# Release Notes for Cisco Catalyst 9300 Series Switches, Cisco IOS XE Bengaluru 17.5.x

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## Introduction

Cisco Catalyst 9300 Series Switches are Cisco's lead stackable access platforms for the next-generation enterprise and have been purpose-built to address emerging trends of Security, IoT, Mobility, and Cloud.

They deliver complete convergence with the rest of the Cisco Catalyst 9000 Series Switches in terms of ASIC architecture with a Unified Access Data Plane (UADP) 2.0. The platform runs an Open Cisco IOS XE that supports model driven programmability, has the capacity to host containers, and run 3rd party applications and scripts natively within the switch (by virtue of x86 CPU architecture, local storage, and a higher memory footprint). This series forms the foundational building block for SD-Access, which is Cisco's lead enterprise architecture.

## Whats New in Cisco IOS XE Bengaluru 17.5.1

### Hardware Features in Cisco IOS XE Bengaluru 17.5.1

| Feature Name | Description and Documentation Link |
|---|---|
| Cisco Catalyst 9300 Series Switches (C9300X) | The following new models have been introduced in the series:<br>• C9300X-12Y: Stackable 12 1/10/25 GE SFP28 downlink ports; 715 WAC power supply; supports StackPower+, StackWise-1T and C9300X-NM network modules.<br>• C9300X-24Y: Stackable 24 1/10/25 GE SFP28 downlink ports; 715 WAC power supply; supports StackPower+, StackWise-1 and C9300X-NM network modules.<br>For information about the hardware including installation and technical specifications, see the Cisco Catalyst 9300 Series Switches Hardware Installation Guide.<br>For information about the software, see the Software Configuration Guide, Cisco IOS XE Bengaluru 17.5.x (Catalyst 9300 Switches). |

| Feature Name | Description and Documentation Link |
|---|---|
| Cisco Catalyst 9300 Series Switches (C9300X)—Uplink Network Modules | The following new models have been introduced in the series:<br>• C9300X-NM-2C: This module has two 40 GE/100 GE slots with a QSFP+ connector in each slot.<br>• C9300X-NM-8M: This module has eight Multigigabit (mGig) module slots.<br>• C9300X-NM-8Y: This module has eight 25 GE/10 GE/1 GE slots with an SFP+ port in each slot.<br>**Note**<br>C9300X network modules are supported only on C9300X switches.<br>For information about the hardware including installation and technical specifications, see the Cisco Catalyst 9300 Series Switches Hardware Installation Guide.<br>For information about the software, see the Software Configuration Guide, Cisco IOS XE Bengaluru 17.5.x (Catalyst 9300 Switches). |
| Cisco 40GBASE QSFP Modules | Supported transceiver module product numbers: QSFP-40G-LR4<br>For information about the module, see Cisco 40GBASE QSFP Modules Data Sheet. For information about device compatibility, see the Transceiver Module Group (TMG) Compatibility Matrix. |
| Cisco 100GBASE QSFP-100G Modules | Supported transceiver module product numbers: QSFP-40/100-SRBD<br>For information about the module, see Cisco 100GBASE QSFP-100G Modules Data Sheet. For information about device compatibility, see the Transceiver Module Group (TMG) Compatibility Matrix. |

## Software Features in Cisco IOS XE Bengaluru 17.5.1

| Feature Name | Description, Documentation Link, and License Level Information |
|---|---|
| ACL Template for IPv4 and IPv6 | Allows you to configure IPv4 and IPv6 access list (ACL) in template configuration mode. Use the **ip access-group** command to apply an IPv4 access list and **ipv6 traffic-filter** command to apply an IPv6 access list in template configuration mode.<br>(Network Essentials and Network Advantage) |
| Disabling USB Ports | Allows you to disable all USB ports on a standalone or stacked device using the **platform usb disable** command. |
| DSCP marking on RADIUS Servers | Allows you to configure Differentiated Services Code Point (DSCP) marking on RADIUS servers and RADIUS server groups using **dscp** command. The **radius-server dscp** command is used to configure DSCP marking for authentication and accounting on RADIUS servers in global configuration mode.<br>(Network Essentials) |

| Feature Name | Description, Documentation Link, and License Level Information |
|---|---|
| ERSPAN over MPLS VPN | Introduces support for Multiprotocol Label Switching (MPLS) VPN for Encapsulated Remote Switched Port Analyzer (ERSPAN). ERSPAN traffic can be transported over MPLS VPN.<br><br>(Network Advantage) |
| Fully Qualified Domain Name (FQDN) ACL | Allows you to configure and apply a URL Redirect ACL policy in the system with dynamically resolved host names based on the domain name system. |
| Generalized PTP over Layer 3 Unicast | Introduces support for generalized Precision Time Protocol (PTP) networks connected over Layer 3 devices.<br><br>(Network Advantage) |
| Network Detection and Response | Introduces support for threat detection and provides accelerated threat response along with network segmentation using Cisco Secure Network Analytics, also known as Stealthwatch Cloud. |
| Programmability<br>• YANG Data Models | The following programmability features are introduced in this release:<br>• YANG Data Models: For the list of Cisco IOS XE YANG models available with this release, navigate to: https://github.com/YangModels/yang/tree/master/vendor/cisco/xe/1751.<br>Revision statements embedded in the YANG files indicate if there has been a model revision. The README.md file in the same GitHub location highlights changes that have been made in the release.<br>(Network Advantage) |
| Selective Q-in-Q | Maps the specified customer VLAN-IDs (C-VLANs) entering the User Network Interface (UNI) to the specified, translated VLAN IDs (S-VLANs). The feature enables selective tunnelling or translation of C-VLANs to S-VLANs on interfaces configured as trunk ports. The egress packet is double-tagged with the C-VLAN ID and the mapped S-VLAN ID. |
| Session Timer Enhancement | The range for number of seconds between reauthentication attempts was increased from 1 to 65535 seconds to 1 to 1073741823 seconds. |
| Wired Dynamic PVLAN | Introduces support for Wired Dynamic Private VLAN (PVLAN) that uses a private VLAN to isolate the clients and provide zero-trust. This feature allows you to block peer to peer communications within a subnet or a VLAN. The client is assigned to a PVLAN which isolates a single wired client connected on a port, from the other ports. |

| Feature Name | Description, Documentation Link, and License Level Information |
|---|---|
| High Speed Stacking | The High Speed Stacking feature allows you to configure a homogenous stack of switches to run at the speed of 1Tbps.<br>This feature is supported only on the C9300X-12Y, C9300X-24Y models of the Cisco Catalyst 9300 Series Switches. |

| New on the Web UI |
|---|
| There are no new features on the Web UI in this release. |

# Important Notes


- Unsupported Features, on page 4
- Complete List of Supported Features, on page 4
- Accessing Hidden Commands, on page 4
- Default Behaviour, on page 5


### Unsupported Features

- Cisco TrustSec Network Device Admission Control (NDAC) on Uplinks
- Converged Access for Branch Deployments
- IPsec VPN
- Performance Monitoring (PerfMon)
- Virtual Routing and Forwarding (VRF)-Aware web authentication

### Complete List of Supported Features

For the complete list of features supported on a platform, see the Cisco Feature Navigator at https://cfnng.cisco.com.

### Accessing Hidden Commands

Starting with Cisco IOS XE Fuji 16.8.1a, as an improved security measure, the way in which hidden commands can be accessed has changed.

Hidden commands have always been present in Cisco IOS XE, but were not equipped with CLI help. That is, entering a question mark (?) at the system prompt did not display the list of available commands. These commands were only meant to assist Cisco TAC in advanced troubleshooting and were not documented either.

Starting with Cisco IOS XE Fuji 16.8.1a, hidden commands are available under:

- Category 1—Hidden commands in privileged or User EXEC mode. Begin by entering the **service internal** command to access these commands.

- Category 2—Hidden commands in one of the configuration modes (global, interface and so on). These commands do not require the **service internal** command.

Further, the following applies to hidden commands under Category 1 and 2:

- The commands have CLI help. Enter enter a question mark (?) at the system prompt to display the list of available commands.

  Note: For Category 1, enter the **service internal** command before you enter the question mark; you do not have to do this for Category 2.

- The system generates a %PARSER-5-HIDDEN syslog message when a hidden command is used. For example:

```
*Feb 14 10:44:37.917: %PARSER-5-HIDDEN: Warning!!! 'show processes memory old-header '
 is a hidden command.
Use of this command is not recommended/supported and will be removed in future.
```

Apart from category 1 and 2, there remain internal commands displayed on the CLI, for which the system does NOT generate the %PARSER-5-HIDDEN syslog message.



**Important** We recommend that you use any hidden command only under TAC supervision.

If you find that you are using a hidden command, open a TAC case for help with finding another way of collecting the same information as the hidden command (for a hidden EXEC mode command), or to configure the same functionality (for a hidden configuration mode command) using non-hidden commands.

### Default Behaviour

Beginning from Cisco IOS XE Gibraltar 16.12.5 and later, do not fragment bit (DF bit) in the IP packet is always set to 0 for all outgoing RADIUS packets (packets that originate from the device towards the RADIUS server).

# Supported Hardware

## Cisco Catalyst 9300 Series Switches—Model Numbers

The following table lists the supported hardware models and the default license levels they are delivered with. For information about the available license levels, see section *License Levels* .

***Table 1: Cisco Catalyst 9300 Series Switches***

| Switch Model | Default License Level[1] | Description |
|---|---|---|
| C9300-24H-A | Network Advantage | Stackable 24 10/100/1000 Mbps UPOE+ ports; PoE budget of 830 W with 1100 WAC power supply; supports StackWise-480 and StackPower |
| C9300-24H-E | Network Essentials | |

| Switch Model | Default License Level[1] | Description |
|---|---|---|
| C9300-24P-A | Network Advantage | Stackable 24 10/100/1000 PoE+ ports; PoE budget of 437W; 715 WAC power supply; supports StackWise-480 and StackPower |
| C9300-24P-E | Network Essentials | |
| C9300-24S-A | Network Advantage | Stackable 24 1G SFP ports; two power supply slots with 715 WAC power supply installed by default; supports StackWise-480 and StackPower. |
| C9300-24S-E | Network Essentials | |
| C9300-24T-A | Network Advantage | Stackable 24 10/100/1000 Ethernet ports; 350 WAC power supply; supports StackWise-480 and StackPower |
| C9300-24T-E | Network Essentials | |
| C9300-24U-A | Network Advantage | Stackable 24 10/100/1000 UPoE ports; PoE budget of 830W; 1100 WAC power supply; supports StackWise-480 and StackPower |
| C9300-24U-E | Network Essentials | |
| C9300-24UB-A | Network Advantage | Stackable 24 10/100/1000 Mbps UPOE ports that provide deep buffers and higher scale; PoE budget of 830W with 1100 WAC power supply; supports StackWise-480 and StackPower |
| C9300-24UB-E | Network Essentials | |
| C9300-24UX-A | Network Advantage | Stackable 24 Multigigabit Ethernet 100/1000/2500/5000/10000 UPoE ports; PoE budget of 490 W with 1100 WAC power supply; supports StackWise-480 and StackPower |
| C9300-24UX-E | Network Essentials | |
| C9300-24UXB-A | Network Advantage | Stackable 24 Multigigabit Ethernet (100 Mbps or 1/2.5/5/10 Gbps) UPOE ports that provide deep buffers and higher scale; PoE budget of 560 W with 1100 WAC power supply; supports StackWise-480 and StackPower |
| C9300-24UXB-E | Network Essentials | |
| C9300-48H-A | Network Advantage | Stackable 48 10/100/1000 Mbps UPOE+ ports; PoE budget of 822 W with 1100 WAC power supply; supports StackWise-480 and StackPower |
| C9300-48H-E | Network Essentials | |

| Switch Model | Default License Level[1] | Description |
|---|---|---|
| C9300-48T-A | Network Advantage | Stackable 48 10/100/1000 Ethernet ports; 350 WAC power supply; supports StackWise-480 and StackPower |
| C9300-48T-E | Network Essentials | |
| C9300-48P-A | Network Advantage | Stackable 48 10/100/1000 PoE+ ports; PoE budget of 437W; 715 WAC power supply; supports StackWise-480 and StackPower |
| C9300-48P-E | Network Essentials | |
| C9300-48S-A | Network Advantage | Stackable 48 1G SFP ports; two power supply slots with 715 WAC power supply installed by default; supports StackWise-480 and StackPower. |
| C9300-48S-E | Network Essentials | |
| C9300-48T-A | Network Advantage | Stackable 48 10/100/1000 Ethernet ports; 350 WAC power supply; supports StackWise-480 and StackPower |
| C9300-48T-E | Network Essentials | |
| C9300-48U-A | Network Advantage | Stackable 48 10/100/1000 UPoE ports; PoE budget of 822 W; 1100 WAC power supply; supports StackWise-480 and StackPower |
| C9300-48U-E | Network Essentials | |
| C9300-48UB-A | Network Advantage | Stackable 48 10/100/1000 Mbps UPOE ports that provide deep buffers and higher scale; PoE budget of 822 W with 1100 WAC power supply; supports StackWise-480 and StackPower |
| C9300-48UB-E | Network Essentials | |
| C9300-48UN-A | Network Advantage | Stackable 48 Multigigabit Ethernet (100 Mbps or 1/2.5/5 Gbps) UPoE ports; PoE budget of 610 W with 1100 WAC power supply; supports StackWise-480 and StackPower |
| C9300-48UN-E | Network Essentials | |
| C9300-48UXM-A | Network Advantage | Stackable 48 (36 2.5G Multigigabit Ethernet and 12 10G Multigigabit Ethernet Universal Power Over Ethernet (UPOE) ports) |
| C9300-48UXM-E | Network Essentials | |

[1] See section *Licensing → Table: Permitted Combinations*, in this document for information about the add-on licenses that you can order.

*Table 2: Cisco Catalyst 9300L Series Switches*

| Switch Model | Default License Level[2] | Description |
|---|---|---|
| C9300L-24T-4G-A | Network Advantage | Stackable 24x10/100/1000M Ethernet ports; 4x1G SFP fixed uplink ports; 350 WAC power supply; supports StackWise-320. |
| C9300L-24T-4G-E | Network Essentials | |
| C9300L-24P-4G-A | Network Advantage | Stackable 24x10/100/1000M PoE+ ports; 4x1G SFP fixed uplink ports; PoE budget of 505W with 715 WAC power supply; supports StackWise-320. |
| C9300L-24P-4G-E | Network Essentials | |
| C9300L-24T-4X-A | Network Advantage | Stackable 24x10/100/1000M Ethernet ports; 4x10G SFP+ fixed uplink ports; 350 WAC power supply; supports StackWise-320. |
| C9300L-24T-4X-E | Network Essentials | |
| C9300L-24P-4X-A | Network Advantage | Stackable 24x10/100/1000M PoE+ ports; 4x10G SFP+ fixed uplink ports; PoE budget of 505W with 715 WAC power supply; supports StackWise-320. |
| C9300L-24P-4X-E | Network Essentials | |
| C9300L-48T-4G-A | Network Advantage | Stackable 48x10/100/1000M Ethernet ports; 4x1G SFP fixed uplink ports; 350 WAC power supply; supports StackWise-320. |
| C9300L-48T-4G-E | Network Essentials | |
| C9300L-48P-4G-A | Network Advantage | Stackable 48x10/100/1000M PoE+ ports; 4x1G SFP fixed uplink ports; PoE budget of 505W with 715 WAC power supply; supports StackWise-320. |
| C9300L-48P-4G-E | Network Essentials | |
| C9300L-48T-4X-A | Network Advantage | Stackable 48x10/100/1000M Ethernet ports; 4x10G SFP+ fixed uplink ports; 350 WAC power supply; supports StackWise-320. |
| C9300L-48T-4X-E | Network Essentials | |
| C9300L-48P-4X-A | Network Advantage | Stackable 48x10/100/1000M PoE+ ports; 4x10G SFP+ fixed uplink ports; PoE budget of 505W with 715 WAC power supply; supports StackWise-320. |
| C9300L-48P-4X-E | Network Essentials | |

| Switch Model | Default License Level[2] | Description |
|---|---|---|
| C9300L-48PF-4G-A | Network Advantage | Stackable 48 10/100/1000 Mbps PoE+ ports; 4x1G SFP+ fixed uplink ports; PoE budget of 890 W with 1100 WAC power supply; supports StackWise-320. |
| C9300L-48PF-4G-E | Network Essentials | |
| C9300L-48PF-4X-A | Network Advantage | Stackable 48 10/100/1000 Mbps PoE+ ports; 4x10G SFP+ fixed uplink ports; PoE budget of 890 W with 1100 WAC power supply; supports StackWise-320. |
| C9300L-48PF-4X-E | Network Essentials | |
| C9300L-24UXG-4X-A | Network Advantage | Stackable 16 10/100/1000 Mbps and 8 Multigigabit Ethernet (100 Mbps or 1/2.5/5/10 Gbps) UPOE ports; 4x10G SFP+ fixed uplink ports; PoE budget of 880 W with 1100 WAC power supply; supports StackWise-320. |
| C9300L-24UXG-4X-E | Network Essentials | |
| C9300L-24UXG-2Q-A | Network Advantage | Stackable 16 10/100/1000 Mbps and 8 Multigigabit Ethernet (100 Mbps or 1/2.5/5/10 Gbps) UPOE ports; 2x40G QSFP+ fixed uplink ports; PoE budget of 722 W with 1100 WAC power supply; supports StackWise-320. |
| C9300L-24UXG-2Q-E | Network Essentials | |
| C9300L-48UXG-4X-A | Network Advantage | Stackable 36 10/100/1000 Mbps and 12 Multigigabit Ethernet (100 Mbps or 1/2.5/5/10 Gbps) UPOE ports; 4x10G SFP+ fixed uplink ports; PoE budget of 675 W with 1100 WAC power supply; supports StackWise-320. |
| C9300L-48UXG-4X-E | Network Essentials | |
| C9300L-48UXG-2Q-A | Network Advantage | Stackable 36 10/100/1000 Mbps and 12 Multigigabit Ethernet (100 Mbps or 1/2.5/5/10 Gbps) UPOE ports; 2x40G QSFP+ fixed uplink ports; PoE budget of 675 W with 1100 WAC power supply; supports StackWise-320. |
| C9300L-48UXG-2Q-E | Network Essentials | |

[2] See section *Licensing → Table: Permitted Combinations*, in this document for information about the add-on licenses that you can order.

***Table 3: Cisco Catalyst 9300X Series Switches***

| Switch Model | Default License Level[3] | Description |
|---|---|---|
| C9300X-12Y-A | Network Advantage | Stackable 12 1/10/25 GE SFP28 downlink ports; 715 WAC power supply; supports StackPower+, StackWise-1T and C9300X-NM network modules. |
| C9300X-12Y-E | Network Essentials | |
| C9300X-24Y-A | Network Advantage | Stackable 24 1/10/25 GE SFP28 downlink ports; 715 WAC power supply; supports StackPower+, StackWise-1 and C9300X-NM network modules. |
| C9300X-24Y-E | Network Essentials | |

| Switch Model | Default License Level[3] | Description |
|---|---|---|
| C9300X-48HXN-E | Network Essentials | |

[3] See section *Licensing → Table: Permitted Combinations*, in this document for information about the add-on licenses that you can order.

## Network Modules

The following table lists the optional uplink network modules with 1-Gigabit, 10-Gigabit, 25-Gigabit, and 40-Gigabit slots. You should only operate the switch with either a network module or a blank module installed.

| Network Module | Description |
|---|---|
| C3850-NM-4-1G [1] | Four 1 Gigabit Ethernet SFP module slots |
| C3850-NM-2-10G [1] | Two 10 Gigabit Ethernet SFP module slots |
| C3850-NM-4-10G [1] | Four 10 Gigabit Ethernet SFP module slots |
| C3850-NM-8-10G [1] | Eight 10 Gigabit Ethernet SFP module slots |
| C3850-NM-2-40G [1] | Two 40 Gigabit Ethernet SFP module slots |
| C9300-NM-4G [2] | Four 1 Gigabit Ethernet SFP module slots |
| C9300-NM-4M [2] | Four MultiGigabit Ethernet slots |
| C9300-NM-8X [2] | Eight 10 Gigabit Ethernet SFP+ module slots |
| C9300-NM-2Q [2] | Two 40 Gigabit Ethernet QSFP+ module slots |
| C9300-NM-2Y [2] | Two 25 Gigabit Ethernet SFP28 module slots |
| C9300X-NM-2C[3] | Two 40 Gigabit Ethernet/100 Gigabit Ethernet QSFP+ module slots |
| C9300X-NM-4C [3] | Four 40 Gigabit Ethernet/100 Gigabit Ethernet slots with a QSFP+ connector ineach slot. |
| C9300X-NM-8M[3] | Eight Multigigabit Ethernet slots |
| C9300X-NM-8Y[3] | Eight 25 Gigabit Ethernet/10 Gigabit Ethernet/1 Gigabit Ethernet SFP+ module slots |

**Note**

1. These network modules are supported only on the C3850 and C9300 SKUs of the Cisco Catalyst 3850 Series Switches and Cisco Catalyst 9300 Series Switches respectively.
2. These network modules are supported only on the C9300 SKUs of the Cisco Catalyst 9300 Series Switches.
3. These network modules are supported only on the C9300X SKUs of the Cisco Catalyst 9300 Series Switches.

The following table lists the network modules that are supported on the Cisco Catalyst 9300X-HXN Series Switches and the ports that are usable on each of these network module:

***Table 4: Network Modules Supported on Catalyst 9300X-HXN Series Switches***

| Network Module | Cisco IOS XE Cupertino 17.7.1 and Previous Releases | Cisco IOS XE Cupertino 17.8.1 and Later Releases |
|---|---|---|
| C9300X-NM-8Y (8x25G) | Ports 1 to 4 usable. | Ports 1 to 6 usable. Ports 7 and 8 are permanently disabled. |
| C9300X-NM-8M (8xmGig) | Ports 1 to 4 usable. | Ports 1 to 6 usable. Ports 7 and 8 are permanently disabled. |
| C9300X-NM-2C (2x100G/2x40G) | Ports 1 to 2 usable. No breakout cable support. | Ports 1 and 2 usable. Breakout cable supported only on port 1. No support for breakout cable on port 2. |

## Optics Modules

Cisco Catalyst Series Switches support a wide range of optics and the list of supported optics is updated on a regular basis. Use the Transceiver Module Group (TMG) Compatibility Matrix tool, or consult the tables at this URL for the latest transceiver module compatibility information: https://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html

# Compatibility Matrix

The following table provides software compatibility information between Cisco Catalyst 9300 Series Switches, Cisco Identity Services Engine, Cisco Access Control Server, and Cisco Prime Infrastructure.

| Catalyst 9300 | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| Bengaluru 17.5.1 | 3.0 Patch 1<br>2.7 Patch 2<br>2.6 Patch 7<br>2.4 Patch 13 | - | C9300, C9300L, and C9300X: PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → **Downloads**. |

| Catalyst 9300 | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| Bengaluru 17.4.1 | 3.0<br>2.7 Patch 2 | - | C9300 and C9300L: PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → **Downloads**. |
| Amsterdam 17.3.8a | 2.7 | - | C9300 and C9300L: PI 3.10 + PI 3.10 latest maintenance release + PI 3.10 latest device pack<br>See Cisco Prime Infrastructure 3.10 → **Downloads**. |
| Amsterdam 17.3.8 | 2.7 | - | C9300 and C9300L: PI 3.10 + PI 3.10 latest maintenance release + PI 3.10 latest device pack<br>See Cisco Prime Infrastructure 3.10 → **Downloads**. |
| Amsterdam 17.3.7 | 2.7 | - | C9300 and C9300L: PI 3.10 + PI 3.10 latest maintenance release + PI 3.10 latest device pack<br>See Cisco Prime Infrastructure 3.10 → **Downloads**. |
| Amsterdam 17.3.6 | 2.7 | - | C9300 and C9300L: PI 3.10 + PI 3.10 latest maintenance release + PI 3.10 latest device pack<br>See Cisco Prime Infrastructure 3.10 → **Downloads**. |
| Amsterdam 17.3.5 | 2.7 | - | C9300 and C9300L: PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → **Downloads**. |
| Amsterdam 17.3.4 | 2.7 | - | C9300 and C9300L: PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → **Downloads**. |

| Catalyst 9300 | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| Amsterdam 17.3.3 | 2.7 | - | C9300 and C9300L: PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → **Downloads**. |
| Amsterdam 17.3.2a | 2.7 | - | C9300 and C9300L: PI 3.8 + PI 3.8 latest maintenance release + PI 3.8 latest device pack<br>See Cisco Prime Infrastructure 3.8 → **Downloads**. |
| Amsterdam 17.3.1 | 2.7 | - | C9300 and C9300L: PI 3.8 + PI 3.8 latest maintenance release + PI 3.8 latest device pack<br>See Cisco Prime Infrastructure 3.8 → **Downloads**. |
| Amsterdam 17.2.1 | 2.7 | - | C9300 and C9300L: PI 3.7 + PI 3.7 latest maintenance release + PI 3.7 latest device pack<br>See Cisco Prime Infrastructure 3.7 → **Downloads**. |
| Amsterdam 17.1.1 | 2.7 | - | C9300: PI 3.6 + PI 3.6 latest maintenance release + PI 3.6 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.6 → **Downloads**. |
| Gibraltar 16.12.8 | 2.6 | - | C9300: PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.9 → Downloads. |
| Gibraltar 16.12.7 | 2.6 | - | C9300: PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.9 → Downloads. |

| Catalyst 9300 | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| Gibraltar 16.12.6 | 2.6 | - | C9300: PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.9 → Downloads. |
| Gibraltar 16.12.5b | 2.6 | - | C9300: PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.9 → Downloads. |
| Gibraltar 16.12.5 | 2.6 | - | C9300: PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.9 → Downloads. |
| Gibraltar 16.12.4 | 2.6 | - | C9300: PI 3.8 + PI 3.8 latest maintenance release + PI 3.8 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.8 → Downloads. |
| Gibraltar 16.12.3a | 2.6 | - | C9300: PI 3.5 + PI 3.5 latest maintenance release + PI 3.5 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.5 → **Downloads**. |
| Gibraltar 16.12.3 | 2.6 | - | C9300: PI 3.5 + PI 3.5 latest maintenance release + PI 3.5 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.5 → **Downloads**. |
| Gibraltar 16.12.2 | 2.6 | - | C9300: PI 3.5 + PI 3.5 latest maintenance release + PI 3.5 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.5 → **Downloads**. |

| Catalyst 9300 | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| Gibraltar 16.12.1 | 2.6 | - | C9300: PI 3.5 + PI 3.5 latest maintenance release + PI 3.5 latest device pack<br>C9300L: -<br>See Cisco Prime Infrastructure 3.5 → **Downloads**. |
| Gibraltar 16.11.1 | 2.6<br>2.4 Patch 5 | 5.4<br>5.5 | PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack<br>See Cisco Prime Infrastructure 3.4 → **Downloads**. |
| Gibraltar 16.10.1 | 2.3 Patch 1<br>2.4 Patch 1 | 5.4<br>5.5 | PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack<br>See Cisco Prime Infrastructure 3.4→ **Downloads**. |
| Fuji 16.9.8 | 2.5<br>2.1 | 5.4<br>5.5 | PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → **Downloads**. |
| Fuji 16.9.7 | 2.5<br>2.1 | 5.4<br>5.5 | PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → **Downloads**. |
| Fuji 16.9.6 | 2.3 Patch 1<br>2.4 Patch 1 | 5.4<br>5.5 | PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack<br>See Cisco Prime Infrastructure 3.4→ **Downloads**. |
| Fuji 16.9.5 | 2.3 Patch 1<br>2.4 Patch 1 | 5.4<br>5.5 | PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack<br>See Cisco Prime Infrastructure 3.4→ **Downloads**. |
| Fuji 16.9.4 | 2.3 Patch 1<br>2.4 Patch 1 | 5.4<br>5.5 | PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack<br>See Cisco Prime Infrastructure 3.4→ **Downloads**. |

| Catalyst 9300 | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| Fuji 16.9.3 | 2.3 Patch 1<br>2.4 Patch 1 | 5.4<br>5.5 | PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack<br>See Cisco Prime Infrastructure 3.4→ **Downloads**. |
| Fuji 16.9.2 | 2.3 Patch 1<br>2.4 Patch 1 | 5.4<br>5.5 | PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack<br>See Cisco Prime Infrastructure 3.4→ **Downloads**. |
| Fuji 16.9.1 | 2.3 Patch 1<br>2.4 Patch 1 | 5.4<br>5.5 | PI 3.4 + PI 3.4 latest device pack<br>See Cisco Prime Infrastructure 3.4→ **Downloads**. |
| Fuji 16.8.1a | 2.3 Patch 1<br>2.4 | 5.4<br>5.5 | PI 3.3 + PI 3.3 latest maintenance release + PI 3.3 latest device pack<br>See Cisco Prime Infrastructure 3.3→ **Downloads**. |
| Everest 16.6.4a | 2.2<br>2.3 | 5.4<br>5.5 | PI 3.1.6 + Device Pack 13<br>See Cisco Prime Infrastructure 3.1 → **Downloads**. |
| Everest 16.6.4 | 2.2<br>2.3 | 5.4<br>5.5 | PI 3.1.6 + Device Pack 13<br>See Cisco Prime Infrastructure 3.1 → **Downloads**. |
| Everest 16.6.3 | 2.2<br>2.3 | 5.4<br>5.5 | PI 3.1.6 + Device Pack 13<br>See Cisco Prime Infrastructure 3.1 → **Downloads** |
| Everest 16.6.2 | 2.2<br>2.3 | 5.4<br>5.5 | PI 3.1.6 + Device Pack 13<br>See Cisco Prime Infrastructure 3.1 → **Downloads** |
| Everest 16.6.1 | 2.2 | 5.4<br>5.5 | PI 3.1.6 + Device Pack 13<br>See Cisco Prime Infrastructure 3.1 → **Downloads** |
| Everest 16.5.1a | 2.1 Patch 3 | 5.4<br>5.5 | - |

# Web UI System Requirements

The following subsections list the hardware and software required to access the Web UI:

### Minimum Hardware Requirements

| Processor Speed | DRAM | Number of Colors | Resolution | Font Size |
|---|---|---|---|---|
| 233 MHz minimum[4] | 512 MB[5] | 256 | 1280 x 800 or higher | Small |

[4] We recommend 1 GHz
[5] We recommend 1 GB DRAM

### Software Requirements

#### Operating Systems

- Windows 10 or later
- Mac OS X 10.9.5 or later

#### Browsers

- Google Chrome—Version 59 or later (On Windows and Mac)
- Microsoft Edge
- Mozilla Firefox—Version 54 or later (On Windows and Mac)
- Safari—Version 10 or later (On Mac)

# ROMMON Versions

ROMMON, also known as the boot loader, is firmware that runs when the device is powered up or reset. It initializes the processor hardware and boots the operating system software (Cisco IOS XE software image). The ROMMON is stored on the following Serial Peripheral Interface (SPI) flash devices on your switch:

- Primary: The ROMMON stored here is the one the system boots every time the device is powered-on or reset.
- Golden: The ROMMON stored here is a backup copy. If the one in the primary is corrupted, the system automatically boots the ROMMON in the golden SPI flash device.

ROMMON upgrades may be required to resolve firmware defects, or to support new features, but there may not be new versions with every release.

| Release | ROMMON Version (C9300 Models) | ROMMON Version (C9300L Models) | ROMMON Version (C9300X Models) | ROMMON Version (C9300LM Models) |
|---|---|---|---|---|
| Bengaluru 17.5.1 | 17.5.2r | 17.4.1r[FC2] | 17.5.1r | - |
| Bengaluru 17.4.1 | 17.4.1r | 17.4.1r[FC2] | - | - |

| Release | ROMMON Version (C9300 Models) | ROMMON Version (C9300L Models) | ROMMON Version (C9300X Models) | ROMMON Version (C9300LM Models) |
|---|---|---|---|---|
| Amsterdam 17.3.8a | 17.3.8r | 17.8.1r[FC2] | - | - |
| Amsterdam 17.3.8 | 17.3.8r | 17.8.1r[FC2] | - | - |
| Amsterdam 17.3.7 | 17.3.2r | 17.8.1r[FC2] | - | - |
| Amsterdam 17.3.6 | 17.3.2r | 17.8.1r[FC2] | - | - |
| Amsterdam 17.3.5 | 17.3.2r | 17.8.1r[FC2] | - | - |
| Amsterdam 17.3.4 | 17.3.2r | 17.3.2r | - | - |
| Amsterdam 17.3.3 | 17.3.2r | 17.3.2r | - | - |
| Amsterdam 17.3.2a | 17.3.2r | 17.3.2r | - | - |
| Amsterdam 17.3.1 | 17.3.1r[FC2] | 17.1.1r [FC1] | - | - |
| Amsterdam 17.2.1 | 17.2.1r[FC1] | 17.1.1r[FC1] | - | - |
| Amsterdam 17.1.1 | 17.1.1r [FC1] | 17.1.1r [FC1] | - | - |

# Upgrading the Switch Software

This section covers the various aspects of upgrading or downgrading the device software.

**Note** You cannot use the Web UI to install, upgrade, or downgrade device software.

## Finding the Software Version

The package files for the Cisco IOS XE software are stored on the system board flash device (flash:).

You can use the **show version** privileged EXEC command to see the software version that is running on your switch.

**Note** Although the **show version** output always shows the software image running on the switch, the model name shown at the end of this display is the factory configuration and does not change if you upgrade the software license.

You can also use the **dir** *filesystem:* privileged EXEC command to see the directory names of other software images that you might have stored in flash memory.

## Software Images

| Release | Image Type | File Name |
|---|---|---|
| Cisco IOS XE Bengaluru 17.5.1 | CAT9K_IOSXE | cat9k_iosxe.17.05.01.SPA. |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.05.01. |

## Upgrading the ROMMON

To know the ROMMON or bootloader version that applies to every major and maintenance release, see ROMMON Versions, on page 17.

You can upgrade the ROMMON before, or, after upgrading the software version. If a new ROMMON version is available for the software version you are upgrading to, proceed as follows:

- Upgrading the ROMMON in the primary SPI flash device

  This ROMMON is upgraded automatically. When you upgrade from an existing release on your switch to a later or newer release for the first time, and there is a new ROMMON version in the new release, the system automatically upgrades the ROMMON in the primary SPI flash device, based on the hardware version of the switch when you boot up your switch with the new image for the first time.

- Upgrading the ROMMON in the golden SPI flash device

  You must manually upgrade this ROMMON. Enter the **upgrade rom-monitor capsule golden switch** command in privileged EXEC mode.

**Note**

- In case of a switch stack, perform the upgrade on the active switch and all members of the stack.

After the ROMMON is upgraded, it will take effect on the next reload. If you go back to an older release after this, the ROMMON is not downgraded. The updated ROMMON supports all previous releases.

## Software Installation Commands

| **Summary of Software Installation Commands**<br>**Supported starting from Cisco IOS XE Everest 16.6.2 and later releases** | |
|---|---|
| To install and activate the specified file, and to commit changes to be persistent across reloads:<br>**`install add file`** *`filename`* [**`activate commit`**]<br>To separately install, activate, commit, cancel, or remove the installation file: **`install ?`** | |
| **add file tftp:** *filename* | Copies the install file package from a remote location to the device and performs a compatibility check for the platform and image versions. |
| **activate** [**auto-abort-timer**] | Activates the file, and reloads the device. The **auto-abort-timer** keyword automatically rolls back image activation. |

| Summary of Software Installation Commands<br>Supported starting from Cisco IOS XE Everest 16.6.2 and later releases | |
|---|---|
| **commit** | Makes changes persistent over reloads. |
| **rollback to committed** | Rolls back the update to the last committed version. |
| **abort** | Cancels file activation, and rolls back to the version that was running before the current installation procedure started. |
| **remove** | Deletes all unused and inactive software installation files. |



**Note** The **request platform software** commands are deprecated starting from Cisco IOS XE Gibraltar 16.10.1. The commands are visible on the CLI in this release and you can configure them, but we recommend that you use the **install** commands to upgrade or downgrade.

| Summary of request platform software Commands | |
|---|---|
| `Device# request platform software package ?` | |
| **clean** | Cleans unnecessary package files from media |
| **copy** | Copies package to media |
| **describe** | Describes package content |
| **expand** | Expands all-in-one package to media |
| **install** | Installs the package |
| **uninstall** | Uninstalls the package |
| **verify** | Verifies In Service Software Upgrade (ISSU) software package compatibility |

# Upgrading in Install Mode

Follow these instructions to upgrade from one release to another, in install mode. To perform a software image upgrade, you must be booted into IOS through **boot flash:packages.conf**.

### Before you begin

Note that you can use this procedure for the following upgrade scenarios:

| When upgrading from ... | Use these commands... | To upgrade to... |
|---|---|---|
| Cisco IOS XE Everest 16.5.1a or Cisco IOS XE Everest 16.6.1 | Only **request platform software** commands | Cisco IOS XE Bengaluru 17.5.x |
| Cisco IOS XE Everest 16.6.2 and all later releases | Either **install** commands or **request platform software** commands[6]. | |

[6] The **request platform software** commands are deprecated. So although they are still visible on the CLI, we recommend that you use **install** commands.

The sample output in this section displays upgrade from Cisco IOS XE Bengaluru 17.4.1 to Cisco IOS XE Bengaluru 17.5.1 using **install** commands only.

### Procedure

**Step 1** Clean-up

**install remove inactive**

Use this command to clean-up old installation files in case of insufficient space and to ensure that you have at least 1GB of space in flash, to expand a new image.

The following sample output displays the cleaning up of unused files, by using the **install remove inactive** command:

```
Switch# install remove inactive

install_remove: START Mon Mar 15 19:51:48 PDT 2021
Cleaning up unnecessary package files
Scanning boot directory for packages ... done.
Preparing packages list to delete ...
    cat9k-cc_srdriver.17.04.01.SPA.pkg
      File is in use, will not delete.
    cat9k-espbase.17.04.01.SPA.pkg
      File is in use, will not delete.
    cat9k-guestshell.17.04.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.04.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.04.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipbase.17.04.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.04.01.SPA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.04.01.SPA.pkg
      File is in use, will not delete.
    cat9k-webui.17.04.01.SPA.pkg
      File is in use, will not delete.
    cat9k-wlc.17.04.01.SPA.pkg
      File is in use, will not delete.
    packages.conf
      File is in use, will not delete.
  done.
The following files will be deleted:
[switch 1]:
/flash/cat9k-cc_srdriver.17.04.01.SPA.pkg
/flash/cat9k-espbase.17.04.01.SPA.pkg
/flash/cat9k-guestshell.17.04.01.SPA.pkg
/flash/cat9k-rpbase.17.04.01.SPA.pkg
/flash/cat9k-rpboot.17.04.01.SPA.pkg
/flash/cat9k-sipbase.17.04.01.SPA.pkg
/flash/cat9k-sipspa.17.04.01.SPA.pkg
/flash/cat9k-srdriver.17.04.01.SPA.pkg
/flash/cat9k-webui.17.04.01.SPA.pkg
/flash/cat9k-wlc.17.04.01.SPA.pkg
/flash/packages.conf
```

```
Do you want to remove the above files? [y/n]y

[switch 1]:
Deleting file flash:cat9k-cc_srdriver.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-espbase.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-guestshell.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpbase.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpboot.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipbase.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipspa.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-srdriver.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-webui.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-wlc.17.04.01.SPA.pkg ... done.
Deleting file flash:packages.conf ... done.
SUCCESS: Files deleted.
--- Starting Post_Remove_Cleanup ---
Performing Post_Remove_Cleanup on all members
[1] Post_Remove_Cleanup package(s) on switch 1
[1] Finished Post_Remove_Cleanup on switch 1
Checking status of Post_Remove_Cleanup on [1]
Post_Remove_Cleanup: Passed on [1]
Finished Post_Remove_Cleanup

SUCCESS: install_remove Mon Mar 15 19:52:25 PDT 2021
Switch#
<output truncated>
```

**Step 2** Copy new image to flash

a) **copy tftp:***[[//location]/directory]/filename***flash:**

Use this command to copy the new image from a TFTP server to flash memory. The location is either an IP address or a host name. The filename is specified relative to the directory used for file transfers. Skip this step if you want to use the new image from a TFTP server.

```
Switch# copy tftp://10.8.0.6/image/cat9k_iosxe.17.05.01.SPA.bin flash:
destination filename [cat9k_iosxe.17.05.01.SPA.bin]?
Accessing tftp://10.8.0.6/image/cat9k_iosxe.17.05.01.SPA.bin...
Loading /cat9k_iosxe.17.05.01.SPA.bin from 10.8.0.6 (via GigabitEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 601216545 bytes]

601216545 bytes copied in 50.649 secs (11870255 bytes/sec)
```

b) **dir flash:**

Use this command to confirm that the image has been successfully copied to flash.

```
Switch# dir flash:*.bin
Directory of flash:/*.bin

Directory of flash:/

434184 -rw- 601216545    Mar 15 2021 10:18:11 -07:00 cat9k_iosxe.17.05.01.SPA.bin
11353194496 bytes total (8976625664 bytes free)
```

**Step 3** Set boot variable

a) **boot system flash:packages.conf**

Use this command to set the boot variable to **flash:packages.conf**.

```
Switch(config)# boot system flash:packages.conf
```

b) **no boot manual**

Use this command to configure the switch to auto-boot.

```
Switch(config)# no boot manual
Switch(config)# exit
```

c) **write memory**

Use this command to save boot settings.

```
Switch# write memory
```

d) **show boot**

Use this command to verify the boot variable (packages.conf) and manual boot setting (no):

```
Switch# show boot
Current Boot Variables:
BOOT variable = flash:packages.conf;

Boot Variables on next reload:
BOOT variable = flash:packages.conf;
Manual Boot = no
Enable Break = yes
Boot Mode = DEVICE
iPXE Timeout = 0
```

**Step 4** Install image to flash

**install add file activate commit**

Use this command to install the image.

We recommend that you point to the source image on your TFTP server or the flash drive of the *active* switch, if you have copied the image to flash memory. If you point to an image on the flash or USB drive of a member switch (instead of the active), you must specify the exact flash or USB drive - otherwise installation fails. For example, if the image is on the flash drive of member switch 3 (flash-3): `Switch# install add file flash-3:cat9k_iosxe.17.05.01.SPA.bin activate commit`.

The following sample output displays installation of the Cisco IOS XE Bengaluru 17.5.1 software image in the flash memory:

```
Switch# install add file flash:cat9k_iosxe.17.05.01.SPA.bin activate commit

install_add_activate_commit: START Mon Mar 15 15:37:20 PDT 2021
install_add_activate_commit: Adding PACKAGE
install_add_activate_commit: Checking whether new add is allowed ....

--- Starting initial file syncing ---
[2]: Copying flash:cat9k_iosxe.17.05.01.SPA.bin from switch 2 to switch 1 3 4
[1 3 4]: Finished copying to switch 1 switch 3 switch 4
Info: Finished copying flash:cat9k_iosxe.17.05.01.SPA.bin to the selected switch(es)
Finished initial file syncing

--- Starting Add ---
Performing Add on all members
  [1] Add package(s) on switch 1
  [1] Finished Add on switch 1
  [2] Add package(s) on switch 2
  [2] Finished Add on switch 2
  [3] Add package(s) on switch 3
  [3] Finished Add on switch 3
```

```
  [4] Add package(s) on switch 4
  [4] Finished Add on switch 4
Checking status of Add on [1 2 3 4]
Add: Passed on [1 2 3 4]
Finished Add

Image added. Version: 17.05.01
install_add_activate_commit: Activating PACKAGE
Following packages shall be activated:
/flash/cat9k-wlc.17.05.01.SPA.pkg
/flash/cat9k-webui.17.05.01.SPA.pkg
/flash/cat9k-srdriver.17.05.01.SPA.pkg
/flash/cat9k-sipspa.17.05.01.SPA.pkg
/flash/cat9k-sipbase.17.05.01.SPA.pkg
/flash/cat9k-rpboot.17.05.01.SPA.pkg
/flash/cat9k-rpbase.17.05.01.SPA.pkg
/flash/cat9k-lni.17.05.01.SPA.pkg
/flash/cat9k-guestshell.17.05.01.SPA.pkg
/flash/cat9k-espbase.17.05.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.05.01.SPA.pkg
--- Starting Activate ---
Performing Activate on all members
  [1] Activate package(s) on switch 1
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.04.01.SPA.pkg
      Removed cat9k-espbase.17.04.01.SPA.pkg
      Removed cat9k-guestshell.17.04.01.SPA.pkg
      Removed cat9k-rpbase.17.04.01.SPA.pkg
      Removed cat9k-rpboot.17.04.01.SPA.pkg
      Removed cat9k-sipbase.17.04.01.SPA.pkg
      Removed cat9k-sipspa.17.04.01.SPA.pkg
      Removed cat9k-srdriver.17.04.01.SPA.pkg
      Removed cat9k-webui.17.04.01.SPA.pkg
      Removed cat9k-wlc.17.04.01.SPA.pkg
    New files list:
      Added cat9k-cc_srdriver.17.05.01.SPA.pkg
      Added cat9k-espbase.17.05.01.SPA.pkg
      Added cat9k-guestshell.17.05.01.SPA.pkg
      Added cat9k-lni.17.05.01.SPA.pkg
      Added cat9k-rpbase.17.05.01.SPA.pkg
      Added cat9k-rpboot.17.05.01.SPA.pkg
      Added cat9k-sipbase.17.05.01.SPA.pkg
      Added cat9k-sipspa.17.05.01.SPA.pkg
      Added cat9k-srdriver.17.05.01.SPA.pkg
      Added cat9k-webui.17.05.01.SPA.pkg
      Added cat9k-wlc.17.05.01.SPA.pkg
    Finished list of software package changes
  [1] Finished Activate on switch 1
  [2] Activate package(s) on switch 2
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.04.01.SPA.pkg
      Removed cat9k-espbase.17.04.01.SPA.pkg
      Removed cat9k-guestshell.17.04.01.SPA.pkg
      Removed cat9k-rpbase.17.04.01.SPA.pkg
      Removed cat9k-rpboot.17.04.01.SPA.pkg
      Removed cat9k-sipbase.17.04.01.SPA.pkg
      Removed cat9k-sipspa.17.04.01.SPA.pkg
      Removed cat9k-srdriver.17.04.01.SPA.pkg
      Removed cat9k-webui.17.04.01.SPA.pkg
      Removed cat9k-wlc.17.04.01.SPA.pkg
    New files list:
      Added cat9k-cc_srdriver.17.05.01.SPA.pkg
```

```
    Added cat9k-espbase.17.05.01.SPA.pkg
    Added cat9k-guestshell.17.05.01.SPA.pkg
    Added cat9k-lni.17.05.01.SPA.pkg
    Added cat9k-rpbase.17.05.01.SPA.pkg
    Added cat9k-rpboot.17.05.01.SPA.pkg
    Added cat9k-sipbase.17.05.01.SPA.pkg
    Added cat9k-sipspa.17.05.01.SPA.pkg
    Added cat9k-srdriver.17.05.01.SPA.pkg
    Added cat9k-webui.17.05.01.SPA.pkg
    Added cat9k-wlc.17.05.01.SPA.pkg
  Finished list of software package changes
[2] Finished Activate on switch 2
[3] Activate package(s) on switch 3
  --- Starting list of software package changes ---
  Old files list:
    Removed cat9k-cc_srdriver.17.04.01.SPA.pkg
    Removed cat9k-espbase.17.04.01.SPA.pkg
    Removed cat9k-guestshell.17.04.01.SPA.pkg
    Removed cat9k-rpbase.17.04.01.SPA.pkg
    Removed cat9k-rpboot.17.04.01.SPA.pkg
    Removed cat9k-sipbase.17.04.01.SPA.pkg
    Removed cat9k-sipspa.17.04.01.SPA.pkg
    Removed cat9k-srdriver.17.04.01.SPA.pkg
    Removed cat9k-webui.17.04.01.SPA.pkg
    Removed cat9k-wlc.17.04.01.SPA.pkg
  New files list:
    Added cat9k-cc_srdriver.17.05.01.SPA.pkg
    Added cat9k-espbase.17.05.01.SPA.pkg
    Added cat9k-guestshell.17.05.01.SPA.pkg
    Added cat9k-lni.17.05.01.SPA.pkg
    Added cat9k-rpbase.17.05.01.SPA.pkg
    Added cat9k-rpboot.17.05.01.SPA.pkg
    Added cat9k-sipbase.17.05.01.SPA.pkg
    Added cat9k-sipspa.17.05.01.SPA.pkg
    Added cat9k-srdriver.17.05.01.SPA.pkg
    Added cat9k-webui.17.05.01.SPA.pkg
    Added cat9k-wlc.17.05.01.SPA.pkg
  Finished list of software package changes
[3] Finished Activate on switch 3
[4] Activate package(s) on switch 4
  --- Starting list of software package changes ---
  Old files list:
    Removed cat9k-cc_srdriver.17.04.01.SPA.pkg
    Removed cat9k-espbase.17.04.01.SPA.pkg
    Removed cat9k-guestshell.17.04.01.SPA.pkg
    Removed cat9k-rpbase.17.04.01.SPA.pkg
    Removed cat9k-rpboot.17.04.01.SPA.pkg
    Removed cat9k-sipbase.17.04.01.SPA.pkg
    Removed cat9k-sipspa.17.04.01.SPA.pkg
    Removed cat9k-srdriver.17.04.01.SPA.pkg
    Removed cat9k-webui.17.04.01.SPA.pkg
    Removed cat9k-wlc.17.04.01.SPA.pkg
  New files list:
    Added cat9k-cc_srdriver.17.05.01.SPA.pkg
    Added cat9k-espbase.17.05.01.SPA.pkg
    Added cat9k-guestshell.17.05.01.SPA.pkg
    Added cat9k-lni.17.05.01.SPA.pkg
    Added cat9k-rpbase.17.05.01.SPA.pkg
    Added cat9k-rpboot.17.05.01.SPA.pkg
    Added cat9k-sipbase.17.05.01.SPA.pkg
    Added cat9k-sipspa.17.05.01.SPA.pkg
    Added cat9k-srdriver.17.05.01.SPA.pkg
    Added cat9k-webui.17.05.01.SPA.pkg
    Added cat9k-wlc.17.05.01.SPA.pkg
```

```
    Finished list of software package changes
  [4] Finished Activate on switch 4
Checking status of Activate on [1 2 3 4]
Activate: Passed on [1 2 3 4]
Finished Activate

--- Starting Commit ---
Performing Commit on all members
  [1] Commit package(s) on switch 1
  [1] Finished Commit on switch 1
  [2] Commit package(s) on switch 2
  [2] Finished Commit on switch 2
  [3] Commit package(s) on switch 3
  [3] Finished Commit on switch 3
  [4] Commit package(s) on switch 4
  [4] Finished Commit on switch 4
Checking status of Commit on [1 2 3 4]
Commit: Passed on [1 2 3 4]
Finished Commit

Send model notification for install_add_activate_commit before reload
[1 2 3 4]: Performing Upgrade_Service

*Mar 15 15:47:28.095: %IOSXEBOOT-4-BOOTLOADER_UPGRADE: (local/local): Starting boot preupgrade
300+0 records in
300+0 records out
307200 bytes (307 kB, 300 KiB) copied, 0.315817 s, 973 kB/s

AppGigabitEthernet port has the latest Firmware

MM [1] MCU version 191 sw ver 196
MM [2] MCU version 191 sw ver 196

Front-end Microcode IMG MGR: found 4 microcode images for 1 device.
Image for front-end 0: /tmp/microcode_update/front_end/fe_type_6_0 update needed: no
Image for front-end 0: /tmp/microcode_update/front_end/fe_type_6_1 update needed: yes
Image for front-end 0: /tmp/microcode_update/front_end/fe_type_6_2 update needed: yes
Image for front-end 0: /tmp/microcode_update/front_end/fe_type_6_3 update needed: no
Front-end Microcode IMG MGR: Preparing to program device microcode...
Front-end Microcode IMG MGR: Preparing to program device[0], index=0 ...594412 bytes....
Skipped[0].
Front-end Microcode IMG MGR: Preparing to program device[0], index=1 ...440976 bytes.
Front-end Microcode IMG MGR: Programming device 0...rwRrrrrrrw..
0%.....10%
  .....20%
  .....30%
  .....40%
  .....50%
  .....60%
  .....70%
  .....80%
  .....90%
  .....100%
Front-end Microcode IMG MGR: Preparing to program device[0], index=2 ...24506 bytes.
Front-end Microcode IMG MGR: Programming device
0...rrrrrrw..0%....10%....20%......30%...40%....50%......60%....70%.....80%....90%....100%w
Wating for MCU to come up .....Rr!
Front-end Microcode IMG MGR: Microcode programming complete for device 0.
Front-end Microcode IMG MGR: Preparing to program device[0], index=3 ...90974 bytes....
Skipped[3].
Front-end Microcode IMG MGR: Microcode programming complete in 298 seconds


MCU UPGRADE COMPLETED!!...  SUCCESS: Upgrade_Service finished
```

```
Install will reload the system now!
SUCCESS: install_add_activate_commit  Mon Mar 15 15:52:33 PDT 2021
Switch#
Chassis 2 reloading, reason - Reload command
Mar 20 15:52:36.588: %PMAN-5-EXITACTION: F0/0: pvp: Process manager is exiting: reload fp
action requested
Mar 20 15:52:38.199: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: rp processes
 exit with reload switch code



Initializing Hardware......

System Bootstrap, Version 17.3.1r[FC2], RELEASE SOFTWARE (P)
Compiled Wed 04/29/2021 12:55:25.08 by rel

Current ROMMON image : Primary
Last reset cause     : SoftwareReload
C9300-48P platform with 8388608 Kbytes of main memory

Preparing to autoboot. [Press Ctrl-C to interrupt]  0
boot: attempting to boot from [flash:packages.conf]
boot: reading file packages.conf
##################################################################################################################
##################################################################################################################


Waiting for 120 seconds for other switches to boot
##################################################################################################################
Switch number is 2
<output truncated>
```

**Note**
The system reloads automatically after executing the **install add file activate commit** command. You do not have to manually reload the system.

**Step 5** Verify installation

After the software has been successfully installed, use the **dir flash:** command to verify that the flash partition has ten new `.pkg` files and two `.conf` files.

a) **dir flash:*.pkg**

The following is sample output of the **dir flash:*.pkg** command:

```
Switch# dir flash:*.pkg

Directory of flash:/
75140 -rw- 2012104     Nov 17 2020 09:52:41 -07:00 cat9k-cc_srdriver.17.04.01.SPA.pkg
475141 -rw- 70333380   Nov 17 2020 09:52:44 -07:00 cat9k-espbase.17.04.01.SPA.pkg
475142 -rw- 13256      Nov 17 2020 09:52:44 -07:00 cat9k-guestshell.17.04.01.SPA.pkg
475143 -rw- 349635524  Nov 17 2020 09:52:54 -07:00 cat9k-rpbase.17.04.01.SPA.pkg
475149 -rw- 24248187   Nov 17 2020 09:53:02 -07:00 cat9k-rpboot.17.04.01.SPA.pkg
475144 -rw- 25285572   Nov 17 2020 09:52:55 -07:00 cat9k-sipbase.17.04.01.SPA.pkg
475145 -rw- 20947908   Nov 17 2020 09:52:55 -07:00 cat9k-sipspa.17.04.01.SPA.pkg
475146 -rw- 2962372    Nov 17 2020 09:52:56 -07:00 cat9k-srdriver.17.04.01.SPA.pkg
475147 -rw- 13284288   Nov 17 2020 09:52:56 -07:00 cat9k-webui.17.04.01.SPA.pkg
475148 -rw- 13248      Nov 17 2020 09:52:56 -07:00 cat9k-wlc.17.04.01.SPA.pkg

491524 -rw- 25711568   Mar 15 2021 11:49:33 -07:00 cat9k-cc_srdriver.17.05.01.SPA.pkg
491525 -rw- 78484428   Mar 15 2021 11:49:35 -07:00 cat9k-espbase.17.05.01.SPA.pkg
491526 -rw- 1598412    Mar 15 2021 11:49:35 -07:00 cat9k-guestshell.17.05.01.SPA.pkg
491527 -rw- 404153288  Mar 15 2021 11:49:47 -07:00 cat9k-rpbase.17.05.01.SPA.pkg
```

```
491533 -rw- 31657374   Mar 15 2021 11:50:09 -07:00 cat9k-rpboot.17.05.01.SPA.pkg
491528 -rw- 27681740   Mar 15 2021 11:49:48 -07:00 cat9k-sipbase.17.05.01.SPA.pkg
491529 -rw- 52224968   Mar 15 2021 11:49:49 -07:00 cat9k-sipspa.17.05.01.SPA.pkg
491530 -rw- 31130572   Mar 15 2021 11:49:50 -07:00 cat9k-srdriver.17.05.01.SPA.pkg
491531 -rw- 14783432   Mar 15 2021 11:49:51 -07:00 cat9k-webui.17.05.01.SPA.pkg
491532 -rw- 9160       Mar 15 2021 11:49:51 -07:00 cat9k-wlc.17.05.01.SPA.pkg


11353194496 bytes total (9544245248 bytes free)
Switch#
```

b) **dir flash:*.conf**

The following is sample output of the **dir flash:*.conf** command. It displays the .conf files in the flash partition; note the two .conf files:

- `packages.conf`—the file that has been re-written with the newly installed .pkg files
- `cat9k_iosxe.17.05.01.SPA.conf`— a backup copy of the newly installed packages.conf file

```
Switch# dir flash:*.conf

Directory of flash:/*.conf
Directory of flash:/

434197 -rw- 7406 Mar 15 2021 10:59:16 -07:00 packages.conf
516098 -rw- 7406 Mar 15 2021 10:58:08 -07:00 cat9k_iosxe.17.05.01.SPA.conf
11353194496 bytes total (8963174400 bytes free)
```

**Step 6** **show version**

After the image boots up, use this command to verify the version of the new image.

The following sample output of the **show version** command displays the Cisco IOS XE Bengaluru 17.5.1 image on the device:

```
Switch# show version
Cisco IOS XE Software, Version 17.05.01
Cisco IOS Software [Bengaluru], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.5.1,
 RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2021 by Cisco Systems, Inc.
<output truncated>
```

# Downgrading in Install Mode

Follow these instructions to downgrade from one release to another, in install mode. To perform a software image downgrade, you must be booted into IOS through **boot flash:packages.conf**.

### Before you begin

Note that you can use this procedure for the following downgrade scenarios:

| When downgrading from ... | Use these commands... | To downgrade to... |
|---|---|---|
| Cisco IOS XE Bengaluru 17.5.x | Either **install** commands or **request platform software** command[7]. | Cisco IOS XE Bengaluru 17.4.x or earlier releases. |

[7] The **request platform software** commands are deprecated. So although they are still visible on the CLI, we recommend that you use **install** commands.



**Note** New switch models that are introduced in a release cannot be downgraded. The release in which a switch model is introduced is the minimum software version for that model.

The sample output in this section shows downgrade from Cisco IOS XE Bengaluru 17.5.1 to Cisco IOS XE Bengaluru 17.4.1, using **install** commands.

**Microcode Downgrade Prerequisite:**

Starting from Cisco IOS XE Gibraltar 16.12.1, a new microcode is introduced to support IEEE 802.3bt Type 3 standard for UPOE switches in the series (C9300-24U, C9300-48U, C9300-24UX, C9300-48UXM, C9300-48UN). The new microcode is not backward-compatible with some releases, because of which you must also downgrade the microcode when you downgrade to one of these releases. If the microcode is not downgraded, PoE features will be impacted after the downgrade.

Depending on the *release* you are downgrading to and the *commands* you use to downgrade, review the table below for the action you may have to take:

| When downgrading from ... | To one of These Releases | by Using... | Action For Microcode Downgrade |
|---|---|---|---|
| Cisco IOS XE Gibraltar 16.12.1 or a later release | Cisco IOS XE Everest 16.6.1 through Cisco IOS XE Everest 16.6.6<br>Cisco IOS XE Fuji 16.9.1 through Cisco IOS XE Fuji 16.9.2 | **install** commands | Microcode will roll back automatically as part of the software installation. No further action is required. |
| | | **request platform software** commands or or bundle boot | Manually downgrade the microcode before downgrading the software image.<br>Enter the **hw-module mcu rollback** command in global configuration mode, to downgrade microcode. |

## Procedure

**Step 1** Clean-up

**install remove inactive**

Use this command to clean-up old installation files in case of insufficient space and to ensure that you have at least 1GB of space in flash, to expand a new image.

The following sample output displays the cleaning up of unused files, by using the **install remove inactive** command:

```
Switch# install remove inactive

install_remove: START Mon Mar 15 19:51:48 PDT 2021
Cleaning up unnecessary package files
Scanning boot directory for packages ... done.
  Preparing packages list to delete ...
    cat9k-cc_srdriver.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-espbase.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-guestshell.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipbase.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-webui.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-wlc.17.05.01.SSA.pkg
      File is in use, will not delete.
    packages.conf
      File is in use, will not delete.
  done.
SUCCESS: No extra package or provisioning files found on media. Nothing to clean.

SUCCESS: install_remove  Mon Mar 15 11:42:39 PDT 2021
```

**Step 2** Copy new image to flash

a) **copy tftp:***[[//location]/directory]/filename***flash:**

Use this command to copy the new image from a TFTP server to flash memory. The location is either an IP address or a host name. The filename is specified relative to the directory used for file transfers. Skip this step if you want to use the new image from a TFTP server.

```
Switch# copy tftp://10.8.0.6/image/cat9k_iosxe.17.04.01.SPA.bin flash:
Destination filename [cat9k_iosxe.17.04.01.SPA.bin]?
Accessing tftp://10.8.0.6//cat9k_iosxe.17.04.01.SPA.bin...
Loading /cat9k_iosxe.17.04.01.SPA.bin from 10.8.0.6 (via GigabitEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 508584771 bytes]
508584771 bytes copied in 101.005 secs (5035244 bytes/sec)
```

b) **dir flash:**

Use this command to confirm that the image has been successfully copied to flash.

```
Switch# dir flash:*.bin
Directory of flash:/*.bin

Directory of flash:/

434184 -rw- 508584771 Mar 15 2021 13:35:16 -07:00 cat9k_iosxe.17.04.01.SPA.bin
11353194496 bytes total (9055866880 bytes free)
```

**Step 3** Set boot variable

a) **boot system flash:packages.conf**

Use this command to set the boot variable to **flash:packages.conf**.

```
Switch(config)# boot system flash:packages.conf
```

b) **no boot manual**

Use this command to configure the switch to auto-boot.

```
Switch(config)# no boot manual
Switch(config)# exit
```

c) **write memory**

Use this command to save boot settings.

```
Switch# write memory
```

d) **show boot**

Use this command to verify the boot variable (packages.conf) and manual boot setting (no):

```
Switch# show boot
Current Boot Variables:
BOOT variable = flash:packages.conf;

Boot Variables on next reload:
BOOT variable = flash:packages.conf;
Manual Boot = no
Enable Break = yes
Boot Mode = DEVICE
iPXE Timeout = 0
```

**Step 4** Downgrade software image

**install add file activate commit**

Use this command to install the image.

We recommend that you point to the source image on your TFTP server or the flash drive of the *active* switch, if you have copied the image to flash memory. If you point to an image on the flash or USB drive of a member switch (instead of the active), you must specify the exact flash or USB drive - otherwise installation fails. For example, if the image is on the flash drive of member switch 3 (flash-3): `Switch# install add file flash-3:cat9k_iosxe.17.04.01.SPA.bin activate commit`.

The following example displays the installation of the Cisco IOS XE Bengaluru 17.4.1 software image to flash, by using the **install add file activate commit** command.

```
Switch# install add file flash:cat9k_iosxe.17.04.01.SPA.bin activate commit
install_add_activate_commit: START Mon Mar 15 14:59:46 PDT 2021
install_add_activate_commit: Adding PACKAGE
install_add_activate_commit: Checking whether new add is allowed ....

--- Starting initial file syncing ---
[1]: Copying flash:cat9k_iosxe.17.04.01.SPA.bin from switch 1 to switch 2 3 4
[2 3 4]: Finished copying to switch 2 switch 3 switch 4
Info: Finished copying flash:cat9k_iosxe.17.04.01.SPA.bin to the selected switch(es)
Finished initial file syncing

--- Starting Add ---
Performing Add on all members
^[[A  [1] Add package(s) on switch 1
```

```
  [1] Finished Add on switch 1
  [2] Add package(s) on switch 2
  [2] Finished Add on switch 2
  [3] Add package(s) on switch 3
  [3] Finished Add on switch 3
  [4] Add package(s) on switch 4
  [4] Finished Add on switch 4
Checking status of Add on [1 2 3 4]
Add: Passed on [1 2 3 4]
Finished Add

Image added. Version: 17.04.01.0.306
install_add_activate_commit: Activating PACKAGE
Following packages shall be activated:
/flash/cat9k-wlc.17.04.01.SPA.pkg
/flash/cat9k-webui.17.04.01.SPA.pkg
/flash/cat9k-srdriver.17.04.01.SPA.pkg
/flash/cat9k-sipspa.17.04.01.SPA.pkg
/flash/cat9k-sipbase.17.04.01.SPA.pkg
/flash/cat9k-rpboot.17.04.01.SPA.pkg
/flash/cat9k-rpbase.17.04.01.SPA.pkg
/flash/cat9k-guestshell.17.04.01.SPA.pkg
/flash/cat9k-espbase.17.04.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.04.01.SPA.pkg
--- Starting Activate ---
Performing Activate on all members
  [1] Activate package(s) on switch 1
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.05.01.SPA.pkg
      Removed cat9k-espbase.17.05.01.SPA.pkg
      Removed cat9k-guestshell.17.05.01.SPA.pkg
      Removed cat9k-lni.17.05.01.SPA.pkg
      Removed cat9k-rpbase.17.05.01.SPA.pkg
      Removed cat9k-rpboot.17.05.01.SPA.pkg
      Removed cat9k-sipbase.17.05.01.SPA.pkg
      Removed cat9k-sipspa.17.05.01.SPA.pkg
      Removed cat9k-srdriver.17.05.01.SPA.pkg
      Removed cat9k-webui.17.05.01.SPA.pkg
      Removed cat9k-wlc.17.05.01.SPA.pkg
    New files list:
      Added cat9k-cc_srdriver.17.04.01.SPA.pkg
      Added cat9k-espbase.17.04.01.SPA.pkg
      Added cat9k-guestshell.17.04.01.SPA.pkg
      Added cat9k-rpbase.17.04.01.SPA.pkg
      Added cat9k-rpboot.17.04.01.SPA.pkg
      Added cat9k-sipbase.17.04.01.SPA.pkg
      Added cat9k-sipspa.17.04.01.SPA.pkg
      Added cat9k-srdriver.17.04.01.SPA.pkg
      Added cat9k-webui.17.04.01.SPA.pkg
      Added cat9k-wlc.17.04.01.SPA.pkg
    Finished list of software package changes
  [1] Finished Activate on switch 1
  [2] Activate package(s) on switch 2
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.05.01.SPA.pkg
      Removed cat9k-espbase.17.05.01.SPA.pkg
      Removed cat9k-guestshell.17.05.01.SPA.pkg
      Removed cat9k-lni.17.05.01.SPA.pkg
      Removed cat9k-rpbase.17.05.01.SPA.pkg
      Removed cat9k-rpboot.17.05.01.SPA.pkg
      Removed cat9k-sipbase.17.05.01.SPA.pkg
      Removed cat9k-sipspa.17.05.01.SPA.pkg
```

```
    Removed cat9k-srdriver.17.05.01.SPA.pkg
    Removed cat9k-webui.17.05.01.SPA.pkg
    Removed cat9k-wlc.17.05.01.SPA.pkg
  New files list:
    Added cat9k-cc_srdriver.17.04.01.SPA.pkg
    Added cat9k-espbase.17.04.01.SPA.pkg
    Added cat9k-guestshell.17.04.01.SPA.pkg
    Added cat9k-rpbase.17.04.01.SPA.pkg
    Added cat9k-rpboot.17.04.01.SPA.pkg
    Added cat9k-sipbase.17.04.01.SPA.pkg
    Added cat9k-sipspa.17.04.01.SPA.pkg
    Added cat9k-srdriver.17.04.01.SPA.pkg
    Added cat9k-webui.17.04.01.SPA.pkg
    Added cat9k-wlc.17.04.01.SPA.pkg
  Finished list of software package changes
[2] Finished Activate on switch 2
[3] Activate package(s) on switch 3
  --- Starting list of software package changes ---
  Old files list:
    Removed cat9k-cc_srdriver.17.05.01.SPA.pkg
    Removed cat9k-espbase.17.05.01.SPA.pkg
    Removed cat9k-guestshell.17.05.01.SPA.pkg
    Removed cat9k-lni.17.05.01.SPA.pkg
    Removed cat9k-rpbase.17.05.01.SPA.pkg
    Removed cat9k-rpboot.17.05.01.SPA.pkg
    Removed cat9k-sipbase.17.05.01.SPA.pkg
    Removed cat9k-sipspa.17.05.01.SPA.pkg
    Removed cat9k-srdriver.17.05.01.SPA.pkg
    Removed cat9k-webui.17.05.01.SPA.pkg
    Removed cat9k-wlc.17.05.01.SPA.pkg
  New files list:
    Added cat9k-cc_srdriver.17.04.01.SPA.pkg
    Added cat9k-espbase.17.04.01.SPA.pkg
    Added cat9k-guestshell.17.04.01.SPA.pkg
    Added cat9k-rpbase.17.04.01.SPA.pkg
    Added cat9k-rpboot.17.04.01.SPA.pkg
    Added cat9k-sipbase.17.04.01.SPA.pkg
    Added cat9k-sipspa.17.04.01.SPA.pkg
    Added cat9k-srdriver.17.04.01.SPA.pkg
    Added cat9k-webui.17.04.01.SPA.pkg
    Added cat9k-wlc.17.04.01.SPA.pkg
  Finished list of software package changes
[3] Finished Activate on switch 3
[4] Activate package(s) on switch 4
  --- Starting list of software package changes ---
  Old files list:
    Removed cat9k-cc_srdriver.17.05.01.SPA.pkg
    Removed cat9k-espbase.17.05.01.SPA.pkg
    Removed cat9k-guestshell.17.05.01.SPA.pkg
    Removed cat9k-lni.17.05.01.SPA.pkg
    Removed cat9k-rpbase.17.05.01.SPA.pkg
    Removed cat9k-rpboot.17.05.01.SPA.pkg
    Removed cat9k-sipbase.17.05.01.SPA.pkg
    Removed cat9k-sipspa.17.05.01.SPA.pkg
    Removed cat9k-srdriver.17.05.01.SPA.pkg
    Removed cat9k-webui.17.05.01.SPA.pkg
    Removed cat9k-wlc.17.05.01.SPA.pkg
  New files list:
    Added cat9k-cc_srdriver.17.04.01.SPA.pkg
    Added cat9k-espbase.17.04.01.SPA.pkg
    Added cat9k-guestshell.17.04.01.SPA.pkg
    Added cat9k-rpbase.17.04.01.SPA.pkg
    Added cat9k-rpboot.17.04.01.SPA.pkg
    Added cat9k-sipbase.17.04.01.SPA.pkg
```

```
      Added cat9k-sipspa.17.04.01.SPA.pkg
      Added cat9k-srdriver.17.04.01.SPA.pkg
      Added cat9k-webui.17.04.01.SPA.pkg
      Added cat9k-wlc.17.04.01.SPA.pkg
    Finished list of software package changes
  [4] Finished Activate on switch 4
Checking status of Activate on [1 2 3 4]
Activate: Passed on [1 2 3 4]
Finished Activate

--- Starting Commit ---
Performing Commit on all members
  [1] Commit package(s) on switch 1
  [1] Finished Commit on switch 1
  [2] Commit package(s) on switch 2
  [2] Finished Commit on switch 2
  [3] Commit package(s) on switch 3
  [3] Finished Commit on switch 3
  [4] Commit package(s) on switch 4
  [4] Finished Commit on switch 4
Checking status of Commit on [1 2 3 4]
Commit: Passed on [1 2 3 4]
Finished Commit

Send model notification for install_add_activate_commit before reload
[1 2 3 4]: Performing Upgrade_Service
300+0 records in
300+0 records out
307200 bytes (307 kB, 300 KiB) copied, 0.316195 s, 972 kB/s
MM [1] MCU version 196 sw ver 191
MM [2] MCU version 196 sw ver 191

MCU UPGRADE IN PROGRESS... PLEASE DO NOT POWER CYCLE!!

Front-end Microcode IMG MGR: found 4 microcode images for 1 device.
Image for front-end 0: /tmp/microcode_update/front_end/fe_type_6_0 update needed: no
Image for front-end 0: /tmp/microcode_update/front_end/fe_type_6_1 update needed: yes
Image for front-end 0: /tmp/microcode_update/front_end/fe_type_6_2 update needed: yes
Image for front-end 0: /tmp/microcode_update/front_end/fe_type_6_3 update needed: no

Front-end Microcode IMG MGR: Preparing to program device microcode...
Front-end Microcode IMG MGR: Preparing to program device[0], index=0 ...594412 bytes....
Skipped[0].
Front-end Microcode IMG MGR: Preparing to program device[0], index=1 ...440688 bytes.
Front-end Microcode IMG MGR: Programming device 0...rwRrrrrrrw
..0%.....10%
    .....20%
    .....30%
    .....40%
    .....50%
    .....60%
    .....70%
    .....80%
    .....90%
    .....100%

Front-end Microcode IMG MGR: Preparing to program device[0], index=2 ...24506 bytes.
Front-end Microcode IMG MGR: Programming device
0...rrrrrrw..0%....10%....20%......30%...40%....50%......60%....70%.....80%....90%....100%w
Wating for MCU to come up .....Rr!
Front-end Microcode IMG MGR: Microcode programming complete for device 0.
Front-end Microcode IMG MGR: Preparing to program device[0], index=3 ...90974 bytes....
Skipped[3].
Front-end Microcode IMG MGR: Microcode programming complete in 295 seconds
```

```
MCU UPGRADE COMPLETED!!...  SUCCESS: Upgrade_Service finished

Install will reload the system now!
SUCCESS: install_add_activate_commit  Mon Mar 15 15:14:57 PDT 2021
stack-4mnyq#
Chassis 1 reloading, reason - Reload command
Jul 20 15:15:01.382: %PMAN-5-EXITACTION: F0/0: pvp: Process manager is exiting: reload fp
action requested
Jul 20 15:15:03.101: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: rp processes
 exit with reload switch code

Initializing Hardware......

System Bootstrap, Version 17.3.1r[FC2], RELEASE SOFTWARE (P)
Compiled Wed 03/17/2021 12:55:25.08 by rel

Current ROMMON image : Primary
Last reset cause     : SoftwareReload
C9300-24UX platform with 8388608 Kbytes of main memory

switch: boot
boot: attempting to boot from [flash:packages.conf]
boot: reading file packages.conf
#
################################################################################################################################
################################################################################################################################
################################################################################################################################


Waiting for 120 seconds for other switches to boot
Switch is in STRAGGLER mode, waiting for active Switch to boot
Active Switch has booted up, starting discovery phase

Switch number is 1
All switches in the stack have been discovered. Accelerating discovery

Switch console is now available

Press RETURN to get started.
```

**Note**
The system reloads automatically after executing the **install add file activate commit** command. You do not have to manually reload the system.

**Step 5** Verify version

**show version**

After the image boots up, use this command to verify the version of the new image.

**Note**
When you downgrade the software image, the ROMMON version does not downgrade. It remains updated.

The following sample output of the **show version** command displays the Cisco IOS XE Bengaluru 17.4.1 image on the device:

```
Switch# show version
Cisco IOS XE Software, Version 17.04.01
Cisco IOS Software [Bengaluru], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.4.1,
 RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2021 by Cisco Systems, Inc.
<output truncated>
```

## Field-Programmable Gate Array Version Upgrade

A field-programmable gate array (FPGA) is a type of programmable memory device that exists on Cisco switches. They are re-configurable logic circuits that enable the creation of specific and dedicated functions.

There is no FPGA upgrade in Cisco IOS XE Bengaluru 17.5.1. To check the current FPGA version, enter the **version -v** command in ROMMON mode.

**Note**

- Not every software release has a change in the FPGA version.
- The version change occurs as part of the regular software upgrade and you do not have to perform any other additional steps.

# Licensing

This section provides information about the licensing packages for features available on Cisco Catalyst 9000 Series Switches.

## License Levels

The software features available on Cisco Catalyst 9300 Series Switches  fall under these base or add-on license levels.

### Base Licenses

- Network Essentials
- Network Advantage—Includes features available with the Network Essentials license and more.

### Add-On Licenses

Add-On Licenses require a Network Essentials or Network Advantage as a pre-requisite. The features available with add-on license levels provide Cisco innovations on the switch, as well as on the Cisco Digital Network Architecture Center (Cisco DNA Center).

- DNA Essentials
- DNA Advantage— Includes features available with the DNA Essentials license and more.

To find information about platform support and to know which license levels a feature is available with, use Cisco Feature Navigator. To access Cisco Feature Navigator, go to https://cfnng.cisco.com. An account on cisco.com is not required.

## Available Licensing Models and Configuration Information

- Cisco IOS XE Fuji 16.8.x and earlier: RTU Licensing is the default and the only supported method to manage licenses.

- Cisco IOS XE Fuji 16.9.1 to Cisco IOS XE Amsterdam 17.3.1: Smart Licensing is the default and the only supported method to manage licenses.

  In the software configuration guide of the required release, see **System Management → Configuring Smart Licensing**.

- Cisco IOS XE Amsterdam 17.3.2a and later: Smart Licensing Using Policy, which is an enhanced version of Smart Licensing, is the default and the only supported method to manage licenses.

  For more information, see Configuring Licenses on Cisco Catalyst 9000 Series Switches.

For a more detailed overview on Cisco Licensing, go to Cisco Software Licensing Guide.

## License Levels - Usage Guidelines

- The duration or term for which a purchased license is valid:

| Smart Licensing Using Policy | Smart Licensing |
|---|---|
| • Perpetual: There is no expiration date for such a license.<br>• Subscription: The license is valid only until a certain date (for a three, five, or seven year period). | • Permanent: for a license level, and without an expiration date.<br>• Term: for a license level, and for a three, five, or seven year period.<br>• Evaluation: a license that is not registered. |

- Base licenses (Network Essentials and Network-Advantage) are ordered and fulfilled only with a perpetual or permanent license type.
- Add-on licenses (DNA Essentials and DNA Advantage) are ordered and fulfilled only with a subscription or term license type.
- An add-on license level is included when you choose a network license level. If you use DNA features, renew the license before term expiry, to continue using it, or deactivate the add-on license and then reload the switch to continue operating with the base license capabilities.
- When ordering an add-on license with a base license, note the combinations that are permitted and those that are not permitted:

***Table 5: Permitted Combinations***

| | DNA Essentials | DNA Advantage |
|---|---|---|
| Network Essentials | Yes | No |
| Network Advantage | Yes[8] | Yes |

[8] You will be able to purchase this combination only at the time of the DNA license renewal and not when you purchase DNA-Essentials the first time.

- Evaluation licenses cannot be ordered. They are not tracked via Cisco Smart Software Manager and expire after a 90-day period. Evaluation licenses can be used only once on the switch and cannot be regenerated. Warning system messages about an evaluation license expiry are generated only 275 days after expiration and every week thereafter. An expired evaluation license cannot be reactivated after

reload. This applies only to *Smart Licensing*. The notion of evaluation licenses does not apply to *Smart Licensing Using Policy*.

# Scaling Guidelines

For information about feature scaling guidelines, see the Cisco Catalyst 9300 Series Switches datasheet at:

http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9300-series-switches/datasheet-c78-738977.html

# Limitations and Restrictions

- Control Plane Policing (CoPP)—The **show run** command does not display information about classes configured under `system-cpp policy`, when they are left at default values. Use the **show policy-map system-cpp-policy** or the **show policy-map control-plane** commands in privileged EXEC mode instead.
- Cisco TrustSec restrictions—Cisco TrustSec can be configured only on physical interfaces, not on logical interfaces.
- Flexible NetFlow limitations
  - You cannot configure NetFlow export using the Ethernet Management port (GigabitEthernet0/0).
  - You can not configure a flow monitor on logical interfaces, such as layer 2 port-channels, loopback, tunnels.
  - You can not configure multiple flow monitors of same type (ipv4, ipv6 or datalink) on the same interface for same direction.
- QoS restrictions
  - When configuring QoS queuing policy, the sum of the queuing buffer should not exceed 100%.
  - Policing and marking policy on sub interfaces is supported.
  - Marking policy on switched virtual interfaces (SVI) is supported.
  - QoS policies are not supported for port-channel interfaces, tunnel interfaces, and other logical interfaces.
  - Stack Queuing and Scheduling (SQS) drops CPU bound packets exceeding 1.4 Gbps.
- Secure Shell (SSH)
  - Use SSH Version 2. SSH Version 1 is not supported.
  - When the device is running SCP and SSH cryptographic operations, expect high CPU until the SCP read process is completed. SCP supports file transfers between hosts on a network and uses SSH for the transfer.

    Since SCP and SSH operations are currently not supported on the hardware crypto engine, running encryption and decryption process in software causes high CPU. The SCP and SSH processes can show as much as 40 or 50 percent CPU usage, but they do not cause the device to shutdown.

- Smart Licensing Using Policy: Starting with Cisco IOS XE Amsterdam 17.3.2a, with the introduction of Smart Licensing Using Policy, even if you configure a hostname for a product instance or device, only the Unique Device Identifier (UDI) is displayed. This change in the display can be observed in all licensing utilities and user interfaces where the hostname was displayed in earlier releases. It does not affect any licensing functionality. There is no workaround for this limitation.

  The licensing utilities and user interfaces that are affected by this limitation include only the following: Cisco Smart Software Manager (CSSM), Cisco Smart License Utility (CSLU), and Smart Software Manager On-Prem (SSM On-Prem).

- Stacking:
  - A switch stack supports up to eight stack members.
  - Only homogenous stacking is supported, mixed stacking is not.

    C9300 SKUs can be stacked only with other C9300 SKUs. Similarly C9300L SKUs can be stacked only with other C9300L SKUs.

    The following additional restriction applies to the C9300-24UB, C9300-24UXB, and C9300-48UB models of the series: These models can be stacked only with each other. They cannot be stacked with other C9300 SKUs.
  - Auto upgrade for a new member switch is supported only in the install mode.

- TACACS legacy command: Do not configure the legacy **tacacs-server host** command; this command is deprecated. If the software version running on your device is Cisco IOS XE Gibraltar 16.12.2 or a later release, using the legacy command can cause authentication failures. Use the **tacacs server** command in global configuration mode.

- USB Authentication—When you connect a Cisco USB drive to the switch, the switch tries to authenticate the drive against an existing encrypted preshared key. Since the USB drive does not send a key for authentication, the following message is displayed on the console when you enter **password encryption aes** command:

```
Device(config)# password encryption aes
Master key change notification called without new or old key
```

- VLAN Restriction—It is advisable to have well-defined segregation while defining data and voice domain during switch configuration and to maintain a data VLAN different from voice VLAN across the switch stack. If the same VLAN is configured for data and voice domains on an interface, the resulting high CPU utilization might affect the device.

- Wired Application Visibility and Control limitations:
  - NBAR2 (QoS and Protocol-discovery) configuration is allowed only on wired physical ports. It is not supported on virtual interfaces, for example, VLAN, port channel nor other logical interfaces.
  - NBAR2 based match criteria ‘match protocol’ is allowed only with marking or policing actions. NBAR2 match criteria will not be allowed in a policy that has queuing features configured.
  - ‘Match Protocol’: up to 256 concurrent different protocols in all policies.
  - NBAR2 and Legacy NetFlow cannot be configured together at the same time on the same interface. However, NBAR2 and wired AVC Flexible NetFlow can be configured together on the same interface.
  - Only IPv4 unicast (TCP/UDP) is supported.

- AVC is not supported on management port (Gig 0/0)
- NBAR2 attachment should be done only on physical access ports. Uplink can be attached as long as it is a single uplink and is not part of a port channel.
- Performance—Each switch member is able to handle 2000 connections per second (CPS) at less than 50% CPU utilization. Above this rate, AVC service is not guaranteed.
- Scale—Able to handle up to 20000 bi-directional flows per 24 access ports and per 48 access ports.

- YANG data modeling limitation—A maximum of 20 simultaneous NETCONF sessions are supported.
- Embedded Event Manager—Identity event detector is not supported on Embedded Event Manager.
- The File System Check (fsck) utility is not supported in install mode.
- Switch Web UI allows configuration of data VLANs only and not voice VLANs. If you remove a voice VLAN configured to an interface using the Web UI, then all data VLANs associated with the interface are also removed by default.

# Caveats

Caveats describe unexpected behavior in Cisco IOS-XE releases. Caveats listed as open in a prior release are carried forward to the next release as either open or resolved.

## Cisco Bug Search Tool

The Cisco Bug Search Tool (BST) allows partners and customers to search for software bugs based on product, release, and keyword, and aggregates key data such as bug details, product, and version. The BST is designed to improve the effectiveness in network risk management and device troubleshooting. The tool has a provision to filter bugs based on credentials to provide external and internal bug views for the search input.

To view the details of a caveat, click on the identifier.

## Open Caveats in Cisco IOS XE Bengaluru 17.5.x

| Identifier | Description |
|---|---|
| CSCvw22989 | Static mode Dual Signature Powered Device can draw more than its class values on C9300 |
| CSCvw79182 | Dynamic power budget values in Ring stack-power on C9300 |
| CSCvw99523 | Dynamic power budget negotiation take too long in Ring stack-power on C9300 |

## Resolved Caveats in Cisco IOS XE Bengaluru 17.5.1

| Identifier | Description |
|---|---|
| CSCvw65866 | Packet loss and jitter seen for media traffic when connected to C9300-48UN |

| Identifier | Description |
|---|---|
| CSCvw67001 | 17.4.1 : With Macsec failover to standby switch port in portchannel causes multicast traffic drop. |
| CSCvx60124 | Traffic failed if incoming interface MPLS and 2+ outgoing interfaces (ECMP) with recursive routing |

# Troubleshooting

For the most up-to-date, detailed troubleshooting information, see the Cisco TAC website at this URL:

https://www.cisco.com/en/US/support/index.html

Go to **Product Support** and select your product from the list or enter the name of your product. Look under Troubleshoot and Alerts, to find information for the problem that you are experiencing.

# Related Documentation

Information about Cisco IOS XE at this URL: https://www.cisco.com/c/en/us/products/ios-nx-os-software/ios-xe/index.html

All support documentation for Cisco Catalyst 9300 Series Switches is at this URL: https://www.cisco.com/c/en/us/support/switches/catalyst-9300-series-switches/tsd-products-support-series-home.html

Cisco Validated Designs documents at this URL: https://www.cisco.com/go/designzone

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: https://cfnng.cisco.com/mibs

# Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
- To get the business results you're looking for with the technologies that matter, visit Cisco Services.
- To submit a service request, visit Cisco Support.
- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit Cisco DevNet.
- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

### Cisco Bug Search Tool

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