

# Release Notes for Cisco NCS 560 Series Routers, Cisco IOS XR Release 7.3.1

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## Network Convergence System 560 Series Routers



**Note** This software release has reached end-of-life status. For more information, see the [End-of-Life and End-of-Sale Notices](#).



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## What's New in Cisco IOS XR Release 7.3.1

Feature	Description
<b>Licensing</b>	
<a href="#">Specific License Reservation</a>	Specific License Reservation is a solution designed for classified environments that don't allow electronic communication in or out of the environment.
<a href="#">Software Innovation Access (SIA) Entitlement</a>	SIA license grants you access to the latest software upgrades which contain new features, bug fixes, and security enhancements for devices on your network. Also, it enables the consumption of Advantage and Essential Right-to-Use (RTU) licenses on your device, and allows portability of these RTU licenses from one device to another.
<b>BGP</b>	
BGP PIC for MPLS for multipath backup	Unlabeled BGP PIC EDGE for global prefixes is not supported.

Feature	Description
<a href="#">Per-Prefix Label Allocation Support on BVI</a>	You can configure connected routes and static routes in per-prefix mode on the BVI. However, dynamic protocols such as BGP in per-prefix mode on the BVI is not supported.
<b>Interface and Hardware Component</b>	
<a href="#">16 bundle members in LAG or LACP</a>	The bundle members on the router are increased to 16. Also, the maximum number of supported subinterfaces per system is increased. This feature increases the performance and memory of the router.
<a href="#">Bundle Consistency Checker (BCC)</a>	<p>This feature provides an on-the-router mechanism to check and verify the correct programming for the bundle interface. The system performs the check on ingress and egress traffic. From the running configuration, BCC fetches information from bundle, sub-bundle, and member information and saves that information in a database. Later, BCC collects data from all the running nodes and verifies the information with the information that is saved in the database.</p> <p>BCC then reports inconsistencies, programming errors, stale entries, and deletes any pending objects.</p>
<a href="#">SPAN to File - PCAPng File Format</a>	<p>This feature introduces new format for recording packet traces. The network packets are mirrored to a file instead of an interface, so that they can be analyzed later. The PCAPng file format:</p> <ul style="list-style-type: none"> <li>• Provides the capability to enhance and extend the existing capabilities of data storage over time.</li> <li>• Allows you to merge or append data to an existing file.</li> <li>• Enables to read data independently from network, hardware, and operating system of the machine that made the capture.</li> </ul>
<b>Modular QoS</b>	
<a href="#">4K Pseudowire on Bundle with QoS Enhancement</a>	With this feature you can configure a desired traffic policy, to which your network complies, by using the bandwidth management technique of two-level traffic shaping. You can also increase the Link Aggregation Group (LAG) subinterface scale or pseudowires up to 4K. This increased scale value enables you to increase the number of devices that are connected to your router, resulting in benefits such as increased bandwidth and cost-effective operations.
<a href="#">Conditional Marking of MPLS Experimental Bits for EVPN-VPWS Single-Homing Services</a>	This feature enables you to differentiate traffic in the MPLS forwarding domain and manage traffic from ingress PE to egress PE based on the MPLS EXP bit of the MPLS header. This feature is supported only for EVPN-VPWS single-homing services, and not supported for EVPN-VPWS multi-homing services.
<a href="#">Scaling of Unique Ingress Policy Maps</a>	With this feature, unique policy maps associated to the same template are shared in TCAM, thus enabling scaling of—Or creating more number of—Policy maps.

Feature	Description
<a href="#">Shared Policy Instance</a>	This feature allows you to share a single instance of QoS policy across multiple subinterfaces, allowing for aggregate shaping of the subinterfaces to one rate. The ability to facilitate queue consumption in this manner offers the advantage of saving on QoS and hardware resources, while ensuring that the specified rate is not exceeded.
<b>Hardware</b>	
<a href="#">2-port 100-Gigabit Ethernet interface module</a>	The Cisco NCS 560-4 and NCS560-7 Routers now support 2-port 100-Gigabit Ethernet QSFP28 or QSFP-DD module pluggable optics (N560-IMA-2C-DD). This reduces the cost of hardware by retaining the same port density when combining multiple interface types such as 100GE. QSFP DD optics support is planned for future software release.
<a href="#">8-port 10-Gigabit Ethernet SFP+ interface module</a>	The Cisco NCS 560-4 and NCS560-7 Routers now support the new 8-port 10-Gigabit Ethernet SFP+ module (A900-IMA-8Z-L). This reduces the cost of hardware by retaining the same port density when combining multiple interface types such as 10GE.
<a href="#">Enable NCS 4200 Ethernet IMs for NCS 560</a>	The Cisco NCS 4200 Ethernet interface module features are now supported in Cisco NCS 560-4 routers. <ul style="list-style-type: none"> <li>• 2-port 100 Gigabit Ethernet QSFP-28 Module (NCS4200-2H-PQ)</li> <li>• 8-port 10 Gigabit Ethernet SFP+ Module (NCS4200-8T-PS)</li> <li>• 8/16-port 1 Gigabit Ethernet + 1-port 10 Gigabit Ethernet Module (NCS4200-1T16G-PS)</li> </ul>
<b>Segment Routing</b>	
<a href="#">Advertisement of SID-Mapping Entries Between IS-IS Levels</a>	This feature supports the advertisement of SID-mapping entries between IS-IS levels (for example, from L1 to L2-only and from L2 to L1). A mapping server is not required for each IS-IS area.
<a href="#">Cumulative Metric Bounds (Delay-Bound use-case)</a>	With this feature, SRTE calculates a shortest path that satisfies multiple metric bounds. This feature provides flexibility for finding paths within metric bounds, for parameters such as latency, hop count, IGP, and TE.
<a href="#">IPv6 Unlabeled Traffic protection with TI-LFA</a>	This feature adds support for IPv6 unlabeled traffic protection for IS-ISv6.
<a href="#">Link Delay Measurement with IPv6 Link Local Address</a>	With Performance Measurement, the source and destination IP addresses used in the OAM packet are determined by the IP address present on the interface where the delay-measurement operation is enabled. If an IPv4 or IPv6 address is not configured under the interface, this feature enables the use of the interface's IPv6 link-local address as the OAM packet source IP address.

Feature	Description
<a href="#">Multicast VPN: Tree-SID MVPN With TI-LFA</a>	With this feature, you can use SR for optimally transporting IP VPN multicast traffic between (BGP/MPLS) IP VPN customer sites, across an SP network. To optimize the traffic flow, SR-PCE is used. It dynamically builds, instantiates, and updates a multicast distribution tree on the multicast routers, through an SR policy.
<a href="#">OSPF: TI-LFA for Flexible Algorithm</a>	This feature extends the current TI-LFA functionality to support OSPF.
<a href="#">SR OAM for SR Policy (Policy Name / Binding SID / Custom label stack)</a>	This feature extends SR OAM ping and traceroute function for an SR policy (or binding SID)-LSP end-point combination. This addresses the limitations of the Nil-FEC LSP Ping and Traceroute function which cannot perform a ping operation to a segment list that is not associated with an installed SR policy. Also, it cannot validate egress device-specific SR policies.
<a href="#">SR Performance Measurement Named Profiles</a>	With this feature, users can create specific performance measurement delay profiles for SR policies, based on the interface type or network area the performance management probes are enabled on. This enhances performance measurement capabilities.
<a href="#">SRv6 Micro-Segment (uSID)</a>	<p>This feature is an extension of the SRv6 architecture. It leverages the existing SRv6 Network Programming architecture to encode up to 6 SRv6 Micro-SID (uSID) instructions within a single 128-bit IPv6 address, called the uSID Container. In addition, this feature leverages the existing the SRv6 data plane (SRH) and the SRv6 control plane with no changes. It also provides low MTU overhead. SRv6 uSID supports the following existing SRv6 functionality:</p> <ul style="list-style-type: none"> <li>• IS-IS: TI-LFA, Microloop Avoidance, Flexible Algorithm, OAM, Performance Measurement</li> <li>• QoS SRv6 BGP Services: IPv4 L3VPN Per-VRF</li> <li>• SRv6 BGP Services: BGP Global IPv4</li> </ul>
<a href="#">SRv6 Services: BGP Global IPv6</a>	With this feature, the egress PE can signal an SRv6 Service SID with the BGP overlay service route. The ingress PE encapsulates the IPv4/IPv6 payload in an outer IPv6 header where the destination address is the SRv6 Service SID provided by the egress PE. BGP messages between PEs carry SRv6 Service SIDs as a means to interconnect PEs.
<a href="#">SRv6 Services: IPv6 L3VPN</a>	With this feature, the egress PE can signal an SRv6 Service SID with the BGP overlay service route. The ingress PE encapsulates the IPv4/IPv6 payload in an outer IPv6 header where the destination address is the SRv6 Service SID provided by the egress PE. BGP messages between PEs carry SRv6 Service SIDs as a means to interconnect PEs and form VPNs.
<a href="#">Weighted Anycast SID-Aware Path Computation</a>	<p>This feature extends Anycast SIDs with weighted nodes.</p> <p>Weighted Anycast nodes advertise a cost (weight) along with the Anycast SID. Traffic is then distributed according to the weights.</p> <p>Weighted Anycast SIDs allow for highly available paths with node redundancy and path optimality that provide Fast ReRoute (FRR) for node failure of service provider edge (PE) routers and ABR/ASBRs nodes in multi-domain networks.</p>

Feature	Description
TI-LFA Open Ring Support	This feature allows the ABR to program a Generic Routing Encapsulation (GRE) tunnel as an outgoing interface for TI-LFA backup paths computed by the IGP in a Segment Routing network.
SR Policy Liveness Monitoring	This feature allows you to verify end-to-end traffic forwarding over an SR Policy candidate path by periodically sending performance monitoring packets.
<b>System Security</b>	
User Configurable Maximum Authentication Attempts for SSH	This feature allows you to set a limit on the number of user authentication attempts allowed for SSH connection, using the three authentication methods that are supported by Cisco IOS XR. The limit that you set is an overall limit that covers all the authentication methods together. If the user fails to enter the correct login credentials within the configured number of attempts, the connection is denied and the session is terminated. This command is introduced for this feature: <b>ssh server max-auth-limit</b> .
Ed25519 Public-Key Signature Algorithm Support for SSH	Support for this algorithm is added, when establishing SSH sessions, to Cisco IOS XR 64-bit platforms. It is a modern and secure public-key signature algorithm that provides several benefits, particularly resistance against several side-channel attacks. Prior to this release, DSA, ECDSA, and RSA public-key algorithms were supported. This command is modified for this feature: <b>ssh server algorithms host-key</b> .
Password Masking	With this feature, when you key in a password or secret, it is not displayed on the screen. This enhances security. The feature is enabled by default. The following options are added to the <b>username</b> command: <ul style="list-style-type: none"> <li>• masked-password</li> <li>• masked-secret</li> </ul>
Support for Ed25519 Public-Key Signature System	This feature allows you to generate and securely store crypto key pair for the Ed25519 public-key signature algorithm on Cisco IOS XR 64-bit platforms. This signature system provides fast signing, fast key generation, fool proof session keys, collision resilience, and small signatures. The feature also facilitates integration of Cisco IOS XR with Cisco Crosswork Trust Insights.  Commands introduced for this feature are: <ul style="list-style-type: none"> <li>• crypto key generate ed25519</li> <li>• crypto key zeroize ed25519</li> <li>• show crypto key mypubkey ed25519</li> </ul> Commands modified for this feature are: <ul style="list-style-type: none"> <li>• ca-keypair</li> <li>• keypair</li> </ul>
<b>Network Synchronization</b>	

Feature	Description
Network Synchronization	<p>The following features are supported on A900-IMA-8Z-L and NCS560-IMA-2C-DD interface modules:</p> <ul style="list-style-type: none"> <li>• PTP Telecom G.8262 Profile</li> <li>• PTP Telecom G.8275.1 and G.8275.2 Profiles and Frequency Synchronization</li> </ul>
PTP Delay Asymmetry	<p>Asymmetrical delays can significantly degrade synchronization in PTP networks and impact PTP accuracy. This feature allows you to set a delay asymmetry to offset the static delays on PTP paths. This facilitates better synchronization between real-time clocks of devices in a network.</p> <p>The <b>delay-symmetry</b> command is introduced for this feature.</p>
<b>L2VPN and Ethernet Services</b>	
<a href="#">EVPN Access-Driven DF Election</a>	<p>This feature enables a new DF election mechanism to allow the access network to control EVPN PE devices through the interface state. This mechanism allows the PE devices to define the backup path much before the event of failure. This feature reduces the convergence time. The following keywords are added to the <b>service-carving</b> command:</p> <p><b>preference-based</b></p> <p><b>access-driven</b></p>
<a href="#">EVPN Convergence Using NTP Synchronization</a>	<p>This feature leverages the NTP clock synchronization mechanism to handle the transfer of DF role from one edge device to another. In this mechanism, the newly added or recovered PE advertises the Service Carving Timestamp along with the current time to peering PEs. This improves convergence by reducing the time for DF election from three seconds to a few tens of milliseconds. The <b>show evpn ethernet-segment</b> command is modified to display the Service-Carving wall clock Timestamp (SCT).</p>
<a href="#">EVPN Preferred Nexthop</a>	<p>With this feature, you can set an active and backup path, in a dual-homed mode based on the nexthop IP address, thereby allowing greater control over traffic patterns. If you are unable to use single-active mode due to hardware, topology, or technological limitations, this feature enables you to direct traffic to a specific remote PE. This feature introduces the <b>preferred nexthop</b> command.</p>
<a href="#">Layer 2 Fast Reroute</a>	<p>In the event of a link failure, this feature enables the router to switch traffic quickly to a precomputed loop-free alternative (LFA) path by allocating a label to the incoming traffic. Thus minimizes the traffic loss ensuring fast convergence. This feature is supported only when PE devices are in an EVPN single-flow-active mode. This feature introduces the <b>convergence reroute</b> command.</p>
<b>MPLS</b>	
EoMPLS 16K Pseudowire scale	<p>This feature is now enhanced to support 16K Pseudowires for Ethernet-over-MPLS.</p>
<b>Multicast</b>	

Feature	Description
<a href="#">Bundle Member Selection</a>	This feature enables selecting a bundle member in the control plane to steer the L2 and L3 multicast traffic traversing over bundle at the egress NP. This feature helps optimize fabric bandwidth as the member selection is performed in the control plane.
Multicast Counters	When enabled, this feature provides information on the rate of packets that are received for a multicast route. Starting this release, the feature is extended on the Cisco NCS 560 series routers.

## Restrictions and Limitations on the Cisco NCS 560 Series Router

- 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.
- Unlabeled BGP PIC EDGE for global prefixes is not supported.

## Caveats

This section describes open and resolved severity 1 and 2 caveats and select severity 3 caveats:

- The “Open Caveats” sections list open caveats that apply to the current release and may apply to previous releases. A caveat that is open for a prior release and is still unresolved applies to all future releases until it is resolved.
- The “Resolved Caveats” sections list caveats resolved in a specific release, but open in previous releases.

The bug IDs are sorted alphanumerically.



### Note

The Caveats section includes the bug ID and a short description of the bug. For details on the symptoms, conditions, and workaround for a specific caveat you must use the Bug Search Tool.

## Cisco IOS XR Caveats Release 7.3.1

There are no caveats for this release.

## Bug Search Tool

Use the [Cisco Bug Search Tool](#) to access open and resolved bugs for a release.

The tool allows you to search for a specific bug ID, or for all bugs specific to a product and a release.

## Supported Packages and System Requirements

For more information on system upgrade and package installation process, see [Perform System Upgrade and Install Feature Packages](#).

For a complete list of supported optics, hardware and ordering information, see the [Cisco NCS 560 Series Routers Interface Modules Data Sheet](#) and [Cisco Network Convergence System 560-4 Router Data Sheet](#).

To install the Cisco NCS 560 Series Routers, see [Cisco N560-RSP4 and Cisco N560-RSP4-E Route Processor Hardware Installation Guide](#) and [Cisco NCS 560-4 Router Hardware Installation Guide](#).

## Release 7.3.1 Packages

This following table lists the supported packages and their corresponding file names.

**Table 1: Release 7.3.1 Packages for Cisco NCS 560 Series Router**

Composite Package		
Feature Set	Filename	Description
Cisco IOS XR IP Unicast Routing Core Bundle	ncs560-mini-x-7.3.1.iso	Contains base image contents that includes: <ul style="list-style-type: none"> <li>• Host operating system</li> <li>• System Admin boot image</li> <li>• IOS XR boot image</li> <li>• BGP packages</li> <li>• OS</li> <li>• Admin</li> <li>• Base</li> <li>• Forwarding</li> <li>• Modular Services Card</li> <li>• Routing</li> <li>• SNMP Agent</li> <li>• Alarm Correlation</li> </ul>
Cisco IOS XR Manageability Package	ncs560-mgbl-2.0.0.0-r731.x86_64.rpm	Telemetry, Extensible Markup Language (XML), Parser, and HTTP server packages, NETCONF, YANG Models, gRPC.
Cisco IOS XR OSPF package	ncs560-ospf-2.0.0.0-r731.x86_64.rpm	Supports OSPF
Cisco IOS XR Security Package	ncs560-k9sec-2.0.0.0-r731.x86_64.rpm	Support for Encryption, Decryption, Secure Shell (SSH), Secure Socket Layer (SSL), and Public-key infrastructure (PKI)



Composite Package		
Feature Set	Filename	Description
Multicast Package	ncs560-mcast-2.0.0.0-r731.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.
Cisco IOS XR ISIS package	ncs560-isis-2.0.0.0-r731.x86_64.rpm	Supports Intermediate System to Intermediate System (IS-IS).
Cisco IOS XR USB Boot Package	ncs560-usb_boot-7.3.1.zip	Supports Cisco IOS XR USB Boot Package
Cisco IOS XR MPLS Package	ncs560-mpls-1.0.0.0-r731.x86_64.rpm ncs560-mpls-te-rsvp-2.0.0.0-r731.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-r731.x86_64.rpm	Lawful Intercept
Cisco IOS XR EIGRP Package	ncs560-eigrp-1.0.0.0-r731.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:R3_PE3_RSP4#show version
Cisco IOS XR Software, Version 7.3.1
Copyright (c) 2013-2021 by Cisco Systems, Inc.
```

Build Information:

```
Build By      : ingunawa
Build On     : Thu Feb 25 19:40:08 PST 2021
Build Host   : iox-ucs-024
Workspace    : /auto/srcarchive17/prod/7.3.1/ncs560/ws
Version      : 7.3.1
```

## Determine Firmware Support

```

Location      : /opt/cisco/XR/packages/
Label        : 7.3.1

```

```

cisco NCS-560 () processor
System uptime is 19 hours 53 minutes

```

## Determine Firmware Support

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

```
RP/0/RP0/CPU0:R3_PE3_RSP4#show hw fpd
```

```
Auto-upgrade:Disabled
```

```

                                FPD Versions
                                =====
Location   Card type           HWver FPD device           ATR Status   Running Programd
-----
0/0        A900-IMA8CS1Z-M           0.0   IMFPGA                 CURRENT      1.96        1.96
0/1        A900-IMA8CS1Z-M           0.0   IMFPGA                 CURRENT      1.96        1.96
0/2        A900-IMA8CS1Z-M           0.0   IMFPGA                 CURRENT      1.96        1.96
0/3        A900-IMA8CS1Z-M           0.0   IMFPGA                 CURRENT      1.96        1.96
0/4        A900-IMA8Z                0.0   IMFPGA                 CURRENT      17.05       17.05
0/5        A900-IMA8Z-L              0.0   IMFPGA                 CURRENT      1.48        1.48
0/7        N560-IMA2C-DD             0.0   IMFPGA                 CURRENT      1.26        1.26
0/9        N560-IMA1W                65.32 CFP2-DE-DCO           CURRENT      38.26887    38.26887
0/9        N560-IMA1W                0.0   IMFPGA                 CURRENT      1.26        1.26
0/10       A900-IMA8Z                0.0   IMFPGA                 CURRENT      17.05       17.05
0/11       A900-IMA8Z-L              0.0   IMFPGA                 CURRENT      1.48        1.48
0/12       A900-IMA8CS1Z-M           0.0   IMFPGA                 CURRENT      1.96        1.96
0/13       A900-IMA8CS1Z-M           0.0   IMFPGA                 CURRENT      1.96        1.96
0/14       NCS4200-1T16G-PS         0.0   IMFPGA                 CURRENT      1.96        1.96
0/15       A900-IMA8CS1Z-M           0.0   IMFPGA                 CURRENT      1.96        1.96
0/RP0     N560-RSP4-E              0.0   ADM                    CURRENT      1.06        1.06
0/RP0     N560-RSP4-E              0.0   IOFPGA                CURRENT      0.64        0.64
0/RP0     N560-RSP4-E              0.0   PRIMARY-BIOS          CURRENT      0.17        0.17
0/RP0     N560-RSP4-E              0.0   SATA                  CURRENT      2.10        2.10
0/RP1     N560-RSP4-E              0.0   ADM                    CURRENT      1.06        1.06
0/RP1     N560-RSP4-E              0.0   IOFPGA                CURRENT      0.64        0.64
0/RP1     N560-RSP4-E              0.0   PRIMARY-BIOS          CURRENT      0.17        0.17
0/RP1     N560-RSP4-E              0.0   SATA                  CURRENT      2.10        2.10
0/FT0     N560-FAN-H               1.0   PSOC                  CURRENT      2.02        2.02
RP/0/RP0/CPU0:R3_PE3_RSP4#

```

## Other Important Information

### 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

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\_7.3.1.tar* file.

## Additional References

### Supported MIBs

The Cisco NCS 5500 MIB support list is also applicable to the Cisco NCS 560 Series Routers. For the list of supported MIBs, see the [Cisco NCS5500 MIB Support List](#).

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