Release Notes for Cisco CRS-1 and Cisco CRS-3 for Cisco IOS XR Software Release 4.1.2

March 15, 2013

Cisco IOS XR Software Release 4.1.2

Text Part Number OL-26129-01

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

Note For information on the Cisco CRS router running Cisco IOS XR Software Release 4.1.2, see the "Important Notes" section on page 87.

You can find the most current Cisco IOS XR Software documentation at

http://www.cisco.com/en/US/products/ps5763/tsd_products_support_series_home.html

These electronic documents may contain updates and modifications. For more information on obtaining Cisco documentation, see the "Obtaining Documentation and Submitting a Service Request".

For a list of software caveats that apply to Cisco IOS XR Software Release 4.1.2, see the "Caveats" section on page 92. The caveats are updated for every release and are described at www.cisco.com.

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

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

Contents

These release notes contain the following sections:

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Introduction

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

Cisco IOS XR Software running on the Cisco CRS router provides the following features and benefits:

- **IP and Routing**—This supports a wide range of IPv4 and IPv6 services and routing protocols; such as Border Gateway Protocol (BGP), Routing Information Protocol (RIPv2), Intermediate System-to-Intermediate System (IS-IS), Open Shortest Path First (OSPF), IP Multicast, Routing Policy Language (RPL), Hot Standby Router Protocol (HSRP), and Virtual Router Redundancy Protocol features (VRRP).
- **BGP Prefix Independent Convergence**—This provides the ability to converge BGP routes within sub seconds instead of multiple seconds. The Forwarding Information Base (FIB) is updated, independent of a prefix, to converge multiple 100K BGP routes with the occurrence of a single failure. This convergence is applicable to both core and edge failures and with or without MPLS. This fast convergence innovation is unique to Cisco IOS XR Software.
- **Multiprotocol Label Switching (MPLS)**—This supports MPLS protocols, including Traffic Engineering (TE), Resource Reservation Protocol (RSVP), Label Distribution Protocol (LDP), Virtual Private LAN Service (VPLS), Layer 2 Virtual Private Network (L2VPN), and Layer 3 Virtual Private Network (L3VPN).
- **Multicast—**This provides comprehensive IP Multicast software including Source Specific Multicast (SSM) and Protocol Independent Multicast (PIM) in Sparse Mode only, and Bidirectional Protocol Independent Multicast (BIDIR-PIM).
- **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).

- **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.
- **Carrier Grade Network Address Translation (CGN)—**This enables service providers to execute orderly transitions to IPv6 through mixed IPv4 and IPv6 networks. CGN provides address family translation but is not limited to just translation within one address family. CGN delivers a comprehensive solution suite for IP address management and IPv6 transition.
- **Enhanced core competencies:**
  - IP fast convergence with Fast Reroute (FRR) is supported for Intermediate System-to-Intermediate System (IS-IS) and OSPF.
  - Traffic engineering is supported for unequal load balancing.
  - Traffic engineering over generic routing encapsulation (GRE) tunnel interfaces—LDP, L2VPN, and L3VPN over TE over GRE are supported. VPN routes over TE and over GRE require a labelled path for path resolution.
  - VRF is supported for GRE tunnel interfaces under a VRF. However, the GRE tunnel source and destination are in the global table.
  - RSVP is supported over GRE tunnels.
  - Traffic engineering is supported with Path Computation Element (PCE) capability.

For more information about new features provided on the Cisco CRS router for Cisco IOS XR Software Release 4.1.2, see the "New Cisco CRS Router Software Features" section on page 61 in this document.

System Requirements

This section describes the system requirements for Cisco IOS XR Software Release 4.1.2 supported on the Cisco CRS 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 25.

Cisco CRS-1 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 the Cisco IOS XR Software Release 4.1.2 supported on the Cisco CRS-1 Series Router.

Table 1 Cisco CRS-1 Supported Feature Sets (Cisco IOS XR Software Release 4.1.2 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	hfr-mini-p-4.1.2	Contains the required core packages, including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Cisco IOS XR IP Unicast Routing Core Bundle	hfr-mini-p.vm-4.1.2	Contains the required core packages including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Optional Individual Packages[1]		
Cisco IOS XR Manageability Package	hfr-mgbl-p.pie-4.1.2	CORBA[2] agent, XML[3] Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	hfr-mpls-p.pie-4.1.2	MPLS-TE,[4] LDP,[5] MPLS Forwarding, MPLS OAM,[6] LMP,[7] OUNI,[8] RSVP,[9] and Layer-2 VPN and Layer-3 VPN.
Cisco IOS XR Multicast Package	hfr-mcast-p.pie-4.1.2	Multicast Routing Protocols (PIM, MSDP,[10] IGMP,[11] Auto-RP), Tools (SAP, MTrace), and Infrastructure (MRIB,[12] MURIB[13], MFWD[14]), and BIDIR-PIM.[15]
Cisco IOS XR Security Package	hfr-k9sec-p.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 FPD Package	hfr-fpd-p.pie-4.1.2	Firmware for Fixed PLIM[20] and SPA[21] modules as well as ROMMON[22] images for Cisco CRS chassis.
Cisco IOS XR Diagnostic Package	hfr-diags-p.pie-4.1.2	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	hfr-doc-p.pie-4.1.2	.man pages for Cisco IOS XR software on the Cisco CRS chassis.
Cisco IOS XR Carrier Grade NAT Package	hfr-cgn-p.pie-4.1.2	Support for Carrier Grade NAT on Cisco CRS routers.

1. Packages are installed individually
2. Common Object Request Broker Architecture
3. Extensible Markup Language
4. MPLS Traffic Engineering

5. Label Distribution Protocol
6. Operations, Administration, and Maintenance
7. Link Manager Protocol
8. Optical User Network Interface
9. Resource Reservation Protocol
10. Multicast Source Discovery Protocol
11. Internet Group Management Protocol
12. Multicast Routing Information Base
13. Multicast-Unicast RIB
14. Multicast forwarding
15. Bidirectional Protocol Independent Multicast
16. IP Security
17. Secure Shell
18. Secure Socket Layer
19. Public-key infrastructure
20. Physical layer interface module
21. Shared port adapters
22. ROM monitor

Table 2 lists the Cisco CRS-1 Router TAR files.

Table 2 Cisco CRS-1 and Cisco CRS-3 Supported Feature Sets (Cisco IOS XR Software Release 4.1.2 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	CRS-1-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 Diagnostic Package • Cisco IOS XR FPD Package
Cisco IOS XR IP/MPLS Core Software 3DES	CRS-1-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 • Cisco IOS XR Diagnostic Package • Cisco IOS XR FPD Package

Cisco CRS-3 Feature Set Table

Table 3 lists the Cisco IOS XR Software feature set matrix (PIE files) and associated filenames available for the Cisco IOS XR Software Release 4.1.2 supported on the Cisco CRS-3 Router.

Table 3 Cisco CRS-3 Supported Feature Sets (Cisco IOS XR Software Release 4.1.2 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	hfr-mini-px-4.1.2	Contains the required core packages, including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Cisco IOS XR IP Unicast Routing Core Bundle	hfr-mini-px.vm-4.1.2	Contains the required core packages including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Optional Individual Packages[1]		
Cisco IOS XR Manageability Package	hfr-mgbl-px.pie-4.1.2	CORBA[2] agent, XML[3] Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	hfr-mpls-px.pie-4.1.2	MPLS-TE,[4] LDP,[5] MPLS Forwarding, MPLS OAM,[6] LMP,[7] OUNI,[8] RSVP,[9] and Layer-2 VPN and Layer-3 VPN.
Cisco IOS XR Multicast Package	hfr-mcast-px.pie-4.1.2	Multicast Routing Protocols (PIM, MSDP,[10] IGMP,[11] Auto-RP), Tools (SAP, MTrace), and Infrastructure (MRIB,[12] MURIB[13], MFWD[14]), and BIDIR-PIM.[15]
Cisco IOS XR Security Package	hfr-k9sec-px.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 FPD Package	hfr-fpd-px.pie-4.1.2	Firmware for Fixed PLIM[20] and SPA[21] modules as well as ROMMON[22] images for Cisco CRS chassis.
Cisco IOS XR Diagnostic Package	hfr-diags-px.pie-4.1.2	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	hfr-doc-px.pie-4.1.2	.man pages for Cisco IOS XR software on the Cisco CRS chassis.
Cisco IOS XR Carrier Grade NAT Package	hfr-cgn-px.pie-4.1.2	Support for Carrier Grade NAT on Cisco CRS routers.

1. Packages are installed individually
2. Common Object Request Broker Architecture
3. Extensible Markup Language
4. MPLS Traffic Engineering
5. Label Distribution Protocol
6. Operations, Administration, and Maintenance

7. Link Manager Protocol
8. Optical User Network Interface
9. Resource Reservation Protocol
10. Multicast Source Discovery Protocol
11. Internet Group Management Protocol
12. Multicast Routing Information Base
13. Multicast-Unicast RIB
14. Multicast forwarding
15. Bidirectional Protocol Independent Multicast
16. IP Security
17. Secure Shell
18. Secure Socket Layer
19. Public-key infrastructure
20. Physical layer interface module
21. Shared port adapters
22. ROM monitor

Table 4 lists the Cisco CRS-3 Router TAR files.

Table 4 Cisco CRS-3 Supported Feature Sets (Cisco IOS XR Software Release 4.1.2 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	CRS-iosxr-px-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 Diagnostic Package • Cisco IOS XR FPD Package
Cisco IOS XR IP/MPLS Core Software 3DES	CRS-iosxr-px-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 • Cisco IOS XR Diagnostic Package • Cisco IOS XR FPD 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 CRS running Cisco IOS XR Software Release 4.1.2 consist of the following:

- 4-GB memory on the route processors (RPs)
- 2-GB memory on Modular Services Card (MSC-40) and Forwarding Processor (FP-40)
- 4-GB memory on MSC-140 and FP-140
- 4-GB USB on MSC-140 and FP-140
- 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 8.

Table 5 lists the supported hardware components on the Cisco CRS and the minimum required software versions. For more information, see the "Other Firmware Support" section on page 14.

Note With Cisco IOS XR Software Release 4.1.0 PX, the CRS MSC-140 or CRS FP-140 can now be used for Provider (P) and Provider Edge (PE) Layer 3 router configurations, including Layer 3 VPN features. With Cisco IOS XR Software Release 4.1.0, CRS MSC-140 or CRS FP-140 now supports Layer 2 VPN functionality. Please contact your Cisco representative for more information.

Table 5 Cisco CRS Supported Hardware and Minimum Software Requirements

Component	Part Number	Support from Version
Cisco CRS Series 16-Slot Line Card Chassis		
Cisco CRS 16-Slot Line Card Chassis	CRS-16-LCC	3.2
Cisco CRS Fan Tray for 16-Slot LCC	CRS-16-LCC-FAN-TR	3.2
Cisco CRS Fan Controller for 16-Slot Line Card Chassis	CRS-16-LCC-FAN-CT	3.2
Cisco CRS 16-Slot Alarm Board	CRS-16-ALARM	3.2
Cisco CRS AC Delta Power Shelf for 16-Slot LCC	CRS-16-LCC-PS-ACD	3.2
Cisco CRS AC Wye Power Shelf for 16-Slot LCC	CRS-16-LCC-PS-ACW	3.2
Cisco CRS DC Power Shelf for 16-Slot LCC	CRS-1-LCC-PS-DC	3.2
Cisco CRS LCC Front AC Power Panel	CRS-16-ACGRILLE	3.2
Cisco CRS LCC Front DC Power Panel	CRS-16-DCGRILLE	3.2
Cisco CRS Line Card Chassis Front Doors	CRS-16-LCC-DRS-F	3.2
Cisco CRS Line Card Chassis Front Cable Mgmt	CRS-16-LCC-FRNT	3.2

Table 5 Cisco CRS Supported Hardware and Minimum Software Requirements (continued)

Component	Part Number	Support from Version
Cisco CRS LCC Expanded Front Cable Mgmt	CRS-16-LCC-FRNT-E	3.2
Cisco CRS Line Card Chassis Rear Cable Mgmt	CRS-16-LCC-BCK-CM	3.2
Cisco CRS Line Card Chassis Rear Doors	CRS-16-LCC-DRS-R	3.2
Cisco CRS Lift for LCC 16 and FCC	CRS-16-LIFT/B	3.2
Cisco CRS DC PEM for 16 slot LCC and FCC	CRS-16-DC-PEM	3.2
Cisco CRS 16 Slot System Reduced-Noise DC PEM	CRS-16-DC-PEM-B	3.8
Cisco CRS 16 Slot System Reduced-Noise Fan Tray	CRS-16-LCC-FNTR-B	3.8
Cisco CRS Series LC Chassis Fan Controller	CRS-16-LCC-F-CT-B	4.0.1PX
Cisco CRS Series 8-Slot Line Card Chassis		
Cisco CRS 8-Slot Install Kit	CRS-8-INSTALL-KT	N/A
Cisco CRS 8-Slot Fork Lift Tube	CRS-8-LIFT-TUBE	N/A
Cisco CRS 8-Slot Front Badge Panel	CRS-8-BDG-PANEL	N/A
Cisco CRS 8-Slot Front Inlet Grill	CRS-8-FRNT-GRILL	N/A
Cisco CRS 8-Slot Horizontal Install Rails	CRS-8-HRZ-RAILS	N/A
Cisco CRS 8-Slot Line Card Chassis	CRS-8-LCC	3.2
Cisco CRS Fan Tray for 8-Slot Line Card Chassis	CRS-8-LCC-FAN-TR	3.2
Cisco CRS Line Card Chassis Filter Pack	CRS-8-LCC-FILTER	3.2
Cisco CRS AC Pwr Rectifier for 8-Slot LCC	CRS-8-AC-RECT	3.2
Cisco CRS DC Power Entry Module for 8-Slot LCC	CRS-8-DC-PEM	3.2
Cisco CRS AC & DC Power Module Filter for 8-Slot LCC	CRS-8-PWR-FILTER	3.2
Cisco CRS AC Delta PDU for CRS-8 LCC	CRS-8-LCC-PDU-ACD	3.2
Cisco CRS AC Wye PDU for CRS-8 LCC	CRS-8-LCC-PDU-ACW	3.2
Cisco CRS DC PDU for CRS-8 LCC	CRS-8-LCC-PDU-DC	3.2
Cisco CRS Series 4-Slot Line Card Chassis		
Cisco CRS-1 4-Slot Single-Shelf System	CRS-4/S	3.4
Cisco CRS Fabric Chassis Hardware		
CRS-FCC= Cisco CRS-1 Series Fabric Card Chassis Only	CRS-FCC=	3.2
CRS-1 Fabric Chassis AC Delta Power Kit	CRS-FCC-ACD-KIT	3.2
CRS-1 Fabric Chassis AC Grille	CRS-FCC-ACGRILLE	3.2
CRS-1 Fabric Chassis AC-Wye Power Kit	CRS-FCC-ACW-KIT	3.2
CRS Fabric Chassis DC Power Kit	CRS-FCC-DC-KIT	3.2
CRS-1 Fabric Chassis DC Power Grille	CRS-FCC-DCGRILLE	3.2
CRS Fabric Chassis Lift Bracket	CRS-FCC-LIFT-BRKT	3.2
CRS Fabric Chassis OIM Modules	CRS-FCC-OIM-1S=	3.2
Cisco CRS-1 Series FC Chassis Shelf/Fan/Enet cntr	CRS-FCC-SC-GE=	3.2
CRS-1 Fabric Chassis AC Intake Grille	CRS-FCC-ACGRILLE=	3.2

Table 5 Cisco CRS Supported Hardware and Minimum Software Requirements (continued)

Component	Part Number	Support from Version
CRS-1 Fabric Chassis DC Intake Grille	CRS-FCC-DCGRILLE=	3.2
Cisco CRS-1 Series Fan Tray for FCC	CRS-FCC-FAN-TR=	3.2
CRS-1 Fabric Card Chassis Fan Tray Filters	CRS-FCC-FILTER=	3.2
CRS-1 Fabric Chassis Front Cosmetic Kit	CRS-FCC-FRNT-CM=	3.2
Cisco CRS-1 Series Fabric Card Chassis Fiber Module LED	CRS-FCC-LED=	3.2
Cisco CRS-1 Series DC Power Shelf for FCC	CRS-FCC-PS-DC=	3.2
CRS-1 Fabric Chassis Rear Cosmetic Kit	CRS-FCC-REAR-CM=	3.2
CRS-LIFT Brackets for Fabric Chassis	CRS-FCC-LIFT-BRKT=	3.2
CRS Fabric Chassis OIM Module	CRS-FCC-OIM-1S	3.2
CRS-1 Fabric Chassis AC Delta Power Supply	CRS-FCC-PS-ACD	3.2
CRS-1 Fabric Chassis AC Wye Option	CRS-FCC-PS-ACW	3.2
CRS-1 Fabric Chassis DC Power Option	CRS-FCC-PS-DC	3.2
Cisco CRS-1 Series Fabric Card Chassis Switch Fabric Card	CRS-FCC-SFC=	3.2
CRS-1 Fabric Chassis Integrated Switch Controller Card	CRS-FCC-SC-22GE Integrated Switch	3.4.1
Cisco CRS General Chassis Hardware		
Cisco CRS PCM CIA Flash Disk 2GB	CRS-FLASH-DISK-2G	3.8
Cisco CRS PCM CIA Flash Disk 4 GB	CRS-FLASH-DISK-4G	3.8
Cisco CRS Modular Services Card	CRS-MSC	3.2
Cisco CRS Modular Service Card B	CRS-MSC-B	3.6
Cisco CRS-1 Series Forwarding Processor 40G	CRS-FP40	3.8.1
Cisco CRS Series Modular Services Card 140G	CRS-MSC-140G	4.0.0 PX
Cisco CRS Series Forwarding Processor Card 140G	CRS-FP140	4.0.0 PX
Cisco CRS SFPs		
Cisco CRS 2.5 G SFP LR Optic	POM-OC48-LR2-LC-C	3.2
Cisco CRS 2.5 G SFP SR Optic	POM-OC48-SR-LC-C	3.2
CRS Fabric Cards		
Cisco CRS 8-Slot Fabric Card/Single	CRS-8-FC/S	3.2
Cisco CRS 8-Slot Fabric Card Blank	CRS-8-FC-BLANK	3.2
Cisco CRS 8-Slot Fabric Handle	CRS-8-FC-HANDLE	3.2
Cisco CRS 16-Slot Fabric Card/Single	CRS-16-FC/S	3.2
Cisco CRS Series 4 Slots Fabric Card / Single (140G)	CRS-4-FC140/S	4.0.0 PX
Cisco CRS Series 8 Slots Fabric Card / Single (140G)	CRS-8-FC140/S	4.0.0 PX
Cisco CRS Series 16 Slots Fabric Card / Single (140G)	CRS-16-FC140/S	4.0.0 PX
Cisco CRS-3 Series Fabric Card Chassis Switch Fabric Card 140G	CRS-FCC-SFC-140	4.0.3
Cisco CRS Series 16 Slots Fabric Card / Multi (140G)	CRS-16-FC140/M	4.0.3
Cisco CRS Interface and Router Processor Cards		

Table 5 Cisco CRS Supported Hardware and Minimum Software Requirements (continued)

Component	Part Number	Support from Version
Cisco CRS 8-Slot Route Processor	CRS-8-RP	3.2
Cisco CRS16-Slot Route Processor	CRS-16-RP	3.2
Cisco CRS-1 Distributed Route Processor	CRS-DRP	3.3
Cisco CRS-1 Distributed Route Processor CPU Module	CRS-DRP-B-CPU	3.4.1
Cisco CRS-1 Distributed Route Processor PLIM Module	CRS-DRP-B-PLIM	3.4.1
Cisco CRS 8-Slot Route Processor Blank	CRS-8-RP-BLANK	3.2
Cisco CRS 8-Slot Route Processor Handle	CRS-8-RP-HANDLE	3.2
Cisco Carrier 1 Series SPA Interface Processor 40G	CRS1-SIP-800	3.2
Cisco CRS-1 16-slot Route Processor, revision B	CRS-16-RP-B	3.3
Cisco CRS 1-port 100-GE CFP PLIM	1x100-GE CFP PLIM	4.0.1 PX
Cisco CRS-1 Series 8 Slots 6 Gb Performance Route Processor	CRS-8-PRP-6G	4.1
Cisco CRS-1 Series 8 Slots 12Gb Performance Route Processor	CRS-8-PRP-12G	4.1
Cisco CRS-1 Series 16 Slots 6 Gb Performance Route Processor	CRS-16-PRP-6G	4.1
Cisco CRS-1 Series 16Slots 6 Gb Performance Route Processor	CRS-16-PRP-12G	4.1
Cisco CRS-1 Series Carrier Grade Service Engine PLIM	CRS-CGSE-PLIM	4.1.1
Cisco CRS Label Switch Processor		
Cisco CRS-LSP Label Switch Processor	CRS-LSP	4.1.1
Cisco CRS SONET Interface Modules and SPAs		
Cisco CRS 4xOC-192c/STM64c POS/DPT Interface Module/VS	4OC192-POS/DPT-VS	3.2
Cisco CRS 4xOC-192c/STM64c POS/DPT Interface Module/SR	4OC192-POS/DPT-SR	3.2
Cisco CRS 4xOC-192c/STM64c POS/DPT Interface Module/IR	4OC192-POS/DPT-IR	3.2
Cisco CRS 4xOC-192c/STM64c POS/DPT Interface Module/LR	4OC192-POS/DPT-LR	3.2
Cisco CRS 16xOC-48c/STM16c POS/DPT Interface Module	16OC48-POS/DPT	3.2
Cisco CRS 1xOC-768c/STM256c POS Interface Module/SR	1OC768-POS-SR	3.2
Cisco CRS 8-Port OC-12c/STM-4c Shared Port Adapter	SPA-8XOC12-POS	3.3
Cisco CRS 2-Port OC-48c/STM-16c POS/RPR Shared Port Adapter	SPA-2XOC48-POS/RPR	3.4
Cisco CRS 4-Port OC-48c/STM-16c POS/RPR Shared Port Adapter	SPA-4XOC48-POS/RPR	3.4
Cisco CRS 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with XFP Optics	SPA-OC192POS-XFP	3.2
Cisco CRS 4-Port OC-3c/STM-1c Shared Port Adapter	SPA-4XOC3-POS	3.2
Cisco CRS 1-Port OC-192/STM-64 POS/RPR SPA VSR Optics	SPA-OC192POS-VSR	3.2
Cisco CRS Serial Interface Modules and SPAs		
Cisco CRS 4-Port Clear Channel T3/E3 Serial Shared Port Adapter	SPA-4XT3/E3	3.4.1
Cisco CRS 2-Port Clear Channel T3/E3 Serial Shared Port Adapter	SPA-2XT3/E3	3.4.1
Cisco CRS 1-Port OC-768c/STM-256c (C-band) DWDM PLIM	10C768-ITU/C	3.4.1

Table 5 Cisco CRS Supported Hardware and Minimum Software Requirements (continued)

Component	Part Number	Support from Version
Cisco CRS 1-Port OC-768c/STM-256c (C-band) DPSK+DWDM PLIM	10C768-DPSK/C	3.4.1
Cisco CRS Ethernet Interface Modules and SPAs		
Cisco CRS 8x10 GbE Interface Module LR/ER	8-10GBE	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 Gigabit Ethernet Shared Port Adapter	SPA-8X1GE	3.2
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 4-Port Ten Gigabit Ethernet (C-band) DWDM PLIM	4-10GE-ITU/C	3.3
Cisco CRS-1 Series 4x10GE Interface Module	4-10GE	3.8.1
Cisco CRS-1 Series 42x1GE Interface Module	42-1GE	3.8.1
Cisco CRS-1 Series 20x1GE Flexible Interface Module	20-1GE-FLEX	3.8.1
Cisco CRS-1 Optical to Electrical Modules		
10GBASE-LR XENPAK Module for Cisco CRS	XENPAK-10GB-LR	3.2
10GBASE-LR XENPAK Module for Cisco CRS	XENPAK-10GB-LR+	3.4
10GBASE-DWDM XENPAK	XENPAK-10GB-DWDM	3.2.2
10GBASE-ER XENPAK Modular for Cisco CRS-1	XENPAK-10GB-ER	3.4
Cisco 1-port 10GbE SPA WAN/LAN PHY	SPA-1X10GE-WL-V2	3.5.2
2-port OC-12c/STM-4 POS SPA - Project Gladiator	SPA-2XOC12-POS	3.5.2
1-port OC-48c/STP-16 POS/RPR SPA Project Iguana48	SPA-1XOC48-POS/RPR	3.5.2
3-port Clear Channel OC-3 ATM SPA	SPA-3XOC3-ATM-VR	3.5.2
1-port Clear Channel OC-12 ATM SPA	SPA-1XOC12-ATM-V2	3.5.2
1-port Channelized OC12 to DS0 SPA	SPA-1XCHOC12/DS0	3.5.2
Cisco CRS-1 Series 2x10GE WAN/LAN Flexible Interface Module	2-10GE-WL-FLEX	3.8.1
Cisco CRS-1 Series 4-Port Ten Gigabit Ethernet Interface Module	4-10GBE-WL-XFP	3.8.4
Cisco CRS-1 Series 8-Port Ten Gigabit Ethernet Interface Module	8-10GBE-WL-XFP	3.9.1
Cisco CRS Series 14x10GbE LAN/WAN-PHY Interface Module	14X10GBE-WL-XFP	4.0.0 PX
Cisco CRS Series 20x10GbE LAN/WAN-PHY Interface Module	20X10GBE-WL-XFP	4.0.0 PX

The CRS FP40 is compatible with the following PLIMs:

- 4-10GE
- 42-1GE
- 20-1GE-FLEX
- 2-10GE-WL-FLEX
- 4-10GBE-WL-XFP
- 8-10GBE-WL-XFP
- 4-10GE-ITU/C

RP-B with CRS-3 is not supported for Multichassis systems; only PRP is supported for such systems. Cisco highly recommends PRP for all CRS-1, CRS-3 Single chassis and Multichassis configurations, due to its significant advantages in improving boot time, performance, and scale. For information on End-of-Sale and End-of-Life Announcement for the Cisco CRS 8-Slot and 16-slot Line Card Chassis Route Processors:

http://www.cisco.com/en/US/partner/prod/collateral/routers/ps5763/end_of_life_notice_c51-695816.html

http://www.cisco.com/en/US/partner/prod/collateral/routers/ps5763/end_of_life_notice_c51-695817.html

CRS FP-140 Licenses

The following licenses apply to the CRS FP-140:

Licence	Description
XC-ENH-NF-140G	Cisco CRS Series Enhanced Netflow Performance License 140G
XC-L2L3VPN-140G	Cisco CRS Series L2 and L3 VPN Peering Edge License 140G
XC-RTE-SCL-140G	Cisco CRS Series Route Scale License 140G
XC-TE-SCL-140G	Cisco CRS Series Traffic Engineering Scale License 140G
XC-MC-LIC-140G	Cisco CRS Series Multishelf License 140G

CRS CGSE-PLIM Licenses

The following licenses apply to the Cisco CRS-1 Series Carrier Grade Service Engine PLIM in Cisco IOS XR software Release 4.1.2.

Licence	Description
XC-XLAT44-5M	SW license for 5M NAT44 translations
XC-XLAT44-10M	SW license for 10M NAT44 translations
XC-XLAT44-20M	SW license for 20M NAT44 translations
XC-XLAT64-SL	SW license for Stateless NAT64
XC-6RD-BR	SW license for 6rd Border Relay

Software Compatibility

Cisco IOS XR Software Release 4.1.2 is compatible with the following Cisco CRS-1 systems:

- Cisco CRS 4-Slot Line Card Chassis
- Cisco CRS 8-Slot Line Card Chassis
- Cisco CRS 16-Slot Line Card Chassis
- Cisco CRS Multishelf Systems

Cisco IOS XR Software Release 4.1.2 is compatible with the following Cisco CRS-3 systems:

- Cisco CRS 4-Slot Line Card Chassis
- Cisco CRS 8-Slot Line Card Chassis
- Cisco CRS 16-Slot Line Card Chassis

Other Firmware Support

The Cisco CRS router supports the following firmware code:

- The minimum ROMMON version required for this release is 2.03. For more information about ROMMON specifications, see http://www.cisco.com/web/Cisco_IOS_XR_Software/index.html. For information about upgrading the ROMMON, refer to the *Cisco IOS XR ROM Monitor Guide for the Cisco CRS-1 Router* at: http://www.cisco.com/en/US/products/ps5763/products_installation_and_configuration_guides_list.html
- The minimum CPUCNTRL version required for this release is 2.07. For more information about CPU controller bits, refer to the *Cisco IOS XR System Management Configuration Guide for the Cisco CRS-1 Router* at: http://www.cisco.com/en/US/products/ps5763/products_installation_and_configuration_guides_list.html
- If the FPDs need an upgrade or a downgrade, use the **admin upgrade hw-module fpd** command.
- At least one FPD is running the minimum supported software version. To upgrade this FPD, use the **admin upgrade hw-module fpd force**.

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

Cisco CRS-1 show fpd package Output

```
RP/0/RP0/CPU0:router(admin)#show fpd package
Wed Nov 23 10:54:39.283 PST

================================ ================================================
                                        Field Programmable Device Package
                                 ================================================
                                                                      SW      Min Req   Min Req
Card Type            FPD Description            Type Subtype    Version   SW Ver    HW Vers
==================== ========================== ==== ======== =========== ======== ========
S2                   FPGA 4.02                  lc   fpga2       4.02        0.0       0.0
                     FPGA 5.00                  lc   fpga3       5.00        0.0       0.0
                     FPGA 6.04 spb              lc   fpga1       6.04        0.0       0.0
                     ROMMONA swv2.05 spb        lc   rommonA     2.05        2.5       0.0
                     ROMMONB swv2.05 spb        lc   rommon      2.05        2.5       0.0
-------------------------------------------------------------------------------------------
140G-S1S2S3          FPGA 4.01                  lc   fpga2       4.01        0.0       0.0
```

```
                    FPGA 6.04 spb              lc   fpga1       6.04        0.0        0.0
                    ROMMONA swv2.05 spb        lc   rommonA     2.05        2.5        0.0
                    ROMMONB swv2.05 spb        lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
Fabric HS123 Superst FPGA 4.00                 lc   fpga2       4.00        0.0        0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.0        0.0
                    ROMMONA swv2.05 spb        lc   rommonA     2.05        2.5        0.0
                    ROMMONB swv2.05 spb        lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
140G-4-S1S2S3        FPGA 4.01                 lc   fpga2       4.01        0.0        0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.0        0.0
                    ROMMONA swv2.05 spb        lc   rommonA     2.05        2.5        0.0
                    ROMMONB swv2.05 spb        lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
140G-S1S3            FPGA 4.01                 lc   fpga2       4.01        0.0        0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.0        0.0
                    ROMMONA swv2.05 spb        lc   rommonA     2.05        2.5        0.0
                    ROMMONB swv2.05 spb        lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
140G-S1S2S3-2        FPGA 4.01                 lc   fpga2       4.01        0.0        0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.0        0.0
                    ROMMONA swv2.05 spb        lc   rommonA     2.05        2.5        0.0
                    ROMMONB swv2.05 spb        lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
140G-S1S3-2          FPGA 4.01                 lc   fpga2       4.01        0.0        0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.0        0.0
                    ROMMONA swv2.05 spb        lc   rommonA     2.05        2.5        0.0
                    ROMMONB swv2.05 spb        lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
140G-S2-2            FPGA 4.02                 lc   fpga2       4.02        0.0        0.0
                    FPGA 16.00                 lc   fpga3      16.00        0.0        0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.0        0.0
                    ROMMONA swv2.05 spb        lc   rommonA     2.05        2.5        0.0
                    ROMMONB swv2.05 spb        lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
140G-MSC             FPGA Linecard 0.36        lc   fpga2       0.36        0.0        0.0
                    FPGA CPU 0.8               lc   fpga1       0.08        0.0        0.0
                    ROMMONA swv2.05 kensho     lc   rommonA     2.05        2.4        0.0
                    ROMMONB swv2.05 kensho     lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
FP-140G              FPGA Linecard 0.36        lc   fpga2       0.36        0.0        0.0
                    FPGA CPU 0.8               lc   fpga1       0.08        0.0        0.0
                    ROMMONA swv2.05 kensho     lc   rommonA     2.05        2.4        0.0
                    ROMMONB swv2.05 kensho     lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
CRS-LSP              FPGA Linecard 0.36        lc   fpga2       0.36        0.0        0.0
                    FPGA CPU 0.8               lc   fpga1       0.08        0.0        0.0
                    ROMMONA swv2.05 kensho     lc   rommonA     2.05        2.4        0.0
                    ROMMONB swv2.05 kensho     lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
1OC768-ITU/C         OPTICS FIRMWARE 110B10    lc   fpga2     110.10        0.0        0.0
--------------------------------------------------------------------------------------------
1OC768-DWDM-L        OPTICS FIRMWARE 110B10    lc   fpga2     110.10        0.0        0.0
--------------------------------------------------------------------------------------------
1OC768-DPSK/C        OPTICS FIRMWARE 110B14    lc   fpga2     110.14        0.0        0.0
--------------------------------------------------------------------------------------------
1OC768-DPSK/C-O      OPTICS FIRMWARE 110B14    lc   fpga2     110.14        0.0        0.0
--------------------------------------------------------------------------------------------
1OC768-DPSK/C-E      OPTICS FIRMWARE 110B14    lc   fpga2     110.14        0.0        0.0
--------------------------------------------------------------------------------------------
CRS-CGSE-PLIM        FPGA mCPU0 0.559          lc   fpga2      0.559        0.0        0.0
                    FPGA sCPU0 0.559           lc   fpga3      0.559        0.0        0.0
                    FPGA mCPU1 0.559           lc   fpga4      0.559        0.0        0.0
                    FPGA sCPU1 0.559           lc   fpga5      0.559        0.0        0.0
```

	FPGA PLIM_SVC 0.41014	lc	fpga1	0.41014	0.0	0.0
20-10GBE	PLIM FPGA 42.0	lc	fpga3	42.00	0.0	0.0
12-10GBE	PLIM FPGA 42.0	lc	fpga3	42.00	0.0	0.0
1-100GBE	PLIM FPGA 19.0	lc	fpga3	19.00	0.0	0.0
	RX MAC FPGA 49.0	lc	fpga4	49.00	0.0	0.0
	TX MAC FPGA 34.0	lc	fpga5	34.00	0.0	0.0
14-10GBE	PLIM FPGA 42.0	lc	fpga3	42.00	0.0	0.0
DRP_B	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.05 asmp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 dsmp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 spb	lc	rommonA	2.05	2.5	0.0
	ROMMONB swv2.05 asmp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 dsmp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 spb	lc	rommon	2.05	2.5	0.0
MSC_B	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.05 asmp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 dsmp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 spb	lc	rommonA	2.05	2.5	0.0
	ROMMONB swv2.05 asmp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 dsmp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 spb	lc	rommon	2.05	2.5	0.0
FP40	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.05 asmp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 dsmp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 spb	lc	rommonA	2.05	2.5	0.0
	ROMMONB swv2.05 asmp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 dsmp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 spb	lc	rommon	2.05	2.5	0.0
CRS1-SIP-800	JACKET FPGA swv6.0	lc	fpga1	6.00	5.0	0.0
	FPGA swv6.0 hwv80	lc	fpga1	6.00	5.0	0.80
8-10GBE	FPGA swvA.0	lc	fpga1	10.00	0.0	0.0
OC48-POS-16-ED	FPGA PLIM_OC48 9.0	lc	fpga1	9.00	0.0	0.0
4-10GBE	FPGA sw_4p_v15.0	lc	fpga1	15.00	0.0	0.0
8-10GBE	FPGA sw_8p_v15.0	lc	fpga1	15.00	0.0	0.0
4-10GE	SQUIRREL FPGA 10.0	lc	fpga1	10.00	0.0	0.0
42-1GE	FPGA swv6.0	lc	fpga1	6.00	0.0	0.0
	FPGA swv6.0 hwv0.80	lc	fpga1	6.00	0.0	0.80
20-1GE-FLEX	FPGA swv6.0	lc	fpga1	6.00	0.0	0.0
	FPGA swv6.0 hwv0.80	lc	fpga1	6.00	0.0	0.80
2-10GE-WL-FLEX	FPGA swv6.0	lc	fpga1	6.00	0.0	0.0
	FPGA swv6.0 hwv0.80	lc	fpga1	6.00	0.0	0.80

```
CRS-16-ALARM-C       FPGA 6.04 spb             lc   fpga1       6.04        0.0        0.0
                     ROMMONA swv2.05 sp        lc   rommonA     2.05        2.1        0.0
                     ROMMONA swv2.05 spb       lc   rommonA     2.05        2.5        0.0
                     ROMMONB swv2.05 sp        lc   rommon      2.05        2.5        0.0
                     ROMMONB swv2.05 spb       lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
CRS-16-ALARM-B       FPGA 6.04 spb             lc   fpga1       6.04        0.0        0.0
                     ROMMONA swv2.05 spb       lc   rommonA     2.05        2.5        0.0
                     ROMMONB swv2.05 spb       lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
CRS-16-FAN-CT        FPGA 6.04 spb             lc   fpga1       6.04        0.0        0.0
                     ROMMONA swv2.05 spb       lc   rommonA     2.05        2.5        0.0
                     ROMMONB swv2.05 spb       lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
CRS-16-LCC-F-CT-B    FPGA 6.04 spb             lc   fpga1       6.04        0.0        0.0
                     ROMMONA swv2.05 spb       lc   rommonA     2.05        2.5        0.0
                     ROMMONB swv2.05 spb       lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
CRS-FCC-LED          FPGA 6.04 spb             lc   fpga1       6.04        0.0        0.0
                     ROMMONA swv2.05 sp        lc   rommonA     2.05        2.1        0.0
                     ROMMONA swv2.05 spb       lc   rommonA     2.05        2.5        0.0
                     ROMMONB swv2.05 sp        lc   rommon      2.05        2.5        0.0
                     ROMMONB swv2.05 spb       lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
Route Processor      ROMMONA swv2.05 asmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONB swv2.05 asmp      lc   rommon      2.05        2.5        0.0
                     ROMMONB swv2.05 dsmp      lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
SC                   ROMMONA swv2.05 asmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONB swv2.05 asmp      lc   rommon      2.05        2.5        0.0
                     ROMMONB swv2.05 dsmp      lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
RP                   ROMMONA swv2.05 asmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONB swv2.05 asmp      lc   rommon      2.05        2.5        0.0
                     ROMMONB swv2.05 dsmp      lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
Shelf Controller GE  ROMMONA swv2.05 asmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONB swv2.05 asmp      lc   rommon      2.05        2.5        0.0
                     ROMMONB swv2.05 dsmp      lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
RP                   ROMMONA swv2.05 asmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONB swv2.05 asmp      lc   rommon      2.05        2.5        0.0
                     ROMMONB swv2.05 dsmp      lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
Shelf Controller GE2 ROMMONA swv2.05 asmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONB swv2.05 asmp      lc   rommon      2.05        2.5        0.0
                     ROMMONB swv2.05 dsmp      lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
DRP                  ROMMONA swv2.05 asmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA     2.05        2.1        0.0
                     ROMMONA swv2.05 sp        lc   rommonA     2.05        2.1        0.0
                     ROMMONB swv2.05 asmp      lc   rommon      2.05        2.5        0.0
                     ROMMONB swv2.05 dsmp      lc   rommon      2.05        2.5        0.0
                     ROMMONB swv2.05 sp        lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
S1S2S3               ROMMONA swv2.05 sp        lc   rommonA     2.05        2.1        0.0
                     ROMMONB swv2.05 sp        lc   rommon      2.05        2.5        0.0
--------------------------------------------------------------------------------------------
```

S1S3	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
S2	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
Fabric HS123	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
Fabric QQS123	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
LED	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
40G-MSC	ROMMONA swv2.05 asmp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 dsmp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 asmp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 dsmp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
CRS-16-ALARM	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
CRS-16-LCC-FAN-CT	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
FC Fan Controller	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
SPA-4XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.0	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.0	0.0
	SPA I/O FPGA	spa	fpga1	1.00	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.0
SPA-2XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.0	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.0	0.0
	SPA I/O FPGA	spa	fpga1	1.00	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.0
SPA-1XCHOC48/DS3	SPA I/O FPGA	spa	fpga2	1.00	0.0	0.49
	SPA I/O FPGA	spa	fpga3	1.00	0.0	0.52
	SPA I/O FPGA	spa	fpga1	1.36	0.0	0.49
	SPA ROMMON	spa	rommon	2.02	0.0	0.49
SPA-1XCHOC12/DS0	SPA I/O FPGA	spa	fpga2	1.00	0.0	0.49
	SPA I/O FPGA	spa	fpga1	1.36	0.0	0.49
	SPA ROMMON	spa	rommon	2.02	0.0	0.49
SPA-OC192POS	SPA FPGA swv1.3	spa	fpga1	1.03	0.0	0.0
SPA-8XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.5
SPA-4XOC3-POS	SPA FPGA swv3.4	spa	fpga1	3.04	0.0	0.0
SPA-OC192POS-XFP	SPA FPGA swv1.2	spa	fpga1	1.02	0.0	0.0
SPA-8X1GE	SPA FPGA swv1.8	spa	fpga1	1.08	0.0	0.0
SPA-2XOC48POS/RPR	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.0
SPA-4XOC48POS/RPR	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.0

```
SPA-1XOC48POS/RPR    SPA FPGA swv1.2            spa  fpga1       1.02        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-8XOC3-POS        SPA FPGA swv1.0            spa  fpga1       1.00        0.0        0.5
                     SPA FPGA swv1.0            spa  fpga1       1.00        0.0        0.5
-------------------------------------------------------------------------------------------
SPA-2XOC12-POS       SPA FPGA swv1.0            spa  fpga1       1.00        0.0        0.5
-------------------------------------------------------------------------------------------
SPA-4XOC12-POS       SPA FPGA swv1.0            spa  fpga1       1.00        0.0        0.5
-------------------------------------------------------------------------------------------
SPA-10X1GE-V2        SPA FPGA swv1.10           spa  fpga1       1.10        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-8X1GE-V2         SPA FPGA swv1.10           spa  fpga1       1.10        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-5X1GE-V2         SPA FPGA swv1.10           spa  fpga1       1.10        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-1X10GE-L-V2      SPA FPGA swv1.11           spa  fpga1       1.11        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-4XOC3-POS-V2     SPA FPGA swv1.0            spa  fpga1       1.00        0.0        0.5
-------------------------------------------------------------------------------------------
SPA-1X10GE-WL-V2     SPA FPGA swv1.11           spa  fpga1       1.11        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-1XOC3-ATM-V2     SPA FPGA swv1.2            spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-2XOC3-ATM-V2     SPA FPGA swv1.2            spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-3XOC3-ATM-V2     SPA FPGA swv1.2            spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------
SPA-1XOC12-ATM-V2    SPA FPGA swv1.2            spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------
RP/0/RP0/CPU0:router(admin)#$
```

Cisco CRS-3 show fpd package Output

```
RP/0/RP0/CPU0:router(admin)#show fpd package

================================ ==============================================
                                          Field Programmable Device Package
                                 ==============================================
                                                                        SW      Min Req   Min Req
Card Type            FPD Description            Type Subtype   Version   SW Ver    HW Vers
==================== ========================== ==== ======= =========== ======== ========
PRP                  FPGA ZJF uBlaze            lc   fpga2       0.01        0.0       0.0
                     S-8 FPGA Nirvana           lc   fpga3      13.00        0.0       0.0
                     FPGA BCM 8727              lc   fpga4       0.01        0.0       0.0
                     FPGA MCU                   lc   fpga5       0.01        0.0       0.0
                     S-8 FPGA UTI               lc   fpga6       4.09        0.0       0.0
                     FPGA CPU ZJF               lc   fpga1       7.00        0.0       0.0
                     ROMMONA swv2.05 x86mp      lc   rommonA     2.05        2.3       0.0
                     ROMMONB swv2.05 x86mp      lc   rommon      2.05        2.5       0.0
-------------------------------------------------------------------------------------------
PRP                  FPGA ZJF uBlaze            lc   fpga2       0.01        0.0       0.0
                     S-16 FPGA Nirvana          lc   fpga3      13.00        0.0       0.0
                     FPGA BCM 8727              lc   fpga4       0.01        0.0       0.0
                     FPGA MCU                   lc   fpga5       0.01        0.0       0.0
                     ZJF FPGA CPU               lc   fpga1       7.00        0.0       0.0
                     ROMMONA swv2.05 x86mp      lc   rommonA     2.05        2.3       0.0
                     ROMMONB swv2.05 x86mp      lc   rommon      2.05        2.5       0.0
-------------------------------------------------------------------------------------------
S2                   FPGA 4.02                  lc   fpga2       4.02        0.0       0.0
                     FPGA 5.00                  lc   fpga3       5.00        0.0       0.0
                     FPGA 6.04 spb              lc   fpga1       6.04        0.0       0.0
                     ROMMONA swv2.05 spb        lc   rommonA     2.05        2.5       0.0
                     ROMMONB swv2.05 spb        lc   rommon      2.05        2.5       0.0
-------------------------------------------------------------------------------------------
```

140G-S1S2S3	FPGA 4.01	lc	fpga2	4.01	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.05 spb	lc	rommonA	2.05	2.5	0.0
	ROMMONB swv2.05 spb	lc	rommon	2.05	2.5	0.0
Fabric HS123 Superst	FPGA 4.00	lc	fpga2	4.00	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.05 spb	lc	rommonA	2.05	2.5	0.0
	ROMMONB swv2.05 spb	lc	rommon	2.05	2.5	0.0
140G-4-S1S2S3	FPGA 4.01	lc	fpga2	4.01	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.05 spb	lc	rommonA	2.05	2.5	0.0
	ROMMONB swv2.05 spb	lc	rommon	2.05	2.5	0.0
140G-S1S3	FPGA 4.01	lc	fpga2	4.01	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.05 spb	lc	rommonA	2.05	2.5	0.0
	ROMMONB swv2.05 spb	lc	rommon	2.05	2.5	0.0
140G-S1S2S3-2	FPGA 4.01	lc	fpga2	4.01	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.05 spb	lc	rommonA	2.05	2.5	0.0
	ROMMONB swv2.05 spb	lc	rommon	2.05	2.5	0.0
140G-S1S3-2	FPGA 4.01	lc	fpga2	4.01	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.05 spb	lc	rommonA	2.05	2.5	0.0
	ROMMONB swv2.05 spb	lc	rommon	2.05	2.5	0.0
140G-S2-2	FPGA 4.02	lc	fpga2	4.02	0.0	0.0
	FPGA 16.00	lc	fpga3	16.00	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.05 spb	lc	rommonA	2.05	2.5	0.0
	ROMMONB swv2.05 spb	lc	rommon	2.05	2.5	0.0
140G-MSC	FPGA Linecard 0.36	lc	fpga2	0.36	0.0	0.0
	FPGA CPU 0.8	lc	fpga1	0.08	0.0	0.0
	ROMMONA swv2.05 kensho	lc	rommonA	2.05	2.4	0.0
	ROMMONB swv2.05 kensho	lc	rommon	2.05	2.5	0.0
FP-140G	FPGA Linecard 0.36	lc	fpga2	0.36	0.0	0.0
	FPGA CPU 0.8	lc	fpga1	0.08	0.0	0.0
	ROMMONA swv2.05 kensho	lc	rommonA	2.05	2.4	0.0
	ROMMONB swv2.05 kensho	lc	rommon	2.05	2.5	0.0
CRS-LSP	FPGA Linecard 0.36	lc	fpga2	0.36	0.0	0.0
	FPGA CPU 0.8	lc	fpga1	0.08	0.0	0.0
	ROMMONA swv2.05 kensho	lc	rommonA	2.05	2.4	0.0
	ROMMONB swv2.05 kensho	lc	rommon	2.05	2.5	0.0
1OC768-ITU/C	OPTICS FIRMWARE 110B10	lc	fpga2	110.10	0.0	0.0
1OC768-DWDM-L	OPTICS FIRMWARE 110B10	lc	fpga2	110.10	0.0	0.0
1OC768-DPSK/C	OPTICS FIRMWARE 110B14	lc	fpga2	110.14	0.0	0.0
1OC768-DPSK/C-O	OPTICS FIRMWARE 110B14	lc	fpga2	110.14	0.0	0.0
1OC768-DPSK/C-E	OPTICS FIRMWARE 110B14	lc	fpga2	110.14	0.0	0.0
CRS-CGSE-PLIM	FPGA mCPU0 0.559	lc	fpga2	0.559	0.0	0.0
	FPGA sCPU0 0.559	lc	fpga3	0.559	0.0	0.0
	FPGA mCPU1 0.559	lc	fpga4	0.559	0.0	0.0

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                    FPGA sCPU1 0.559          lc   fpga5       0.559       0.0       0.0
                    FPGA PLIM_SVC 0.41014     lc   fpga1       0.41014     0.0       0.0
-------------------------------------------------------------------------------------------
20-10GBE            PLIM FPGA 42.0            lc   fpga3      42.00        0.0       0.0
-------------------------------------------------------------------------------------------
12-10GBE            PLIM FPGA 42.0            lc   fpga3      42.00        0.0       0.0
-------------------------------------------------------------------------------------------
1-100GBE            PLIM FPGA 19.0            lc   fpga3      19.00        0.0       0.0
                    RX MAC FPGA 49.0          lc   fpga4      49.00        0.0       0.0
                    TX MAC FPGA 34.0          lc   fpga5      34.00        0.0       0.0
-------------------------------------------------------------------------------------------
14-10GBE            PLIM FPGA 42.0            lc   fpga3      42.00        0.0       0.0
-------------------------------------------------------------------------------------------
DRP_B               FPGA 6.04 spb             lc   fpga1       6.04        0.0       0.0
                    ROMMONA swv2.05 asmp      lc   rommonA     2.05        2.1       0.0
                    ROMMONA swv2.05 dsmp      lc   rommonA     2.05        2.1       0.0
                    ROMMONA swv2.05 sp        lc   rommonA     2.05        2.1       0.0
                    ROMMONA swv2.05 spb       lc   rommonA     2.05        2.5       0.0
                    ROMMONB swv2.05 asmp      lc   rommon      2.05        2.5       0.0
                    ROMMONB swv2.05 dsmp      lc   rommon      2.05        2.5       0.0
                    ROMMONB swv2.05 sp        lc   rommon      2.05        2.5       0.0
                    ROMMONB swv2.05 spb       lc   rommon      2.05        2.5       0.0
-------------------------------------------------------------------------------------------
MSC_B               FPGA 6.04 spb             lc   fpga1       6.04        0.0       0.0
                    ROMMONA swv2.05 asmp      lc   rommonA     2.05        2.1       0.0
                    ROMMONA swv2.05 dsmp      lc   rommonA     2.05        2.1       0.0
                    ROMMONA swv2.05 sp        lc   rommonA     2.05        2.1       0.0
                    ROMMONA swv2.05 spb       lc   rommonA     2.05        2.5       0.0
                    ROMMONB swv2.05 asmp      lc   rommon      2.05        2.5       0.0
                    ROMMONB swv2.05 dsmp      lc   rommon      2.05        2.5       0.0
                    ROMMONB swv2.05 sp        lc   rommon      2.05        2.5       0.0
                    ROMMONB swv2.05 spb       lc   rommon      2.05        2.5       0.0
-------------------------------------------------------------------------------------------
FP40                FPGA 6.04 spb             lc   fpga1       6.04        0.0       0.0
                    ROMMONA swv2.05 asmp      lc   rommonA     2.05        2.1       0.0
                    ROMMONA swv2.05 dsmp      lc   rommonA     2.05        2.1       0.0
                    ROMMONA swv2.05 sp        lc   rommonA     2.05        2.1       0.0
                    ROMMONA swv2.05 spb       lc   rommonA     2.05        2.5       0.0
                    ROMMONB swv2.05 asmp      lc   rommon      2.05        2.5       0.0
                    ROMMONB swv2.05 dsmp      lc   rommon      2.05        2.5       0.0
                    ROMMONB swv2.05 sp        lc   rommon      2.05        2.5       0.0
                    ROMMONB swv2.05 spb       lc   rommon      2.05        2.5       0.0
-------------------------------------------------------------------------------------------
CRS1-SIP-800        JACKET FPGA swv6.0        lc   fpga1       6.00        5.0       0.0
                     FPGA swv6.0 hwv80         lc   fpga1       6.00        5.0 0.80
-------------------------------------------------------------------------------------------
8-10GBE             FPGA swvA.0               lc   fpga1      10.00        0.0       0.0
-------------------------------------------------------------------------------------------
OC48-POS-16-ED      FPGA PLIM_OC48 9.0        lc   fpga1       9.00        0.0       0.0
-------------------------------------------------------------------------------------------
4-10GBE             FPGA sw_4p_v15.0          lc   fpga1      15.00        0.0       0.0
-------------------------------------------------------------------------------------------
8-10GBE             FPGA sw_8p_v15.0          lc   fpga1      15.00        0.0       0.0
-------------------------------------------------------------------------------------------
4-10GE              SQUIRREL FPGA 10.0        lc   fpga1      10.00        0.0       0.0
-------------------------------------------------------------------------------------------
42-1GE              FPGA swv6.0               lc   fpga1       6.00        0.0       0.0
                     FPGA swv6.0 hwv0.80       lc   fpga1       6.00        0.0 0.80
-------------------------------------------------------------------------------------------
20-1GE-FLEX         FPGA swv6.0               lc   fpga1       6.00        0.0       0.0
                     FPGA swv6.0 hwv0.80       lc   fpga1       6.00        0.0 0.80
-------------------------------------------------------------------------------------------
2-10GE-WL-FLEX      FPGA swv6.0               lc   fpga1       6.00        0.0       0.0
                     FPGA swv6.0 hwv0.80       lc   fpga1       6.00        0.0 0.80
```

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-------------------------------------------------------------------------------------
CRS-16-ALARM-C       FPGA 6.04 spb             lc   fpga1      6.04        0.0       0.0
                     ROMMONA swv2.05 sp        lc   rommonA    2.05        2.1       0.0
                     ROMMONA swv2.05 spb       lc   rommonA    2.05        2.5       0.0
                     ROMMONB swv2.05 sp        lc   rommon     2.05        2.5       0.0
                     ROMMONB swv2.05 spb       lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
CRS-16-ALARM-B       FPGA 6.04 spb             lc   fpga1      6.04        0.0       0.0
                     ROMMONA swv2.05 spb       lc   rommonA    2.05        2.5       0.0
                     ROMMONB swv2.05 spb       lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
CRS-16-FAN-CT        FPGA 6.04 spb             lc   fpga1      6.04        0.0       0.0
                     ROMMONA swv2.05 spb       lc   rommonA    2.05        2.5       0.0
                     ROMMONB swv2.05 spb       lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
CRS-16-LCC-F-CT-B    FPGA 6.04 spb             lc   fpga1      6.04        0.0       0.0
                     ROMMONA swv2.05 spb       lc   rommonA    2.05        2.5       0.0
                     ROMMONB swv2.05 spb       lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
CRS-FCC-LED          FPGA 6.04 spb             lc   fpga1      6.04        0.0       0.0
                     ROMMONA swv2.05 sp        lc   rommonA    2.05        2.1       0.0
                     ROMMONA swv2.05 spb       lc   rommonA    2.05        2.5       0.0
                     ROMMONB swv2.05 sp        lc   rommon     2.05        2.5       0.0
                     ROMMONB swv2.05 spb       lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
Route Processor      ROMMONA swv2.05 asmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONB swv2.05 asmp      lc   rommon     2.05        2.5       0.0
                     ROMMONB swv2.05 dsmp      lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
SC                   ROMMONA swv2.05 asmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONB swv2.05 asmp      lc   rommon     2.05        2.5       0.0
                     ROMMONB swv2.05 dsmp      lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
RP                   ROMMONA swv2.05 asmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONB swv2.05 asmp      lc   rommon     2.05        2.5       0.0
                     ROMMONB swv2.05 dsmp      lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
Shelf Controller GE  ROMMONA swv2.05 asmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONB swv2.05 asmp      lc   rommon     2.05        2.5       0.0
                     ROMMONB swv2.05 dsmp      lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
RP                   ROMMONA swv2.05 asmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONB swv2.05 asmp      lc   rommon     2.05        2.5       0.0
                     ROMMONB swv2.05 dsmp      lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
Shelf Controller GE2 ROMMONA swv2.05 asmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONB swv2.05 asmp      lc   rommon     2.05        2.5       0.0
                     ROMMONB swv2.05 dsmp      lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
DRP                  ROMMONA swv2.05 asmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONA swv2.05 dsmp      lc   rommonA    2.05        2.1       0.0
                     ROMMONA swv2.05 sp        lc   rommonA    2.05        2.1       0.0
                     ROMMONB swv2.05 asmp      lc   rommon     2.05        2.5       0.0
                     ROMMONB swv2.05 dsmp      lc   rommon     2.05        2.5       0.0
                     ROMMONB swv2.05 sp        lc   rommon     2.05        2.5       0.0
-------------------------------------------------------------------------------------
S1S2S3               ROMMONA swv2.05 sp        lc   rommonA    2.05        2.1       0.0
                     ROMMONB swv2.05 sp        lc   rommon     2.05        2.5       0.0
```

S1S3	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
S2	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
Fabric HS123	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
Fabric QQS123	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
LED	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
40G-MSC	ROMMONA swv2.05 asmp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 dsmp	lc	rommonA	2.05	2.1	0.0
	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 asmp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 dsmp	lc	rommon	2.05	2.5	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
CRS-16-ALARM	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
CRS-16-LCC-FAN-CT	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
FC Fan Controller	ROMMONA swv2.05 sp	lc	rommonA	2.05	2.1	0.0
	ROMMONB swv2.05 sp	lc	rommon	2.05	2.5	0.0
SPA-4XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.0	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.0	0.0
	SPA I/O FPGA	spa	fpga1	1.00	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.0
SPA-2XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.0	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.0	0.0
	SPA I/O FPGA	spa	fpga1	1.00	0.0	0.0
	SPA ROMMON	spa	rommon	2.12	0.0	0.0
SPA-1XCHOC48/DS3	SPA I/O FPGA	spa	fpga2	1.00	0.0	0.49
	SPA I/O FPGA	spa	fpga3	1.00	0.0	0.52
	SPA I/O FPGA	spa	fpga1	1.36	0.0	0.49
	SPA ROMMON	spa	rommon	2.02	0.0	0.49
SPA-1XCHOC12/DS0	SPA I/O FPGA	spa	fpga2	1.00	0.0	0.49
	SPA I/O FPGA	spa	fpga1	1.36	0.0	0.49
	SPA ROMMON	spa	rommon	2.02	0.0	0.49
SPA-OC192POS	SPA FPGA swv1.3	spa	fpga1	1.03	0.0	0.0
SPA-8XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.5
SPA-4XOC3-POS	SPA FPGA swv3.4	spa	fpga1	3.04	0.0	0.0
SPA-OC192POS-XFP	SPA FPGA swv1.2	spa	fpga1	1.02	0.0	0.0
SPA-8X1GE	SPA FPGA swv1.8	spa	fpga1	1.08	0.0	0.0
SPA-2XOC48POS/RPR	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.0
SPA-4XOC48POS/RPR	SPA FPGA swv1.0	spa	fpga1	1.00	0.0	0.0

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-------------------------------------------------------------------------------------------
SPA-1XOC48POS/RPR    SPA FPGA swv1.2            spa  fpga1       1.02        0.0       0.0
-------------------------------------------------------------------------------------------
SPA-8XOC3-POS        SPA FPGA swv1.0            spa  fpga1       1.00        0.0       0.5
                     SPA FPGA swv1.0            spa  fpga1       1.00        0.0       0.5
-------------------------------------------------------------------------------------------
SPA-2XOC12-POS       SPA FPGA swv1.0            spa  fpga1       1.00        0.0       0.5
-------------------------------------------------------------------------------------------
SPA-4XOC12-POS       SPA FPGA swv1.0            spa  fpga1       1.00        0.0       0.5
-------------------------------------------------------------------------------------------
SPA-10X1GE-V2        SPA FPGA swv1.10           spa  fpga1       1.10        0.0       0.0
-------------------------------------------------------------------------------------------
SPA-8X1GE-V2         SPA FPGA swv1.10           spa  fpga1       1.10        0.0       0.0
-------------------------------------------------------------------------------------------
SPA-5X1GE-V2         SPA FPGA swv1.10           spa  fpga1       1.10        0.0       0.0
-------------------------------------------------------------------------------------------
SPA-1X10GE-L-V2      SPA FPGA swv1.11           spa  fpga1       1.11        0.0       0.0
-------------------------------------------------------------------------------------------
SPA-4XOC3-POS-V2     SPA FPGA swv1.0            spa  fpga1       1.00        0.0       0.5
-------------------------------------------------------------------------------------------
SPA-1X10GE-WL-V2     SPA FPGA swv1.11           spa  fpga1       1.11        0.0       0.0
-------------------------------------------------------------------------------------------
SPA-1XOC3-ATM-V2     SPA FPGA swv1.2            spa  fpga1       2.02        0.0       0.0
-------------------------------------------------------------------------------------------
SPA-2XOC3-ATM-V2     SPA FPGA swv1.2            spa  fpga1       2.02        0.0       0.0
-------------------------------------------------------------------------------------------
SPA-3XOC3-ATM-V2     SPA FPGA swv1.2            spa  fpga1       2.02        0.0       0.0
-------------------------------------------------------------------------------------------
SPA-1XOC12-ATM-V2    SPA FPGA swv1.2            spa  fpga1       2.02        0.0       0.0
-------------------------------------------------------------------------------------------
RP/0/RP0/CPU0:router(admin)#$
```

Minimum Firmware Requirement

- After completing an RMA remember to upgrade the firmware as per this matrix:

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

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

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

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

  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 CRS router for the upgrade CLI:

  http://www.cisco.com/en/US/docs/routers/crs/software/crs_r4.0/system_management/command/reference/yr40crs_chapter8.html

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:

Cisco CRS-1 show version Output

Step 1 Establish a Telnet session with the router.

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

```
RP/0/RP0/CPU0:router(admin)#show version
Wed Nov 23 10:53:11.713 PST

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

ROM: System Bootstrap, Version 2.05(20110622:200433) [CRS ROMMON],

PE3 uptime is 1 day, 16 hours, 7 minutes
System image file is "bootflash:disk1/hfr-os-mbi-4.1.2/mbihfr-rp.vm"

cisco CRS-4/S (7457) processor with 4194304K bytes of memory.
7457 processor at 1197Mhz, Revision 1.1
UNKNOWN RACK

2 Management Ethernet
1 WANPHY controller(s)
10 GigabitEthernet
4 SONET/SDH
4 Packet over SONET/SDH
1 TenGigE
1019k bytes of non-volatile configuration memory.
38079M bytes of hard disk.
14119040k bytes of disk0: (Sector size 512 bytes).
14119040k bytes of disk1: (Sector size 512 bytes).

Boot device on node 0/0/SP is bootflash:
Package active on node 0/0/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
```

```
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Configuration register on node 0/RP0/CPU0 is 0x102
Boot device on node 0/RP0/CPU0 is disk1:
Package active on node 0/RP0/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-doc-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-doc-supp-4.1.2
    Built on Sat Nov 19 23:49:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-security, V 4.1.2[00], Cisco Systems, at disk0:iosxr-security-4.1.2
    Built on Sat Nov 19 23:48:27 PST 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 23:33:48 PST 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 23:33:39 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-k9sec-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-k9sec-supp-4.1.2
    Built on Sat Nov 19 23:48:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mgbl-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mgbl-supp-4.1.2
    Built on Sat Nov 19 23:33:39 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Configuration register on node 0/RP1/CPU0 is 0x102
Boot device on node 0/RP1/CPU0 is disk0:
Package active on node 0/RP1/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-doc-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-doc-supp-4.1.2
    Built on Sat Nov 19 23:49:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-security, V 4.1.2[00], Cisco Systems, at disk0:iosxr-security-4.1.2
    Built on Sat Nov 19 23:48:27 PST 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 23:33:48 PST 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 23:33:39 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-k9sec-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-k9sec-supp-4.1.2
    Built on Sat Nov 19 23:48:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mgbl-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mgbl-supp-4.1.2
    Built on Sat Nov 19 23:33:39 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/SM0/SP is bootflash:
Package active on node 0/SM0/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/SM1/SP is bootflash:
Package active on node 0/SM1/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/SM2/SP is bootflash:
Package active on node 0/SM2/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
Boot device on node 0/SM3/SP is bootflash:
Package active on node 0/SM3/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

RP/0/RP0/CPU0:router(admin)#$
```

Cisco CRS-3 show version Output

Step 1 Establish a Telnet session with the router.

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

```
RP/0/RP0/CPU0:router(admin)#show version

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

ROM: System Bootstrap, Version 2.05(20110622:151317) [CRS ROMMON],

PE1 uptime is 1 day, 19 hours, 19 minutes
System image file is "disk0:hfr-os-mbi-4.1.2/0x100008/mbihfr-rp-x86e.vm"

cisco CRS-16/S (Intel 686 F6M14S4) processor with 6291456K bytes of memory.
Intel 686 F6M14S4 processor at 2128Mhz, Revision 2.174
Cisco CRS Series 16 Slots Line Card Chassis

2 Management Ethernet
57 TenGigE
48 WANPHY controller(s)
4 E3
4 T3
49 GigabitEthernet
31 SONET/SDH
28 Packet over SONET/SDH
8 Serial network interface(s)
3 Asynchronous Transfer Mode
1 HundredGigE
```

```
1019k bytes of non-volatile configuration memory.
14712M bytes of hard disk.
10449904k bytes of disk0: (Sector size 512 bytes).
10449904k bytes of disk1: (Sector size 512 bytes).

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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
```

```
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/6/CPU0 is mem:
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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

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

```
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/11/CPU0 is disk0:
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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-doc-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-doc-supp-4.1.2
    Built on Sat Nov 19 23:49:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-security, V 4.1.2[00], Cisco Systems, at disk0:iosxr-security-4.1.2
    Built on Sat Nov 19 23:48:27 PST 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 23:33:48 PST 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 23:33:39 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-k9sec-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-k9sec-supp-4.1.2
    Built on Sat Nov 19 23:48:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mgbl-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mgbl-supp-4.1.2
    Built on Sat Nov 19 23:33:39 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/11/CPU1 is disk0:
Package active on node 0/11/CPU1:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-doc-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-doc-supp-4.1.2
    Built on Sat Nov 19 23:49:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-security, V 4.1.2[00], Cisco Systems, at disk0:iosxr-security-4.1.2
    Built on Sat Nov 19 23:48:27 PST 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 23:33:48 PST 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 23:33:39 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-k9sec-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-k9sec-supp-4.1.2
    Built on Sat Nov 19 23:48:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mgbl-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mgbl-supp-4.1.2
    Built on Sat Nov 19 23:33:39 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/15/CPU0 is lcdisk0:
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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
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hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/0/SP is bootflash:
Package active on node 0/0/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

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hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/1/SP is bootflash:
Package active on node 0/1/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

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iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/2/SP is bootflash:
Package active on node 0/2/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
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    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
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hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/3/SP is bootflash:
Package active on node 0/3/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
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iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/4/SP is bootflash:
Package active on node 0/4/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
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    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/5/SP is bootflash:
Package active on node 0/5/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
```

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    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/6/SP is bootflash:
Package active on node 0/6/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/7/SP is bootflash:
Package active on node 0/7/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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
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    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/8/SP is bootflash:
Package active on node 0/8/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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
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    Built on Sat Nov 19 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/9/CPU0 is lcdisk0:
Package active on node 0/9/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
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iosxr-mpls, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mpls-4.1.2
    Built on Sat Nov 19 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/10/SP is bootflash:
Package active on node 0/10/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
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    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/10/CPU0 is mem:
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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

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hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/11/SP is bootflash:
Package active on node 0/11/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/12/CPU0 is lcdisk0:
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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
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iosxr-routing, V 4.1.2[00], Cisco Systems, at disk0:iosxr-routing-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/13/CPU0 is lcdisk0:
Package active on node 0/13/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 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
```

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    Built on Sat Nov 19 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/14/CPU0 is lcdisk0:
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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 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 23:33:48 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

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iosxr-mcast, V 4.1.2[00], Cisco Systems, at disk0:iosxr-mcast-4.1.2
    Built on Sat Nov 19 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Configuration register on node 0/RP0/CPU0 is 0x102
Boot device on node 0/RP0/CPU0 is disk0:
Package active on node 0/RP0/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-doc-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-doc-supp-4.1.2
    Built on Sat Nov 19 23:49:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

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iosxr-service, V 4.1.2[00], Cisco Systems, at disk0:iosxr-service-4.1.2
    Built on Sat Nov 19 23:48:37 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-security, V 4.1.2[00], Cisco Systems, at disk0:iosxr-security-4.1.2
    Built on Sat Nov 19 23:48:27 PST 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 23:33:48 PST 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 23:33:39 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-k9sec-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-k9sec-supp-4.1.2
    Built on Sat Nov 19 23:48:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mgbl-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mgbl-supp-4.1.2
    Built on Sat Nov 19 23:33:39 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
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hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Configuration register on node 0/RP1/CPU0 is 0x102
Boot device on node 0/RP1/CPU0 is disk0:
Package active on node 0/RP1/CPU0:
iosxr-ce, V 4.1.2[00], Cisco Systems, at disk0:iosxr-ce-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-doc-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-doc-supp-4.1.2
    Built on Sat Nov 19 23:49:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-ce, V 4.1.2[00], Cisco Systems, at disk0:hfr-ce-4.1.2
    Built on Sat Nov 19 23:31:17 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-service-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-service-supp-4.1.2
    Built on Sat Nov 19 23:48:37 PST 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 23:48:37 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

iosxr-security, V 4.1.2[00], Cisco Systems, at disk0:iosxr-security-4.1.2
    Built on Sat Nov 19 23:48:27 PST 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 23:33:48 PST 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 23:33:39 PST 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 23:33:20 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fwding, V 4.1.2[00], Cisco Systems, at disk0:hfr-fwding-4.1.2
    Built on Sat Nov 19 23:31:17 PST 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 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
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    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-k9sec-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-k9sec-supp-4.1.2
    Built on Sat Nov 19 23:48:27 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mgbl-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mgbl-supp-4.1.2
    Built on Sat Nov 19 23:33:39 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-mcast-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.2
    Built on Sat Nov 19 23:33:20 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/FC0/SP is bootflash:
Package active on node 0/FC0/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/FC1/SP is bootflash:
Package active on node 0/FC1/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

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

```
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/AM0/SP is bootflash:
Package active on node 0/AM0/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/AM1/SP is bootflash:
Package active on node 0/AM1/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
```

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    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/SM2/SP is bootflash:
Package active on node 0/SM2/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/SM3/SP is bootflash:
Package active on node 0/SM3/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/SM4/SP is bootflash:
Package active on node 0/SM4/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
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hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/SM5/SP is bootflash:
Package active on node 0/SM5/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/SM6/SP is bootflash:
Package active on node 0/SM6/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

```
hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

Boot device on node 0/SM7/SP is bootflash:
Package active on node 0/SM7/SP:
iosxr-infra, V 4.1.2[00], Cisco Systems, at disk0:iosxr-infra-4.1.2
    Built on Sat Nov 19 23:31:14 PST 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 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-fpd, V 4.1.2[00], Cisco Systems, at disk0:hfr-fpd-4.1.2
    Built on Sat Nov 19 23:49:36 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-diags-supp, V 4.1.2[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.2
    Built on Sat Nov 19 23:49:00 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-base, V 4.1.2[00], Cisco Systems, at disk0:hfr-base-4.1.2
    Built on Sat Nov 19 23:31:14 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie

hfr-os-mbi, V 4.1.2[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.2
    Built on Sat Nov 19 23:32:57 PST 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.2/all/workspace for pie
```

New Cisco CRS Router Software Features

This section contains the new software features that were introduced in Cisco IOS XR Software Release 4.1.2 on the Cisco CRS platform.

- ISSU (In-Service Software Upgrade)
- Stateful NAT64
- Bulk Ping

Note Cisco Session Border Controller (SBC) is not supported on any platform in Cisco IOS XR Software Release 4.1.2. Cisco IOS XR Software Release 3.7 is the last release that supports SBC.

ISSU (In-Service Software Upgrade)

ISSU (In-Service Software Upgrade) is a user initiated and controlled process or a procedure through a set of CLI commands to upgrade an Cisco IOS XR image that is running on a Cisco Platform that supports SSO/NSF (Stateful switchover/Nonstop forwarding), from lower version to higher version. This moves a Cisco router from one version of SSO/NSF capable Cisco IOS XR image to another version of SSO/NSF capable Cisco IOS XR image with minimized downtime, degradation of service, or loss of

packets. The CLI commands are issued in a specific order to perform this process. For Release 4.1.2, only SMUs (Software Maintenance Upgrades) that are identified and tagged as ISSU SMUs can be activated using ISSU.

Note A SMU marked as parallel process restart or marked as reload cannot be activated using ISSU.

For ISSU, a system is a single-chassis router, with a single pair of (redundant) management nodes. Any node which is the head of a rack in a single-chassis system or redundant service cards is known as the management node. The system treats non-redundant service cards as managed nodes..

The standby management node is upgraded with the new version of the software. The switchover of management node takes place to activate the new version of the software. The upgrade method for non-management nodes uses either the Reload or iMDR (ISSU MDR) methods. iMDR is a warm-reload technology. With iMDR, all the states (with some exceptions) are wiped out and rebuilt in the new software with a reprogrammed hardware after the upgrade. iMDR supports forwarding changes that are impacted in the software and hardware.

LCs (line cards) are upgraded using iMDR or reloaded based on these factors:

- Nature of the software changes in the image. Some types of software changes cannot be activated on the router using ISSU, and require router reload. However, the majority of software changes can be activated using ISSU.
- The type of SPA/PLIM associated with an MSC card.

If a LC that is non-iMDR-able or a non-iMDR-able SPA is plugged in and the SPA has to be reset, then the user is notified at the beginning of the ISSU procedure. iMDR process upgrades the software while minimizing the traffic outage during reprogramming of the hardware. During an ISSU upgrade, service processor modules on the Alarm card is upgraded. There is no interruption to the PEM, FAN, Alarm or BITs states or functionality, during such upgrades. Although Service Processor (SP) modules use iMDR, no service outage is experienced on the SP, since there is no forwarding plane to update.

The user can issue a specific CLI command in prompted mode to ensure and verify that there is no degradation of the service throughout the process. However, in unprompted mode, the phases are executed automatically with no user intervention.

An ISSU process comprises of three phases. The supported modes are prompted and unpromoted. The phases are described as:

1. **Load**—This initiates the ISSU Process. During this step, ISSU infrastructure ensures that the new image is downloaded to all nodes in a given router and checks the compatibility of the new image to ensure the appropriate system upgrades. For any incompatible images or if an outage is warranted, it notifies the user. On the Cisco CRS router, fabric cards are upgraded with one plane at a time during the load phase. Here, each plane is brought down with its fabric cards being reloaded with new image and then the plane is added back before proceeding to the next plane. All unsupported cards and SPAs are brought down at the beginning of the load phase.
2. **Run**—All supported LCs undergo warm reload during the run phase and boot with the new MBI (mimimum boot image) image. After the LCs come up with the new image, an RP (Route Processor) switchover is initiated to activate the RP running the new version. During this initiation, the LCs are held in MBI until the new active RP is fully initiated. Once the new active RP is initiated, LCs proceed with the remaining bring up activities for iMDR. At the conclusion of this phase, the new Active RP, along with the managed node runs the new version of the software. A rollback mechanism is provided in this phase to guard against the catastrophic failures. After the iMDR process is completed, all unsupported SPAs are brought up during the run phase. Also, the standby management node is held in the new version MBI until the iMDR

has completed. Once the iMDR is completed, the node is unblocked and the standby RP is restarted and runs with the new version. The standby RP also synchronizes with the Active RP that is running the old software.

3. **Complete**—This is the final phase of the ISSU process that concludes the ISSU process and ensures that the new version of the software is running on all nodes in the system. The user cannot go back to the older version of the software, as downgrade process is not supported by ISSU for Release 4.1.2. All unsupported cards are brought up during the complete phase.

A new process iMDR Director is introduced on the LC to coordinate and minimize traffic outage during the iMDR. All ISSU-aware platform independent processes interested in event notifications can become iMDR clients by registering with iMDR process. iMDR helps to rebuild the software state in the new version of the software without disturbing the traffic while hardware is running and forwarding traffic using the old state. When the new state is rebuilt, traffic is stopped completely and the hardware is updated.

The following feature is provided with Release 4.1.2:

- SMU upgrade ONLY for SMUs tagged for activation using ISSU method.

The following provides the list of supported hardware in ISSU implementation:

Type	Component	Part number
Chassis	Cisco CRS 16-Slot Line Card Chassis	CRS-16-LCC
Chassis	Cisco CRS 8-Slot Line Card Chassis	CRS-8-LCC
Chassis	Cisco CRS 4-Slot Line Card Chassis	CRS-4/S
RP	Cisco CRS 8-Slot Route Processor	CRS-8-RP
RP	Cisco CRS-1 16-slot Route Processor, revision B	CRS-16-RP-B
Flash	Cisco CRS PCMCIA Flash Disk 4 GB	CRS-FLASH-DISK-4G
MSC	Cisco CRS Modular Services Card	CRS-MSC
MSC	Cisco CRS Modular Services Card B	CRS-MSC-B
MSC	Cisco CRS-1 Series Forwarding Processor 40G	CRS-FP40
PLIM	Cisco Carrier 1 Series SPA Interface Processor 40G (Jacket card)	CRS1-SIP-800
PLIM	Cisco CRS 4xOC-192c/STM64c POS/DPT Interface Module/VS	4OC192-POS/DPT-VS
PLIM	Cisco CRS 8x10 GbE Interface Module LR/ER	8-10GBE
PLIM	Cisco CRS-1 Series 4x10GE Interface Module	4-10GE
PLIM	Cisco CRS-1 Series 42x1GE Interface Module	42-1GE
PLIM	Cisco CRS-1 Series 20x1GE Flexible Interface Module	20-1GE-FLEX
PLIM	Cisco CRS-1 Series 2x10GE WAN/LAN Flexible Interface Module	2-10GE-WL-FLEX
PLIM	Cisco CRS-1 Series 4-Port Ten Gigabit Ethernet Interface Module	4-10GBE-WL-XFP
PLIM	Cisco CRS-1 Series 8-Port Ten Gigabit Ethernet Interface Module	8-10GBE-WL-XFP

Type	Component	Part number
SPA	Cisco CRS 8-Port OC-12c/STM-4c Shared Port Adapter	SPA-8XOC12-POS
SPA	Cisco CRS 2-Port OC-48c/STM-16c POS/RPR Shared Port Adapter	SPA-2XOC48-POS/RPR
SPA	Cisco CRS 4-Port OC-48c/STM-16c POS/RPR Shared Port Adapter	SPA-4XOC48-POS/RPR
SPA	Cisco CRS 1-Port OC-192c/STM-64c POS/RPR Shared Port Adapter with XFP Optics	SPA-OC192POS-XFP
SPA	Cisco CRS 4-Port OC-3c/STM-1c Shared Port Adapter	SPA-4XOC3-POS
SPA	Cisco 5-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-5X1GE-V2
SPA	Cisco 8-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-8X1GE-V2
SPA	Cisco 8-Port Gigabit Ethernet Shared Port Adapter	SPA-8X1GE
SPA	Cisco 10-Port Gigabit Ethernet Shared Port Adapter, Version 2	SPA-10X1GE-V2
SPA	Cisco 1-Port Ten Gigabit Ethernet Shared Port Adapter, Version 2	SPA-1X10GE-L-V2
SPA	Cisco 1-port 10GbE SPA WAN/LAN PHY	SPA-1X10GE-WL-V2
SPA	4-port OC-3C/STM-1 POS SPA - Project Gladiator	SPA-4XOC3-POS-V2
RP	Cisco CRS 16-Slot Route Processor	CRS-16-RP
Flash	Cisco CRS PCM CIA Flash Disk 2 GB	CRS-FLASH-DISK-2G
PLIM	Cisco CRS 4xOC-192c/STM64c POS/DPT Interface Module/SR	4OC192-POS/DPT-SR
PLIM	Cisco CRS 4xOC-192c/STM64c POS/DPT Interface Module/IR	4OC192-POS/DPT-IR
PLIM	Cisco CRS 4xOC-192c/STM64c POS/DPT Interface Module/LR	4OC192-POS/DPT-LR
PLIM	Cisco CRS 16xOC-48c/STM16c POS/DPT Interface Module	16OC48-POS/DPT
PLIM	Cisco CRS 1xOC-768c/STM256c POS Interface Module/SR	1OC768-POS-SR
SPA	Cisco CRS 1-Port OC-192/STM-64 PS/RPR SPA VSR Optics	SPA-OC192POS-VSR
SPA	2-port OC-12c/STM-4 POS SPA - Project Gladiator	SPA-2XOC12-POS
SPA	1-port OC-48c/STM-16POS/RPR SPA Project Iguana48	SPA-1XOC48-POS/RPR

The following provides the list of hardware that are not supported in ISSU implementation:

Type	Component	Part number
SPA	2-port OC-12c/STM-4 POS SPA - Project Gladiator	SPA-2XOC12-POS
SPA	1-port OC-48c/STM-16POS/RPR SPA Project Iguana48	SPA-1XOC48-POS/RPR
SPA	3-port Clear Channel OC-3 ATM SPA	SPA-3XOC3-ATM-V2
SPA	1-port Clear Channel OC-12 ATM SPA	SPA-1XOC12-ATM-V2
SPA	1-Port Channelized OC12 to DS0 SPA	SPA-1XCHOC12/DS0
SPA	Cisco CRS 2-Port Clear Channel T3/E3 Serial Shared Port Adapter	SPA-4XT3/E3
PLIM	Cisco CRS 1-Port OC-768c/STM-256c (C-band) DWDM PLIM	1OC768-ITU/C
PLIM	Cisco CRS 1-Port OC-768c/STM-256c (C-band) DPSK + DWDM PLIM	1OC768-DPSK/C
Chassis	Cisco CRS Series Modular Services Card 140G	CRS-MSC-140G
Chassis	Cisco CRS Series Forwarding Processor Card 140G	CRS-FP-140
Fabric cards	Cisco CRS Series 4 Slots Fabric Card / Single (140G)	CRS-4-FC140/S
Fabric cards	Cisco CRS Series 8 Slots Fabric Card / Single (140G)	CRS-8-FC140/S
Fabric cards	Cisco CRS Series 16 Slots Fabric Card / Single (140G)	CRS-16-FC140/S
Fabric cards	Cisco CRS-3 Series Fabric Card Chassis Switch Fabric Card 140G	CRS-FCC-SFC-140
Fabric cards	Cisco CRS Series 16 Slots Fabric Card / Multi (140G)	CRS-16-FC140/M
CRS-DRP	Cisco CRS-1 Distributed Route Processor	CRS-DRP
CRS-DRP	Cisco CRS-1 Distributed Route Processor CPU Module	CRS-DRP-B-CPU
CRS-DRP	Cisco CRS-1 Distributed Route Processor PLIM Module	CRS-DRP-B-PLIM
PRP	Cisco CRS-1 Series 8 Slots 6 Gb Performance Route Processor	CRS-8-PRP-6G
PRP	Cisco CRS-1 Series 8 Slots 12Gb Performance Route Processor	CRS-8-PRP-12G
PRP	Cisco CRS-1 Series 16 Slots 6 Gb Performance Route Processor	CRS-16-PRP-6G
PRP	Cisco CRS-1 Series 16Slots 12Gb Performance Route Processor	CRS-8-PRP-12G
SPA	Cisco CRS 4-Port Clear Channel T3/E3 Serial Shared Port Adapter	SPA-4XT3/E3

Type	Component	Part number
PLIM	Cisco 4-Port Ten Gigabit Ethernet (C-band) DWDM PLIM	4-10GE-ITU/C
DRP	CRS-DRP+CRS-DRP-CPU	DRP
CGSE	Cisco CRS-1 Series Carrier Grade Service Engine PLIM	CRS-CGSE-PLIM

Note During the ISSU orchestration (from the load process till the complete process), ISSU disables all the unsupported hardware (LCs/SPAs) and holds them in the MBI run. Once ISSU process is completed, the unsupported hardware boot with the new software.

Caution If the users have DRPs (Distributed Route Processors) in the router, then they must shut down the DRPs manually to start the ISSU. Else, ISSU gets aborted. Also, SDR configurations must be avoided or removed before starting the ISSU.

A SMU delivers a software change to the user in the least possible time. Prior to the ISSU support, SMU installation resulted in either restart of one of more processes or reload of one or more nodes. ISSU minimizes the operational impact that a user experiences. As ISSU does not support software downgrade, SMU upgrades installed using ISSU can only be un-installed by means of parallel reload method.

To perform ISSU SMU upgrade, user must issue the **issu** keyword when using the **install activate** command. The three types of SMUs are:

- ISSU SMU—This is installed using ISSU method. These SMUs can also be installed using parallel reload method by omitting the **issu** keyword in the **install activate** command.
- Reload SMU—This SMU requires parallel reloads during its installation.
- Restart SMU—This SMU requires process restarts during its installation.

The type of SMU can be identified with the output of **show install pie-info <pie> detail**.

- ISSU SMUs are identified by ISSU in the Restart information field. Mixed SMU types can only be combined in the same activation, if parallel reload is used as the activation type. ISSU cannot be used to activate parallel-process-restart SMUs. However, if the user wants to install both parallel-process-restart and ISSU SMUs, the following two options are provided:
  - Use parallel-reload to install the SMUs.
  - Install the parallel-process-restart SMU(s) as a first operation, and then install the ISSU SMU(s) as a separate operation.

```
RP/0/RP0/CPU0:ROUTER(admin)#show install pie-info tftp://223.255.254.254/hfrp-
4.1.2.02I.issu.pie detail
Mon Jul 11 12:32:27.114 PST
Contents of pie file '/tftp://223.255.254.254/hfr-p-4.1.2.02I.issu.pie':
Expiry date : Oct 16, 2015 17:51:47 PST
Uncompressed size : 727056
Compressed size : 316258
hfr-p-4.1.2.02I.CSCea12345-1.0.0
hfr-p-4.1.2.02I.CSCea12345 V1.0.0[SMU] User specified bundle hfrbase-
4.1.2.02I.CSCea12345.pi.pie.
[composite package]
[root package, grouped contents]
```

```
Vendor : Cisco Systems
Desc : User specified bundle hfr-base-4.1.2.02I.CSCea12345.pi.pie.
Build : Built on Fri Jul 8 16:25:25 PST 2011
Source : By sjc-lds-773 in /nobackup/ryeh/smu-test-issu for pie
Card(s): RP, RP-B, HRP, DRP, 40G-MSC, SP, SC
Restart information:
Default:
parallel impacted processes restart
Size Compressed/Uncompressed: 308KB/710KB (43%)
Components in package hfr-p-4.1.2.02I.CSCea12345-1.0.0, package hfrp-
4.1.2.02I.CSCea12345:
hfr-base-4.1.2.02I.CSCea12345-1.0.0
hfr-base-4.1.2.02I.CSCea12345 V1.0.0[SMU] HFR base Package
Vendor : Cisco Systems
Desc : HFR base Package
Build : Built on Fri Jul 8 16:25:24 PST 2011
Source : By sjc-lds-773 in /nobackup/ryeh/smu-test-issu for pie
Card(s): RP, RP-B, HRP, DRP, 40G-MSC, SP, SC
Restart information:
Default:
ISSU (quick) warm reload
Specific:
ISSU (quick) warm reload to and from ***-*
Size Compressed/Uncompressed: 308KB/710KB (43%)
Components in package hfr-base-4.1.2.02I.CSCea12345-1.0.0,
package hfr-base-4.1.2.02I.CSCea12345:
hfr-lcplatform-mgr V[r412/3] LC only version of HFR
platform-mgr.
hfr-base-4.1.2.02I.CSCea12345-package-compatibility
V[Default] Package Compatibility information for package hfr-base-
4.1.2.02I.CSCea12345
hfr-base-4.1.2.02I.CSCea12345-package V[Default] Manifest
information for package hfr-base-4.1.2.02I.CSCea12345
```

- Restart SMUs are identified by parallel impacted processes restart in the Restart information field:

```
RP/0/RP0/CPU0:ROUTER(admin)#show install pie-info tftp://223.255.254.254/hfrp-
4.1.2.02I.restart.pie detail
Mon Jul 11 12:40:58.130 PST
Contents of pie file '/tftp://223.255.254.254/hfr-p-4.1.2.02I.restart.pie':
Expiry date : Oct 16, 2015 17:51:47 PST
Uncompressed size : 727059
Compressed size : 316260
hfr-p-4.1.2.02I.CSCea12345-1.0.0
hfr-p-4.1.2.02I.CSCea12345 V1.0.0[SMU] User specified bundle hfrbase-
4.1.2.02I.CSCea12345.pi.pie.
[composite package]
[root package, grouped contents]
Vendor : Cisco Systems
Desc : User specified bundle hfr-base-4.1.2.02I.CSCea12345.pi.pie.
Build : Built on Mon Jul 11 12:14:21 PST 2011
Source : By sjc-lds-773 in /nobackup/ryeh/smu-test-restart for pie
Card(s): RP, RP-B, HRP, DRP, 40G-MSC, SP, SC
Restart information:
Default:
parallel impacted processes restart
Size Compressed/Uncompressed: 308KB/710KB (43%)
Components in package hfr-p-4.1.2.02I.CSCea12345-1.0.0, package hfrp-
4.1.2.02I.CSCea12345:
hfr-base-4.1.2.02I.CSCea12345-1.0.0
hfr-base-4.1.2.02I.CSCea12345 V1.0.0[SMU] HFR base Package
Vendor : Cisco Systems
Desc : HFR base Package
Build : Built on Mon Jul 11 12:14:20 PST 2011
```

```
Source : By sjc-lds-773 in /nobackup/ryeh/smu-test-restart for
pie
Card(s): RP, RP-B, HRP, DRP, 40G-MSC, SP, SC
Restart information:
Default:
parallel impacted processes restart
Size Compressed/Uncompressed: 308KB/710KB (43%)
Components in package hfr-base-4.1.2.02I.CSCea12345-1.0.0,
package hfr-base-4.1.2.02I.CSCea12345:
hfr-lcplatform-mgr V[r412/3] LC only version of HFR
platform-mgr.
hfr-base-4.1.2.02I.CSCea12345-package-compatibility
V[Default] Package Compatibility information for package hfr-base-
4.1.2.02I.CSCea12345
hfr-base-4.1.2.02I.CSCea12345-package V[Default] Manifest
information for package hfr-base-4.1.2.02I.CSCea12345
```

- Reload SMUs are identified by parallel reload in the Restart information field:

```
RP/0/RP0/CPU0:ROUTER(admin)#show install pie-info tftp://223.255.254.254/hfrp-
4.1.2.02I.reload.pie detail
Mon Jul 11 19:13:34.716 PST
Contents of pie file '/tftp://223.255.254.254/hfr-p-4.1.2.02I.reload.pie':
Expiry date : Oct 16, 2015 17:51:47 PST
Uncompressed size : 727058
Compressed size : 316251
hfr-p-4.1.2.02I.CSCea12345-1.0.0
hfr-p-4.1.2.02I.CSCea12345 V1.0.0[SMU] User specified bundle hfrbase-
4.1.2.02I.CSCea12345.pi.pie.
[composite package]
[root package, grouped contents]
Vendor : Cisco Systems
Desc : User specified bundle hfr-base-4.1.2.02I.CSCea12345.pi.pie.
Build : Built on Mon Jul 11 12:57:16 PST 2011
Source : By sjc-lds-773 in /nobackup/ryeh/smu-test-reload for pie
Card(s): RP, RP-B, HRP, DRP, 40G-MSC, SP, SC
Restart information:
Default:
parallel reload
Size Compressed/Uncompressed: 308KB/710KB (43%)
Components in package hfr-p-4.1.2.02I.CSCea12345-1.0.0, package hfrp-
4.1.2.02I.CSCea12345:
hfr-base-4.1.2.02I.CSCea12345-1.0.0
hfr-base-4.1.2.02I.CSCea12345 V1.0.0[SMU] HFR base Package
Vendor : Cisco Systems
Desc : HFR base Package
Build : Built on Mon Jul 11 12:57:15 PST 2011
Source : By sjc-lds-773 in /nobackup/ryeh/smu-test-reload for pie
Card(s): RP, RP-B, HRP, DRP, 40G-MSC, SP, SC
Restart information:
Default:
parallel reload
Size Compressed/Uncompressed: 308KB/710KB (43%)
Components in package hfr-base-4.1.2.02I.CSCea12345-1.0.0,
package hfr-base-4.1.2.02I.CSCea12345:
hfr-lcplatform-mgr V[r412/3] LC only version of HFR
platform-mgr.
hfr-base-4.1.2.02I.CSCea12345-package-compatibility
V[Default] Package Compatibility information for package hfr-base-
4.1.2.02I.CSCea12345
hfr-base-4.1.2.02I.CSCea12345-package V[Default] Manifest
information for package hfr-base-4.1.2.02I.CSCea12345
```

The users could execute the following commands outside the maintenance window since there is no traffic impact:

- **install add**

```
Example:
install add tftp://223.255.254.245/hfr-px-4.1.2.22I.CSCtr08523.pie
```

- **install activate**—This command is used to initiate the ISSU and specify the prompt mode.

```
Example:
install activate id 1 issu prompt-level all issu
```

It is recommend that the users execute the following command within the maintenance window in run phase.

- ISSU Run Phase

```
Example:
install operation 70 run
```

- ISSU Complete Phase

```
Example:
install operation 70 complete
```

The following new ISSU process syslog events are added:

- A new event is logged upon execution of each phase (Load, Run and Complete) of the ISSU Process.
- A new event is logged when the ISSU process is completed.
- A new event is logged when the Rollback Process is kicked off.
- A new event is logged for all of the abnormal cases.

Note ISSU SMU upgraded is ONLY supported for the Cisco CRS-1 router and only for legacy RP. PRP is NOT supported.

Stateful NAT64

Stateful NAT64 (Network Address Translation 64) is a stateful translator between IPv4 and IPv6. NAT64 allows IPv6-only clients to contact IPv4 servers using unicast UDP, TCP, or ICMP. The public IPv4 address can be shared with several IPv6-only clients. NAT64 supports communication between:

- IPv6 Network and Public IPv4 Internet
- Public IPv6 Internet and IPv4 Network
- IPv6 Network and IPv6 Network

NAT64 is implemented on the Cisco CRS-1 router CGSE platform. CGSE (Carrier Grade Service Engine) has four octeons and supports 20 Gbps full duplex traffic. It works on Linux operating system and traffic into CGSE is forwarded using serviceApp interfaces. SVIs (Service Virtual Interfaces) are configured to enable traffic to flow in and out of CGSE.

Each NAT64 instance configured is associated with two serviceApps for the following purposes:

- One serviceApp is used to carry traffic from IPv6 side
- Another serviceApp is used to carry traffic from IPv4 side of the NAT64.

NAT64 instance parameters are configured using the CGN (Carrier-Grade NAT) CLI. The NAT64 application in the octeons updates its NAT64 instance and serviceApp databases, which are used to perform the translation between IPv6 and IPv4 and vice versa.

Active CGN instance configuration is replicated in the standby CGN instance through the XR control plane. Translations that are established on the Active CGN instance are exported to the Standby CGN instance as the failure of the Active CGN affects the service until translations are re-established through normal packet flow. Service interruption is moderate for the given fault detection time and translation learning rate in terms of seconds or tens of seconds for a large translation database.

The following are the functionalities being supported in NAT64 implementation:

- TCP, UDP, and ICMP protocol NAT64
- IPv4 to IPv6 header translation and vice versa
- End point independent mapping
- Address dependant filtering
- Multiple Address Pools
- Well known prefix handling
- NFv9 netflow logging
- TCP/UDP/ICMP fragments handling
- IP options and ICMP error handling
- Protocol based session timers
- Destination based session timers
- Hairpinning
- DNS64 being decoupled and NAT64 working with decoupled DNS64
- Multiple NAT64 instances each having configurable options
- XML support for config and show
- CLI consistent with other CGv6 applications

A maximum of 64 NAT64 instances are supported in the NAT64 configuration. The configuration parameters per NAT64 instance are as follows:

- NAT64 Prefix—Indicates IPv6 prefix (for mapping destination IPv4 address – default WKP 64:FF9B::/96)
- NAT64 Prefix Length—Indicates IPv6 NAT64 prefix length (/32, to /96)
- NAT64 IPv4 map address pool—Indicates outside IPv4 address space for this NAT64 instance
- IPv4 serviceApp and IPv6 serviceApp interfaces for the instance
- u-bit-reserved flag—When this configuration is enabled, bits in the range 64-71 in the IPv6 addresses are reserved for several purposes including U-Bit. These bits are not used for translation purposes.
- Static port configuration—This is a protocol based configuration which specifies source IPv6 address that needs static mapping to the outside IPv4
- Protocol based timeouts—Indicates active/init timeouts and per destination IP/port timeouts
- tcp mss—Indicates the tcp mss value to be used while translating packets
- tos, traffic class, df override related flags similar to NAT64 stateless
- Netflow information

- Address dependant filtering enabling
- Port limit
- Destination based active timeouts
- Fragment handling timeouts.

The following set of commands are used to configure NAT64:

```
service cgn cgn1
service-type nat64 stateful xlat1
map address-pool 100.1.1.0/24
ubit-reserved
ipv6-prefix 2001:db8::/32
protocol tcp
address 123.14.4.4
port 1234 timeout 200
!
mss 1500
static-forward inside
address 1345:ABc::1 port 123
session active timeout 1230
!
address-family ipv4
tos 111
interface ServiceApp4
tcp mss 28
!
address-family ipv6
interface ServiceApp6
protocol icmp
reset-mtu
!
traffic-class 222
tcp mss 30
df-override
!
external-logging netflow version 9
   server
    address 90.1.1.1 port 99
    session-logging
```

The details of the counters that are maintained on NAT64 instant basis are as follows:

- Counters to track TCP packet counts V6 -> V4 direction
  - Input
  - Drop due to state mismatch
  - Drop due to no NAT64 instance entry
  - Output
- Counters to track TCP packet counts V4 -> V6 direction
  - Input
  - Drop due to no NAT64 DB entry
  - Drop due to filtering
  - Drop due to state mismatch
  - Output
- Counters to track UDP packet counts V6 -> V4 direction

  - Input
  - Drop due to no NAT64 DB entry
  - Output
- Counters to track UDP packet counts V4 -> V6 direction
  - Input
  - Drop due to no NAT64 DB entry
  - Drop due to filtering
  - Output
  - Drop due to Fragmented UDP pkt with CRC ==0
- Counters to track ICMP packet counts V6 -> V4 direction
  - Input
  - Drop due to no NAT64 DB entry
  - Drop due to Fragmented ICMPv6 packets
  - Drop due to unsupported ICMP types/codes
  - ICMP Error Output
  - ICMP Query Output
- Counters to track ICMP packet counts V4 -> V6 direction
  - Input
  - Drop due to no NAT64 DB entry
  - Drop due to Fragmented ICMPv4 packets
  - Drop due to unsupported ICMP types/codes
  - ICMP Error Output
  - ICMP Query Output
- Counters to track Fragmented packet counts V6 -> V4 direction
  - Input
  - Drop due to invalid next header fields
  - Drop due to no NAT64 DB entry
  - Drop due to timeout of arrival first fragment header
  - Output
- Counters to track Fragmented packet counts V4 -> V6 direction
  - Input
  - Drop due to no NAT64 DB entry
  - Drop due to timeout of no arrival of first fragment
  - Output
- Counters to track Option packet counts V6 -> V4 direction
  - Input
  - Drop due to unsupported options
  - Output

The NAT64 based commands are described as follows:

- Create a NAT64 stateful instance—The following command creates an instance for the NAT64 stateful application. There can be a maximum of 64 NAT64 stateful instances that can be created.

```
service cgn cgn1
  service
Syntax:
   [no] service-type nat64 stateful nat64instance
```

- Configure IPv6 prefix and prefix length for a NAT64 stateful instance—This is a NAT64 stateful instance command. This IPv6 prefix is used to convert destination IPv6 address to an external destination IPv4 address which is derived by DNS64 using this prefix and IPv4 address of an external IPv4 address. This configuration is optional.

```
service cgn cgn1
  service-type nat64 stateful stfull
    ipv6-prefix 2001:db8::/32
  !
!
Syntax:
    [no] service cgn cgninstance service-type nat64 stful 1 ipv6-prefix
ipv6prefix/prefixlen
```

- Configure ipv4 address poo —This command is used per NAT64 stateful instance. This assigns an IPv4 address pool to be used by a NAT64 stateful instance to map an internal IPv6 address to a public IPv4 address which is used as a source address in the IPv4 network. A maximum of 8 pools per instance can be added and a maximum of /16 inclusive of all NAT64 and NAT44 instances. Total addresses (for pool) per CGSE card (NAT44 and NAT64 included) are /16.

```
service cgn cgn1
  service-type nat64 stateful stfull
    ipv4 address-pool 20.20.30.0/24
    ipv4 address-pool 30.20.30.0/24
 !
!
Syntax:
[no] service cgn cgninstance service-type nat64 stateful nat64instance ipv4
address-pool ipv4address-prefix/len
```

- Configure u-bit reserved—This is a NAT64 stateful translation command that is used per instance of NAT64 stateful.When this configuration is enabled, the bits 64-71 in the IPv6 addresses are reserved for various purposes including U-Bit.

```
service cgn cgn1
  service-type nat64 stateful stfull
   ubit-reserved
 !
!
Syntax:
  [no] service cgn cgninstance service-type nat64 stateful nat64instance ubit-reserved
```

- Configure port limit per subscriber for NAT64 stateful instance for TCP, UDP and ICMP—This is a NAT64 stateful service type command user per NAT64 stateful instance. This command restricts the number of ports used by an IPv6 address.

```
service cgn cgn1
  service-type nat64 stateful stfull
   portlimit 10
 !
!
Syntax:
```

```
 [no] service cgn cgninstance service-type nat64 stateful nat64instance portlimit
portlimitvalue
```

- Configure timeout value for ICMP, UDP and TCP session per NAT64 stateful instance—This is a NAT64 stateful service type specific command used per NAT64 stateful instance. This command configures the timeout value in seconds for ICMP, TCP or UDP sessions for a NAT64 stateful instance. For TCP and UDP, the user can configure the init and active session timeout values. For ICMP, there are no such options. This configuration is applicable to all the sessions that belong to the particular NAT64 stateful instance.

```
service cgn cgn1
service-type nat64 stateful stful1
protocol icmp
timeout 908
!
!
!
service cgn cgn1
service-type nat64 stateful stful1
protocol tcp
session active timeout 90
!
!
!
service cgn cgn1
service-type nat64 stateful stful1
protocol tcp
session initial timeout 90
!
!
!
service cgn cgn1
service-type nat64 stateful stful1
protocol udp
session timeout 90
!
!
!
Syntax:
  [no] service cgn cgninstance service-type nat64 stateful nat64instance protocol
{tcp} session {initial|active} timeout value
  [no] service cgn cgninstance service-type nat64 stateful nat64instance protocol
{udp|icmp} timeout value
```

- Configure fragment timeout per NAT64 stateful instance—The NAT64 must limit the amount of resources devoted to the storage of fragmented packets in order to protect from DoS attacks. As long as the NAT64 has available resources, the NAT64 must allow the fragments to arrive over a time interval. The time interval should be configurable and the default value for FRAGMENT_MIN must be 2 sec and FRAGMENT_MAX must be 20 sec.

```
service cgn cgn1
  service-type nat64 stateful stfull
   fragment-timeout 15
   !
  !
!
Syntax:
  [no] service cgn cgninstance service-tye nat64 stateful nat64instance
fragment-timeout value
```

- IPv4 ServiceApp name—This is a service application on whichV4 traffic enters or leaves.
- IPv6 ServiceApp name—This is a service application on which V6 traffic enters or leaves.

- IPv4 & IPv6 TCP MSS configuration—IPv4 TCP traffic's MSS value is set to the smaller of incoming MSS value and IPv6 TCP traffic's MSS value is set to the smaller of incoming MSS value.
- IPv4 TOS Setting—By default, IPv4 TOS field is copied from IPv6 Traffic Class field. This value can be overridden based on the configured TOS value.
- IPv6 Traffic Class Setting—By default, IPv6 Traffic Class field is copied from IPv4 field. This value can be overridden based on the configured Traffic Class value.
- IPv4 DF override—When translating IPv6 packet with no fragment header, IPv4 DF bit is made 1. This can be overridden and DF bit can be set to 0, if incoming IPv6 packets are smaller than 1280 bytes.
- refresh-direction Outbound—If set, session timer will only be reset, if the in2out packets are flowing.
- dynamic-port-range start—Provides the start port for selecting outside port for dynamic sessions.
- Netflow—This indicates the IP address, port of the external netflow server.
  - session-logging—Enabling this would send destination information along with the translation information. Netflow record is send only when the destination information is also available. By default, the translation information is only sent (after the translation entry is created).
  - path-mtu—This is the MTU for the netflow packet.
  - Refresh-rate—This is used to indicate template refresh time.
- Timeouts
  - Protocol level
    - TCP init/active
    - UDP, ICMP and Frag
  - Destination-based (IP only, port only, IP/port)
    - Maximum 1000 per instance, maximum of 16k per CGSE
- Static port forwarding
  - TCP, UDP
  - Max 6K per CGSE

The following provide the CLI commands for stateful NAT64:

NAT64 Statistics:

```
RP/0/RP0/CPU0:router#show cgn nat64 stateful nat64_1 statistics
Sun Aug 7 23:24:45.072 UTC
Statistics summary of NAT64 Stateful instance: 'nat64_1'
------------------------------------------------------
Number of active translations : 1 ? Total Number of translation active
Number of static translations : 0 ?
Number of dynamic translations : 1
Number of Sessions : 1
Translations create rate : 0
Translations delete rate : 0
Inside to outside forward rate : 0
Outside to inside forward rate : 1
Inside to outside drops port limit exceeded : 0
Inside to outside drops system limit reached : 0
Inside to outside drops resource depletion : 0
No translation entry drops : 73
Filtering Drops : 0
Invalid Ipv6 Prefix Drops : 0
```

```
Pool address totally free : 255
Pool address used : 1
Pool address usage:
------------------------------------------------
External Address Ports Used
------------------------------------------------
52.52.52.89 1
```

Show NAT64 instance counters:

```
RP/0/RP0/CPU0:router#show cgn nat64 Stateful NAT64_1 counters
Stateful Nat64 IPv6 to IPv4 counters:
TCP Input Count: 64
TCP NonTranslatable Drop Count: 128
TCP NoDb Drop Count: 256
TCP Output Count: 320
……
Stateful Nat64 IPv4 to IPv6 counters:
TCP Input Count: 384
TCP No Db Drop Count: 448
TCP Output Count: 512
……
```

Show translations (inside):

```
show cgn nat64 stateful nat64_1 inside-translation protocol tcp inside-address
3301:db8::2 port
start 1 end 10
Inside-translation details
------------------------------------------------------------------------------------------
------
NAT64 Stateful instance : nat64_1
------------------------------------------------------------------------------------------
------
Outside Protocol Inside Outside Translation Inside Outside
Address Source Source Type to to
Port Port Outside Inside
Packets Packets
------------------------------------------------------------------------------------------
------
51.51.33.186 tcp 1 42910 dynamic 112 112
51.51.33.186 tcp 2 52014 dynamic 112 112
51.51.33.186 tcp 3 6316 dynamic 112 112
51.51.33.186 tcp 4 45502 dynamic 112 112
51.51.33.186 tcp 5 49890 dynamic 111 111
51.51.33.186 tcp 6 29084 dynamic 111 111
51.51.33.186 tcp 7 30359 dynamic 112 112
51.51.33.186 tcp 8 16231 dynamic 112 112
51.51.33.186 tcp 9 27703 dynamic 112 112
RP/0/RP0/CPU0:CGN-node1#
```

Show translations (outside):

```
show cgn nat64 stateful nat64_1outside-translation protocol tcp outside-address
51.51.33.186 port
start 6300 end 6310
Outside-translation details
------------------------------------------------------------------------------------------
------
NAT64 Stateful instance : nat64_1
------------------------------------------------------------------------------------------
------
Inside Protocol Outside Inside Translation Inside Outside
Address Destination Destination Type to to
Port Port Outside Inside
Packets Packets
```

```
-------------------------------------------------------------------------------
------
3301:db8::2 tcp 6300 11144 dynamic 122 122
3301:db8::2 tcp 6301 37521 static 121 121
3301:db8::2 tcp 6302 50524 dynamic 121 121
3301:db8::2 tcp 6303 13872 dynamic 122 122
3301:db8::2 tcp 6304 24180 dynamic 121 121
3301:db8::2 tcp 6305 53615 dynamic 121 121
3301:db8::2 tcp 6306 34139 dynamic 121 121
3301:db8::2 tcp 6307 20798 dynamic 121 121
3301:db8::2 tcp 6308 2624 dynamic 122 122
3301:db8::2 tcp 6309 2282 dynamic 121 121
3301:db8::2 tcp 6310 16620 dynamic 121 121
```

Show - Pool Utilization:

```
# RP/0/RP0/CPU0:router#show cgn nat64 stateful nat64_1 pool-utilization address-range
50.1.1.20 50.1.1.30
Thu Aug 11 06:31:25.180 UTC
Public address pool utilization details
-----------------------------------------------------
NAT64 Statefeul instance : nat64_1
-----------------------------------------------------
Outside Number Number
Address of of
Free ports Used ports
-----------------------------------------------------
50.1.1.20 65535 0
50.1.1.21 65535 0
50.1.1.22 65535 0
50.1.1.23 65535 0
50.1.1.24 65535 0
50.1.1.25 65535 0
50.1.1.26 65533 2
50.1.1.27 65535 0
50.1.1.28 65535 0
50.1.1.29 65535 0
50.1.1.30 65535 0
```

Show session:

```
RP/0/RP0/CPU0:router#show cgn nat64 stateful nat64_1 session
protocol tcp in$
Tue Aug 16 03:22:36.537 UTC
-----------------------------------------------------
NAT64 Stateful instance : nat64_1
-----------------------------------------------------
Outside Address : 52.52.52.25
Outside Port : 61746
Translation Type : dynamic
Protocol : tcp
-----------------------------------------------------
Destination Address Destination Port
-----------------------------------------------------
14.14.14.2 40
```

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 batch 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#
```

Cisco CRS-3 SW Features

Note With Cisco IOS XR Software Release 4.1.0 PX, the CRS MSC-140 or CRS FP-140 can now be used for Provider (P) and Provider Edge (PE) Layer 3 router configurations, including Layer 3 VPN features. With Cisco IOS XR Software Release 4.1.0, CRS MSC-140 or CRS FP-140 now supports Layer 2 VPN functionality. Please contact your Cisco representative for more information.

The following features are now supported on the Cisco CRS-3 router in Cisco IOS XR Software Release 4.1.2:

- IPv6 ABF
- VRF-Aware IPv4 ABF

IPv6 ABF

The IPv6 ABF feature for the Cisco CRS-3 router in Release 4.1.2 includes the support for next hop table from specified VRF in the ABF configuration. In addition to its current access list of actions, IPv6 is set to have the following actions for Release 4.1.2:

- List of next hops—The following gives the situations or conditions on which the hops are made:
  - Up to 3 next hops can be specified with an optional VRF name and an optional IPv6 address.
  - For any of the next hop address that is UP (in global or in specified VRF), the next hop specified with VRF name and IP address identifies the next hop router in the path to the destination (where packets are to be forwarded).
  - For any of the next hop address that is not UP, packets are transferred through standard routing path based on destination address.
  - If the VRF name is not specified in the configuration of next hop, either the global table or the VRF table is used for the next hop lookup.
  - If the IP address is not specified in the configuration of next hop, destination address lookup is done in the specified VRF.
- List of default hops—This differs from the List of next hops process by means of enabling the next hop only when there is no explicit route in the routing table for the packet to go to the destination address, on the condition that the default keyword to be specified in ACE configuration before next hops.

The following configurations are taken into consideration while implementing this feature:

- Permitting packets by security ACL and accepting forwarding result from ACE—Packets are forwarded only based on next hop information having either VRF only or both VRF and IPv6 address from ACE result.

- Permitting packets by security ACT and ignoring forwarding result from ACE—Packets are forwarded using traditional routing based on the destination address.
- Denying packets from security ACL—This means that the security is denied and the packets matching this ACE will get dropped. For this, an implicit “deny IPv6 any” is present at the end of security ACL to drop packets that does not match permit entries in security ACL.

For any change in VRF or IPv6 address, the next hop status changes. If the status of a next hop changes, PFilter EA gets a notification from ACL client and updates ACL TCAM result entry with new next hop or with no next hop for all next-hops that are down.

The change in VRF name or IP address for any next hop in ACE configuration is considered an ACE modification and thus resets the statistics for that ACE.

The packets are forwarded based on the ABF rule as follows:

- Packet forwarding at Ingress LC Mode—Here the packet forwarding is done as:
  1. With Adjacent next hop being the action, the following activities are performed:
     - If PLU NH lookup configured in global or specific VRF table results in a default route or with specific route to next hop, the packets are forwarded using traditional forwarding wherein the microcode forwards the packets using the result from PLU lookup launched with packet destination address.
     - On the other hand, the packets are forwarded using ACL next hop PLU lookup result. The microcode adds the next hop extension header including both the IP address and VRF table id in buffer header
  2. With Adjacent default next hop being the action, if PLU lookup with packet destination address results in a default route entry, the packets are forwarded using ACL next hop PLU lookup result. The microcode adds the next hop extension header in buffer header. If not, the forwarding is done in a traditional manner.
- Packet forwarding at Egress LC Mode—Here the packet forwarding is done as:
  - The NH bit in the buffer header indicates the presence of next hop in buffer header extensions. If this bit is set, Egress PSE microcode would launch PLU lookup using next hop from the next hop extension header for TX adjacency.
  - There are cases where packets hitting the incomplete adjacencies that are caused when the interface connecting to next hop is UP but with the next hop status as down in broadcast networks. In such situations, the microcode would send NH extension header to LC CPU which is an Ingress feature and which is not configured in Egress line card. Here the L2encap node on output interface IDB e-chain punts packet to ND process after which the packet is forwarded or dropped based on ND resolution result.
  - In cases of incomplete or glean adjacency, a global statistics counter is added to count the packets that are sent to LC CPU.

ABF is an ingress ONLY feature. Henceforth, the configuration is rejected for the following reasons:

- If a next hop is configured in ACE of ACL that is attached to an interface in Egress direction.
- Modifying an ACL attached in Egress direction with next hop (or ABF) action.

The configuration steps regarding current IPv6 activities are as follows:

In addition to the current IPv6 ACE actions such as permit, deny, log | log-input, the optional next hop or default nexthop with an optional vrf name for each next hop combination of vrf name and next hop address are included by the CLI for packet forwarding.

```
{[default]  nexthop1 [vrf <vrf_name_A>] [ipv6 <IPv6-address1>] [[nexthop2[vrf
<vrf_name_B>] [ipv6 <IPv6-address2> ]] [ nexthop3  [vrf <vrf_name_C>] [ipv6
<IPv6-address3>]]]}
```

The nexthop<n>*/default nexthop<n>* extensions are valid only for permit ACEs, whereas **n** identifies which nexthop. Up to three nexthops are allowed and each nexthop is a combination of vrf name and ipv6 address.

```
RP/0/RP0/CPU0:router(config)#IPv6 access-list v6
RP/0/RP0/CPU0:router(config-IPv6-acl)#10 permit IPv6 any any ?
  authen           Match if authentication header is present
  destopts        Match if destination opts header is present
  dscp             Match packets with given DSCP value
  fragments    Match if fragment extension header contains a non-zero fragment offset
  log               Log matches against this entry
  log-input     Log matches against this entry, including input interface
  packet-length  Check packet length
  precedence     Match packets with given precedence
  routing           Match if routing header is present
  ttl                   Match against Hop Limit
  default        Use specified default nexthop on match against this entry
  nexthop1     Forward to specified nexthop on match against this entry
  <cr>

RP/0/RP0/CPU0:router(config)#IPv6 access-list v6
RP/0/RP0/CPU0:router(config-IPv6-acl)#10 permit IPv6 any any nexthop1 ?
  vrf              Enter specific vrf Name for this nexthop
 ipv6            Enter nexthop address
  <cr>
```

The show command for IPv6 access list with hardware option displays count of packets matched against each ACE along with active next hop that is programmed in hardware. The count of packets forwarded using any of the next hops configured in the ACE are also shown. For any next hop status change, the active next hop is updated in the hardware but the statistics for the ACE will not get reset.

```
RP/0/RP0/CPU0:router#sh access-lists IPv6 v6_acl
Mon Apr  6 17:40:44.225 UTC
IPv6 access-list v6_acl
 10 permit IPv6 any host 3ffe::1:10 nexthop1 vrf vrf_A ipv6 3ffe::1:2 nexthop2 vrf
vrf_B ipv6 3ffe::2:12 nexthop3 vrf vrf_C ipv6 3ffe::3:13
20 permit IPv6 any host 3ffe::1:10 default nexthop1 vrf vrf_A ipv6 3ffe::1:2 nexthop2
vrf vrf_B ipv6 3ffe::2:12 nexthop3 vrf vrf_C ipv6 3ffe::3:13

RP/0/RP0/CPU0:router#sh access-lists IPv6 v6_acl hardware ingress loc <>
IPv6 access-list v6_acl
10 permit IPv6 any host 3ffe::1:10 (nexthop: vrf-B 3ffe::2:12)

RP/0/RP0/CPU0:router#sh access-lists IPv6 v6_acl hardware ingress detail loc <>
Wed Apr 29 17:56:55.360 UTC
ACL name: v6_acl
Sequence Number: 10
Grant: permit
Logging: OFF
Per ace icmp: ON
Next Hop Enable: ON
VRF: vrf_B
VRF Table Id:  123
Nexthop: 3ffe::2:12
Default Next hop Enable: OFF
```

VRF-Aware IPv4 ABF

VRF-Aware IPv4 ABF feature is supported on CRS-1 and CRS-3 line cards in the Cisco CRS-3 router for the Release 4.1.2. This feature provides configuration of up to 3 next hop addresses belonging to a VRF table rather than a global routing table.

There are three types of next hop addresses per ACE available for the Release 4.1.2:

- VRF Next Hop Address—This indicates that an IPv4 address can be specified with VRF name. This next hop address is programmed into the ACE result and is used for forwarding, if this is the first UP address and is reachable in the VRF table.
- VRF Default Next Hop Address—This indicates that an IPv4 default next hop can be specified with VRF name. This default next hop address is programmed into the ACE result and is used for forwarding only on the condition that there is no explicit route available for the packet to the destination address in the global routing table.
- VRF Select—This indicates that no VRF name and no IPv4 address can be specified. Here the first available VRF is programmed into the ACE result and the destination address of the packets is used to do the forwarding lookup in the VRF table.

Note VRF-Aware IPv4 ABF is supported on

- Both CRS-1 and CRS-3 line card types.
- All PLIM or interface types which support ACL.

The following provides the required configuration for VRF-Aware IPv4 ABF feature:

The **show access-list ipv4** is enhanced to display next hop configuration. With the hardware option in show command CLI, the next-hop programmed in hardware is also displayed.

```
RP/0/RP0/CPU0:router#sh access-lists ipv4 v4_acl
Mon Apr  6 17:40:44.225 UTC
ipv4 access-list 4_acl
 10 permit ipv4 any host 10.1.1.10 nexthop1 vrf vrf-A ipv4 20.1.1.2 nexthop2 vrf vrf-B
ipv4 30.1.1.2 nexthop3 vrf vrf-C ipv4 40.1.1.2

RP/0/RP0/CPU0:router#sh access-lists IPv4 v4_acl hardware ingress loc <>
ipv4 access-list v4_acl
10 permit ipv4 any host 10.1.1.10 (nexthop: vrf-B 30.1.1.2)

RP/0/RP0/CPU0:router#sh access-lists ipv4 v4_acl hardware ingress detail loc <>
Wed Apr 29 17:56:55.360 UTC
ACL name: v4_acl
Sequence Number: 10
Grant: permit
Logging: OFF
Per ace icmp: ON
Next Hop Enable: ON
VRF Table Id:  123
Nexthop: 30.1.1.2
Default Next hop Enable: OFF
```

Current configuration also changes the CLI and the XML based settings.The CLI changes are provided as follows:

The pfilter-ea show command, **show access-list ipv4 <name> hardware** displays the VRF table ID. This is the hardware table ID, or VRF of the VRF select or VRF next-hop address which is currently active.

A table IDof **0** implies the default or global routing table.

```
RP/0/RP0/CPU0:router#sh access-lists ipv4 v4_acl
Mon Apr  6 17:40:44.225 UTC
ipv4 access-list 4_acl
 10 permit ipv4 any host 10.1.1.10 nexthop1 vrf vrf-A ipv4 20.1.1.2 nexthop2 vrf vrf-B
ipv4 30.1.1.2 nexthop3 vrf vrf-C ipv4 40.1.1.2
```

```
RP/0/RP0/CPU0:router#sh access-lists IPv4 v4_acl hardware ingress loc <>
ipv4 access-list v4_acl
10 permit ipv4 any host 10.1.1.10 (tableid: 123 nexthop: 30.1.1.2)

RP/0/RP0/CPU0:router#sh access-lists ipv4 v4_acl hardware ingress detail loc <>
Wed Apr 29 17:56:55.360 UTC
ACL name: v4_acl
Sequence Number: 10
Grant: permit
Logging: OFF
Per ace icmp: ON
Next Hop Enable: ON
VRF Table Id:  123
Nexthop: 30.1.1.2
```

The XML changes for both IPv4 and IPv6 ABF features are as follows:

The VRF Table ID and IPv4/IPv6 next-hop address is added to the following pfilter BAG structures to support IPv4 and IPv6 VRF aware ABF:

```
bag pfilter_ea_ace_brief {
     private uint32_t    ace_sequence/Sequence
                           @ "ACE sequence number";
     private uint8_t     ace_gr;
     grant_type          ace_grant/Grant
                           @ "Either permit or deny";
     bool                ace_log/IsLog
                           @ "True if log enabled otherwise disabled";
     bool                ace_icmp_on/IsICMPEnabled
                           @ "Per ACE ICMP enabled/disabled";
     bool                ace_no_stats/IsStatistics
                           @ "True if statistics available";
     uint32_t            ace_num_entries/Entries
                           @ "Number of tcam entries";
     uint64_t            ace_hits_count/Hits
                           @ "Number of  TCAM hits";
     private pfilter_engine_type ace_pse_type/PSEType
                           @ "PSE engine type";
     bool                ace_next_hop_enable/IsNextHop
                           @ "True if nexthop enable";
3
                           @ "Nexthop IPv6 address";
} @ "Pfilter ACL hardware brief";
```

New Hardware Features for the Cisco CRS router

The following new hardware features were introduced in Cisco IOS XR Software Release 4.1.2 on the Cisco CRS router:

- Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router
- 16G Flash Support

Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router

Cisco IOS XR Software Release 4.1.2 introduces support for the Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router. Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router is a chassis that has 8 slots for modular service cards (MSCs), forwarding processor (FPs) cards, and label

switch processor (LSP) cards (all referred to as line cards); associated physical layer interface modules (PLIMs) and SPA Interface Processors (SIPs). Each slot has the capacity of up to 400 gigabits per second (Gbps) ingress and 400 Gbps egress, for a total routing capacity per chassis of 12.8 terabits.

The LCC supports both 40 G and 140 G fabric cards and line cards. The Cisco CRS-1 Carrier Routing System uses fabric cards designed for 40 G operation (CRS-8-FC/S or CRS-8-FC/M cards) and the Cisco CRS-3 Carrier Routing System uses fabric cards designed for 140 G operation (CRS-8-FC140/S or CRS-8-FC140/M cards). A mixture of 40 G and 140 G fabric cards is not supported except during migration.

The chassis has an integrated rack and does not require an external rack. It is bolted to the facility floor. It contains its own power and cooling systems. Power systems are available using AC or DC power.

The Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router is supported in Release 4.1.2 to increase the middle plane to 400G per slot and to make necessary changes in thermal and power capacity to support this 400G capacity. The Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router has the same physical dimension as the existing Cisco CRS Series 8-slot Line Card Chassis (LCC) Router. This is compatible to support all 40G and 140G cards.

A new power shelf with an upgraded 70 Amp circuit breaker is created for the Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router to support an increased load of 400G per slot. The changes made in the hardware have created a new Product ID (PID) for the Chassis, CRS Modular DC Power Shelf for CRS-8/S-B or CRS Modular AC Power Shelf for CRS-8/S-B AC and DC power shelf.

The following provides the characteristics of the Chassis:

- Slot Numbers—A single-shelf (standalone) system consists of a single LCC. The chassis is provided with slot numbers for major cards that plug into the chassis. The MSC slot numbers on the rear of the chassis are reversed from the PLIM slot numbers on the front side of the chassis. A mated MSC and PLIM are slot specific and mated through the midplane.
- Chassis Cable Management—Cable Management features in the chassis are provided for both the front (PLIM) and rear (MSC) sides of the chassis. The PLIM side has horizontal cable management features above both card cages. There are two types of vertical cable troughs as part of the chassis cable management: standard width and wider width. The MSC side of the chassis has one cable management system above the lower card cage.
- Chassis Exterior Components—There are exterior cosmetic components for the front side, rear side of the chassis.

The Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router support in Release 4.1.2 ensures the following in Phase 1 and Phase 2 implementation:

- Improves Airflow cooling, EMI performance and incorporates DFM (Design For Manufacturing).
- Upgrades Power shelf to increase power budget per zone for Cisco CRS 400 support for higher powered HW and incorporates CRS Modular DC Power Shelf for CRS-8/S-B or CRS Modular AC Power Shelf for CRS-8/S-B DFM.
- Upgrades Fan Tray to use higher performance fans from CRS-16 VE PWM fans.

In addition, the following changes are made for Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router support in the Cisco CRS router:

- **New PIDs**
  - CRS-8-LCC-B—CRS-8 Line Card Chassis-enhanced for CRS-8/S-B
  - CRS-8-PSH-AC-B—CRS Modular AC Power Shelf for CRS-8/S-B
  - CRS-8-PSH-DC-B—CRS Modular DC Power Shelf for CRS-8/S-B

- **Network Management OID**—Three OIDs as provided in the following table are requested for the 400G midplane, AC and DC power shelf.

```
/vob/ios.sys1/sys/MIBS/CISCO-ENTITY-VENDORTYPE-OID-MIB.my

+ cevChassisCrs8SB
OBJECT IDENTIFIER ::= { cevChassis 1123 }
-- CRS-8 Line Card Chassis-enhanced for CRS-8/S-B

+ cevPowerSupplyCrs8PshDcB
OBJECT IDENTIFIER ::= { cevPowerSupply 330 }
-- CRS Modular DC Power Shelf for CRS-8/S-B

+ cevPowerSupplyCrs8PshAcB
OBJECT IDENTIFIER ::= { cevPowerSupply 331 }
-- CRS Modular AC Power Shelf for CRS-8/S-B
```

Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router supports the following CLIs:

- Inventory manager CLI show and debug commands—The show and debug commands are similar to that of existing CRS-8/S CLI, except for the new PIDs in the inventory display.

```
RP/0/RP0/CPU0:router(admin)#sh inventory power-supply
Thu Jun 16 00:54:32.400 UTC
NAME: "Rack 0 - Power Shelf", DESCR: "CRS Modular DC Power Shelf for CRS-8/S-B"
PID: CRS-8-PSH-DC-B    , VID: V255255, SN: P1A2

NAME: "Rack 0 - Power Supply A0", DESCR: "Cisco CRS-1 Series DC Power Module 2100W"
PID: CRS-PM-DC         , VID: V01, SN: DTM1316004H

NAME: "Rack 0 - Power Supply A1", DESCR: "Cisco CRS-1 Series DC Power Module 2100W"
PID: CRS-PM-DC         , VID: V01, SN: DTM1316004C

NAME: "Rack 0 - Power Supply A2", DESCR: "Cisco CRS-1 Series DC Power Module 2100W"
PID: CRS-PM-DC         , VID: V01, SN: DTM1316003V

NAME: "Rack 0 - Power Shelf", DESCR: "CRS Modular DC Power Shelf for CRS-8/S-B"
PID: CRS-8-PSH-DC-B    , VID: V255255, SN: P1A3

NAME: "Rack 0 - Power Supply B0", DESCR: "Cisco CRS-1 Series DC Power Module 2100W"
PID: CRS-PM-DC         , VID: V01, SN: DTM1316006Y

NAME: "Rack 0 - Power Supply B2", DESCR: "Cisco CRS-1 Series DC Power Module 2100W"
PID: CRS-PM-DC         , VID: V01, SN: DTM1316006J

NAME: "Rack 0 - Power Supply B3", DESCR: "Cisco CRS-1 Series DC Power Module 2100W"
PID: CRS-PM-DC         , VID: V01, SN: DTM1316004R

RP/0/RP0/CPU0:router(admin)#sh inventory chassis
Thu Jun 16 00:55:20.616 UTC
NAME: "Rack 0 - Chassis", DESCR: "CRS-8 Line Card Chassis-enhanced for CRS-8/S-B"
PID: CRS-8-LCC-B       , VID: V04, SN: TBM14399128
RP/0/RP0/CPU0:router(admin)#sh inventory fan
Thu Jun 16 00:55:51.800 UTC
NAME: "Rack 0 - Fan Tray Upper", DESCR: "Cisco CRS-1 Series Fan Tray for 8 slots LCC"
PID: CRS-8-LCC-FAN-TR  , VID: V04, SN: TBA12430025

NAME: "Rack 0 - Fan Tray Lower", DESCR: "Cisco CRS-1 Series Fan Tray for 8 slots LCC"
PID: CRS-8-LCC-FAN-TR  , VID: V05, SN: TBA12370014

RP/0/RP0/CPU0:router(admin)#sh inventory oid
Thu Jun 16 00:52:47.254 UTC
NAME: "0/RP0/*", DESCR: "Cisco CRS-1 Series 8 Slots Route Processor"
PID: CRS-8-RP          , VID: V160, SN: SAD083703V9
```

```
OID: 1.3.6.1.4.1.9.12.3.1.9.55.22

NAME: "MgmtEth0/RP0/CPU0/0", DESCR: "RP Mgmt Port"
PID:                    , VID: N/A, SN:
OID: 1.3.6.1.4.1.9.12.3.1.10

NAME: "ControlEthernet0/RP0/CPU0", DESCR: "CPU_PORT_0"
PID:                    , VID: N/A, SN:
OID: 1.3.6.1.4.1.9.12.3.1.10

NAME: "ControlEthernet0/RP0/CPU0/S0/1", DESCR: "INTRA_RACK_SWITCH_PORT_0"
PID:                    , VID: N/A, SN:
OID: 1.3.6.1.4.1.9.12.3.1.10
….
NAME: "Rack 0 - Chassis", DESCR: "CRS-8 Line Card Chassis-enhanced for CRS-8/S-B"
PID: CRS-8-LCC-B        , VID: V04, SN: TBM14399128
OID: 1.3.6.1.4.1.9.12.3.1.3.1123

NAME: "Rack 0 - Fan Tray Upper", DESCR: "Cisco CRS-1 Series Fan Tray for 8 slots LCC"
PID: CRS-8-LCC-FAN-TR   , VID: V04, SN: TBA12430025
OID: 1.3.6.1.4.1.9.12.3.1.7.84

NAME: "Rack 0 - Fan Tray Lower", DESCR: "Cisco CRS-1 Series Fan Tray for 8 slots LCC"
PID: CRS-8-LCC-FAN-TR   , VID: V05, SN: TBA12370014
OID: 1.3.6.1.4.1.9.12.3.1.7.84

NAME: "Rack 0 - Power Shelf", DESCR: "CRS Modular DC Power Shelf for CRS-8/S-B"
PID: CRS-8-PSH-DC-B     , VID: V255255, SN: P1A2
OID: 1.3.6.1.4.1.9.12.3.1.6.330

NAME: "Rack 0 - Power Supply A0", DESCR: "Cisco CRS-1 Series DC Power Module 2100W"
PID: CRS-PM-DC          , VID: V01, SN: DTM1316004H
OID: 1.3.6.1.4.1.9.12.3.1.6.258

NAME: "Rack 0 - Power Shelf", DESCR: "CRS Modular DC Power Shelf for CRS-8/S-B"
PID: CRS-8-PSH-DC-B     , VID: V255255, SN: P1A3
OID: 1.3.6.1.4.1.9.12.3.1.6.330

NAME: "Rack 0 - Power Supply B0", DESCR: "Cisco CRS-1 Series DC Power Module 2100W"
PID: CRS-PM-DC          , VID: V01, SN: DTM1316006Y
OID: 1.3.6.1.4.1.9.12.3.1.6.258
```

The following factors are considered for Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router implementation:

- Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router powershelf is not backward compatible with the Cisco CRS Series 8-slot Line Card Chassis (LCC) Router.
- Cisco CRS Series 8-slot Line Card Chassis (LCC) Router power shelf is not compatible with the new Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router.
- Invmgr and CCTL are updated to recognize the PIDs for the Cisco CRS Series 8-slot Line Card Chassis (LCC) Enhanced Router and new CRS Modular DC Power Shelf for CRS-8/S-B or CRS Modular AC Power Shelf for CRS-8/S-B AC and DC power shelves.

16G Flash Support

The Cisco IOS XR Software Release 4.1.2 supports the 16G flash cards on CRS-4, CRS-8, RP-B for CRS-16, DRP and SC-Ges. The cards must be formatted within the Cisco IOS XR Software with FAT32 file system as the cards only support FAT32 file system by default.

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 CRS-1 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.
- **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 CRS-1 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.
- **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.
- The following commands are not supported on the Cisco CRS-1 Series Router:
  - affinity location set
  - affinity location type
  - affinity program
  - affinity self
- BFD IPv6 UDP Checksum Calculation—In Cisco IOS XR Software Release 3.9, you turn the BFD IPv6 UDP checksum calculation on and off:
  - To disable the BFD IPv6 UDP checksum calculation:

```
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# ipv6 checksum disable
RP/0/RP0/CPU0:router(config-bfd)# end
```

  - To enable BFD IPv6 UDP checksum calculation:

```
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# no ipv6 checksum disable
RP/0/RP0/CPU0:router(config-bfd)# end
```

- On upgrading the Cisco CRS-1 Software from 3.6.2 to 4.0.0 the MAC address assigned to physical interfaces changes. This is required because prior to Cisco IOS XR software Release 3.8.4 the MAC address assigned to the bundle interface was taken from the first member's MAC address. If this bundle member is removed from the bundle, the bundle gets a new MAC address, which results in traffic loss due to ARP resolution. Beginning in Cisco IOS XR software Release 3.8.4, a pool of MAC addresses are assigned to the bundle interfaces by the bundlemgr process during bundle interface creation.
- Deactivation of os-mbi dependent (Nonreload) SMU fails—Backing out the non reload os-mbi SMU fails because deactivation runs out of memory (activation did not release some memory, which stayed at 38 MB). This failure to activate or deactivate the SMU due to insufficient SP resources impacts SP cards on Cisco CRS router.
- When configuring the Label Distribution Protocol (LDP) graceful restart (GR) process in a network with multiple [link and/or targeted] LDP hello adjacencies with the same neighbor, make sure that GR is activated on the session before any hello adjacency times out due to neighbor control plane failures. One way of achieving this is by configuring a lower session hold time between neighbors such that session time out always occurs before hello adjacency can time out. Cisco recommends setting LDP session hold time using the following formula:

  LDP session hold time <= (Hello hold time - Hello interval) * 3

  This means that for default values of 15/5 seconds respectively for the link Hello hold time and the Hello interval, the LDP session hold time should be set to 30 seconds or less.

  For more information, refer to the “Implementing MPLS Label Distribution Protocol on Cisco IOS XR Software” section of the *Cisco IOS XR MPLS Configuration Guide, Release 4.0*.
- For information about upgrading from a Cisco CRS-1 router to a Cisco CRS-3 chassis, refer to the *Cisco CRS-1 Carrier Routing System to Cisco CRS-3 Carrier Routing System Upgrade Guide* at the following URL:

http://www.cisco.com/en/US/products/ps5763/prod_installation_guides_list.html

- The following commands have been modified to support Cisco CRS-3 router:
  - show environment
  - hw-module reload
  - show controllers egressq client location
  - show controllers egressq queue drr [max | min] location <>
  - show controllers egressq group drr [max | min] location <>
  - show controllers egressq group ntb [max | min] location <>
  - show controllers egressq port bpmap location <>
  - show controllers egressq statistics detail location <>
  - show controllers egressq resources location <>

  For information about these commands, refer to the Commands section of the *Cisco CRS-1 Carrier Routing System to Cisco CRS-3 Carrier Routing System Upgrade Guide:*

  http://www.cisco.com/en/US/products/ps5763/prod_installation_guides_list.html
- For Cisco IOS XR software Release 4.0.0 and above, after upgrading, the FPGA upgrade using the **auto-fpd upgrade** command as a part of the auto-fpd upgrade process fails for the SPA-1X10GE-L-V2 SPA. The workaround is to perform a manual FPGA upgrade on the SPA-1X10GE-L-V2 SPA using the **upgrade hw-module fpd fpga1 location 0/0/1** command in admin mode after the **auto-fpd upgrade** command execution completes.
- The minimum timer configuration value for the BFD on Bundle Members feature (BoB) increases from 30 to 60 seconds in Cisco IOS XR Software Release 4.1.2. The timer value can be left as default or modified as follows:
  - int bundle-(ether|pos) <num>
  - bfd address-family ipv4 timers start <30-3600>
  - bfd address-family ipv4 timers nbr-unconfig <30-3600>
- Optics Supported in Cisco IOS XR software Release 4.1.2—See Table 6.

Table 6 Optics Supported in Cisco IOS XR Software Release 4.1.2

PLIM/SPA	Optics Supported
4-10GBE-WL-XFP	XFP-10GLR-192SR-L
8-10GBE-WL-XFP	XFP-10GER-192IR-L
	XFP-10G-MM-SR
	XFP-10GZR-OC192LR
	DWDM-XFP
14x10GBE-WL-XFP	XFP10GLR-192SR-L
20X10GBE-WL-XFP	XFP10GER-192IR-L
	XFP-10G-MM-SR
	XFP-10GZR-OC192LR
	DWDM-XFP

Table 6 Optics Supported in Cisco IOS XR Software Release 4.1.2

PLIM/SPA	Optics Supported
2-10GE-WL-FLEX	XFP-10G-MM-SR XFP-10GLR-OC192SR XFP-10GER-192IR+ XFP-10GZR-OC192LR DWDM-XFP
SPA-1X10GE-WL-V2	XFP-10G-MM-SR XFP-10GLR-OC192SR XFP-10GER-192IR+ XFP-10GZR-OC192LR DWDM-XFP

DWDM-XFP listed in Table 6 includes any one of the DWDM-XFPs listed in Table 7.

Table 7 DWDM XFPs

DWDM-XFP-30.33	DWDM-XFP-38.19	DWDM-XFP-48.51
DWDM-XFP-60.61	DWDM-XFP-38.98	DWDM-XFP-51.72
DWDM-XFP-50.92	DWDM-XFP-39.77	DWDM-XFP-52.52
DWDM-XFP-50.12	DWDM-XFP-40.56	DWDM-XFP-54.13
DWDM-XFP-31.12	DWDM-XFP-42.14	DWDM-XFP-54.94
DWDM-XFP-31.90	DWDM-XFP-42.94	DWDM-XFP-55.75
DWDM-XFP-32.68	DWDM-XFP-43.73	DWDM-XFP-56.55
DWDM-XFP-34.25	DWDM-XFP-44.53	DWDM-XFP-58.17
DWDM-XFP-35.04	DWDM-XFP-46.12	DWDM-XFP-58.98
DWDM-XFP-35.82	DWDM-XFP-46.92	DWDM-XFP-59.79
DWDM-XFP-36.61	DWDM-XFP-47.72	

Reference caveat, CSCtk96820. Please contact your Cisco representative for more information on dates by which this will be available.

- 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.

New DWDM Configuration Requirement

Note This section describes only the new DWDM configuration requirements in Cisco IOS XR 3.9.0 and later releases. It does not describe all updates to the DWDM feature. For more information about DWDM configuration, refer to the "Configuring Dense Wavelength Division Multiplexing Controllers on Cisco IOS XR Software" module in the *Cisco IOS XR Interface and Hardware Component Configuration Guide for the Cisco CRS-1 Router.*

Cisco IOS XR Software Release 3.9.0 introduced new commands in addition to an important change to the default laser state for all of the DWDM physical layer interface modules (PLIMs) supported on the Cisco CRS-1 router, which impacts the required configuration to support those cards.

This change affects all models of the following hardware on the Cisco CRS-1 router:

- Cisco 1-Port OC-768c/STM-256c DWDM PLIM
- Cisco 4-Port 10-Gigabit Ethernet DWDM PLIM

Summary of Important DWDM Changes in Cisco IOS XR Software Release 3.9.0 and Later Releases

- The **laser off** and **shutdown (DWDM)** commands are replaced by the **admin-state out-of-service** command.
- The default state of the laser has changed from "On" to "Off" for all PLIMs. Therefore, the laser for all DWDM controllers must explicitly be turned on using the **admin-state in-service** command in DWDM configuration mode.

Configuration Examples in Cisco IOS XR Software Release 3.9.0 and Later Releases

This section provides configuration examples for turning on and off the laser on a DWDM PLIM.

Turning On the Laser: Example

Note This is a required configuration beginning in Cisco IOS XR Software Release 3.9.0. The DWDM PLIMs will not operate without this configuration.

The following example shows how to turn on the laser and place a DWDM port in In Service (IS) state:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# admin-state in-service
RP/0/RP0/CPU0:router(config-dwdm)# commit
```

Turning Off the Laser: Example

Note This configuration replaces the **laser off** and **shutdown (DWDM)** configuration commands.

The following example shows how to turn off the laser, stop all traffic and place a DWDM port in Out of Service (OOS) state:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# admin-state out-of-service
RP/0/RP0/CPU0:router(config-dwdm)# commit
```

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 CRS 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 CRS 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 CRS router Installation and Upgrade URL: http://www.cisco.com/en/US/products/ps5763/prod_installation_guides_list.html

Additional upgrade instructions for the Cisco CRS router are available from http://www.cisco.com/web/Cisco_IOS_XR_Software/pdf/ReplacingPCMCIACardOnCRS-1.pdf

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 CRS-1 router and the Cisco CRS-3 router.

Cisco IOS XR Caveats

The following open caveats apply to Cisco IOS XR Software Release 4.1.2 and are not platform specific:

- **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.

CRS Caveats from 4.1.2

The following open caveat is common to both the Cisco CRS-1 router and the Cisco CRS-3 router:

- **CSCts04706**

  Basic Description:

  ipv6_rib : %ROUTING-RIB-3-UPDATE_TIMEOUT : Client "bgp" updated the RIB without signaling update completion for Vrf: "default" Tbl: "default" Safi: "Unicast".

  Symptom:

  RIB error is seen on console for the client bgp.

  ipv6_rib[1121]: %ROUTING-RIB-3-UPDATE_TIMEOUT : Client "bgp" updated the RIB without signaling update completion for Vrf: "default" Tbl: "default" Safi: "Unicast"

  Conditions:

  This happens while reloading the RPFO or router.

  Workaround:

  None.

  Recovery:

  None.

Caveats Specific to the Cisco CRS-1 Router

The following open caveats are specific to the Cisco CRS-1 router:

- **CSCts99249**

  Basic Description:

  CGSE Stateful NAT Line rate traffic results in fabric ping failure.

  Symptom:

  Fabric ping failure messages are shown in XR console.

  Conditions:

  When there is a traffic that is above 8 Mpps.

  Workaround:

  The messages are harmless unless the automatic node reload (ANR) is configured. ANR should be disabled. This defect is fixed in 4.2.1 release.

  Recovery:

  None.

- **CSCts80241**

  Basic Description:

  After ISSU SMU upgrade, “show red” is not showing the correct reason.

  Symptom:

  After a reload SMU is activated in the router using the ISSU method, the “show redundancy” does not show correct reason why the active RP and the standby RP got reloaded. This is a display issue and there is no functional impact to the router operation.

  Conditions:

  This behavior is observed in a CRS-1 router running Cisco IOS XR Software Release 4.1.2.

  Workaround:

  There is no known workaround available for this issue.

  Recovery:

  None.

- **CSCtq56162**

  Basic Description:

  Memory leak in mibd_interface on SNMP polling of ATMMIB.

  Symptom:

  Increase in memory consumption by mibd_interface process on Active RP. It is approximately 16k memory leak for 500 polls.

  Conditions:

  Cisco CRS router running 4.1.1.x image performing SNMP polling ATMMIB.

  Workaround:

  None.

  Recovery:

  System can restart mibd_interface automatically or user can initiate the restart without any impact.

- **CSCtr23982**

  Basic Description:

  %L2-EGRESSQ-3-QUEUE-STUCK-LC reloaded.

  Symptom:

  EgressQ stuck condition is observed in Cisco CRS-edge profile system with the combination of edge feature set (12vpn, mldp, l3vpn, etc.) and IPv6 HBH options stream.

  Conditions:

  The issue is observed with overnight traffic and is only applicable to CRS-1 based line cards. Also, the issue is only observed in edge profile running IPv6 HBH options stream with many streams going over MTU limit.

  Workaround:

  None.

  Recovery:

  None.

- **CSCto34421**

  Basic Description:

  sysdb svr virtual address fragmentation

  Symptom:

  In the Cisco IOS XR Software, “SYSDB-SYSDB-6-TIMEOUT-EDM” syslog messages might be displayed steadily.

  Conditions:

  A syslog message like the following example might be displayed steadily:

  RP/0/RP0/CPU0:Mar 29 10:20:05.152 : sysdb_svr_admin[346]: %SYSDB-SYSDB-6-TIMEOUT_EDM :

  EDM request for 'admin/oper/fabric/rack/2/lport/s1tx/' from 'online_diag_lc' (jid 227, node

  2/3/CPU0). No response from 'fsdb_server' (jid 211, node 2/RP1/CPU0) within the timeout period (100 seconds)

  It indicates that certain EDM requests are rejected by sysdb. The reason is that sysdb is not able to allocate memory for replies because of memory fragmentation. The probability to hit this problem is low.

  Workaround:

  Not available.

  Recovery:

  Restart sysdb_svr_admin process.

  Example: process restart sysdb_svr_admin

- **CSCtu33128**

  Basic Description:

  Big chunk of address pool (/18 or below) may fail.

  Symptom:

  Addition of big chunk of Address pool (/18 or below) failure may result in CGSE spp crash or HA failure.

  Conditions:

  Addition of big chunk of Address pool after there is a removal of big chunk of pool(s) in nat64 instances.

  Workaround:

  Remove the instance and add it back with required address pools, while removing a big chunk in address pool. This would ensure that enough memory is available to take up new pool configurations.

  Recovery:

  None.

Caveats Specific to the Cisco CRS-3 Router

There are no Cisco CRS-3 router specific caveats available for the Release 4.1.2.

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

Migrating Cisco CRS-1 to Cisco CRS-3

For information about migrating from a Cisco CRS-1 router to a Cisco CRS-3 chassis, refer to the *Cisco CRS-1 Carrier Routing System to Cisco CRS-3 Carrier Routing System Migration Guide* at the following URL:

http://www.cisco.com/en/US/products/ps5763/prod_installation_guides_list.html

Troubleshooting

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

Related Documentation

The most current Cisco CRS router hardware documentation is located at the following URL:

http://www.cisco.com/en/US/products/ps5763/tsd_products_support_series_home.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 CRS router software documentation is located at the following URL:

http://www.cisco.com/en/US/products/ps5763/tsd_products_support_series_home.html

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation* at: http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html.

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