Release Notes for Cisco XR 12000 Series Router for Cisco IOS XR Software Release 4.2.4

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

These release notes describe the features provided in the Cisco IOS XR Software Release 4.2.4 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 4.2.4, see the "Important Notes on Cisco IOS XR Software and Cisco XR 12000 Series Router, on page 39" section.

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 "Obtaining Documentation and Submitting a Service Request".

For a list of software caveats that apply to Cisco IOS XR Software Release 4.2.4, see the "Caveats" section. 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/en/US/support/tsd_products_field_notice_summary.html

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 (VRRP) features.
- **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**— This 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. This 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, see the "New Features in Cisco IOS XR Software Release 4.2.4" section in this document.

System Requirements

This section describes the system requirements for Cisco IOS XR Software Release 4.2.4 supported on the Cisco XR 12000 Series Router.

To determine the software versions or levels of your current system, see the "Determining Your Software Version, on page 21" section.

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 4.2.4 features.

Table 1: Cisco IOS XR Software Release 4.2.4 PIE Files, on page 3 lists the Cisco IOS XR Software feature set matrix (PIE files) and associated filenames available for Cisco IOS XR Software Release 4.2.4, supported on the Cisco XR 12000 Series Router.

Table 1: Cisco IOS XR Software Release 4.2.4 PIE Files

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini-pie-4.2.4	Contains the required core packages, including OS, Admin, Base, Forwarding, Routing, SNMP Agent, and Alarm Correlation.

Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini-vm-4.2.4	Contains the required core packages including OS, Admin, Base, Forwarding, and Routing SNMP Agent, and Alarm Correlation. 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-4.2.4	CORBA[2] agent, XML Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	c12k-mpls.pie-4.2.4	MPLS-TE[3], LDP[4], MPLS Forwarding, MPLS OAM[5], LMP[6], OUNI[7], and RSVP[8].
Cisco IOS XR Multicast Package	c12k-mcast.pie-4.2.4	Multicast Routing Protocols (PIM[9], MSDP[10], IGMP[11], Auto-RP, BSR[12]), Tools (SAP MTraces, MRINFO), and Infrastructure (MRIB[13], MURIB[14], MFWD[15]).
Cisco IOS XR Security Package	c12k-k9sec.pie-4.2.4	Support for Encryption, Decryption, IPSec[16], SSH[17], SSL[18], and PKI[19]. Software based IPSec support: maximum of 500 tunnels
Cisco IOS XR Standby RP Boot Image	mbiprp-rp.vm-4.2.4	Support for booting the Standby RP from ROMMON on a Cisco XR 12000 Series Router.
Cisco IOS XR FPD Package	c12k-fpd.pie-4.2.4	Firmware for shared port adapters (SPA) and for fixed port line cards supported in Cisco IOS XR.
Cisco IOS XR Diagnostic Package	c12k-diags.pie-4.2.4	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	c12k-doc.pie-4.2.4	.man pages for Cisco IOS XR Software on the Cisco XR 12000 Series Router chassis.
Cisco IOS XR Service Package	c12k-service.pie-4.2.4	Includes binaries to support Booster daughter card.

Cisco IOS XR Video Package	c12k-video.pie-4.2.4	Includes firmware for the advanced video feature.
Cisco IOS XR Boothelper Package	c12kprp-boot-mz.120-32.SY5	Supports downloading the Cisco IOS XR image from tftp.
Cisco IOS XR Upgrade package	c12k-upgrade.pie-4.2.4	Supports a major release upgrade, such as 3.x to 4.x releases. Once the upgrade is completed, the upgrade pie must be deactivated and removed.

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 Public-key infrastructure

Table 2: Cisco IOS XR Software Release 4.2.4 TAR Files, on page 5 lists the Cisco XR 12000 Series Router TAR files.

Table 2: Cisco IOS XR Software Release 4.2.4 TAR Files

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	XR12000-iosxr-4.2.4.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software 3DES	XR12000-iosxr-k9-4.2.4.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 4.2.4 consist of the following:

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

  Note 4-GB route memory on PRP-2 is required if 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

The following tables lists the supported hardware components on the Cisco XR 12000 Series Router and the minimum required software versions. For more information, see the "Firmware Support, on page 16" section.

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
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
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
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		
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 4.2.4 is compatible with the following Cisco XR 12000 Series Router systems:

- Cisco XR 12004 Router
- Cisco XR 12006 Router
- Cisco XR 12010 Router
- Cisco XR 12016 Router
- Cisco XR 12404 Router
- Cisco XR 12406 Router
- Cisco XR 12410 Router

- Cisco XR 12416 Router
- Cisco XR 12810 Router
- Cisco XR 12816 Router

The following chassis are supported for an existing installed base:

- Cisco XR 12008 Router
- Cisco XR 12010 Router
- Cisco XR 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 cards. For ROMMON, MBUS, and Fabric Downloader versions, see the "Other Firmware Support" section.

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

```
RP/0/0/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        0.0       0.0
                     IOB FPGA                   lc   fpga3   41091.00        0.0       0.0
                     SAF 0 FPGA                 lc   fpga4   45586.00        0.0       0.0
                     Mouse FPGA                 lc   fpga1   40977.00        0.0       0.0
--------------------------------------------------------------------------------------------
E3-OC3-ATM-4         Mickey FPGA                lc   fpga2   40971.00        0.0       0.0
                     IOB FPGA                   lc   fpga3   41091.00        0.0       0.0
                     SAF 0 FPGA                 lc   fpga4   45586.00        0.0       0.0
                     Mouse FPGA                 lc   fpga1   40977.00        0.0       0.0
--------------------------------------------------------------------------------------------
12000-ServEngCard    TREX FPGA                  lc   fpga2     162.45        0.0       0.0
                     TREX FPGA                  lc   fpga1      0.41257      0.0       0.0
--------------------------------------------------------------------------------------------
12000-SIP            HABANERO FPGA              lc   fpga2     240.03        0.0       0.0
                     JALAPENO FPGA              lc   fpga5     240.13        0.0       0.0
                     JALAPENO FPGA              lc   fpga5     240.13        0.0       0.0
                     JALAPENO FPGA              lc   fpga1     255.23        0.0       0.0
--------------------------------------------------------------------------------------------
E3-OC12-CH-1         Shiver FPGA                lc   fpga1       1.02        0.0       0.0
--------------------------------------------------------------------------------------------
SPA-IPSEC-2G         Sequoia                    spa  fpga2       1.01        0.0       1.0
                     Lodi                       spa  fpga1       1.22        0.0       1.0
```

	SPA PROM	spa	rommon	1.01	0.0	1.0
SPA-4XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.0	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.0	0.0
	SPA I/O FPGA	spa	fpga1	1.01	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.0
SPA-2XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.0	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.0	0.0
	SPA I/O FPGA	spa	fpga1	1.01	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.0
SPA-4XCT3/DS0	SPA T3 Subrate FPGA	spa	fpga2	0.11	0.0	0.100
	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.0	0.200
	SPA I/O FPGA	spa	fpga1	2.08	0.0	0.100
	SPA ROMMON	spa	rommon	2.12	0.0	0.100
SPA-2XCT3/DS0	SPA T3 Subrate FPGA	spa	fpga2	0.11	0.0	0.100
	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.0	0.200
	SPA I/O FPGA	spa	fpga1	2.08	0.0	0.100
	SPA ROMMON	spa	rommon	2.12	0.0	0.100
SPA-1XCHSTM1/OC3	SPA T3 Subrate FPGA	spa	fpga2	1.04	0.0	0.0
	SPA I/O FPGA	spa	fpga1	1.08	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.0
SPA-24CHT1-CE-ATM	SPA T3 Subrate FPGA	spa	fpga2	1.10	0.0	1.0
	SPA I/O FPGA	spa	fpga1	2.32	0.0	1.0
	SPA ROMMON	spa	rommon	1.03	0.0	1.0
SPA-2CHT3-CE-ATM	SPA T3 Subrate FPGA	spa	fpga2	1.10	0.0	1.0
	SPA I/O FPGA	spa	fpga1	2.22	0.0	1.0
	SPA ROMMON	spa	rommon	1.04	0.0	1.0
SPA-1CHOC3-CE-ATM	SPA OC3 Subrate FPGA	spa	fpga2	1.00	0.0	2.0
	SPA I/O FPGA	spa	fpga1	2.23	0.0	2.0
	SPA ROMMON	spa	rommon	1.04	0.0	2.0
SPA-IPSEC-2G-2	Sequoia	spa	fpga2	1.01	0.0	1.0
	Lodi	spa	fpga1	1.22	0.0	1.0
	SPA PROM	spa	rommon	1.01	0.0	1.0

SPA-1XCHOC48/DS3	SPA I/O FPGA	spa	fpga2	1.00	0.0	0.49
	SPA I/O FPGA	spa	fpga3	1.00	0.0	0.52
	SPA I/O FPGA	spa	fpga1	1.36	0.0	0.49
	SPA ROMMON	spa	rommon	2.02	0.0	0.49
SPA-1XCHOC12/DS0	SPA I/O FPGA	spa	fpga2	1.00	0.0	0.49
	SPA I/O FPGA	spa	fpga1	1.36	0.0	0.49
	SPA ROMMON	spa	rommon	2.02	0.0	0.49
SPA-OC192POS	SPA FPGA swv1.2	spa	fpga1	1.02	0.0	0.0
SPA-8XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.5
SPA-8XCHT1/E1	SPA I/O FPGA	spa	fpga1	2.08	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.140
SPA-OC192POS-XFP	SPA FPGA swv1.2	spa	fpga1	1.02	0.0	0.0
	SPA FPGA swv1.2 hwv2	spa	fpga1	1.02	0.0	2.0
SPA-10X1GE	SPA FPGA swv1.10	spa	fpga1	1.10	0.0	0.0
SPA-5X1GE	SPA FPGA swv1.10	spa	fpga1	1.10	0.0	0.0
SPA-2XOC48POS/RPR	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.0
SPA-4XOC48POS/RPR	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.0
SPA-1XTENGE-XFP	SPA FPGA swv1.11	spa	fpga1	1.11	0.0	0.0
SPA-8X1FE	SPA FPGA swv1.1	spa	fpga1	1.01	0.0	0.0
SPA-1XOC48POS/RPR	SPA FPGA swv1.2	spa	fpga1	1.02	0.0	0.0
SPA-8XOC3-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.5
SPA-2XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.5
SPA-4XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.5
SPA-10X1GE-V2	SPA FPGA swv1.10	spa	fpga1	1.10	0.0	0.0
SPA-8X1GE-V2	SPA FPGA swv1.10	spa	fpga1	1.10	0.0	0.0
SPA-5X1GE-V2	SPA FPGA swv1.10	spa	fpga1	1.10	0.0	0.0
SPA-2X1GE-V2	SPA FPGA swv1.1	spa	fpga1	1.01	0.0	0.0

```
SPA-1X10GE-L-V2      SPA FPGA swv1.11           spa  fpga1       1.11        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-8X1FE-V2         SPA FPGA swv1.1            spa  fpga1       1.01        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-4XOC3-POS-V2     SPA FPGA swv1.0            spa  fpga1       1.00        0.0        0.5
-------------------------------------------------------------------------------------------
SPA-1X10GE-L-IT      SPA FPGA swv1.0            spa  fpga1       1.00        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-1XOC3-ATM-V2     TATM SPA IOFPGA            spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-2XOC3-ATM-V2     SPA TATM IOFPGA            spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-3XOC3-ATM-V2     SPA TATM IOFPGA            spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-1XOC12-ATM-V2    SPA TATM IOFPGA            spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------
```

Firmware Support

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

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

```
RP/0/0/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
-------------------------------------------------------------------------------------------------
```

- 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.)

- Router 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

The following table provides the procedures and resources for minimum firmware requirements:

- 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 the admin 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 which contains links to PDF copies of the IOS XR Firmware Upgrade Guides which are available online here :

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

- 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 syntaxhttp://www.cisco.com/en/US/docs/routers/xr12000/software/xr12k_r4.0/system_management/command/reference/b_yr40xr12k_chapter_0111.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 4.2.44.3.0:

- 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 *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 in to the router and enter the **show version** command:

Procedure

Step 1 Establish a Telnet session with the router.

Step 2 Enter **show version** command from EXEC mode.

```
RP/0/0/CPU0:router#show version
Cisco IOS XR Software, Version 4.2.4[Default]
Copyright (c) 2012 by Cisco Systems, Inc.

ROM: ROMMON System Bootstrap, Version 1.05(0), DEVELOPMENT SOFTWARE

MSE-PE1 uptime is 26 minutes
System image file is "disk0:c12k-os-mbi-4.2.4/mbiprp-rp.vm"

cisco 12416/PRP (8641D) processor with 4194304K bytes of memory.
8641D processor at 1330Mhz, Revision 2.1
Cisco 12416 320 Gbps

1 4 Port ISE Packet Over SONET OC-12c/STM-4 Controller (4 POS)
8 Cisco 12000 Series SPA Interface Processor-601/501/401
2 1 Port ISE Packet Over SONET OC-48c/STM-16 Controllers (2 POS)
1 Cisco 12000 4 Port Gigabit Ethernet Controller (4 GigabitEthernet)
2 Cisco 12000 Series Performance Route Processor 3s
1 1 Port ISE OC12 Channelized to DS1/E1 Single Mode/IR LC connector Controller (1 SONET)
4 Management Ethernet
33 PLIM_QOS
4 MgmtMultilink
86 T3
54 Serial network interface(s)
22 SONET/SDH
194 Multilink network interface(s)
840 T1
909 Serial network interface(s)
15 Packet over SONET/SDH
```

```
2 MgmtIMA
1 Asynchronous Transfer Mode
2 TenGigE
19 GigabitEthernet/IEEE 802.3 interface(s)
8 FastEthernet
895k bytes of non-volatile configuration memory.
3515M bytes of compact flash card.
1635260k bytes of disk0: (Sector size 512 bytes).

Boot device on node 0/0/CPU0 is mem:
Package active on node 0/0/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
```

```
iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Boot device on node 0/1/CPU0 is mem:
Package active on node 0/1/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
```

```
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Boot device on node 0/2/CPU0 is mem:
Package active on node 0/2/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
```

```
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Boot device on node 0/3/CPU0 is mem:
Package active on node 0/3/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
```

```
c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Boot device on node 0/4/CPU0 is mem:
Package active on node 0/4/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
```

```
iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
Boot device on node 0/5/CPU0 is mem:
Package active on node 0/5/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
```

```
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Configuration register on node 0/6/CPU0 is 0x102
Boot device on node 0/6/CPU0 is disk0:
Package active on node 0/6/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-doc-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-doc-supp-4.2.4
    Built on Thu Dec 13 23:40:08 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
```

```
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mgbl-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mgbl-supp-4.2.4
    Built on Thu Dec 13 23:37:33 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mgbl, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mgbl-4.2.4
    Built on Thu Dec 13 23:37:33 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Boot device on node 0/7/CPU0 is mem:
Package active on node 0/7/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
```

```
c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Boot device on node 0/8/CPU0 is mem:
Package active on node 0/8/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
```

```
iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Configuration register on node 0/10/CPU0 is 0x102
Boot device on node 0/10/CPU0 is disk0:
Package active on node 0/10/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
```

```
c12k-doc-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-doc-supp-4.2.4
    Built on Thu Dec 13 23:40:08 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mgbl-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mgbl-supp-4.2.4
    Built on Thu Dec 13 23:37:33 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mgbl, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mgbl-4.2.4
    Built on Thu Dec 13 23:37:33 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
```

```
iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Boot device on node 0/11/CPU0 is mem:
Package active on node 0/11/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
```

```
iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Boot device on node 0/12/CPU0 is mem:
Package active on node 0/12/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
```

```
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Boot device on node 0/14/CPU0 is mem:
Package active on node 0/14/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
```

```
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

Boot device on node 0/15/CPU0 is mem:
Package active on node 0/15/CPU0:
c12k-os-mbi, V 4.2.4[Default], Cisco Systems, at disk0:c12k-os-mbi-4.2.4
    Built on Thu Dec 13 23:39:42 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-ce, V 4.2.4[Default], Cisco Systems, at disk0:c12k-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-ce, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-ce-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-fpd-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fpd-supp-4.2.4
    Built on Thu Dec 13 23:40:14 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-diags, V 4.2.4[Default], Cisco Systems, at disk0:c12k-diags-4.2.4
    Built on Thu Dec 13 23:40:02 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-diags, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-diags-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-mcast-supp, V 4.2.4[Default], Cisco Systems, at disk0:c12k-mcast-supp-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mcast, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mcast-4.2.4
    Built on Thu Dec 13 23:37:20 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-mpls, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-mpls-4.2.4
    Built on Thu Dec 13 23:37:12 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
```

```
c12k-fwding, V 4.2.4[Default], Cisco Systems, at disk0:c12k-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-fwding, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-fwding-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-routing, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-routing-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

iosxr-infra, V 4.2.4[Default], Cisco Systems, at disk0:iosxr-infra-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie

c12k-base, V 4.2.4[Default], Cisco Systems, at disk0:c12k-base-4.2.4
    Built on Thu Dec 13 23:37:48 PDT 2012
    By iox-bld2 in /auto/srcarchive6/production/4.2.4/all/workspace for pie
```

New Software Features on the Cisco XR 12000 Series Router

The following new software features are introduced in Cisco IOS XR Software Release 4.2.4 for the XR 12000 Router.

route-priority

To enable users to adjust the route-priority given to TE labels into the data plane, compared to labels and route updates from other protocols, use the **route-priority** command in MPLS-TE configuration mode. To return to the default behavior, use the **no** form of this command.

route-priority role {**middle**| **head** {**primary**| **backup**}} **queue** *queue*

no route-priority role {**middle**| **head** {**primary**| **backup**}}

Syntax Description

role	Defines the role of the tunnel to which the label belongs.
middle	A tunnel mid-point.
head backup	A tunnel head which is assigned as a FRR backup to an interface.
head primary	All other tunnel heads.

queue	Defines the queue number. Range is from 0 to 12 inclusive; lower values represent higher priority queues.

Command Default

head backup: 9

head primary: 10

middle: 10

Command Modes

MPLS-TE configuration

Command History

Release	Modification
Release 4.2.4	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use this command to change the priority given to TE labels when updates to the forwarding plane are made from the control plane.

The priority values used by other applications are:

- 0 - Unused
- 1 - Unused
- 2 - RIB/LDP (Critical)
- 3 - Unused
- 4 - Unused
- 5 - RIB/LDP (High)
- 6 - Unused
- 7 - Unused
- 8 - RIB/LDP (Medium)
- 9 - TE backup tunnel head
- 10 - Other TE tunnels
- 11 - Unused (future TE use)
- 12 - Unused (future TE use)

Caution The default prioritization of label updates from the control plane to the forwarding plane has been carefully chosen to avoid traffic loss under both normal operation and high system load, and to balance the needs of the various features that employ label switching. Changing these defaults may cause unpredictable behavior including traffic loss, especially when the router is experiencing high load. Use of this command is not recommended without proper understanding of its effects and possible side-effects.

Task ID

Task ID	Operations
mpls-te	read, write

The following example shows how to enable route-priority:

```
RP/0/0/CPU0:router(config)# mpls traffic-eng
RP/0/0/CPU0:router(config-mpls-te)# route-priority role middle queue 7
```

Related Commands

Command	Description
mpls traffic-eng	Enters MPLS-TE configuration mode.

New Hardware Features on the Cisco XR 12000 Series Router

There are no new hardware features introduced in Cisco IOS XR Software Release 4.2.4 for the XR 12000 Router.

Important Notes on Cisco IOS XR Software and Cisco XR 12000 Series Router

- **Default timestamp setting**—The timestamp prompt that precedes console output is enabled by default. 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*.
- **Country-specific laws, regulations, and licenses**—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 RSP removal**—For all card removal and replacement (including fabric cards, line cards, fan controller, and RSP) 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/0/4/CPU0:router(admin)#show environment power-supply table
Mon Sep 24 00:56:28.054 UTC
                  48V       Current
R/S/I     Module   (V)         (A)
0/24/*    PEM1       0          0       12000/6-AC-PEM= Intelligent AC PS
          PEM2      52         11       12000/6-AC-PEM= Intelligent AC PS
0/25/*    PEM1       0          0       12000/6-AC-PEM= Intelligent AC PS
          PEM2      52          9       12000/6-AC-PEM= Intelligent AC PS
```

To display the power used or total power or remaining power in chassis. Use the command **show power-mgr detail** command in EXEC mode.

```
RP/0/4/CPU0:router#show power-mgr detail
Mon Sep 24 00:53:54.518 UTC


Power management summary
------------------------
Powershelf type: AC Power Supplies
Operating phase: RUNNING_PHASE
Feature state  : Enabled
Operating mode : NON-REDUNDANT

       Total supply power: 1900 W
         Route processors: 60   W
                Linecards: 240  W
       Chassis components: 477  W
        Total inuse power: 777  W
                Remaining: 1123 W


PEM1 present, but unpowered
PEM2 present, supplying up to 1900 watts: uptime 0d01h39m

Slot   Cardtype                  Watts  Status
----   --------                 -----  ------
  1    12000-SIP-601=             240  powered
  4    PRP=                        60  powered
  16   GSR6-CSC=                   56  powered
  17   GSR6-CSC=                   56  powered
  18   GSR6-SFC=                   45  powered
  19   GSR6-SFC=                   45  powered
  20   GSR6-SFC=                   45  powered
  24   GSR6-ALRM=                  26  powered
  25   GSR6-ALRM=                  26  powered
  28   GSR6-BLOWER=               178  powered
```

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. This CLI needs to be turned on under IGP (OSPF/ISIS) under the respective AFI.

- **Disable/Enable RSVP Message Checksum** Starting with C isco 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.

- Starting from Cisco IOS XR Software Release 4.0.0, the **hw-module location <LOC> reload warm** command is disabled. As a result, the warm reload feature also has been disabled.

Minimum Flash Disk Requirements When Upgrading to Release 4.2.4

Cisco IOS XR Software Release 4.2.44.3.0 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 4.2.44.3.0. 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 4.2.4 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 and are not platform specific:

- **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.

  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.

- **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.

- **CSCub15328**

Basic Description:

underscore "_" in a RPL regexp does not match the start of a AS-SET segment denoted as {a, b, c, ...}.

Symptom:

The underscore symbol "_" in an RPL regexp does not match the start of a AS-SET segment denoted as {a, b, c, ...}.

Conditions:

When an RPL regexp is used in either inbound route-policy or outbound route-policy, the AS-PATH string contains AS-SET segment {a, b, c, ...}.

Workaround:

Use rpl native as-path semantics such as as-path neighbor-is, as-path originates-from or as-path passes-through instead of the regular expressions.

As-Path native semantics are more superior to ios regex. Use of regular expressions is computation intensive since regular expression is stored as a string.

- **CSCub98462**

Basic Description:

Radiusd mem leak occurred while executing all radius related CLI on router, which is used more than 10000 bytes for each and every radius CLI.

Symptom:

The **show radius** command triggers memory leak in 'radiusd' on routers with LC nodes, more so on MC (Multi-Chassis) routers than on SC routers.

Conditions:

The radius is configured on the router.

Workaround:

Use 'location' option with the **show radius** command to get statistics from a particular node. On non-BNG platforms (Carrier Routing System, Gigabit Switch Router, Aggregation Service Router) statistics from only dSC/dLRSC nodes are relevant because 'radiusd' that runs on other nodes are not used for non-BNG deployments. Therefore, dSC/dLRSC node-name can be given as input to 'location' option without any loss of functionality (statistics) of the **show radius** command.

Alternately, restart 'radiusd' if heap memory has accumulated.

- **CSCuc30874**

Basic Description:

MGMT fails to resolve NH in ingress LC(0/6/cpu0) if prefix and NH are from different VRF (V500:U31) and imported via export-map.

Symptom:

Routes imported from another vrf (on another LC) shows as unresolved in cef.

Conditions:

When prefix (from a vrf on a LC) is exported via export route-policy with additive route-target instead of export route-target configuration to another vrf on another LC.

Workaround:

Use export route-target configuration to export the routes in stead of route-policy or disable selective vrf download.

- **CSCuc95942**

  Basic Description:

  The snmpd process crashes with a SIGSEGV - Segementation Fault.

  Symptom:

  The snmpd process crashes with a SIGSEGV - Segementation Fault. This behavior is inconsistent.

  Conditions:

  The problem occurs shortly after the router upgrades without any changes in SNMP polling or configuration.

  Workaround:

  None. The process recovers automatically after the crash.

- **CSCud64916**

  Basic Description:

  The pifibm_server_lc process crashes on the line card.

  Symptom:

  The pifibm_server_lc process crashes on the line card.

  Conditions:

  The crash is observed during the router reload, line card reload, or commit replace scenarios.

  Workaround:

  None. The process recovers automatically after the crash.

Caveats Specific to the Cisco XR 12000 Series Router

There are no caveats specific to the Cisco XR 12000 Series Router in this release.

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, see 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 router software documentation is located at the following URL:

http://www.cisco.com/en/US/products/ps5763/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, at:

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

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