Release Notes for Cisco XR 12000 Series Router for Cisco IOS XR Software Release 4.1.2

February 6, 2013

Cisco IOS XR Software Release 4.1.2

Text Part Number OL-26130-01

These release notes describe the features provided in the Cisco IOS XR Software Release 4.1.2 for the Cisco XR 12000 Series Router and are updated as needed.

Note For information on the Cisco XR 12000 Series Router running Cisco IOS XR Software Release 4.1.2, see the "Important Notes" section on page 35.

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 about 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 4.1.2, see the "Caveats" section on page 38. 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**—This supports a wide range of IPv4 and IPv6 services and routing protocols; such as Border Gateway Protocol (BGP), Routing Information Protocol (RIPv2), Intermediate System-to-Intermediate System (IS-IS), Open Shortest Path First (OSPF), IP Multicast, Routing Policy Language (RPL), Hot Standby Router Protocol (HSRP), and Virtual Router Redundancy Protocol features (VRRP).
- **BGP Prefix Independent Convergence**—This provides the ability to converge BGP routes within sub seconds instead of multiple seconds. The Forwarding Information Base (FIB) is updated, independent of a prefix, to converge multiple 100K BGP routes with the occurrence of a single failure. This convergence is applicable to both core and edge failures and with or with out MPLS. This fast convergence innovation is unique to Cisco IOS XR Software.
- **Multiprotocol Label Switching (MPLS)**—This supports MPLS protocols, including Traffic Engineering (TE), Resource Reservation Protocol (RSVP), Label Distribution Protocol (LDP), Virtual Private LAN Service (VPLS), and Layer 3 Virtual Private Network (L3VPN).
- **Multicast—**Provides comprehensive IP Multicast software including Source Specific Multicast (SSM) and Protocol Independent Multicast (PIM) in Sparse Mode only.
- **Quality of Service (QoS)—**This supports QoS mechanisms including policing, marking, queuing, random and hard traffic dropping, and shaping. Additionally, Cisco IOS XR Software also supports modular QoS command-line interface (MQC). MQC is used to configure QoS features.
- **Manageability—**This provides industry-standard management interfaces including modular command-line interface (CLI), Simple Network Management Protocol (SNMP), and native Extensible Markup Language (XML) interfaces. It includes a comprehensive set of Syslog messages.
- **Security—**This provides comprehensive network security features including access control lists (ACLs), routing authentications, Authentication, Authorization, and Accounting (AAA)/Terminal Access Controller Access Control System (TACACS+), Secure Shell (SSH), Management Plane Protection (MPP) for management plane security and Simple Network Management Protocol version3 (SNMPv3). Control plane protections integrated into line card Application-Specific Integrated Circuits (ASICs) include Generalized TTL Security Mechanism (GTSM), RFC 3682, and Dynamic Control Plane Protection (DCPP).

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

For more information about new features provided on the Cisco XR 12000 Series Router for Cisco IOS XR Software Release 4.1.2, see the "New Features in Cisco IOS XR Software Release 4.1.2" section on page 30 in this document.

System Requirements

This section describes the system requirements for Cisco IOS XR Software Release 4.1.2 supported on the Cisco XR 12000 Series Router. The system requirements include the following information:

To determine the software versions or levels of your current system, see the "Determining Your Software Version" section on page 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 4.1.2 features.

Table 1 lists the Cisco IOS XR Software feature set matrix (PIE files) and associated filenames available for Cisco IOS XR Software Release 4.1.2, supported on the Cisco XR 12000 Series Router.

Table 1 Cisco XR 12000 Series Router Supported Feature Set (Cisco IOS XR Software Release 4.1.2 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	c12k-mini.pie-4.1.2	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-4.1.2	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-4.1.2	CORBA[2] agent, XML Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	c12k-mpls.pie-4.1.2	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-4.1.2	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-4.1.2	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-4.1.2	Support for booting the Standby RP on a Cisco XR 12000 Series Router.
Cisco IOS XR FPD Package	c12k-fpd.pie-4.1.2	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 4.1.2 PIE Files) (continued)

Feature Set	Filename	Description
Cisco IOS XR Diagnostic Package	c12k-diags.pie-4.1.2	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	c12k-doc.pie-4.1.2	.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 4.1.2 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	XR12000-iosxr-4.1.2.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-k9-4.1.2.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 4.1.2 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

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

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

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

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

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

Component	Part Number	Support from Version
1-Port Channelized OC-12/DS0 Shared Port Adapters	SPA-1XCHOC12/DS0	3.5
1-Port Channelized STM-1/OC-3 to DS0 Shared Port Adapter	SPA-1XCHSTM1/OC3	3.5
1-Port OC-48c/STM-16 POS/RPR Shared Port Adapter	SPA-1XOC48POS/RPR	3.5
2-Port OC-12c/STM-4 POS Shared Port Adapter	SPA-2XOC12-POS	3.5
4-Port OC-12c/STM-4 POS Shared Port Adapter	SPA-4XOC12-POS	3.5
4-Port OC-3c/STM-1 POS Shared Port Adapter	SPA-4XOC3-POS-V2	3.5
8-Port OC-12c/STM-4 POS Shared Port Adapter	SPA-8XOC12-POS	3.5
8-Port OC-3c/STM-1 POS Shared Port Adapter	SPA-8XOC3-POS	3.5
Cisco 1-Port Channelized OC-48/DS3 Optical Packet Processor Shared Port Adapter	SPA-1XCHOC48/DS3	3.6
1-Port Clear Channel OC-3 ATM SPA	SPA-1XOC3-ATM-V2	3.7
3-Port Clear Channel OC-3 ATM SPA	SPA-3XOC3-ATM-V2	3.7
1-Port Clear Channel OC-12 ATM SPA	SPA-1XOC12-ATM-V2	3.7
1-Port Channelized OC-3 ATM CEoP SPA	SPA-1CHOC3-CE-ATM	4.1.1
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 1-Port 10-Gigabit Ethernet IPoDWDM Shared Port Adapter	SPA-1X10GE-L-ITUC	4.1.1
Cisco XR 12000 Series Router T/1T3 and E1/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 8-Port Channelized T1/E1 Shared Port Adapter	SPA-8XCHT1/E1	3.6
2-Port Channelized T3/E3 ATM CEoP SPA	SPA-2CHT3-CE-ATM	3.7
24-Port Channelized T1/E1 ATM CEoP SPA	SPA-24CHT1-CE-ATM	4.0.1

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

Component	Part Number	Support from Version
Cisco XR 12000 Series Router Channelized Line Cards		
Cisco 1-Port Channelized OC-48 line card	CHOC48/DS3-SR-SC	3.6
Cisco 1-Port Channelized OC-12 line card	CHOC12/DS1-SR-SC	3.8
Cisco 4-Port Channelized OC-12 line card	4CHOC12/DS3-I-SCB	3.8

Software Compatibility

Cisco IOS XR Software Release 4.1.2 is compatible with the following Cisco XR 12000 Series Router systems:

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

The following chassis are supported for an existing installed base:

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

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

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

```
RP/0/6/CPU0:router(admin)#sh hw-module fpd loc all
Mon Nov 21 02:21:53.206 PDT

==================================== ========================================
                                     Existing Field Programmable Devices
                                     ========================================
                                       HW                        Current SW Upg/
Location     Card Type               Version Type Subtype Inst   Version   Dng?
============ ======================= ======= ==== ======= ==== =========== ====
0/1/0        SPA-10X1GE-V2             1.2   spa  fpga1   0       1.10     No
------------------------------------------------------------------------------------
0/2/0        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
-------------------------------------------------------------------------------------
0/3/0        SPA-1XTENGE-XFP             3.2    spa  fpga1   0       1.11     No
-------------------------------------------------------------------------------------
0/3/1        SPA-1XCHOC12/DS0            1.0    spa  rommon  1       2.02     No
                                                spa  fpga1   1       1.36     No
                                                spa  fpga2   1       1.00     No
-------------------------------------------------------------------------------------
0/7/0        SPA-1XTENGE-XFP             3.2    spa  fpga1   0       1.09     Yes
-------------------------------------------------------------------------------------
0/7/1        SPA-1XCHSTM1/OC3            2.0    spa  fpga1   1       1.08     No
                                                spa  rommon  1       2.12     No
                                                spa  fpga2   1       1.04     No
-------------------------------------------------------------------------------------
0/7/3        SPA-4XT3/E3                 1.1    spa  fpga1   3       1.01     No
                                                spa  rommon  3       2.12     No
                                                spa  fpga2   3       1.04     No
                                                spa  fpga3   3       1.04     No
-------------------------------------------------------------------------------------
0/8/0        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
-------------------------------------------------------------------------------------
0/11/CPU0    E3-OC12-CH-1              223.1    lc   fpga1   0       1.02     No
-------------------------------------------------------------------------------------
0/12/1       SPA-5X1GE-V2                1.1    spa  fpga1   1       1.10     No
-------------------------------------------------------------------------------------
0/12/2       SPA-4XCT3/DS0               1.2    spa  fpga1   2       2.08     No
                                                spa  rommon  2       2.12     No
                                                spa  fpga2   2       1.04     No
-------------------------------------------------------------------------------------
0/12/3       SPA-8X1FE                   1.2    spa  fpga1   3       1.01     No
-------------------------------------------------------------------------------------
0/14/1       SPA-2XOC48POS/RPR           1.0    spa  fpga1   1       1.00     No
-------------------------------------------------------------------------------------
0/14/2       SPA-2CHT3-CE-ATM            1.0    spa  fpga1   2       2.22     No
                                                spa  rommon  2       1.04     No
                                                spa  fpga2   2       1.11     No
-------------------------------------------------------------------------------------
0/15/0       SPA-8XOC12-POS              1.0    spa  fpga1   0       1.00     No
-------------------------------------------------------------------------------------
0/15/1       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
-------------------------------------------------------------------------------------
0/15/2       SPA-1CHOC3-CE-ATM           2.0    spa  fpga1   2       2.23     No
                                                spa  rommon  2       1.04     No
                                                spa  fpga2   2       1.13     No
-------------------------------------------------------------------------------------
```

Note One or more FPD needs an upgrade or a downgrade. This can be accomplished using the *admin > upgrade hw-module fpd <fpd> location <loc>* CLI.

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 can 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 is the link to the Cisco Systems IOS XR Firmware Upgrade Guide For CRS-1 and XR12000:

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

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

  http://www.cisco.com/en/US/docs/routers/xr12000/software/xr12k_r4.0/system_management/command/reference/yr40xr12k_chapter7.html

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

If you are migrating from Cisco IOS to Cisco IOS XR Software on the Cisco XR 12000 Series Router, you must have the following minimum Cisco IOS image level and Boothelper version to support Release 4.1.2:

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

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

Determining Your Software Version

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

Step 1 Establish a Telnet session with the router.

Step 2 Enter the show version command from EXEC mode.

```
RP/0/6/CPU0:router#sh version
Mon Nov 21 01:30:00.421 PDT

Cisco IOS XR Software, Version 4.1.2[Default]
Copyright (c) 2011 by Cisco Systems, Inc.
```

```
ROM: ROMMON System Bootstrap, Version 1.04(0), DEVELOPMENT SOFTWARE

router uptime is 1 hour, 48 minutes
System image file is "disk0:c12k-os-mbi-4.1.2/mbiprp-rp.vm"

cisco 12416/PRP (8641D) processor with 8388608K bytes of memory.
8641D processor at 1330Mhz, Revision 2.1
Cisco 12416 320 Gbps

1 4 Port ISE Packet Over SONET OC-12c/STM-4 Controller (4 POS)
8 Cisco 12000 Series SPA Interface Processor-601/501/401
2 1 Port ISE Packet Over SONET OC-48c/STM-16 Controllers (2 POS)
1 Cisco 12000 4 Port Gigabit Ethernet Controller (4 GigabitEthernet)
2 Cisco 12000 Series Performance Route Processor 3s
1 1 Port ISE OC12 Channelized to DS1/E1 Single Mode/IR LC connector Controller (1 SONET)
4 Management Ethernet
22 SONET/SDH
33 PLIM_QOS
86 T3
54 Serial network interface(s)
4 MgmtMultilink
19 GigabitEthernet/IEEE 802.3 interface(s)
8 FastEthernet
194 Multilink network interface(s)
840 T1
909 Serial network interface(s)
2 TenGigE
15 Packet over SONET/SDH
2 MgmtIMA
7 Asynchronous Transfer Mode
1 Asynchronous Transfer Mode
895k bytes of non-volatile configuration memory.
3515M bytes of compact flash card.
1635260k bytes of disk0: (Sector size 512 bytes).

Boot device on node 0/0/CPU0 is mem:
Package active on node 0/0/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/1/CPU0 is mem:
Package active on node 0/1/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
```

```
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/2/CPU0 is mem:
Package active on node 0/2/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/3/CPU0 is mem:
Package active on node 0/3/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
```

```
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/4/CPU0 is mem:
Package active on node 0/4/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/5/CPU0 is mem:
Package active on node 0/5/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
```

```
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Configuration register on node 0/6/CPU0 is 0x102
Boot device on node 0/6/CPU0 is disk0:
Package active on node 0/6/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
```

```
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mgbl, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mgbl-4.1.2
    Built on Sat Nov 19 19:20:10 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-doc-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-doc-supp-4.1.2
    Built on Sat Nov 19 19:20:38 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mgbl-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mgbl-supp-4.1.2
    Built on Sat Nov 19 19:20:10 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/7/CPU0 is mem:
Package active on node 0/7/CPU0:
```

```
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
Boot device on node 0/8/CPU0 is mem:
Package active on node 0/8/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
```

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    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Configuration register on node 0/10/CPU0 is 0x102
Boot device on node 0/10/CPU0 is disk0:
Package active on node 0/10/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mgbl, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mgbl-4.1.2
    Built on Sat Nov 19 19:20:10 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-doc-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-doc-supp-4.1.2
    Built on Sat Nov 19 19:20:38 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
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c12k-mgbl-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mgbl-supp-4.1.2
    Built on Sat Nov 19 19:20:10 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/11/CPU0 is mem:
Package active on node 0/11/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
```

```
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/12/CPU0 is mem:
Package active on node 0/12/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/14/CPU0 is mem:
Package active on node 0/14/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
```

```
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/15/CPU0 is mem:
Package active on node 0/15/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-service-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-service-supp-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fwding, V 4.1.2[00], Cisco Systems, at disk0:c12k-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-ce, V 4.1.2[00], Cisco Systems, at disk0:c12k-ce-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 19:21:08 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 19:20:16 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 19:19:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-fwding, V 4.1.2[00], Cisco Systems, at disk0:iosxr-fwding-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
iosxr-diags, V 4.1.2[00], Cisco Systems, at disk0:iosxr-diags-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-fpd-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-fpd-supp-4.1.2
    Built on Sat Nov 19 19:20:43 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-diags, V 4.1.2[00], Cisco Systems, at disk0:c12k-diags-4.1.2
    Built on Sat Nov 19 19:20:32 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:c12k-mcast-supp-4.1.2
    Built on Sat Nov 19 19:19:56 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-base, V 4.1.2[00], Cisco Systems, at disk0:c12k-base-4.1.2
    Built on Sat Nov 19 19:18:25 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

c12k-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:c12k-os-mbi-4.1.2
    Built on Sat Nov 19 19:19:37 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

New Features in Cisco IOS XR Software Release 4.1.2

The following sections contain information on new features and enhancements in Cisco IOS XR Software Release 4.1.2:

New Software Features on the Cisco XR 12000 Series Router

This section contains the new software features that were introduced in Cisco IOS XR Software Release 4.1.2 on the Cisco XR 12000 Series Router platform:

mLDP FRR

Multicast Label Distribution Protocol (mLDP) is a protocol used to build Point to Multipoint (P2MP) or Multipoint to Multipoint (MP2MP) trees or tunnels in MPLS network for multicast traffic distribution. These tunnels are suitable for mVPN and BiDir type of applications. mLDP is also responsible for building Label Switched Path (LSP). The LSP is used in various ways based on the requirement and nature of the application. The solutions derived using LSPs are:

- P2MP LSPs used for global table transit multicast using in-band signaling.

- P2MP or MP2MP LSPs for MVPN based on MI-PMSI.
- P2MP or MP2MP LSPs for MVPN based on MS-PMSI (Partitioned E-LAN).

For Release 4.1.2, mLDP has FRR (Fast ReRoute) support with link protection for its tunnels. Backup path through a TE tunnel is the backup path that is provided with the mLDP FRR implementation.

With every FRR Backup NH object that is created per primary backup path pair, a backup tunnel id is associated with and is stored in the primary rewrite. These backup rewrites are maintained as a table in SRAM from FRR Backup NH objects that is indexed by backup tunnel id.

To make sure that the FRR is active on a specific primary backup path pair, the microcode maintains a Global FRR active flag (in regmem) and a 2k bitmap (in PHPB).

However, during the course of mLDP FRR implementation, there are situations when a protected link might go down.

The following sequence of activities occur, if a protected link goes down:

1. FIB high priority thread calls PD to set the Tx Global FRR active flag.
2. FIB high priority thread calls PD on the FRR Protect NH with the action FRR_active.
3. PD triggers a backwalk to the FRR Backup NH to obtain the backup tunnel id and to set the tunnel id bitmap on Tx side.
4. If the FRR flag is active while verifying the Tx Global FRR flag in the microcode, the tunnel id stored in the primary LSPs rewrite is indexed into the tunnel id bitmap to check whether the backup tunnel associated with this primary LSP is active. When it is active, it DMAed in the backup rewrite to send out the packet.

The other FRR processes that are affected for a protected link that is reported down are as follows:

- For Ingress FRR Processing: When a protected link goes down, the affected entries on the Ingress LC sends traffic to the backup tunnel of the protected interface. This leads to the following sequence of activities to occur:

Step 1 The high priority FIB FRR is invoked.

Step 2 FIB high priority thread calls PD on the FRR Protect NH with the action FIB_ACTION_GLOBAL_FRR_ACTIVE. PD FIB sets a global FRR active flag in the RX engine to trigger prefix and tunnel independent FRR.

Step 3 FIB high priority thread calls PD on the FRR Protect NH with the action FRR_ACTIVE.

Step 4 PD FIB identifies the slot corresponding to the protected interface and sets global FRR active slot mask. This is repeated for each protected link that is reported down.

- For Egress FRR Processing: The activities that occur during the FRR process are provided in the following steps:

Step 1 FIB high-priority thread calls PD to set the Global FRR active flag. This is also extended to indicate the Rx Global FRR flag and the Tx Global FRR flag.

Step 2 FIB high-priority thread calls PD on the FRR Protect NH with the action FRR_ACTIVE.

Step 3 PD backwalks from FRR Protect NH to a set of FRR Backup NH. For a backup tunnel hosted by this card, the backup tunnel id is retrieved and the backup tunnel id bitmap is updated.

Step 4 The microcode checks for the Global FRR active flag and the FRR bit in the BHDR to identify if FRR processing is required for a given packet (both the bits need to be set). If FRR processing is required, it necessary to visit,

- a Primary replicord and use the backup tunnel id maintained in the primary replicord to index the bitmap table to see if the backup tunnel is active. If it is active, it is required to DMA the backup info from SRAM.
- a Backup replicord and use the backup tunnel id maintained in the backup replicord to index the bitmap table to see if the backup tunnel is active. If it is active, it should be used to forward the multicast packet.

VRF Mtrace

To trace the path from a source to a destination branch for a multicast distribution tree, the **mtrace** command is used in user EXEC or privileged EXEC mode.

mtrace [**vrf** *vrf-name*] {*source-address* | *destination-address* | *group-address* | *response-address*} *trace_time*

no mtrace

Syntax Description

vrf *vrf-name*	Specifies a VPN routing and forwarding (VRF) instance.
source-address	Specifies the hostname or the source to trace route from.
destination-address	Specifies the hostname or the destination to route.
group-address	Specifies the hostname or group to trace route via.
response-address	Specifies the hostname or response address to receive response.
trace_time	Specifies the time-to-live for multicasted trace request.

Command Default

This feature is disabled by default.

Command Modes

EXEC or privileged EXEC mode.

Command History

Release	Modification
Release 4.2.1	This command was introduced.

Usage Guidelines

The trace request generated by the **mtrace** command is multicast to the multicast group to find the last hop router to the specified destination. The trace then follows the multicast path from the destination to the source by passing the mtrace request packet via unicast to each hop. Responses are unicast to the querying router by the first hop router to the source. This command allows you to isolate multicast routing failures.

If no arguments are entered, the router will interactively prompt you for them.

This command is identical in function to the UNIX version of **mtrace**.

Task ID

Task ID	Operations
multicast	execute

Examples

The following example shows how to run the mtrace command:

```
RP/0/RSP0RP00/CPU0:router(config)# mtrace vrf vrf1 43.23.2.1 45.33.78.1 42.12.55.6
98.7.6.54 56
```

NAT44 Booster Phase1

The carrier grade Network Address Translation(NAT44) services and features which were earlier deployed on the CRS can be deployed on Cisco XR 12000 Series routers using the Booster Daughter Card. Booster Daughter Card (DC) for the PRP-3 route processor has been introduced for the Cisco XR-12000 router. Booster card plugs into a PRP-3 (Performance Route Processor) board directly and enables additional features and services that cannot be enabled with the existing hardware.

The Booster DC creates a new service delivery platform for the Cisco XR12000 Series router to support high performance layer 4 to layer 7 services that cannot be easily accomplished using the current hardware. Booster card is placed on the PRP3 board and shares the same slot as PRP3.

Carrier Grade Network (CGN) Address Translation is a large scale NAT that is capable of providing private IPv4 to public IPv4 address translation in the order of millions of translations to support a large number of subscribers, and at least 10 Gbps full-duplex bandwidth throughput.

CGN is a workable solution to the IPv4 address completion problem, and offers a way for service provider subscribers and content providers to implement a seamless transition to IPv6. CGN employs Network Address and Port Translation (NAPT) methods to aggregate many private IP addresses into fewer public IPv4 addresses. For example, a single public IPv4 address with a pool of 32 K port numbers supports 320 individual private IP subscribers assuming each subscriber requires 100 ports.

Bulk Ping

In prior Cisco IOS XR Software releases, multiple ping commands are issued through CLI or XML, to check reachability to multiple destinations. This resulted in buying huge CPU time at the QNX/XR microkernel OS, which in turn resulted in more time consumption, thus blocking other processes during this interval.

To overcome this issue, the platform independent Bulk Ping feature is introduced in Release 4.1.2. When a bulk ping mode is chosen, users can input multiple destinations in one ping process itself. The ping process checks the reachability to all the multiple destinations that have been provided and prints the result on the console or back in XML agent. The advantage over this is that there will be no more spawn or exit overhead of QNX. The destination addresses can either be specified in a file or directly entered at the CLI prompt.

The following shows the format of the bulk ping command:

```
      ping bulk ipvr\ipv6 input cli\file [filesystem://<path to input file>]

   [vrf <vrf1>] addr1 <other ping options currently supported>
          [vrf <vrf2>] addr2 <other ping option currently supported >
```

```
….
[vrf <vrfm>] addrn <other ping options currently supported >
```

The following factors are considered while implementing the Bulk Ping feature:

- In the bulk ping mode, back-to-back pings to multiple destinations greater than 50 should not take high CPU time of QNX process for handling the spawn or exit.
- Unlike single ping command, bulk ping process must get completed very quickly by taking only 10% of the actual time on an idle system.
- Bulk ping mode should be made available for IPv4 destinations also.
- With CLI being the preferred input method, destination address is entered one by one in inline mode and as a batch (complete set of destination addresses) in batch mode.
- Except for the vrf option, no other options should be used with the destination address.
- Only about 8000 destinations are allowed in a single bulk ping process to avoid memory conflicts within the DOS.

The bulk ping commands are issued at the CLI interface both in inline mode and bulk mode as follows:

Example for Input through CLI using inline mode

```
RP/0/RP0/CPU0:router#ping bulk ipv4 input cli inline
Fri Sep 16 15:57:23.640 EDT Please enter the first destination (or) Ctrl-D/(exit) to
exit:
vrf NMVPN 10.2.1.16

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.2.1.16, vrf is NMVPN, timeout is 2
seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 6/7/8 ms
Please enter the next destination: (or) Ctrl-D/(exit) to exit:
```

Example for Input through CLI using batch mode

```
RP/0/RP0/CPU0:router#ping bulk ipv4 input cli batch
Fri Sep 16 15:57:40.141 EDT
Please enter input via CLI with one destination per line and when done Ctrl-D/(exit)
to initiate pings:
1: vrf NMVPN 10.2.1.16 2: Starting pings...
Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to 10.2.1.16, vrf is
NMVPN, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 5/7/9 ms
RP/0/RP0/CPU0:router#
```

New Hardware Features on the Cisco XR 12000 Series Router

There are no hardware features supported for Cisco IOS XR Software Release 4.1.2 on the Cisco XR 12000 Series router.

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 Software 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 4.1.2

Cisco IOS XR Software Release 4.1.2 requires a 2-GB Flash Disk as a minimum. If your Cisco XR 12000 Series Router currently uses a 1-GB Flash Disk, you must upgrade it to 2-GB before upgrading to Cisco IOS XR Software Release 4.1.2. The PCMCIA 1-GB Flash Disk was the default size for the Cisco XR 12000 Series Router running Cisco IOS XR Software Release 3.6 and earlier.

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

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

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

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

Caveats

Caveats describe unexpected behavior in Cisco IOS XR Software releases. Severity-1 caveats are the most serious caveats; severity-2 caveats are less serious.

This section contains caveats that are generic to the Cisco IOS XR Release 4.1.2 Software and those specific to the Cisco XR 12000 Series Router.

Cisco IOS XR Caveats

- **CSCtt29747**

  Basic Description:

  Error adding 2K RT through XML interface.

  Symptom:

```
<?xml version="1.0"?>
<Response MajorVersion="1" MinorVersion="0"><Set ErrorCode="0x43679000"
ErrorMsg="'XML Service Library' detected the 'warning'
condition 'An error was encountered in the XML beneath this operation
tag'"><Configuration><RoutingPolicy MajorVersion="3"
MinorVersion="1"><Sets><ExtendedCommunityRTSetTable><ExtendedCommunityRTSet
ErrorCode="0x4368a200" ErrorMsg="'XMLMDA' detected the
'warning' condition 'An XML request provided too little or
too much values for a
class'"><Naming><SetName>rt_set_global_service</SetName></Naming><Exten
dedCommunityRTSetAsText ErrorCode="0x42c6aa00" ErrorMsg="'Policy
Repository' detected the 'warning' condition 'The parser
encountered an internal error while parsing the
policy/set.'"/></ExtendedCommunityRTSet></ExtendedCommunityRTSetTable><
/Sets></RoutingPolicy></Configuration></Set><Commit ErrorCode="0x41864e00"
ErrorMsg="'CfgMgr' detected the 'wa!
 rning' condition 'The target configuration buffer is
empty.'"/><ResultSummary ErrorCount="2"/></Response>
```

  Conditions:

  Configuring a number of extended community RTs through the XML interface exceeding 8192 bytes. In other words, string length of the content within the ExtendedCommunityRTSetAsText tag exceeding 8192 bytes.This limitation affects other xxxAsText tags in the RPL configuration schema.

  Workaround:

  None.

  Recovery:

  None.

- **CSCtr78557**

  Basic Description:

  MPP SNMP out-of-band not working.

  Symptom:

  SNMP packets coming on out-of-band interface are dropped. When **snmp-server host trap source-port <port>** configuration gets removed, SNMP inform packets are not received.

Conditions:

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

Workaround:

Restart snmpd process.

Recovery:

None.

- **CSCti50227**

  Basic Description:

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

  Symptom:

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

  – Removing a set or policy referred by another policy that is attached to any attach point directly or indirectly.

  – Modifying the policy to remove the reference to the same set or policy that is getting removed.

  Workaround:

  The commit must be performed in two steps:

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

Caveats Specific to the Cisco XR 12000 Series Router

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

- **CSCtu00248**

  Basic Description:

  AT&T experiencing 36 secs convergence with BGP PIC enabled.

  Symptom:

  AT&T is seeing 36 secs of convergence time for remote PE to converge

  Conditions:

  This happens when PE-CE link is shut on the local PE.

  Workaround:

  None.

  Recovery:

  None.

- **CSCts20691**

  Basic Description:

  [Eng 3 ChOC12]:PLIM Debugs for HB Failures seen due to PICANTE error.

  Symptom:

The following messages might be seen on Engine 3 1XChOC12 LC:

```
LC/0/4/CPU0:Nov 19 11:57:44.576 : plim_ipc[244]: %PLATFORM-PLIM_IPC-3-ERROR :
__FUNCTION__(): consecutive heartbeat failures: 0x1e, reaching max threshold
LC/0/4/CPU0:Nov 19 11:57:49.690 : plim_ipc[244]: %PLATFORM-PLIM_IPC-6-INFO :  PLIM
file saved, size: 0x20, /disk0:/dumper/node0_4_CPU0-PPC_chkpoint.20101119-115749
RP/0/8/CPU0:Nov 19 11:57:50.477 : gsr_prp_pm[56]: %PLATFORM-FAULT-3-LC_DEVICE : LC 4:
Reset Device - Picante IO bus error intr_status 0x00000015 address: 0x12010500
```

Conditions:

This is shown after downgrade from 4.1.0.14I to 3.9.2 CCO image.

Workaround:

Reload the line card.

Recovery:

None.

- **CSCtt05683**

  Basic Description:

  %SECURITY-SSHD-3-ERR_ERRNO: Error in accept Resource temporarily unavailable.

  Symptom:

  The following syslog messages are seen on a Cisco XR 12000 Series router:

  %SECURITY-SSHD-3-ERR_ERRNO: Error in accept Resource temporarily unavailable.

  Conditions:

  If a SSH session is established by the client and immediately terminated, before the ssh server could access the TCP socket, these messages could be seen in the log as the ssh server could not be able to access the resource.

  Workaround:

  None.

  Recovery:

  None.

- **CSCtt17906**

  Basic Description:

  Uptime values for PEMs being reset after RP switchover.

  Symptom:

  The uptime values for PEMS shown in sh powermgr CLI will start from the beginning after RPFO.

  Conditions:

  This occurs on any router with Active and Standby setup.

  Workaround:

  None.

  Recovery:

  None.

- **CSCtt19786**

  Basic Description:

  2xOC48 POS SPA autoreset twice, interfaces are in preconfigure state.

  Symptom:

  The 2xOC48 POS SPA in subslot 0/6/1 is stopped and is reset twice. The interfaces got into preconfigure state though the SPA is up and running.

  Conditions:

  Not known.

  Workaround:

  None.

  Recovery:

  Recovered by itself.

- **CSCtt19923**

  Basic Description:

  E3 Choc12 T3 Controller does not detect DS3 Idle blue alarm.

  Symptom:

  If a DS3 Idle alarm is detected, it is not indicated in the **show controller** output. Also, the controller goes down.

  Conditions:

  This only happens when a DS3 Idle alarm is detected.

  Workaround:

  None.

  Recovery:

  None.

- **CSCtt26718**

  Basic Description:

  P-LOP not linked with T3 controller to send RAI/X-bit remote alarm on.

  Symptom:

  P-LOP not linked in with T3 controller to send RAI/X-bit remote alarm on. Upon receiving PLOP, SONET PATH and T3 controllers respond and go down correctly.

  Conditions:

  DS3 RAI/X-bit is not sent upstream (E5 choc48 sends DS3-RAI upstream on PLOP). Only P-RDI is send upstream. Other PATH alarms send DS3 RAI upstream.

  Workaround:

  P-RDI & DS3-RAI should be sent upstream alerting systems and to bring down other direction for router interfaces.

  Recovery:

  None.

- **CSCto72695**

  Basic Description:

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

  Symptom:

  RR sends full vpn table though RT constraint is configured between RR and PE. On the RR, the **show bgp neighbor** counters for advertised prefixes will increment correspondingly to reflect a large number of prefixes advertised to PE.

  Conditions:

  When a vrf on the PE is unconfigured and reconfigured within a short interval.

  Workaround:

  To have an interval of around a minute before reconfiguring a vrf after unconfiguring it.

  Recovery:

  None.

Upgrading Cisco IOS XR Software

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

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

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

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

Troubleshooting

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

Related Documentation

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

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

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

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

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

Obtaining Documentation and Submitting a Service Request

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

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

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.