# Release Notes for Cisco Catalyst 9500 Series Switches, Cisco IOS XE Amsterdam 17.3.x

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## Release Notes for Cisco Catalyst 9500 Series Switches, Cisco IOS XE Amsterdam 17.3.x

## Introduction

Cisco Catalyst 9500 Series Switches and Cisco Catalyst 9500 Series Switches - High Performance are leading, fixed, core and aggregation enterprise switching platforms and have been purpose-built to address emerging trends in security, IoT, mobility, and cloud.

These switches deliver complete convergence in terms of ASIC architecture with Unified Access Data Plane (UADP) 2.0 on Cisco Catalyst 9500 Series Switches and UADP 3.0 on Cisco Catalyst 9500 Series Switches - High Performance. The platform runs an open Cisco IOS XE that supports model-driven programmability. This series forms the foundational building block for Software-Defined Access (SD-Access), which is Cisco's lead enterprise architecture.

**Note** With the introduction of the High Performance models in the series, there may be differences in the supported and unsupported features, limitations, and caveats that apply to the Cisco Catalyst 9500 Series Switches and Cisco Catalyst 9500 Series Switches - High Performance models. Throughout this release notes document, any such differences are expressly called out. If they are not, the information applies to all the models in the series.

## Whats New in Cisco IOS XE Amsterdam 17.3.8a

There are no new features in this release. This release provides a fix for CSCwh87343: Cisco IOS XE Software Web UI Privilege Escalation Vulnerability. For more information, see Security Advisory: cisco-sa-iosxe-webui-privesc-j22SaA4z.

## Whats New in Cisco IOS XE Amsterdam 17.3.8

### Hardware Features in Cisco IOS XE Amsterdam 17.3.8

There are no new hardware features in this release.

### Software Features in Cisco IOS XE Amsterdam 17.3.8

There are no new software features in this release.

## Whats New in Cisco IOS XE Amsterdam 17.3.7

### Hardware Features in Cisco IOS XE Amsterdam 17.3.7

There are no new hardware features in this release.

### Software Features in Cisco IOS XE Amsterdam 17.3.7

There are no new software features in this release.

## Whats New in Cisco IOS XE Amsterdam 17.3.6

### Hardware Features in Cisco IOS XE Amsterdam 17.3.6

There are no new hardware features in this release.

### Software Features in Cisco IOS XE Amsterdam 17.3.6

There are no new software features in this release.

## Whats New in Cisco IOS XE Amsterdam 17.3.5

### Hardware Features in Cisco IOS XE Amsterdam 17.3.5

There are no new hardware features in this release.

### Software Features in Cisco IOS XE Amsterdam 17.3.5

There are no new software features in this release.

## Whats New in Cisco IOS XE Amsterdam 17.3.4

### Hardware Features in Cisco IOS XE Amsterdam 17.3.4

There are no new hardware features in this release.

### Software Features in Cisco IOS XE Amsterdam 17.3.4

There are no new software features in this release.

# Whats New in Cisco IOS XE Amsterdam 17.3.3

## Hardware Features in Cisco IOS XE Amsterdam 17.3.3

There are no new hardware features in this release.

## Software Features in Cisco IOS XE Amsterdam 17.3.3

| Feature Name | Description, Documentation Link, and License Level Information |
|---|---|
| Smart Software Manager On-Prem (SSM On-Prem) Support for Smart Licensing Using Policy | SSM On-Prem is an asset manager, which works in conjunction with CSSM. It enables you to administer products and licenses on your premises instead of having to directly connect to CSSM.<br><br>Here, a product instance is connected to SSM On-Prem, and SSM On-Prem becomes the single point of interface with CSSM. The product instance can be configured to *push* the required information to SSM On-Prem. Alternatively, SSM On-Prem can be set-up to *pull* the required information from a product instance at a configurable frequency. After usage information is available in SSM On-Prem, you must synchronize the same with CSSM, to ensure that the product instance count, license count and license usage information is the same on both, CSSM and SSM On□Prem. Offline and online options are available for synchronization between CSSM and SSM On□Prem.<br><br>Minimum Required SSM On-Prem Version: Version 8, Release 202102.<br><br>Minimum Required Cisco IOS XE Version: Cisco IOS XE Amsterdam 17.3.3.<br><br>See System Mangement → Smart Licensing Using Policy and System Management Commands.<br><br>(A license level does not apply) |
| MLDP-Based MVPN | The MLDP-based MVPN feature provides extensions to Label Distribution Protocol (LDP) for the setup of point-to-multipoint (P2MP) and multipoint-to-multipoint (MP2MP) label switched paths (LSPs) for transport in the Multicast Virtual Private Network (MVPN) core network.<br><br>See IP Multicast Routing Configuration Guide → MLDP-Based MVPN.<br><br>(Network Advantage) |

# Whats New in Cisco IOS XE Amsterdam 17.3.2a

## Hardware Features in Cisco IOS XE Amsterdam 17.3.2a

There are no new hardware features in this release.

## Software Features in Cisco IOS XE Amsterdam 17.3.2a


- Software Features Introduced on All Models, on page 4
- Software Features Introduced on Cisco Catalyst 9500 Series Switches, on page 5
- Software Features Introduced on Cisco Catalyst 9500 Series Switches-High Performance, on page 5

There are no new software features in this release.

### Software Features Introduced on All Models

| Feature Name | Description, Documentation Link, and License Level Information |
|---|---|
| Smart Licensing Using Policy | An enhanced version of Smart Licensing, with the overarching objective of providing a licensing solution that does not interrupt the operations of your network, rather, one that enables a compliance relationship to account for the hardware and software licenses you purchase and use.<br><br>With this licensing model, you do not have to complete any licensing-specific operations, such as registering or generating keys before you start using the software and the licenses that are tied to it. License usage is recorded on your device with timestamps and the required workflows can be completed at a later date.<br><br>Multiple options are available for license usage reporting – this depends on the topology you implement. You can use the Cisco Smart Licensing Utility (CSLU) Windows application, or report usage information directly to CSSM. A provision for offline reporting for air-gapped networks, where you download usage information and upload to CSSM, is also available.<br><br>Starting with this release, Smart Licensing Using Policy is automatically enabled on the device. This is also the case when you upgrade to this release.<br><br>By default, your Smart Account and Virtual Account in CSSM is enabled for Smart Licensing Using Policy.<br><br>For conceptual, configuration, migration, and troubleshooting information for Smart Licensing Using Policy, see the documentation links below.<br><br>See System Mangement → Smart Licensing Using Policy and System Management Commands.<br><br>(A license level does not apply) |
| Cisco DNA Center Support for Smart Licensing Using Policy | Cisco DNA Center supports Smart Licensing Using Policy functionality starting with Cisco DNA Center Release 2.2.2. The corresponding minimum required Cisco IOS XE Release on the Cisco Catalyst 9500 Series Switches (all models) is Cisco IOS XE Amsterdam 17.3.2a.<br><br>Implement the “Connected to CSSM Through a Controller” topology to have Cisco DNA Center manage a product instance. When you do, the product instance records license usage, but it is the Cisco DNA Center that initiates communication with the product instance to retrieve and report usage to Cisco Smart Software Manager (CSSM), and returns the acknowledgement (RUM ACK).<br><br>In order to meet reporting requirements, Cisco DNA Center provides ad hoc or on-demand reporting, as well as scheduled reporting options.<br><br>See System Mangement → Smart Licensing Using Policy.<br><br>(A license level does not apply) |

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

| Serviceability |
| --- |
| There are no new serviceability features in this release. |

#### Software Features Introduced on Cisco Catalyst 9500 Series Switches

None. See Software Features Introduced on All Models, on page 6.

#### Software Features Introduced on Cisco Catalyst 9500 Series Switches-High Performance

None. See Software Features Introduced on All Models, on page 6.

# Whats New in Cisco IOS XE Amsterdam 17.3.1

## Hardware Features in Cisco IOS XE Amsterdam 17.3.1

There are no new hardware features in this release.

## Software Features in Cisco IOS XE Amsterdam 17.3.1


- Software Features Introduced on All Models, on page 6
- Software Features Introduced on Cisco Catalyst 9500 Series Switches, on page 8
- Software Features Introduced on Cisco Catalyst 9500 Series Switches-High Performance, on page 9

### Software Features Introduced on All Models

| Feature Name | Description, Documentation Link, and License Level Information |
|---|---|
| BGP EVPN VXLAN<br>• Broadcast, Unknown Unicast, and Multicast (BUM) Traffic Rate Limiting<br>• Enhanced rendezvous point (RP) Functionality for Layer 3 TRM for IPv4 and IPv6 traffic<br>• Interworking of Layer 3 TRM with MVPN Networks for IPv4 Traffic<br>• Layer 3 Tenant Routed Multicast (TRM) for IPv6 Traffic | The following BGP EVPN VXLAN features are introduced in this release:<br>• BUM Traffic Rate Limiting: Allows you to use a policer and set the flood rate limit of the BUM traffic in the network to a predefined value.<br>• Enhanced RP Functionality for Layer 3 TRM for IPv4 and IPv6 traffic: Allows you to configure an RP for TRM with PIM-Sparse Mode (PIM-SM) on a single or multiple VTEPs inside the BGP EVPN VXLAN fabric or on a device outside the fabric.<br>• Interworking of Layer 3 TRM with MVPN Networks for IPv4 Traffic: Allows you to forward IPv4 Layer 3 multicast traffic between sources and receivers of an EVPN VXLAN network and an MVPN network.<br>• Layer 3 Tenant Routed Multicast for IPv6 Traffic: Introduces support to configure Layer 3 TRM for IPv6 traffic with PIM-Source Specific Mode (PIM-SSM) and with PIM-SM.<br>See BGP EVPN VXLAN.<br>(Network Advantage) |
| Enhanced ACL Logging | Introduces support for Access Control List (ACL) logging using NetFlow hardware, which allows much higher logging rates.<br>See Cisco TrustSec → Configuring Security Group ACL Policies.<br>(Network Essentials and Network Advantage) |
| Link Aggregation Control Protocol (LACP) 1:1 Redundancy and Dampening | Introduces support for:<br>• LACP 1:1 Redundancy: Supports an EtherChannel configuration with one active link and fast switchover to a hot standby link.<br>• LACP 1:1 Hot Standby Dampening: Configures a timer that delays switchover back to the higher priority port after it becomes active.<br>See Layer 2 → Configuring EtherChannels.<br>(Network Essentials and Network Advantage) |
| MPLS QoS - WRED | Introduces support for weighted random early detection (WRED) in MPLS Quality of Service (QoS). This feature configures WRED to use the MPLS experimental bits (EXP) to calculate the drop probability of a packet.<br>See Multiprotocol Label Switching → Configuring MPLS QoS.<br>(Network Advantage) |

| Feature Name | Description, Documentation Link, and License Level Information |
|---|---|
| MPLS VPN InterAS Option AB | Enables different autonomous systems to interconnect by using a single Multiprotocol Border Gateway Protocol (MP-BGP) session, which is enabled globally on the router. When different autonomous systems are interconnected in an MPLS VPN InterAS Option AB configuration, the entire network configuration is scaled and simplified, and maintains IP quality of service (QoS) functions between Autonomous System Boundary Router (ASBR) peers.<br>(Network Advantage) |
| Private VLAN (PVLAN) on Trunk Ports and Portchannels | Enables configuration of private VLANs on isolated trunk ports, promiscuous trunk ports, and on port channels.<br>See Multiprotocol Label Switching → Configuring MPLS VPN InterAS Options.<br>(Network Essentials and Network Advantage) |
| Programmability<br>• gNMI Configuration Persistence<br>• gNOI Certificate Management<br>• gNOI Bootstrapping with Certificate Service<br>• YANG Data Models | The following programmability features are introduced in this release:<br>• gNMI (gRPC Network Management Interface) Configuration Persistence: Ensures that all successful changes made through the gNMI SET RPC persist after a device restart.<br>• gNOI Certificate Management: The gRPC Network Operations Interface (gNOI) Certificate Management service provides RPCs to install, rotate, get certificate, revoke certificate, and generate certificate signing request (CSR).<br>• gNOI Bootstrapping with Certificate Service: After installing gNOI certificates, bootstrapping is used to configure or operate a target. gNMI bootstrapping is enabled by using the **gnxi-secure-int** command and disabled by using the **secure-allow-self-signed-trustpoint** command.<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/1731.<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 Essentials and Network Advantage) |
| Switch Integrated Security Features (SISF) - Throttling of ARP Packets | Starting with this release, ARP packets are throttled to mitigate high CPU utilization scenarios.<br>In a five second window, a maximum of 50 ARP broadcast packets per binding entry are processed by SISF. When the limit is reached, incoming ARP packets are dropped. Note that the limit of 50 in five seconds is for each binding entry, that is, for each source IP. |

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

| Serviceability | |
|---|---|
| **monitor capture match** | The command was modified. The following keywords were introduced:<br>• **packet-length**: Specifies packet length filter for packet capture<br>• **access-list**: Specifies access-list filter for packet capture |
| **show bootflash:** | The command was modified. The following keywords were introduced:<br>• **namesort**: Sorts the output based on file name<br>• **sizesort**: Sorts the output based on file size<br>• **timesort**: Sorts the output based on the timestamp of the file |
| **show platform hardware fed active fwd-asic counters tla** | • The command output was enhanced to display the TLA counters information.<br>• The **change** keyword was deprecated. |
| **show switch stack-ports** | The command was modified. The **detail** keyword was introduced. It displays the stack interface link status and errors. |
| **show mpls ldp** | The command was introduced. It provides the following options:<br>• **show mpls ldp discovery**: Displays the status of the LDP discovery process<br>• **show mpls ldp neighbor**: Displays the status of LDP sessions.<br>• **show mpls ldp bindings**: Displays the contents of the Label Information Base (LIB). |
| **show tech-support** | The command was modified. The following keywords were introduced:<br>• **show tech-support confidential**: The **confidential** keyword was introduced, to mask sensitive information in the output of **show tech-support** command.<br>• **show tech-support monitor**: The **monitor** keyword was introduced. It displays Switched Port Analyzer (SPAN) monitor-related information.<br>• **show tech-support pvlan**: The **pvlan** keyword was introduced. It displays Private VLAN-related information. |
| System Report Files - Hostname | In a complex network it is difficult to track the origin of a system-report file. In order to make the reports easily and uniquely identifiable, the hostname is now prepended to the system-report file name. |

### Software Features Introduced on Cisco Catalyst 9500 Series Switches

None. See Software Features Introduced on All Models, on page 6.

**Software Features Introduced on Cisco Catalyst 9500 Series Switches-High Performance**

| Feature Name | Description, Documentation Link, and License Level Information |
|---|---|
| Customizable Switching Database Manager (SDM) Templates | Allows you to configure a customizable SDM template. In the customized template, you can assign resources to different features based on your requirement.<br>See System Management → Configuring SDM Templates.<br>(Network Essentials and Network Advantage) |
| EIGRP Loop-Free Alternate (LFA) IP Fast Reroute (IPFRR) | Enables the Enhanced Interior Gateway Routing Protocol (EIGRP) to reduce the routing transition time to less than 50 ms by precomputing repair paths or backup routes and installing these paths or routes in the Routing Information Base (RIB).<br>See IP Routing → Configuring EIGRP Loop-Free Alternate IP Fast Reroute.<br>(Network Essentials and Network Advantage) |
| IPv6 Multicast Virtual Private Network (MVPNv6) | Enables service providers to use their existing IPv4 backbone to provide multicast-enabled private IPv6 networks to their customers.<br>See IP Multicast Routing → Configuring MVPNv6.<br>(Network Advantage) |
| Open Shortest Path First Nonstop Routing (OSPF NSR) | Enables a device with redundant Route Processors (RPs) to maintain its Open Shortest Path First (OSPF) state and adjacencies across planned and unplanned RP switchovers, by checkpointing state information from OSPF on the active RP to the standby RP. OSPF uses this checkpointed information to continue operation without interruption when the switchover to standby RP occurs.<br>See IP Routing.<br>(Network Advantage) |
| OSPFv2 Loop-Free Alternate (LFA) IP Fast Reroute (IP FRR) | Enables Open Shortest Path First version 2 (OSPFv2) to use a precomputed alternate next hop to reduce failure reaction time when the primary next hop fails. You can configure a per-prefix LFA path that redirects traffic to a next hop other than the primary neighbor.<br>See IP Routing → Configuring OSPFv2 Loop-Free Alternate IP Fast Reroute.<br>(Network Essentials and Network Advantage) |

# Important Notes


- Cisco StackWise Virtual: Supported and Unsupported Features, on page 10
- Unsupported Features: All Models, on page 10
- Unsupported Features: Cisco Catalyst 9500 Series Switches, on page 10
- Unsupported Features: Cisco Catalyst 9500 Series Switches - High Performance, on page 10
- Complete List of Supported Features, on page 11
- Accessing Hidden Commands, on page 11

- Default Behaviour—All Models, on page 12
- Default Interface Behaviour on Cisco Catalyst 9500 Series Switches - High Performance Only, on page 12

### Cisco StackWise Virtual: Supported and Unsupported Features

The following is a list of features that are supported or unsupported when you enable Cisco StackWise Virtual on a device:

- Layer 2, Layer 3, Security, Quality of Service, Multicast, Application, Monitoring and Management, Multiprotocol Label Switching, High Availability, BGP EVPN VXLAN, Remote Switched Port Analyzer, and Sofware Defined Access are supported.

  Contact the Cisco Technical Support Centre for the specific list of features that are supported under each one of these technologies.

- Resilient Ethernet Protocol is *not* supported.

### Unsupported Features: All Models

- IPsec VPN
- Performance Monitoring (PerfMon)
- Virtual Routing and Forwarding-Aware (VRF-Aware) web authentication

### Unsupported Features: Cisco Catalyst 9500 Series Switches

- Border Gateway Protocol (BGP) Additional Paths
- Cisco TrustSec Network Device Admission Control (NDAC) on Uplinks
- Flexible NetFlow: NetFlow v5 Export Protocol, 4-byte (32-bit) AS Number Support, TrustSec NetFlow IPv4 Security Group Access Control List (SGACL) Deny and Drop Export
- Lawful Intercept
- PIM Bidirectional Forwarding Detection (PIM BFD), PIM Snooping.
- Quality of Service: Classification (Layer 3 Packet Length, Time-to-Live (TTL)), per queue policer support, sharped profile enablement for egress per port queue, L2 Miss, Ingress Packet FIFO (IPF)
- Unicast over Point-to-Multipoint (P2MP) Generic Routing Encapsulation (GRE), Multicast over P2MP GRE.

### Unsupported Features: Cisco Catalyst 9500 Series Switches - High Performance

- Cisco Application Visibility and Control (AVC)
- Flexlink+
- VLAN Load Balancing for FlexLink+
- Preemption for VLAN Load Balancing
- FlexLink+ Dummy Multicast Packets

- MPLS Label Distribution Protocol (MPLS LDP) VRF-Aware Static Labels
- Network-Based Application Recognition (NBAR) and Next-Generation NBAR (NBAR2)
- QoS Options on GRE Tunnel Interfaces
- Resilient Ethernet Protocol (REP)

### 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.

Choose the following in the context of the Cisco Catalyst 9500 Series Switches:

- CAT9500: to see all the features supported on the C9500-12Q, C9500-16X, C9500-24Q, C9500-40X models
- CAT9500 HIGH PERFORMANCE (32C; 32QC; 48Y4C; 24Y4C): to see all the features supported on the C9500-24Y4C, C9500-32C, C9500-32QC, and C9500-48Y4C models

### Accessing Hidden Commands

From 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. Hidden commands are only meant to assist Cisco TAC in advanced troubleshooting, and are not documented either.

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

- Category 1: Hidden commands in Privileged or User EXEC mode. Enter the **service internal** command to access these commands.
- Category 2: Hidden commands in one of the configuration modes (global, interface, and so on).

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

- The commands have CLI help. 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. The following is an 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 categories 1 and 2, there are other internal commands displayed on the CLI, for which the system does *not* generate the `%PARSER-5-HIDDEN` syslog message.

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

If you find that you need to use 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 nonhidden commands.

#### Default Behaviour—All Models

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).

#### Default Interface Behaviour on Cisco Catalyst 9500 Series Switches - High Performance Only

From Cisco IOS XE Gibraltar 16.11.1, the default interface for all High Performance models in the series changes from Layer 3 to Layer 2. Use the **no switchport** command to change the Layer 2 interface into Layer 3 mode.

The startup configuration has explicit configuration of the **switchport** command for Layer 2 interfaces and the **no switchport** command for Layer 3 interfaces to address this change in behaviour and to support seamless migration.

# Supported Hardware

## Cisco Catalyst 9500 Series Switches—Model Numbers

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

Base PIDs are the model numbers of the switch.

Bundled PIDs indicate the orderable part numbers for base PIDs that are bundled with a particular network module. Entering the **show version**, **show module**, or **show inventory** commands on such a switch (bundled PID), displays its base PID.

***Table 1: Cisco Catalyst 9500 Series Switches***

| Switch Model | Default License Level[1] | Description |
|---|---|---|
| **Base PIDs** | | |
| C9500-12Q-E | Network Essentials | 12 40-Gigabit Ethernet QSFP+ ports and two power supply slots |
| C9500-12Q-A | Network Advantage | |
| C9500-16X-E | Network Essentials | 16 1/10-Gigabit Ethernet SFP/SFP+ ports and two power supply slots |
| C9500-16X-A | Network Advantage | |

| Switch Model | Default License Level[1] | Description |
|---|---|---|
| C9500-24Q-E | Network Essentials | 24-Port 40-Gigabit Ethernet QSFP+ ports and two power supply slots |
| C9500-24Q-A | Network Advantage | |
| C9500-40X-E | Network Essentials | 40 1/10-Gigabit Ethernet SFP/SFP+ ports and two power supply slots |
| C9500-40X-A | Network Advantage | |
| **Bundled PIDs** | | |
| C9500-16X-2Q-E | Network Essentials | 16 10-Gigabit Ethernet SFP+ port switch and a 2-Port 40-Gigabit Ethernet (QSFP) network module on uplink ports |
| C9500-16X-2Q-A | Network Advantage | |
| C9500-24X-E | Network Essentials | 16 10-Gigabit Ethernet SFP+ port switch and an 8-Port 10-Gigabit Ethernet (SFP) network module on uplink ports |
| C9500-24X-A | Network Advantage | |
| C9500-40X-2Q-E | Network Essentials | 40 10-Gigabit Ethernet SFP+ port switch and a 2-Port 40-Gigabit Ethernet (QSFP) network module on uplink ports |
| C9500-40X-2Q-A | Network Advantage | |
| C9500-48X-E | Network Essentials | 40 10-Gigabit Ethernet SFP+ port switch and an 8-Port 10-Gigabit Ethernet (SFP) network module on uplink ports |
| C9500-48X-A | Network Advantage | |

[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 9500 Series Switches-High Performance***

| Switch Model | Default License Level[2] | Description |
|---|---|---|
| C9500-24Y4C-E | Network Essentials | 24 SFP28 ports that support 1/10/25-GigabitEthernet connectivity, four QSFP uplink ports that support 100/40-GigabitEthernet connectivity; two power supply slots. |
| C9500-24Y4C-A | Network Advantage | |
| C9500-32C-E | Network Essentials | 32 QSFP28 ports that support 40/100 GigabitEthernet connectivity; two power supply slots. |
| C9500-32C-A | Network Advantage | |
| C9500-32QC-E | Network Essentials | 32 QSFP28 ports, where you can have 24 ports that support 40-GigabitEthernet connectivity and 4 ports that support 100-GigabitEthernet connectivity, OR 32 ports that support 40-GigabitEthernet connectivity, OR 16 ports that support 100-GigabitEthernet connectivity; two power supply slots. |
| C9500-32QC-A | Network Advantage | |

| Switch Model | Default License Level[2] | Description |
|---|---|---|
| C9500-48Y4C-E | Network Essentials | 48 SFP28 ports that support 1/10/25-GigabitEthernet connectivity; four QSFP uplink ports that supports up to 100/40-GigabitEthernet connectivity; two power supply slots. |
| C9500-48Y4C-A | Network Advantage | |

[2] 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 optional network modules for uplink ports available with some configurations .

| Network Module | Description |
|---|---|
| C9500-NM-8X | Cisco Catalyst 9500 Series Network Module 8-port 1/10 Gigabit Ethernet with SFP/SFP+<br>Note the supported switch models (Base PIDs):<br>• C9500-40X<br>• C9500-16X |
| C9500-NM-2Q | Cisco Catalyst 9500 Series Network Module 2-port 40 Gigabit Ethernet with QSFP+<br>Note the supported switch models (Base PIDs):<br>• C9500-40X<br>• C9500-16X |

## 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 9500 Series Switches, Cisco Identity Services Engine, Cisco Access Control Server, and Cisco Prime Infrastructure.

| Catalyst 9500, 9500-High Performance and 9500X | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| Amsterdam 17.3.8a | 2.7 | - | 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 | - | 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 | - | 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 | - | 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 | - | 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 | - | PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → **Downloads**. |
| Amsterdam 17.3.3 | 2.7 | - | 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 | - | PI 3.8 + PI 3.8 latest maintenance release + PI 3.8 latest device pack<br>See Cisco Prime Infrastructure 3.8 → **Downloads**. |

| Catalyst 9500, 9500-High Performance and 9500X | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| Amsterdam 17.3.1 | 2.7 | - | 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 | - | 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 | - | PI 3.6 + PI 3.6 latest maintenance release + PI 3.6 latest device pack<br>See Cisco Prime Infrastructure 3.6 → **Downloads**. |
| Gibraltar 16.12.8 | 2.6 | - | PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → Downloads. |
| Gibraltar 16.12.7 | 2.6 | - | PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → Downloads. |
| Gibraltar 16.12.6 | 2.6 | - | PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → Downloads. |
| Gibraltar 16.12.5b | 2.6 | - | PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → Downloads. |
| Gibraltar 16.12.5 | 2.6 | - | PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack<br>See Cisco Prime Infrastructure 3.9 → Downloads. |

| Catalyst 9500, 9500-High Performance and 9500X | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| Gibraltar 16.12.4 | 2.6 | - | PI 3.8 + PI 3.8 latest maintenance release + PI 3.8 latest device pack<br>See Cisco Prime Infrastructure 3.8 → Downloads. |
| Gibraltar 16.12.3a | 2.6 | - | PI 3.5 + PI 3.5 latest maintenance release + PI 3.5 latest device pack<br>See Cisco Prime Infrastructure 3.5 → **Downloads**. |
| Gibraltar 16.12.3 | 2.6 | - | PI 3.5 + PI 3.5 latest maintenance release + PI 3.5 latest device pack<br>See Cisco Prime Infrastructure 3.5 → **Downloads**. |
| Gibraltar 16.12.2 | 2.6 | - | PI 3.5 + PI 3.5 latest maintenance release + PI 3.5 latest device pack<br>See Cisco Prime Infrastructure 3.5 → **Downloads**. |
| Gibraltar 16.12.1 | 2.6 | - | PI 3.5 + PI 3.5 latest maintenance release + PI 3.5 latest device pack<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**. |

| Catalyst 9500, 9500-High Performance and 9500X | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| 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**. |
| 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**. |

| Catalyst 9500, 9500-High Performance and 9500X | Cisco Identity Services Engine | Cisco Access Control Server | Cisco Prime Infrastructure |
|---|---|---|---|
| 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[3] | 512 MB[4] | 256 | 1280 x 800 or higher | Small |

[3] We recommend 1 GHz
[4] 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.

The following table provides ROMMON version information for the Cisco Catalyst 9500 Series Switches. For ROMMON version information of Cisco IOS XE 16.x.x releases, refer to the corresponding Cisco IOS XE 16.x.x release notes of the respective platform.

| Release | ROMMON Version (C9500-12Q, C9500-24Q, C9500-16X, C9500-40X) | ROMMON Version (C9500-32C, C9500-32QC, C9500-24Y4C, C9500-48Y4C) | ROMMON Version (C9500X) |
|---|---|---|---|
| Amsterdam 17.3.8a | 17.3.1r[FC2] | 17.3.1r[FC2] | - |
| Amsterdam 17.3.8 | 17.3.1r[FC2] | 17.3.1r[FC2] | - |
| Amsterdam 17.3.7 | 17.3.1r[FC2] | 17.3.1r[FC2] | - |
| Amsterdam 17.3.6 | 17.3.1r[FC2] | 17.3.1r[FC2] | - |
| Amsterdam 17.3.5 | 17.3.1r[FC2] | 17.3.1r[FC2] | - |
| Amsterdam 17.3.4 | 17.3.1r[FC2] | 17.3.1r[FC2] | - |
| Amsterdam 17.3.3 | 17.3.1r[FC2] | 17.3.1r[FC2] | - |
| Amsterdam 17.3.2a | 17.3.1r[FC2] | 17.3.1r[FC2] | - |
| Amsterdam 17.3.1 | 17.3.1r[FC2] | 17.3.1r[FC2] | - |
| Amsterdam 17.2.1 | 17.2.1r[FC1] | 17.1.1[FC2] | - |
| Amsterdam 17.1.1 | 17.1.1r [FC1] | 17.1.1[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 Amsterdam 17.3.8a | CAT9K_IOSXE | cat9k_iosxe.17.03.08a.SPA |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.03.08a |
| Cisco IOS XE Amsterdam 17.3.8 | CAT9K_IOSXE | cat9k_iosxe.17.03.08.SPA. |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.03.08. |
| Cisco IOS XE Amsterdam 17.3.7 | CAT9K_IOSXE | cat9k_iosxe.17.03.07.SPA. |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.03.07. |
| Cisco IOS XE Amsterdam 17.3.6 | CAT9K_IOSXE | cat9k_iosxe.17.03.06.SPA. |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.03.06. |
| Cisco IOS XE Amsterdam 17.3.5 | CAT9K_IOSXE | cat9k_iosxe.17.03.05.SPA. |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.03.05. |
| Cisco IOS XE Amsterdam 17.3.4 | CAT9K_IOSXE | cat9k_iosxe.17.03.04.SPA. |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.03.04. |

| Release | Image Type | File Name |
|---|---|---|
| Cisco IOS XE Amsterdam 17.3.3 | CAT9K_IOSXE | cat9k_iosxe.17.03.03.SPA.bin |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.03.03.SPA |
| Cisco IOS XE Amsterdam 17.3.2a | CAT9K_IOSXE | cat9k_iosxe.17.03.02a.SPA.bin |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.03.02a.SP |
| Cisco IOS XE Amsterdam 17.3.1 | CAT9K_IOSXE | cat9k_iosxe.17.03.01.SPA.bin |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.03.01.SPA |

# Upgrading the ROMMON

To know the ROMMON or bootloader version that applies to every major and maintenance release, see ROMMON Versions, on page 20.

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

  On the C9500-12Q, C9500-16X, C9500-24Q, C9500-40X models of the series, *you must manually upgrade* the ROMMON in the primary SPI flash device, if a new version is applicable, and the release you are upgrading *from* is Cisco IOS XE Gibraltar 16.12.1 or a later release. (So if you upgrade from Cisco IOS XE Gibraltar 16.11.1 for example, a manual upgrade does not apply; the ROMMON is automatically updated, if applicable). Enter the **upgrade rom-monitor capsule primary switch** command in privileged EXEC mode.

  On the C9500-24Y4C, C9500-32C, C9500-32QC, and C9500-48Y4C models of the series, 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. The manual upgrade applies to all models in the series. Enter the **upgrade rom-monitor capsule golden switch** command in privileged EXEC mode.

**Note**

- In case of a Cisco StackWise Virtual setup, upgrade the active and standby switch.

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. |
| **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**<br>**Note**<br>**This table of commands is not supported on Cisco Catalyst 9500 Series Switches - High Performance.** | |
|---|---|
| `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, using **install** commands, in install mode. To perform a software image upgrade, you must be booted into IOS through **boot flash:packages.conf**.

### Before you begin

| 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 Amsterdam 17.3.x |
| Cisco IOS XE Everest 16.6.2 and all later releases | On Cisco Catalyst 9500 Series Switches, either **install** commands or **request platform software** commands[5].<br>On Cisco Catalyst 9500 Series Switches - High Performance, only install commands[6]. | |

[5] The **request platform software** commands are deprecated. So although they are still visible on the CLI, we recommend that you use **install** commands.
[6] Introduced in Cisco IOS XE Fuji 16.8.1a.

Use the procedure described here to upgrade the device in the following configurations:

- Standalone
- Cisco StackWise Virtual
- Cisco StackWise Virtual without ISSU

The sample output in this section displays upgrade from Cisco IOS XE Amsterdam 17.2.1 to Cisco IOS XE Amsterdam 17.3.1 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 Wed Jul 15 19:51:48 UTC 2020
Cleaning up unnecessary package files
Scanning boot directory for packages ... done.
Preparing packages list to delete ...
    cat9k-cc_srdriver.17.02.01.SPA.pkg
      File is in use, will not delete.
    cat9k-espbase.17.02.01.SPA.pkg
```

```
      File is in use, will not delete.
    cat9k-guestshell.17.02.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.02.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.02.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipbase.17.02.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.02.01.SPA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.02.01.SPA.pkg
      File is in use, will not delete.
    cat9k-webui.17.02.01.SPA.pkg
      File is in use, will not delete.
    cat9k-wlc.17.02.01.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:
[R0]:
/flash/cat9k-cc_srdriver.17.01.01.SPA.pkg
/flash/cat9k-espbase.17.01.01.SPA.pkg
/flash/cat9k-guestshell.17.01.01.SPA.pkg
/flash/cat9k-rpbase.17.01.01.SPA.pkg
/flash/cat9k-rpboot.17.01.01.SPA.pkg
/flash/cat9k-sipbase.17.01.01.SPA.pkg
/flash/cat9k-sipspa.17.01.01.SPA.pkg
/flash/cat9k-srdriver.17.01.01.SPA.pkg
/flash/cat9k-webui.17.01.01.SPA.pkg
/flash/cat9k-wlc.17.01.01.SPA.pkg
/flash/packages.conf

Do you want to remove the above files? [y/n]y
[R0]:
Deleting file flash:cat9k-cc_srdriver.17.01.01.SPA.pkg ... done.
Deleting file flash:cat9k-espbase.17.01.01.SPA.pkg ... done.
Deleting file flash:cat9k-guestshell.17.01.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpbase.17.01.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpboot.17.01.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipbase.17.01.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipspa.17.01.01.SPA.pkg ... done.
Deleting file flash:cat9k-srdriver.17.01.01.SPA.pkg ... done.
Deleting file flash:cat9k-webui.17.01.01.SPA.pkg ... done.
Deleting file flash:cat9k-wlc.17.01.01.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 Wed Jul 15 19:52:25 UTC 2020
Switch#
```

**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.17.03.01.SPA.bin flash:
destination filename [cat9k_iosxe.17.03.01.SPA.bin]?
Accessing tftp://10.8.0.6/image/cat9k_iosxe.17.03.01.SPA.bin...
Loading /cat9k_iosxe.17.03.01.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    Jul 15 2020 10:18:11 -07:00 cat9k_iosxe.17.03.01.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. Settings are synchronized with the standby switch, if applicable.

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

c) **write memory**

Use this command to save boot settings.

```
Switch# write memory
```

d) **show bootvar** or **show boot**

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

```
Switch# show bootvar               <<on the C9500-24Y4C,C9500-32C, C9500-32QC, and
C9500-48Y4C models
BOOT variable = bootflash:packages.conf
MANUAL_BOOT variable = no
BAUD variable = 9600
ENABLE_BREAK variable = yes
BOOTMODE variable does not exist
IPXE_TIMEOUT variable does not exist
CONFIG_FILE variable =

Standby BOOT variable = bootflash:packages.conf
Standby MANUAL_BOOT variable = no
```

```
Standby BAUD variable = 9600
Standby ENABLE_BREAK variable = yes
Standby BOOTMODE variable does not exist
Standby IPXE_TIMEOUT variable does not exist
Standby CONFIG_FILE variable =

Switch# show boot                          <<on the C9500-12Q,C9500-16X C9500-24Q, and
C9500-40X models
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.17.03.01.SPA.bin activate commit`.

The following sample output displays installation of the Cisco IOS XE Amsterdam 17.3.1 software image in the flash memory:

```
Switch# install add file flash:cat9k_iosxe.17.03.01.SPA.bin activate commit
install_add_activate_commit: Adding PACKAGE
install_add_activate_commit: Checking whether new add is allowed ....
--- Starting Add ---
Performing Add on Active/Standby
 [1] Add package(s) on R0
 [1] Finished Add on R0

Checking status of Add on [R0]
Add: Passed on [R0]
Finished Add

Image added. Version: 17.3.01

install_add_activate_commit: Activating PACKAGE
Following packages shall be activated:
/flash/cat9k-wlc.17.03.01.SPA.pkg
/flash/cat9k-webui.17.03.01.SPA.pkg
/flash/cat9k-srdriver.17.03.01.SPA.pkg
/flash/cat9k-sipspa.17.03.01.SPA.pkg
/flash/cat9k-sipbase.17.03.01.SPA.pkg
/flash/cat9k-rpboot.17.03.01.SPA.pkg
/flash/cat9k-rpbase.17.03.01.SPA.pkg
/flash/cat9k-guestshell.17.03.01.SPA.pkg
/flash/cat9k-espbase.17.03.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.03.01.SPA.pkg

This operation may require a reload of the system. Do you want to proceed? [y/n] y

--- Starting Activate ---
```

```
Performing Activate on Active/Standby
[1] Activate package(s) on R0
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.02.01.SPA.pkg
      Removed cat9k-espbase.17.02.01.SPA.pkg
      Removed cat9k-guestshell.17.02.01.SPA.pkg
      Removed cat9k-rpbase.17.02.01.SPA.pkg
      Removed cat9k-rpboot.17.02.01.SPA.pkg
      Removed cat9k-sipbase.17.02.01.SPA.pkg
      Removed cat9k-sipspa.17.02.01.SPA.pkg
      Removed cat9k-srdriver.17.02.01.SPA.pkg
      Removed cat9k-webui.17.02.01.SPA.pkg
      Removed cat9k-wlc.17.02.01.SPA.pkg
    New files list:
      Added cat9k-cc_srdriver.17.03.01.SSA.pkg
      Added cat9k-espbase.17.03.01.SSA.pkg
      Added cat9k-guestshell.17.03.01.SSA.pkg
      Added cat9k-lni.17.03.01.SSA.pkg
      Added cat9k-rpbase.17.03.01.SSA.pkg
      Added cat9k-rpboot.17.03.01.SSA.pkg
      Added cat9k-sipbase.17.03.01.SSA.pkg
      Added cat9k-sipspa.17.03.01.SSA.pkg
      Added cat9k-srdriver.17.03.01.SSA.pkg
      Added cat9k-webui.17.03.01.SSA.pkg
      Added cat9k-wlc.17.03.01.SSA.pkg
    Finished list of software package changes
  [1] Finished Activate on R0
Checking status of Activate on [R0]
Activate: Passed on [R0]
Finished Activate

--- Starting Commit ---
Performing Commit on Active/Standby
  [1] Commit package(s) on R0
  [1] Finished Commit on R0
Checking status of Commit on [R0]
Commit: Passed on [R0]
Finished Commit
Send model notification for install_add_activate_commit before reload
Install will reload the system now!
SUCCESS: install_add_activate_commit  Wed Jul 15 12:13:05 IST 2020

Switch#Jul 15 12:13:11.023: %PMANTACTION: F0/0vp: Process manager is exiting: n requested
Jul 15 12:13:11.028: %PMAN-5-EXITACTION: C1/0: pvp: Process manager is exiting: reload fru
 action requested
Jul 15 12:13:11.825: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: reload
action requested

Initializing Hardware...
System Bootstrap, Version 17.3.1r[FC2], RELEASE SOFTWARE (P)

Compiled 30-04-2020 12:00:00.00 by rel
Current ROMMON image : Primary Rommon Image
Last reset cause:LocalSoft
C9500-32QC platform with 16777216 Kbytes of main memory
Preparing to autoboot. [Press Ctrl-C to interrupt]  5     5     /-\|/-\|/-4     \|/-\|/-\|3
     /-\|/-\|/-2     \|/-\|/-\|1     /-\|/-\|/-0

boot: attempting to boot from [bootflash:packages.conf]

boot: reading file packages.conf
<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:/
475140 -rw- 2012104   Nov 26 2019 09:52:41 -07:00 cat9k-cc_srdriver.17.02.01.SPA.pkg
475141 -rw- 70333380  Nov 26 2019 09:52:44 -07:00 cat9k-espbase.17.02.01.SPA.pkg
475142 -rw- 13256     Nov 26 2019 09:52:44 -07:00 cat9k-guestshell.17.02.01.SPA.pkg
475143 -rw- 349635524 Nov 26 2019 09:52:54 -07:00 cat9k-rpbase.17.02.01.SPA.pkg
475149 -rw- 24248187  Nov 26 2019 09:53:02 -07:00 cat9k-rpboot.17.02.01.SPA.pkg
475144 -rw- 25285572  Nov 26 2019 09:52:55 -07:00 cat9k-sipbase.17.02.01.SPA.pkg
475145 -rw- 20947908  Nov 26 2019 09:52:55 -07:00 cat9k-sipspa.17.02.01.SPA.pkg
475146 -rw- 2962372   Nov 26 2019 09:52:56 -07:00 cat9k-srdriver.17.02.01.SPA.pkg
475147 -rw- 13284288  Nov 26 2019 09:52:56 -07:00 cat9k-webui.17.02.01.SPA.pkg
475148 -rw- 13248     Nov 26 2019 09:52:56 -07:00 cat9k-wlc.17.02.01.SPA.pkg

491524 -rw- 25711568 Jul 15 2020 11:49:33 -07:00 cat9k-cc_srdriver.17.03.01.SPA.pkg
491525 -rw- 78484428 Jul 15 2020 11:49:35 -07:00 cat9k-espbase.17.03.01.SPA.pkg
491526 -rw- 1598412  Jul 15 2020 11:49:35 -07:00 cat9k-guestshell.17.03.01.SPA.pkg
491527 -rw- 404153288Jul 15 2020 11:49:47 -07:00 cat9k-rpbase.17.03.01.SPA.pkg
491533 -rw- 31657374 Jul 15 2020 11:50:09 -07:00 cat9k-rpboot.17.03.01.SPA.pkg
491528 -rw- 27681740 Jul 15 2020 11:49:48 -07:00 cat9k-sipbase.17.03.01.SPA.pkg
491529 -rw- 52224968 Jul 15 2020 11:49:49 -07:00 cat9k-sipspa.17.03.01.SPA.pkg
491530 -rw- 31130572 Jul 15 2020 11:49:50 -07:00 cat9k-srdriver.17.03.01.SPA.pkg
491531 -rw- 14783432 Jul 15 2020 11:49:51 -07:00 cat9k-webui.17.03.01.SPA.pkg
491532 -rw- 9160     Jul 15 2020 11:49:51 -07:00 cat9k-wlc.17.03.01.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.17.03.01.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 Jul 15 2020 10:59:16 -07:00 packages.conf
516098 -rw- 7406 Jul 15 2020 10:58:08 -07:00 cat9k_iosxe.17.03.01.SPA.conf
11353194496 bytes total (8963174400 bytes free)
```

**Step 6** Upgrade the ROMMON version

A new ROMMON version is available for Cisco IOS XE Amsterdam 17.3.1, for all models in the series. Use the applicable commands to upgrade the ROMMON version. After you enter the command, confirm upgrade at the system prompt.

In case of a Cisco StackWise Virtual setup, remember to upgrade the active and standby

- Enter the **upgrade rom-monitor capsule golden switch** command for all models in the series.
- Also enter the **upgrade rom-monitor capsule primary switch** command, only for the C9500-12Q, C9500-16X, C9500-24Q, C9500-40X models in the series.

```
Switch# upgrade rom-monitor capsule golden switch active R0
This operation will reload the switch and take a few minutes to complete. Do you want to
proceed (y/n)? [confirm]y
Switch#
Initializing Hardware...
<output truncated>
```

For more information about this, see Upgrading the ROMMON, on page 22 in this document.

**Step 7** Reload and verify version

a) **reload**

Use this command to reload the switch. When the switch reloads after a ROMMON upgrade, the ROMMON version is updated, but not displayed in the output until the next reload.

```
Switch# reload
```

b) **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 Amsterdam 17.3.1 image on the device:

```
Switch# show version
Cisco IOS XE Software, Version 17.03.01
Cisco IOS Software [Amsterdam], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.3.1,
 RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2020 by Cisco Systems, Inc.
<output truncated>
```

# Downgrading in Install Mode

Follow these instructions to downgrade from one release to another, in install mode.

### 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 Amsterdam 17.3.x | • On Cisco Catalyst 9500 Series Switches, either **install** commands or **request platform software** commands[7].<br>• On Cisco Catalyst 9500 Series Switches - High Performance, only **install** commands | Cisco IOS XE Amsterdam 17.2.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.

Use the procedure described here to downgrade the device in the following configurations:

- Standalone
- Cisco StackWise Virtual
- Cisco StackWise Virtual without ISSU

The sample output in this section shows downgrade from Cisco IOS XE Amsterdam 17.3.1 to Cisco IOS XE Amsterdam 17.2.1, using **install** commands.

### 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 Wed Jul 15 11:42:27 IST 2020

Cleaning up unnecessary package files

No path specified, will use booted path bootflash:packages.conf

Cleaning bootflash:
  Scanning boot directory for packages ... done.
  Preparing packages list to delete ...
    cat9k-cc_srdriver.17.03.01.SSA.pkg
      File is in use, will not delete.
```

```
    cat9k-espbase.17.03.01.SSA.pkg
      File is in use, will not delete.
    cat9k-guestshell.17.03.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.03.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.03.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipbase.17.03.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.03.01.SSA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.03.01.SSA.pkg
      File is in use, will not delete.
    cat9k-webui.17.03.01.SSA.pkg
      File is in use, will not delete.
    cat9k-wlc.17.03.01.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  Wed Jul 15 11:42:39 IST 2020
```

**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.17.02.01.SPA.bin flash:
Destination filename [cat9k_iosxe.17.02.01.SPA.bin]?
Accessing tftp://10.8.0.6//cat9k_iosxe.17.02.01.SPA.bin...
Loading /cat9k_iosxe.17.02.01.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 Jul 15 2020 13:35:16 -07:00 cat9k_iosxe.17.02.01.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. Settings are synchronized with the standby switch, if applicable.

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

c) **write memory**

Use this command to save boot settings.

```
Switch# write memory
```

d) **show bootvar** or **show boot**

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

```
Switch# show bootvar                <<on the C9500-24Y4C,C9500-32C, C9500-32QC, and
C9500-48Y4C models
BOOT variable = bootflash:packages.conf
MANUAL_BOOT variable = no
BAUD variable = 9600
ENABLE_BREAK variable = yes
BOOTMODE variable does not exist
IPXE_TIMEOUT variable does not exist
CONFIG_FILE variable =

Standby BOOT variable = bootflash:packages.conf
Standby MANUAL_BOOT variable = no
Standby BAUD variable = 9600
Standby ENABLE_BREAK variable = yes
Standby BOOTMODE variable does not exist
Standby IPXE_TIMEOUT variable does not exist
Standby CONFIG_FILE variable =
```

```
Switch# show boot                         <<on the C9500-12Q,C9500-16X C9500-24Q, and
C9500-40X models
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.17.03.01.SPA.bin activate commit`.

The following example displays the installation of the Cisco IOS XE Amsterdam 17.2.1 software image to flash, by using the **install add file activate commit** command.

```
Switch# install add file flash:cat9k_iosxe.17.02.01.SPA.bin activate commit
install_add_activate_commit: Adding PACKAGE
install_add_activate_commit: Checking whether new add is allowed ....
```

```
--- Starting Add ---
Performing Add on Active/Standby
[1] Add package(s) on R0
[1] Finished Add on R0
Checking status of Add on [R0]
Add: Passed on [R0]
Finished Add
Image added. Version: 17.02.01.0.269
install_add_activate_commit: Activating PACKAGE

Following packages shall be activated:
/flash/cat9k-wlc.17.02.01.SPA.pkg
/flash/cat9k-webui.17.02.01.SPA.pkg
/flash/cat9k-srdriver.17.02.01.SPA.pkg
/flash/cat9k-sipspa.17.02.01.SPA.pkg
/flash/cat9k-sipbase.17.02.01.SPA.pkg
/flash/cat9k-rpboot.17.02.01.SPA.pkg
/flash/cat9k-rpbase.17.02.01.SPA.pkg
/flash/cat9k-guestshell.17.02.01.SPA.pkg
/flash/cat9k-espbase.17.02.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.02.01.SPA.pkg

This operation may require a reload of the system. Do you want to proceed? [y/n] y


Performing Activate on Active/Standby
1] Activate package(s) on R0
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.03.01.SSA.pkg
      Removed cat9k-espbase.17.03.01.SSA.pkg
      Removed cat9k-guestshell.17.03.01.SSA.pkg
      Removed cat9k-lni.17.03.01.SSA.pkg
      Removed cat9k-rpbase.17.03.01.SSA.pkg
      Removed cat9k-rpboot.17.03.01.SSA.pkg
      Removed cat9k-sipbase.17.03.01.SSA.pkg
      Removed cat9k-sipspa.17.03.01.SSA.pkg
      Removed cat9k-srdriver.17.03.01.SSA.pkg
      Removed cat9k-webui.17.03.01.SSA.pkg
      Removed cat9k-wlc.17.03.01.SSA.pkg
    New files list:
      Added cat9k-cc_srdriver.17.02.01.SPA.pkg
      Added cat9k-espbase.17.02.01.SPA.pkg
      Added cat9k-guestshell.17.02.01.SPA.pkg
      Added cat9k-rpbase.17.02.01.SPA.pkg
      Added cat9k-rpboot.17.02.01.SPA.pkg
      Added cat9k-sipbase.17.02.01.SPA.pkg
      Added cat9k-sipspa.17.02.01.SPA.pkg
      Added cat9k-srdriver.17.02.01.SPA.pkg
      Added cat9k-webui.17.02.01.SPA.pkg
      Added cat9k-wlc.17.02.01.SPA.pkg
    Finished list of software package changes
  [1] Finished Activate on R0
Checking status of Activate on [R0]
Activate: Passed on [R0]
Finished Activate

--- Starting Commit ---
Performing Commit on Active/Standby
 [1] Commit package(s) on R0
 [1] Finished Commit on R0
Checking status of Commit on [R0]
Commit: Passed on [R0]
Finished Commit
```

```
Send model notification for install_add_activate_commit before reload
Install will reload the system now!
SUCCESS: install_add_activate_commit  Wed Jul 15 11:51:01 IST 2020

Jul 15 11:51:07.505: %PMANTvp: Process manager is exiting: ren requested
Jul 15 11:51:07.505: %PMAN-5-EXITACTION: F0/0: pvp: Process manager is exiting: reload fru
 action requested
Jul 15 11:51:07.834: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: reload
action requested

Initializing Hardware...

System Bootstrap, Version 17.3.1r[FC2], RELEASE SOFTWARE (P)
Compiled 30-04-2020 12:00:00.00 by rel
Current ROMMON image : Primary Rommon Image

Last reset cause:LocalSoft
C9500-32QC platform with 16777216 Kbytes of main memory
Preparing to autoboot. [Press Ctrl-C to interrupt]  5     5     /-\|/-\|/-4     \|/-\|/-\|3
     /-\|/-\|/-2     \|/-\|/-\|1     /-\|/-\|/-0
boot: attempting to boot from [bootflash:packages.conf]
boot: reading file packages.conf

<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 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 Amsterdam 17.2.1 image on the device:

```
Switch# show version
Cisco IOS XE Software, Version 17.02.01
Cisco IOS Software [Amsterdam], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.2.1,
 RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2020 by Cisco Systems, Inc.
<output truncated>
```

# In Service Software Upgrade (ISSU) with Cisco StackWise Virtual

Follow the instructions described here to perform an In Service Software Upgrade (ISSU) upgrade. Use the procedure described here, only for the releases indicated in the table below. For more general information about ISSU release support and recommended releases, see this technical reference document: In-Service Software Upgrade (ISSU).

### Before you begin

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

| When upgrading from... | Use these commands... | To... |
|---|---|---|
| Cisco IOS XE Amsterdam 17.3.1 | **install add file activate issu commit** | Cisco IOS XE Amsterdam 17.3.x |
| Not applicable | ISSU does not support downgrade. To downgrade, see Downgrading in Install Mode, on page 30. | Not applicable |

### Procedure

**Step 1** **enable**

Enables privileged EXEC mode. Enter your password if prompted.

```
Switch# enable
```

**Step 2** **show version | in INSTALL** or **show version | in System image**

On the Catalyst 9500 Series Switches, use **show version | in INSTALL** command to check the boot mode. ISSU is supported only in install mode. You cannot perform ISSU if the switch is booted in bundle mode.

```
Switch# show version | in INSTALL
Switch Ports Model              SW Version        SW Image              Mode
------ ----- -----              ----------        ----------            ----
*    1 12    C9500-12Q          17.3.1            CAT9K_IOSXE           INSTALL
     2 12    C9500-12Q          17.3.1            CAT9K_IOSXE           INSTALL
```

On Catalyst 9500 Series Switches - High Performance, use **show version | in System image** to check if the switch booted into IOS via " boot flash:packages.conf ". The output should display the following:

```
Switch# show version | in System image
System image file is "flash:packages.conf"
```

You cannot perform ISSU if the switch is booted in bundle mode. If you perform ISSU in bundle mode, you will see the following error.

```
*Nov 10 14:55:57.338: %INSTALL-5-INSTALL_START_INFO: Chassis 1 R1/0: install_engine: Started
 install one-shot ISSU flash:cat9k_iosxe.17.3.02.SPA.bininstall_add_activate_commit: Adding
 ISSU
ERROR: install_add_activate_commit: One-Shot ISSU operation is not supported in bundle boot
 mode
FAILED: install_add_activate_commit  exit(1) Tue Nov 10 14:56:03 UTC 2020
```

**Step 3** **dir flash: | in free**

Use this command to check if there is sufficient available memory on flash. Ensure that you have at least 1GB of space in flash to expand a new image.

```
Switch# dir flash: | in free
11353194496 bytes total (8565174272 bytes free)
```

**Step 4** **show redundancy**

Use this command to check if the switch is in SSO mode.

```
Switch# show redundancy
Redundant System Information :
------------------------------
       Available system uptime = 4 minutes
Switchovers system experienced = 0
              Standby failures = 0
        Last switchover reason = none

                 Hardware Mode = Duplex
    Configured Redundancy Mode = sso
     Operating Redundancy Mode = sso
              Maintenance Mode = Disabled
                Communications = Up
<output truncated>
```

**Step 5** **show boot system**

Use this command to verify that the manual boot variable is set to **no**.

```
Switch# show boot system
Current Boot Variables:
BOOT variable = flash:packages.conf;
MANUAL_BOOT variable = no

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

If the manual boot variable is set to **yes**, use the **no boot manual** command in global configuration mode to set the switch for autoboot.

**Step 6** **show issu state** [*detail*]

Use this command to verify that no other ISSU process is in progress.

```
Switch# show issu state detail
--- Starting local lock acquisition on chassis 2 ---
Finished local lock acquisition on chassis 2

No ISSU operation is in progress

Switch#
```

**Step 7** **show install summary**

Use this command to verify that the state of the image is *Activated & Committed*. Clear the install state if the state is not *Activated & Committed*.

```
Switch# show install summary
[ Switch 1 2 ] Installed Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
            C - Activated & Committed, D - Deactivated & Uncommitted
--------------------------------------------------------------------------------
Type  St   Filename/Version
--------------------------------------------------------------------------------
IMG   C    17.3.2.0.2433
```

**Step 8** **install add file activate issu commit**

Use this command to automate the sequence of all the upgrade procedures, including downloading the images to both the switches, expanding the images into packages, and upgrading each switch as per the procedures.

```
Switch# install add file tftp:cat9k_iosxe.17.3.02.SPA.bin activate issu commit
```

The following sample output displays installation of Cisco IOS XE Amsterdam 17.3.2a software image with ISSU procedure.

```
Switch# install add file tftp:cat9k_iosxe.17.03.02.SPA.bin activate issu commit
install_add_activate_commit: START Thu Nov 19 06:16:32 UTC 2020
Downloading file tftp://172.27.18.5//cat9k_iosxe.17.03.02.SPA.bin

*Nov 19 06:16:34.064: %INSTALL-5-INSTALL_START_INFO: Switch 1 R0/0: install_engine: Started
 install one-shot ISSU tftp://172.27.18.5//cat9k_iosxe.17.03.02.SPA.bin
Finished downloading file tftp://172.27.18.5//cat9k_iosxe.17.03.02.SPA.bin to
flash:cat9k_iosxe.17.03.02.SPA.bin
install_add_activate_commit: Adding ISSU

--- Starting initial file syncing ---
[1]: Copying flash:cat9k_iosxe.17.03.02.SPA.bin from switch 1 to switch 2
[2]: Finished copying to switch 2
Info: Finished copying flash:cat9k_iosxe.17.03.02.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
Checking status of Add on [1 2]
Add: Passed on [1 2]
Finished Add

install_add_activate_commit: Activating ISSU

NOTE: Going to start Oneshot ISSU install process

STAGE 0: Initial System Level Sanity Check before starting ISSU
================================================
--- Verifying install_issu supported ---
--- Verifying standby is in Standby Hot state ---
--- Verifying booted from the valid media ---
--- Verifying AutoBoot mode is enabled ---
Finished Initial System Level Sanity Check


STAGE 1: Installing software on Standby
================================================
--- Starting install_remote ---
Performing install_remote on Chassis remote
[2] install_remote package(s) on switch 2
[2] Finished install_remote on switch 2
install_remote: Passed on [2]
Finished install_remote


STAGE 2: Restarting Standby
================================================
--- Starting standby reload ---
Finished standby reload

--- Starting wait for Standby to reach terminal redundancy state ---

*Nov 19 06:24:16.426: %SMART_LIC-5-EVAL_START: Entering evaluation period
*Nov 19 06:24:16.426: %SMART_LIC-5-EVAL_START: Entering evaluation period
*Nov 19 06:24:16.466: %HMANRP-5-CHASSIS_DOWN_EVENT: Chassis 2 gone DOWN!
```

```
*Nov 19 06:24:16.497: %REDUNDANCY-3-STANDBY_LOST: Standby processor fault (PEER_NOT_PRESENT)
*Nov 19 06:24:16.498: %REDUNDANCY-3-STANDBY_LOST: Standby processor fault (PEER_DOWN)
*Nov 19 06:24:16.498: %REDUNDANCY-3-STANDBY_LOST: Standby processor fault
(PEER_REDUNDANCY_STATE_CHANGE)
*Nov 19 06:24:16.674: %RF-5-RF_RELOAD: Peer reload. Reason: EHSA standby down
*Nov 19 06:24:16.679: %IOSXE_REDUNDANCY-6-PEER_LOST: Active detected switch 2 is no longer
 standby
*Nov 19 06:24:16.416: %NIF_MGR-6-PORT_LINK_DOWN: Switch 1 R0/0: nif_mgr: Port 1 on front
side stack link 0 is DOWN.
*Nov 19 06:24:16.416: %NIF_MGR-6-PORT_CONN_DISCONNECTED: Switch 1 R0/0: nif_mgr: Port 1 on
 front side stack link 0 connection has DISCONNECTED: CONN_ERR_PORT_LINK_DOWN_EVENT
*Nov 19 06:24:16.416: %NIF_MGR-6-STACK_LINK_DOWN: Switch 1 R0/0: nif_mgr: Front side stack
 link 0 is DOWN.
*Nov 19 06:24:16.416: %STACKMGR-6-STACK_LINK_CHANGE: Switch 1 R0/0: stack_mgr: Stack port
1 on Switch 1 is down

<output truncated>

*Nov 19 06:29:36.393: %IOSXE_REDUNDANCY-6-PEER: Active detected switch 2 as standby.
*Nov 19 06:29:36.392: %STACKMGR-6-STANDBY_ELECTED: Switch 1 R0/0: stack_mgr: Switch 2 has
been elected STANDBY.
*Nov 19 06:29:41.397: %REDUNDANCY-5-PEER_MONITOR_EVENT: Active detected a standby insertion
 (raw-event=PEER_FOUND(4))
*Nov 19 06:29:41.397: %REDUNDANCY-5-PEER_MONITOR_EVENT: Active detected a standby insertion
 (raw-event=PEER_REDUNDANCY_STATE_CHANGE(5))
*Nov 19 06:29:42.257: %REDUNDANCY-3-IPC: IOS versions do not match.
*Nov 19 06:30:24.323: %HA_CONFIG_SYNC-6-BULK_CFGSYNC_SUCCEED: Bulk Sync succeededFinished
wait for Standby to reach terminal redundancy state


*Nov 19 06:30:25.325: %RF-5-RF_TERMINAL_STATE: Terminal state reached for (SSO)
STAGE 3: Installing software on Active
==================================================
--- Starting install_active ---
Performing install_active on Chassis 1

<output truncated>

[1] install_active package(s) on switch 1
[1] Finished install_active on switch 1
install_active: Passed on [1]
Finished install_active


STAGE 4: Restarting Active (switchover to standby)
==================================================
--- Starting active reload ---
New software will load after reboot process is completed
SUCCESS: install_add_activate_commit  Thu Nov 19 23:06:45 UTC 2020
Nov 19 23:06:45.731: %INSTALL-5-INSTALL_COMPLETED_INFO: R0/0: install_engine: Completed
install one-shot ISSU flash:cat9k_iosxe.17.03.02.SPA.bin
Nov 19 23:06:47.509: %PMAN-5-EXITACTION: F0/0: pvp: Process manager is exiting: reload fp
action requested
Nov 19 23:06:48.776: %PM

Initializing Hardware...

System Bootstrap, Version 17.3.1r[FC2], RELEASE SOFTWARE (P)
Compiled Fri 08/17/2018 10:48:42.68 by rel

Current ROMMON image : Primary
Last reset cause     : PowerOn
C9500-40X platform with 16777216 Kbytes of main memory
```

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


Nov 19 23:08:30.238: %PMAN-5-EXITACTION: C0/0: pvp: Process manager is exiting:

Waiting for 120 seconds for other switches to boot
######################
Switch number is 1
All switches in the stack have been discovered. Accelerating discovery


Switch console is now available


Press RETURN to get started.




Nov 19 23:14:17.080: %INSTALL-5-INSTALL_START_INFO: R0/0: install_engine: Started install
commit
Nov 19 23:15:48.445: %INSTALL-5-INSTALL_COMPLETED_INFO: R0/0: install_engine: Completed
install commit ISSU
```

**Step 9** **show version**

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 Amsterdam 17.3.2a image on the device:

```
Switch# show version
Cisco IOS XE Software, Version 17.03.02
Cisco IOS Software [Amsterdam], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.3.2,
 RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2020 by Cisco Systems, Inc.
<output truncated>
```

**Step 10** **show issu state** [*detail*]

Use this command to verify that no ISSU process is in pending state.

```
Switch# show issu state detail
--- Starting local lock acquisition on chassis 2 ---
Finished local lock acquisition on chassis 2

No ISSU operation is in progress

Switch#
```

**Step 11** **exit**

Exits privileged EXEC mode and returns to user EXEC mode.

## 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.

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. The version is not downgraded when you downgrade the software image.

# 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 9500 Series Switches and Cisco Catalyst 9500 Series Switches - High Performance 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.

**Note** On the Cisco Catalyst 9500 Series Switches-High Performance, it is from Cisco IOS XE Fuji 16.8.1a to Cisco IOS XE Amsterdam 17.3.1.

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 3: 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 9500 Series Switches datasheet at:

https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9500-series-switches/datasheet-c78-738978.html

# Limitations and Restrictions

With Cisco Catalyst 9500 Series Switches and Cisco Catalyst 9500 Series Switches - High Performance—If a feature is not supported on a switch model, you do not have to factor in any limitations or restrictons that may be listed here. If limitations or restrictions are listed for a feature that is supported, check if model numbers are specified, to know if they apply. If model numbers are not specified, the limitations or restrictons apply to all models in the series.

- Auto negotiation

  Auto negotiation (the **speed auto** command) and half duplex (the **duplex half** command) are not supported on GLC-T or GLC-TE transceivers for 10 Mbps and 100 Mbps speeds. This applies only to the C9500-48Y4C and C9500-24Y4C models of the series.

  We recommend not changing Forward Error Correction (FEC) when auto negotiation is ON. This is applicable to 100G/40G/25G CU cables on the C9500-32C, C9500-32QC, C9500-24Y4C and C9500-48Y4C models of the series.

- 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 StackWise Virtual

  - On Cisco Catalyst 9500 Series Switches, when Cisco StackWise Virtual is configured, breakout ports using 4X10G breakout cables, or the Cisco QSFP to SFP or SFP+ Adapter (QSA) module can only be used as data ports; they cannot be used to configure StackWise Virtual links (SVLs) or dual-active detective (DAD) links.

  - On Cisco Catalyst 9500 Series Switches - High Performance,

    - When Cisco StackWise Virtual is configured, breakout ports using 4X25G or 4X10G breakout cables can only be used as data ports; they cannot be used to configure SVLs or DAD links.

    - When Cisco StackWise Virtual is configured, Cisco QSA module with 10G SFP modules can be used as data ports and to configure SVLs or DAD links.

- When Cisco StackWise Virtual is configured, Cisco QSA module with 1G SFP modules can be used as data ports and to configure DAD links; they cannot be used to configure SVLs since SVLs are not supported on 1G interfaces.

- 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.
- Hardware limitations:
  - Use the MODE button to switch-off the beacon LED.
  - All port LED behavior is undefined until interfaces are fully initialized.
  - 1G with Cisco QSA Module (CVR-QSFP-SFP10G) is not supported on the uplink ports of the C9500-24Y4C and C9500-48Y4C models.
  - The following limitations apply to Cisco QSA Module (CVR-QSFP-SFP10G) when Cisco 1000Base-T Copper SFP (GLC-T) or Cisco 1G Fiber SFP Module for Multimode Fiber are plugged into the QSA module:
    - 1G Fiber modules over QSA do not support autonegotiation. Auto-negotiation should be disabled on the far-end devices.
    - Although visible in the CLI, the command [**no**] **speed nonegotiate** is not supported with 1G Fiber modules over QSA.
    - Only GLC-T over QSA supports auto-negotiation.
    - GLC-T supports only port speed of 1000 Mb/s over QSA. Port speeds of 10/100-Mb/s are not supported due to hardware limitation.
  - When you use Cisco QSFP-4SFP10G-CUxM Direct-Attach Copper Cables, autonegotiation is enabled by default. If the other end of the line does not support autonegotation, the link does not come up.
  - Autonegotiation is not supported on HundredGigabitEthernet1/0/49 to HundredGigabitEthernet1/0/52 uplink ports of the C9500-48Y4C models, and HundredGigabitEthernet1/0/25 to HundredGigabitEthernet1/0/28 uplink ports of the C9500-24Y4C models. Disable autonegotiation on the peer device if you are using QSFP-H40G-CUxx and QSFP-H40G-ACUxx cables.
  - For QSFP-H100G-CUxx cables, the C9500-48Y4C and C9500-24Y4C models support the cables only if both sides of the connection are either C9500-48Y4C or C9500-24Y4C.
- Interoperability limitations—When you use Cisco QSFP-4SFP10G-CUxM Direct-Attach Copper Cables, if one end of the 40G link is a Catalyst 9400 Series Switch and the other end is a Catalyst 9500 Series Switch, the link does not come up, or comes up on one side and stays down on the other. To avoid this

interoperability issue between devices, apply the the **speed nonegotiate** command on the Catalyst 9500 Series Switch interface. This command disables autonegotiation and brings the link up. To restore autonegotiation, use the **no speed nonegotiation** command.

- In-Service Software Upgrade (ISSU)
  - In-Service Software Upgrade (ISSU)—On Cisco Catalyst 9500 Series Switches (C9500-12Q, C9500-16X, C9500-24Q, C9500-40X), ISSU from Cisco IOS XE Fuji 16.9.x to Cisco IOS XE Gibraltar 16.10.x or to Cisco IOS XE Gibraltar 16.11.x is not supported.
  - On Cisco Catalyst 9500 Series Switches - High Performance (C9500-24Y4C, C9500-32C, C9500-32QC, and C9500-48Y4C), ISSU with Cisco StackWise Virtual is supported only starting from Cisco IOS XE Gibraltar 16.12.1. Therefore, ISSU upgrades can be performed only starting from this release to a later release.
  - While ISSU allows you to perform upgrades with zero downtime, we recommend you to do so during a maintenance window only.
  - If a new feature introduced in a software release requires a change in configuration, the feature should not be enabled during ISSU.
  - If a feature is not available in the downgraded version of a software image, the feature should be disabled before initiating ISSU.

- QoS restrictions
  - When configuring QoS queuing policy, the sum of the queuing buffer should not exceed 100%.
  - For QoS policies, only switched virtual interfaces (SVI) are supported for logical interfaces.
  - QoS policies are not supported for port-channel interfaces, tunnel interfaces, and other logical interfaces.

- 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).

- 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.
- HTTP Services Restriction—If you configure **ip http active-session-modules none** and **ip http secure-active-session-modules none** commands, NGINX process will be held down. This will prevent HTTP or HTTPS from running. Use the **ip http session-module-list** command to enable the required HTTP modules.
- 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 500 connections per second (CPS) at less than 50% CPU utilization. Above this rate, AVC service is not guaranteed.
  - Scale—Able to handle up to 5000 bi-directional flows per 24 access ports and 10000 bi-directional flows 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.

# 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 Amsterdam 17.3.x

| Identifier | Applicable Models | Description |
|---|---|---|
| CSCvt99971 | All models | Client in UnAuthorized state when config is applied on defaulted interface |
| CSCwc77392 | Catalyst 9500 | Some VTPv3 clients fail to get updates if Primary server fails |
| CSCwe46621 | Catalyst 9500 | C9500: In private vlan condition, communication failed when shut/no shut interface |
| CSCwe48591 | Catalyst 9500 | SPAN Tx traffic could not be mirrored when preferred SDM Template is set as NAT |

## Resolved Caveats in Cisco IOS XE Amsterdam 17.3.8a

| Identifier | Description |
|---|---|
| CSCwh87343 | Cisco IOS XE Software Web UI Privilege Escalation Vulnerability.<br>For more information, see Security Advisory: cisco-sa-iosxe-webui-privesc-j22SaA4z |

## Resolved Caveats in Cisco IOS XE Amsterdam 17.3.8

There are no resolved caveats in this release.

## Resolved Caveats in Cisco IOS XE Amsterdam 17.3.7

There are no resolved caveats in this release.

## Resolved Caveats in Cisco IOS XE Amsterdam 17.3.6

| Identifier | Applicable Models | Description |
|---|---|---|
| CSCwc01376 | Catalyst 9500 | Etherchannel member interface going to suspended state |

## Resolved Caveats in Cisco IOS XE Amsterdam 17.3.5

| Identifier | Applicable Models | Description |
|---|---|---|
| CSCvs33050 | All models | SVL Hung - CPU HOG by Process - "Crimson Flush Transaction" |
| CSCvx38654 | All models | Memory leakage is getting incremented whenever dnac-ca crl fails |
| CSCvv79275 | Catalyst 9500 High Performance | chassis 2 PS0 not getting SYS log message on OIR – inconsistent |
| CSCvv62890 | Catalyst 9500 | Capsule upgrade failed message seein while upgrading rommon |
| CSCvx94276 | Catalyst 9500 High Performance | %CRIMSON-3-DATABASE_MEMLEAK: Database memory leak detected in /tmp/rp/tdldb/0/IOS_PRIV_OPER_DB |
| CSCvy13512 | Catalyst 9500 High Performance | Fragmented ESP packets not forwarded |
| CSCvy51582 | All models | SNMP: sub-interface octet counter reports wrong value |
| CSCvz01398 | All models | Incorrect L3 LISP instance ID on Cef table for VN's |
| CSCvz32969 | All models | Cat9k \| DHCP unicast ACK not forwarded to the client when DHCP snooping is enabled |
| CSCvz54210 | All models | C9300 / C9500 / C9500H // Constraining Uncore Frequency on CPU to mitigate Hang/Crash |
| CSCwa17838 | All models | Stackwise virtual drop ARP request in secondary private VLAN after reload |
| CSCwa21130 | Catalyst 9500 High Performance | 16.12.4:Cat9kQSFP-H40G-CUxM are not recognized or listed as Unknown pluggable optics and link not up |

# Resolved Caveats in Cisco IOS XE Amsterdam 17.3.4

| Identifier | Applicable Models | Description |
|---|---|---|
| CSCvt16172 | Catalyst 9500 High Performance | Wrong values for transceivers (DOM) in Cat9k Core switches |
| CSCvv82819 | All models | Manually configured MAC address is programmed in hardware when interface is admin down |
| CSCvv97807 | All models | Netconf & Netconf-yang are not enabled on the Ext-Nodes as part of PnP config. |
| CSCvv97823 | All models | Yang requests from DNAC to IoT devices related to device Licensing are failing on the device |
| CSCvw13923 | All models | Vlan randomly stop forwarding DHCP pkts - Wedged input interface queue |
| CSCvw32545 | All models | STACK : Stale mac entry in the member switch causing the connectivity issues. |
| CSCvw51810 | All models | Disruption of IP communication due to AUTH_DRIVEN_DROP on uplinks when flapping downlink ports |
| CSCvx06374 | All models | Profinet (PN-PTCP) frames overwhelming L2 Control CoPP queue on Cat9K |
| CSCvx15864 | Catalyst 9500 | ETA+AVC: After active timer expiry, multiple FNF exports sent for same flow |
| CSCvx23125 | Catalyst 9500 High Performance | SVL Link Instability May Result in IOMD Exhaustion |
| CSCvx25344 | All models | Private Native Vlan packets are erroneously tagged |
| CSCvx60124 | All models | Traffic failed if incoming interface MPLS and 2+ outgoing interfaces (ECMP) with recursive routing |
| CSCvx83266 | All models | DHCP snooping and PVLAN dropping DHCP Offer unicast packet on C9K |
| CSCvx87277 | All models | Cat9XXX may experience an unexpected reboot with Critical process fed fault on fp_0_0 |
| CSCvx94722 | All models | Radius protocol generate jumbo frames for dot1x packets |
| CSCvy02075 | All models | Switch forwards traffic received on ports in blocking BLK state |
| CSCvy07376 | All models | Catalyst 9K Switch may crash on ISSU upgrade if run debug issu all |

# Resolved Caveats in Cisco IOS XE Amsterdam 17.3.3

| Identifier | Applicable Models | Description |
|---|---|---|
| CSCvr77861 | All models | Cat9300/C9500/C9500H switches may reload with last reload reason as LocalSoft or CpuCatastrophicErr |
| CSCvt41614 | Catalyst 9500 | cat9k/REP:convergence time after rep interface flap runs into 5 mins for some flows |
| CSCvt73669 | All models | Ports remains in notconnect state when moved from L2 to L3 to L2 |
| CSCvu38231 | All models | Configuring reserved PO 127 & 128 in SVL setup disables show etherchannel CLI |
| CSCvv27849 | All models | Unexpected reload caused by the FED process. |
| CSCvv39593 | All models | 'SL using Policy' to SL downgrade to 16.12.4 leads to \"Initial Registration-First Attempt Pending\" |
| CSCvv84271 | Catalyst 9500 High Performance | When given \"speed noneg\" on both ends of the 25G/40G/100G Cu,link going down and never come up |
| CSCvv88670 | All models | [SDA] SISF marking mac as tentative |
| CSCvw32481 | All models | EVPN Type-2 IP/MAC route is created for not-connected SVI |
| CSCvw28418 | All models | VRF leaking using self-GRE tunnels causes traffic to be punted to CPU. |
| CSCvt33159 | All models | SVL Crash when performing SUP failover on a scaled setup |
| CSCvv56278 | All models | Dot1x Client mac in dropped state post switchover |
| CSCvw18461 | All models | Switch Crashes when enabling RSPAN Destination port |
| CSCvv26018 | All models | Loopback error is not detected on trunk interface |
| CSCvw20225 | All models | Cat9k switches may roll back to old software after unexpected switchover event |
| CSCvw74061 | All models | Cat9300 & Cat9500 series switches may see unexpected reloads due to Localsoft or CpuCatastrophicErr |
| CSCvu65604 | Catalyst 9500 | Cat9500 // NTP and HSRP: replies with the wrong source IP (SVI address) |
| CSCvu90016 | All models | Catalyst 9k: FED crash after reaching webauth scale of about 1k sessions |

# Resolved Caveats in Cisco IOS XE Amsterdam 17.3.2a

| Identifier | Applicable Models | Description |
|---|---|---|
| CSCvq13832 | All models | Whenever Acct-terminate-cause is 24 the duplicate set of traffic counts is sent as 0. |
| CSCvt18739 | All models | Cat9K - incorrect source mac address used for L3 packets after L3 link flap |
| CSCvt70277 | All models | Power allocation issue in 16.9.x/16.12.x |
| CSCvt93918 | All models | Cat9k reboot due to ACL count being huge. |
| CSCvt95680 | All models | Unexpected Reload when a VLAN is created within the range 2-1002 |
| CSCvu24011 | All models | Interface Not Passing Traffic after Boot-up with IE 3400 with forced speed/duplex setting on IE |
| CSCvu25931 | All models | DHCPv6 RELAY-REPLY dropped when punted on cat9k |
| CSCvu52246 | All models | sessmgrd memory leak when CTS PAC download fails |
| CSCvu62273 | All models | CLI should be auto-upgraded from "tacacs-server" cli to newer version while upgrading |
| CSCvu82477 | All models | Random L3 ports stop traffic processing on SDA internal border nodes |
| CSCvu94010 | All models | Cat9k Active stack switch crash while applying the CTS configuration |
| CSCvv16874 | All models | CAT9K: PRD18: SISF Crash seen on device when left traffic running overnight |
| CSCvv26075 | All models | On Auth port, timestamp update is not happening for Authz MAC address upon RX of control-plane/BPDU |
| CSCvv34688 | All models | IPv6 communication stops working post applying ipv6 source-guard on interface |
| CSCvv35565 | All models | L3 ECMP load balancing not working as expected for fragmented packets. |
| CSCvv44720 | All models | IPV4 and IPV6 Per-User ACL is not working together on singe authentication session |
| CSCvv45801 | All models | inconsistent behaviour for autoconf template binding after switchover |
| CSCvv48305 | All models | Route not fully programmed in the hardware for macsec enabled end-point |

| Identifier | Applicable Models | Description |
|---|---|---|
| CSCvv69764 | All models | Dot1Q Native vlan tag is ignored after configuring Layer2 Vlan on 16.12.4 code |
| CSCvv77355 | All models | Cat9k in VXLAN with directed-broadcast on egress interface duplicates broadcast traffic |
| CSCvv77365 | All models | Forwarding for mac addresses in a vlan that is extended across VXLAN fabric may fail. |
| CSCvv86246 | All models | CAT9K reload due to "Critical process cmand fault on rp_0_0 (rc=139)" |
| CSCvv24756 | Catalyst 9500 High Performance | In SVL, syslog is not getting generated for PS0 status of standby switch after SSO intermittently |
| CSCvv33848 | Catalyst 9500 High Performance | value 9 being displayed when snmp walk on the OID cefcFRUPowerOperStatus for PSU after SSO sometimes |

## Resolved Caveats in Cisco IOS XE Amsterdam 17.3.1

| Identifier | Applicable Models | Description |
|---|---|---|
| CSCvr92287 | All models | EPC with packet-len opt breaks CPU in-band path for bigger frames |
| CSCvs14673 | All models | SVL node may get removed if one of the SVL links goes bad. |
| CSCvs22896 | All models | DHCPv6 RELAY-REPLY packet is being dropped |
| CSCvs84212 | All models | DHCP server sends out a NAK packet during DHCP renewal process. |
| CSCvs97551 | All models | Unable to use VLAN range 4084-4095 for any business operations |
| CSCvt13518 | All models | QoS ACL matching incorrectly when udp range is used |
| CSCvt59448 | All models | LACP link suspend or PAgP link getting into error-disabled if stack-mac persistent timer is set |
| CSCvt99199 | All models | MACSEC issue in SDA deployment |
| CSCvk13860 | Catalyst 9500 | C9K switch does not boot with IOS above 16.8.1a |
| CSCvr90477 | Catalyst 9500 | Cat3k/Cat9k incorrectly set more-fragment flag for double fragmentation |
| CSCvs74735 | Catalyst 9500 | Large scale ACL with range L4 operators is dropping permitted packets |
| CSCvs39968 | Catalyst 9500 High Performance | CAT 9500 & 9600 crashes on transceiver insertion |

| Identifier | Applicable Models | Description |
|---|---|---|
| CSCvs89792 | Catalyst 9500 High Performance | INJECT_FEATURE_ESCAPE: Egress IP packet delivered via legacy inject path for NetBios packets |
| CSCvt01955 | Catalyst 9500 High Performance | [9500-H]:Network Advantage License not getting registered on 16.12.2 |
| CSCvt17460 | Catalyst 9500 High Performance | SVL/DAD links will be err-disabled when there is link-flap due to faulty SFPs |

# 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 9500 Series Switches is at this URL: https://www.cisco.com/c/en/us/support/switches/catalyst-9500-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.
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- 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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