Release Notes for Cisco NCS 540 Series Routers, Cisco IOS XR Release 25.4.1

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Cisco NCS 540 Series Routers, Release 25.4.1

Cisco IOS XR Release 25.4.1 is a new feature release for Cisco NCS 540 Series routers.

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

New software features

This section provides a brief description of the new software features introduced in this release.

Table 1. New software features for Cisco NCS 540 Series Routers, Release 25.4.1

Product impact	Feature	Description
IP Addresses and Services		
Software Reliability	Dynamic Address Resolution Protocol (ARP) Inspection	Support for this feature is now extended to these variants: * N540X-16Z4G8Q2C-A/D * N540X-16Z8Q2C-D * N540X-12Z16G-SYS-A/D * N540X-4Z14G2Q-A/D * N540X-8Z16G-SYS-A/D * N540X-6Z18G-SYS-A/D * N540X-16Z4G8Q2C-A/D * N540X-16Z8Q2C-D * N540X-12Z16G-SYS-A/D * N540X-4Z14G2Q-A/D * N540X-8Z16G-SYS-A/D
Software Reliability	IP source guard	Support for this feature is now extended to these variants: * N540X-16Z4G8Q2C-A/D * N540X-16Z8Q2C-D * N540X-12Z16G-SYS-A/D * N540X-4Z14G2Q-A/D * N540X-8Z16G-SYS-A/D * N540X-6Z18G-SYS-A/D * N540X-16Z4G8Q2C-A/D * N540X-16Z8Q2C-D * N540X-12Z16G-SYS-A/D * N540X-4Z14G2Q-A/D * N540X-8Z16G-SYS-A/D
Software Reliability	DHCP snooping	Support for this feature is now extended to these variants: * N540X-16Z4G8Q2C-A/D * N540X-16Z8Q2C-D * N540X-12Z16G-SYS-A/D * N540X-4Z14G2Q-A/D * N540X-8Z16G-SYS-A/D * N540X-6Z18G-SYS-A/D * N540X-16Z4G8Q2C-A/D * N540X-16Z8Q2C-D * N540X-12Z16G-SYS-A/D * N540X-4Z14G2Q-A/D * N540X-8Z16G-SYS-A/D
Interface and Hardware Component		
Software Reliability	Restore timer configuration	This feature stabilizes your network performance by allowing you to configure the restore timer per service individually.

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Product impact	Feature	Description
		The default value is 3.5 times of the CCM packet interval.
L2VPN		
Ease of Use	Layer 3 EVPN IGMP and MLD state synchronization	You can ensure seamless and reliable multicast delivery in residential FTTH networks with IGMP and MLD state synchronization for L3 using EVPN. This feature synchronizes IPv4 IGMP and IPv6 Multicast Listener Discovery (MLD) states across multiple PE devices using L3 sub-interfaces, eliminating the need for complex L2 or IRB configurations. It supports both VRF and global routing table deployments, providing flexibility for various network designs.
Software Reliability	Configure EVPN IRB	You can configure EVPN IRB over an SRv6 core to provide seamless Layer 2 and Layer 3 connectivity between distributed sites using SRv6 as the transport.
Licensing		
Licensing Process	Smart Licensing perpetual mode	Smart Licensing perpetual mode offers flexibility for customer purchasing pay-as-you-grow FCM licenses while supporting accurate license management. These customers are now required to deploy Smart Licensing and report utilization based on honor. Enforcement actions will not be triggered for non-compliance. Customers with Perpetual licenses that cover the entire chassis, or all line cards are exempt from Smart Licensing and reporting requirements. This update streamlines compliance and reduces administrative overhead for Perpetual license holders.
MPLS		
Software Reliability	MPLS-TE IPv6-only autoroute announce	This feature allows you to disable IPv4 autoroute announce without turning off autoroute announce entirely. To achieve IPv6-only announcements over MPLS-TE tunnels, use the new **exclude-ipv4** option along with the **include-ipv6** option in the autoroute announce configuration.
Modular QoS		
Upgrade	Ingress QoS policer scale enhancement	Introduced in this release on NCS 540 fixed routers (select variants only*) You can now configure a maximum of 16,000 ingress QoS policers. With more QoS policers, you can apply policies on more ingress L2 sub-interfaces, improving traffic control and service differentiation at scale. This is achieved by reallocating statistics resources from other features, allowing policer statistics to be assigned where scale demands are highest. *This feature is supported on N540-24Q8L2DD-SYS and N540-24Q2C2DD-SYS.
Network Synchronization		
Software Reliability	Synchronous Ethernet ESMC and SSM on N540X-6Z6G-SYS	SyncE provides synchronization signals transmitted over the Ethernet physical layer to downstream devices, while the Synchronization Status Message (SSM) indicates the quality level of the transmitting clock to the neighboring nodes, informing the

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Product impact	Feature	Description
		nodes about the level of the network's reliability. Ethernet Synchronization Message Channel (ESMC) is the logical channel that uses an Ethernet PDU (protocol data unit) to exchange SSM information over the SyncE link. G.8262 and G.8264 synchronous ethernet ESMC and SSM are now supported on N540X-6Z6G-SYS For 1G ports, SyncE clock recovery is not supported.
Software Reliability	PTP profiles support on N540X-6Z6G-SYS	Based on the IEEE 1588-2008 standard, Precision Time Protocol (PTP) is a protocol that defines a method to synchronize clocks in a network for networked measurement and control systems. G.8265.1,G.8275.1,G.8275.2, and G.8273.2(Class C) PTP profiles are now supported on the following Cisco NCS 540 router variant: * N540X-6Z6G-SYS
System Monitoring		
Software reliability	Insecure features warning syslog messages	The Cisco IOS XR software displays a warning syslog message when you run an insecure command. The warning syslog appears each time when you execute an insecure command, alerting you to potential security risks and suggesting safer alternatives so you can take action to improve your router and network security. Cisco will systematically deprecate the insecure features and protocols from the IOS XR software and will eventually remove them in future releases.
System Security		
Software Reliability	Netconf access controls	This feature blocks Netconf requests from specific IP addresses on the SSH port. You can use ACLs to specify which addresses are blocked for Netconf. Blocked IP addresses can still use other SSH services like SCP and SFTP. If your address is blocked, you cannot use Netconf over SSH. After you authenticate over SSH, Netconf requests are denied, but you can use other SSH-based services.
Ease of Setup	TLS RFC 5289 compliance for security template framework	The security template framework is based on RFC 5289, which specifies new cipher suites for the Transport Layer Security (TLS) protocol. This feature supports Common Criteria (CC) mode which is an enhanced security mode that enforces stricter compliance-focused behavior. It enhances TLS security by introducing stronger Elliptic Curve Cryptography (ECC) algorithms.
Ease of Setup	Security template framework for TLS enabled applications	Security templates reduce misconfiguration risks and operational overhead by centralizing and standardizing security policy configuration for TLS-enabled applications. A security template bundles certificate authentication policy, TLS controls, and compliance mode settings. It acts as a single source of truth that applications reference, avoiding local embedding of security settings. This template defines how certificates are handled and controls various aspects of the TLS handshake.
Timing and Synchronization		
Ease of Use	Synchronous Ethernet ESMC and SSM on N540-24Q8L2DD-SYS	With Enhanced SyncE (eSyncE) and Extended Ethernet Synchronization Message Channel (eESMC) support, the NCS 540 Series Routers are capable of handling the following SyncE clocks on the network: * Enhanced primary reference clock (ePRC)

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Product impact	Feature	Description
		* Enhanced primary reference timing clock (ePRTC) In this release, eSyncE and eESMC are supported on this Cisco NCS 540 router variant: * N540-24Q8L2DD-SYS
Ease of Use	PTP profiles support on N540-24Q8L2DD-SYS	Based on the IEEE 1588-2008 standard, Precision Time Protocol (PTP) is a protocol that defines a method to synchronize clocks in a network for networked measurement and control systems. This feature is now extended to N540-24Q8L2DD-SYS. For support for Class C PTP is extended to N540-24Q8L2DD-SYS.

New hardware

This section provides a brief description of the new hardware features introduced in this release.

Table 2. New hardware for Cisco NCS 540 Series Routers, Release 25.4.1

Hardware	Description
Cisco N540X-6Z6G-SYS small density router	The Cisco N540X-6Z6G-SYS small density router supports: • 6x1G SFP ports SFP ports: The Small Form-factor Pluggable (SFP) port that supports 1 Gpbs data rate. • 6x1G/10G SFP+ ports SFP ports: The dual rate Small Form-factor Pluggable plus (SFP +) port that supports 1 or 10 Gpbs data rate.

Changes in behavior

This section provides a brief description of the behavior changes introduced in this release.

- Starting with Release 25.4.1, IOS XR software no longer supports Call Home transport mode for Licensing. Please configure CSLU or Smart Transport to ensure seamless operation of the licensing solution.
- The outgoing-interface leaf of Cisco-IOS-XR-mpls-forwarding-oper has been updated to include the full outgoing interface name instead of the shortened interface name.
- **Deprecation and phasing out features with insecure capabilities and its secure alternatives**
  From Release 25.4.1, Cisco IOS XR software displays warning messages when you configure features or protocols that lack sufficient security, such as those that transmit sensitive data without encryption or use outdated encryption mechanisms. The software also shows warnings when you do not follow security best practices, and it provides suggestions for secure alternatives.

  This list may change, but Cisco plans to generate warnings for the following features and protocols from Release 25.4.1. Each Release Notes will describe the exact changes for that version.
  These documents list all features planned for removal, including insecure commands, and provide recommended secure alternatives to help you maintain network security and compliance.

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- Feature deprecation phasing out insecure capabilities
- Feature deprecation and removal details
- Feature removal and suggested alternatives

Table 3. Deprecation and phasing out features with insecure capabilities and its secure alternatives

If you are using the following insecure features...	Then follow these secure alternatives...
HTTP	Use HTTPS.
FTP client install FTP install TFTP	Use SFTP.
IPV4 source route	There is no alternative. Do not enable IPv4 source routing.
Telnet client Telnet dscp	There is no alternative. Do not use Telnet client.
Telnet server	Use SSH.
TFTP client	Use SFTP.
TFTP server	Use SSH.
copy ftp copy ftp running-config copy running-config ftp copy running-config tftp copy tftp copy tftp running-config copy xml-schema tftp	Use SFTP or SCP.
install FTP install TFTP	Use SFTP.
TCP or UDP small_servers	There is no alternative. Do not use TCP or UDP small_servers.
SSHv1	Use ssh server v2.
SSH host-key DSA algorithm	Use ECDSA, ED25519, or RSA and so on.
Syslog TLS Version 1.1 (server1)	Configure TLS Version 1.2 or higher.
TLS 1.0 TLS 1.1	Use TLS 1.2 or TLS 1.3.
utility mv ftp utility mv tftp	There is no alternative. Do not use utility mv ftp and utility mv tftp.

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If you are using the following insecure features...	Then follow these secure alternatives...
load ftp load tftp load script ftp load script tftp load diff ftp load diff tftp load diff reverse ftp load diff reverse tftp	Use scp or sftp.
tacacs and radius server with type-7 shared secret	Use type 6 secret.
NTPv2 NTPv3	Use NTPv4.

Open issues

Table 4. Open issues for Cisco NCS 540 Series Routers, Release 25.4.1

Bug ID	Description
CSCwr03926	NTP warning when you enable no authentication or MD5 authentication

Known issues

- During the software upgrade to 25.4.1, the system may not complete the Auto-FPD upgrade as expected. After the software upgrade, the FPD status shows 'RLOAD REQ', indicating that you must perform an additional reload to activate the updated FPD.
- 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.
- Autonegotiation is disabled by default on the fixed GigE - 0/0/0/0 - 0/0/0/4 copper ports of N540X-16Z4G8Q2C-A/D and N540X-12Z16G-SYS-A/D router variants. To enable autonegotiation, use the **negotiation auto** command.
- If you're migrating from previous XR versions, then you must enable autonegotiation for fixed copper ports using the **negotiation auto** command before performing the software upgrade to avoid any links going down.
- Enabling or disabling frame preemption on the Time Sensitive Networking (TSN) port results in traffic drop for N540-FH-CSR-SYS. The port Twenty Five G0/0/12 is used as the TSN port.
- Fabric multicast queue stats are not supported in N540X-8Z16G-SYS-A/D, N540X-6Z18G-SYS-A/D, N540-6Z14S-SYS-D, N540-6Z18G-SYS-A/D, and N540X-4Z14G2Q-A/D variants.
- Unlabeled BGP PIC EDGE for global prefixes is not supported.
- The interface ports 0/0/0/24 to 0/0/0/31 do not support 1G Copper SFPs on N540-24Z8Q2C-SYS, N540-ACC-SYS, and N540X-ACC-SYS variants. Also, these ports do not support Auto-Negotiation with 1GE optical SFPs and they cannot act as 1GE Synchronous Ethernet sources.

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- The interface ports 0/0/0/20 to 0/0/0/27 do not support 1G Copper SFPs on N540X-16Z4G8Q2C-A, N540X-16Z8Q2C-D, and N540X-16Z4G8Q2C-D variants. Also, these ports do not support Auto-Negotiation with 1GE optical SFPs and they cannot act as 1GE Synchronous Ethernet sources.
- The 1G ports on the N540-24Q8L2DD-SYS variant do not support Auto-Negotiation with 1GE optical SFPs.
- Remove the speed settings on the 1G Copper optics when 10M/100M is configured and replaced with 1G SFP optics.
- The **hw-module profile mfib statistics** command is not supported.

Compatibility

Compatibility Matrix for EPNM and Crosswork with Cisco IOS XR Software

The compatibility matrix lists the version of EPNM and Crosswork that are supported with Cisco IOS XR Release in this release.

Table 5. Compatibility Matrix for Cisco NCS 540 Series Routers, Release 25.4.1

Cisco IOS XR	Crosswork	EPNM
Release 25.4.1	Crosswork Optimization Engine 6.0	Evolved Programmable Network Manager 8.1.1

System requirements

Use the **show hw-module fpd** command in EXEC and Admin mode to view the hardware components with their current FPD version and status. The status of the hardware must be CURRENT; Running and Programmed version must be the same. You can also use the `show fpd package` command in Admin mode to check the fpd versions.

Software Version

To verify the software version running on the router, use **show version** command in the EXEC mode.

```
Router# show version
Thu Dec 18 11:42:00.697 IST
Cisco IOS XR Software, Version 25.4.1
Copyright (c) 2013-2025 by Cisco Systems, Inc.

Build Information:
 Built By     : swtools
 Built On     : Mon Dec 15 14:03:47 PST 2025
 Built Host   : iox-lnx-121
 Workspace    : /auto/srcarchive12/prod/25.4.1/ncs540/ws
 Version      : 25.4.1
 Location     : /opt/cisco/XR/packages/
 Label        : 25.4.1

cisco NCS-540 () processor
System uptime is 5 minutes
```

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Supported software packages

The following tables list the supported base images and optional packages and their corresponding file names.

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

Table 6. Release 25.4.1 software for N540-24Z8Q2C-SYS, N540-ACC-SYS, and N540X-ACC-SYS

Package	Filename	Description
Base image		
IOS XR Base Image	ncs540-mini-x-25.4.1.iso	IOS XR mandatory base image.
USB Boot Package	ncs540-usb_boot-25.4.1.zip	Package required to perform USB Boot. Includes the same packages as the base image.
Optional packages not included in the base image		
IOS XR Manageability	ncs540-mgbl-1.0.0.0-r2541.x86_64.rpm	Supports Extensible Markup Language (XML) Parser, Telemetry, Netconf, gRPC and HTTP server
IOS XR MPLS	ncs540-mpls-1.0.0.0-r2541.x86_64.rpm ncs540-mpls-te-rsvp-1.0.0.0-r2541.x86_64.rpm	Supports MPLS and MPLS Traffic Engineering (MPLS-TE)
IOS XR Security	ncs540-k9sec-1.0.0.0-r2541.x86_64.rpm	Supports MACsec and 802.1X
IOS XR ISIS	ncs540-isis-1.0.0.0-r2541.x86_64.rpm	Supports ISIS
IOS XR OSPF	ncs540-ospf-1.0.0.0-r2541.x86_64.rpm	Supports OSPF
IOS XR Lawful Intercept	ncs540-li-1.0.0.0-r2541.x86_64.rpm	Supports Lawful Intercept (LI)
IOS XR Multicast	ncs540-mcast-1.0.0.0-r2541.x86_64.rpm	Supports Multicast
IOS XR EIGRP	ncs540-eigrp-1.0.0.0-r2541.x86_64.rpm	Supports EIGRP
IOS XR LI-CTRL	ncs540-lictrl-1.0.0.0-r2541.x86_64.rpm	Supports LI-CTRL

Table 7. Release 25.4.1 Software for N540-24Q8L2DD-SYS, N540-24Q2C2DD-SYS, N540X-16Z4G8Q2C-A/D, N540-28Z4C-SYS-A/D, N540X-12Z16G-SYS-A/D, N540-12Z20G-SYS-A/D, N540-FH-CSR-SYS, N540X-16Z8Q2C-D, and N540-FH-AGG-SYS

Package	Filename	Description
Base Image		

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Package	Filename	Description
IOS XR Base Image	ncs540l-x64-25.4.1.iso	IOS XR base image with mandatory packages. The base ISO image also includes the following optional packages: xr-bgp xr-cdp xr-eigrp xr-ipsla xr-is-is xr-k9sec xr-lictrl xr-lldp xr-mcast xr-mpls-oam xr-netflow xr-ospf xr-perf-meas xr-perfmgmt xr-rip xr-telnet xr-track These optional packages are also included in NCS540l-iosxr-25.4.1.tar.
USB Boot Package	ncs540l-usb_boot-25.4.1.zip	Package required to perform USB Boot. Includes the same packages as the base image.
Optional packages not included in the base image		
IOS XR Telnet (xr-telnet)	NCS540l-iosxr-25.4.1.tar	Supports Telnet
IOS XR EIGRP (xr-eigrp)	NCS540l-iosxr-25.4.1.tar	Supports EIGRP
IOS XR CDP (xr-cdp)	NCS540l-iosxr-25.4.1.tar	Supports CDP
IOS XR k9sec (xr-k9sec)	NCS540l-k9sec-rpms.25.4.1.tar	Supports 802.1X
IOS XR RIP (xr-rip)	NCS540l-iosxr-25.4.1.tar	Supports RIP

Table 8. Release 25.4.1 Software for N540X-4Z14G2Q-A/D, N540X-8Z16G-SYS-A/D, N540-6Z14S-SYS-D, N540-6Z18G-SYS-A/D, N540X-6Z18G-SYS-A/D, and N540X-6Z6G-SYS

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Package	Filename	Description
Base image		
IOS XR Base Image	ncs540l-aarch64-25.4.1.iso	IOS XR base image with mandatory packages. The ISO image also includes the following optional packages: xr-bgp xr-cdp xr-eigrp xr-ipsla xr-is-is xr-k9sec xr-lictrl xr-lldp xr-mcast xr-mpls-oam xr-ncs540l-mcast xr-ncs540l-netflow xr-netflow xr-ospf xr-perf-meas xr-perfmgmt xr-rip xr-telnet xr-track These optional packages are also included in NCS540l aarch64 iosxr optional rpms-25.4.1.tar.
USB Boot Package	ncs540l-aarch64-usb_boot-25.4.1.zip	Package required to perform USB Boot. Includes the same packages as the base image.
Optional packages not included in the base image		
Package	Filename	Description
IOS XR Telnet (xr-telnet)	NCS540l-aarch64-iosxr-optional-rpms-25.4.1.tar	Supports Telnet
IOS XR EIGRP (xr-eigrp)	NCS540l-aarch64-iosxr-optional-rpms-25.4.1.tar	Supports EIGRP

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Package	Filename	Description
IOS XR CDP (xr-cdp)	NCS540l-aarch64-iosxr-optional-rpms-25.4.1.tar	Supports CDP
IOS XR k9sec (xr-k9sec)	NCS540l-aarch64-k9sec-rpms.25.4.1.tar	Supports 802.1X
IOS XR RIP (xr-rip)	NCS540l-aarch64-iosxr-optional-rpms-25.4.1.tar	Supports RIP

Related resources

Table 9. Related resources

Document	Description
Cisco feature finder	An interactive tool that assists in locating features introduced across Cisco IOS XR releases and platforms.
Smart licensing	Information about Smart Licensing Using Policy solutions and their deployment on IOS XR Routers.
Cisco NCS 540 documentation	CCO Documentation for Cisco NCS 540 Series Routers
Transceiver Module Group (TMG) compatibility matrix	Search by product family, product ID, data rate, reach, cable type, or form factor to determine the transceivers that Cisco hardware device supports.
Cisco IOS XR error messages	Search by release number, error strings, or compare release numbers to view a detailed repository of error messages and descriptions.
Cisco IOS XR MIBs	Select the MIB of your choice from a drop-down to explore an extensive repository of MIB information.
YANG data models	A user-friendly reference designed to easily explore and understand the various data models supported in Cisco IOS XR platforms and releases.
Yang data models in Github	Repository containing the folders with yang data models introduced and enhanced in every IOS XR release.

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