Release Notes for Cisco CRS-1 and Cisco CRS-3 for Cisco IOS XR Software Release 4.1

March 15, 2013

Cisco IOS XR Software Release 4.1

Text Part Number OL-24745-04

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

Note For information on the Cisco CRS Router running Cisco IOS XR Software Release 4.1, see the "Important Notes" section on page 41.

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

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

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

For a list of software caveats that apply to Cisco IOS XR Software Release 4.1, see the "Caveats" section on page 46. The caveats are updated for every release and are described at www.cisco.com.

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

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

Contents

These release notes contain the following sections:

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Introduction

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

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

- **IP and Routing**—Supports a wide range of IPv4 and IPv6 services and routing protocols; such as Border Gateway Protocol (BGP), Routing Information Protocol (RIPv2), Intermediate System-to-Intermediate System (IS-IS), Open Shortest Path First (OSPF), IP Multicast, Routing Policy Language (RPL), Hot Standby Router Protocol (HSRP), and Virtual Router Redundancy Protocol features (VRRP).
- **BGP Prefix Independent Convergence**—Provides the ability to converge BGP routes within sub seconds instead of multiple seconds. The Forwarding Information Base (FIB) is updated, independent of a prefix, to converge multiple 100K BGP routes with the occurrence of a single failure. This convergence is applicable to both core and edge failures and with or with out MPLS. This fast convergence innovation is unique to Cisco IOS XR software.
- **Multiprotocol Label Switching (MPLS)**—Supports MPLS protocols, including Traffic Engineering (TE), Resource Reservation Protocol (RSVP), Label Distribution Protocol (LDP), Virtual Private LAN Service (VPLS), Layer 2 Virtual Private Network (L2VPN), and Layer 3 Virtual Private Network (L3VPN).
- **Multicast—**Provides comprehensive IP Multicast software including Source Specific Multicast (SSM) and Protocol Independent Multicast (PIM) in Sparse Mode only, and Bidirectional Protocol Independent Multicast (BIDIR-PIM).
- **Quality of Service (QoS)—**Supports QoS mechanisms including policing, marking, queuing, random and hard traffic dropping, and shaping. Additionally, Cisco IOS XR software also supports modular QoS command-line interface (MQC). MQC is used to configure QoS features.
- **Manageability—**Provides industry-standard management interfaces including modular command-line interface (CLI), Simple Network Management Protocol (SNMP), and native Extensible Markup Language (XML) interfaces. Includes a comprehensive set of Syslog messages.
- **Security—**Provides comprehensive network security features including access control lists (ACLs); routing authentications; Authentication, Authorization, and Accounting (AAA)/Terminal Access Controller Access Control System (TACACS+); Secure Shell (SSH); Management Plane Protection (MPP) for management plane security; and Simple Network Management Protocol version3 (SNMPv3). Control plane protections integrated into line card Application-Specific Integrated Circuits (ASICs) include Generalized TTL Security Mechanism (GTSM), RFC 3682, and Dynamic Control Plane Protection (DCPP).

- **Availability—**Supports rich availability features such as fault containment, fault tolerance, fast switchover, link aggregation, nonstop routing for ISIS, LDP, BGP, and OSPF, and nonstop forwarding (NSF).
- **Multicast service delivery in SP NGN—**MVPNv4 support carries multicast traffic over an ISP MPLS core network.
- **IPv6 Provider Edge Router support for IPv6 applications**—Delivers IPv6 traffic over an IPv4/MPLS core with IPv6 provider edge router (6PE) support.
- **IPv6 VPN over MPLS (6VPE) support**—Delivers IPv6 VPN over MPLS (IPv6) VPN traffic over an IPv4 or MPLS core with 6VPE support.
- **Carrier Grade Network Address Translation (CGN)—**Enables service providers to execute orderly transitions to IPv6 through mixed IPv4 and IPv6 networks. CGN provides address family translation but is not limited to just translation within one address family. CGN delivers a comprehensive solution suite for IP address management and IPv6 transition.
- **Enhanced core competencies:**
  - IP fast convergence with Fast Reroute (FRR) 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 4.1, see the "New Cisco CRS Router Software Features" section on page 30 in this document.

System Requirements

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

To determine the software versions or levels of your current system, see the "Determining Your Software Version" section on page 19.

Cisco CRS-1 Feature Set Table

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

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

Table 1 Cisco CRS-1 Supported Feature Sets (Cisco IOS XR Software Release 4.1 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	hfr-mini-p-4.1.0	Contains the required core packages, including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Cisco IOS XR IP Unicast Routing Core Bundle	hfr-mini-p.vm-4.1.0	Contains the required core packages including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Optional Individual Packages[1]		
Cisco IOS XR Manageability Package	hfr-mgbl-p.pie-4.1.0	CORBA[2] agent, XML[3] Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	hfr-mpls-p.pie-4.1.0	MPLS-TE,[4] LDP,[5] MPLS Forwarding, MPLS OAM,[6] LMP,[7] OUNI,[8] RSVP,[9] and Layer-2 VPN and Layer-3 VPN.
Cisco IOS XR Multicast Package	hfr-mcast-p.pie-4.1.0	Multicast Routing Protocols (PIM, MSDP,[10] IGMP,[11] Auto-RP), Tools (SAP, MTrace), and Infrastructure (MRIB,[12] MURIB[13], MFWD[14]), and BIDIR-PIM.[15]
Cisco IOS XR Security Package	hfr-k9sec-p.pie-4.1.0	Support for Encryption, Decryption, IPSec,[16]SSH,[17] SSL,[18]and PKI[19] (Software based IPSec support—maximum of 500 tunnels)
Cisco IOS XR FPD Package	hfr-fpd-p.pie-4.1.0	Firmware for Fixed PLIM[20] and SPA[21] modules as well as ROMMON[22] images for Cisco CRS chassis.
Cisco IOS XR Diagnostic Package	hfr-diags-p.pie-4.1.0	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	hfr-doc-p.pie-4.1.0	.man pages for Cisco IOS XR software on the Cisco CRS chassis.
Cisco IOS XR Carrier Grade NAT Package	hfr-cgn-p.pie-4.1.0	Support for Carrier Grade NAT on Cisco CRS routers.

1. Packages are installed individually
2. Common Object Request Broker Architecture
3. Extensible Markup Language
4. MPLS Traffic Engineering
5. Label Distribution Protocol
6. Operations, Administration, and Maintenance
7. Link Manager Protocol
8. Optical User Network Interface

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

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

Table 2 Cisco CRS-1 and Cisco CRS-3 Supported Feature Sets (Cisco IOS XR Software Release 4.1 TAR Files)

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	CRS-1-iosxr-4.1.0.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package • Cisco IOS XR Diagnostic Package • Cisco IOS XR FPD Package
Cisco IOS XR IP/MPLS Core Software 3DES	CRS-1-iosxr-k9-4.1.0.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package • Cisco IOS XR Security Package • Cisco IOS XR Diagnostic Package • Cisco IOS XR FPD Package

Cisco CRS-3 Feature Set Table

Table 3 lists the Cisco IOS XR software feature set matrix (PIE files) and associated filenames available for the Cisco IOS XR Software Release 4.1 supported on the Cisco CRS-3 Router.

Table 3 Cisco CRS-3 Supported Feature Sets (Cisco IOS XR Software Release 4.1 PIE Files)

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	hfr-mini-px-4.1.0	Contains the required core packages, including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Cisco IOS XR IP Unicast Routing Core Bundle	hfr-mini-px.vm-4.1.0	Contains the required core packages including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, and Alarm Correlation.
Optional Individual Packages[1]		
Cisco IOS XR Manageability Package	hfr-mgbl-px.pie-4.1.0	CORBA[2] agent, XML[3] Parser, and HTTP server packages.
Cisco IOS XR MPLS Package	hfr-mpls-px.pie-4.1.0	MPLS-TE,[4] LDP,[5] MPLS Forwarding, MPLS OAM,[6] LMP,[7] OUNI,[8] RSVP,[9] and Layer-2 VPN and Layer-3 VPN.
Cisco IOS XR Multicast Package	hfr-mcast-px.pie-4.1.0	Multicast Routing Protocols (PIM, MSDP,[10] IGMP,[11] Auto-RP), Tools (SAP, MTrace), and Infrastructure (MRIB,[12] MURIB[13], MFWD[14]), and BIDIR-PIM.[15]
Cisco IOS XR Security Package	hfr-k9sec-px.pie-4.1.0	Support for Encryption, Decryption, IPSec,[16]SSH,[17] SSL,[18]and PKI[19] (Software based IPSec support—maximum of 500 tunnels)
Cisco IOS XR FPD Package	hfr-fpd-px.pie-4.1.0	Firmware for Fixed PLIM[20] and SPA[21] modules as well as ROMMON[22] images for Cisco CRS chassis.
Cisco IOS XR Diagnostic Package	hfr-diags-px.pie-4.1.0	Diagnostic utilities for Cisco IOS XR routers.
Cisco IOS XR Documentation Package	hfr-doc-px.pie-4.1.0	.man pages for Cisco IOS XR software on the Cisco CRS chassis.
Cisco IOS XR Carrier Grade NAT Package	hfr-cgn-px.pie-4.1.0	Support for Carrier Grade NAT on Cisco CRS routers.

1. Packages are installed individually
2. Common Object Request Broker Architecture
3. Extensible Markup Language
4. MPLS Traffic Engineering
5. Label Distribution Protocol
6. Operations, Administration, and Maintenance
7. Link Manager Protocol
8. Optical User Network Interface
9. Resource Reservation Protocol
10. Multicast Source Discovery Protocol

11. Internet Group Management Protocol
12. Multicast Routing Information Base
13. Multicast-Unicast RIB
14. Multicast forwarding
15. Bidirectional Protocol Independent Multicast
16. IP Security
17. Secure Shell
18. Secure Socket Layer
19. Public-key infrastructure
20. Physical layer interface module
21. Shared port adapters
22. ROM monitor

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

Table 4 Cisco CRS-3 Supported Feature Sets (Cisco IOS XR Software Release 4.1 TAR Files)

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

Memory Requirements

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

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

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

Hardware Supported

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

Table 5 lists the supported hardware components on the Cisco CRS and the minimum required software versions. For more information, see the "Other Firmware Support" section on page 13.

Note With Cisco IOS XR Release 4.1.0 PX, the CRS MSC-140 or CRS FP-140 can now be used for Provider (P) and Provider Edge (PE) Layer 3 router configurations, including Layer 3 VPN features. With Cisco IOS XR Release 4.1.0, CRS MSC-140 or CRS FP-140 does not support Layer 2 VPN functionality. Please contact your Cisco representative for more information.

Table 5 Cisco CRS Supported Hardware and Minimum Software Requirements

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

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

Component	Part Number	Support from Version
Cisco CRS Series 8-Slot Line Card Chassis		
Cisco CRS 8-Slot Install Kit	CRS-8-INSTALL-KT	N/A
Cisco CRS 8-Slot Fork Lift Tube	CRS-8-LIFT-TUBE	N/A
Cisco CRS 8-Slot Front Badge Panel	CRS-8-BDG-PANEL	N/A
Cisco CRS 8-Slot Front Inlet Grill	CRS-8-FRNT-GRILL	N/A
Cisco CRS 8-Slot Horizontal Install Rails	CRS-8-HRZ-RAILS	N/A
Cisco CRS 8-Slot Line Card Chassis	CRS-8-LCC	3.2
Cisco CRS Fan Tray for 8-Slot Line Card Chassis	CRS-8-LCC-FAN-TR	3.2
Cisco CRS Line Card Chassis Filter Pack	CRS-8-LCC-FILTER	3.2
Cisco CRS AC Pwr Rectifier for 8-Slot LCC	CRS-8-AC-RECT	3.2
Cisco CRS DC Power Entry Module for 8-Slot LCC	CRS-8-DC-PEM	3.2
Cisco CRS AC & DC Power Module Filter for 8-Slot LCC	CRS-8-PWR-FILTER	3.2
Cisco CRS AC Delta PDU for CRS-8 LCC	CRS-8-LCC-PDU-ACD	3.2
Cisco CRS AC Wye PDU for CRS-8 LCC	CRS-8-LCC-PDU-ACW	3.2
Cisco CRS DC PDU for CRS-8 LCC	CRS-8-LCC-PDU-DC	3.2
Cisco CRS Series 4-Slot Line Card Chassis		
Cisco CRS-1 4-Slot Single-Shelf System	CRS-4/S	3.4
Cisco CRS Fabric Chassis Hardware		
CRS-FCC= Cisco CRS-1 Series Fabric Card Chassis Only	CRS-FCC=	3.2
CRS-1 Fabric Chassis AC Delta Power Kit	CRS-FCC-ACD-KIT	3.2
CRS-1 Fabric Chassis AC Grille	CRS-FCC-ACGRILLE	3.2
CRS-1 Fabric Chassis AC-Wye Power Kit	CRS-FCC-ACW-KIT	3.2
CRS Fabric Chassis DC Power Kit	CRS-FCC-DC-KIT	3.2
CRS-1 Fabric Chassis DC Power Grille	CRS-FCC-DCGRILLE	3.2
CRS Fabric Chassis Lift Bracket	CRS-FCC-LIFT-BRKT	3.2
CRS Fabric Chassis OIM Modules	CRS-FCC-OIM-1S=	3.2
Cisco CRS-1 Series FC Chassis Shelf/Fan/Enet cntr	CRS-FCC-SC-GE=	3.2
CRS-1 Fabric Chassis AC Intake Grille	CRS-FCC-ACGRILLE=	3.2
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

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

Component	Part Number	Support from Version
CRS Fabric Chassis OIM Module	CRS-FCC-OIM-1S	3.2
CRS-1 Fabric Chassis AC Delta Power Supply	CRS-FCC-PS-ACD	3.2
CRS-1 Fabric Chassis AC Wye Option	CRS-FCC-PS-ACW	3.2
CRS-1 Fabric Chassis DC Power Option	CRS-FCC-PS-DC	3.2
Cisco CRS-1 Series Fabric Card Chassis Switch Fabric Card	CRS-FCC-SFC=	3.2
CRS-1 Fabric Chassis Integrated Switch Controller Card	CRS-FCC-SC-22GE Integrated Switch	3.4.1
Cisco CRS General Chassis Hardware		
Cisco CRS PCM CIA Flash Disk 2 GB	CRS-FLASH-DISK-2G	3.7
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 SFPs		
Cisco CRS 2.5 G SFP LR Optic	POM-OC48-LR2-LC-C	3.2
Cisco CRS 2.5 G SFP SR Optic	POM-OC48-SR-LC-C	3.2
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 Interface and Router 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 16-Slot Route Processor	CRS-16-RP	3.2
Cisco CRS-1 Distributed Route Processor	CRS-DRP	3.3
Cisco CRS-1 Distributed Route Processor CPU Module	CRS-DRP-B-CPU	3.4.1
Cisco CRS-1 Distributed Route Processor PLIM Module	CRS-DRP-B-PLIM	3.4.1
Cisco CRS-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

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

Component	Part Number	Support from Version
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 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

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

Component	Part Number	Support from Version
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-1 Optical to Electrical Modules		
10GBASE-LR XENPAK Module for Cisco CRS	XENPAK-10GB-LR	3.2
10GBASE-LR XENPAK Module for Cisco CRS	XENPAK-10GB-LR+	3.4
10GBASE-DWDM XENPAK	XENPAK-10GB-DWDM	3.2.2
10GBASE-ER XENPAK Modular for Cisco CRS-1	XENPAK-10GB-ER	3.4

Hardware Not Supported

The following hardware is not supported in Cisco IOS XR Release 4.1:

Component	Part Number
Cisco CRS-1 Series Carrier Grade Service Engine PLIM	CRS-CGSE-PLIM
Cisco CRS-3 Series Fabric Card Chassis Switch Fabric Card 140 G	CRS-FCC-SFC-140
Cisco CRS Series 16 Slots Fabric Card / Multi (140G)	CRS-16-FC140/M

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

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

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

Note The USB Flash drive is recognized as disk2 on a Performance Route Processor (PRP) during an online insertion and removal (OIR) or when the card is reloaded or reset at the ROMMON prompt. An OIR requires the PRP card to be removed and reinserted during the reset operation.

CRS FP-140 Licenses

The following licenses apply to the CRS FP-140:

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

Software Compatibility

Cisco IOS XR Software Release 4.1 is compatible with the following Cisco CRS-1 systems:

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

Cisco IOS XR Software Release 4.1 is compatible with the following Cisco CRS-3 systems:

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

Other Firmware Support

The Cisco CRS supports the following firmware code:

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

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

Cisco CRS-1 show fpd package Output

```
15:25:27 PDT Thu Apr 07 2011

================================ ============================================
                                         Field Programmable Device Package
                                 ============================================
```

Card Type	FPD Description	Type	Subtype	SW Version	Min Req SW Ver	Min Req HW Vers
S2	FPGA 4.02	lc	fpga2	4.02	0.0	0.0
	FPGA 5.00	lc	fpga3	5.00	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.03 spb	lc	rommonA	2.01	0.0	0.0
	ROMMONB swv2.03 spb	lc	rommon	2.03	0.0	0.0
140G-S1S2S3	FPGA 4.01	lc	fpga2	4.01	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.03 spb	lc	rommonA	2.01	0.0	0.0
	ROMMONB swv2.03 spb	lc	rommon	2.03	0.0	0.0
Fabric HS123 Superst	FPGA 4.00	lc	fpga2	4.00	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.03 spb	lc	rommonA	2.01	0.0	0.0
	ROMMONB swv2.03 spb	lc	rommon	2.03	0.0	0.0
140G-4-S1S2S3	FPGA 4.01	lc	fpga2	4.01	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.03 spb	lc	rommonA	2.01	0.0	0.0
	ROMMONB swv2.03 spb	lc	rommon	2.03	0.0	0.0
140G-S1S3	FPGA 4.01	lc	fpga2	4.01	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.03 spb	lc	rommonA	2.01	0.0	0.0
	ROMMONB swv2.03 spb	lc	rommon	2.03	0.0	0.0
140G-S1S2S3-2	FPGA 4.01	lc	fpga2	4.01	0.0	0.0
	FPGA 6.04 spb	lc	fpga1	6.04	0.0	0.0
	ROMMONA swv2.03 spb	lc	rommonA	2.01	0.0	0.0
	ROMMONB swv2.03 spb	lc	rommon	2.03	0.0	0.0
140G-MSC	FPGA Linecard 0.35	lc	fpga2	0.35	0.0	0.0
	FPGA CPU 0.8	lc	fpga1	0.08	0.0	0.0
	ROMMONA swv2.03 kensho	lc	rommonA	2.01	0.0	0.0
	ROMMONB swv2.03 kensho	lc	rommon	2.03	0.0	0.0
FP-140G	FPGA Linecard 0.35	lc	fpga2	0.35	0.0	0.0
	FPGA CPU 0.8	lc	fpga1	0.08	0.0	0.0
	ROMMONA swv2.03 kensho	lc	rommonA	2.01	0.0	0.0
	ROMMONB swv2.03 kensho	lc	rommon	2.03	0.0	0.0
1OC768-ITU/C	OPTICS FIRMWARE 110B10	lc	fpga2	110.10	0.0	0.0
1OC768-DWDM-L	OPTICS FIRMWARE 110B10	lc	fpga2	110.10	0.0	0.0
1OC768-DPSK/C	OPTICS FIRMWARE 110B14	lc	fpga2	110.14	0.0	0.0
1OC768-DPSK/C-O	OPTICS FIRMWARE 110B14	lc	fpga2	110.14	0.0	0.0
1OC768-DPSK/C-E	OPTICS FIRMWARE 110B14	lc	fpga2	110.14	0.0	0.0
20-10GBE	PLIM FPGA 42.0	lc	fpga3	42.00	0.0	0.0
12-10GBE	PLIM FPGA 42.0	lc	fpga3	42.00	0.0	0.0
1-100GBE	PLIM FPGA 19.0	lc	fpga3	19.00	0.0	0.0
	RX MAC FPGA 49.0	lc	fpga4	49.00	0.0	0.0
	TX MAC FPGA 34.0	lc	fpga5	34.00	0.0	0.0
14-10GBE	PLIM FPGA 42.0	lc	fpga3	42.00	0.0	0.0

```
DRP_B                FPGA 6.04 spb             lc   fpga1       6.04        0.0        0.0
                     ROMMONA swv2.03 asmp      lc   rommonA     2.01        0.0        0.0
                     ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                     ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                     ROMMONA swv2.03 spb       lc   rommonA     2.01        0.0        0.0
                     ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                     ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
                     ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
                     ROMMONB swv2.03 spb       lc   rommon      2.03        0.0        0.0
--------------------------------------------------------------------------------------------
MSC_B                FPGA 6.04 spb             lc   fpga1       6.04        0.0        0.0
                     ROMMONA swv2.03 asmp      lc   rommonA     2.01        0.0        0.0
                     ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                     ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                     ROMMONA swv2.03 spb       lc   rommonA     2.01        0.0        0.0
                     ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                     ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
                     ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
                     ROMMONB swv2.03 spb       lc   rommon      2.03        0.0        0.0
--------------------------------------------------------------------------------------------
FP40                 FPGA 6.04 spb             lc   fpga1       6.04        0.0        0.0
                     ROMMONA swv2.03 asmp      lc   rommonA     2.01        0.0        0.0
                     ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                     ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                     ROMMONA swv2.03 spb       lc   rommonA     2.01        0.0        0.0
                     ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                     ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
                     ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
                     ROMMONB swv2.03 spb       lc   rommon      2.03        0.0        0.0
--------------------------------------------------------------------------------------------
CRS1-SIP-800         JACKET FPGA swv6.0        lc   fpga1       6.00        5.0        0.0
                     FPGA swv6.0 hwv80         lc   fpga1       6.00        5.0
0.80
--------------------------------------------------------------------------------------------
8-10GBE              FPGA swvA.0               lc   fpga1      10.00        0.0        0.0
--------------------------------------------------------------------------------------------
OC48-POS-16-ED       FPGA PLIM_OC48 9.0        lc   fpga1       9.00        0.0        0.0
--------------------------------------------------------------------------------------------
4-10GBE              FPGA sw_4p_v15.0          lc   fpga1      15.00        0.0        0.0
--------------------------------------------------------------------------------------------
8-10GBE              FPGA sw_8p_v15.0          lc   fpga1      15.00        0.0        0.0
--------------------------------------------------------------------------------------------
4-10GE               SQUIRREL FPGA 10.0        lc   fpga1      10.00        0.0        0.0
--------------------------------------------------------------------------------------------
42-1GE               FPGA swv6.0               lc   fpga1       6.00        0.0        0.0
                     FPGA swv6.0 hwv0.80       lc   fpga1       6.00        0.0
0.80
--------------------------------------------------------------------------------------------
20-1GE-FLEX          FPGA swv6.0               lc   fpga1       6.00        0.0        0.0
                     FPGA swv6.0 hwv0.80       lc   fpga1       6.00        0.0
0.80
--------------------------------------------------------------------------------------------
2-10GE-WL-FLEX       FPGA swv6.0               lc   fpga1       6.00        0.0        0.0
                     FPGA swv6.0 hwv0.80       lc   fpga1       6.00        0.0
0.80
--------------------------------------------------------------------------------------------
CRS-16-LCC-F-CT-B    FPGA 6.04 spb             lc   fpga1       6.04        0.0        0.0
                     ROMMONA swv2.03 spb       lc   rommonA     2.01        0.0        0.0
                     ROMMONB swv2.03 spb       lc   rommon      2.03        0.0        0.0
--------------------------------------------------------------------------------------------
CRS-FCC-LED          FPGA 6.04 spb             lc   fpga1       6.04        0.0        0.0
                     ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                     ROMMONA swv2.03 spb       lc   rommonA     2.01        0.0        0.0
                     ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
```

```
                    ROMMONB swv2.03 spb       lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
Route Processor     ROMMONA swv2.03 asmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                    ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
SC                  ROMMONA swv2.03 asmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                    ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
RP                  ROMMONA swv2.03 asmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                    ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
Shelf Controller GE ROMMONA swv2.03 asmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                    ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
RP                  ROMMONA swv2.03 asmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                    ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
Shelf Controller GE2 ROMMONA swv2.03 asmp     lc   rommonA     2.01        0.0        0.0
                    ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                    ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
DRP                 ROMMONA swv2.03 asmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                    ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
                    ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
S1S2S3              ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
S1S3                ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
S2                  ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
Fabric HS123        ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
Fabric QQS123       ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
LED                 ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
40G-MSC             ROMMONA swv2.03 asmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONA swv2.03 dsmp      lc   rommonA     2.01        0.0        0.0
                    ROMMONA swv2.03 sp        lc   rommonA     2.01        0.0        0.0
                    ROMMONB swv2.03 asmp      lc   rommon      2.03        0.0        0.0
                    ROMMONB swv2.03 dsmp      lc   rommon      2.03        0.0        0.0
                    ROMMONB swv2.03 sp        lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------
```

```
CRS-16-ALARM          ROMMONA swv2.03 sp          lc   rommonA     2.01        0.0        0.0
                      ROMMONB swv2.03 sp          lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------------
CRS-16-ALARM-C        ROMMONA swv2.03 sp          lc   rommonA     2.01        0.0        0.0
                      ROMMONB swv2.03 sp          lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------------
CRS-16-LCC-FAN-CT     ROMMONA swv2.03 sp          lc   rommonA     2.01        0.0        0.0
                      ROMMONB swv2.03 sp          lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------------
FC Fan Controller     ROMMONA swv2.03 sp          lc   rommonA     2.01        0.0        0.0
                      ROMMONB swv2.03 sp          lc   rommon      2.03        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-4XT3/E3           SPA E3 Subrate FPGA         spa  fpga2       1.04        0.0        0.0
                      SPA T3 Subrate FPGA         spa  fpga3       1.04        0.0        0.0
                      SPA I/O FPGA                spa  fpga1       1.00        0.0        0.0
                      SPA ROMMON                  spa  rommon      2.12        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-2XT3/E3           SPA E3 Subrate FPGA         spa  fpga2       1.04        0.0        0.0
                      SPA T3 Subrate FPGA         spa  fpga3       1.04        0.0        0.0
                      SPA I/O FPGA                spa  fpga1       1.00        0.0        0.0
                      SPA ROMMON                  spa  rommon      2.12        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-OC192POS          SPA FPGA swv1.3             spa  fpga1       1.03        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-8XOC12-POS        SPA FPGA swv1.0             spa  fpga1       1.00        0.0        0.5
-------------------------------------------------------------------------------------------------
SPA-4XOC3-POS         SPA FPGA swv3.4             spa  fpga1       3.04        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-OC192POS-XFP      SPA FPGA swv1.2             spa  fpga1       1.02        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-8X1GE             SPA FPGA swv1.8             spa  fpga1       1.08        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-2XOC48POS/RPR     SPA FPGA swv1.0             spa  fpga1       1.00        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-4XOC48POS/RPR     SPA FPGA swv1.0             spa  fpga1       1.00        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-1XOC48POS/RPR     SPA FPGA swv1.2             spa  fpga1       1.02        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-8XOC3-POS         SPA FPGA swv1.0             spa  fpga1       1.00        0.0        0.5
                      SPA FPGA swv1.0             spa  fpga1       1.00        0.0        0.5
-------------------------------------------------------------------------------------------------
SPA-2XOC12-POS        SPA FPGA swv1.0             spa  fpga1       1.00        0.0        0.5
-------------------------------------------------------------------------------------------------
SPA-4XOC12-POS        SPA FPGA swv1.0             spa  fpga1       1.00        0.0        0.5
-------------------------------------------------------------------------------------------------
SPA-10X1GE-V2         SPA FPGA swv1.10            spa  fpga1       1.10        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-8X1GE-V2          SPA FPGA swv1.10            spa  fpga1       1.10        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-5X1GE-V2          SPA FPGA swv1.10            spa  fpga1       1.10        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-1X10GE-L-V2       SPA FPGA swv1.11            spa  fpga1       1.11        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-4XOC3-POS-V2      SPA FPGA swv1.0             spa  fpga1       1.00        0.0        0.5
-------------------------------------------------------------------------------------------------
SPA-1X10GE-WL-V2      SPA FPGA swv1.11            spa  fpga1       1.11        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-1XOC3-ATM-V2      SPA FPGA swv1.2             spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-2XOC3-ATM-V2      SPA FPGA swv1.2             spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-3XOC3-ATM-V2      SPA FPGA swv1.2             spa  fpga1       2.02        0.0        0.0
-------------------------------------------------------------------------------------------------
SPA-1XOC12-ATM-V2     SPA FPGA swv1.2             spa  fpga1       2.02        0.0        0.0
```

```
------------------------------------------------------------------------------------------
```

Cisco CRS-3 show fpd package Output

```
07:54:35 PDT Fri Apr 08 2011

==================================== ========================================
                                     Existing Field Programmable Devices
                                     ========================================
                                       HW                          Current SW Upg/
Location     Card Type                Version Type Subtype Inst    Version    Dng?
============ ======================== ======= ==== ======= ==== =========== ====
0/0/CPU0     CRS1-SIP-800               0.104 lc   fpga1   0        6.00     No
                                              lc   rommonA 0        2.03     No
                                              lc   rommon  0        2.03     No
------------------------------------------------------------------------------------------
0/0/1        SPA-4XOC48POS/RPR            1.0   spa  fpga1   1        1.00     No
------------------------------------------------------------------------------------------
0/0/2        SPA-4XOC48POS/RPR            1.0   spa  fpga1   2        1.00     No
------------------------------------------------------------------------------------------
0/0/4        SPA-8X1GE                    2.2   spa  fpga1   4        1.08     No
------------------------------------------------------------------------------------------
0/1/CPU0     CRS1-SIP-800               0.104 lc   fpga1   0        6.00     No
                                              lc   rommonA 0        2.03     No
                                              lc   rommon  0        2.03     No
------------------------------------------------------------------------------------------
0/1/0        SPA-1X10GE-WL-V2             1.0   spa  fpga1   0        1.11     No
------------------------------------------------------------------------------------------
0/1/3        SPA-1X10GE-L-V2              1.2   spa  fpga1   3        1.11     No
------------------------------------------------------------------------------------------
0/1/4        SPA-4XOC3-POS                1.0   spa  fpga1   4        3.04     No
------------------------------------------------------------------------------------------
0/1/5        SPA-1X10GE-WL-V2             1.0   spa  fpga1   5        1.11     No
------------------------------------------------------------------------------------------
0/RP0/CPU0   RP                           0.1   lc   rommonA 0        2.03     No
                                              lc   rommon  0        2.03     No
------------------------------------------------------------------------------------------
```

Minimum Firmware Requirement

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

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

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

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

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

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

- Refer to the Hardware Redundancy and Node Administration Commands on Cisco IOS XR Software chapter of the Cisco IOS XR System Management Command Reference for the Cisco CRS Router for the upgrade CLI:

  http://www.cisco.com/en/US/docs/routers/crs/software/crs_r4.1/system_management/command/reference/sysman_cr41crs_chapter9.html

Determining Your Software Version

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

Cisco CRS-1 show version Output

Step 1 Establish a Telnet session with the router.

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

```
Wed Apr 27 16:58:34.178 UTC

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

ROM: System Bootstrap, Version 2.03(20110128:194139) [CRS ROMMON],

L2VPN-UPE1-CE1 uptime is 1 day, 18 hours, 51 minutes
System image file is "bootflash:disk0/hfr-os-mbi-4.1.0/mbihfr-rp.vm"

cisco CRS-4/S (7457) processor with 4194304K bytes of memory.
7457 processor at 1197Mhz, Revision 1.2
Cisco CRS Series 4 Slots Line Card Chassis

2 Management Ethernet
28 GigabitEthernet
1 TenGigE
4 SONET/SDH
4 Packet over SONET/SDH
1019k bytes of non-volatile configuration memory.
22892M bytes of hard disk.
3525052k bytes of disk0: (Sector size 512 bytes).

Boot device on node 0/1/SP is bootflash:
Package active on node 0/1/SP:
iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 18:48:55 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 18:48:12 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 18:29:50 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie
```

```
Boot device on node 0/1/CPU0 is mem:
Package active on node 0/1/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-ce, V 4.1.0[00], Cisco Systems, at disk0:hfr-ce-4.1.0
    Built on Sun Apr 24 18:27:57 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 18:27:18 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 18:27:33 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fwding, V 4.1.0[00], Cisco Systems, at disk0:hfr-fwding-4.1.0
    Built on Sun Apr 24 18:27:57 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 18:48:55 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 18:48:12 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.0
    Built on Sun Apr 24 18:27:33 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 18:29:50 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

Boot device on node 0/2/SP is bootflash:
Package active on node 0/2/SP:
iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie
```

```
iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 18:48:55 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 18:48:12 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 18:29:50 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

Boot device on node 0/2/CPU0 is mem:
Package active on node 0/2/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-ce, V 4.1.0[00], Cisco Systems, at disk0:hfr-ce-4.1.0
    Built on Sun Apr 24 18:27:57 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 18:27:18 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 18:27:33 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fwding, V 4.1.0[00], Cisco Systems, at disk0:hfr-fwding-4.1.0
    Built on Sun Apr 24 18:27:57 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 18:48:55 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 18:48:12 UTC 2011
```

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

hfr-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.0
    Built on Sun Apr 24 18:27:33 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 18:29:50 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

Configuration register on node 0/RP0/CPU0 is 0x2
Boot device on node 0/RP0/CPU0 is disk0:
Package active on node 0/RP0/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-doc-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-doc-supp-4.1.0
    Built on Sun Apr 24 18:49:14 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-ce, V 4.1.0[00], Cisco Systems, at disk0:hfr-ce-4.1.0
    Built on Sun Apr 24 18:27:57 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-security, V 4.1.0[00], Cisco Systems, at disk0:iosxr-security-4.1.0
    Built on Sun Apr 24 18:48:00 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 18:27:18 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mgbl, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mgbl-4.1.0
    Built on Sun Apr 24 18:27:03 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 18:27:33 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fwding, V 4.1.0[00], Cisco Systems, at disk0:hfr-fwding-4.1.0
    Built on Sun Apr 24 18:27:57 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie
```

```
hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 18:48:55 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 18:48:12 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-k9sec-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-k9sec-supp-4.1.0
    Built on Sun Apr 24 18:48:00 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-mgbl-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-mgbl-supp-4.1.0
    Built on Sun Apr 24 18:27:03 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.0
    Built on Sun Apr 24 18:27:33 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 18:29:50 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

Configuration register on node 0/RP1/CPU0 is 0x2
Boot device on node 0/RP1/CPU0 is disk0:
Package active on node 0/RP1/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-doc-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-doc-supp-4.1.0
    Built on Sun Apr 24 18:49:14 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-ce, V 4.1.0[00], Cisco Systems, at disk0:hfr-ce-4.1.0
    Built on Sun Apr 24 18:27:57 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-security, V 4.1.0[00], Cisco Systems, at disk0:iosxr-security-4.1.0
    Built on Sun Apr 24 18:48:00 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 18:27:18 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mgbl, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mgbl-4.1.0
    Built on Sun Apr 24 18:27:03 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 18:27:33 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie
```

```
iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fwding, V 4.1.0[00], Cisco Systems, at disk0:hfr-fwding-4.1.0
    Built on Sun Apr 24 18:27:57 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 18:48:55 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 18:48:12 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-k9sec-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-k9sec-supp-4.1.0
    Built on Sun Apr 24 18:48:00 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-mgbl-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-mgbl-supp-4.1.0
    Built on Sun Apr 24 18:27:03 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.0
    Built on Sun Apr 24 18:27:33 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 18:29:50 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

Boot device on node 0/SM0/SP is bootflash:
Package active on node 0/SM0/SP:
iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 18:48:55 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 18:48:12 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
```

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

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 18:29:50 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

Boot device on node 0/SM1/SP is bootflash:
Package active on node 0/SM1/SP:
iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 18:48:55 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 18:48:12 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 18:29:50 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

Boot device on node 0/SM2/SP is bootflash:
Package active on node 0/SM2/SP:
iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 18:48:55 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 18:48:12 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 18:29:50 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

Boot device on node 0/SM3/SP is bootflash:
Package active on node 0/SM3/SP:
iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie
```

```
iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 18:48:55 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 18:48:12 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 18:27:54 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 18:29:50 UTC 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie
```

Cisco CRS-3 show version Output

Step 1 Establish a Telnet session with the router.

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

```
Wed Apr 27 10:49:30.919 PDT

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

ROM: System Bootstrap, Version 2.03(20110128:194139) [CRS ROMMON],

CSC-CE1 uptime is 31 minutes
System image file is "bootflash:disk0/hfr-os-mbi-4.1.0/mbihfr-rp.vm"

cisco CRS-4/S (7457) processor with 4194304K bytes of memory.
7457 processor at 1197Mhz, Revision 1.1
Cisco CRS Series 4 Slots Line Card Chassis

1 Management Ethernet
2 WANPHY controller(s)
3 TenGigE
12 SONET/SDH
12 Packet over SONET/SDH
8 GigabitEthernet
1019k bytes of non-volatile configuration memory.
38079M bytes of hard disk.
3607548k bytes of disk0: (Sector size 512 bytes).
3607548k bytes of disk1: (Sector size 512 bytes).

Boot device on node 0/0/CPU0 is mem:
Package active on node 0/0/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fit, V 4.1.0[00], Cisco Systems, at disk0:hfr-fit-4.1.0
    Built on Sun Apr 24 11:49:11 PDT 2011
```

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

hfr-ce, V 4.1.0[00], Cisco Systems, at disk0:hfr-ce-4.1.0
    Built on Sun Apr 24 11:27:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 11:27:18 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 11:27:33 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fwding, V 4.1.0[00], Cisco Systems, at disk0:hfr-fwding-4.1.0
    Built on Sun Apr 24 11:27:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 11:48:55 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 11:48:12 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.0
    Built on Sun Apr 24 11:27:33 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 11:29:50 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

Boot device on node 0/1/CPU0 is mem:
Package active on node 0/1/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fit, V 4.1.0[00], Cisco Systems, at disk0:hfr-fit-4.1.0
    Built on Sun Apr 24 11:49:11 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie
```

```
hfr-ce, V 4.1.0[00], Cisco Systems, at disk0:hfr-ce-4.1.0
    Built on Sun Apr 24 11:27:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 11:27:18 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 11:27:33 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fwding, V 4.1.0[00], Cisco Systems, at disk0:hfr-fwding-4.1.0
    Built on Sun Apr 24 11:27:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 11:48:55 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 11:48:12 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.0
    Built on Sun Apr 24 11:27:33 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-base, V 4.1.0[00], Cisco Systems, at disk0:hfr-base-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 11:29:50 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

Configuration register on node 0/RP0/CPU0 is 0x2
Boot device on node 0/RP0/CPU0 is disk0:
Package active on node 0/RP0/CPU0:
iosxr-ce, V 4.1.0[00], Cisco Systems, at disk0:iosxr-ce-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fit, V 4.1.0[00], Cisco Systems, at disk0:hfr-fit-4.1.0
    Built on Sun Apr 24 11:49:11 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-doc-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-doc-supp-4.1.0
```

```
    Built on Sun Apr 24 11:49:14 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-ce, V 4.1.0[00], Cisco Systems, at disk0:hfr-ce-4.1.0
    Built on Sun Apr 24 11:27:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-security, V 4.1.0[00], Cisco Systems, at disk0:iosxr-security-4.1.0
    Built on Sun Apr 24 11:48:00 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mpls, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mpls-4.1.0
    Built on Sun Apr 24 11:27:18 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mgbl, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mgbl-4.1.0
    Built on Sun Apr 24 11:27:03 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-mcast, V 4.1.0[00], Cisco Systems, at disk0:iosxr-mcast-4.1.0
    Built on Sun Apr 24 11:27:33 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-routing, V 4.1.0[00], Cisco Systems, at disk0:iosxr-routing-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-infra, V 4.1.0[00], Cisco Systems, at disk0:iosxr-infra-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fwding, V 4.1.0[00], Cisco Systems, at disk0:hfr-fwding-4.1.0
    Built on Sun Apr 24 11:27:57 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-fwding, V 4.1.0[00], Cisco Systems, at disk0:iosxr-fwding-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

iosxr-diags, V 4.1.0[00], Cisco Systems, at disk0:iosxr-diags-4.1.0
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-fpd, V 4.1.0[00], Cisco Systems, at disk0:hfr-fpd-4.1.0
    Built on Sun Apr 24 11:48:55 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-diags-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-diags-supp-4.1.0
    Built on Sun Apr 24 11:48:12 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-k9sec-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-k9sec-supp-4.1.0
    Built on Sun Apr 24 11:48:00 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-mgbl-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-mgbl-supp-4.1.0
    Built on Sun Apr 24 11:27:03 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-mcast-supp, V 4.1.0[00], Cisco Systems, at disk0:hfr-mcast-supp-4.1.0
    Built on Sun Apr 24 11:27:33 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

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

```
    Built on Sun Apr 24 11:27:54 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie

hfr-os-mbi, V 4.1.0[00], Cisco Systems, at disk0:hfr-os-mbi-4.1.0
    Built on Sun Apr 24 11:29:50 PDT 2011
    By sjc-lds-511 in /auto/srcarchive5/production/4.1.0/hfr/workspace for pie
```

New Cisco CRS Router Software Features

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

- Lawful Intercept on CRS-3 Linecard—This feature is supported on the CRS-MSC-140G and CRS-FP-140 line cards.

  For more information, refer to the *Cisco IOS XR System Security Configuration Guide for the Cisco CRS Router*.

- Layer 3 VPN Support for CRS FP-140 on the Cisco CRS-3—For more information about Layer 3 VPN, refer to the *Cisco IOS XR Virtual Private Network Configuration Guide for the Cisco CRS Router*.

  For licensing information, see the "CRS FP-140 Licenses" section on page 12 of these notes.

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

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

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

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

- Pseudowire Headend—The pseudowire (PW) virtual interface is a layer 3 interface. This feature supports layer 3 features, such as QoS along with routing protocols on the PW interface.

  For more information, refer to the *Cisco IOS XR Modular Quality of Service Configuration Guide for the Cisco CRS Router* and the *Cisco IOS XR Virtual Private Network Configuration Guide for the Cisco CRS Router*.

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

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

- Dynamic BW Allocation for Gigabit Ethernet and OC12 Interfaces—This feature is applicable to the copper 4-Port 1-Gigabit Ethernet physical layer interface module (PLIM) and packet-over-SONET/SDH (POS) interfaces.

  For more information, refer to the *Cisco IOS XR Modular Quality of Service Configuration Guide for the Cisco CRS Router*.

- IPv6 Rapid Deployment (6RD)—This mechanism provides a unicast IPv6 service to customers over an IPv4 network.

  For more information, refer to the *Cisco IOS XR Carrier Grade NAT Configuration Guide for the Cisco CRS Router*.

- IPv4/IPv6 Stateless Translator (Xlat)—This feature enables an IPv4-only endpoint situated in an IPv4-only network to communicate with an IPv6-only end-point situated in an IPv6-only network.

  For more information, refer to the *Cisco IOS XR Carrier Grade NAT Configuration Guide for the Cisco CRS Router*.

- Filters for ISIS Overload Bit—This feature supports configuring the ignore-overload for multiple roles of the nodes in the label switched path (LSP). The following optional arguments were added to the **path-selection ignore overload** command:
  - head
  - mid
  - tail

  For more information, refer to the *Cisco IOS XR MPLS Configuration Guide for the Cisco CRS Router* and the *Cisco IOS XR MPLS Command Reference for the Cisco CRS Router*.

- Online Diagnostics Enhancements—For information about the enhancements to online diagnostics in Cisco IOS XR Release 4.1, see Online Diagnostics Enhancements, page 31.

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

Online Diagnostics Enhancements

Cisco IOS XR Software Release 4.1 includes the following enhancements to online diagnostics:

FabricUcastMcast Test

The FabricUcastMcast diagnostic test was introduced in Cisco IOS XR Software Release 4.1. This test combines the unicast test, FabricDiagnosisTest, and the multicast test, FabricMcastTest and replaces them as the test that is enabled in the health monitoring by default. The FabricDiagnosisTest and FabricMcastTest are no longer turned on by default as part of the health monitoring, however they are still available.

The default interval for invoking FabricUcastMcastTest as part of the health monitoring is set to 1 min. In previous releases, the interval of FabricDiagnosisTest and FabricMcastTest was set to 2 mins.

By default, the FabricUcastMcastTest is enabled on the DSC standby RP. If the standby RP is not available the test runs from the active RP.

FabricUcastMcastTest includes the automatic plane disabling (APD) feature, in which a request is made to take the faulty fabric plane out-of-service. The APD rules for making the plane out-of-service (OOS) request by the online-diags require either one of the following to be true for the tested plane:

- 50% or more (and at least 3) nodes failed to respond to the ping test.

- 100% (and at least 2) nodes of a given fabric group failed to respond to the ping test. The test enforces 0% tolerance for ping packet loss or corruption.

The request to take a faulty fabric plane out-of-service is fulfilled when the fabric capacity threshold is met. The default threshold setting is 7. However, you can configure the fabric capacity threshold by using the following command:

```
RP/0/RP0/CPU0:router(admin-config)#controllers fabric capacity threshold <2-8>
```

The threshold parameter is in the range 2 through 8.

Use the **show diagnostic result** command in admin exec mode to view the results of the FabricUcastMcast Test. See the following example:

```
RP/1/RP0/CPU0:router(admin)#show diagnostic result location 0/rp1/cpu0 test
FabricUcastMcastTest detail

Fri Mar  4 11:21:01.153 UTC

Current bootup diagnostic level for RP 0/RP1/CPU0: bypass

  Test results: (. = Pass, F = Fail, U = Untested)

  ___________________________________________________________________________

  13 ) FabricUcastMcastTest ------------> .

          Error code ------------------> 0 (DIAG_SUCCESS)
          Total run count -------------> 17
          Last test execution time ----> Fri Mar  4 11:20:54 2011
          First test failure time -----> Fri Mar  4 11:19:47 2011
          Last test failure time ------> Fri Mar  4 11:19:47 2011
          Last test pass time ---------> Fri Mar  4 11:20:54 2011
          Total failure count ---------> 1
          Consecutive failure count ---> 0
Unicast Results
        dest:               (all nodes) session_id:                48
        ret_code:                     0 (No error)
        rx_ret_code:                  0 (No error)
        tx_ret_code:                  0 (No error)
        min_rtt_ms:                   2 max_rtt_ms:                63
        ping_mode_mask:      0x00000099 fplane_bitmap:      0x000000ff
        inter_packet_delay:           0 max_timeout_ms:           1500
        late_timeout_ms:           1500 priority:                    0
        flags:               0x00000000 pkt_cnt:                    10
        pkt_size:                  1000 num_nodes:                    15
        tx_start_ts:       11:20:54.488 UTC Fri Mar 04 2011

        modes: 0 - LP/fabricq0, 3 - LP/fabricq1, 4 - HP/fabricq0, 7 - HP/fabricq1

            node[mode]  req'ed   rx_good  tx_good tx_unrea   tx_err rx_unexp  rx_corr
           ============== ======== ======== ======== ======== ======== ======== ========
              0/0/CPU0[0]       10       10       10        0        0        0        0
              0/0/CPU0[3]       10       10       10        0        0        0        0
              0/0/CPU0[4]       10       10       10        0        0        0        0
              0/0/CPU0[7]       10       10       10        0        0        0        0
              0/4/CPU0[0]       10       10       10        0        0        0        0
              0/4/CPU0[3]       10       10       10        0        0        0        0
              0/4/CPU0[4]       10       10       10        0        0        0        0
              0/4/CPU0[7]       10       10       10        0        0        0        0
              0/5/CPU0[0]       10       10       10        0        0        0        0
              0/5/CPU0[3]       10       10       10        0        0        0        0
              0/5/CPU0[4]       10       10       10        0        0        0        0
              0/5/CPU0[7]       10       10       10        0        0        0        0
```

```
   0/6/CPU0[0]       10       10       10        0        0        0        0
   0/6/CPU0[3]       10       10       10        0        0        0        0
   0/6/CPU0[4]       10       10       10        0        0        0        0
   0/6/CPU0[7]       10       10       10        0        0        0        0
   0/8/CPU0[0]       10       10       10        0        0        0        0
   0/8/CPU0[4]       10       10       10        0        0        0        0
  0/RP0/CPU0[0]      10       10       10        0        0        0        0
  0/RP0/CPU0[4]      10       10       10        0        0        0        0
  0/RP1/CPU0[0]      10       10       10        0        0        0        0
  0/RP1/CPU0[4]      10       10       10        0        0        0        0
   1/3/CPU0[0]       10       10       10        0        0        0        0
   1/3/CPU0[3]       10       10       10        0        0        0        0
   1/3/CPU0[4]       10       10       10        0        0        0        0
   1/3/CPU0[7]       10       10       10        0        0        0        0
   1/4/CPU0[0]       10       10       10        0        0        0        0
   1/4/CPU0[3]       10       10       10        0        0        0        0
   1/4/CPU0[4]       10       10       10        0        0        0        0
   1/4/CPU0[7]       10       10       10        0        0        0        0
   1/7/CPU0[0]       10       10       10        0        0        0        0
   1/7/CPU0[4]       10       10       10        0        0        0        0
   1/9/CPU0[0]       10       10       10        0        0        0        0
   1/9/CPU0[3]       10       10       10        0        0        0        0
   1/9/CPU0[4]       10       10       10        0        0        0        0
   1/9/CPU0[7]       10       10       10        0        0        0        0
  1/14/CPU0[0]       10       10       10        0        0        0        0
  1/14/CPU0[3]       10       10       10        0        0        0        0
  1/14/CPU0[4]       10       10       10        0        0        0        0
  1/14/CPU0[7]       10       10       10        0        0        0        0
  1/15/CPU0[0]       10       10       10        0        0        0        0
  1/15/CPU0[4]       10       10       10        0        0        0        0
 1/RP0/CPU0[0]       10       10       10        0        0        0        0
 1/RP0/CPU0[4]       10       10       10        0        0        0        0
 1/RP1/CPU0[0]       10       10       10        0        0        0        0
 1/RP1/CPU0[4]       10       10       10        0        0        0        0
============== ======== ======== ======== ======== ======== ======== ========
Global              460      460      460        0        0        0        0


Unicast Results (Last Failure)
        dest:               (all nodes) session_id:                30
        ret_code:             606182912 ('FAB_SVR' detected the 'informational' condition
'Timed out

waiting for all ping replies.')
        rx_ret_code:                  0 (No error)
        tx_ret_code:                  0 (No error)
        min_rtt_ms:                   2 max_rtt_ms:                 61
        ping_mode_mask:      0x00000099 fplane_bitmap:      0x000000ff
        inter_packet_delay:           0 max_timeout_ms:           1500
        late_timeout_ms:           1500 priority:                    0
        flags:               0x00000000 pkt_cnt:                    10
        pkt_size:                  1000 num_nodes:                    15
        tx_start_ts:       11:19:47.167 UTC Fri Mar 04 2011

        modes: 0 - LP/fabricq0, 3 - LP/fabricq1, 4 - HP/fabricq0, 7 - HP/fabricq1

            node[mode]  req'ed   rx_good  tx_good tx_unrea   tx_err rx_unexp  rx_corr
        ============== ======== ======== ======== ======== ======== ======== ========
           0/0/CPU0[0]       10        0       10        0        0        0        0
           0/0/CPU0[3]       10        0       10        0        0        0        0
           0/0/CPU0[4]       10        0       10        0        0        0        0
           0/0/CPU0[7]       10        0       10        0        0        0        0
           0/4/CPU0[0]       10       10       10        0        0        0        0
           0/4/CPU0[3]       10       10       10        0        0        0        0
```

```
   0/4/CPU0[4]       10       10       10        0        0        0        0
   0/4/CPU0[7]       10       10       10        0        0        0        0
   0/5/CPU0[0]       10       10       10        0        0        0        0
   0/5/CPU0[3]       10       10       10        0        0        0        0
   0/5/CPU0[4]       10       10       10        0        0        0        0
   0/5/CPU0[7]       10       10       10        0        0        0        0
   0/6/CPU0[0]       10       10       10        0        0        0        0
   0/6/CPU0[3]       10       10       10        0        0        0        0
   0/6/CPU0[4]       10       10       10        0        0        0        0
   0/6/CPU0[7]       10       10       10        0        0        0        0
   0/8/CPU0[0]       10       10       10        0        0        0        0
   0/8/CPU0[4]       10       10       10        0        0        0        0
  0/RP0/CPU0[0]      10       10       10        0        0        0        0
  0/RP0/CPU0[4]      10       10       10        0        0        0        0
  0/RP1/CPU0[0]      10       10       10        0        0        0        0
  0/RP1/CPU0[4]      10       10       10        0        0        0        0
   1/3/CPU0[0]       10       10       10        0        0        0        0
   1/3/CPU0[3]       10       10       10        0        0        0        0
   1/3/CPU0[4]       10       10       10        0        0        0        0
   1/3/CPU0[7]       10       10       10        0        0        0        0
   1/4/CPU0[0]       10       10       10        0        0        0        0
   1/4/CPU0[3]       10       10       10        0        0        0        0
   1/4/CPU0[4]       10       10       10        0        0        0        0
   1/4/CPU0[7]       10       10       10        0        0        0        0
   1/7/CPU0[0]       10       10       10        0        0        0        0
   1/7/CPU0[4]       10       10       10        0        0        0        0
   1/9/CPU0[0]       10       10       10        0        0        0        0
   1/9/CPU0[3]       10       10       10        0        0        0        0
   1/9/CPU0[4]       10       10       10        0        0        0        0
   1/9/CPU0[7]       10       10       10        0        0        0        0
  1/14/CPU0[0]       10       10       10        0        0        0        0
  1/14/CPU0[3]       10       10       10        0        0        0        0
  1/14/CPU0[4]       10       10       10        0        0        0        0
  1/14/CPU0[7]       10       10       10        0        0        0        0
  1/15/CPU0[0]       10       10       10        0        0        0        0
  1/15/CPU0[4]       10       10       10        0        0        0        0
  1/RP0/CPU0[0]      10       10       10        0        0        0        0
  1/RP0/CPU0[4]      10       10       10        0        0        0        0
  1/RP1/CPU0[0]      10       10       10        0        0        0        0
  1/RP1/CPU0[4]      10       10       10        0        0        0        0
================ ======== ======== ======== ======== ======== ======== ========
Global              460      420      460        0        0        0        0

Multicast Results
        dest:           FGID       1023 session_id:                 49
        ret_code:                     0 (No error)
        rx_ret_code:                  0 (No error)
        tx_ret_code:                  0 (No error)
        min_rtt_ms:                  13 max_rtt_ms:                58
        ping_mode_mask:      0x00000011 fplane_bitmap:      0x000000ff
        inter_packet_delay:           0 max_timeout_ms:           1500
        late_timeout_ms:           1500 priority:                    0
        flags:               0x00000000 pkt_cnt:                    10
        pkt_size:                  1000 num_nodes:                   15
        tx_start_ts:       11:20:54.492 UTC Fri Mar 04 2011

        modes: 0 - LP/fabricq0, 4 - HP/fabricq0

            node[mode]  req'ed   rx_good  tx_good tx_unrea   tx_err rx_unexp  rx_corr
        ============== ======== ======== ======== ======== ======== ======== ========
           0/0/CPU0[0]       10       10       10        0        0        0        0
           0/0/CPU0[4]       10       10       10        0        0        0        0
           0/4/CPU0[0]       10       10       10        0        0        0        0
           0/4/CPU0[4]       10       10       10        0        0        0        0
```

```
   0/5/CPU0[0]       10       10       10        0        0        0        0
   0/5/CPU0[4]       10       10       10        0        0        0        0
   0/6/CPU0[0]       10       10       10        0        0        0        0
   0/6/CPU0[4]       10       10       10        0        0        0        0
   0/8/CPU0[0]       10       10       10        0        0        0        0
   0/8/CPU0[4]       10       10       10        0        0        0        0
  0/RP0/CPU0[0]      10       10       10        0        0        0        0
  0/RP0/CPU0[4]      10       10       10        0        0        0        0
  0/RP1/CPU0[0]      10       10       10        0        0        0        0
  0/RP1/CPU0[4]      10       10       10        0        0        0        0
   1/3/CPU0[0]       10       10       10        0        0        0        0
   1/3/CPU0[4]       10       10       10        0        0        0        0
   1/4/CPU0[0]       10       10       10        0        0        0        0
   1/4/CPU0[4]       10       10       10        0        0        0        0
   1/7/CPU0[0]       10       10       10        0        0        0        0
   1/7/CPU0[4]       10       10       10        0        0        0        0
   1/9/CPU0[0]       10       10       10        0        0        0        0
   1/9/CPU0[4]       10       10       10        0        0        0        0
  1/14/CPU0[0]       10       10       10        0        0        0        0
  1/14/CPU0[4]       10       10       10        0        0        0        0
  1/15/CPU0[0]       10       10       10        0        0        0        0
  1/15/CPU0[4]       10       10       10        0        0        0        0
  1/RP0/CPU0[0]      10       10       10        0        0        0        0
  1/RP0/CPU0[4]      10       10       10        0        0        0        0
  1/RP1/CPU0[0]      10       10       10        0        0        0        0
  1/RP1/CPU0[4]      10       10       10        0        0        0        0
============== ======== ======== ======== ======== ======== ======== ========
Global              300      300      300        0        0        0        0


Multicast Results (Last Failure)
        dest:           FGID       1023 session_id:                 31
        ret_code:                     0 (No error)
        rx_ret_code:                  0 (No error)
        tx_ret_code:                  0 (No error)
        min_rtt_ms:                  14 max_rtt_ms:                58
        ping_mode_mask:      0x00000011 fplane_bitmap:      0x000000ff
        inter_packet_delay:           0 max_timeout_ms:           1500
        late_timeout_ms:           1500 priority:                    0
        flags:               0x00000000 pkt_cnt:                  10
        pkt_size:                  1000 num_nodes:                  15
        tx_start_ts:       11:19:47.171 UTC Fri Mar 04 2011

        modes: 0 - LP/fabricq0, 4 - HP/fabricq0

            node[mode]  req'ed   rx_good  tx_good tx_unrea   tx_err rx_unexp  rx_corr
        ============== ======== ======== ======== ======== ======== ======== ========
           0/0/CPU0[0]       10       10       10        0        0        0        0
           0/0/CPU0[4]       10       10       10        0        0        0        0
           0/4/CPU0[0]       10       10       10        0        0        0        0
           0/4/CPU0[4]       10       10       10        0        0        0        0
           0/5/CPU0[0]       10       10       10        0        0        0        0
           0/5/CPU0[4]       10       10       10        0        0        0        0
           0/6/CPU0[0]       10       10       10        0        0        0        0
           0/6/CPU0[4]       10       10       10        0        0        0        0
           0/8/CPU0[0]       10       10       10        0        0        0        0
           0/8/CPU0[4]       10       10       10        0        0        0        0
          0/RP0/CPU0[0]      10       10       10        0        0        0        0
          0/RP0/CPU0[4]      10       10       10        0        0        0        0
          0/RP1/CPU0[0]      10       10       10        0        0        0        0
          0/RP1/CPU0[4]      10       10       10        0        0        0        0
           1/3/CPU0[0]       10       10       10        0        0        0        0
           1/3/CPU0[4]       10       10       10        0        0        0        0
           1/4/CPU0[0]       10       10       10        0        0        0        0
```

```
    1/4/CPU0[4]       10       10       10        0        0        0        0
    1/7/CPU0[0]       10       10       10        0        0        0        0
    1/7/CPU0[4]       10       10       10        0        0        0        0
    1/9/CPU0[0]       10       10       10        0        0        0        0
    1/9/CPU0[4]       10       10       10        0        0        0        0
   1/14/CPU0[0]       10       10       10        0        0        0        0
   1/14/CPU0[4]       10       10       10        0        0        0        0
   1/15/CPU0[0]       10       10       10        0        0        0        0
   1/15/CPU0[4]       10       10       10        0        0        0        0
  1/RP0/CPU0[0]       10       10       10        0        0        0        0
  1/RP0/CPU0[4]       10       10       10        0        0        0        0
  1/RP1/CPU0[0]       10       10       10        0        0        0        0
  1/RP1/CPU0[4]       10       10       10        0        0        0        0
 ============== ======== ======== ======== ======== ======== ======== ========
 Global              300      300      300        0        0        0        0
```

The **show diagnostic content location** command has been modified to support the new FabricUcastMcast Test. See the following example:

```
RP/0/RP0/CPU0:router(admin)#show diagnostic content location 0/0/CPU0
    Thu Mar  3 13:45:26.115 PST


    DRP 0/0/CPU0:

      Diagnostics test suite attributes:
        M/C/* - Minimal bootup level test / Complete bootup level test / NA
          B/* - Basic ondemand test / NA
        P/V/* - Per port test / Per device test / NA
        D/N/* - Disruptive test / Non-disruptive test / NA
          S/* - Only applicable to standby unit / NA
          X/* - Not a health monitoring test / NA
          F/* - Fixed monitoring interval test / NA
          E/* - Always enabled monitoring test / NA
          A/I - Monitoring is active / Monitoring is inactive

                                                          Test Interval    Thre-
      ID   Test Name                           Attributes     (day hh:mm:ss.ms shold)
      ==== ================================== ============ ================= =====
        1) ControlEthernetPingTest ---------> *B*N*X**I       001 00:00:00.000 1
        2) SelfPingOverFabric --------------> *B*N*X**I       001 00:00:00.000 1
        3) FabricPingTest ------------------> *B*N*X**I       001 00:00:00.000 1
        4) ControlEthernetInactiveLinkTest -> *B*NS***I       001 00:00:00.000 1
        5) RommonRevision ------------------> *B*N*X**I       001 00:00:00.000 1
        6) FabricDiagnosisTest  ------------> *B*NS***I       000 00:02:00.000 1
        7) FilesystemBasicDisk0 ------------> *B*N****I       003 00:00:00.000 1
        8) FilesystemBasicDisk1 ------------> *B*N****I       003 00:00:00.000 1
        9) FilesystemBasicHarddisk ---------> *B*N****I       003 00:00:00.000 1
       10) ScratchRegisterTest -------------> CBVN****I       001 00:00:00.000 1
       11) FabricMcastTest -----------------> *B*NS***A       000 00:02:00.000 1
       12) ControlEthernetIntraSwitchTest --> ***N****I       000 00:00:02.000 3
       13) FabricUcastMcastTest ------------> *B*N****A       000 00:01:00.000 1
```

The FabricUcastMcastTest diagnostic test is used to periodically verify the fabric connectivity to all fabric destinations (RP, LC, DRP nodes) in a single or multi-chassis system.

Automatic reload and shutdown as a result of a single -node failure is disabled by default. To enable this feature, set the parameters of the FabricUcastMcast test by setting one or more of the optional parameters of the **diagnostic test-parameters FabricUcastMcastTest** command.

diagnostic test-parameters FabricUcastMcastTest [**single-DRP-node-failure | single-LC-node-failure | single-RP-node-failure**] <*failure-type*| *reload threshold* | *shutdown threshold*>

Syntax Description

single-DRP-node-failure	(Optional) Enters the mode to set the parameters for the FabricUcastMcast Test when a single node failure occurs as a result of a DRP failure.
single-LC-node-failure	(Optional) Enters the mode to set the parameters for the FabricUcastMcast Test when a single node failure occurs as a result of a line card (LC) failure.
single-RP-node-failure	(Optional) Enters the mode to set the parameters for the FabricUcastMcast Test when a single node failure occurs as a result of a route processor (RP) failure.
failure-type	(Optional) Specifies the type of ping result to use for triggering node reload or shutdown. Options are: • unicast-only—Multicast ping results are ignored. • multicast-only—Unicast ping results are ignored. Default is both unicast and multicast ping results are used.
reload threshold	(Optional) Specifies the number of consecutive single-node failures that trigger the reload of a node. Range is 2 through 255. This value must be less than the **shutdown threshold** for the same node type.
shutdown threshold	(Optional) Specifies the number of consecutive single-node failures that trigger the shutdown of a node. Range is 2 through 255. This value must be greater than the **reload threshold** for the same node type.

Command Default

None.

Command Modes

Admin-config FabricUcastMcastTest

Command History

Release	Modification
Release 4.1	This command was introduced on the Cisco CRS Router.

Usage Guidelines

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

Task ID

Task ID	Operations
diag	read, write

Examples

The following example shows how to set a node for automatic reload and shutdown when the FabricUcastMcastTest results return single node failure as a result of line card failures for only multicast traffic:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# configuration
RP/0/RP0/CPU0:router(admin-config)# diagnostic test-parameters
RP/0/RP0/CPU0:router(admin-config-diag-test-params)#FabricUcastMcastTest
RP/0/RP0/CPU0:router(admin-config-FabricUcastMcastTest)#single-LC-node-failure
RP/0/RP0/CPU0:router(admin-config-FabricUcastMcastTest-LC)failure-type multicast-only
RP/0/RP0/CPU0:router(admin-config-FabricUcastMcastTest-LC)reload threshold 5
RP/0/RP0/CPU0:router(admin-config-FabricUcastMcastTest-LC)shutdown threshold 6
RP/0/RP0/CPU0:router(admin-config-FabricUcastMcastTest-LC)commit
```

When a single-node failure is detected, the following syslog messages are logged:

```
RP/0/RP1/CPU0:Jan 27 07:58:58.364 : online_diag_rp[276]: %DIAG-XR_DIAG-3-ERROR : (U)
Fabric Ping Failure, 1 of 3 nodes failed(L): 0/3/CPU0
RP/0/RP1/CPU0:Jan 27 07:58:58.802 : online_diag_rp[276]: %DIAG-XR_DIAG-3-ERROR : (U) FIM:
single-node failure detected - 0/3/CPU0consecutive ucast/mcast failures: 15/0
```

When the reload threshold is reached, the following syslog message is logged prior to the reload:

```
RP/0/RP1/CPU0:Jan 27 07:58:58.803 : online_diag_rp[276]: %DIAG-XR_DIAG-6-INFO :reload
threshold 15 crossed, reloading 0/3/CPU0
```

When the shutdown threshold is reached, the following syslog messages are logged:

```
RP/0/RP1/CPU0:Jan 27 08:11:02.104 : online_diag_rp[276]: %DIAG-XR_DIAG-6-INFO : shutdown
threshold 10 crossed, shutting down 0/3/CPU0
RP/0/RP1/CPU0:Jan 27 08:11:02.137 : online_diag_rp[276]:
%PLATFORM-SHELFMGR-6-BRINGDOWN_REQUEST_LIB : Requesting node 0/3/CPU0 to be shutdown.
reason: [diag fabric ping failure]
RP/0/RP0/CPU0:Jan 27 08:11:02.136 : shelfmgr[306]: %PLATFORM-SHELFMGR-6-BRINGDOWN_REQUEST
: process online_diag_rp running on node0_RP1_CPU0 requested node 0/3/CPU0 to be shutdown.
reason: [diag fabric ping failure]
```

FabSRCC Test on Cisco CRS-3 Line Cards

The FabSRCC diagnostic test was introduced in Cisco IOS XR Software Release 4.1 on the Cisco CRS-3 line cards. This test supports CRS-3 nodes that send and receive statically routed control cells (SRCC).

Use the following command to start the SRCC Test

diagnostic start location <*location*> **test FabSRCCTest**

The <*location*> parameter is one of the nodes in the Run state that supports SRCC functionality.

By default the FabSRCC test is run on demand, but you can configure it to run as a health monitor test by using the following command:.

diagnostic monitor <*location*> **test FabSRCCTest**

To stop the SRCC test to run as a health monitor test, use the following command:

no diagnostic monitor <*location*> **test FabSRCCTest**

If you run the SRCC test as a health monitor, you can configure the interval by using the following command:

diagnostic monitor interval <*location*> **test FabSRCCTest number-of-days**
hour:minutes:seconds. milliseconds

The default interval is 2 minutes.

The following show command has been modified to support the new FabricUcastMcast test:

- **show diagnostic content location**

```
RP/0/RP0/CPU0:router(admin)#show diagnostic content location 0/0/CPU0


RP/0/RP0/CPU0:router(admin)#show diagnostic content location 0/4/CPU0
Tue Jun  1 20:59:42.924 UTC


MSC-140G 0/4/CPU0:

  Diagnostics test suite attributes:
    M/C/* - Minimal bootup level test / Complete bootup level test / NA
      B/* - Basic ondemand test / NA
    P/V/* - Per port test / Per device test / NA
    D/N/* - Disruptive test / Non-disruptive test / NA
      S/* - Only applicable to standby unit / NA
      X/* - Not a health monitoring test / NA
      F/* - Fixed monitoring interval test / NA
      E/* - Always enabled monitoring test / NA
      A/I - Monitoring is active / Monitoring is inactive

                                                        Test Interval    Thre-
  ID   Test Name                           Attributes     (day hh:mm:ss.ms shold)
  ==== ================================== ============ ================= =====
    1) ControlEthernetPingTest ---------> *B*N*X**I       001 00:00:00.000 1
    2) SelfPingOverFabric --------------> *B*N*X**I       001 00:00:00.000 1
    3) RommonRevision ------------------> *B*N*X**I       001 00:00:00.000 1
    4) ScratchRegisterTest -------------> CBVN****I       001 00:00:00.000 1
    5) PSEMemoryBISTTest ---------------> **VD*X**I       001 00:00:00.000 1
    6) FabricqMemoryBISTTest -----------> **VD*X**I       001 00:00:00.000 1
    7) EgressqMemoryBISTTest -----------> **VD*X**I       001 00:00:00.000 1
    8) IngressqMemoryBISTTest ----------> **VD*X**I       001 00:00:00.000 1
    9) FabSRCCTest  --------------------> *B*N*X**I       000 00:02:00.000 1
```

To display detailed diagnostic test results for the FabSRCC Test, use the following command:

show diagnostic result <*location*> test FabSRCCTest detail

```
RP/0/RP0/CPU0:router(admin)#show diagnostic result location 0/4/cpu0 test FabSRCCTest
detail
Tue Jun  1 21:07:38.974 UTC
Current bootup diagnostic level for MSC-140G 0/4/CPU0: bypass
  Test results: (. = Pass, F = Fail, U = Untested)

  ___________________________________________________________________________

  9  ) FabSRCCTest  --------------------> .

          Error code ------------------> 0 (DIAG_SUCCESS)
          Total run count -------------> 1
          Last test execution time ----> Tue Jun  1 21:05:00 2010
          First test failure time -----> n/a
          Last test failure time ------> n/a
          Last test pass time ---------> Tue Jun  1 21:05:00 2010
          Total failure count ---------> 0
          Consecutive failure count ---> 0
  ___________________________________________________________________________
```

New Hardware Features for the Cisco CRS Router

The following new hardware features were introduced in Cisco IOS XR Software Release 4.1 on the Cisco CRS Router:

- CRS-8-PRP-6G
- CRS-8-PRP-12G
- CRS-16-PRP-6G
- CRS-16-PRP-12G
- Cisco IOS XR Software Release 4.1 is compatible with the following Cisco CRS-3 systems:
  - Cisco CRS 4-Slot Line Card Chassis
  - Cisco CRS 8-Slot Line Card Chassis
  - Cisco CRS 16-Slot Line Card Chassis

Cisco CRS-3 SW Features

Note With Cisco IOS XR Release 4.1.0 PX, the CRS MSC-140 or CRS FP-140 can now be used for Provider (P) and Provider Edge (PE) Layer 3 router configurations, including Layer 3 VPN features. With Cisco IOS XR Release 4.1.0, CRS MSC-140 or CRS FP-140 does not support Layer 2 VPN functionality. Please contact your Cisco representative for more information.

The following features are now supported on the Cisco CRS-3 Router in Cisco IOS XR Software Release 4.1:

- 6VPE Basic
- 6VPE Inter-AS
- IPv4 L3VPN Basic
- IPv4 L3VPN CsC
- IPv4 L3VPN Inter-AS
- Netflow Reporting of BGP VRF Attributes
- IP/LDP LFA FRR
- 6PE
- BFD over Bundles support
- IPv4 Unicast, Multicast
- IPv6 Unicast, Multicast
- MPLS LDP, TE, FRR
- PBTS v4/v6/MPLS
- P2MP-TE
- BFD v4/v6
- QoS
- ACL

- uRPF, QPPB, BGP-PA
- Sampled Netflow
- Link Bundles (Parity with MSC-40)
- 10GE WAN PHY
- Single Chassis (4 , 8, 16)
- CRS MSC-140 (same scale as FP-140 and Full QoS)
- CRS FP-140
- Online and Field Diagnostics

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

Important Notes

- **Default timestamp setting**—The timestamp prompt that precedes console output is enabled by default in Cisco IOS XR Release 3.8. To disable the timestamp prompt, use the **no service timestamp** command. For more information, refer to the *Cisco IOS XR System Management Command Reference for the Cisco CRS-1 Router.*
- From Cisco IOS XR Software Release 3.6.0, WRED statements are collapsed in that if different random-detect statements using the same match types (EXP, DSCP, Prec, and so forth) are entered with identical minimum and maximum threshold values, a single configuration line is shown in the output of **show running config**. This reduces the length of the configuration but creates a problem with backward compatibility with previous releases. In such a situation, on rollback, the QoS policy is rejected and must be manually entered again.

  Configuration prior to Cisco IOS XR Software Release 3.6.0:

```
Policy-map wred_example
   Class class-default
       random-detect exp 0 384 packets 484 packets
       random-detect exp 1 384 packets 484 packets
       random-detect exp 2 384 packets 484 packets
       random-detect exp 3 484 packets 584 packets
       random-detect exp 4 484 packets 584 packets
       random-detect discard-class 0 384 packets 484 packets
      random-detect discard-class 1 384 packets 484 packets
      random-detect discard-class 2 484 packets 584 packets
      bandwidth remaining percent 20
```

  Cisco IOS XR Software Release 3.6.0 and later releases:

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

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

- **Country-specific laws, regulations, and licences—**In certain countries, use of these products may be prohibited and subject to laws, regulations, or licenses, including requirements applicable to the use of the products under telecommunications and other laws and regulations; customers must comply with all such applicable laws in the countries in which they intend to use the products.
- **Card, fan controller, and RP removal—**For all card removal and replacement (including fabric cards, line cards, fan controller, and RP) follow the instructions provided by Cisco to avoid impact to traffic. See the *Cisco IOS XR Getting Started Guide for the Cisco CRS-1 Router* for procedures.
- **Exceeding Cisco testing—**If you intend to test beyond the combined maximum configuration tested and published by Cisco, contact your Cisco Technical Support representative to discuss how to engineer a large-scale configuration maximum for your purpose.
- **mpls traffic engineering igp-intact** command—This command must be used only when policy based tunnel selection is configured for all tunnels originating on the device.
- The following commands are not supported on the Cisco CRS-1 Series Router:
  - affinity location set
  - affinity location type
  - affinity program
  - affinity self
- BFD IPv6 UDP Checksum Calculation—In Cisco IOS XR Software Release 3.9, you turn the BFD IPv6 UDP checksum calculation on and off:
  - To disable the BFD IPv6 UDP checksum calculation:

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

  - To enable BFD IPv6 UDP checksum calculation:

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

- On upgrading CRS-1 software from 3.6.2 to 4.0.0 the MAC address assigned to physical interfaces changes. This is required because prior to Cisco IOS XR software Release 3.8.4 the MAC address assigned to the bundle interface was taken from the first member's MAC address. If this bundle member is removed from the bundle, the bundle gets a new MAC address, which results in traffic loss due to ARP resolution. Beginning in Cisco IOS XR software Release 3.8.4, a pool of MAC addresses are assigned to the bundle interfaces by the bundlemgr process during bundle interface creation.
- Deactivation of os-mbi dependent (Nonreload) SMU fails—Backing out the non reload os-mbi SMU fails because deactivation runs out of memory (activation did not release some memory, which stayed at 38 MB). This failure to activate or deactivate the SMU due to insufficient SP resources impacts SP cards on 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, Release 4.0*.

- 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 group drr [max | min] location <>
  - show controllers egressq group ntb [max | min] location <>
  - show controllers egressq port bpmap location <>
  - show controllers egressq statistics detail location <>
  - show controllers egressq resources location <>

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

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

- For Cisco IOS XR software Release 4.0.0 and above, after upgrading, the FPGA upgrade using the **auto-fpd upgrade** command as a part of the auto-fpd upgrade process fails for the SPA-1X10GE-L-V2 SPA. The workaround is to perform a manual FPGA upgrade on the SPA-1X10GE-L-V2 SPA using the **upgrade hw-module fpd fpga1 location 0/0/1** command in admin mode after the **auto-fpd upgrade** command execution completes.

- The minimum timer configuration value for the BFD on Bundle Members feature (BoB) increases from 30 to 60 seconds in Cisco IOS XR Software Release 4.1. 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>

- The following XFPs are supported in this release:
  - XFP-10G-MM-SR
  - XFP10GLR-192SR-L

- XFP10GER-192IR-L
- XFP-10GZR-OC192LR
- 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

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

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

New DWDM Configuration Requirement

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

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

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

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

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

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

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

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

Turning On the Laser: Example

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

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

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

Turning Off the Laser: Example

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

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

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

Minimum Flash Disk Requirements When Upgrading to Release 4.1

Cisco IOS XR Software Release 4.1 requires a 2-GB Flash Disk as a minimum. If your Cisco CRS currently uses a 1-GB Flash Disk, you must upgrade it to 2-GB before upgrading to Cisco IOS XR Software Release 4.1. The PCMCIA 1-GB Flash Disk was the default size for the Cisco CRS running Cisco IOS XR Software Release 3.6 and earlier.

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

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

To upgrade from a 1-GB flash disk to a 2-GB or greater flash disk, refer to the *Flash Disk Upgrade Tasks* link on the following Cisco CRS Router Installation and Upgrade URL: http://www.cisco.com/en/US/products/ps5763/prod_installation_guides_list.html

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

Caveats

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

This section contains caveats that are generic to the Cisco IOS XR Release 4.1 software and those specific to the Cisco CRS-1 Router and the Cisco CRS-3 Router.

Cisco IOS XR Caveats

The following open caveats apply to Cisco IOS XR Software Release 4.1 and are not platform specific:

- **CSCtn02761**

  Basic Description:

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

  Symptom:

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

Conditions:

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

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

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

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

Node 0/0/CPU0 (0x821)

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

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

Workaround:

None.

Recovery:

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

For the interfaces not being used for IPv6:

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

```
::
RP/0/5/CPU0:ios#process restart rsi_agent location 0/0/CPU0
```

- **CSCtn83882**

  Basic Description:

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

  Symptom:

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

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

  Conditions:

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

  Workaround:

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

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

  Recovery:

  Restart the mibd_entity process.

- **CSCto11030**

  Basic Description:

  Ping process crashed with parallel pings.

  Symptom:

  Ping process crashes.

  Conditions:

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

  Workaround:

  None.

  Recovery:

  None.

- **CSCto72677**

  Basic Description:

  PE not sending route-refresh request after reconfiguring VRF.

  Symptom:

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

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

Conditions:

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

Workaround:

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

Recovery

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

- **CSCto72695**

  Basic Description:

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

  Symptom:

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

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

  Conditions:

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

  Workaround:

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

  Recovery:

  No recovery is necessary if the workaround is used.

- **CSCto91788**

  Basic Description:

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

  Symptom:

  This issue occurs with permanent P2MP multicast traffic loss.

  Conditions:

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

  Workaround:

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

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

  Recovery:

  Restart the PIM process (process restart).

or

Remove/add multicast-routing config related to P2MP.

or

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

- **CSCto96827**

  Basic Description:

  Harmless sysdb_mc timeout messages periodically pops up in the console

  Symptom:

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

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

  Conditions:

  This issue occurs with an RSP switchover.

  Workaround:

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

  Recovery:

  Issue a RSP switchover.

- **CSCto99989**

  Basic Description:

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

  Symptom:

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

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

  Conditions:

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

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

  Workaround:

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

Recovery:

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

- **CSCto21373**

  Basic Description:

  mibd_interfaces crash while polling cIpMRouteNextHopTable.

  Symptom:

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

  Conditions:

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

  Workaround:

  Not available.

  Recovery:

  The process is restarted automatically.

- **CSCti50227**

  Basic Description:

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

  Symptom:

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

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

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

  Workaround:

  The commit must be performed in two steps:

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

Caveats Specific to the Cisco CRS-1 Router

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

- **CSCth36615**

  Basic Description:

  Auto FPD upgrade is not triggered in some conditions.

  Symptom:

On a Cisco CRS-1 or Cisco CRS-3 router, FPD auto-upgrade is configured. During an IOS-XR upgrade, the fpd auto-upgrade is not triggered. The output of the "admin" mode CLI command "show hw-module fpd location all" still displays nodes with a fpga or rommon down revision.

Conditions:

FPD auto-upgrade is only triggered if the new IOS-XR version contains a newer FPD PIE that has newer firmware versions as in the previous release.

RommonA is not upgraded by FPD auto-upgrade. FPD auto-upgrade is not triggered at software downgrades.

Workaround:

Not applicable.

Recovery:

User should manually perform the upgrade using the **upgrade hw-module fpd** CLI from the admin mode. This ensures that the rommon/fpga versions for that node are compatible with the current image and are in sync with the FPD package that is currently active on the router. Subsequently, auto-fpd upgrade should work for such a node whenever there is a change in the FPD package between the From and To images.

- **CSCtn82051**

  Basic Description:

  Fabric plane mcast down after rack reload on Cisco CRS Multishelf.

  Symptom:

  On a Cisco CRS Multishelf system, the "Oper State" of a fabric plane might be "MCAST_DOWN" after a Line Card Chassis (LCC) reload.

  Conditions:

  An LCC is reloaded on a CRS Multishelf system. The problem is not consistently reproducible.

  Workaround:

  None available.

  Recovery:

  Shut/no shut down the affected fabric plane in admin config mode.

  See the following example:

```
(admin-config)#controllers fabric plane 2 shutdown
(admin-config)#commit
(admin-config)#no controllers fabric plane 2 shutdown
(admin-config)#commit
```

- **CSCtn82971**

  Basic Description:

  Multiple processes blocked on sysdb_svr_local on LC after reload

  Symptom:

  After a reload of a Cisco CRS-1, the following error message might be observed from sfe_drvr process on all fabric SMs:

```
SP/0/SM4/SP:Mar 8 23:06:16.601 : sfe_drvr[120]:
%FABRIC-FABRIC_DRVR-3-ERRRATE_EXCEED_SLOW : SEA ASIC: s3/0/SM4/SP/3, MC NQ Err: HP Err
Dest Bitmap: 0x10000000 HP Enabled Queues: 0xc3333333 LP Err Dest Bitmap: 0x0 LP
Enabled Queues: 0xc3333333.
```

Conditions:

The NQ Errors of the above message are observed for destinations on a particular LC. In parallel the interface configurations of the affected LC appears in the preconfigure mode. Many processes on the LC are blocked on sysdb_svr_local.

Workaround:

None available.

Recovery:

Restart of SLD process should recover the issue.

- **CSCtn94341**

  Basic Description:

  Harddisk Disk Mirroring failed after rack OIR.

  Symptom:

  On a Cisco CRS-1 or Cisco CRS-3, harddisk mirroring may fail sync with resource busy error after RP reload.

  Conditions:

  1. Harddisk mirroring is enabled in admin config mode with the command: **mirror boot-harddisk**
  2. No local disk mirroring is configured in the user config mode.
  3. A node that has harddisk mirroring enabled is reloaded.

  The problem also applies to Cisco IOS XR Release 4.0.1.

  Workaround:

  None available.

  Recovery:

  Disable harddisk mirroring in admin config mode.

Caveats Specific to the Cisco CRS-3 Router

The following open caveats are specific to the Cisco CRS-3 platform:

- **CSCto34421**

  Basic Description:

  EDM request Timeouts from online_diag_lc for Cisco CRS-3 LCs in steady state.

  Symptom:

  In Cisco IOS-XR, SYSDB-SYSDB-6-TIMEOUT_EDM syslog messages might be displayed steadily.

  Conditions:

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

```
RP/0/RP0/CPU0:Mar 29 10:20:05.152 : sysdb_svr_admin[346]: %SYSDB-SYSDB-6-TIMEOUT_EDM :
EDM request for 'admin/oper/fabric/rack/2/lport/s1tx/' from 'online_diag_lc' (jid 227,
node 2/3/CPU0). No response from 'fsdb_server' (jid 211, node 2/RP1/CPU0) within the
timeout period (100 seconds).
```

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

Workaround:

Not available.

Recovery:

Restart the sysdb_svr_admin process: **process restart sysdb_svr_admin**

- CSCtn98033

  Basic Description:

  show controllers fabric plane statistics shows garbage values sometimes.

  Symptom:

  The output of the admin CLI command, **show controllers fabric plane all statistics**, might display large garbage values in the "Cell" columns.

  Conditions:

  The problem might be observed when the above command is executed several times very fast in a row.

  Workaround:

  If the command is issued serially, allow a couple of seconds time between each execution.

  Recovery:

  Rerun the command if the problem is present after some time.

Upgrading Cisco IOS XR Software

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

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

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

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

Migrating Cisco CRS-1 to Cisco CRS-3

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

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

Troubleshooting

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

Related Documentation

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

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

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

The most current Cisco CRS Router software documentation is located at the following URL:

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

Obtaining Documentation and Submitting a Service Request

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

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