



Release Notes for Cisco NCS 560 Series Routers, Cisco IOS XR Release 24.4.1

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Network Convergence System 560 Series Routers

What's New in Cisco IOS XR Release 24.4.1

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
BGP	
Source-based remote traffic black holing	Source-based Remote Traffic Black Holing (S-RTBH) is a network security technique used to drop traffic originating from specific malicious source IP addresses. It leverages BGP updates and Unicast Reverse Path Forwarding (uRPF) to ensure that unwanted traffic is discarded at the network edge.
L2VPN and Ethernet Services	

Feature	Description
EVPN-IRB ARP and ND proxy suppression	<p>You can now manage and minimize Address Resolution Protocol (ARP) for IPv4 traffic or Neighbor Discovery (ND) for IPv6 traffic on a network segment by configuring full or partial suppression mode.</p> <p>If the target host entry is not found in the ARP and ND tables,</p> <ul style="list-style-type: none"> the full suppression mode prevents ARP and ND request flooding and reduces the consumption of processing resources on network devices. the partial suppression mode broadcasts the packet to all devices within the EVPN Bridge Domain (BD) as it would perform without suppression, ensuring connectivity even if the information isn't immediately available in the EVPN control plane. <p>The feature introduces these changes:</p> <p>CLI:</p> <ul style="list-style-type: none"> arp evpn-proxy mode ipv6 nd evpn-proxy mode <p>YANG Data Model:</p> <ul style="list-style-type: none"> Cisco-IOS-XR-um-ipv6-nd-cfg.yang Cisco-IOS-XR-um-if-arp-cfg.yang <p>(see GitHub, YANG Data Models Navigator)</p>
MPLS	
MPLS traffic flow control for TTL and QoS propagation on MPLS push, pop, and penultimate nodes	<p>With this feature, the extended granular control capability for the incoming and outgoing MPLS traffic changes the behavior of the IP TTL and IP QoS DSCP propagation on the MPLS push, pop, and penultimate nodes. This ensures a reduced network latency, enhanced QoS management, and simplified network operations.</p> <p>This feature introduces these changes:</p> <p>CLI:</p> <ul style="list-style-type: none"> hw-module fib mpls ip-ttl-propagate-disable exclude mpls-push ttl hw-module fib mpls ip-ttl-propagate-disable exclude mpls-pop ttl-and-cos hw-module fib mpls ip-ttl-propagate-disable exclude mpls-pop-penultimate-hop ttl-and-cos <p>YANG Data Model: New XPathS for Cisco-IOS-XR-um-hw-module-profile-cfg (see Github, YANG Data Models Navigator).</p>
Segment Routing	

Feature	Description
Far-end delay metrics in one-way measurement mode	<p>SR PM now enables network operators to compute both far-end (T4 – T3) and near-end (T2 – T1) delay metrics, providing a complete view of end-to-end delay across the entire data path. Measuring the far-end delay from the responder to the querier node improves visibility, and allows operators to accurately monitor and evaluate network performance.</p> <p>Previously, you could measure the near-end delay metrics for a given data path.</p>
SRv6 double recursion for multilayer BGP underlay	<p>The feature introduces support to SRv6 double recursion where network service such as BGP VPN (Layer 2/Layer 3) requires multiple layers of resolution, specifically where one routing layer resolves over another before reaching its final destination. You can achieve double recursion by collapsing the underlay, which typically involves protocols like IGP or BGP in the packet forwarding chain, allowing three-level load balancing and even distribution of traffic across multiple layers of the network stack.</p> <p>The feature is supported on the ingress Provider Edge (PE) router.</p> <p>Previously, SRv6 supported only two levels of load balancing, which works for traditional service provider setups.</p> <p>The feature introduces these changes:</p> <p>CLI:</p> <ul style="list-style-type: none"> • tag-map tag <value> map forwarding-hierarchy level-2-used-as-nexthop • The show cef ipv6 ipv6-prefixes and show cef ipv4 ipv4-prefixes commands now include the Layer 2 prefix information, which resolve as nexthop Layer 3 prefixes. <p>YANG Data Models:</p> <ul style="list-style-type: none"> • <code>Cisco-IOS-XR-um-router-rib-cfg:router</code> (see GitHub, Yang Data Models Navigator) data model.
VRF-to-VRF route leaking in SRv6 core	<p>VRF-to-VRF route leaking enables sharing of routes between VRFs while maintaining their isolation. This feature allows the source VRF to send leaked routes to remote PEs or Route Reflectors (RRs) across an SRv6 core network, similar to an MPLS core network, enabling communication between different service tenants or administrative domains without compromising VRF isolation.</p>
mLDP LSP protection with optimal TI-LFA backup paths	<p>With this release, the Topology Independent Loop-Free Alternate (TI-LFA) calculates an optimal, loop-free post-convergence path and enforces it by encoding the path as a list of segments. You can now enhance the protection and convergence for Multicast Label Distribution Protocol Label Switched Paths (mLDP LSP) using TI-LFA backup paths.</p> <p>TI-LFA supports zero-segment and single-segment backup paths, enabling native Point-to-Multipoint (P2MP) over SR code with a Tree Segment Identifier (Tree-SID) profile.</p>

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	
Cisco-IOS-XR-um-router-rib-cfg:router.yang	This Cisco unified YANG data model enables you to achieve SRv6 double recursion by collapsing the underlay, which typically involves protocols like IGP or BGP in the packet forwarding chain, allowing three-level load balancing and even distribution of traffic across multiple layers of the network stack.
Cisco-IOS-XR-um-performance-measurement-cfg.yang	This Cisco unified YANG data model is enhanced with a new container fallback to advertise a fallback delay value, retaining delay information in performance metrics even when the delay metrics for interfaces are temporarily unavailable due to hardware, synchronization, or network connectivity issues.

Feature	Description
Cisco-IOS-XR-um-hw-module-profile-cfg	<p>This Cisco unified YANG data model is enhanced to have a new container, ip-ttl-propagate-disable, which is used to exclude the propagation of the IP Time-To-Live (TTL) and QoS capability to and from the MPLS header using the MPLS Push, Pop, and Penultimate Hop Pop (PHP) operations with these three sub-containers:</p> <ul style="list-style-type: none"> • mpls-push - This container uses its sub-container, ttl, to change the IP TTL propagation on the MPLS Push (imposition) node to uniform mode. • mpls-pop - Changes the IP TTL and QoS DSCP propagation to uniform mode on the MPLS Pop (disposition) node using the sub-container, ttl-and-cos. • mpls-pop-penultimate-hop - Uses the additional three sub-containers, ttl, cos, and ttl-and-cos to change the IP TTL and QoS DSCP propagation to uniform mode on the MPLS PHP node. If cos is used, the TTL propagation remains in the pipe mode. If ttl is used, the QoS propagation remains in pipe mode.
Cisco-IOS-XR-um-if-arp-cfg.yang	<p>This Cisco unified YANG data model is revised to introduce a new arp evpn-proxy container which drops the ARP request if the target entry is not available in the ARP tables on the EVPN control plane.</p>
Cisco-IOS-XR-um-ipv6-nd-cfg.yang	<p>This Cisco unified YANG data model is revised to introduce a new ipv6 and evpn-proxy container which drops the ND request if the target entry is not available in the ND tables on the EVPN control plane.</p>

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	<p>This release introduces new optics on specific hardware within the product portfolio.</p> <ul style="list-style-type: none"> • Cisco Provider Connectivity Assurance Sensor SFP <ul style="list-style-type: none"> • S10G-LR-PM-D-I • S10G-SR-PM-D-I • S10G-ER-PM-D-I • Cisco Bidirectional Pluggable Transceivers <ul style="list-style-type: none"> • QSFP-100G-B20D4-I • QSFP-100G-B20U4-I <p>For details refer to the Transceiver Module Group (TMG) Compatibility Matrix</p>

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 indexaddress 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 adjacencyaddress** 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 24.4.1 Packages for Cisco NCS 560 Series Router

Composite Package		
Feature Set	Filename	Description
Cisco IOS XR IP Unicast Routing Core Bundle	ncs560-mini-x-24.4.1.iso	Contains base image contents that includes: <ul style="list-style-type: none"> • 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-r2441.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-r2441.x86_64.rpm	Supports OSPF
Cisco IOS XR Security Package	ncs560-k9sec-1.0.0.0-r2441.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-r2441.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-r2441.x86_64.rpm	Supports Intermediate System to Intermediate System (IS-IS).
Cisco IOS XR USB Boot Package	ncs560-usb_boot-24.4.1.zip	Supports Cisco IOS XR USB Boot Package
Cisco IOS XR MPLS Package	ncs560-mpls-1.0.0.0-r2441.x86_64.rpm ncs560-mpls-te-rsvp-1.0.0.0-r2441.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-r2441.x86_64.rpm	Lawful Intercept
Cisco IOS XR EIGRP Package	ncs560-eigrp-1.0.0.0-r2441.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 24.4.1
Copyright (c) 2013-2024 by Cisco Systems, Inc.

Build Information:
  Built By      : swtools
  Built On     : Sun Dec 15 21:11:03 PST 2024
  Built Host   : iox-lnx-122
  Workspace    : /auto/srcarchive10/prod/24.4.1/ncs560/ws
  Version      : 24.4.1
  Location     : /opt/cisco/XR/packages/
  Label        : 24.4.1

cisco NCS-560 () processor
System uptime is 2 hours 50 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					
Card Type	FPD Description	Req Reload	SW Ver	Min Req SW Ver	Min Req 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	1.27	1.27	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	0.69	0.69	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	0.69	0.69	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	0.69	0.69	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	0.69	0.69	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	0.80	0.80	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	0.80	0.80	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

Determine Firmware Support

	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:Enabled
```

Location	Card type	HWver	FPD device	ATR Status	FPD Versions	
					Running	Programd
0/0	N560-IMA2C	0.0	IMFPGA	CURRENT	6.06	6.06
0/1	N560-IMA2C	0.0	IMFPGA	CURRENT	6.06	6.06
0/2	A900-IMA8Z	0.0	IMFPGA	CURRENT	17.05	17.05
0/3	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	0.69	0.69
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	0.69	0.69
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 variant](#).

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_24.3.1.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>

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