Release Notes for Cisco CRS-1 and Cisco CRS-3 for Cisco IOS XR Software Release 4.3.2

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

These release notes describe the features provided in the Cisco IOS XR Software Release 4.3.2 for the Cisco CRS router and are updated as needed.

Note For information on the Cisco CRS router running Cisco IOS XR Software Release 4.3.2, see the Important Notes on Cisco IOS XR Software and Cisco CRS Router, on page 49 section.

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, on page 58 section.

For a list of software caveats that apply to Cisco IOS XR Software Release 4.3.2, see the Caveats section. The caveats are updated for every release and are described at http://www.cisco.com.

We recommend that you view the field notices for this release located at the following URL to see if your software or hardware platforms are affected:
http://www.cisco.com/en/US/support/tsd_products_field_notice_summary.html

Cisco IOS XR Software running on the Cisco 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 (VRRP) features.
- **BGP Prefix Independent Convergence—**This provides the ability to converge BGP routes within sub seconds instead of multiple seconds. The Forwarding Information Base (FIB) is updated, independent of a prefix, to converge multiple 100K BGP routes with the occurrence of a single failure. This convergence is applicable to both core and edge failures and with or without MPLS. This fast convergence innovation is unique to Cisco IOS XR Software.

- **Multiprotocol Label Switching (MPLS)—**This supports MPLS protocols, including Traffic Engineering (TE), Resource Reservation Protocol (RSVP), Label Distribution Protocol (LDP), Virtual Private LAN Service (VPLS), 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. 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.
- **IPv6 VPN over IP —**This delivers IPv6 VPN over IP traffic.

Note IPv6 VPN over MPLS and IPv6 VPN over IP won't co-exist

- **Carrier Grade Network Address Translation (CGN)—**This enables services 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) support for intermediate System-to-Intermediate System (IS-IS) and OSPF
  - Traffic engineering support 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 support for GRE tunnel interfaces—This support includes GRE tunnel interfaces under a VRF, however the GRE tunnel source and destination are in the global table
- RSVP support over GRE tunnels
- Path Computation Element (PCE) capability for traffic engineering

For more information about new features provided on the Cisco CRS router for Cisco IOS XR Software Release 4.3.2 see the New Cisco CRS Router Software Features section in this document.

System Requirements

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

To determine the software versions or levels of your current system, see the Determining Your Software Version, on page 23 section.

Feature Set Table

Table 1: Cisco IOS XR Software Release 4.3.2 PIE Files, on page 3 lists the Cisco IOS XR Software feature set matrix (PIE files) and associated filenames available for the Cisco IOS XR Software Release 4.3.2 supported on the Cisco CRS router.

Table 1: Cisco IOS XR Software Release 4.3.2 PIE Files

Feature Set	Filename	Description

Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	hfr-mini-px.pie-4.3.2	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-4.3.2	Contains the required core packages including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Optional Individual Packages (Packages are installed individually)		
Cisco IOS XR Manageability Package	hfr-mgbl-px.pie-4.3.2	Common Object Request Broker Architecture (CORBA) agent, Extensible Markup Language (XML) Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	hfr-mpls-px.pie-4.3.2	MPLS Traffic Engineering (MPLS-TE), Label Distribution Protocol (LDP), MPLS Forwarding, MPLS Operations, Administration, and Maintenance (OAM), Link Manager Protocol (LMP), Optical User Network Interface (OUNI), Resource Reservation Protocol (RSVP), and Layer-3 VPN.
Cisco IOS XR Multicast Package	hfr-mcast-px.pie-4.3.2	Multicast Routing Protocols (PIM, Multicast Source Discovery Protocol [MSDP], Internet Group Management Protocol [IGMP], Auto-RP), Tools (SAP, MTrace), and Infrastructure [(Multicast Routing Information Base [MRIB], Multicast-Unicast RIB [MURIB], Multicast forwarding [MFWD]), and Bidirectional Protocol Independent Multicast (BIDIR-PIM).

Cisco IOS XR Security Package	hfr-k9sec-px.pie-4.3.2	Support for Encryption, Decryption, IP Security (IPSec), Secure Shell (SSH), Secure Socket Layer (SSL), and Public-key infrastructure (PKI) (Software based IPSec support—maximum of 500 tunnels)
Cisco IOS XR FPD Package	hfr-fpd-px.pie-4.3.2	Firmware for Fixed Physical layer interface module (PLIM) and Shared port adapters (SPA) modules as well as ROM monitor (ROMMON) images for Cisco CRS chassis.
Cisco IOS XR Diagnostic Package	hfr-diags-px.pie-4.3.2	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	hfr-doc-px.pie-4.3.2	.man pages for Cisco IOS XR Software on the Cisco CRS chassis.
Cisco IOS XR Video Package	hfr-video-px.pie-4.3.2	Support for Video Monitoring on Cisco CRS routers.
Cisco IOS XR Carrier Grade Services Engine Package	hfr-services-px.pie-4.3.2	Support for Carrier Grade NAT and Cloud Centric Networking on Cisco CRS routers.
Cisco IOS XR Satellite Package	hfr-asr9000v-nV-px.pie-4.3.2	Includes Satellite software images.
Cisco IOS XR Lawful Intercept (LI) Package	hfr-li-px.pie-4.3.2	Includes LI software images.

Table 2: Cisco IOS XR Software Release 4.3.2 TAR Files, on page 6 lists the Cisco CRS Router TAR files.

Table 2: Cisco IOS XR Software Release 4.3.2 TAR Files

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	CRS-iosxr-px-4.3.2.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS MPLS Package • Cisco IOS XR Multicast Package • Cisco IOS XR Diagnostic Package • Cisco IOS XR FPD Package • Cisco IOS XR BNG Package • Cisco IOS XR Service/CGv6 Package • Cisco IOS XR Lawful Intercept Package
Cisco IOS XR IP/MPLS Core Software 3DES	CRS-iosxr-px-k9-4.3.2.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 IOS XR BNG Package • Cisco IOS XR Service/CGv6 Package • Cisco IOS XR Lawful Intercept 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 4.3.2 consist of the following:

- 4-GB memory on the route processors (RPs)
- 4-GB PCMCIA Flash Disk on the route processors (RPs)
- 6-GB memory on Performance Route Processors (PRPs)

Supported Hardware

All hardware features are supported on Cisco IOS XR Software, subject to the memory requirements specified in the "Memory Requirements, on page 7" section.

The following tables lists the supported hardware components on the Cisco CRS Router and the minimum required software versions. For more information, see the Firmware Support, on page 17 section.

Table 3: 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-16-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
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 16-Slot Enhanced Line Card Chassis	CRS-16-LCC-B	4.0.3
Cisco CRS Modular Power Alarm for 16 slots and FCC	CRS-16-ALARM-C	3.9
Cisco CRS Modular Power Grill For 16 Slots and FCC	CRS-16-PW-GRILL	3.9
Cisco CRS Modular DC Power Shelf for 16 slots LCC	CRS-16LCC-PSH-DC	3.9
Cisco CRS Modular AC Power Shelf for 16 slots LCC	CRS-16LCC-PSH-AC	3.9
Cisco CRS Modular AC Power Module	CRS-PM-AC	3.9
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 8-Slot Enhanced Line Card Chassis	CRS-8-LCC-B	4.2.0
Cisco CRS Modular DC Power Shelf for 8 slots Chassis	CRS-8-PSH-DC	3.9
Cisco CRS Modular DC Power Module	CRS-PM-DC	3.9
Cisco CRS Modular AC Power Shelf for 8 slots Chassis	CRS-8-PSH-AC	3.9
Cisco CRS Modular AC Power Module	CRS-PM-AC	3.9
Cisco CRS Series 4-Slot Line Card Chassis		
Cisco CRS 4-Slot Line Card Chassis	CRS-4-CH	3.4
Cisco CRS Fabric Chassis Hardware		
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
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 PCMCIA 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-3 Label Switch Processor	CRS-LSP	4.3.0
Cisco CRS PCMCIA Flash Disk 16 GB	CRS-FLASH-DISK-16G	4.2
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 Series 8-Slot Back-to-Back Fabric Card	CRS-8-FC140/M	4.3.1
Cisco CRS Interface and Route Processor Cards		
Cisco CRS 8-Slot Route Processor	CRS-8-RP	3.2
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 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-1 16-slot Route Processor, revision B	CRS-16-RP-B	3.3
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
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 12 Gb 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 16 Slots 12 Gb Performance Route Processor	CRS-16-PRP-12G	4.1
Cisco CRS Series 4x40GbE OTU3 Interface Module	4-40GE-L/OTN	4.2.3
Cisco CRS Series 2x40GbE OTU3 Interface Module	2-40GE-L/OTN	4.2.3
Cisco CRS Series 1x100GbE IPoDWDM Interface Module	1-100GE-DWDM/C	4.2.3
Cisco CRS Flexible SPA and 6-port 10GE PLIM	6-10GE-WLO-FLEX	4.3.0
Cisco CRS 80 Gbps Carrier Grade Services Engine PLIM	CRS-CGSE-PLUS	4.3.1
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	3.4.1
Cisco CRS 1-Port OC-768c/STM-256c (C-band) DWDM PLIM	1OC768-ITU/C	3.3
Cisco CRS 1-Port OC-768c/STM-256c (C-band) DPSK+ DWDM PLIM	1OC768-DPSK/C	3.6
Cisco CRS ATM Modules and SPAs		
3-Port Clear Channel OC-3 ATM SPA	SPA-3XOC3-ATM-V2	3.7
1-Port Clear Channel OC-12 ATM SPA	SPA-1XOC12-ATM-V2	3.7
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 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 1-port 10GbE SPA WAN/LAN PHY	SPA-1X10GE-WL-V2	3.5.2
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 8-Port Ten Gigabit Ethernet Interface Module	8-10GBE-WL-XFP	3.9.1
Cisco CRS-1 Series 4-Port Ten Gigabit Ethernet Interface Module	4-10GBE-WL-XFP	3.8.4
Cisco CRS-1 Series 20x1GE Flexible Interface Module	20-1GE-FLEX	3.8.1
Cisco CRS-1 Series 2x10GE WAN/LAN Flexible Interface Module	2-10GE-WL-FLEX	3.8.1
Cisco CRS 10GE Optical to Electrical Modules		
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
10GBASE-ER XENPAK Modular for Cisco CRS-1	XENPAK-10GB-ER+	3.4
Cisco 10GBASE-SR XFP Module for MMF	XFP-10G-MM-SR	3.8
Cisco Multirate 10GBASE-LR/-LW and OC-192/STM-64 SR-1 XFP Module for SMF	XFP-10GLR-OC192SR	3.4
Cisco Multirate 10GBASE-LR/-LW and OC-192/STM-64 SR-1 XFP Module for SMF, low power (1.5W)	XFP10GLR-192SR-L	3.8.4, 3.9.1
Cisco Multirate 10GBASE-ER/-EW and OC-192/STM-64 IR-2 XFP Module for SMF	XFP-10GER-192IR+	3.4
Cisco Multirate 10GBASE-ER/-EW and OC-192/STM-64 IR-2 XFP Module for SMF, low power (2.5W)	XFP10GER-192IR-L	3.8.4, 3.9.1

Cisco Multirate 10GBASE-ZR/-ZW and OC-192/STM-64 lR-2 XFP Module for SMF	XFP-10GZR-OC192LR	3.4
Cisco CRS SFPs and CFPs		
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
GE SFP, LC connector LX/LH transceiver	GLC-LH-SM	3.2
1000BASE-SX SFP transceiver module, MMF, 850nm, DOM	GLC-SX-MMD	3.6
1000BASE-LX/LH SFP transceiver module, MMF/SMF, 1310nm, DOM	GLC-LH-SMD	3.6
1000BASE-LX/LH SFP	SFP-GE-L	3.4
1000BASE-SX SFP (DOM)	SFP-GE-S	3.4
1000BASE-T SFP (NEBS 3 ESD)	SFP-GE-T	3.4
1000BASE-ZX Gigabit Ethernet SFP (DOM)	SFP-GE-Z	3.4
100GBASE-LR4 CFP transceiver module for SMF, 1310-nm wavelength, SC duplex connector	CFP-100G-LR4	4.0
100 Gigabit Ethernet over 10 short-reach optical lanes (SR10) optics (multimode fiber)	CFP-100G-SR10	4.2.1
Cisco 10GBASE Dense Wavelength-Division Multiplexing XFP Module	DWDM-XFP-C	4.2.3
40-Gigabit Ethernet C Form-factor Pluggable (CFP) optics module - 40GBASE-LR4	CFP-40G-LR4	4.2.3
40-Gigabit Ethernet C Form-factor Pluggable (CFP) optics module - 40GBASE-SR4	CFP-40G-SR4	4.2.3
40-Gigabit Ethernet C Form-factor Pluggable (CFP) optics module - 40GBASE-FR	CFP-40G-FR	4.2.3

Hardware Not Supported

The following hardware are not supported in Cisco IOS XR Software Release :

Component	Part Number

Cisco CRS-1 16-Slot Line-Card Chassis Route Processor	CRS-16-RP
Cisco CRS PCMCIA Flash Disk 2 GB	CRS-FLASH-DISK-2G

Note 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/prod/collateral/routers/ps5763/end_of_life_notice_c51-695816.html

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

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

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 Multichassis License 140G

CRS FP-140 also supports eDelivery licenses, which can be downloaded as the License Certificates in PDF format.

For further information or questions, please visit http://www.cisco.com/web/partners/tools/edelivery.html.

eDelivery PID	Description
L-XC-ENH-NF-140G=	Cisco CRS Series Enhanced NetFlow License 140G

L-XC-RTE-SCL-140G=	Cisco CRS Series Route Scale License 140G
L-XC-MC-LIC-140G=	Cisco CRS Series Multichassis License 140G
L-XC-TE-SCL-140G=	Cisco CRS Series Traffic Engineering Scale License 140G
L-XC-L2L3VPN-140G=	Cisco CRS Series L2 L3 VPN Peering Edge License 140G

Software Compatibility

Cisco IOS XR Software Release is compatible with the following Cisco CRS-1 and CRS-3 systems:

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

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

- Cisco CRS Back-to-Back System

Firmware Support

To check the firmware code running on the Cisco CRS Router, run the **show fpd package** command in admin mode.

- The bundled ROMMON version is 2.07.
- For details about minimum required firmware versions please refer to **admin show fpd package** (see below).
- To upgrade firmware use the **admin upgrade hw-module fpd** command. Alternatively, refer to the fpd auto-upgrade feature.

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

Cisco CRS 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        0.00       0.0
                     S-8 FPGA Nirvana           lc    fpga3      14.00        0.00       0.0
                     FPGA BCM 8727              lc    fpga4       0.01        0.00       0.0
                     FPGA MCU                   lc    fpga5       0.01        0.00       0.0
                     FPGA CPU ZJF               lc    fpga1       7.00        0.00       0.0
```

```
                    ROMMONA swv2.07 x86mp      lc   rommonA     2.07        2.03       0.0
                    ROMMONB swv2.07 x86mp      lc   rommon      2.07        2.07       0.0
--------------------------------------------------------------------------------------------
PRP                 FPGA ZJF uBlaze            lc   fpga2       0.01        0.00       0.0
                    S-16 FPGA Nirvana          lc   fpga3      13.00        0.00       0.0
                    FPGA BCM 8727              lc   fpga4       0.01        0.00       0.0
                    FPGA MCU                   lc   fpga5       0.01        0.00       0.0
                    ZJF FPGA CPU               lc   fpga1       7.00        0.00       0.0
                    ROMMONA swv2.07 x86mp      lc   rommonA     2.07        2.03       0.0
                    ROMMONB swv2.07 x86mp      lc   rommon      2.07        2.07       0.0
--------------------------------------------------------------------------------------------
S2                  FPGA 4.02                  lc   fpga2       4.02        0.00       0.0
                    FPGA 5.00                  lc   fpga3       5.00        0.00       0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.00       0.0
                    ROMMONA swv2.07 spb        lc   rommonA     2.07        2.05       0.0
                    ROMMONB swv2.07 spb        lc   rommon      2.07        2.07       0.0
--------------------------------------------------------------------------------------------
140G-S1S2S3         FPGA 4.01                  lc   fpga2       4.01        0.00       0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.00       0.0
                    ROMMONA swv2.07 spb        lc   rommonA     2.07        2.05       0.0
                    ROMMONB swv2.07 spb        lc   rommon      2.07        2.07       0.0
--------------------------------------------------------------------------------------------
Fabric HS123 Superst FPGA 4.00                 lc   fpga2       4.00        0.00       0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.00       0.0
                    ROMMONA swv2.07 spb        lc   rommonA     2.07        2.05       0.0
                    ROMMONB swv2.07 spb        lc   rommon      2.07        2.07       0.0
--------------------------------------------------------------------------------------------
140G-4-S1S2S3       FPGA 4.01                  lc   fpga2       4.01        0.00       0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.00       0.0
                    ROMMONA swv2.07 spb        lc   rommonA     2.07        2.05       0.0
                    ROMMONB swv2.07 spb        lc   rommon      2.07        2.07       0.0
--------------------------------------------------------------------------------------------
140G-S1S3           FPGA 4.01                  lc   fpga2       4.01        0.00       0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.00       0.0
                    ROMMONA swv2.07 spb        lc   rommonA     2.07        2.05       0.0
                    ROMMONB swv2.07 spb        lc   rommon      2.07        2.07       0.0
--------------------------------------------------------------------------------------------
140G-S1S2S3-2       FPGA 4.01                  lc   fpga2       4.01        0.00       0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.00       0.0
                    ROMMONA swv2.07 spb        lc   rommonA     2.07        2.05       0.0
                    ROMMONB swv2.07 spb        lc   rommon      2.07        2.07       0.0
--------------------------------------------------------------------------------------------
140G-S1S3-2         FPGA 4.01                  lc   fpga2       4.01        0.00       0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.00       0.0
                    ROMMONA swv2.07 spb        lc   rommonA     2.07        2.05       0.0
                    ROMMONB swv2.07 spb        lc   rommon      2.07        2.07       0.0
                    RXPOD swvF034 spb          lc   rxpod       0.52        0.00       0.0
                    TXPOD swvF039 spb          lc   txpod       0.57        0.00       0.0
--------------------------------------------------------------------------------------------
140G-S2-2           FPGA 4.02                  lc   fpga2       4.02        0.00       0.0
                    FPGA 16.00                 lc   fpga3      16.00        0.00       0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.00       0.0
                    ROMMONA swv2.07 spb        lc   rommonA     2.07        2.05       0.0
                    ROMMONB swv2.07 spb        lc   rommon      2.07        2.07       0.0
                    RXPOD swvF034 spb          lc   rxpod       0.52        0.00       0.0
                    TXPOD swvF039 spb          lc   txpod       0.57        0.00       0.0
--------------------------------------------------------------------------------------------
140G-HS1S3-1        FPGA 4.01                  lc   fpga2       4.01        0.00       0.0
                    FPGA 6.04 spb              lc   fpga1       6.04        0.00       0.0
                    ROMMONA swv2.07 spb        lc   rommonA     2.07        2.07       0.0
                    ROMMONB swv2.07 spb        lc   rommon      2.07        2.07       0.0
                    RXPOD swvF034 spb          lc   rxpod       0.52        0.00       0.0
                    TXPOD swvF039 spb          lc   txpod       0.57        0.00       0.0
--------------------------------------------------------------------------------------------
140G-MSC            FPGA Linecard 0.36         lc   fpga2       0.36        0.00       0.0
                    FPGA CPU 0.8               lc   fpga1       0.08        0.00       0.0
                    ROMMONA swv2.07 kensho     lc   rommonA     2.07        2.04       0.0
                    ROMMONB swv2.07 kensho     lc   rommon      2.07        2.07       0.0
--------------------------------------------------------------------------------------------
FP-140G             FPGA Linecard 0.36         lc   fpga2       0.36        0.00       0.0
                    FPGA CPU 0.8               lc   fpga1       0.08        0.00       0.0
                    ROMMONA swv2.07 kensho     lc   rommonA     2.07        2.04       0.0
                    ROMMONB swv2.07 kensho     lc   rommon      2.07        2.07       0.0
```

CRS-LSP	FPGA Linecard 0.36	lc	fpga2	0.36	0.00	0.0
	FPGA CPU 0.8	lc	fpga1	0.08	0.00	0.0
	ROMMONA swv2.07 kensho	lc	rommonA	2.07	2.04	0.0
	ROMMONB swv2.07 kensho	lc	rommon	2.07	2.07	0.0
1OC768-ITU/C	OPTICS FIRMWARE 110B10	lc	fpga2	110.10	0.00	0.0
1OC768-DWDM-L	OPTICS FIRMWARE 110B10	lc	fpga2	110.10	0.00	0.0
1OC768-DPSK/C	OPTICS FIRMWARE 110B14	lc	fpga2	110.14	0.00	0.0
1OC768-DPSK/C-O	OPTICS FIRMWARE 110B14	lc	fpga2	110.14	0.00	0.0
1OC768-DPSK/C-E	OPTICS FIRMWARE 110B14	lc	fpga2	110.14	0.00	0.0
CRS-CGSE-PLIM	FPGA mCPU0 0.559	lc	fpga2	0.559	0.00	0.0
	FPGA sCPU0 0.559	lc	fpga3	0.559	0.00	0.0
	FPGA mCPU1 0.559	lc	fpga4	0.559	0.00	0.0
	FPGA sCPU1 0.559	lc	fpga5	0.559	0.00	0.0
	FPGA PLIM_SVC 0.41014	lc	fpga1	0.41014	0.00	0.0
2-40GBE-OTN	PLIM FPGA 32	lc	fpga3	32.00	0.00	0.0
1-100GBE-DWDM	PLIM FPGA 32.0	lc	fpga3	32.00	0.00	0.0
	OPTICS FIRMWARE 5.05	lc	fpga4	5.05	0.00	0.0
4-40GBE-OTN	PLIM FPGA 32	lc	fpga3	32.00	0.00	0.0
6-10GE-WLO-FLEX	OBI FPGA 31.0	lc	fpga3	31.00	0.00	0.0
	TORBAY FPGA 45.0	lc	fpga4	45.00	0.00	0.0
CRS-CGSE-PLUS-PLIM	PLIM FPGA 0.03	lc	fpga3	0.4107	0.00	0.0
	FPGA XLP 0.301	lc	fpga4	0.301	0.00	0.0
20-10GBE	PLIM FPGA 42.0	lc	fpga3	42.00	0.00	0.0
12-10GBE	PLIM FPGA 42.0	lc	fpga3	42.00	0.00	0.0
1-100GBE	PLIM FPGA 19.0	lc	fpga3	19.00	0.00	0.0
	RX MAC FPGA 49.0	lc	fpga4	49.00	0.00	0.0
	TX MAC FPGA 38.0	lc	fpga5	38.00	0.00	0.0
14-10GBE	PLIM FPGA 42.0	lc	fpga3	42.00	0.00	0.0
DRP_B	FPGA 6.04 spb	lc	fpga1	6.04	0.00	0.0
	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 spb	lc	rommonA	2.07	2.05	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 spb	lc	rommon	2.07	2.07	0.0
MSC_B	FPGA 6.04 spb	lc	fpga1	6.04	0.00	0.0
	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 spb	lc	rommonA	2.07	2.05	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 spb	lc	rommon	2.07	2.07	0.0
FP40	FPGA 6.04 spb	lc	fpga1	6.04	0.00	0.0
	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 spb	lc	rommonA	2.07	2.05	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0

	ROMMONB swv2.07 spb	lc	rommon	2.07	2.07	0.0
CRS1-SIP-800	JACKET FPGA swv6.0	lc	fpga1	6.00	5.00	0.0
	FPGA swv6.0 hwv80	lc	fpga1	6.00	5.00	0.80
8-10GBE	FPGA swvA.0	lc	fpga1	10.00	0.00	0.0
OC48-POS-16-ED	FPGA PLIM_OC48 9.0	lc	fpga1	9.00	0.00	0.0
4-10GBE	FPGA sw_4p_v15.0	lc	fpga1	15.00	0.00	0.0
8-10GBE	FPGA sw_8p_v15.0	lc	fpga1	15.00	0.00	0.0
4-10GE	SQUIRREL FPGA 10.0	lc	fpga1	10.00	0.00	0.0
42-1GE	FPGA swv6.0	lc	fpga1	6.00	0.00	0.0
	FPGA swv6.0 hwv0.80	lc	fpga1	6.00	0.00	0.80
20-1GE-FLEX	FPGA swv6.0	lc	fpga1	6.00	0.00	0.0
	FPGA swv6.0 hwv0.80	lc	fpga1	6.00	0.00	0.80
2-10GE-WL-FLEX	FPGA swv6.0	lc	fpga1	6.00	0.00	0.0
	FPGA swv6.0 hwv0.80	lc	fpga1	6.00	0.00	0.80
CRS-16-ALARM-C	FPGA 6.04 spb	lc	fpga1	6.04	0.00	0.0
	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 spb	lc	rommonA	2.07	2.05	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 spb	lc	rommon	2.07	2.07	0.0
CRS-16-ALARM-B	FPGA 38.05 spb	lc	fpga1	38.05	0.00	0.0
	ROMMONA swv2.07 spb	lc	rommonA	2.07	2.05	0.0
	ROMMONB swv2.07 spb	lc	rommon	2.07	2.07	0.0
CRS-16-FAN-CT	FPGA 6.04 spb	lc	fpga1	6.04	0.00	0.0
	ROMMONA swv2.07 spb	lc	rommonA	2.07	2.05	0.0
	ROMMONB swv2.07 spb	lc	rommon	2.07	2.07	0.0
CRS-16-LCC-F-CT-B	FPGA 6.04 spb	lc	fpga1	6.04	0.00	0.0
	ROMMONA swv2.07 spb	lc	rommonA	2.07	2.05	0.0
	ROMMONB swv2.07 spb	lc	rommon	2.07	2.07	0.0
CRS-FCC-LED	FPGA 6.04 spb	lc	fpga1	6.04	0.00	0.0
	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 spb	lc	rommonA	2.07	2.05	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 spb	lc	rommon	2.07	2.07	0.0
Route Processor	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0
SC	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0
RP	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0
Shelf Controller GE	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0
RP	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0

Shelf Controller GE2	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0
DRP	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
S1S2S3	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
S1S3	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
S2	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
Fabric HS123	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
Fabric QQS123	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
LED	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
40G-MSC	ROMMONA swv2.07 asmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 dsmp	lc	rommonA	2.07	2.01	0.0
	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 asmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 dsmp	lc	rommon	2.07	2.07	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
CRS-16-ALARM	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
CRS-16-LCC-FAN-CT	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
FC Fan Controller	ROMMONA swv2.07 sp	lc	rommonA	2.07	2.01	0.0
	ROMMONB swv2.07 sp	lc	rommon	2.07	2.07	0.0
SPA-4XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.00	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.00	0.0
	SPA I/O FPGA	spa	fpga1	1.00	0.00	0.0
	SPA ROMMON	spa	rommon	2.12	0.00	0.0
SPA-2XT3/E3	SPA E3 Subrate FPGA	spa	fpga2	1.04	0.00	0.0
	SPA T3 Subrate FPGA	spa	fpga3	1.04	0.00	0.0
	SPA I/O FPGA	spa	fpga1	1.00	0.00	0.0
	SPA ROMMON	spa	rommon	2.12	0.00	0.0
SPA-1XCHOC48/DS3	SPA I/O FPGA	spa	fpga2	1.00	0.00	0.49
	SPA I/O FPGA	spa	fpga3	1.00	0.00	0.52
	SPA I/O FPGA	spa	fpga1	1.36	0.00	0.49
	SPA ROMMON	spa	rommon	2.02	0.00	0.49
SPA-1XCHOC12/DS0	SPA I/O FPGA	spa	fpga2	1.00	0.00	0.49
	SPA I/O FPGA	spa	fpga1	1.36	0.00	0.49
	SPA ROMMON	spa	rommon	2.02	0.00	0.49
SPA-OC192POS	SPA FPGA swv1.3	spa	fpga1	1.03	0.00	0.0
SPA-8XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.5

SPA-4XOC3-POS	SPA FPGA swv3.4	spa	fpga1	3.04	0.00	0.0
SPA-OC192POS-XFP	SPA FPGA swv1.2	spa	fpga1	1.02	0.00	0.0
SPA-8X1GE	SPA FPGA swv1.8	spa	fpga1	1.08	0.00	0.0
SPA-2XOC48POS/RPR	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.0
SPA-4XOC48POS/RPR	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.0
SPA-1XOC48POS/RPR	SPA FPGA swv1.2	spa	fpga1	1.02	0.00	0.0
SPA-8XOC3-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.5
	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.5
SPA-2XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.5
SPA-4XOC12-POS	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.5
SPA-10X1GE-V2	SPA FPGA swv1.10	spa	fpga1	1.10	0.00	0.0
SPA-8X1GE-V2	SPA FPGA swv1.10	spa	fpga1	1.10	0.00	0.0
SPA-5X1GE-V2	SPA FPGA swv1.10	spa	fpga1	1.10	0.00	0.0
SPA-1X10GE-L-V2	SPA FPGA swv1.11	spa	fpga1	1.11	0.00	0.0
SPA-4XOC3-POS-V2	SPA FPGA swv1.0	spa	fpga1	1.00	0.00	0.5
SPA-1X10GE-WL-V2	SPA FPGA swv1.11	spa	fpga1	1.11	0.00	0.0
SPA-1XOC3-ATM-V2	SPA FPGA swv1.2	spa	fpga1	2.02	0.00	0.0
SPA-2XOC3-ATM-V2	SPA FPGA swv1.2	spa	fpga1	2.02	0.00	0.0
SPA-3XOC3-ATM-V2	SPA FPGA swv1.2	spa	fpga1	2.02	0.00	0.0
SPA-1XOC12-ATM-V2	SPA FPGA swv1.2	spa	fpga1	2.02	0.00	0.0

Minimum Firmware Requirement

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

After completing an RMA, upgrade the firmware as per the matrix in this link, which also links to PDF copies of the IOS XR Firmware Upgrade Guides	http://www.cisco.com/web/Cisco_IOS_XR_Software/index.html
For the upgrade CLI, 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*	http://www.cisco.com/en/US/products/ps5763/prod_command_reference_list.html

Determining Your Software Version

Note P image is discontinued from Cisco IOS XR Software Release 4.2 onwards. For more information about this, see the discontinuation of P image for Cisco CRS in Cisco IOS XR Software Release 4.2 and later at

http://www.cisco.com/en/US/prod/collateral/routers/ps5763/product_bulletin_c25-663499.html.

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

Procedure

Step 1 Establish a Telnet session with the router.

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

```
RP/0/RP0/CPU0:router#show version
Cisco IOS XR Software, Version 4.3.2[Default]
Copyright (c) 2013 by Cisco Systems, Inc.

ROM: System Bootstrap, Version 2.07(20120620:232041) [CRS ROMMON],

R107-P2 uptime is 38 minutes
System image file is "disk0:hfr-os-mbi-4.3.2/0x100008/mbihfr-rp-x86e.vm"

cisco CRS-8/S (Intel 686 F6M14S4) processor with 6291456K bytes of memory.
Intel 686 F6M14S4 processor at 1729Mhz, Revision 2.174
Cisco CRS Series 8 Slots Line Card Chassis

2 Management Ethernet
25 TenGigE
13 SONET/SDH
13 Packet over SONET/SDH
1 WANPHY controller(s)
59 GigabitEthernet
1019k bytes of non-volatile configuration memory.
15801M bytes of hard disk.
11223024k bytes of disk0: (Sector size 512 bytes).
11223024k bytes of disk1: (Sector size 512 bytes).

Boot device on node 0/0/CPU0 is mem:
Package active on node 0/0/CPU0:
iosxr-li, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-li-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-supp-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-px-4.3.2
```

```
    Built on Mon Sep  2 07:34:26 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-service, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-service-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-service-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-service-supp-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-services-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-services-px-4.3.2
    Built on Mon Sep  2 07:35:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-adv-video, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-adv-video-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-adv-video-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-adv-video-supp-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-video-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-video-px-4.3.2
    Built on Mon Sep  2 07:35:20 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-supp-4.3.2
    Built on Mon Sep  2 07:33:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-px-4.3.2
    Built on Mon Sep  2 07:33:43 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-4.3.2
    Built on Mon Sep  2 07:33:48 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-px-4.3.2
    Built on Mon Sep  2 07:34:11 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mcast, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mcast-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-supp-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-px-4.3.2
    Built on Mon Sep  2 07:11:41 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
iosxr-mpls, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mpls-4.3.2
    Built on Mon Sep  2 07:11:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mpls-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mpls-px-4.3.2
    Built on Mon Sep  2 07:11:21 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-infra, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-infra-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-fwding-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-routing, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-routing-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-diags, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-diags-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-ce, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-ce-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-base, V 4.3.2[Default], Cisco Systems, at disk0:hfr-base-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-os-mbi, V 4.3.2[Default], Cisco Systems, at disk0:hfr-os-mbi-4.3.2
    Built on Mon Sep  2 07:14:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fwding-4.3.2
    Built on Mon Sep  2 07:11:54 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-ce, V 4.3.2[Default], Cisco Systems, at disk0:hfr-ce-4.3.2
    Built on Mon Sep  2 07:11:57 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mini-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mini-px-4.3.2
    Built on Mon Sep  2 07:15:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

Boot device on node 0/1/CPU0 is mem:
Package active on node 0/1/CPU0:
iosxr-li, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-li-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-supp-4.3.2
```

```
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-px-4.3.2
    Built on Mon Sep  2 07:34:26 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-service, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-service-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-service-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-service-supp-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-services-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-services-px-4.3.2
    Built on Mon Sep  2 07:35:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-adv-video, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-adv-video-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-adv-video-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-adv-video-supp-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-video-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-video-px-4.3.2
    Built on Mon Sep  2 07:35:20 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-supp-4.3.2
    Built on Mon Sep  2 07:33:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-px-4.3.2
    Built on Mon Sep  2 07:33:43 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-4.3.2
    Built on Mon Sep  2 07:33:48 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-px-4.3.2
    Built on Mon Sep  2 07:34:11 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mcast, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mcast-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-supp-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-mcast-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-px-4.3.2
    Built on Mon Sep  2 07:11:41 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mpls, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mpls-4.3.2
    Built on Mon Sep  2 07:11:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mpls-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mpls-px-4.3.2
    Built on Mon Sep  2 07:11:21 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-infra, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-infra-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-fwding-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-routing, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-routing-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-diags, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-diags-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-ce, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-ce-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-base, V 4.3.2[Default], Cisco Systems, at disk0:hfr-base-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-os-mbi, V 4.3.2[Default], Cisco Systems, at disk0:hfr-os-mbi-4.3.2
    Built on Mon Sep  2 07:14:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fwding-4.3.2
    Built on Mon Sep  2 07:11:54 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-ce, V 4.3.2[Default], Cisco Systems, at disk0:hfr-ce-4.3.2
    Built on Mon Sep  2 07:11:57 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mini-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mini-px-4.3.2
    Built on Mon Sep  2 07:15:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

Boot device on node 0/2/CPU0 is mem:
Package active on node 0/2/CPU0:
iosxr-li, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-li-4.3.2
```

```
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-supp-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-px-4.3.2
    Built on Mon Sep  2 07:34:26 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-service, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-service-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-service-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-service-supp-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-services-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-services-px-4.3.2
    Built on Mon Sep  2 07:35:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-adv-video, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-adv-video-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-adv-video-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-adv-video-supp-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-video-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-video-px-4.3.2
    Built on Mon Sep  2 07:35:20 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-supp-4.3.2
    Built on Mon Sep  2 07:33:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-px-4.3.2
    Built on Mon Sep  2 07:33:43 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-4.3.2
    Built on Mon Sep  2 07:33:48 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-px-4.3.2
    Built on Mon Sep  2 07:34:11 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mcast, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mcast-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-mcast-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-supp-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-px-4.3.2
    Built on Mon Sep  2 07:11:41 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mpls, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mpls-4.3.2
    Built on Mon Sep  2 07:11:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mpls-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mpls-px-4.3.2
    Built on Mon Sep  2 07:11:21 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-infra, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-infra-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-fwding-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-routing, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-routing-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-diags, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-diags-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-ce, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-ce-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-base, V 4.3.2[Default], Cisco Systems, at disk0:hfr-base-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-os-mbi, V 4.3.2[Default], Cisco Systems, at disk0:hfr-os-mbi-4.3.2
    Built on Mon Sep  2 07:14:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fwding-4.3.2
    Built on Mon Sep  2 07:11:54 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-ce, V 4.3.2[Default], Cisco Systems, at disk0:hfr-ce-4.3.2
    Built on Mon Sep  2 07:11:57 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mini-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mini-px-4.3.2
    Built on Mon Sep  2 07:15:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
Boot device on node 0/3/CPU0 is mem:
Package active on node 0/3/CPU0:
iosxr-li, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-li-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-supp-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-px-4.3.2
    Built on Mon Sep  2 07:34:26 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-service, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-service-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-service-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-service-supp-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-services-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-services-px-4.3.2
    Built on Mon Sep  2 07:35:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-adv-video, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-adv-video-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-adv-video-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-adv-video-supp-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-video-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-video-px-4.3.2
    Built on Mon Sep  2 07:35:20 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-supp-4.3.2
    Built on Mon Sep  2 07:33:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-px-4.3.2
    Built on Mon Sep  2 07:33:43 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-4.3.2
    Built on Mon Sep  2 07:33:48 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-px-4.3.2
    Built on Mon Sep  2 07:34:11 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
iosxr-mcast, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mcast-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-supp-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-px-4.3.2
    Built on Mon Sep  2 07:11:41 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mpls, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mpls-4.3.2
    Built on Mon Sep  2 07:11:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mpls-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mpls-px-4.3.2
    Built on Mon Sep  2 07:11:21 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-infra, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-infra-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-fwding-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-routing, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-routing-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-diags, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-diags-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-ce, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-ce-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-base, V 4.3.2[Default], Cisco Systems, at disk0:hfr-base-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-os-mbi, V 4.3.2[Default], Cisco Systems, at disk0:hfr-os-mbi-4.3.2
    Built on Mon Sep  2 07:14:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fwding-4.3.2
    Built on Mon Sep  2 07:11:54 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-ce, V 4.3.2[Default], Cisco Systems, at disk0:hfr-ce-4.3.2
    Built on Mon Sep  2 07:11:57 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-mini-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mini-px-4.3.2
    Built on Mon Sep  2 07:15:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

Boot device on node 0/4/CPU0 is mem:
Package active on node 0/4/CPU0:
iosxr-li, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-li-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-supp-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-px-4.3.2
    Built on Mon Sep  2 07:34:26 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-service, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-service-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-service-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-service-supp-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-services-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-services-px-4.3.2
    Built on Mon Sep  2 07:35:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-adv-video, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-adv-video-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-adv-video-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-adv-video-supp-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-video-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-video-px-4.3.2
    Built on Mon Sep  2 07:35:20 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-supp-4.3.2
    Built on Mon Sep  2 07:33:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-px-4.3.2
    Built on Mon Sep  2 07:33:43 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-4.3.2
    Built on Mon Sep  2 07:33:48 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-fpd-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-px-4.3.2
    Built on Mon Sep  2 07:34:11 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mcast, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mcast-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-supp-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-px-4.3.2
    Built on Mon Sep  2 07:11:41 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mpls, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mpls-4.3.2
    Built on Mon Sep  2 07:11:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mpls-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mpls-px-4.3.2
    Built on Mon Sep  2 07:11:21 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-infra, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-infra-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-fwding-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-routing, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-routing-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-diags, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-diags-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-ce, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-ce-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-base, V 4.3.2[Default], Cisco Systems, at disk0:hfr-base-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-os-mbi, V 4.3.2[Default], Cisco Systems, at disk0:hfr-os-mbi-4.3.2
    Built on Mon Sep  2 07:14:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fwding-4.3.2
    Built on Mon Sep  2 07:11:54 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-ce, V 4.3.2[Default], Cisco Systems, at disk0:hfr-ce-4.3.2
    Built on Mon Sep  2 07:11:57 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mini-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mini-px-4.3.2
    Built on Mon Sep  2 07:15:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

Boot device on node 0/5/CPU0 is mem:
Package active on node 0/5/CPU0:
iosxr-li, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-li-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-supp-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-px-4.3.2
    Built on Mon Sep  2 07:34:26 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-service, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-service-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-service-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-service-supp-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-services-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-services-px-4.3.2
    Built on Mon Sep  2 07:35:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-adv-video, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-adv-video-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-adv-video-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-adv-video-supp-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-video-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-video-px-4.3.2
    Built on Mon Sep  2 07:35:20 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-supp-4.3.2
    Built on Mon Sep  2 07:33:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-px-4.3.2
    Built on Mon Sep  2 07:33:43 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-fpd, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-4.3.2
    Built on Mon Sep  2 07:33:48 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-px-4.3.2
    Built on Mon Sep  2 07:34:11 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mcast, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mcast-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-supp-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-px-4.3.2
    Built on Mon Sep  2 07:11:41 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mpls, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mpls-4.3.2
    Built on Mon Sep  2 07:11:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mpls-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mpls-px-4.3.2
    Built on Mon Sep  2 07:11:21 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-infra, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-infra-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-fwding-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-routing, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-routing-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-diags, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-diags-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-ce, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-ce-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-base, V 4.3.2[Default], Cisco Systems, at disk0:hfr-base-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-os-mbi, V 4.3.2[Default], Cisco Systems, at disk0:hfr-os-mbi-4.3.2
    Built on Mon Sep  2 07:14:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fwding-4.3.2
    Built on Mon Sep  2 07:11:54 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-ce, V 4.3.2[Default], Cisco Systems, at disk0:hfr-ce-4.3.2
    Built on Mon Sep  2 07:11:57 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mini-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mini-px-4.3.2
    Built on Mon Sep  2 07:15:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

Boot device on node 0/6/CPU0 is mem:
Package active on node 0/6/CPU0:
iosxr-li, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-li-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-supp-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-px-4.3.2
    Built on Mon Sep  2 07:34:26 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-service, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-service-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-service-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-service-supp-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-services-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-services-px-4.3.2
    Built on Mon Sep  2 07:35:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-adv-video, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-adv-video-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-adv-video-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-adv-video-supp-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-video-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-video-px-4.3.2
    Built on Mon Sep  2 07:35:20 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-supp-4.3.2
    Built on Mon Sep  2 07:33:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-diags-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-px-4.3.2
    Built on Mon Sep  2 07:33:43 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-4.3.2
    Built on Mon Sep  2 07:33:48 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-px-4.3.2
    Built on Mon Sep  2 07:34:11 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mcast, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mcast-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-supp-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-px-4.3.2
    Built on Mon Sep  2 07:11:41 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mpls, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mpls-4.3.2
    Built on Mon Sep  2 07:11:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mpls-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mpls-px-4.3.2
    Built on Mon Sep  2 07:11:21 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-infra, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-infra-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-fwding-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-routing, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-routing-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-diags, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-diags-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-ce, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-ce-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-base, V 4.3.2[Default], Cisco Systems, at disk0:hfr-base-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-os-mbi, V 4.3.2[Default], Cisco Systems, at disk0:hfr-os-mbi-4.3.2
    Built on Mon Sep  2 07:14:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fwding-4.3.2
    Built on Mon Sep  2 07:11:54 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-ce, V 4.3.2[Default], Cisco Systems, at disk0:hfr-ce-4.3.2
    Built on Mon Sep  2 07:11:57 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mini-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mini-px-4.3.2
    Built on Mon Sep  2 07:15:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

Boot device on node 0/7/CPU0 is mem:
Package active on node 0/7/CPU0:
iosxr-li, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-li-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-supp-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-px-4.3.2
    Built on Mon Sep  2 07:34:26 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-service, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-service-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-service-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-service-supp-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-services-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-services-px-4.3.2
    Built on Mon Sep  2 07:35:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-adv-video, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-adv-video-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-adv-video-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-adv-video-supp-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-video-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-video-px-4.3.2
    Built on Mon Sep  2 07:35:20 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-diags-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-supp-4.3.2
    Built on Mon Sep  2 07:33:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-px-4.3.2
    Built on Mon Sep  2 07:33:43 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-4.3.2
    Built on Mon Sep  2 07:33:48 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-px-4.3.2
    Built on Mon Sep  2 07:34:11 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mcast, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mcast-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-supp-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-px-4.3.2
    Built on Mon Sep  2 07:11:41 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mpls, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mpls-4.3.2
    Built on Mon Sep  2 07:11:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mpls-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mpls-px-4.3.2
    Built on Mon Sep  2 07:11:21 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-infra, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-infra-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-fwding-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-routing, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-routing-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-diags, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-diags-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-ce, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-ce-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-base, V 4.3.2[Default], Cisco Systems, at disk0:hfr-base-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-os-mbi, V 4.3.2[Default], Cisco Systems, at disk0:hfr-os-mbi-4.3.2
    Built on Mon Sep  2 07:14:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fwding-4.3.2
    Built on Mon Sep  2 07:11:54 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-ce, V 4.3.2[Default], Cisco Systems, at disk0:hfr-ce-4.3.2
    Built on Mon Sep  2 07:11:57 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mini-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mini-px-4.3.2
    Built on Mon Sep  2 07:15:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/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-li, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-li-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-supp-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-px-4.3.2
    Built on Mon Sep  2 07:34:26 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-asr9000v-nV-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-asr9000v-nV-supp-4.3.2
    Built on Mon Sep  2 07:33:05 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-asr9000v-nV-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-asr9000v-nV-px-4.3.2
    Built on Mon Sep  2 07:33:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-service, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-service-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-service-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-service-supp-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-services-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-services-px-4.3.2
    Built on Mon Sep  2 07:35:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
iosxr-adv-video, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-adv-video-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-adv-video-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-adv-video-supp-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-video-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-video-px-4.3.2
    Built on Mon Sep  2 07:35:20 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-supp-4.3.2
    Built on Mon Sep  2 07:33:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-px-4.3.2
    Built on Mon Sep  2 07:33:43 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-doc-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-doc-supp-4.3.2
    Built on Mon Sep  2 07:34:16 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-doc-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-doc-px-4.3.2
    Built on Mon Sep  2 07:34:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-4.3.2
    Built on Mon Sep  2 07:33:48 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-px-4.3.2
    Built on Mon Sep  2 07:34:11 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-security, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-security-4.3.2
    Built on Mon Sep  2 07:33:10 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-k9sec-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-k9sec-supp-4.3.2
    Built on Mon Sep  2 07:33:10 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-k9sec-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-k9sec-px-4.3.2
    Built on Mon Sep  2 07:33:18 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mcast, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mcast-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-supp-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
```

```
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-px-4.3.2
    Built on Mon Sep  2 07:11:41 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mpls, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mpls-4.3.2
    Built on Mon Sep  2 07:11:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mpls-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mpls-px-4.3.2
    Built on Mon Sep  2 07:11:21 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mgbl, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mgbl-4.3.2
    Built on Mon Sep  2 07:11:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mgbl-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mgbl-supp-4.3.2
    Built on Mon Sep  2 07:11:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mgbl-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mgbl-px-4.3.2
    Built on Mon Sep  2 07:11:07 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-infra, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-infra-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-fwding-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-routing, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-routing-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-diags, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-diags-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-ce, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-ce-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-base, V 4.3.2[Default], Cisco Systems, at disk0:hfr-base-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-os-mbi, V 4.3.2[Default], Cisco Systems, at disk0:hfr-os-mbi-4.3.2
    Built on Mon Sep  2 07:14:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fwding-4.3.2
```

```
    Built on Mon Sep  2 07:11:54 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-ce, V 4.3.2[Default], Cisco Systems, at disk0:hfr-ce-4.3.2
    Built on Mon Sep  2 07:11:57 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mini-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mini-px-4.3.2
    Built on Mon Sep  2 07:15:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/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-li, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-li-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-supp-4.3.2
    Built on Mon Sep  2 07:34:24 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-li-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-li-px-4.3.2
    Built on Mon Sep  2 07:34:26 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-asr9000v-nV-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-asr9000v-nV-supp-4.3.2
    Built on Mon Sep  2 07:33:05 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-asr9000v-nV-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-asr9000v-nV-px-4.3.2
    Built on Mon Sep  2 07:33:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-service, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-service-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-service-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-service-supp-4.3.2
    Built on Mon Sep  2 07:34:27 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-services-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-services-px-4.3.2
    Built on Mon Sep  2 07:35:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-adv-video, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-adv-video-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-adv-video-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-adv-video-supp-4.3.2
    Built on Mon Sep  2 07:35:17 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-video-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-video-px-4.3.2
```

```
    Built on Mon Sep  2 07:35:20 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-supp-4.3.2
    Built on Mon Sep  2 07:33:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-diags-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-diags-px-4.3.2
    Built on Mon Sep  2 07:33:43 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-doc-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-doc-supp-4.3.2
    Built on Mon Sep  2 07:34:16 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-doc-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-doc-px-4.3.2
    Built on Mon Sep  2 07:34:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-4.3.2
    Built on Mon Sep  2 07:33:48 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fpd-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fpd-px-4.3.2
    Built on Mon Sep  2 07:34:11 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-security, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-security-4.3.2
    Built on Mon Sep  2 07:33:10 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-k9sec-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-k9sec-supp-4.3.2
    Built on Mon Sep  2 07:33:10 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-k9sec-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-k9sec-px-4.3.2
    Built on Mon Sep  2 07:33:18 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mcast, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mcast-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-supp-4.3.2
    Built on Mon Sep  2 07:11:23 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mcast-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mcast-px-4.3.2
    Built on Mon Sep  2 07:11:41 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mpls, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mpls-4.3.2
    Built on Mon Sep  2 07:11:08 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

```
hfr-mpls-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mpls-px-4.3.2
    Built on Mon Sep  2 07:11:21 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-mgbl, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-mgbl-4.3.2
    Built on Mon Sep  2 07:11:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mgbl-supp, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mgbl-supp-4.3.2
    Built on Mon Sep  2 07:11:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mgbl-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mgbl-px-4.3.2
    Built on Mon Sep  2 07:11:07 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-infra, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-infra-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-fwding-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-routing, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-routing-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-diags, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-diags-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

iosxr-ce, V 4.3.2[Default], Cisco Systems, at disk0:iosxr-ce-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-base, V 4.3.2[Default], Cisco Systems, at disk0:hfr-base-4.3.2
    Built on Mon Sep  2 07:11:42 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-os-mbi, V 4.3.2[Default], Cisco Systems, at disk0:hfr-os-mbi-4.3.2
    Built on Mon Sep  2 07:14:19 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-fwding, V 4.3.2[Default], Cisco Systems, at disk0:hfr-fwding-4.3.2
    Built on Mon Sep  2 07:11:54 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-ce, V 4.3.2[Default], Cisco Systems, at disk0:hfr-ce-4.3.2
    Built on Mon Sep  2 07:11:57 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie

hfr-mini-px, V 4.3.2[Default], Cisco Systems, at disk0:hfr-mini-px-4.3.2
    Built on Mon Sep  2 07:15:00 IST 2013
    By iox-bld2 in /auto/srcarchive7/production/4.3.2/all/workspace for pie
```

Software Features Introduced in Cisco IOS XR Software Release 4.3.2

BFD over Satellite Interfaces

Bidirectional Forwarding Detection (BFD) over satellite interfaces feature enables BFD support on satellite line cards. Satellite interfaces are known as virtual (bundle) interfaces. BFD uses multipath infrastructure to support BFD on satellite line cards. BFD over satellite is a multipath (MP) single-hop session and is supported on IPv4 address, IPv6 global address, and IPv6 link-local address. BFD over Satellite is supported on the Cisco CRS-3 Modular Services Line Card or the Cisco CRS Modular Services Line Card.

Note The **bfd multipath include location** *node-id* command is not supported on ASR 9000 Ethernet Line Card. Hence, BFD over Satellite Interfaces feature does not work on the ASR 9000 Ethernet Line Card.

Egress MAC Accounting

The MAC address accounting feature provides accounting information for IP traffic based on the source and destination MAC addresses on LAN interfaces. This feature calculates the total packet and byte counts for a LAN interface that receives or sends IP packets to or from a unique MAC address. It also records a time stamp for the last packet received or sent. The Cisco CRS Router provides the support for Egress MAC accounting on bundle ethernet interfaces. Egress MAC accounting supports IPv4 unicast traffic over bundles that includes both fast path and slow path traffic.

For more information on Egress MAC Accounting, see the *Cisco IOS XR Interface and Hardware Component Configuration Guide for the Cisco CRS Router*.

Multi-Chassis Link Aggregation

The Multichassis Link Aggregation (MC-LAG) feature provides an end to end interchassis redundancy solution for the Carrier Ethernet Networks. MC-LAG involves two devices collaborating to act as a single LAG from the perspective of a (third) connected device, thus providing device-level as well as link-level redundancy. To achieve this, two devices co-ordinate with each other to present a single LACP bundle (spanning the two devices) to a partner device. Only one of the devices forwards traffic at any one time, eliminating the risk of forwarding loops. When a failure occurs, these devices coordinate to perform a switchover, changing the device on which traffic is being forwarded by manipulating the link LACP states.

For more information on MC-LAG configuration, see the *Cisco IOS XR Interface and Hardware Component Configuration Guide for the Cisco CRS Router* . For more information on MC-LAG commands, see the *Cisco IOS XR Interface and Hardware Component Command Reference for the Cisco CRS Router*.

Predefined NAT

In classic NAT, the process of mapping a private IP to a public IP or a private port to an outside port is random. Therefore, it becomes difficult to track the subscribers using an IP and a port at a given time. Predefined NAT avoids this random process by mapping a private IP address to a range of ports associated with the corresponding public IP address. This is done through an algorithm that helps the user to recognize a private IP address without having to refer to the massive CGN logs. The address and port translation is done in accordance with the algorithm.

For more information on Predefined NAT, see the *Configuring Predefined NAT* module in the *Cisco IOS XR Carrier Grade NAT Configuration Guide for the Cisco CRS Router*. For more information on *Predefined NAT* commands, see the *Cisco IOS XR Carrier Grade NAT Command Reference for the Cisco CRS Router*.

Differentiated Services Code Point (DSCP) Marking support for TACACS packets

Differentiated Services is a Quality of Service (QoS) architecture that manages the data traffic in a network by using the principle of traffic classification. In this model, the traffic is divided into classes and the data packets are forwarded to the corresponding classes. Based on the priority of the network traffic, the different classes are managed.

To classify traffic, Differentiated Services uses Differentiated Services Code Point (DSCP). It is a 6-bit field in the Type of Service (ToS) byte in the IP header. Based on the DSCP value, the user is able to classify the data traffic and forward packets to the next destination.

You can set the value of DSCP. For a single connection, set the DSCP value on the socket while connecting to the server. In this way, all the outgoing packets will have the same DSCP value in their IP headers. For multiple connections, the DSCP value is set on the available open sockets. Use the **tacacs-server ipv4** command to set the DSCP value.

Implementing Lawful Intercept

Lawful intercept is the process by which law enforcement agencies conduct electronic surveillance of circuit and packet-mode communications, authorized by judicial or administrative order. Service providers worldwide are legally required to assist law enforcement agencies in conducting electronic surveillance in both circuit-switched and packet-mode networks.

Only authorized service provider personnel are permitted to process and configure lawfully authorized intercept orders. Network administrators and technicians are prohibited from obtaining knowledge of lawfully authorized intercept orders, or intercepts in progress. Error messages or program messages for intercepts installed in the router are not displayed on the console.

Lawful Intercept is not a part of the Cisco IOS XR software by default. You have to install it separately by installing and activating **hfr-li.px.pie**.

Feature History for Implementing Lawful Intercept

Release	Modification
Release 3.8.0	This feature was introduced.

Release	Modification
Release 4.0.1	Support for Lawful Intercept IPv6 on CRS-MSC-40G and CRS-FP-40 line cards was added. Information on intercepting IPv6 packets, lawful intercept filters, intercepting 6VPE and 6PE packets, IPv6 MD encapsulation, and per tap drop counter support was added.
Release 4.1.0	Support for Lawful Intercept on CRS-MSC-140G and CRS-FP-140 line cards was added.
Release 4.2.0	High Availability support for Lawful Intercept was added.
Release 4.3.2	Lawful Intercept is available as a separate package. It is no longer a part of the Cisco IOS XR software.

Software Feature Enhancements

These software feature enhancements are introduced in Cisco IOS XR Software Release 4.3.2.

- Multi-chassis and Back to Back support on Cisco CRS-3 Satellite System was included.
- Interconnection between the Cisco CRS-3 Router and its satellites is supported through the standard Ethernet interfaces or bundle ethernet interfaces coming from a single modular services line card. All bundle members must be connected to the same satellite device.
- For MPLS packets with non-IPv4/non-IPv6 payload, when CRS is used as a core router, these fields are considered for load balancing:
  - 3 tuple hashing - MPLS Label, Router ID
  - 7 tuple hashing - MPLS Label, Router ID, Ingress interface handle

Hardware Features Introduced in Cisco IOS XR Software Release 4.3.2 for Cisco CRS Router

- The Cisco ASR900v module is supported as a satellite interface to CIsco CRS router.
- The 6x10GE-WLO-FLEX PLIM supports these SPAs:
  - 1x10GE-L-V2
  - 1x10GE-WL-V2
  - 10x1GE-V2
  - 4xOC3-POS-v2
  - 2xOC48-POS

- The enhanced fan tray (CRS-8-FANTRAY-B) for the Carrier Routing System 8-slot enhanced chassis is supported. The CRS-8-FANTRAY-B fan tray supports a fully configured 400 Gbps system.

)

Important Notes on Cisco IOS XR Software and Cisco CRS Router

- **Default timestamp setting—**The timestamp prompt that precedes console output is enabled by default. To disable the timestamp prompt, use the **no service timestamp** command. For more information, refer to the *Cisco IOS XR System Management Command Reference for the Cisco CRS Router* .

- **Country-specific laws, regulations, and licenses—**In certain countries, use of these products may be prohibited and subject to laws, regulations, or licenses, including requirements applicable to the use of the products under telecommunications and other laws and regulations; customers must comply with all such applicable laws in the countries in which they intend to use the products.
- **Field replacable unit (FRU) 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 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. This CLI needs to be turned on under IGP (OSPF/ISIS) under the respective AFI.

- The following TE Path option attribute 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**—**Starting 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
```

- When upgrading a system from a release prior to 3.8.4, 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 CRS.
- 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 for the Cisco CRS Router*.
- For information about upgrading from a Cisco CRS-1 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 queue 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
- 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 4.2. 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>**

- This release supports the following fixed DWDM XFPs with CRS-3 and certain CRS-1 10GE interface modules:
  - DWDM-XFP-30.33
  - DWDM-XFP-60.61
  - DWDM-XFP-50.92
  - DWDM-XFP-50.12
  - DWDM-XFP-31.12
  - DWDM-XFP-31.90
  - DWDM-XFP-32.68
  - DWDM-XFP-34.25
  - DWDM-XFP-35.04
  - DWDM-XFP-35.82
  - DWDM-XFP-36.61
  - DWDM-XFP-38.19
  - DWDM-XFP-38.98
  - DWDM-XFP-39.77
  - DWDM-XFP-40.56
  - DWDM-XFP-42.14
  - DWDM-XFP-42.94
  - DWDM-XFP-43.73
  - DWDM-XFP-44.53
  - DWDM-XFP-46.12
  - DWDM-XFP-46.92
  - DWDM-XFP-47.72
  - DWDM-XFP-48.51
  - DWDM-XFP-51.72
  - DWDM-XFP-52.52
  - DWDM-XFP-54.13
  - DWDM-XFP-54.94
  - DWDM-XFP-55.75

- DWDM-XFP-56.55
- DWDM-XFP-58.17
- DWDM-XFP-58.98
- DWDM-XFP-59.79

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

DWDM Configuration Management

Note This section describes 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 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 and CRS-3 routers, 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

This change affects all models of the following hardware on the Cisco CRS-3 router:

- Cisco 1-Port 100GE OTU4 IPoDWDM PLIM
- Cisco 4-Port 40-GE OTU3 OTN/LAN PLIM
- Cisco 2-Port 40-GE OTU3 OTN/LAN PLIM

The **g709 fec high-gain** and **g709 fec long-haul** commands are added under DWDM configuration to configure the new high-gain FEC mode and long-haul FEC mode for Cisco 1-Port 100GE OTU4 IPoDWDM PLIM.

The following is an example of configuring the **g709 fec high-gain** command under DWDM configuration to configure the new high-gain FEC mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller dwdm <>
RP/0/RP0/CPU0:router(config)# g709 fec high-gain
RP/0/RP0/CPU0:router(config)# commit
```

The following is an example of configuring the **g709 fec long-haul** command under DWDM configuration to configure the new long-haul FEC mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# g709 fec long-haul
RP/0/RP0/CPU0:router(config)# commit
```

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

Cisco IOS XR Software Release requires a minimum of 4-GB Flash Disk. This release also provides an upgrade option to 16-GB Flash Disk. 1-GB and 2-GB Flash Disks are no longer supported with this release. For information on End-of-Sale and End-of-Life Announcement for the Cisco CRS-1 PCMCIA Flash Disk 2 GB, refer to: http://www.cisco.com/en/US/prod/collateral/routers/ps5763/end_of_life_notice_c51-681333.html

To upgrade from a 1-GB or 2-GB to a 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

For Cisco CRS routers, change to FAT32 in order to partition a 4 GB Flash Disk as a 3.5 GB and 0.5 GB partition. This type of partition is recommended in order to create a partition with more than 2 GB of flash space. Disk partitioning has been supported from Cisco IOS XR Software Release 3.6 onwards. For more information, refer to the *Turbo Boot Appendix* of the *Cisco CRS-1 Carrier Routing System to Cisco CRS-3 Carrier Routing System Migration Guide* .

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 Software Release 4.3.2 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 and are not platform specific:

- **CSCuh83194**

  Basic Description:

  No response from 'l2vpn_mgr' within timeout period, when the **no l2vpn** command is executed.

  Symptom

  The "No response from l2vpn_mgr" console message is seen after the **no l2vpn** command is executed. During this period, l2vpn_mgr is mutex blocked and it takes about 15 mins to commit this changes/recover.

  Conditions:

  This occurs when L2VPN configuration is removed by executing the **no l2vpn** command.

  Workaround:

  None.

- **CSCui57313**

  Basic Description:

  PIM/PIM6 ITAL register fails with VRFs having name starting with "all".

  Symptom

  On a router running Cisco IOS-XR software, the **show pim** related commands may get stuck. Modifying the multicast or PIM configuration fails.

  Conditions:

This happens when a VRF with name beginning with "all" is configured. When this occurs, every subsequent VRF that is created, even if the name of the newly created VRF does not begin with "all", blocks the PIM/PIM6 processes.

Workaround:

Avoid naming VRFs beginning with "all".

- **CSCue78677**

  Basic Description:

  Memory leak seen on XML dedicated agent.

  Symptom

  System fails to properly free the memory allocated while processing the "get XML query" query, provided with large number of Broader Gateway Protocol (BGP) configurations. It happens even after the XML session is terminated. Note: The xml_tty_agent process leaks some chunk of memory, for each iteration, for example 328 bytes of memory.

  Conditions:

  Execute the "get XML query" for BGP with large number of BGP configurations.

  Workaround:

  None.

Caveats Specific to the Cisco CRS Router

The following open caveats are specific to the Cisco CRS platform:

- **CSCui75815**

  Basic Description:

  After router reload, admin configuration is inconsistent due to diagnostic configuration.

  Symptom

  On a Cisco CRS router, the admin diagnostic configuration is lost after router reload.

  Conditions:

  The problem happens at an ISSU SMU activation. In this case the operation is aborted because of a timeout in ISSUMgr.

  Workaround:

  At a planned reload or ISSU SMU activation remove all the online diagnostic configuration. After reload or the successful ISSU SMU activation reapply the diagnostic configuration.

- **CSCui79874**

  Basic Description:

  CGSE Plus traffic is not flowing when jumbo frame is sent.

  Symptom

  On Cisco CRS router, CGSE Plus traffic drop for servie-type 6rd or nat444 may be observed.

  Conditions:

This problem occurs when traffic with a packet size >=1900 bytes is received on interface serviceApp.

Workaround:

None.

- **CSCui82656**

  Basic Description:

  Multiple SPAs fail after install operation.

  Symptom

  After reload of a Cisco CRS router, multiple SPAs may display the state FAILED before they come UP.

  Conditions:

  The affected SPAs are stuck in BOOTING state and then move to state FAILED. After some time they recover and finally comes UP.

  Workaround:

  None.

- **CSCuh00660**

  Basic Description:

  BFD sessions flap on CRS multi-chassis system after route processor switch over due to fabricq and ingressq drops.

  Symptom

  The BFD sessions flap on a scaled CRS multi-chassis system may be observed at DSC-route processor switch over.

  Conditions:

  On a scaled-multi-chassis, huge control traffic is generated during route processor switch over. This leads to the drop of some control packets due to queue build up in CPU. As a result, some BFD control packets is dropped and some BFD sessions flap due to control timer expiry.

  Workaround:

  None. Flapped BFD sessions recovers on its own.

- **CSCuh75936**

  Basic Description:

  CGSE-PLUS module goes into FAILED state after router reload.

  Symptom

  On Cisco CRS router, the CGSE-PLUS module goes into FAILED state despite configuring a valid role and ServiceInfra interface for the slot.

  Conditions:

  The happens after router reload.

  Workaround:

  Reload the module with the **hw-module location** <*R/S/M*> **reload** admin command, where R is rack number, S is slot number, and M is module.

- **CSCui19318**

Basic Description:

Anomalies detected on install verify packages for multiple nodes.

Symptom

Anomalies are detected because of install_debug_remote.

Conditions:

This occurs when the **install verify packages** admin command is executed.

Workaround:

None.

- **CSCui42817**

  Basic Description:

  BFD packets dropped due to wrong uidb ID.

  Symptom

  On a Cisco CRS router, BFD sessions over the bundle interfaces may flap during route processor fail over.

  Conditions:

  The occurs on CRS multi-chassis systems configured with BFD and a high number of bundles interfaces. Occasionally a BFD session flaps on bundle interfaces during a route processor fail over. The happens when the uidb index for bundle interface is reprogrammed. BFD packets coming to the bundle interface are dropped when members are removed and added again.

  Workaround:

  None. The affected BFD sessions restores automatically.

- **CSCug34749**

  Basic Description:

  SESH stays down due to "Service has requested for DOWN state".

  Symptom

  On a Cisco CRS CGSE service configured with DDoS Mitigation Support, Engine Service Hosting (SESH) remains in state ADMIN DOWN.

  Conditions:

  This occurs after router reload, chassis reload (in case of multi-chassis system), or CGSE reload where Threat Management System (TMS) is configured.

  Workaround:

  None.

Caveats Specific to the Cisco CRS-3 Router

There are no open caveats that are specific to the Cisco CRS-3 platform:

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 CRS-3

For information about migrating from a Cisco CRS-1 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 URL http://www.cisco.com/en/US/products/ps5763/prod_installation_guides_list.html

Troubleshooting

For information on troubleshooting Cisco IOS XR Software, see 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 the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

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

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