Release Notes for Cisco NCS 560 Series Routers, Cisco IOS XR Release 24.2.1

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Network Convergence System 560 Series Routers

What's New in Cisco IOS XR Release 24.2.1

For more details on the Cisco IOS XR release model and associated support, see Software Lifecycle Support Statement - IOS XR.

Software Features Enhanced and Introduced

To learn about features introduced in other Cisco IOS XR releases, select the release from the Documentation Landing Page.

Feature	Description
Routing	
Support for NCS 560 routers as Seamless BFD reflector	This feature introduces support for NCS 560 routers as a Seamless BFD (SBFD) reflector. Seamless BFD simplifies the negotiation and state establishment aspects of BFD by predetermining session discriminators and maintaining session state only at the headend. This approach ensures quicker connectivity tests and reduces complexity in session establishment. Previously, support for Seamless BFD reflector was not available. The feature introduces these changes: **CLI:** The **sbfd** command is extended to support NCS 560 routers.
Segment Routing	

Feature	Description
Data Plane Validation for SR-MPLS IPv6-based Controller Instantiated LSPs	You can now verify the network configuration and paths and policies set up, without interrupting or potentially disrupting live network traffic, for SR-MPLS (Segment Routing over Multiprotocol Label Switching) IPv6-based Label Switched Paths (LSPs). With this feature, you can validate controller instantiated LSPs programmed directly into the forwarding hardware. Previously, SR data plane validation was possible over IPv4-based LSPs. The feature introduces these changes: **CLI:** The **dataplane-only** keyword is introduced in the **traceroute sr-mpls** and **ping sr-mpls** commands. **YANG Data Models:** • `Cisco-IOS-XR-mpls-traceroute-act.yang` • `Cisco-IOS-XR-mpls-ping-act.yang` See (GitHub, Yang Data Models Navigator)
Delay Measurement for IP Endpoint over SRv6 Network	In Segment Routing over an IPv6 network (SRv6), you can measure packet delay from the source to a specific IP endpoint. You can use this information for troubleshooting, network maintenance, and optimizing network performance. Additionally, you can use flow labels to verify the delay of each subsequent hop path towards the IP endpoint of that path. So that, when network traffic is distributed across multiple available paths towards an IP endpoint, delay measurement tracks the delay of each of these paths towards the IP endpoint. The feature introduces these changes: **CLI:** • The **source-address ipv6** keyword is introduced in the **performance-measurement endpoint** command. • The **segment-list name** keyword is introduced in the **segment-routing traffic-eng explicit** command. • The **flow-label** keyword is introduced in the **performance-measurement delay-profile name** command. **YANG Data Model:** • `Cisco-IOS-XR-um-performance-measurement-cfg` • `Cisco-IOS-XR-perf-meas-oper.yang` (See GitHub, YANG Data Models Navigator)

Feature	Description
Liveness Monitoring for IP Endpoint over SRv6 Network	In Segment Routing over an IPv6 network (SRv6), you can keep track of the operational status of both the forward and reverse paths of a particular node or IP endpoint. You can use this information for troubleshooting, network maintenance, and optimizing network performance. Additionally, you can use flow labels to verify the liveness of each subsequent hop path toward the IP endpoint of that path. So that, when network traffic is distributed across multiple available paths towards an IP endpoint, liveness detection tracks the operational status of each of these paths towards the IP endpoint. The feature introduces these changes: **CLI:** • The **reverse-path** and **segment-list name** keywords are introduced in the **segment-routing traffic-eng explicit** command. • The **source-address ipv6** is introduced in the **performance-measurement endpoint** command. **YANG Data Model:** • `Cisco-IOS-XR-um-performance-measurement-cfg` • `Cisco-IOS-XR-perf-meas-oper.yang` (see GitHub, YANG Data Models Navigator)
MPLS OAM support for SR-TE Policies using MPLS IPv6-based LSPs	You can now verify the network configuration and paths and SR-TE policies set up, without interrupting or potentially disrupting live network traffic, for SR-MPLS (Segment Routing over Multiprotocol Label Switching) IPv6-based Label Switched Paths (LSPs). Previously, MPLS OAM support was only for IPv4-based LSPs. The feature introduces these changes: **CLI:** The **traceroute sr-mpls** and **ping sr-mpls** commands are extended to support IPv6 nexthop addresses. **YANG Data Models:** • `Cisco-IOS-XR-mpls-traceroute-act.yang` • `Cisco-IOS-XR-mpls-ping-act.yang` See (GitHub, Yang Data Models Navigator)

Feature	Description
Multi-area Loopback Interface Support for OSPF	You can save IP addresses and resources, prevent the use of multiple node SIDs for labels associated with loopback interfaces, and save time configuring multiple loopback interfaces for an Area Border Router (ABR) in a network. These improvements are possible as you can now configure a single loopback interface for multiple areas. With this feature, an ABR can use a single loopback interface for all areas it connects to, eliminating the need for separate loopback interfaces for each area. Previously, each loopback interface was linked to only one area. The feature introduces these changes: **CLI:** The **multi-area-interface** command is extended to support loopback interfaces.
SRv6 Traffic Class DSCP Marking Enhancement for QoS	This feature enables you to configure the traffic-class DSCP marking to 6-bits using the new**policy-map-extend** keyword in the **hw-module profile segment-routing srv6 mode microsegment f3216 encapsulation traffic-class** CLI in both the L2 and L3 traffic configurations for SRv6. This is a mutually inclusive feature for L2 and L3 traffic. Therefore, this feature cannot be used in the individual configuration for L2 and L3 traffic. When you use the **policy-map-extend** keyword in the **hw-module profile segment-routing srv6 mode microsegment f3216 encapsulation traffic-class** CLI, the existing 3-bit DSCP marking set by the **hw-module profile segment-routing srv6 mode microsegment f3216 encapsulation traffic-class l3-traffic policy-map** CLI in the L3 traffic configuration is modified to 6-bits. This feature introduces this change: **CLI:** The **policy-map-extend** keyword is introduced in the **hw-module profile segment-routing srv6 mode microsegment f3216 encapsulation traffic-class** command.
SR ECMP-FEC Optimization for IPv6 Prefixes	You can now minimize ECMP-FEC resource consumption and duplication of resources during underlay programming for an SR-MPLS network for IPv6 prefixes. The feature supports sharing the same ECMP-FEC, regular FEC, and Egress Encapsulation DB (EEDB) entries for all paths with the same outgoing MPLS label among IPv6 prefixes. This improvement is now possible by using the **hw-module fib mpls label lsr-optimized** command. In earlier releases, ECMP-FEC optimization for IPv4 prefixes was available.

Feature	Description
User-Defined Generic Metric Support for IS-IS Flex Algo	This feature adds support for user-defined generic metric as a metric type for IS-IS Flexible Algorithm. You can now have more control over traffic flows using user-defined generic metrics. You can define a family of user-defined generic metrics that can advertise different types of administrative metrics such as jitter, reliability, and fiscal cost depending on the traffic class for Flexible Algorithms. You can selectively define and assign semantics of these metrics as per the network requirement. The feature introduces the following changes: **CLI**: • The feature introduces the **generic-metric flex-algo** and **metric-type generic** commands. **YANG Data Models:** • `Cisco-IOS-XR-um-router-isis-cfg.yang`
L3VPN	
MPLS Layer 3 VPNs CLI Enhancements	You can now verify that MPLS labels are correctly programmed in the control plane (or software) and the data plane (hardware forwarding tables) using the show mpls forwarding labels command. Previously the command only showed the MPLS label information for software, additional steps were required to verify the label status in the hardware, by checking in the SDK.
Netflow	
Monitor GTP-U Traffic in 5G Network	You can now export GTP-U traffic flow records using NetFlow v9 and IPFIX in 5G network. This enables you to monitor provides you with bidirectional traffic monitoring crucial for analytics and robust DDoS prevention strategies. This feature modifies the output of the **show flow monitor** command.
System Management	
Advanced Network Latency Insights through Frame Delay Categorization	By precisely measuring the frame delay range into widths, bins, minimum-delay and range percentile, you can now get a clearer picture of network speeds by sorting delays into groups. This helps make sure data flows smoothly and problems are found and fixed faster. Plus, it allows users to check if most data gets through the network quickly, making the network more reliable for everyone. This feature introduces these changes: **CLI:** **frame delay width bins minimum-delay frame-delay-range percentile** **Yang Data Models:** • `Cisco-IOS-XR-ethernet-sat-oper.yang` • `Cisco-IOS-XR-ethernet-sat-cfg.yang`

Feature	Description
Support For Default mode of Encapsulation	Using the default encapsulation setting for Service Activation Tests (SAT) streamlines the activation process with its ease of configuration and uniform testing standards. It accelerates service rollout by diminishing the need for intricate adjustments and guarantees the consistency of test outcomes. This setting establishes a dependable benchmark for assessing performance, benefits from extensive vendor support, and ensures seamless interaction between diverse network elements, aiding in the efficient deployment and ongoing management of network services.
User-Specified MTU Support for EMIX Traffic in Service Activation Tests	Defining the MTU packet size in Service Activation Tests (SAT) allows for tailored testing that matches the network's maximum frame capacity. This precision testing ensures accurate service performance validation and a reliable network service rollout. This feature introduces the following changes: **CLI:** **packet-size emix Sequence h**
System Security	
Support for Layer 2 Untagged Sub-interface configuration in IEEE 802.1X Port-based Authentication	This feature allows you to configure the Layer 2 untagged sub-interfaces in the IEEE 802.1X port-based authentication.
System Monitoring	
Traffic Statistics with Packet Drop Location	We help you save debugging time to locate packet drops by automatically detecting nonzero traffic drops from the commands running in the background and giving you the exact location of the packet drop. In earlier releases, you used multiple show commands with their respective locations to detect packet drops. This feature introduces the **show drops all** command.

YANG Data Models Introduced and Enhanced

This release introduces or enhances the following data models. For detailed information about the supported and unsupported sensor paths of all the data models, see the Github repository. To get a comprehensive list of the data models supported in a release, navigate to the Available-Content.md file for the release in the Github repository. The unsupported sensor paths are documented as deviations. For example, `openconfig-acl.yang`provides details about the supported sensor paths, whereas `cisco-xr-openconfig-acl-deviations.yang` provides the unsupported sensor paths for `openconfig-acl.yang` on Cisco IOS XR routers.

You can also view the data model definitions using the YANG Data Models Navigator tool. This GUI-based and easy-to-use tool helps you explore the nuances of the data model and view the dependencies between various containers in the model. You can view the list of models supported across Cisco IOS XR releases and

platforms, locate a specific model, view the containers and their respective lists, leaves, and leaf lists presented visually in a tree structure.

To get started with using data models, see the *Programmability Configuration Guide for Cisco NCS 560 Series Routers*.

Feature	Description
Programmability	
openconfig-local-routing.yang Version 2.0.1	The OpenConfig data model, which is part of the openconfig-network-instance.yang data model is revised from version 1.2.0 to 2.0.1. This revision enables you to configure the preference for the order selection when multiple sources, such as protocols and static routes, contribute to the same prefix entry. A lower number signifies a better preference. When the preference value is not specified, default preference value is considered which is one. This data model supports event-driven and Model-driven telemetry.
Cisco-IOS-XR-infra-statsd-oper.yang	The native yang data model streams cached counters using a TARGET_DEFINED subscription. It enables you to fetch interface statistics, such as bytes-received, packets-received and other details, from a cache which is periodically updated from hardware using generic-counters container. The hardware-timestamp field indicates the timestamp of the most recent hardware counter readings. If hardware-timestamp field is 0, the last-data-time field indicates the timestamp of the most recent counter readings, which could be either from hardware or software.
openconfig-if-ip.yang Version 3.5.0	The OpenConfig data model has been updated from version 3.0.0 to 3.5.0. This data model helps you specify data structures for managing both configuration and operational state on IP interfaces, supporting IPv4 and IPv6. You can stream telemetry for the operational state of these interfaces using both model-driven and event-driven approaches.
Cisco-IOS-XR-mpls-traceroute-act.yang	This unified data model is enhanced with a new container, *ipv6*, and leaves such as *next-hop*, l*sp-endpoint*, and *force-ipv6-explicit-null* in the *type-ipv6-next-hop* interface to extend support to Segment Routing OAM to verify network configuration for SR-MPLS IPv6-based LSPs.
Cisco-IOS-XR-um-router-isis-cfg	This unified data model is enhanced with new containers *generic-metric*, and *generic-metric-level* to define a family of user-defined generic metrics that can advertise different types of administrative metrics such as jitter, reliability, and fiscal cost depending on the traffic class for Flexible Algorithms.

Hardware Introduced

Note Before you install the Cisco router, you must prepare your site for the installation, for more details on site planning and environmental requirements, see Hardware Installation Guide.

Hardware	Description

Optics	This release launches the following new optics on selective hardware within the product portfolio. For details and other new supported transceivers, refer to the Transceiver Module Group (TMG) Compatibility Matrix.
	• Cisco 100BASE-X Small Form-Factor Pluggable Modules
	  • GLC-FE-100BX-D
	  • GLC-FE-100BX-U
	• Cisco 100GBASE QSFP-100G Module
	  • QSFP-100G-SR1.2
	• Cisco 100BASE-X Small Form-Factor Pluggable Modules
	  • GLC-FE-100EX
	  • GLC-FE-100FX
	• Cisco 400G Digital Coherent Optics QSFP-DD Optical Module
	  • QDD-400G-ZRP-S
	• Cisco 400G QSFP-DD High-Power (Bright) Optical Module
	  • DP04QSDD-HE0

Behavior Changes

- From this release, the default order of authentication methods for SSH clients on Cisco IOS XR routers running Cisco IOS XR SSH is changed to: **public-key**, **keyboard-interactive**, and **password**.

  Prior to this release, the default order was: **public-key**, **password**, and **keyboard-interactive**.

- Prior to Cisco IOS XR Release 7.2.1, a segment of an explicit segment list can be configured as an IPv4 address (representing a Node or a Link) using the **index** *index***address ipv4** *address* command.

  Starting with Cisco IOS XR Release 7.2.1, an IPv4-based segment (representing a Node or a Link) can also be configured with the new **index** *index* **mpls adjacency***address* command. The configuration is

stored in NVRAM in the same CLI format used to create it. There is no conversion from the old CLI to the new CLI.

Starting with Cisco IOS XR Release 7.9.1, the old CLI has been deprecated. Old configurations stored in NVRAM will be rejected at boot-up.

As a result, explicit segment lists with IPv4-based segments using the old CLI must be re-configured using the new CLI.

There are no CLI changes for segments configured as MPLS labels using the **index** *index* **mpls label** *label* command.

- If you are on a release before Cisco IOS XR Release 7.4.1, you can configure SR-ODN with Flexible Algorithm constraints using the **segment-routing traffic-eng on-demand color** *color* **dynamic sid-algorithm** *algorithm-number* command.

  Starting with Cisco IOS XR Release 7.4.1, you can also configure SR-ODN with Flexible Algorithm constraints using the new **segment-routing traffic-eng on-demand color** *color* **constraints segments sid-algorithm** *algorithm-number* command.

  From Cisco IOS XR Release 7.9.1, the **segment-routing traffic-eng on-demand color** *color* **dynamic sid-algorithm** *algorithm-number* command is deprecated. Previous configurations stored in NVRAM will be rejected at boot-up. (Performing In-Service Software Upgrade (ISSU) to Cisco IOS XR Release 7.9.1 will also be rejected.)

  Hence, for Cisco IOS XR Release 7.9.1, you must reconfigure all SR-ODN configurations with Flexible Algorithm constraints that use the on-demand dynamic sid-algorithm with the on-demand constraints command.

Restrictions and Limitations

- The statistics collection may time out due to CPU overload during route churn. In such scenarios, statistics collection will resume when the CPU becomes available after the route churn is complete.
- The standby RP may get into '`NOT READY`' state intermittently due to some network churn, though the corresponding VM is up and running. But this is a transient state and shows that some data aren't in sync between active and standby due to the network churn. After both active and standby are in sync with respect to all the parameters, then the standby RP comes into '`READY`' state.

Caveats

There are no caveats in this release.

Release Package

This following table lists the Cisco IOS XR Software feature set matrix (packages) with associated filenames.

Visit the Cisco Software Download page to download the Cisco IOS XR software images.

Table 1: Release 24.2.1 Packages for Cisco NCS 560 Series Router

Composite Package		
Feature Set	**Filename**	**Description**
Cisco IOS XR IP Unicast Routing Core Bundle	ncs560-mini-x-24.2.1.iso	Contains base image contents that includes: • Host operating system • System Admin boot image • IOS XR boot image • BGP packages • OS • Admin • Base • Forwarding • Modular Services Card • Routing • SNMP Agent • Alarm Correlation
Cisco IOS XR Manageability Package	ncs560-mgbl-1.0.0.0-r2421.x86_64.rpm	Telemetry, Extensible Markup Language (XML), Parser, and HTTP server packages, NETCONF, YANG Models, gRPC.
Cisco IOS XR OSPF package	ncs560-ospf-1.0.0.0-r2421.x86_64.rpm	Supports OSPF
Cisco IOS XR Security Package	ncs560-k9sec-1.0.0.0-r2421.x86_64.rpm	k9sec is needed for IPsec or MACsec and Dot1x and for basic crypto services such as Decryption, Secure Shell (SSH), Secure Socket Layer (SSL), and Public-key infrastructure (PKI).
Multicast Package	ncs560-mcast-1.0.0.0-r2421.x86_64.rpm	Supports Multicast Supports Automatic Multicast Tunneling (AMT), IGMP Multicast Listener Discovery (MLD), Multicast Label Distribution Protocol (MLDP), Multicast Source Discovery Protocol (MSDP) and PIM.

Composite Package		
Feature Set	**Filename**	**Description**
Cisco IOS XR ISIS package	ncs560-isis-1.0.0.0-r2421.x86_64.rpm	Supports Intermediate System to Intermediate System (IS-IS).
Cisco IOS XR USB Boot Package	ncs560-usb_boot-24.2.1.zip	Supports Cisco IOS XR USB Boot Package
Cisco IOS XR MPLS Package	ncs560-mpls-1.0.0.0-r2421.x86_64.rpm ncs560-mpls-te-rsvp-1.0.0.0-r2421.x86_64.rpm	Supports MPLS and MPLS Traffic Engineering (MPLS-TE) RPM. Label Distribution Protocol (LDP), MPLS Forwarding, MPLS Operations, Administration, and Maintenance (OAM), Link Manager Protocol (LMP), Optical User Network Interface (OUNI) and Layer-3 VPN. Cisco IOS XR MPLS-TE and RSVP Package MPLS Traffic Engineering (MPLS-TE) and Resource Reservation Protocol (RSVP).
Cisco IOS XR LI Package	ncs560-li-1.0.0.0-r2421.x86_64.rpm	Lawful Intercept
Cisco IOS XR EIGRP Package	ncs560-eigrp-1.0.0.0-r2421.x86_64.rpm	(Optional) Includes EIGRP protocol support software

Determine Software Version

Log in to the router and enter the **show version** command.

```
RP/0/RP0/CPU0:Router#show version
Cisco IOS XR Software, Version 24.2.1
Copyright (c) 2013-2024 by Cisco Systems, Inc.

Build Information:
 Built By     : swtools
 Built On     : Tue Jun 11 08:36:59 PDT 2024
 Built Host   : iox-ucs-002
 Workspace    : /auto/srcarchive11/prod/24.2.1/ncs560/ws
 Version      : 24.2.1
 Location     : /opt/cisco/XR/packages/
 Label        : 24.2.1

cisco NCS-560 () processor
System uptime is 8 hours 14 minutes
```

Determine Firmware Support

Log in to the router and enter the **show fpd package** command to know the release image.

```
RP/0/RP0/CPU0:Router#show fpd package
================================ ============================================
                                          Field Programmable Device Package
                                 ============================================
                                           Req      SW       Min Req   Min Req
Card Type            FPD Description       Reload   Ver      SW Ver    Board Ver
================== ========================= ====== ======= ======== =========
------------------------------------------------------------------------------
A900-IMA-8Z-L-CC     IMFPGA                 YES     1.50      1.50      0.0
------------------------------------------------------------------------------
A900-IMA8CS1Z-CC     IMFPGA                 YES     1.115     1.115     0.0
------------------------------------------------------------------------------
A900-IMA8CS1Z-M      IMFPGA                 YES     1.115     1.115     0.0
------------------------------------------------------------------------------
A900-IMA8Z           IMFPGA                 YES    17.05     17.05      0.0
------------------------------------------------------------------------------
A900-IMA8Z-CC        IMFPGA                 YES    17.05     17.05      0.0
------------------------------------------------------------------------------
A900-IMA8Z-L         IMFPGA                 YES     1.50      1.50      0.0
------------------------------------------------------------------------------
A900-PWR1200-A       DCA-PriMCU(A)          NO      0.11      0.11      0.0
                     DCA-SecMCU(A)          NO      1.04      1.04      0.0
------------------------------------------------------------------------------
A900-PWR1200-D       LIT-PriMCU(A)          NO      2.04      0.04      0.0
                     LIT-SecMCU(A)          NO      1.27      1.27      0.0
------------------------------------------------------------------------------
A900-PWR900-D2       LIT-PriMCU(A)          NO      1.82      1.82      0.0
                     LIT-SecMCU(A)          NO      1.84      1.84      0.0
------------------------------------------------------------------------------
A907-FAN-E           PSOC(A)                NO      1.65      1.65      0.0
                     PSOC(A)                NO      1.66      1.66      0.4
------------------------------------------------------------------------------
A907-FAN-H           PSOC(A)                NO      1.65      1.65      0.0
------------------------------------------------------------------------------
ASR914-F2B-FAN       PSOC(A)                NO     44.08     44.08      0.0
------------------------------------------------------------------------------
N560-4-FAN-H         PSOC(A)                NO    177.02    177.02      0.0
------------------------------------------------------------------------------
N560-4-FAN-H-CC      PSOC(A)                NO    177.02    177.02      0.0
------------------------------------------------------------------------------
N560-4-FAN-H-R       PSOC(A)                NO    177.02    177.02      0.0
------------------------------------------------------------------------------
N560-4-PWR-FAN       PSOC(A)                NO    177.08    177.08      0.0
------------------------------------------------------------------------------
N560-4-PWR-FAN-CC    PSOC(A)                NO    177.08    177.08      0.0
------------------------------------------------------------------------------
N560-4-PWR-FAN-R     PSOC(A)                NO    177.08    177.08      0.0
------------------------------------------------------------------------------
N560-4-RSP4          ADM(A)                 NO      1.06      1.06      0.0
                     IOFPGA(A)              YES     0.68      0.68      0.0
                     PRIMARY-BIOS(A)        YES     0.24      0.24      0.0
                     SATA(A)                NO      2.20      2.20      0.0
                     SATA_MAR(A)            NO      1.30      1.30      0.0
                     SATA_MAR_B4(A)         NO      1.10      1.10      0.0
                     SATA_SMI(A)            NO      1.10      1.10      0.0
------------------------------------------------------------------------------
N560-4-RSP4-CC       ADM(A)                 NO      1.06      1.06      0.0
                     IOFPGA(A)              YES     0.68      0.68      0.0
```

	PRIMARY-BIOS(A)	YES	0.24	0.24	0.0
	SATA(A)	NO	2.20	2.20	0.0
	SATA_MAR(A)	NO	1.30	1.30	0.0
	SATA_MAR_B4(A)	NO	1.10	1.10	0.0
	SATA_SMI(A)	NO	1.10	1.10	0.0
N560-4-RSP4E	ADM(A)	NO	1.06	1.06	0.0
	IOFPGA(A)	YES	0.68	0.68	0.0
	PRIMARY-BIOS(A)	YES	0.24	0.24	0.0
	SATA(A)	NO	2.20	2.20	0.0
	SATA_MAR(A)	NO	1.30	1.30	0.0
	SATA_MAR_B4(A)	NO	1.10	1.10	0.0
	SATA_SMI(A)	NO	1.10	1.10	0.0
N560-4-RSP4E-CC	ADM(A)	NO	1.06	1.06	0.0
	IOFPGA(A)	YES	0.68	0.68	0.0
	PRIMARY-BIOS(A)	YES	0.24	0.24	0.0
	SATA(A)	NO	2.20	2.20	0.0
	SATA_MAR(A)	NO	1.30	1.30	0.0
	SATA_MAR_B4(A)	NO	1.10	1.10	0.0
	SATA_SMI(A)	NO	1.10	1.10	0.0
N560-FAN-H	PSOC(A)	NO	2.02	2.02	0.0
N560-IMA-8Q/4L	IMFPGA	YES	1.27	1.27	0.0
N560-IMA1W	CFP2-D-DCO	NO	38.27397	38.27397	0.0
	CFP2-DE-DCO	NO	38.27397	38.27397	0.0
	CFP2-DET-DCO	NO	38.27397	38.27397	0.0
	CFP2-DETS-DCO	NO	38.27397	38.27397	0.0
	CFP2-DS-DCO	NO	38.27397	38.27397	0.0
	CFP2-DS100-DCO	NO	38.27397	38.27397	0.0
	IMFPGA	YES	1.28	1.28	0.0
N560-IMA2C	IMFPGA	YES	6.06	6.06	0.0
N560-IMA2C-CC	IMFPGA	YES	6.06	6.06	0.0
N560-IMA2C-DD	IMFPGA	YES	1.28	1.28	0.0
	QDD_100_BRT_FW_P0	NO	70.130	70.130	0.0
	QDD_100_BRT_FW_P1	NO	70.130	70.130	0.0
	QDD_100_FW_P0	NO	61.23	61.23	0.0
	QDD_100_FW_P1	NO	61.23	61.23	0.0
	QDD_400_ZRP_FW_P0	NO	161.24	161.24	0.0
	QDD_400_ZRP_FW_P1	NO	161.24	161.24	0.0
N560-IMA2C-L	IMFPGA	YES	1.28	1.28	0.0
N560-PWR1200-D-E	QCS-PriMCU(A)	NO	1.82	1.82	0.0
	QCS-SecMCU(A)	NO	1.84	1.84	0.0
N560-RSP4	ADM(A)	NO	1.06	1.06	0.0
	IOFPGA(A)	YES	0.79	0.79	0.0
	PRIMARY-BIOS(A)	YES	0.24	0.24	0.0
	SATA(A)	NO	2.20	2.20	0.0
	SATA_MAR(A)	NO	1.30	1.30	0.0
	SATA_MAR_B4(A)	NO	1.10	1.10	0.0
	SATA_SMI(A)	NO	1.10	1.10	0.0
N560-RSP4-E	ADM(A)	NO	1.06	1.06	0.0
	IOFPGA(A)	YES	0.79	0.79	0.0
	PRIMARY-BIOS(A)	YES	0.24	0.24	0.0
	SATA(A)	NO	2.20	2.20	0.0
	SATA_MAR(A)	NO	1.30	1.30	0.0

```
                    SATA_MAR_B4(A)             NO      1.10      1.10      0.0
                    SATA_SMI(A)                NO      1.10      1.10      0.0
--------------------------------------------------------------------------------
NCS4200-1T16G-PS    IMFPGA                     YES     1.115     1.115     0.0
--------------------------------------------------------------------------------
NCS4200-2H-PQ       IMFPGA                     YES     6.06      6.06      0.0
--------------------------------------------------------------------------------
NCS4200-8T-PS       IMFPGA                     YES    17.05     17.05      0.0
--------------------------------------------------------------------------------
NCS4216-F2B-FAN     PSOC(A)                    NO     44.08     44.08      0.0
--------------------------------------------------------------------------------
NCS4216-RSP-800     ADM(A)                     NO      1.06      1.06      0.0
                    IOFPGA(A)                  YES     0.02      0.02      0.0
                    PRIMARY-BIOS(A)            YES     0.24      0.24      0.0
                    SATA(A)                    NO      2.20      2.20      0.0
                    SATA_MAR(A)                NO      1.30      1.30      0.0
                    SATA_MAR_B4(A)             NO      1.10      1.10      0.0
                    SATA_SMI(A)                NO      1.10      1.10      0.0
```

Log in to the router and enter the **show hw-module fpd** command to know the current version.

```
RP/0/RP0/CPU0:Router#show hw-module fpd
Auto-upgrade:Disabled
                                                                  FPD Versions
                                                                  ==============
Location   Card type             HWver FPD device       ATR Status    Running   Programd
--------------------------------------------------------------------------------------
0/0        NCS4200-2H-PQ         0.0   IMFPGA                CURRENT     6.06      6.06

0/1        N560-IMA2C-DD         0.0   IMFPGA                CURRENT     1.28      1.28

0/2        A900-IMA8Z-L          0.0   IMFPGA                CURRENT     1.50      1.50

0/3        N560-IMA1W            66.32 CFP2-D-DCO            CURRENT    38.27397  38.27397

0/3        N560-IMA1W            0.0   IMFPGA                CURRENT     1.28      1.28

0/4        A900-IMA8CS1Z-M       0.0   IMFPGA                CURRENT     1.115     1.115

0/5        A900-IMA8Z            0.0   IMFPGA                CURRENT    17.05     17.05

0/RP0      N560-4-RSP4E          0.0   ADM                   CURRENT     1.06      1.06

0/RP0      N560-4-RSP4E          0.0   IOFPGA                CURRENT     0.68      0.68

0/RP0      N560-4-RSP4E          0.0   PRIMARY-BIOS          CURRENT     0.24      0.24

0/RP0      N560-4-RSP4E          0.0   SATA                  CURRENT     2.20      2.20

0/RP1      N560-4-RSP4E          0.0   ADM                   CURRENT     1.06      1.06

0/RP1      N560-4-RSP4E          0.0   IOFPGA                CURRENT     0.68      0.68

0/RP1      N560-4-RSP4E          0.0   PRIMARY-BIOS          CURRENT     0.24      0.24

0/RP1      N560-4-RSP4E          0.0   SATA                  CURRENT     2.20      2.20

0/FT0      N560-4-PWR-FAN        1.0   PSOC                  CURRENT   177.08    177.08

0/FT1      N560-4-FAN-H          1.0   PSOC                  CURRENT   177.02    177.02

0/FT2      N560-4-FAN-H          1.0   PSOC                  CURRENT   177.02    177.02
```

Important Notes

Licensing

Starting with Cisco IOS XR Release 24.1.1, Smart Licensing Using Policy (SLP) is the default Licensing model. When you upgrade to the Cisco IOS XR Release 24.1.1 release or later, the Smart Licensing Using Policy is enabled by default.

You can migrate your devices to Smart Licensing with Policy model, see *Migrating from Smart Licensing to Smart Licensing Using Policy*, Smart Licensing Using Policy on Cisco IOS XR Routers.

We recommend that you update to the latest version of SSM On-Prem or Cisco Smart Licensing Utility.

Note SSM On-Prem and CSSM both support SLP devices and SL devices. SLP devices and SL devices can coexist in a network. The Smart Licensing (SL) model is available in releases Cisco IOS XR Release 7.11.1 and earlier.

Supported Transceiver Modules

For more information on the supported transceiver modules, see Transceiver Module Group (TMG) Compatibility Matrix. In the **Begin your Search** search box, enter the keyword NCS560 and click **Enter**.

Upgrading Cisco IOS XR Software

For software installation and upgrades, refer to the respective upgrade/downgrade docs *.tar* files based on your 560 router varaint.

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).

The upgrade document for Cisco NCS 560 router is available along with the software image in *NCS560_Upgrade_MOP_24.2.1.tar* file.

Production Software Maintenance Updates (SMUs)

A production SMU is a SMU that is formally requested, developed, tested, and released. Production SMUs are intended for use in a live network environment and are formally supported by the Cisco TAC and the relevant development teams. Software bugs identified through software recommendations or Bug Search Tools are not a basis for production SMU requests.

For information on production SMU types, refer the Production SMU Types section of the *IOS XR Software Maintenance Updates (SMUs)* guide.

Cisco IOS XR Error messages

To view, search, compare, and download Cisco IOS XR Error Messages, refer to the Cisco IOS XR Error messages tool.

Cisco IOS XR MIBs

To determine the MIBs supported by platform and release, refer to the Cisco IOS XR MIBs tool.

Related Documentation

The most current Cisco NCS 560 router documentation is located at the following URL:

https://www.cisco.com/c/en/us/td/docs/iosxr/ncs-560-series-routers.html