
12000-SIP	HABANERO FPGA	lc	fpga2	240.03	0.00	0.0
	JALAPENO FPGA	lc	fpga5	240.13	0.00	0.0
	JALAPENO FPGA	lc	fpga5	240.13	0.00	0.0
	JALAPENO FPGA	lc	fpga1	255.23	0.00	0.0
E3-OC12-CH-1	Shiver FPGA	lc	fpga1	1.02	0.00	0.0
SPA-IPSEC-2G	Sequoia	spa	fpga2	1.01	0.00	1.0
	Lodi	spa	fpga1	1.22	0.00	1.0
	SPA PROM	spa	rommon	1.01	0.00	1.0
SPA-4XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.00	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.00	0.0
	SPA I/O FPGA	spa	fpga1	1.01	0.00	0.0
	SPA ROMMON	spa	rommon	2.12	0.00	0.0
SPA-2XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.00	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.00	0.0
	SPA I/O FPGA	spa	fpga1	1.01	0.00	0.0
	SPA ROMMON	spa	rommon	2.12	0.00	0.0
SPA-4XCT3/DS0	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.00	0.200
	SPA I/O FPGA	spa	fpga1	2.08	0.00	0.100
	SPA ROMMON	spa	rommon	2.12	0.00	0.100
SPA-2XCT3/DS0	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.00	0.200
	SPA I/O FPGA	spa	fpga1	2.08	0.00	0.100
	SPA ROMMON	spa	rommon	2.12	0.00	0.100
SPA-1XCHSTM1/OC3	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.00	0.0
	SPA I/O FPGA	spa	fpga1	1.08	0.00	0.0
	SPA ROMMON	spa	rommon	2.12	0.00	0.0
SPA-24CHT1-CE-ATM	SPA T3 Subrate FPGA	spa	fpga2	1.10	0.00	1.0
	SPA I/O FPGA	spa	fpga1	2.32	0.00	1.0
	SPA ROMMON	spa	rommon	1.03	0.00	1.0
SPA-2CHT3-CE-ATM	SPA T3 Subrate FPGA	spa	fpga2	1.11	0.00	1.0
	SPA I/O FPGA	spa	fpga1	2.22	0.00	1.0
	SPA ROMMON	spa	rommon	1.04	0.00	1.0
SPA-1CHOC3-CE-ATM	SPA OC3 Subrate FPGA	spa	fpga2	2.23	0.00	2.0
	SPA I/O FPGA	spa	fpga1	2.23	0.00	2.0
	SPA ROMMON	spa	rommon	1.04	0.00	2.0
SPA-IPSEC-2G-2	Sequoia	spa	fpga2	1.01	0.00	1.0
	Lodi	spa	fpga1	1.22	0.00	1.0
	SPA PROM	spa	rommon	1.01	0.00	1.0
SPA-1XCHOC48/DS3	SPA I/O FPGA	spa	fpga2	1.00	0.00	0.49
	SPA I/O FPGA	spa	fpga3	1.00	0.00	0.52
	SPA I/O FPGA	spa	fpga1	1.36	0.00	0.49
	SPA ROMMON	spa	rommon	2.02	0.00	0.49
SPA-1XCHOC12/DS0	SPA I/O FPGA	spa	fpga2	1.00	0.00	0.49
	SPA I/O FPGA	spa	fpga1	1.36	0.00	0.49
	SPA ROMMON	spa	rommon	2.02	0.00	0.49

```
-------------------------------------------------------------------------------------------
SPA-OC192POS          SPA FPGA swv1.2             spa  fpga1       1.02        0.00  0.0
-------------------------------------------------------------------------------------------
SPA-8XOC12-POS        SPA FPGA swv1.0             spa  fpga1       1.00        0.00  0.5
-------------------------------------------------------------------------------------------
SPA-8XCHT1/E1         SPA I/O FPGA                spa  fpga1       2.08        0.00    0.0
                      SPA ROMMON                  spa  rommon      2.12        0.00    0.140
-------------------------------------------------------------------------------------------
SPA-OC192POS-XFP      SPA FPGA swv1.2            spa  fpga1       1.02        0.00      0.0
                     SPA FPGA swv1.2 hwv2       spa  fpga1       1.02        0.00      2.0
-------------------------------------------------------------------------------------------
SPA-10X1GE           SPA FPGA swv1.10           spa  fpga1       1.10        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-5X1GE            SPA FPGA swv1.10           spa  fpga1       1.10        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-2XOC48POS/RPR    SPA FPGA swv1.0            spa  fpga1       1.00        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-4XOC48POS/RPR    SPA FPGA swv1.0            spa  fpga1       1.00        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-1XTENGE-XFP      SPA FPGA swv1.11           spa  fpga1       1.11        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-8X1FE            SPA FPGA swv1.1            spa  fpga1       1.01        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-1XOC48POS/RPR    SPA FPGA swv1.2            spa  fpga1       1.02        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-8XOC3-POS        SPA FPGA swv1.0            spa  fpga1       1.00        0.00      0.5
-------------------------------------------------------------------------------------------
SPA-2XOC12-POS       SPA FPGA swv1.0            spa  fpga1       1.00        0.00      0.5
-------------------------------------------------------------------------------------------
SPA-4XOC12-POS       SPA FPGA swv1.0            spa  fpga1       1.00        0.00      0.5
-------------------------------------------------------------------------------------------
SPA-10X1GE-V2        SPA FPGA swv1.10           spa  fpga1       1.10        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-8X1GE-V2         SPA FPGA swv1.10           spa  fpga1       1.10        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-5X1GE-V2         SPA FPGA swv1.10           spa  fpga1       1.10        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-2X1GE-V2         SPA FPGA swv1.1            spa  fpga1       1.01        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-1X10GE-L-V2      SPA FPGA swv1.11           spa  fpga1       1.11        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-8X1FE-V2         SPA FPGA swv1.1            spa  fpga1       1.01        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-4XOC3-POS-V2     SPA FPGA swv1.0            spa  fpga1       1.00        0.00      0.5
-------------------------------------------------------------------------------------------
SPA-1X10GE-L-IT      SPA FPGA swv1.0            spa  fpga1       1.00        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-1XOC3-ATM-V2     TATM SPA IOFPGA            spa  fpga1       2.02        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-2XOC3-ATM-V2     SPA TATM IOFPGA            spa  fpga1       2.02        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-3XOC3-ATM-V2     SPA TATM IOFPGA            spa  fpga1       2.02        0.00      0.0
-------------------------------------------------------------------------------------------
SPA-1XOC12-ATM-V2    SPA TATM IOFPGA            spa  fpga1       2.02        0.00      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

- Links to PDF copies of the IOS XR Firmware Upgrade Guides are available online here:

  http://www.cisco.com/web/Cisco_IOS_XR_Software/index.html

  Here's the link to the Cisco Systems IOS XR Firmware Upgrade Guide For CRS-1 and XR12000:

  http://www.cisco.com/web/Cisco_IOS_XR_Software/pdf/IOSXRFirmwareUpgradeGuide.pdf

- Refer to the *Hardware Redundancy and Node Administration Commands on Cisco IOS XR Software* chapter of the *Cisco IOS XR System Management Command Reference for the Cisco XR 12000 Router* for the **upgrade all** command syntax:

  http://www.cisco.com/en/US/docs/routers/xr12000/software/xr12k_r4.0/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 4.2:

- 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/0/2/CPU0:router#show version

Cisco IOS XR Software, Version 4.2.0[Default]
Copyright (c) 2011 by Cisco Systems, Inc.
```

```
ROM: System Bootstrap, Version 12.00(20101111:181729) [karangan-rommon 2.4dev(0.67)]
DEVELOPMENT SOFTWARE
Copyright (c) 1994-2010 by cisco Systems,  Inc.

PE1-E3E5 uptime is 3 hours, 25 minutes
System image file is "disk0:c12k-os-mbi-4.2.0/mbiprp-rp.vm"

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

9 Cisco 12000 Series SPA Interface Processor-601/501/401
2 Cisco 12000 Series Performance Route Processors
2 Cisco 12000 4-Port ISE ATM Over SONET OC12/STM-4 Controllers (8 ATM)
1 1 Port ISE Packet Over SONET OC-48c/STM-16 Controller (1 POS)
2 Cisco 12000 4 Port Gigabit Ethernet Controllers (8 GigabitEthernet)
6 Management Ethernet
4 MgmtMultilink
18 SONET/SDH
38 PLIM_QOS
14 T3
164 Multilink network interface(s)
3 Serial network interface(s)
260 T1
646 Serial network interface(s)
7 Packet over SONET/SDH
28 GigabitEthernet/IEEE 802.3 interface(s)
1 TenGigE
16 FastEthernet
1 MgmtIMA
37 Asynchronous Transfer Mode
917k bytes of non-volatile configuration memory.
2053376k bytes of disk0: (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 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie
```

```
iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/1/CPU0 is mem:
Package active on node 0/1/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
```

```
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Configuration register on node 0/2/CPU0 is 0x22
Boot device on node 0/2/CPU0 is disk0:
Package active on node 0/2/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
```

```
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mgbl, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mgbl-4.2.0
    Built on Mon Dec 19 15:28:59 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mgbl-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mgbl-supp-4.2.0
    Built on Mon Dec 19 15:28:59 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
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    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/3/CPU0 is mem:
Package active on node 0/3/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie
```

```
c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/4/CPU0 is mem:
Package active on node 0/4/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
```

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    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/5/CPU0 is mem:
Package active on node 0/5/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie
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iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/6/CPU0 is mem:
Package active on node 0/6/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
```

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    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/7/CPU0 is mem:
Package active on node 0/7/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie
```

```
c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/8/CPU0 is mem:
Package active on node 0/8/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
```

```
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
```

```
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/9/CPU0 is mem:
Package active on node 0/9/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie
```

```
c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/10/CPU0 is mem:
Package active on node 0/10/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
```

```
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/11/CPU0 is mem:
Package active on node 0/11/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie
```

```
iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/12/CPU0 is mem:
Package active on node 0/12/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
```

```
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Configuration register on node 0/13/CPU0 is 0x22
Boot device on node 0/13/CPU0 is disk0:
Package active on node 0/13/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie
```

```
iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mgbl, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mgbl-4.2.0
    Built on Mon Dec 19 15:28:59 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mgbl-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mgbl-supp-4.2.0
    Built on Mon Dec 19 15:28:59 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie
```

```
Boot device on node 0/14/CPU0 is mem:
Package active on node 0/14/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
```

```
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

Boot device on node 0/15/CPU0 is mem:
Package active on node 0/15/CPU0:
iosxr-ce, V 4.2.0[00], Cisco Systems, at disk0:iosxr-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fwding, V 4.2.0[00], Cisco Systems, at disk0:c12k-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-ce, V 4.2.0[00], Cisco Systems, at disk0:c12k-ce-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-adv-video-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-adv-video-supp-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-security, V 4.2.0[00], Cisco Systems, at disk0:iosxr-security-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-video-adv, V 4.2.0[00], Cisco Systems, at disk0:iosxr-video-adv-4.2.0
    Built on Mon Dec 19 15:31:49 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mpls, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mpls-4.2.0
    Built on Mon Dec 19 15:28:34 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-mcast, V 4.2.0[00], Cisco Systems, at disk0:iosxr-mcast-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-routing, V 4.2.0[00], Cisco Systems, at disk0:iosxr-routing-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-infra, V 4.2.0[00], Cisco Systems, at disk0:iosxr-infra-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-fwding, V 4.2.0[00], Cisco Systems, at disk0:iosxr-fwding-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

iosxr-diags, V 4.2.0[00], Cisco Systems, at disk0:iosxr-diags-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-fpd-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.2.0
    Built on Mon Dec 19 15:31:26 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie
```

```
c12k-diags, V 4.2.0[00], Cisco Systems, at disk0:c12k-diags-4.2.0
    Built on Mon Dec 19 15:31:16 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-k9sec-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-k9sec-supp-4.2.0
    Built on Mon Dec 19 15:29:07 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-mcast-supp, V 4.2.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.2.0
    Built on Mon Dec 19 15:28:44 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-base, V 4.2.0[00], Cisco Systems, at disk0:c12k-base-4.2.0
    Built on Mon Dec 19 15:29:14 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie

c12k-os-mbi, V 4.2.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.2.0
    Built on Mon Dec 19 15:30:55 UTC 2011
    By iox-bld2 in /auto/srcarchive6/production/4.2.0/all/workspace for pie
```

New Features in Cisco IOS XR Software Release 4.2

The following sections contain information on new features and enhancements in Cisco IOS XR Software Release 4.2:

- New Software Features on the Cisco XR 12000 Series Router, page 35
- New Hardware Features on the Cisco XR 12000 Series Router, page 41

Note Cisco Session Border Controller (SBC) is not supported on any platform in Cisco IOS XR Software Release 4.2. Cisco IOS XR Software Release 3.7 is the last release that supports SBC.

New Software Features on the Cisco XR 12000 Series Router

The following new software features were introduced in Cisco IOS XR Software Release 4.2 on the Cisco XR 12000 Series Router platform:

- SNMP over IPv6—The Cisco IOS XR Software Release 4.2 supports Simple Network Management Protocol (SNMP) over IPv6 on the Cisco XR 12000 Series Router. The following SNMP commands are provided with IPv6 support in the Cisco IOS XR Software Release 4.2:
  - snmp-server host
  - snmp-server target-list
  - snmp-server vrf
  - snmp-server engineid remote

  For more information about SNMP server commands, see the *SNMP Server Commands on Cisco IOS XR Software* section in Cisco *IOS XR System Management Command Reference*.

- E5 LC UCode Packaging—The available features within the Cisco IOS XR Software image have been bundled to allow sufficient computation capabilities within the router. A feature profile determines which bundle of features is available for use. Although users can always configure a feature, if it is not supported by the active feature profile, they cannot use it. There are two feature profiles available on XR 12000 router:
  - The default profile supports all Cisco IOS XR Software features except for iMSG Layer 2 aggregation.
  - The iMSG profile supports all Cisco IOS XR Software features except for Layer 3 VPN over IP.

  If the feature profile configured on your router does not support a feature that you have configured, warning messages are displayed to the console and the feature does not work. When you configure a feature profile, all modular multirate IP Services Engine line cards in the router are reloaded.
- 1-Port 10-Gigabit Ethernet IPoDWDM (IP overDWDM) SPA—The 1-Port 10-Gigabit Ethernet DWDM SPA has three types of LEDs: an ACTIVE/LINK LED for the port, a CARRIER LED, and a STATUS LED. The 1-Port 10-Gigabit Ethernet DWDM SPA supports the following types of optical transceiver modules:
  - Multimode Small Form-Factor Pluggable (MM XFP) module
  - Single-mode short reach (SR) XFP module—XFP-10GLR
  - Single-mode intermediate reach (IR) XFP module—XFP-10GER

  Cisco Systems qualifies the optics that are approved for use with its SPAs. Use a single-mode optical fiber that has a modal-field diameter of 8.7 ±0.5 microns (nominal diameter is approximately 10/125 microns) to connect your router to a network. For more information about this SPA, see *Cisco XR 12000 Series Router SIP and SPA Hardware Installation Guide*.
- FR/MFR to Ethernet Bridged Interworking Pseudowire—Bridged interworking is used when Layer 2 packets are considered regardless of Layer 3 contents. In FR/MFR (Frame Relay/Multilink Frame Relay) to Ethernet bridged interworking, Ethernet frames extracted from the FR/MFR attachment circuit (AC) are sent over the MPLS Pseudowire, whereas non-ethernet frames are dropped. The bridged interworking happens at the PE connected to the FR/MFR AC.
- FR/MFR to Ethernet Bridged Interworking Local Switching—Local Switching with bridged interworking provides interoperability between FR/MFR attachment circuit and Ethernet circuit connected to the same PE router. For this interworking type, bridged encapsulation is used corresponding to the bridged (Ethernet) interworking mechanism. In the Ethernet to FR/MFR directions, the PE router forwards the Layer 2 packet (Ethernet frame) without any change to the egress interface, encapsulating the L2 packet (Ethernet frame) over FR/MFR using bridged encapsulation. In the FR/MFR to Ethernet direction, the FR/MFR header and bridged encapsulation are discarded and the L2 packet is sent out with Ethernet encapsulation. The only difference between pseudowire and local switching is that there is no PWE3 signaling involved in bringing up the L2VPN circuit, in local switching.
- PPP/cHDLC IP Interworking Pseudowire—In IP interworking, the point-to-point (PPP) session is terminated at the PE while interworking with PPP attachment circuits. The PE router is responsible for negotiating the LCP and IPCP with the CE router. PPP on the PE router can be configured with the ppp ipcp address proxy ip-address command where the remote CE router's IP address is used. This IP address is used by the PE router during IPCP negotiations with the CE router. In IP interworking Pseudowire, the IP packets are across the pseudowire.

  Interworking with Cisco High-Level Data Link Control (cHDLC) attachment circuits works in the same ways as interworking with PPP attachment circuits. However, keepalive messages are sent and received between the PE and CE routers in order to keep the L2VPN attachment circuit active.

- PPP/cHDLC IP Interworking Local Switching—This functionality is similar to that of the PPP/cHDLC IP Interworking Pseudowire.The only difference in local switching is that there is no PWE3 signaling involved in bringing up the L2VPN circuit.
- CEM (Circuit Emulation over Packet Switched Network over MPLS) — Circuit Emulation over Packet (CEoP) is a way to carry TDM circuits over packet switched network and is the imitation of a physical connection. CEoP replaces leased lines and legacy time-division multiplex (TDM) networks putting TDM bits into packets, encapsulates them into appropriate header and sends through public switched network (PSN). CEoP assumes the following two modes:
  - Unstructured Mode—This is called SAToP (Structure Agnostic TDM over Packet). SAToP considers the incoming data as pure bit stream and ignores the internal structure of the data.
  - Structured Mode—This is called CESoPSN (Circuit Emulation Service over Packet Switched Network) that understands the type of incoming TDM structure down to DS0.

  The Cisco IOS XR Release 4.2 supports CEM functionality on the following SPAs for the Cisco IOS XR 12000 Series router:
  - SPA-2CHT3-CE-ATM
  - SPA-24CHT1-CE-ATM
  - SPA-1CHOC3-CE-ATM

  For more information about CEM, see the *Cisco IOS XR Interface and Hardware component Configuration Guide for the Cisco XR 12000 Series Router.*
- Shared Policy Interface on XR12000—Shared Policy Instance is a new concept that provides the ability to share service-policy instance among multiple ethernet flow points (EFPs) or L3/L2 subinterfaces on the same interface. A service-policy binding on a subinterface creates unique Quality of Service (QoS) resources (Queue, Policers, stats, etc.). This does not allow multiple subinterfaces to be aggregately shaped or policed. With shared policy instance, user can allocate a single set of resources and share them across any number of subinterfaces. For more information about Shared Policy Interface, see the *Configuring Modular QoS Service Packet Classification on Cisco IOS XR Software*.
- High Availability for Lawful Intercept—The high availability for lawful intercept is a feature enabled by default from Release 4.2 onwards. It provides operational continuity of the TAP flows and provisioned MD (Mediation Device) tables to reduce loss of information due to route processor fail over (RPFO).

  When RPFO (route processor failover) is detected, MDs are required to re-provision all the rows related to CISCO-TAP2-MIB, CISCO-IP-TAP-MIB and CISCO-USER-CONNECTION-TAP-MIB, to synchronize database view across RP and MD. The replay timer, an internal timeout is used to re-provision TAP entries smoothly while maintaining existing TAP flows. For more information about high availability for lawful intercept, see the *Cisco IOS XR System Security Configuration Guide for the Cisco XR 12000 Series Router.*
- CISCO-IP-STAT-MIB—The CISCO-IP-STAT-MIB incorporates objects to provide support for the Cisco IP statistics as implemented in command interfaces. cipPrecendenceTable, cipMacTable, cipMacFreeTable, cipPrecedenceXTable, cipMacXTable are the tables available in CISCO-IP-STAT-MIB. For more information about the tables, see the *Cisco Carrier Routing System and Cisco XR 12000 Series Router MIB Support Guide.*
- IF-MIB Congestion Control Support—A packet from ingress interface traverses through various internal queues before reaching the egress interface. Packets can be dropped when any of these queues cannot hold them, either due to the full queue or based on some policies or priorities. The respective queue or device drivers like ASIC drivers, interface drivers, platform manager, QoS EA, etc. can track the drop of the packets.

CISCO-IF-EXTENSION-MIB consists of two objects, cieIfInOctetRate and cieIfOutOctetRate for reporting number of bytes of data transferred from or to the interface within 5 minutes. The other two objects, cieIfInputQueueDrops and cieIfOutputQueueDrops are used for reporting packet drops in queues available through Stats Infrastructure. While configuring an interface for congestion control, a callback is registered with interface manager to get the bandwidth change and also notified to update rising threshold or falling threshold. All the interface types supported for packet loss configuration are also applicable to congestion control configurations.

- IF-MIB Congestion Control Trap—When congestion control goes above upper threshold, a SNMP trap is generated to indicate that an event is set. When congestion control goes below lower threshold, another SNMP trap is generated to indicate that an event is cleared. mteTriggerThreshold table contains the details on threshold values for congestion control. The following provides sample trap information:

```
Received SNMPv2c Trap:
Community: public
From: 12.25.20.9
sysUpTimeInstance = 618943
snmpTrapOID.0 = mteTriggerFalling
ifType.87 = hdlc(118)
ifName.87 = POS0/2/0/0
mteHotValue.0 = 3500
mteHotOID.0 = [cieIfInOctetRate.87 | cieIfInputQueueDrops.87]
mteHotContextName.0 =
mteHotTargetName.0 =
mteHotTrigger.0 = POS0_2_0_0-ingress

Received SNMPv2c Trap:
Community: public
From: 12.25.20.9
sysUpTimeInstance = 619943
snmpTrapOID.0 = mteTriggerRising
ifType.87 = hdlc(118)
ifName.87 = POS0/2/0/0
mteHotValue.0 = 4000
mteHotOID.0 = [cieIfOutOctetRate.87 | cieIfOutputQueueDrops.87]
mteHotContextName.0 =
mteHotTargetName.0 =
mteHotTrigger.0 = POS0_2_0_0-egress
```

- Multiple Group Optimization (MGO) for HSRP—By running the Hot Standby Router Protocol (HSRP) control traffic for just one of the sessions, MGO reduces control traffic in a deployment consisting of many subinterfaces with identical redundancy requirements. All other sessions that become slaves of this session inherit their state from this session. For more information about MGO, see the *Cisco IOS XR IP Addresses and Services Configuration Guide for the Cisco XR 12000 Series Router.*
- Redundancy Manageability Improvements—This feature supports configuration, control and monitoring of redundancy protection for various kinds of components on Cisco managed devices. It is a generic approach to handle basic redundancy control and monitoring for many types of redundant member components and redundancy architectures as long as there is an Entity MIB entPhysicalIntex and entPhysicalVendorType assigned to each member component. For more information about this feature, see the *Cisco Carrier Routing System and Cisco XR 12000 Series Router MIB Support Guide*.
- Security Hardening—In Cisco IOS XR LPTS, as part of for-us packet delivery process, the rate at which packets are delivered are selectively monitored to avoid overwhelming the CPU. LPTS filters and polices the packets based on the defined flow-type rate in hardware before punting to the software. Today, some of the control protocols have a configured peer or source interface in some

way, but the protocol (application) and/or LPTS ignores the peer configuration or has a single policer rate for all known and unknown (default) connections. This restricts the user's ability to police the rates for known peers differently than for unknown peers.

Cisco IOS XOR security system needs a granular protocol traffic classification based on the configured peers and ingress interfaces. To classify and distinguish the traffic accurately, the protocol or application needs to have new flow-types and policer rates in hardware. New flow-types such as DNS, RADIUS, TACACS, NTP KNOWN, RSVP KNOWN and PIM MULTICAST KNOWN are added to the configuration. The user gets the new flow types by running the following command:

```
show lpts pifib hardware police location 0/3/CPU0

76 DNS 101 0/0
77 RADIUS 1000 0/0
78 TACACS 101 0/0
79 (null) 101 0/0
```

For more information about LPTS commands, see the *Cisco IOS XR IP Addresses and Services Command Reference for the Cisco XR 12000 Series Router*

- SNMP context/view improvements—The CISCO-CONTEXT-MAPPING-MIB provides an option to associate an SNMP context to a feature package group. This MIB allows manageability of license MIB objects specific to a feature package group. For more information about this feature, see the *Cisco Carrier Routing System and Cisco XR 12000 Series Router MIB Support Guide*.
- VRF-aware IF-MIB—The IF-MIB describes the attributes of physical and logical interface. This MIB is made VRF-aware to provide access to information on selected interfaces stored in IF-MIB table to a user. VRF-aware IF-MIB makes management of IF-MIB table for VRF based network more secure. The ifTable and ifXTable are VRF-aware tables. For more information about this feature, see the *Cisco Carrier Routing System and Cisco XR 12000 Series Router MIB Support Guide*.
- VRF Aware IP-FORWARD-MIB—The IP-FORWARD-MIB contains objects to control the display of Classless Interdomain Routing (CIDR) multipath IP routes. The IP-FORWARD-MIB is made VRF-aware to provide selective access to information stored in IP forwarding table to user. This makes management of IP forwarding table for VRF based networks more secure. ipForwardTable is a VRF-aware table. For more information about this feature, see *Cisco Carrier Routing System and Cisco XR 12000 Series Router MIB Support Guide*.
- BGP Multi-Instance/Multi-AS—BGP (Border Gateway Protocol) Multi-Instance/Multi-AS feature allows BPM to directly interact with BGP speakers and sends configuration information using the AIPC channels. The Async IPC (AIPC) is a point-to-point communication channel that can be used to read and write bi-directionally. The Cisco IOS XR Software Release 4.2 supports multiple BGP instances running:
  - Different address families within an unit under test(UUT).
  - Different ASes within an UUT with each AS running different address families.
  - VPNVX unicast address family with mutually exclusive VRFs with an UUT.

  The constraint is that each BGP speaker process must run mutually exclusive address family or VRFs due to the underlying shared RIB/FIB infrastructure. The Cisco IOS XR Software Release 4.2 also facilitates migration of configuration republishing mechanism between BPM process and BGP speaker process(es) from sysdb to Async IPC for filtered configuration publication for each BGP speaker process as well as for reducing load to sysdb.
- OSPFv2 Per-Prefix LFA IPFRR & SRLG support—Per-prefix LFA computation is used to find the backup path for each individual path to the prefix that is subject to the computation based on the user configuration. The computation finds out a neighbor to which traffic for prefix can be sent in

case of a primary link failure. This guarantees that the traffic is not sent back to the calculation node. Users can limit the amount of prefixes, for which per-prefix LFA computation is done, thus by associating the minimum prefix priority with the per-prefix LFA computation. Per-prefix LFA considers the local SRLG values during the backup computation. SRLG integration with per-prefix LFA is done through the tiebreaker approach, where SRLG disjoint is used as one of the tiebreakers.

- OSPFv3 Non-Stop Routing (NSR) support—The Cisco IOS XR Software Release 4.2 supports NSR functionality for OSPFv3 processes. When NSR is enabled (disabled by default), OSPFv3 processes on the active RP, synchronizes all necessary data, and states with the OSPFv3 process on the standby RP. During the switchover, OSPFv3 processes on the newly active RP has all the necessary data and states to continue running, and does not require any help from its neighbors.
- Route Consistency Checker (RCC) and Label Consistency Checker (LCC)—RCC and LCC are used to verify consistency periodically in the background, as well as on-demand from the CLI, between control plane and data plane route and label programming in a Cisco IOS XR Software. Any detected inconsistencies are re-verified to ensure no false positives, and the detection mechanism uses an adaptive algorithm to ensure that route and label convergence are not affected in any way. For more information on how to use the RCC and LCC, see the *Cisco IOS XR Routing Configuration Guide for the Cisco XR 12000 Series Router.*
- Hierarchical RPL—Hierarchical Routing Policy Language (RPL) enables apply condition policies to specify a route policy in the **if** statement of another route policy. It also enables route policies to be applied for configurations based on hierarchical policies. Cisco IOS XR RPL supports apply condition policies that can be used with various types of Boolean operators along with various other matching statements. Apply conditions can also be used with parameters and are supported on all attach points and on all clients. Hierarchical apply conditions can be used without any constraints on cascaded level.
- System-wide Route and Label Prioritization—System-wide Route and Label Prioritization feature provides faster and more consistent Interior Gateway Protocol (IGP) convergence due to router or network events. For more information on how to prioritize and download the critical routes and labels, see the *Cisco IOS XR Routing Configuration Guide for the Cisco XR 12000 Series Router.*
- BFD Multihop support for BGP—The first application that makes use of BFD multihop will be BGP (Border Gateway Protocol). BFD for BGP can be enabled on a neighbor router and a neighbor router configuration is supported for BGP only. For more information about the configuration of BFD Multihop on a BGP, see the *Cisco IOS XR Interface and Hardware Component Configuration Guide for the Cisco XR 12000 Series Router*
- MPLS Traffic Engineering (TE) Soft Preemption—Multiprotocol Label Switching (MPLS) TE Soft Preemption is an extension to the Resource ReSerVation Protocol Traffic Engineering (RSVP-TE) protocol to minimize or eliminate the traffic disruption over the preempted Label Switched Paths (LSPs). For more information on how to achieve zero traffic loss, see the *Cisco IOS XR MPLS Configuration Guide for the Cisco XR 12000 Series Router.*
- MPLS Traffic Engineering (TE) Path-Option Attributes—MPLS TE path option attributes are configurable through a template configuration. This template named attribute-set, is configured globally in the MPLS TE mode. For more information on how to implement path option attributes, see the *Cisco IOS XR MPLS Configuration Guide for the Cisco XR 12000 Series Router.*

New Hardware Features on the Cisco XR 12000 Series Router

The following new hardware feature is introduced on the Cisco XR 12000 Series Router in Cisco IOS XR Software Release 4.2.

- 1-Port 10-Gigabit Ethernet IPoDWDM SPA

Note Contact 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.
- On rare occassions, during Cisco IOS XR Software Release 4.2.0 testing, we have observed issues while making bulk configuration changes (1000+ lines) in a single configuration (Using copy (remote) running, commit replace and rollback.) We recommend that you archive configurations before executing bulk configuration changes on this scale in Cisco IOS XR Software Release 4.2.0. This way you can easily retry or compare results.

Minimum Flash Disk Requirements When Upgrading to Release 4.2

Cisco IOS XR Software Release 4.2 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 4.2. 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

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 4.2 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 4.0.2 and are not platform specific:

- **CSCtw80900**

  Basic Description:

  420-PSI: After router reload, new configuration is not applied.

  Symptom:

  1. When performing a commit replace, a syslog similar to the following is displayed:

```
RP/0/RSP0/CPU0:Dec 20 05:02:45.555 : sysdb_mc[399]: %SYSDB-SMC-7-TIMEOUT : Message
#0x200088ed state:0x13fe5326, gid(1009),destined for all local, timed out having
received 7 of 8 expected responses: returning received responses to client config.
Check for potential transport issues within the system, or deadlocked SysDB processes.
```

  2. Following a router reload or LC OIR, configuration that had been previously removed by the commit replace operation reappears in the active running configuration.

  Conditions:

  The following two conditions are the reasons:

  1. The configuration that is being replaced is either,
  a. larger than 20MB (ASCII), or
  b. over 100,000 interfaces on a single LC
  2. The configuration changes involves a Viking RSP3 LC with the following types;

```
0/1/CPU0        A9K-MOD80-SE              IOS XR RUN       PWR,NSHUT,NMON
```

```
0/5/CPU0        A9K-24x10GE-SE             IOS XR RUN       PWR,NSHUT,MON
0/0/CPU0        A9K-8T/4-E                 IOS XR RUN       PWR,NSHUT,MON
0/4/CPU0        A9K-2T20GE-E               IOS XR RUN       PWR,NSHUT,MON
0/5/CPU0        A9K-2x100GE-TR             IOS XR RUN       PWR,NSHUT,MON
0/6/CPU0        A9K-24x10GE-SE             IOS XR RUN       PWR,NSHUT,MON
0/7/CPU0        A9K-4T-E                   IOS XR RUN       PWR,NSHUT,MON
```

Workaround:

- If you see the SYSDB-SMC-7-TIMEOUT error message described in Symptom 1 above, and have not yet performed any additional commits,and have not yet performed a router reload or LC OIR:
  - Repeat the original "commit replace" command, until you do not see the sysdb_mc syslog any more.
- If you see the SYSDB-SMC-7-TIMEOUT error message described in Symptom 1 above, and you have performed some addtional configuration commits, and have not yet performed a router reload or LC OIR:
  1. Execute "show running" and verify that the running configuration is what you want.
  2. Execute "cfs check" twice to make sure the running and saved configurations are now in sync and saved properly.
- If you have already performed a router reload or LC OIR and see only old configuration:

  You have two options:

  Option 1:

  1. rollback to the point where you see the sysdb_mc syslog.
  2. repeat the original commit replace operation.
  3. repeat any subsequent configuration changes.

  Option 2: wipe out all the configuration via "commit replace" and re-apply the settings you want to apply.

  After doing Option 1 or Option 2:

  1. Execute "show running" and verify that the running configuration meets your needs.
  2. Execute "cfs check" twice to make sure that the running and saved configuration are now in sync and saved properly.

  Recovery:

  None.

- **CSCtt92490**

  Basic Description:

  xml_tty_agent procedure crash when xml help is requested.

  Symptom:

  Help for CLI over XML does not work. XML agent process does not respond after the request for returning help on CLI show command.

  Conditions:

  When ACT software sends an XML request to the router for help hints, the XML agent did not respond and ACT was blocked. In addition, the Help hints returned were not correct.

  Workaround:

None. When this is observed on a setup, it can be safely ignored assuming that the hardware under test is functioning good.

Recovery:

None.

- **CSCtu31007**

  Basic Description:

  IPv6 LPTS entry was missing for some bundle interfaces. The IPv6 ND packets did not go through and IPv6 traffic was dropped at affected bundle interfaces.

  Symptom:

  IPv6 protocol peering neighbor sessions flapping; IPv6 traffic could not pass.

  Conditions:

  The bundle interfaces are on CRS-3 linecards. The issue may happen after scaled configuration is restored by either "commit replace" or router reload.

  Workaround:

  Restart pifibm_server_lc process on the bundle member linecards.

  Recovery:

  None.

- **CSCtt38345**

  Basic Description:

  The SNMP duplicate request dropping feature is not working.

  Symptom:

  SNMP duplicate request dropping feature is supposed to drop requests from the same NMS and port with the same request ID, and if the number of requests in queue is greater than 20. This feature is not working in 4.2.

  Conditions:

  SNMP duplicate request dropping feature is supposed to drop requests from the same NMS and port with the same request ID and if the number of requests in queue is greater than 20.

  Workaround:

  None.

  Recovery:

  None.

- **CSCtt30049**

  Basic Description:

  Slow SNMP response issue when polling IFMIBs with random-order.

  Symptom:

  Slowing down of SNMP response time is seen and the rate drops to about 45 packets/second under certain conditions.

  Conditions:

  1. When SNMP requests are sent from one NMS/ source IP at a rate greater than 3,000 packets/sec

2. When SNMP requests are sent from 18 source IPs / 18 NMS stations at a rate of 500 packets/sec or more
3. When CLI commands (for example, config, show commands) are being run while SNMP requests are being sent by NMS, even at a rate of about 500 packets/sec
4. SNMP response is slow when polling ifmibs in random-order

Workaround:

The above conditions may not be normal scenarios and could be avoided. For example, limit the number of NMSes to 15 or less and their polling frequency. When this is observed on a setup, the hardware under test is assumed to be functionally good in routing/switching.

Recovery:

Avoid concurrently running heavy CLI commands/processing and sending high rate of SNMP requests from NMS. Avoid the above conditions if the system gets into a state of slow response to SNMP requests.

- **CSCtw81342**

  Basic Description:

  Alternate path is used for Inter-AS P2MP TE forwarding after LC reload.

  Symptom:

  After LC OIR affecting egress interface for a P2MP midpoint sub-lsp, the tunnel sub-lsp gets signaled over a path different from one specified at head. Traffic is not impacted.

  Conditions:

  1. Inter-AS P2MP tunnel.
  2. LC OIR affects egress interface for the sub-LSP.
  3. RIB does not withdraw the route to the next-hop address (in down state)- this is timing issue related.

  Workaround:

  1. At head (for affected destination), create a higher preference path-option (lower index) with same properties, and force reoptimization of the tunnel.
  2. Shut/no shut the p2mp tunnel recovers the sub-LSP on the correct path.

  or,

  3. Disable/no disable the p2mp destinatio at head.

  Recovery:

  None.

- **CSCtt31599**

  Basic Description:

  Incorrect pw-type after configuration rollback due to configuration failure.

  Symptom:

  After a configuration reject, the pw-type changes from Ethernet-VLAN to Ethernet.

  Conditions:

  The issue is seen with the following sequence of config steps:

  1. Start with

```
l2vpn
logging
pseudowire
!
pw-class c1
encapsulation mpls
control-word
transport-mode vlan
```

2. Now configure

```
l2vpn
logging
pseudowire
!
pw-class mpls_class
encapsulation l2tpv3
transport-mode vlan
```

3. This configuration gets rejected and the configuration applied in step 2 is rolledback.
4. All the PWs that are using this class now have the pw-type as Ethernet instead of Ethernet-vlan.

Workaround:

To recover, re-apply configuration from step1, though the running configuration after step 4 shows the same as in step 1.

Recovery:

None.

- **CSCtt39429**

  Basic Description:

  420: Copy of 4K static route shown fail, although successful.

  Symptom:

  Copying of 4K static route shows error, although successful.

  Conditions:

  When trying to copy 4k static route configuration to running configuration, an error appears stating, "Failed to commit one or more configuration items". However, there is no failure.

  Workaround:

  None.

  Recovery:

  None.

- **CSCtw62111**

  Basic Description:

  Running RCMD diag script may lead to RP Reload.

  Symptom:

  In one specific manifestation, the GSP process could crash with the following message:

```
gsp[238]: %OS-gsp-3-MUTEX_OP_FAILED : get_sgrp_gid: Mutex op cond_wait failed on mutex
grp_cond (RDS_CGRP_/etc/eem_rdsfs_1) : Connection timed out : pkg/bin/gsp :
(PID=627769708)
```

There are other possible manifestations for other infra process restarts or deadlocks.

Conditions:

When RCMD diagnostics mode is enabled using the following CLI, the RCMD EEM diagnostics script collects debug information from various components within the router.

```
config
  router-convergence
    collect-diagnostics <>
  event manager policy rcmd_diags.tcl username <>
```

In certain scenarios, where the CPU utilization is high (100%) over a period of time and the diagnostics script gets triggered, it could create race conditions which causes deadlocks and some processes to restart, leading to reload of the RP.

Workaround:

Disable the RCMD diagnostics script by not registering the EEM policy.

Remove the following CLI:

```
config
  router-convergence
    collect-diagnostics <>
  event manager policy rcmd_diags.tcl username <>
```

Recovery:

None.

Further Problem Description:

It is recommended not to use the RCMD diagnostics feature in 4.2.0 in the production deployment, due to possible delays and deadlocks in the XR infrastructure in certain race conditions while CPU is running at 100% for an extended period.

- **CSCtw47793**

  Basic Description:

  IP/LDP LFA does not choose TE Tunnel as backup with use-candidate-only.

  Symptom:

  TE Tunnel may not be chosen as IP/LDP LFA FRR back-up route.

  Conditions:

  The defect is seen when ISIS has a directly connected neighbor and also a TE tunnel to the directly connected neighbor. If the 'use-candidate-only' is configured with the TE tunnel as the only candidate, the back-up is not calculated.

  Workaround:

  Do not to use the use-candidate-only feature in this scenario. Instead, use explicit exclude statements for excluding interfaces from being used as a back-up.

  Note that this defect would not occur if the Tunnel destination was multiple hops away from ISIS or if ISIS does not have a direct adjacency with the tunnel destination.

  Recovery:

  None.

- **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:

- **CSCts46117**

  Basic Description:

  Hardware address changes on vlans on upgrading from 4.1.1 to 4. 2.0.13I.

  Symptom:

  About 700 VLANs stay UP/UP but do not ping (back-to-back connected between PE and CE). The reason seems to be that the hardware address of the VLANs change on the PE router with static ARP being configured on CE routers.

  Conditions:

  On upgrading from 4.1.1 CCO image to 4.2.0 image SPA/LC/Router reloads do not clear the issue.

  Workaround:

  Static ARP configuration needs to be changed according to new MAC addresses assigned for interfaces. This will prevent the system from getting into problem state.

  Recovery:

  Recovery procedure is the same as the workaround, and it will recover the system from the problem state.

- **CSCtr23150**

  Basic Description:

  Commit replace failed to remove few ACLs from the system.

  Symptom:

  Unable to delete ACLs from the system (through **no IPV4 access-list acl-name** or **commit replace** though they are detached from the interfaces.

  Conditions:

  This issue may be seen when one applies duplicate ACLs (same protocol(ipv4/v6) + same direction (ingress/egress) to interfaces in bulk.

Workaround:

Restart pfilter_ea or reload LC and try to delete the acls from the system.

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

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

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

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

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