Release Notes for Cisco XR 12000 Series Router for Cisco IOS XR Software Release 4.1

February 6, 2013

Cisco IOS XR Software Release 4.1

Text Part Number OL-24746-01

These release notes describe the features provided in the Cisco IOS XR Software Release 4.1 for the Cisco XR 12000 Series Router and are updated as needed.

Note For information on the Cisco XR 12000 Series Router running Cisco IOS XR Software Release 4.1, see the "Important Notes" section on page 32.

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 4.1, see the "Caveats" section on page 35. The caveats are updated for every release and are described at www.cisco.com.

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

http://www.cisco.com/public/support/tac/fn_index.html

Contents

These release notes contain the following sections:

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

Introduction

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

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

- **IP and Routing**—Supports a wide range of IPv4 and IPv6 services and routing protocols; such as Border Gateway Protocol (BGP), Routing Information Protocol (RIPv2), Intermediate System-to-Intermediate System (IS-IS), Open Shortest Path First (OSPF), IP Multicast, Routing Policy Language (RPL), Hot Standby Router Protocol (HSRP), and Virtual Router Redundancy Protocol features (VRRP).
- **BGP Prefix Independent Convergence**—Provides the ability to converge BGP routes within sub seconds instead of multiple seconds. The Forwarding Information Base (FIB) is updated, independent of a prefix, to converge multiple 100K BGP routes with the occurrence of a single failure. This convergence is applicable to both core and edge failures and with or with out MPLS. This fast convergence innovation is unique to Cisco IOS XR software.
- **Multiprotocol Label Switching (MPLS)**—Supports MPLS protocols, including Traffic Engineering (TE), Resource Reservation Protocol (RSVP), Label Distribution Protocol (LDP), Virtual Private LAN Service (VPLS), and Layer 3 Virtual Private Network (L3VPN).
- **Multicast—**Provides comprehensive IP Multicast software including Source Specific Multicast (SSM) and Protocol Independent Multicast (PIM) in Sparse Mode only.
- **Quality of Service (QoS)—**Supports QoS mechanisms including policing, marking, queuing, random and hard traffic dropping, and shaping. Additionally, Cisco IOS XR software also supports modular QoS command-line interface (MQC). MQC is used to configure QoS features.
- **Manageability—**Provides industry-standard management interfaces including modular command-line interface (CLI), Simple Network Management Protocol (SNMP), and native Extensible Markup Language (XML) interfaces. Includes a comprehensive set of Syslog messages.
- **Security—**Provides comprehensive network security features including access control lists (ACLs); routing authentications; Authentication, Authorization, and Accounting (AAA)/Terminal Access Controller Access Control System (TACACS+); Secure Shell (SSH); Management Plane Protection (MPP) for management plane security; and Simple Network Management Protocol version3 (SNMPv3). Control plane protections integrated into line card Application-Specific Integrated Circuits (ASICs) include Generalized TTL Security Mechanism (GTSM), RFC 3682, and Dynamic Control Plane Protection (DCPP).

- **Craft Works Interface (CWI)—**CWI is a client-side application used to configure and manage Cisco routers. Management and configuration features include fault, configuration, security, and inventory, with an emphasis on speed and efficiency. The CWI provides a context-sensitive graphical representation of the objects in a Cisco router, simplifying the process of configuring and managing the router. The CWI allows you to log in to multiple routers and perform management tasks.
- **Availability—**Supports rich availability features such as fault containment, fault tolerance, fast switchover, link aggregation, nonstop routing for ISIS, LDP, BGP, and OSPF, and nonstop forwarding (NSF).
- **Multicast service delivery in SP NGN—**MVPNv4 support carries multicast traffic over an ISP MPLS core network.
- **IPv6 Provider Edge Router support for IPv6 applications**—Delivers IPv6 traffic over an IPv4/MPLS core with IPv6 provider edge router (6PE) support.
- **IPv6 VPN over MPLS (6VPE) support**—Delivers IPv6 VPN over MPLS (IPv6) VPN traffic over an IPv4 or MPLS core with 6VPE support.
- **6VPE over L2TPv3 support**—Delivers IPv6 VPN traffic over L2TPv3 core with 6VPE support. This feature is also available on Cisco IOS software.
- **Enhanced core competencies:**
  - IP fast convergence with Fast Reroute (FRR) support for Intermediate System-to-Intermediate System (IS-IS) and OSPF
  - Path Computation Element (PCE) capability for traffic engineering
- **L2TPv3 Tunneling Mechanism—**Service Providers who do not use MPLS in the core, but want to offer VPN services can use the L2TPv3 tunneling mechanism. This feature support includes IPv4 (VPNv4) and IPv6 (6VPE) VPN services using L2TPv3 encapsulation. The L2TPv3 packet is encapsulated in an IPv4 delivery header and is carried across an IPv4 backbone. VPN prefixes are advertised with BGP labels and resolved over L2TPv3 tunnels. This feature is supported only on the Cisco XR 12000 Series Router.

For more information about new features provided on the Cisco XR 12000 Series Router for Cisco IOS XR Software Release 4.1, see the "New Features in Cisco IOS XR Software Release 4.1" section on page 30 in this document.

System Requirements

This section describes the system requirements for Cisco IOS XR Software Release 4.1 supported on the Cisco XR 12000 Series Router. The system requirements include the following information:

To determine the software versions or levels of your current system, see the "Determining Your Software Version" section on page 14.

Feature Set Table

Cisco IOS XR software is packaged in *feature sets* (also called *software images*). Each feature set contains a specific set of Cisco IOS XR Software Release 4.1 features.

Table 1 lists the Cisco IOS XR software feature set matrix (PIE files) and associated filenames available for Cisco IOS XR Software Release 4.1, supported on the Cisco XR 12000 Series Router.

Table 1 Cisco XR 12000 Series Router Supported Feature Set (Cisco IOS XR Software Release 4.1 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini.pie-4.1.0	Contains the required core packages, including OS, Admin, Base, Forwarding, Routing, SNMP Agent, and Alarm Correlation.
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini.vm-4.1.0	Contains the required core packages including OS, Admin, Base, Forwarding, and Routing SNMP Agent, and Alarm Correlation.
Optional Individual Packages[1]		
Cisco IOS XR Manageability Package	c12k-mgbl.pie-4.1.0	CORBA[2] agent, XML Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	c12k-mpls.pie-4.1.0	MPLS-TE,[3] LDP, [4]MPLS Forwarding, MPLS OAM,[5] LMP,[6] OUNI,[7] and RSVP.[8]
Cisco IOS XR Multicast Package	c12k-mcast.pie-4.1.0	Multicast Routing Protocols (PIM,[9] MSDP,[10] IGMP,[11] Auto-RP, BSR[12]), Tools (SAP MTrace, MRINFO), and Infrastructure (MRIB,[13] MURIB,[14] MFWD)[15].
Cisco IOS XR Security Package	c12k-k9sec.pie-4.1.0	Support for Encryption, Decryption, IPSec[16], SSH,[17] SSL,[18] and PKI.[19] Software based IPSec support: maximum of 500 tunnels
Cisco IOS XR Standby RP Boot Image	mbiprp-rp.vm-4.1.0	Support for booting the Standby RP on a Cisco XR 12000 Series Router.
Cisco IOS XR FPD Package	c12k-fpd.pie-4.1.0	Firmware for shared port adapters (SPA) and for fixed port line cards supported in Cisco IOS XR.

Table 1 Cisco XR 12000 Series Router Supported Feature Set (Cisco IOS XR Software Release 4.1 PIE Files) (continued)

Feature Set	Filename	Description
Cisco IOS XR Diagnostic Package	c12k-diags.pie-4.1.0	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	c12k-doc.pie-4.1	.man pages for Cisco IOS XR software on the Cisco XR 12000 Series Router chassis.

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

Table 2 lists the Cisco XR 12000 Series Router TAR files.

Table 2 Cisco XR 12000 Series Router Supported Feature Sets (Cisco IOS XR Software Release 4.1 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	XR12000-iosxr-4.1.0.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package
Cisco IOS XR IP/MPLS Core Software 3DES	XR12000-iosxr-k9-4.1.0.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package • Cisco IOS XR Security Package

Memory Requirements

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

The minimum memory requirements for a Cisco XR 12000 Series Router running Cisco IOS XR Software Release 4.1 consist of the following:

- 2-GB route memory on performance route processor 2 (PRP-2)
  However, a 4-GB route memory on PRP-2 is required if BGP is enabled or other applications are running on the router.
- 2-GB or greater ATA flash storage on PRP-2
- 4-GB route memory on performance route processor 3 (PRP-3)
- 2-GB or greater Compact flash storage on PRP-3
- 1-GB line card route memory on all Engine 3 line cards
- 1-GB line card memory on Engine 5-based SPA interface processor (SIP-600)
  - The default route memory on the 12000-SIP-600 is 1GB
- 2-GB line card memory on all Engine 5-based SPA interface processors (SIPs)
  - The default route memory on the 12000-SIP-401, 501, and 601 is 2 GB.

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

- 2-GB PCMCIA Flash Disk

Hardware Supported

All hardware features are supported on Cisco IOS XR software, subject to the memory requirements specified in the "Memory Requirements" section on page 6.

Table 3 lists the supported hardware components on the Cisco XR 12000 Series Router and the minimum required software versions. For more information, see the "Determining Your Software Version" section on page 14.

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

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

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

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

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

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

Component	Part Number	Support from Version
1-Port Channelized OC-12/DS0 Shared Port Adapters	SPA-1XCHOC12/DS0	3.5
1-Port Channelized STM-1/OC-3 to DS0 Shared Port Adapter	SPA-1XCHSTM1/OC3	3.5
1-Port OC-48c/STM-16 POS/RPR Shared Port Adapter	SPA-1XOC48POS/RPR	3.5
2-Port OC-12c/STM-4 POS Shared Port Adapter	SPA-2XOC12-POS	3.5
4-Port OC-12c/STM-4 POS Shared Port Adapter	SPA-4XOC12-POS	3.5
4-Port OC-3c/STM-1 POS Shared Port Adapter	SPA-4XOC3-POS-V2	3.5
8-Port OC-12c/STM-4 POS Shared Port Adapter	SPA-8XOC12-POS	3.5
8-Port OC-3c/STM-1 POS Shared Port Adapter	SPA-8XOC3-POS	3.5
Cisco 8-Port Channelized T1/E1 Shared Port Adapter	SPA-8XCHT1/E1	3.6
Cisco 1-Port Channelized OC-48/DS3 Optical Packet Processor Shared Port Adapter	SPA-1XCHOC48/DS3	3.6
1-Port Clear Channel OC-3 ATM SPA	SPA-1XOC3-ATM-V2	3.7
3-Port Clear Channel OC-3 ATM SPA	SPA-3XOC3-ATM-V2	3.7
1-Port Clear Channel OC-12 ATM SPA	SPA-1XOC12-ATM-V2	3.7
2-Port Channelized T3/E3 ATM CEoP SPA	SPA-2CHT3-CE-ATM	3.7
24-Port Channelized T1/E1 ATM CEoP SPA	SPA-24CHT1-CE-ATM	4.0.1
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

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

Component	Part Number	Support from Version
Cisco 1-Port Channelized OC-12 line card	CHOC12/DS1-SR-SC	3.8
Cisco 4-Port Channelized OC-12 line card	4CHOC12/DS3-I-SCB	3.8

Software Compatibility

Cisco IOS XR Software Release 4.1 is compatible with the following Cisco XR 12000 Series Router systems:

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

The following chassis are supported for an existing installed base:

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

Note If you are running Cisco IOS XR software on a Cisco XR120xx system with SIP 600, 401, 501, or 601, you must upgrade the fabric. For ROMMON, MBUS, and Fabric Downloader versions, see the "Other Firmware Support" section on page 13.

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

```
RP/0/8/CPU0:ios(admin)#show fpd package
==================================== ========================================
                                     Existing Field Programmable Devices
                                     ========================================
                                       HW                          Current SW Upg/
Location     Card Type               Version Type Subtype Inst   Version   Dng?
============ ======================= ======= ==== ======= ==== =========== ====
0/0/0        SPA-5X1GE-V2              1.2   spa  fpga1   0       1.10     No
-------------------------------------------------------------------------------------
0/0/1        SPA-4XT3/E3               1.0   spa  fpga1   1       1.01     No
                                             spa  rommon  1       2.12     No
                                             spa  fpga2   1       1.04     No
                                             spa  fpga3   1       1.04     No
-------------------------------------------------------------------------------------
0/0/2        SPA-4XOC12-POS            1.0   spa  fpga1   2       1.00     No
-------------------------------------------------------------------------------------
```

```
0/0/3        SPA-8XCHT1/E1              1.0   spa  fpga1   3       2.08     No
                                              spa  rommon  3       2.12     No
-------------------------------------------------------------------------------
0/1/1        SPA-1XCHOC12/DS0           1.0   spa  rommon  1       2.02     No
                                              spa  fpga1   1       1.36     No
                                              spa  fpga2   1       1.00     No
-------------------------------------------------------------------------------
0/1/2        SPA-4XOC3-POS-V2           1.0   spa  fpga1   2       1.00     No
-------------------------------------------------------------------------------
0/2/0        SPA-10X1GE-V2              1.1   spa  fpga1   0       1.10     No
-------------------------------------------------------------------------------
0/2/1        SPA-2CHT3-CE-ATM           1.0   spa  fpga1   1       2.22     No
                                              spa  rommon  1       1.04     No
                                              spa  fpga2   1       1.10     No
-------------------------------------------------------------------------------
0/3/0        SPA-5X1GE                  2.2   spa  fpga1   0       1.10     No
-------------------------------------------------------------------------------
0/3/1        SPA-2XOC48POS/RPR          1.0   spa  fpga1   1       1.00     No
-------------------------------------------------------------------------------
0/4/0        SPA-OC192POS-XFP           2.1   spa  fpga1   0       1.02     No
-------------------------------------------------------------------------------
0/4/1        SPA-1XCHOC48/DS3           1.0   spa  rommon  1       2.02     No
                                              spa  fpga1   1       1.36     No
                                              spa  fpga2   1       1.00     No
                                              spa  fpga3   1       1.00     No
                                              spa  fpga2   1       1.00     No
                                              spa  fpga3   1       1.00     No
-------------------------------------------------------------------------------
0/4/2        SPA-8X1FE                  1.2   spa  fpga1   2       1.01     No
-------------------------------------------------------------------------------
0/8/CPU0     E3-OC3-ATM-4               N/A   lc   fpga1   0   40977.00     No
                                              lc   fpga2   0   40971.00     No
                                              lc   fpga3   0   41091.00     No
                                              lc   fpga4   0   45586.00     No
-------------------------------------------------------------------------------
0/10/0       SPA-8XCHT1/E1              1.5   spa  fpga1   0       2.08     No
                                              spa  rommon  0       2.12     No
-------------------------------------------------------------------------------
0/10/2       SPA-4XCT3/DS0              1.2   spa  fpga1   2       2.08     No
                                              spa  rommon  2       2.12     No
                                              spa  fpga2   2       1.04     No
-------------------------------------------------------------------------------
0/11/CPU0    E3-OC12-CH-1             223.1   lc   fpga1   0       1.02     No
-------------------------------------------------------------------------------
0/12/0       SPA-1XCHOC48/DS3           1.0   spa  rommon  0       2.02     No
                                              spa  fpga1   0       1.36     No
                                              spa  fpga2   0       1.00     No
                                              spa  fpga3   0       1.00     No
-------------------------------------------------------------------------------
0/12/1       SPA-4XT3/E3                1.1   spa  fpga1   1       1.01     No
                                              spa  rommon  1       2.12     No
                                              spa  fpga2   1       1.04     No
                                              spa  fpga3   1       1.04     No
-------------------------------------------------------------------------------
0/12/3       SPA-1XCHSTM1/OC3           2.0   spa  fpga1   3       1.08     No
                                              spa  rommon  3       2.12     No
                                              spa  fpga2   3       1.04     No
-------------------------------------------------------------------------------
```

Other Firmware Support

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

- Line cards (LCs)

  For Engine 3 line card:

  - Maintenance Bus (MBUS) Agent Software-RAM version 4.7, ROM version 4.7
  - ROM Monitor version 19.0
  - Fabric Downloader - RAM version 10.1 , ROM version 10.1 (The ROM version will be the same as the RAM version if upgraded.)

  For Engine 5 line card:

  - Maintenance Bus (MBUS) Agent Software-RAM version 4.7, ROM version 4.7
  - ROM Monitor version 19.0
  - Fabric Downloader - RAM version 6.1, ROM version 6.1 (The ROM version will be the same as the RAM version if upgraded.)

- Route processors (RPs)

  For Performance Route Processor 2 (PRP-2):

  - Maintenance Bus (MBUS) Agent Software-RAM version 4.7, ROM version 4.7
  - ROM Monitor version 1.24

  For Performance Route Processor 3 (PRP-3):

  - Maintenance Bus (MBUS) Agent Software-RAM version 4.7, ROM version 4.7
  - ROM Monitor version 1.4.0

Minimum Firmware Requirement

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

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

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

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

RMA Card Firmware Upgrade Procedure:

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

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

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

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

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

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

- The list of minimum supported firmware versions is available online in this matrix:

  http://www.cisco.com/web/Cisco_IOS_XR_Software/pdf/XR12000SoftwareFirmwareCompatibilityMatrix.pdf

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

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

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

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

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

  http://www.cisco.com/en/US/docs/routers/xr12000/software/xr12k_r40/system_management/command/reference/yr40xr12k_chapter7.html

Requirement of Cisco IOS Image Level and Boot Helper Version for Migration

If you are migrating from Cisco IOS to Cisco IOS XR software on the Cisco XR 12000 Series Router, you must have the following minimum Cisco IOS image level and Boothelper version to support Release 4.1:

- Cisco IOS image—12.0(32)S
- Cisco IOS Boothelper—12.0(32)S0a

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

Determining Your Software Version

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

Step 1 Establish a Telnet session with the router.

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

```
RP/0/4/CPU0:router#show version

Cisco IOS XR Software, Version 4.1.0[Default]
Copyright (c) 2011 by Cisco Systems, Inc.
```

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

PE1_IP uptime is 3 hours, 44 minutes
System image file is "disk0:c12k-os-mbi-4.1.0/mbiprp-rp.vm"

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

7 Cisco 12000 Series SPA Interface Processor-601/501/401
1 1 port ISE OC48 channelized STS-12c/STM-4, STS-3c/STM-1 or DS3/E3 Controller (1 SONET)
1 Cisco 12000 4 Port Gigabit Ethernet Controller (4 GigabitEthernet)
1 Cisco 12000 4-Port ISE ATM Over SONET OC3/STM-1 Controller (4 ATM)
1 1 Port ISE Packet Over SONET OC-48c/STM-16 Controller (1 POS)
1 1 Port ISE OC12 Channelized to DS1/E1 Single Mode/IR LC connector Controller (1 SONET)
1 4 port ISE OC12 channelized STS-3c/STM-1 or DS3/E3 Controller (4 SONET)
2 Cisco 12000 Series Performance Route Processors
6 Management Ethernet
26 SONET/SDH
33 Asynchronous Transfer Mode
12 Packet over SONET/SDH
105 T3
109 Serial network interface(s)
24 GigabitEthernet/IEEE 802.3 interface(s)
29 PLIM_QOS
6 MgmtMultilink
133 Multilink network interface(s)
496 Serial network interface(s)
184 T1
8 FastEthernet
1 MgmtIMA
1018k bytes of non-volatile configuration memory.
4020M bytes of compact flash card.
2043M bytes of hard disk.
2062432k bytes of disk0: (Sector size 512 bytes).
65536k bytes of Flash internal SIMM (Sector size 256k).
2062432k bytes of disk0: (Sector size 512 bytes).
65536k bytes of Flash internal SIMM (Sector size 256k).

Boot device on node 0/0/CPU0 is mem:
Package active on node 0/0/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
```

```
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/1/CPU0 is mem:
Package active on node 0/1/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
```

```
iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/2/CPU0 is mem:
Package active on node 0/2/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
Package active on node 0/2/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
```

```
iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/3/CPU0 is mem:
Package active on node 0/3/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
```

```
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/4/CPU0 is mem:
Package active on node 0/4/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
```

```
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/6/CPU0 is mem:
Package active on node 0/6/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
```

```
c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/7/CPU0 is mem:
Package active on node 0/7/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
```

```
c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/8/CPU0 is mem:
Package active on node 0/8/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
```

```
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/9/CPU0 is mem:
Package active on node 0/9/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
```

```
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/10/CPU0 is mem:
Package active on node 0/10/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
```

```
c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/11/CPU0 is mem:
Package active on node 0/11/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
```

```
c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/12/CPU0 is mem:

Boot device on node 0/12/CPU0 is mem:
Package active on node 0/12/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
```

```
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Boot device on node 0/13/CPU0 is mem:
Package active on node 0/13/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Configuration register on node 0/14/CPU0 is 0x102
```

```
Boot device on node 0/14/CPU0 is disk0:
Package active on node 0/14/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mgbl, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mgbl-4.1.0
    Built on Sun Apr 24 04:37:09 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-doc-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-doc-supp-4.1.0
    Built on Sun Apr 24 05:35:21 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mgbl-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mgbl-supp-4.1.0
    Built on Sun Apr 24 04:37:09 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
```

```
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

Configuration register on node 0/15/CPU0 is 0x102
Boot device on node 0/15/CPU0 is disk0:
Package active on node 0/15/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fwding, V 4.1.0[00], Cisco Systems, at disk0:c12k-fwding-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-ce, V 4.1.0[00], Cisco Systems, at disk0:c12k-ce-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 04:36:23 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mgbl, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mgbl-4.1.0
    Built on Sun Apr 24 04:37:09 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-doc-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-doc-supp-4.1.0
    Built on Sun Apr 24 05:35:21 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 04:37:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-fpd-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.0
    Built on Sun Apr 24 05:35:32 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-diags, V 4.1.0[00], Cisco Systems, at disk0:c12k-diags-4.1.0
```

```
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
    Built on Sun Apr 24 05:10:12 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mgbl-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mgbl-supp-4.1.0
    Built on Sun Apr 24 04:37:09 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.0
    Built on Sun Apr 24 04:36:42 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-base, V 4.1.0[00], Cisco Systems, at disk0:c12k-base-4.1.0
    Built on Sun Apr 24 04:37:43 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie

c12k-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.0
    Built on Sun Apr 24 04:41:19 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/c12k/workspace for pie
```

New Features in Cisco IOS XR Software Release 4.1

The following sections contain information on new features and enhancements in Cisco IOS XR Software Release 4.1:

- New Software Features on the Cisco XR 12000 Series Router, page 30
- New Hardware Features on the Cisco XR 12000 Series Router, page 32

Note Cisco Session Border Controller (SBC) is not supported on any platform in Cisco IOS XR Software Release 4.1. Cisco IOS XR Software Release 3.7 is the last release that supports SBC.

New Software Features on the Cisco XR 12000 Series Router

The following new software features were introduced in Cisco IOS XR Software Release 4.1 on the Cisco XR 12000 Series Router platform:

- Link Bundling—The link bundle interface is enabled to be used as an edge-facing interface by providing the following features:
  - ACL
  - Mac Accounting
  - 6PE with link bundles on the edge (with MPLS core)
  - L2TPv3 with core-facing link bundles
  - PIMv6
  - uRPF
  - MVPNv4 with edge-facing link bundles
  - L2VPN

  - BFD On bundle members (Ethernet and POS SPAs only as supported by the Cisco XR 12000 SIP-600, SIP-401, SIP-501 and SIP-601)
  - Unequal BW

  For more information, refer to the *Cisco IOS XR Interface and Hardware Component Configuration Guide for the Cisco XR 12000 Series Router.*

- Selective VRF Download—This feature allows the download of only those prefixes and labels to a line card that are actively required to forward traffic through that line card.

  For more information on SVD, refer to the *Cisco IOS XR Routing Configuration Guide for the Cisco XR 12000 Series Router.*

- Configuring ITU-T Y.1731 Fault Management Functions—The following E-OAM features are supported in this release:
  - Service Level Agreement (SLA) Y.1731
  - Alarm Indication Signal (AIS) Y.1731
  - CFM support on L2TPv3 xconnects
  - Ethernet Fault Detection

  For more information, refer to the *Cisco IOS XR Interface and Hardware Component Configuration Guide for the Cisco XR 12000 Series Router.*

- N-Tuple Hashing—To provide better load balancing across equal cost paths, a new 7-tuple hash algorithm that uses additional Layer 4 information from the Layer 3 packet is introduced.

  For more information on N-Tuple Hashing, refer to the *Cisco IOS XR IP Addresses and Services Configuration Guide for the Cisco\n XR 12000 Series Router.*

- MPLS VPN OSPFv3 PE-CE—This feature provides support for Open Shortest Path First Version 3 (OSPFv3) Routing Protocol between provider edge-to-customer edge (PE-CE) router over IPv6 L3VPN.

  For more information, refer to the *Cisco IOS XR Virtual Private Network Configuration Guide for the Cisco XR 12000 Series Router.*

- Single Image Solution—This feature allows a standby PRP2 or a PRP2 in named SDRs to boot from an active RP without the need to boot with the mbiprp-rp.vm image.

- Call Home—Call Home provides an email-based notification for critical system policies. A range of message formats are available for compatibility with pager services or XML-based automated parsing applications. You can use this feature to page a network support engineer, email a Network Operations Center, or use Cisco Smart CallHome services to generate a case with the Technical Assistance Center. The Call Home feature can deliver alert messages containing information about diagnostics and environmental faults and events.

  For more information about the Call Home feature, refer to the *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router* and the *Cisco IOS XR System Management Command Reference for the Cisco XR 12000 Series Router.*

- Virtual Router Redundancy Protocol (VRRP) over IPv6—This feature supports virtual IPv6 addresses. VRRP Version 3 is implemented for both IPv4 and IPv6. The feature also includes VRRP support for IPv6 VRFs and BFD.

  For more information, refer to the *Cisco IOS XR IP Addresses and Services Configuration Guide for the Cisco XR 12000 Series Router.*

- MPLS VPN OSPFv3 PE-CE—This feature provides support for OSPFv3 routing protocol between provider edge-to-customer edge (PE-CE) router over IPv6 L3VPN.

For more information, refer to the *Cisco IOS XR Virtual Private Network Configuration Guide for the Cisco XR 12000 Series Router.*

- BGP: RT Constrained Route Distribution—This feature is used to reduce the number of unnecessary routing updates that route reflectors (RRs) send to PEs. The reduction in routing updates saves resources.

  For more information, refer to the *Cisco IOS XR Routing Configuration Guide for the Cisco XR 12000 Series Router.*

- Other features that are supported on the Cisco XR 12000 Series Router:
  - Disk Corruption Recovery
  - VRF aware TACACS+
  - BCDLv2
  - NTP Enhancements for RP/LC

New Hardware Features on the Cisco XR 12000 Series Router

No new hardware was introduced on the Cisco XR 12000 Series Router in Cisco IOS XR Software Release 4.1.

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

- *Cisco XR 12000 Series Router SIP and SPA Hardware Installation Guide*
- *Cisco Interface and Hardware Component Configuration Guide for the Cisco XR 12000 Series Router, Release 4.1*

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

Important Notes

- **Default timestamp setting**—The timestamp prompt that precedes console output is enabled by default in Cisco IOS XR Release 3.8. To disable the timestamp prompt, use the **no service timestamp** command. For more information, refer to the *Cisco IOS XR System Management Command Reference for the Cisco XR 12000 Series Router.*
- From Cisco IOS XR Software Release 3.6.0, WRED statements are collapsed in that if different random-detect statements using the same match types (EXP, DSCP, Prec, and so forth) are entered with identical minimum and maximum threshold values, a single configuration line is shown in the output of **show running config**. This reduces the length of the configuration but creates a problem with backward compatibility with previous releases. In such a situation, on rollback, the QoS policy is rejected and must be manually entered again.

  Configuration prior to Cisco IOS XR Software Release 3.6.0:

```
Policy-map wred_example
   Class class-default
       random-detect exp 0 384 packets 484 packets
       random-detect exp 1 384 packets 484 packets
       random-detect exp 2 384 packets 484 packets
       random-detect exp 3 484 packets 584 packets
       random-detect exp 4 484 packets 584 packets
```

```
       random-detect discard-class 0 384 packets 484 packets
      random-detect discard-class 1 384 packets 484 packets
      random-detect discard-class 2 484 packets 584 packets
      bandwidth remaining percent 20
```

Cisco IOS XR Software Release 3.6.0 and later releases:

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

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

- **Country-specific laws, regulations, and licences—**In certain countries, use of these products may be prohibited and subject to laws, regulations, or licenses, including requirements applicable to the use of the products under telecommunications and other laws and regulations; customers must comply with all such applicable laws in the countries in which they intend to use the products.
- **Migrating from Cisco IOS to** Cisco IOS XR **Software on the Cisco XR 12000 Series Router—**When migrating a Cisco XR 12000 Series Router from Cisco IOS to Cisco IOS XR software, follow the instructions provided in *Migrating from Cisco IOS to* Cisco IOS XR *Software on the Cisco XR 12000 Series Router.*
- **Card, fan controller, and RP removal—**For all card removal and replacement (including fabric cards, line cards, fan controller, and RP) follow the instructions provided by Cisco to avoid impact to traffic. See the *Cisco IOS XR Getting Started Guide for the Cisco XR 12000 Series Router* for procedures.
- **Exceeding Cisco testing—**If you intend to test beyond the combined maximum configuration tested and published by Cisco, contact your Cisco Technical Support representative to discuss how to engineer a large-scale configuration maximum for your purpose.
- **More power required for Cisco SIP line cards (SIP-401/501/600/601) on the Cisco XR 12000 Series Router—**These line cards draw more power than previous generation line cards. Depending on the exact configuration of power entry modules (PEMs) and other cards in the chassis, there may not be enough power available when inserting a new card or removing a PEM. Before you insert a new card or remove a PEM, run the following command in **admin** mode:

```
RP/0/0/CPU0:router# admin
RP/0/0/CPU0:router# show environment power-supply table
48V       Current
R/S/I     Module      (V)           (A)
0/24/*    PEM1         54             4
          PEM2         53             4
0/25/*    PEM1         54             4
          PEM2         53             4

Total Power Supplies:                  3200W
        Redundant Power Supplies:              1600W
        Worst Case Power Used:                  621W
```

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

PID                 Description                                          Watts
---                 -----------                                          -----
GRP-B               Route Processor                                         38
PRP-1               Cisco 12000 Series Performance Route Processor          60
LC-4OC-3-POS-SM     4 Port Packet Over SONET OC-3c/STM-1                    80
4OC3X/POS-MM-MJ-B   4 port ISE OC3                                          90
```

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

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

- **Per-interface Internet Control Message Protocol (ICMP) disable** feature is not supported on the Cisco XR 12000 Series Router.
- **Online Diagnostics is not supported on the Cisco XR 12000 Series Router—**If you execute the **diagnostic** command, an error appears stating that there is no online diagnostics process running on the router.
- The **rp mgmtethernet forwarding** command is not supported on the Cisco XR 12000 Series Router.
- Enabling the Lawful Interface feature triggers the L2-PRECAM-2-HW_RESOURCE_FAILURE message on Engine-3 linecards. This error reflects that your configuration has used up all available look-up registers (LUREGs).

  There is no direct workaround for this issue as its a hardware limitation. Only way to recover from this issue is to reduce feature scale. You need to identify the features which use LUREG at PreCAM1 and remove one or more of the features depending on LUREG requirements of the feature being added.
- **mpls traffic engineering igp-intact** command—This command must be used only when policy based tunnel selection is configured for all tunnels originating on the device.
- **Disable/Enable RSVP Message Checksum** Starting with Cisco IOS XR Software Release 4.0.2, RSVP will, by default, compute and set the checksum field in all outgoing RSVP messages. Also, RSVP will verify the checksum field on all RSVP messages received to insure RSVP message integrity.

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

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

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

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

Minimum Flash Disk Requirements When Upgrading to Release 4.1

Cisco IOS XR Software Release 4.1 requires a 2-GB Flash Disk as a minimum. If your Cisco XR 12000 Series Router currently uses a 1-GB Flash Disk, you must upgrade it to 2-GB before upgrading to Cisco IOS XR Software Release 4.1. 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 4.1 software and those specific to the Cisco XR 12000 Series Router.

Cisco IOS XR Caveats

- **CSCtn02761**

  Basic Description:

  IPv6 svd role shown as "Standard" even without any ip config on ints.

  Symptom:

  This occurs when there is an incorrect role calculation for IPv6 AFI. A typical occurrence would be enabling IPv6 ACL on the interface which is being used only for IPv4 forwarding. This causes SVD infra to assume that IPv6 forwarding is also intended on the interface and the SVD card role would change to Core/Customer/Standard based on the usual role calculation rules. Incorrect role calculation could cause more VRFs/prefixes to be downloaded on the card as an impact. There should not be any forwarding impact due to this caveat.

  Conditions:

IPv6 Features (for example, IPv6 ACL, IPv6 MTU, and so forth) are enabled on the interface without assigning it an IPv6 address (Global or LinkLocal) via ipv6 address or ipv6 enable command.

```
RP/0/5/CPU0:ios#show running-config interface GigabitEthernet0/1/2/3
interface GigabitEthernet0/1/2/3
 :
 ipv6 access-group test ingress
 ipv6 bgp policy accounting input source-accounting destination-accounting
 ipv6 mtu 1300
 ipv6 verify unicast source reachable-via rx
 :

RP/0/5/CPU0:ios#show im database interface GigabitEthernet 0/0/0/0

View: OWN - Owner, L3P - Local 3rd Party, G3P - Global 3rd Party,
      LDP - Local Data Plane, GDP - Global Data Plane, RED - Redundancy

Node 0/0/CPU0 (0x821)

Interface GigabitEthernet0/1/2/3, ifh 0x04000080 (down, 1514)
  Interface flags:          0x000000000010059f (IFCONNECTOR|IFINDEX
                            |SUP_NAMED_SUB|BROADCAST|CONFIG|HW|VIS|DATA
                            |CONTROL)
  Encapsulation:            ether
  Interface type:           IFT_GETHERNET
  Control parent:           None
  Data parent:              None
  Views:                    GDP|LDP|L3P|OWN

  Protocol        Caps (state, mtu)
  --------        -----------------
  None            ether (down, 1514)
  arp             arp (down, 1500)
  ipv4            ipv4 (down, 1500)
  mpls            mpls (down, 1500)
  ipv6            ipv6_preswitch (down, 1500)
  ipv6            ipv6 (down, 1300)
  ether_sock      ether_sock (down, 1500)
```

Workaround:

None.

Recovery:

Remove the IPv6 features from the interfaces which are not being used for IPv6 forwarding. If an interface on which IPv6 features were enabled and then VRF was configured on the interface, the process restart rsi_agent on the node where the interface is hosted is also required.

For the interfaces not being used for IPv6:

```
RP/0/5/CPU0:ios(config)#interface GigabitEthernet 0/1/2/3
RP/0/5/CPU0:ios(config-if)#no ipv6 access-group test egress
RP/0/5/CPU0:ios(config-if)#no ipv6 mtu
::
RP/0/5/CPU0:ios#process restart rsi_agent location 0/0/CPU0
```

- **CSCtn83882**

  Basic Description:

  4-10GE-ITU/C and 16OC48-POS/DPT have hierarchy issue in entity mib.

Symptom:

In the ENTITY-MIBs entPhysicalTable, some of the 'portslot' entities for a PLIM only show up when polled via community-strings or usernames with the SystemOwner configuration attribute.

- entPhysicalName of the format "portslot 0/0/CPU0/3"
- entPhysicalDescr = "PLIM Optics Port Slot"
- entPhysicalClass = 'container'

Conditions:

This issue occurs when the PLIM with entPhysicalName equals "Cisco CRS-1 4 port 10GE (C-band) DWDM PLIM" entPhysicalVendorType = "cevModuleCrs14x10GeCDwdmPlim"

Workaround:

Poll with community-strings or usernames with the SystemOwner configuration.

An alternative workaround is to restart the mibd_entity process prior to initial entPhysicalTable discovery after reload

Recovery:

Restart the mibd_entity process.

- **CSCto11030**

  Basic Description:

  Ping process crashed with parallel pings.

  Symptom:

  Ping process crashes.

  Conditions:

  This issue is seen when parallel pings are performed on multiple vty sessions.

  Workaround:

  None.

  Recovery:

  None.

- **CSCto72677**

  Basic Description:

  PE not sending route-refresh request after reconfiguring VRF.

  Symptom:

  PE is not sending route-refresh request to RR on reconfiguring VRF. This is visible in the **show bgp neighbor** CLI output where the sent counter for refresh requests does not increment on VRF RT config changes.

  As a result, the updated VRF config is not in effect.

  Conditions:

  This issue occurs after configuring and unconfiguring RT SAFI between PE and RR, with the RR side still having the RT SAFI configured for the PE neighbor. When a new vrf is configured on PE, the PE is not sending route-refresh request to the RR.

Workaround:

The workaround is to remove the RT SAFI config under the RR for the PE nbr.

Recovery

To recover, you can manually issue router fresh via clear bgp vpnv4 unicast soft in.

- **CSCto72695**

  Basic Description:

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

  Symptom:

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

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

  Conditions:

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

  Workaround:

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

  Recovery:

  No recovery is necessary if the workaround is used.

- **CSCto91788**

  Basic Description:

  P2MP perm traffic loss on the tail doing 'clear pim topology.'

  Symptom:

  This issue occurs with permanent P2MP multicast traffic loss.

  Conditions:

  This condition occurs when doing a 'clear pim topology' on the tail node.

  Workaround:

  Restart the PIM process (process restart) instead of doing "clear pim topology".

  Alternatively, remove the IGMP/PIM Join on the decap and rejoin.

  Recovery:

  Restart the PIM process (process restart).

  or

  Remove/add multicast-routing config related to P2MP.

  or

  Remove S,G IGMP/PIM. Join on decap, and rejoin the S,G.

- **CSCto96827**

  Basic Description:

Harmless sysdb_mc timeout messages periodically pops up in the console

Symptom:

Harmless sysdb_mc timeout messages periodically pops up in the console, for example:

```
RP/0/RSP1/CPU0:Apr 27 00:41:58.486 : sysdb_mc[380]: %SYSDB-SMC-7-TIMEOUT :
Message #0x2004bd2e state:0x13fe5326, gid(1011),destined for shared plane,
timed out having received 0 of 1 expected responses: returning error to client
Unknown. Check for potential transport issues within the system, or deadlocked
SysDB processes.
```

Conditions:

This issue occurs with an RSP switchover.

Workaround:

None. However, these messages are level-7 messages and are not functionally impacting.

Recovery:

Issue a RSP switchover.

- **CSCto99989**

  Basic Description:

  SNMP bulk config, or load from saved config, or rollback shows error.

  Symptom:

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

```
RP/0/RSP0/CPU0:Apr 27 19:26:59.446 : snmpd[1112]: %SNMP-SNMP-4-VIEWOID_NOT_FOUND : The
command "snmp view li-view ifMIB included" could not be applied at this time because
the oid "ifMIB" does not belong to a known MIB module.
RP/0/RSP0/CPU0:Apr 27 19:26:59.481 : snmpd[1112]: %SNMP-SNMP-4-VIEWOID_NOT_FOUND : The
command "snmp view li-view ciscoTap2MIB included" could not be applied at this time
because the oid "ciscoTap2MIB" does not belong to a known MIB module.
RP/0/RSP0/CPU0:Apr 27 19:26:59.495 : snmpd[1112]: %SNMP-SNMP-4-VIEWOID_NOT_FOUND : The
command "snmp view li-view ciscoIpTapMIB included" could not be applied at this time
because the oid "ciscoIpTapMIB" does not belong to a known MIB module.
```

  Conditions:

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

  This behavior is observed since the MIB is not loaded and the OID translation is not in place. After few seconds, this gets resolved, and you can query the MIB successfully.

  Workaround:

  None. When this behavior is observed during SNMP configuration for lawful intercept, it still allows adding taps. Lawful intercept functionality does not impact in any manner.

  Recovery:

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

- **CSCto21373**

  Basic Description:

mibd_interfaces crash while polling cIpMRouteNextHopTable.

Symptom:

In Cisco IOS-XR a crash of process mibd_interface might be observed when the mroute mib is polled.

Conditions:

Multicast is configured. The OID cIpMRouteNextHopTable of mroute mib is polled.

Workaround:

Not available.

Recovery:

The process is restarted automatically.

- **CSCti50227**

  Basic Description:

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

  Symptom:

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

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

  Workaround:

  The commit must be performed in two steps:

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

Caveats Specific to the Cisco XR 12000 Series Router

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

- **CSCtk69560**

  Basic Description:

  Process restart of g_spa for ATM SPA reloads SPA.

  Symptom:

  g_spa restart on the following SPAs, leads to traffic impact and spa reload:

  - SPA-1XOC3-ATM-V2
  - SPA-2XOC3-ATM-V2
  - SPA-3XOC3-ATM-V2
  - SPA-1XOC12-ATM-V2

  Conditions:

  When g_spa process is restarted or crashed, it results in traffic impact and spa reload.

  Workaround:

None.

Recovery:

Manual reload of SPA recovers the issue.

```
hw_module subslot <> reload
```

- **CSCtn29692**

  Basic Description:

  PA-1X10GE went to FAILED state after being PRESENT before going READY.

  Symptom:

  This occurs with longer than normal SPA-1X10GE-L-V2 boot time.

  Conditions:

  SPA-1X10GE-L-V2 temporarily goes into FAILED state before going into READY state during a SPA reload.

  The 10Gige SPA goes to the PRESENT state, and then instead of going to the READY state, it moves to the FAILED state before finally getting READY.

  This adds a little to the SPA bring-up time, but the traffic resumes once the SPA is up.

  Workaround:

  None.

  Recovery:

  No manual action is necessary. The SPA eventually boots up as expected.

- **CSCtn80610**

  Basic Description:

  CSC-Traffic drop and vpnv4-BGP sessions down, svd role change in core.

  Symptom:

  On Cisco XR12000 routers running Cisco IOS XR R4.1.0 software, user may notice labels missing in label database on line cards and some of the prefixes may be unresolved in vrfs.

  This condition results in traffic drops for an impacted prefix/label.

  Conditions:

  This issue happens under following conditions:

  – Cisco XR 12000 Series Routers are running the Cisco IOS XR R4.1.0 image

  – Label unicast config is present under bgp (3107, CSC option)

  AND

  – The user makes a config change that results in removal of the last IPv4/IPv6 address on the linecard under the VRF.

  Workaround:

  None.

  Recovery:

  When the issue is hit, the user can recover by restarting the rsi_agent.

- **CSCto40258**

  Basic Description:

  SVD: stale label leafs in FIB MPLS table caused FIB to drop new route.

  Symptom:

  On Cisco XR 12000 routers running Cisco IOS XR Release 4.1.0 software, a user may notice a label state inconsistency between RIB/LSD and FIB label database. When this condition is hit, the fib_mgr process running on a linecard (LC) logs a console message similar to the following:

  ```
  LC/0/4/CPU0:Apr 23 12:48:42.253 : fib_mgr[155]: %ROUTING-FIB-5-ROUTE_UPDATE_DROP :
  LABEL-RECYCLING: found unbound label=16377(leaf label=0) for
  prefix=2800:2222::3e:0/112, tbl=default, lcnt=1(leaf lcnt=0), rt-src=4, leaf=53af106c,
  pl_flags=0x480f0
  ```

  This condition results in a traffic drop for the impacted prefix/label, depending on which prefix owns the recycled label. Currently, this issue can impact either v4 or v6 traffic when it transits through the affected LC.

  Conditions:

  This issue happens under following conditions:

  - Cisco XR 12000 Series Routers is running Cisco IOS XR Release 4.1.0 image.
  - 6VPE feature is enabled on the router

  AND

  - The user makes a config change that results in the removal of the last VRF IPv6 address on the interface that is local to the LC. The Selective VRF Download (SVD) role for the IPv6 address family becomes Not-Interested. Use the **show rsi role-transition location <lc>** command.

  Workaround:

  For users who are not particular about the memory/scale benefits of SVD, they can keep at least one interface under VRF configured with an IPv6 address to avoid running into this issue.

  A production SMU is provided with Cisco IOS XR Release 4.1.0 on the Cisco XR 12000 Series Router mages to fix this issue.

  Recovery:

  When the issue is hit, the user can recover by reloading the node/LC that reported the label recycling error.

Upgrading Cisco IOS XR Software

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

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

The following URL contains links to information about how to upgrade Cisco IOS XR software:

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

Troubleshooting

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

Related Documentation

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

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

The Cisco IOS XR software documentation set includes the Cisco IOS XR software configuration guides and command references, as well as a getting started guide.

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

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

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation:

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

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

This document is to be used in conjunction with the documents listed in the "Related Documentation" section.