# Release Notes for Cisco NCS 560 Series Routers, Cisco IOS XR Release 7.3.2

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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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**Note** Cisco IOS XR Release 7.3.2 is an Extended Maintenance Release of Cisco IOS XR Release 7.3.1 for Cisco NCS 560 Series routers. For more details on the Cisco IOS XR release model and associated support, see Guidelines for Cisco IOS XR Software.

## What's New in Cisco IOS XR Release 7.3.2

| Feature | Description |
|---|---|
| **System Setup** | |
| FPD Auto Upgrade | This functionality enables automatic upgrade and reload for field-programmable devices (FPDs) whenever the Cisco IOS XR image has a newer FPD version. This functionality upgrades all route processor FPDs simultaneously while displaying upgrade triggers on the console. |
| **System Security** | |

| Feature | Description |
|---|---|
| SSH Port Forwarding | With this feature enabled, the SSH client on a local host forwards the traffic coming on a given port to the specified host and port on a remote server, through an encrypted SSH channel. Legacy applications that do not otherwise support data encryption can leverage this functionality to ensure network security and confidentiality to the traffic that is sent to remote application servers.<br>This feature introduces the ssh server port-forwarding local command. |
| **BGP** | |
| BGP PIC: Export of Backup Path Agnostic to its Multipath Eligibility | Prior to this release, you could only import the backup paths of a prefix to the respective VRFs only when the backup paths are multipath eligible. For backup paths to be multipath eligible, all the following attributes in the backup paths must be the same: weight, local preference, autonomous system path, origin code, Multi Exit Discriminator (MED), and Interior Gateway Protocol (iGP) distance. Also, the next hop router for each multipath must be different. This feature introduces flexibility to allow the import of backup paths to the VRF even if the said attributes are not the same. |
| **Programmability** | |
| Cisco IOS XR mpls-ping-act and Cisco IOS XR mpls-traceroute-act YANG data model | This feature introduces the Cisco-IOS-XR-mpls-ping-act and Cisco-IOS-XR-mpls-traceroute-act YANG data models to accommodate OAM RPCs for MPLS and SR-MPLS.<br>You can access these Cisco IOS XR native data models from the Github repository. |
| **Routing** | |
| Fast Path - Graceful Conflict Identification or Resolution for Encapsulation-ID | |
| **Segment Routing** | |
| Autoroute Include | This feature allows you to steer specific IGP (IS-IS, OSPF) prefixes, or all prefixes, over non-shortest paths and to divert the traffic for those prefixes on to an SR-TE policy. |
| SRv6/MPLS L3 Service Interworking Gateway (SRv6 Micro-SID) | This feature enables you to extend L3 services between MPLS and SRv6 domains by providing service continuity on the control plane and data plane.<br>This feature allows for SRv6 L3VPN domains to interwork with existing MPLS L3VPN domains. The feature also allows a way to migrate from MPLS L3VPN to SRv6 L3VPN. |
| SRv6/MPLS Dual-Connected PE (SRv6 Micro SID) | This feature allows a PE router to support IPv4 L3VPN services for a given VRF with both MPLS and SRv6. This is MPLS and SRv6 L3VPNv4 co-existence scenario and is sometimes referred to as dual-connected PE. |

| Feature | Description |
|---|---|
| BGP-LU Inter-AS Option-C Interworking with LDP and IGP SR-MPLS using Proxy BGP-SR | This feature extends the current Proxy BGP-SR functionality by allowing the BGP-LU ASBR router with Proxy BGP-SR configured to also interconnect attached LDP domains.<br>The Proxy BGP-SR feature allows interconnection of IGP SR-MPLS domains and legacy domains via BGP-LU Inter-AS option-C. It provides a prefix-to-SID mapping for BGP-LU prefixes that are learned without a Prefix-SID. |
| L3VPN BGP PIC over SR-TE | This feature provides BGP PIC support for L3VPN over SR policies. BGP PIC provides fast convergence when traffic switches from a primary path to a backup path.<br>BGP PIC over SR-TE is supported when both primary and backup paths each resolve into the BSID of an SR policy. |
| SR-TE BGP Soft Next-Hop Validation For ODN Policies | This feature addresses BGP Next-Hop reachability issues through BGP Next-Hop soft validation, and also enhances BGP best path selection.<br>• **nexthop validation color-extcomm disable**<br>• **nexthop validation color-extcomm sr-policy**<br>• **bgp bestpath igp-metric sr-policy** |
| SR-TE PCE Groups | This feature allows an SR policy to be delegated to a set of PCE servers configured under a PCE group. Multiple PCE groups can be configured to allow SR policies on the same head-end to be delegated to different sets of PCEs.<br>With this functionality, an operator can designate sets of PCEs for various purposes, such as PCE-per-service-type or PCE-per-wholesale-customers. |
| SR-PCE: North-Bound API for SRv6 and Flexible Algorithm in Cisco Optimization Engine (COE) v3.0 release | The SR-PCE provides a north-bound HTTP-based API to allow communication between SR-PCE and external clients and applications. The Cisco Crosswork Optimization Engine is an application that leverages the SR-PCE.<br>This release adds support for the following:<br>• Reporting of Flexible Algorithm participation and definitions<br>• SRv6 topology information (nodes, links, Node uSIDs and Adj uSIDs)<br>• SRv6 uSID list and uB6 SIDs allocated for a policy<br>For more information, refer to the Cisco Crosswork Optimization Engine User Guides. |
| IP Endpoint Delay Measurement and Liveness Monitoring | This feature measures the end-to-end delay and monitors liveness of a specified IP endpoint node, including VRF-aware (awareness of multiple customers belonging to different VRFs).<br>This feature is supported on IPv4, IPv6, and MPLS data planes. |
| OSPF: Microloop Avoidance for Flexible Algorithm | This feature extends the current OSPF Flexible Algorithm functionality to support Microloop Avoidance. |

| Feature | Description |
|---|---|
| SRv6TE Phase1: PCC/PCE (PCEPv6) uSID Introduction - PCE Delegated, Constraints: Disjoint, affinity, Metric: IGP, TE, Latency, L3 Services ODN/AS | This feature brings the Segment Routing Traffic Engineering features to the SRv6 data plane.<br>This release supports the following features:<br>• SRv6-TE with SRv6 micro-SIDs (uSIDs)<br>• SRv6 policies<br>• Manual SRv6 policies<br>• On-Demand SRv6 policies - SR On-Demand Next-Hop (SR-ODN)<br>• Automated steering for Layer 3-based BGP services (IPv4 L3VPN, IPv6 L3VPN, IPv4 BGP global, IPv6 BGP global)<br>• SRv6-aware Path Computation Element (PCE)<br>• PCEPv6<br>• Path computation optimization objectives (TE, IGP, latency)<br>• Path computation constraints (affinity, disjointness) |

## 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 7.3.2

| Caveat ID Number | Description |
|---|---|
| CSCvy13197 | Telemetry Syslog events are not received by telemetry client. |

## 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 7.3.2 Packages

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

*Table 1: Release 7.3.2 Packages for Cisco NCS 560 Series Router*

| **Composite Package** | | |
|---|---|---|
| **Feature Set** | **Filename** | **Description** |
| Cisco IOS XR IP Unicast Routing Core Bundle | ncs560-mini-x-7.3.2.iso | Contains base image contents that includes:<br>• Host operating system<br>• System Admin boot image<br>• IOS XR boot image<br>• BGP packages<br>• OS<br>• Admin<br>• Base<br>• Forwarding<br>• Modular Services Card<br>• Routing<br>• SNMP Agent<br>• Alarm Correlation |
| Cisco IOS XR Manageability Package | ncs560-mgbl-2.0.0.0-r732.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-r732.x86_64.rpm | Supports OSPF |
| Cisco IOS XR Security Package | ncs560-k9sec-2.0.0.0-r732.x86_64.rpm | Support for Encryption, Decryption, Secure Shell (SSH), Secure Socket Layer (SSL), and Public-key infrastructure (PKI) |
| Multicast Package | ncs560-mcast-2.0.0.0-r732.x86_64.rpm | Supports Multicast<br>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-2.0.0.0-r732.x86_64.rpm | Supports Intermediate System to Intermediate System (IS-IS). |
| Cisco IOS XR USB Boot Package | ncs560-usb_boot-7.3.2.zip | Supports Cisco IOS XR USB Boot Package |
| Cisco IOS XR MPLS Package | ncs560-mpls-1.0.0.0-r732.x86_64.rpm<br>ncs560-mpls-te-rsvp-2.0.0.0-r732.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.<br>Cisco IOS XR MPLS-TE and RSVP Package<br>MPLS Traffic Engineering (MPLS-TE) and Resource Reservation Protocol (RSVP). |
| Cisco IOS XR LI Package | ncs560-li-1.0.0.0-r732.x86_64.rpm | Lawful Intercept |
| Cisco IOS XR EIGRP Package | ncs560-eigrp-1.0.0.0-r732.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
Fri Oct 15 13:23:14.591 IST
Cisco IOS XR Software, Version 7.3.2
Copyright (c) 2013-2021 by Cisco Systems, Inc.

Build Information:
 Built By     : ingunawa
 Built On     : Wed Oct 13 20:37:50 PDT 2021
 Built Host   : iox-ucs-024
 Workspace    : /auto/srcarchive17/prod/7.3.2/ncs560/ws
 Version      : 7.3.2
 Location     : /opt/cisco/XR/packages/
 Label        : 7.3.2

cisco NCS-560 () processor
System uptime is 12 hours 58 minutes
```

## Determine Firmware Support

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

```
RP/0/RP0/CPU0:RSP4-PE4#sh fpd package
Fri Oct 15 13:23:20.682 IST

================================ ============================================
                                        Field Programmable Device Package
                                 ============================================
                                          Req      SW       Min Req   Min Req
Card Type            FPD Description      Reload   Ver      SW Ver    Board Ver
================== ========================== ====== ======= ======== =========
------------------------------------------------------------------------------
A900-IMA8CS1Z-CC     IMFPGA                    YES     1.102     1.102     0.0
------------------------------------------------------------------------------
A900-IMA8CS1Z-M      IMFPGA                    YES     1.102     1.102     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     1.49      1.49      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      1.23      1.23      0.0
------------------------------------------------------------------------------
A907-FAN-E           PSOC(A)                   NO      1.65      1.65      0.0
                     PSOC(A)                   NO      1.66      1.66      0.4
------------------------------------------------------------------------------
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-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-RSP4          ADM(A)                    NO      1.06      1.06      0.0
                     IOFPGA(A)                 YES     0.64      0.64      0.0
                     PRIMARY-BIOS(A)           YES     0.21      0.21      0.0
                     SATA(A)                   NO      2.10      2.10      0.0
------------------------------------------------------------------------------
N560-4-RSP4-CC       ADM(A)                    NO      1.06      1.06      0.0
                     IOFPGA(A)                 YES     0.64      0.64      0.0
                     PRIMARY-BIOS(A)           YES     0.21      0.21      0.0
                     SATA(A)                   NO      2.10      2.10      0.0
------------------------------------------------------------------------------
N560-4-RSP4E         ADM(A)                    NO      1.06      1.06      0.0
                     IOFPGA(A)                 YES     0.64      0.64      0.0
                     PRIMARY-BIOS(A)           YES     0.21      0.21      0.0
                     SATA(A)                   NO      2.10      2.10      0.0
------------------------------------------------------------------------------
N560-4-RSP4E-CC      ADM(A)                    NO      1.06      1.06      0.0
                     IOFPGA(A)                 YES     0.64      0.64      0.0
                     PRIMARY-BIOS(A)           YES     0.21      0.21      0.0
                     SATA(A)                   NO      2.10      2.10      0.0
------------------------------------------------------------------------------
N560-FAN-H           PSOC(A)                   NO      2.02      2.02      0.0
------------------------------------------------------------------------------
N560-IMA-8Q/4L       IMFPGA                    YES     1.08      1.08      0.0
------------------------------------------------------------------------------
N560-IMA1W           CFP2-D-DCO                NO     38.2739   38.2739    0.0
                     CFP2-DE-DCO               NO     38.2739   38.2739    0.0
                     CFP2-DET-DCO              NO     38.2739   38.2739    0.0
```

```
                    CFP2-DETS-DCO             NO     38.2739   38.2739    0.0
                    CFP2-DS-DCO               NO     38.2739   38.2739    0.0
                    CFP2-DS100-DCO            NO     38.2739   38.2739    0.0
                    IMFPGA                    YES     1.28      1.28      0.0
--------------------------------------------------------------------------------
N560-IMA2C          IMFPGA                    YES     5.07      5.07      0.0
--------------------------------------------------------------------------------
N560-IMA2C-CC       IMFPGA                    YES     5.07      5.07      0.0
--------------------------------------------------------------------------------
N560-IMA2C-DD       IMFPGA                    YES     1.28      1.28      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     0.64      0.64      0.0
                    PRIMARY-BIOS(A)           YES     0.21      0.21      0.0
                    SATA(A)                   NO      2.10      2.10      0.0
--------------------------------------------------------------------------------
N560-RSP4-E         ADM(A)                    NO      1.06      1.06      0.0
                    IOFPGA(A)                 YES     0.64      0.64      0.0
                    PRIMARY-BIOS(A)           YES     0.21      0.21      0.0
                    SATA(A)                   NO      2.10      2.10      0.0
--------------------------------------------------------------------------------
NCS4200-1T16G-PS    IMFPGA                    YES     1.102     1.102     0.0
--------------------------------------------------------------------------------
NCS4200-2H-PQ       IMFPGA                    YES     5.07      5.07      0.0
--------------------------------------------------------------------------------
NCS4200-8T-PS       IMFPGA                    YES    17.05     17.05      0.0

RP/0/RP0/CPU0:RSP4-PE4#sh hw-module location all fpd
Fri Oct 15 13:23:33.939 IST

Auto-upgrade:Enabled

                                                                    FPD Versions
                                                                    ============
Location   Card type              HWver FPD device       ATR Status    Running   Programd
--------------------------------------------------------------------------------------
0/0        A900-IMA8CS1Z-M        0.0   IMFPGA               CURRENT     1.102     1.102
0/2        A900-IMA8CS1Z-M        0.0   IMFPGA               CURRENT     1.102     1.102
0/4        A900-IMA8Z             0.0   IMFPGA               CURRENT    17.05     17.05
0/5        A900-IMA8Z             0.0   IMFPGA               CURRENT    17.05     17.05
0/7        N560-IMA2C             0.0   IMFPGA               CURRENT     5.11      5.11
0/9        N560-IMA2C-DD          0.0   IMFPGA               CURRENT     1.28      1.28
0/10       A900-IMA8Z-L           0.0   IMFPGA               CURRENT     1.49      1.49
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     0.21      0.21
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     0.21      0.21
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
```

# 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_7.3.2.tar* file.

## Use user-class Option 'xr-config' Instead Of 'exr-config' To Provision ZTP

In Cisco IOS XR Release 7.3.1 and earlier, the system accepts the device sending **user-class = "exr-config"**; however starting Cisco IOS XR Release 7.3.2 and later, you must use only **user-class = "xr-config"**.

In Cisco IOS XR Release 7.3.2 and later, use:

```
host cisco-rp0 {
   hardware ethernet e4:c7:22:be:10:ba;
   fixed-address 172.30.12.54;
   if exists user-class and option user-class = "iPXE" {
      filename = "http://172.30.0.22/boot.ipxe";
   } elsif exists user-class and option user-class = "xr-config" {
      filename = "http://172.30.0.22/scripts/cisco-rp0_ztp.sh";
   }
}
```

# 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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