Release Notes for Cisco Catalyst 9400 Series Switches, Cisco IOS XE Bengaluru 17.5.x

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Introduction

Cisco Catalyst 9400 Series Switches are Cisco's leading modular enterprise switching access platform and have been purpose-built to address emerging trends of Security, IoT, Mobility, and Cloud.

They deliver complete convergence with the rest of the Cisco Catalyst 9000 Series Switches in terms of ASIC architecture with Unified Access Data Plane (UADP) 2.0 and UADP 3.0. The platform runs an Open Cisco IOS XE that supports model driven programmability, has the capacity to host containers, and run 3rd party applications and scripts natively within the switch (by virtue of x86 CPU architecture, local storage, and a higher memory footprint). This series forms the foundational building block for SD-Access, which is Cisco's lead enterprise architecture.

Cisco Catalyst 9400 Series Switches are enterprise optimized with a dual-serviceable fan tray design, side to side airflow, and are closet-friendly with a16-inch depth

Whats New in Cisco IOS XE Bengaluru 17.5.1

Hardware Features in Cisco IOS XE Bengaluru 17.5.1

Feature Name	Description and Documentation Link
C9400-LC-48HN	Cisco Catalyst 9400 Series 48-port, UPOE+ 100Mbps/1/2.5/5G Multigigabit Module, IEEE802.3af, IEEE802.3at, and IEEE802.3bt compliant module supporting up to 90 W Cisco UPOE+ on each of its 48 RJ45 ports See Cisco Catalyst 9400 Series Switching Module Installation Note.

Software Features in Cisco IOS XE Bengaluru 17.5.1

Feature Name	Description, Documentation Link, and License Level Information
ACL Template for IPv4 and IPv6	Allows you to configure IPv4 and IPv6 access list (ACL) in template configuration mode. Use the **ip access-group** command to apply an IPv4 access list and **ipv6 traffic-filter** command to apply an IPv6 access list in template configuration mode. (Network Essentials and Network Advantage)
Disabling USB Ports	Allows you to disable all USB ports on a standalone or stacked device using the **platform usb disable** command.
DSCP marking on RADIUS Servers	Allows you to configure Differentiated Services Code Point (DSCP) marking on RADIUS servers and RADIUS server groups using **dscp** command. The **radius-server dscp** command is used to configure DSCP marking for authentication and accounting on RADIUS servers in global configuration mode. (Network Essentials)
ERSPAN over MPLS VPN	Introduces support for Multiprotocol Label Switching (MPLS) VPN for Encapsulated Remote Switched Port Analyzer (ERSPAN). ERSPAN traffic can be transported over MPLS VPN. (Network Advantage)
Fully Qualified Domain Name (FQDN) ACL	Allows you to configure and apply a URL Redirect access list (ACL) policy in the system with dynamically resolved host names based on the domain name system.
Generalized PTP over Layer 3 Unicast	Introduces support for generalized Precision Time Protocol (PTP) networks connected over Layer 3 devices. (Network Advantage)

Feature Name	Description, Documentation Link, and License Level Information
Programmability • ThousandEyes Enterprise Agent • High Availability in OpenFlow Mode • YANG Data Models	The following programmability features are introduced in this release: • A new version of the ThousandEyes Enterprise Agent is introduced. This is an embedded Docker-based application that runs on Cisco devices using the application-hosting capability. The Enterprise Agent is available on both the SSD and bootflash. (DNA Advantage) • Introduces support for SSO and NSO for high availability in OpenFlow mode. • YANG Data Models: For the list of Cisco IOS XE YANG models available with this release, navigate to: https://github.com/YangModels/yang/tree/master/vendor/cisco/xe/1751. 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. (Network Advantage)
Selective Q-in-Q	Maps the specified customer VLAN-IDs (C-VLANs) entering the User Network Interface (UNI) to the specified, translated VLAN IDs (S-VLANs). The feature enables selective tunnelling or translation of C-VLANs to S-VLANs on interfaces configured as trunk ports. The egress packet is double-tagged with the C-VLAN ID and the mapped S-VLAN ID.
Session Timer Enhancement	The range for number of seconds between reauthentication attempts was increased from 1 to 65535 seconds to 1 to 1073741823 seconds.
Support for Openflow MACsec	Introduces support for MACsec in OpenFlow mode. This feature is not supported with high availability.
Wired Dynamic PVLAN	Introduces support for Wired Dynamic Private VLAN (PVLAN) that uses a private VLAN to isolate the clients and provide zero-trust. This feature allows you to block peer to peer communications within a subnet or a VLAN. The client is assigned to a PVLAN which isolates a single wired client connected on a port, from the other ports.

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

Important Notes

• Cisco StackWise Virtual - Supported and Unsupported Features, on page 4
• Unsupported Features, on page 4

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

Cisco StackWise Virtual - Supported and Unsupported Features

When you enable Cisco StackWise Virtual on the device

- Layer 2, Layer 3, Security, Quality of Service, Multicast, Application, Monitoring and Management, Multiprotocol Label Switching, High Availability, VXLAN BGP EVPN, and Cisco 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 (REP) and Remote Switched Port Analyzer (RSPAN) are NOT supported.

Unsupported Features

- Audio Video Bridging (including IEEE802.1AS, IEEE 802.1Qat, and IEEE 802.1Qav)
- Cisco TrustSec Network Device Admission Control (NDAC) on Uplinks
- Converged Access for Branch Deployments
- Fast PoE
- IPsec VPN
- MACsec Switch to Switch Connections on C9400-SUP-1XL-Y.
- Performance Monitoring (PerfMon)
- Virtual Routing and Forwarding (VRF)-Aware web authentication

Complete List of Supported Features

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

Accessing Hidden Commands

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

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

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

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

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

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

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

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

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

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

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



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

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

Default Behaviour

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

Supported Hardware

Cisco Catalyst 9400 Series Switches—Model Numbers

The following table lists the supported switch models. For information about the available license levels, see section *License Levels*.

Switch Model (append with "=" for spares)	Description
C9404R	Cisco Catalyst 9400 Series 4 slot chassis • Redundant supervisor module capability • Two switching module slots • Hot-swappable, front and rear serviceable, non-redundant fan tray assembly • Four power supply module slots
C9407R	Cisco Catalyst 9400 Series 7 slot chassis • Redundant supervisor module capability • Five switching module slots • Hot-swappable, front and rear serviceable fan tray assembly • Eight power supply module slots
C9410R	Cisco Catalyst 9400 Series 10 slot chassis • Redundant supervisor module capability • Eight switching module slots • Hot-swappable, front and rear serviceable fan tray assembly • Eight power supply module slots

Supported Hardware on Cisco Catalyst 9400 Series Switches

Product ID (append with "=" for spares)	Description
Supervisor Modules	
C9400-SUP-1	Cisco Catalyst 9400 Series Supervisor 1 Module This supervisor module is supported on the C9404R, C9407R, and C9410R chassis.
C9400-SUP-1XL	Cisco Catalyst 9400 Series Supervisor 1XL Module This supervisor module is supported on the C9404R, C9407R, and C9410R chassis.
C9400-SUP-1XL-Y	Cisco Catalyst 9400 Series Supervisor 25XL Module This supervisor module is supported on the C9404R, C9407R, and C9410R chassis.

Product ID (append with "=" for spares)	Description
Line Cards	
C9400-LC-24S	24-port, 1 Gigabit Ethernet SFP module that supports 100/1000 BASET-T with Cu-SFP
C9400-LC-24XS	24-port Gigabit Ethernet module that supports 1 and 10 Gbps connectivity.
C9400-LC-48H	48-port Gigabit Ethernet UPOE+ module supporting up to 90W on each of its 48 RJ45 ports.
C9400-LC-48HN	48-port, UPOE+ 100 Mbps/1G/2.5G/5G Multigigabit Ethernet Module
C9400-LC-48P	48-port, 1 Gigabit Ethernet POE/POE+ module supporting up to 30W per port.
C9400-LC-48S	48-port, 1 Gigabit Ethernet SFP module that supports 100/1000 BASET-T with Cu-SFP.
C9400-LC-48T	48-port, 10/100/1000 BASE-T Gigabit Ethernet module.
C9400-LC-48U	48-port UPOE 10/100/1000 (RJ-45) module supporting up to 60W per port.
C9400-LC-48UX	48-port, UPOE Multigigabit Ethernet Module with: • 24 ports (Ports 1 to 24) 1G UPOE 10/100/1000 (RJ-45) • 24 ports (Ports 25 to 48) MultiGigabit Ethernet 100/1000/2500/5000/10000 UPOE ports
M.2 SATA SSD Modules[1] **(for the Supervisor)**	
C9400-SSD-240GB	Cisco Catalyst 9400 Series 240GB M2 SATA memory
C9400-SSD-480GB	Cisco Catalyst 9400 Series 480GB M2 SATA memory
C9400-SSD-960GB	Cisco Catalyst 9400 Series 960GB M2 SATA memory
AC Power Supply Modules	
C9400-PWR-2100AC	Cisco Catalyst 9400 Series 2100W AC Power Supply
C9400-PWR-3200AC	Cisco Catalyst 9400 Series 3200W AC Power Supply
DC Power Supply Modules	
C9400-PWR-3200DC	Cisco Catalyst 9400 Series 3200W DC Power Supply

[1] M.2 Serial Advanced Technology Attachment (SATA) Solid State Drive (SSD) Module

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 9400 Series Switches, Cisco Identity Services Engine, Cisco Access Control Server, and Cisco Prime Infrastructure.

Catalyst 9400	Cisco Identity Services Engine	Cisco Access Control Server	Cisco Prime Infrastructure
Bengaluru 17.5.1	3.0 Patch 1 2.7 Patch 2 2.6 Patch 7 2.4 Patch 13	-	PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack See Cisco Prime Infrastructure 3.9 → **Downloads**.
Bengaluru 17.4.1	3.0 2.7 Patch 2	-	PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack See Cisco Prime Infrastructure 3.9 → **Downloads**.
Amsterdam 17.3.8a	2.7	-	PI 3.10 + PI 3.10 latest maintenance release + PI 3.10 latest device pack 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 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 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 See Cisco Prime Infrastructure 3.10 → **Downloads**.

Catalyst 9400	Cisco Identity Services Engine	Cisco Access Control Server	Cisco Prime Infrastructure
Amsterdam 17.3.5	2.7	-	PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack 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 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 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 See Cisco Prime Infrastructure 3.8 → **Downloads**.
Amsterdam 17.3.1	2.7	-	PI 3.8 + PI 3.8 latest maintenance release + PI 3.8 latest device pack 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 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 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 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 See Cisco Prime Infrastructure 3.9 → Downloads.

Catalyst 9400	Cisco Identity Services Engine	Cisco Access Control Server	Cisco Prime Infrastructure
Gibraltar 16.12.6	2.6	-	PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack 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 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 See Cisco Prime Infrastructure 3.9 → Downloads.
Gibraltar 16.12.4	2.6	-	PI 3.8 + PI 3.8 latest maintenance release + PI 3.8 latest device pack 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 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 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 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 See Cisco Prime Infrastructure 3.5 → **Downloads**.
Gibraltar 16.11.1	2.6 2.4 Patch 5	5.4 5.5	PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack See Cisco Prime Infrastructure 3.4 → **Downloads**.

Catalyst 9400	Cisco Identity Services Engine	Cisco Access Control Server	Cisco Prime Infrastructure
Gibraltar 16.10.1	2.3 Patch 1 2.4 Patch 1	5.4 5.5	PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack See Cisco Prime Infrastructure 3.4→ **Downloads**.
Fuji 16.9.8	2.5 2.1	5.4 5.5	PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack See Cisco Prime Infrastructure 3.9 → **Downloads**.
Fuji 16.9.7	2.5 2.1	5.4 5.5	PI 3.9 + PI 3.9 latest maintenance release + PI 3.9 latest device pack See Cisco Prime Infrastructure 3.9 → **Downloads**.
Fuji 16.9.6	2.3 Patch 1 2.4 Patch 1	5.4 5.5	PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack See Cisco Prime Infrastructure 3.4→ **Downloads**.
Fuji 16.9.5	2.3 Patch 1 2.4 Patch 1	5.4 5.5	PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack See Cisco Prime Infrastructure 3.4→ **Downloads**.
Fuji 16.9.4	2.3 Patch 1 2.4 Patch 1	5.4 5.5	PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack See Cisco Prime Infrastructure 3.4→ **Downloads**.
Fuji 16.9.3	2.3 Patch 1 2.4 Patch 1	5.4 5.5	PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack See Cisco Prime Infrastructure 3.4→ **Downloads**.
Fuji 16.9.2	2.3 Patch 1 2.4 Patch 1	5.4 5.5	PI 3.4 + PI 3.4 latest maintenance release + PI 3.4 latest device pack See Cisco Prime Infrastructure 3.4→ **Downloads**.
Fuji 16.9.1	2.3 Patch 1 2.4 Patch 1	5.4 5.5	PI 3.4 + PI 3.4 latest device pack See Cisco Prime Infrastructure 3.4→ **Downloads**.

Catalyst 9400	Cisco Identity Services Engine	Cisco Access Control Server	Cisco Prime Infrastructure
Fuji 16.8.1a	2.3 Patch 1 2.4	5.4 5.5	PI 3.3 + PI 3.3 latest maintenance release + PI 3.3 latest device pack See Cisco Prime Infrastructure 3.3→ **Downloads**.
Everest 16.6.4a	2.2 2.3	5.4 5.5	PI 3.1.6 + Device Pack 13 See Cisco Prime Infrastructure 3.1 → **Downloads**.
Everest 16.6.4	2.2 2.3	5.4 5.5	PI 3.1.6 + Device Pack 13 See Cisco Prime Infrastructure 3.1 → **Downloads**.
Everest 16.6.3	2.2 2.3	5.4 5.5	PI 3.1.6 + Device Pack 13 See Cisco Prime Infrastructure 3.1 → **Downloads**
Everest 16.6.2	2.2 2.3	5.4 5.5	PI 3.1.6 + Device Pack 13 See Cisco Prime Infrastructure 3.1 → **Downloads**
Everest 16.6.1	2.2	5.4 5.5	PI 3.1.6 + Device Pack 13 See Cisco Prime Infrastructure 3.1 → **Downloads**

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[2]	512 MB[3]	256	1280 x 800 or higher	Small

[2] We recommend 1 GHz
[3] 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 and CPLD Versions

ROM Monitor (ROMMON)

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.

Complex Programmable Logic Device (CPLD)

CPLD refers to hardware-programmable firmware. CPLD upgrades are not mandatory but may be required to resolve firmware defects, or to support new features. The upgrade process can be completed after upgrading the software image. There may not be new CPLD versions with every release.

The following table provides ROMMON and CPLD version information for the Cisco Catalyst 9400 Series Supervisor Modules. For ROMMON and CPLD 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 (C9400-SUP-1, C9400-SUP-1XL, C9400-SUP-1XL-Y)	CPLD Version (C9400-SUP-1, C9400-SUP-1XL, C9400-SUP-1XL-Y)	ROMMON Version (C9400X-SUP-2, C9400X-SUP-2XL)	CPLD Version (C9400X-SUP-2, C9400X-SUP-2XL)
Bengaluru 17.5.1	17.5.1r	20062105	-	-
Bengaluru 17.4.1	17.3.1r[FC2]	20062105	-	-
Amsterdam 17.3.8a	17.3.1r[FC2]	19082605	-	-
Amsterdam 17.3.8	17.3.1r[FC2]	19082605	-	-
Amsterdam 17.3.7	17.3.1r[FC2]	19082605	-	-

Release	ROMMON Version (C9400-SUP-1, C9400-SUP-1XL, C9400-SUP-1XL-Y)	CPLD Version (C9400-SUP-1, C9400-SUP-1XL, C9400-SUP-1XL-Y)	ROMMON Version (C9400X-SUP-2, C9400X-SUP-2XL)	CPLD Version (C9400X-SUP-2, C9400X-SUP-2XL)
Amsterdam 17.3.6	17.3.1r[FC2]	19082605	-	-
Amsterdam 17.3.5	17.3.1r[FC2]	19082605	-	-
Amsterdam 17.3.4	17.3.1r[FC2]	19082605	-	-
Amsterdam 17.3.3	17.3.1r[FC2]	19082605	-	-
Amsterdam 17.3.2a	17.3.1r[FC2]	19082605	-	-
Amsterdam 17.3.1	17.3.1r[FC2]	19082605	-	-
Amsterdam 17.2.1	17.1.1r	19082605	-	-
Amsterdam 17.1.1	17.1.1r	19032905	-	-

Upgrading the Switch Software

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

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

Finding the Software Version

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

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

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

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

Software Images

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

Upgrading the ROMMON

To know the ROMMON or bootloader version that applies to every major and maintenance release, see ROMMON and CPLD Versions, on page 13.

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

- Upgrading the ROMMON in the primary SPI flash device

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

- Upgrading the ROMMON in the golden SPI flash device

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

Note

- Golden ROMMON upgrade is only applicable to Cisco IOS XE Amsterdam 17.3.5 and later releases.
- Golden ROMMON upgrade will fail if the FPGA version is 17101705 or older. To upgrade the FPGA version, see Upgrading the Complex Programmable Logic Device Version, on page 30.
- In case of a Cisco StackWise Virtual setup, upgrade the active and standby supervisor modules.
- In case of a High Availability set up, upgrade the active and standby supervisor modules.

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	
To install and activate the specified file, and to commit changes to be persistent across reloads: **`install add file`** *`filename`* [**`activate commit`**] 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.

Upgrading in Install Mode

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

Before you begin

Caution You must comply with these cautionary guidelines during an upgrade:

- Do not power cycle the switch.
- Do not disconnect power or remove the supervisor module.
- Do not perform an online insertion and replacement (OIR) of either supervisor (in a High Availability setup), if one of the supervisor modules in the chassis is in the process of a bootloader upgrade or when the switch is booting up.
- Do not perform an OIR of a switching module (linecard) when the switch is booting up.

Note Disconnecting and reconnecting power to a Cisco Catalyst 9400 Series Supervisor 1 Module within a 5-second window, can corrupt the boot SPI.

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

When upgrading from ...	Permitted Supervisor Setup (Applies to the release you are upgrading from)	First upgrade to...	To upgrade to ...
Cisco IOS XE Everest 16.6.1[4]	Upgrade a single supervisor, and complete the boot loader and CPLD upgrade. After completing the first supervisor upgrade, remove and swap in the second supervisor. After both supervisors are upgraded, they can be inserted and booted in a high availability setup. **Note** Do not simultaneously upgrade dual supervisors from Cisco IOS XE Everest 16.6.1 to a later release. Doing so may cause hardware damage.	Cisco IOS XE Everest 16.6.3 Follow the upgrade steps as in the Release Notes for Cisco Catalyst 9400 Series Switches, Cisco IOS XE Everest 16.6.x → Upgrading the Switch Software → Upgrading in Install Mode	Cisco IOS XE Bengaluru 17.5.x
Cisco IOS XE Everest 16.6.2 and later releases	This procedure automatically copies the images to both active and standby supervisor modules. Both supervisor modules are simultaneously upgraded.	Not applicable	

[4] When upgrading from Cisco IOS XE Everest 16.6.1 to a later release, the upgrade may take a long time, and the system will reset three times due to rommon and complex programmable logic device (CPLD) upgrade. Stateful switchover is supported from Cisco IOS XE Everest 16.6.2

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

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 Fri Mar 19 14:14:40 UTC 2021
Cleaning up unnecessary package files
No path specified, will use booted path flash:packages.conf
Cleaning flash:
Scanning boot directory for packages ... done.
Preparing packages list to delete ...
cat9k-cc_srdriver.17.04.01.SPA.pkg
```

```
File is in use, will not delete.
cat9k-espbase.17.04.01.SPA.pkg
File is in use, will not delete.
cat9k-rpbase.17.04.01.SPA.pkg
File is in use, will not delete.
cat9k-rpboot.17.04.01.SPA.pkg
File is in use, will not delete.
cat9k-sipbase.17.04.01.SPA.pkg
File is in use, will not delete.
cat9k-sipspa.17.04.01.SPA.pkg
File is in use, will not delete.
cat9k-srdriver.17.04.01.SPA.pkg
File is in use, will not delete.
cat9k-webui.17.04.01.SPA.pkg
File is in use, will not delete.
packages.conf
File is in use, will not delete.
done.

The following files will be deleted:
[R0]:
/flash/cat9k-cc_srdriver.17.04.01.SPA.pkg
/flash/cat9k-espbase.17.04.01.SPA.pkg
/flash/cat9k-guestshell.17.04.01.SPA.pkg
/flash/cat9k-rpbase.17.04.01.SPA.pkg
/flash/cat9k-rpboot.17.04.01.SPA.pkg
/flash/cat9k-sipbase.17.04.01.SPA.pkg
/flash/cat9k-sipspa.17.04.01.SPA.pkg
/flash/cat9k-srdriver.17.04.01.SPA.pkg
/flash/cat9k-webui.17.04.01.SPA.pkg
/flash/cat9k-wlc.17.04.01.SPA.pkg
/flash/packages.conf
/flash/cat9k_iosxe.17.04.01.SPA.bin

Do you want to remove the above files? [y/n]y
[R0]:
Deleting file flash:cat9k-cc_srdriver.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-espbase.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-guestshell.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpbase.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpboot.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipbase.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipspa.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-srdriver.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-webui.17.04.01.SPA.pkg ... done.
Deleting file flash:cat9k-wlc.17.04.01.SPA.pkg ... done.
Deleting file flash:packages.conf ... done.
SUCCESS: Files deleted.
SUCCESS: Files deleted.
--- Starting Post_Remove_Cleanup ---
Performing Post_Remove_Cleanup on Active/Standby
[R0] Post_Remove_Cleanup package(s) on R0
[R0] Finished Post_Remove_Cleanup on R0
Checking status of Post_Remove_Cleanup on [R0]
Post_Remove_Cleanup: Passed on [R0]
Finished Post_Remove_Cleanup

SUCCESS: install_remove Fri Mar 19 14:16:29 UTC 2021
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.17.05.01.SPA.bin flash:
destination filename [cat9k_iosxe.17.05.01.SPA.bin]?
Accessing tftp://10.8.0.6/image/cat9k_iosxe.17.05.01.SPA.bin...
Loading /cat9k_iosxe.17.05.01.SPA.bin from 10.8.0.6 (via GigabitEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 601216545 bytes]

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

b) **dir flash:**

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

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

Directory of flash:/

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

Step 3 Set boot variable

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

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

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

b) **no boot manual**

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

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

```
Switch# show bootvar
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 =
```

Step 4 Install image to flash

install add file activate commit

Use this command to install the image.

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

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

install_add_activate_commit: START Fri Mar 19 22:49:41 UTC 2021

*Mar 19 22:49:42.772: %IOSXE-5-PLATFORM: Switch 1 R0/0: Mar 19 22:49:42 install_engine.sh:
 %INSTALL-5-INSTALL_START_INFO: Started install one-shot flash:cat9k_iosxe.17.05.01.SPA.bin

install_add_activate_commit: Adding PACKAGE

--- Starting initial file syncing ---
Info: Finished copying flash:cat9k_iosxe.17.05.01.SPA.bin
 to the selected switch(es)
Finished initial file syncing

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

install_add_activate_commit: Activating PACKAGE

/flash/cat9k-webui.17.05.01.SPA.pkg
/flash/cat9k-srdriver.17.05.01.SPA.pkg
/flash/cat9k-sipspa.17.05.01.SPA.pkg
/flash/cat9k-sipbase.17.05.01.SPA.pkg
/flash/cat9k-rpboot.17.05.01.SPA.pkg
/flash/cat9k-rpbase.17.05.01.SPA.pkg
/flash/cat9k-guestshell.17.05.01.SPA.pkg
/flash/cat9k-espbase.17.05.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.05.01.SPA.pkg

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

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

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

```
Finished Commit

Install will reload the system now!

Chassis 1 reloading, reason - Reload command
SUCCESS: install_add_activate_commit
/flash/cat9k-webui.17.05.01.SPA.pkg
/flash/cat9k-srdriver.17.05.01.SPA.pkg
/flash/cat9k-sipspa.17.05.01.SPA.pkg
/flash/cat9k-sipbase.17.05.01.SPA.pkg
/flash/cat9k-rpboot.17.05.01.SPA.pkg
/flash/cat9k-rpbase.17.05.01.SPA.pkg
/flash/cat9k-guestshell.17.05.01.SPA.pkg
/flash/cat9k-espbase.17.05.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.05.01.SPA.pkg
Fri Mar 19 22:53:58 UTC 2021
Switch#
```

Note
Old files listed in the logs will not be removed from flash.

Step 5 Verify installation

After the software has been successfully installed, check that the ten new `.pkg` files and two `.conf` are in the flash partition, and also check the version installed on the switch.

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

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

```
Switch# dir flash:*.pkg
Directory of flash:/*.pkg
Directory of flash:/
475140 -rw- 2012104     Nov 17 2020 09:52:41 -07:00 cat9k-cc_srdriver.17.04.01.SPA.pkg
475141 -rw- 70333380    Nov 17 2020 09:52:44 -07:00 cat9k-espbase.17.04.01.SPA.pkg
475142 -rw- 13256       Nov 17 2020 09:52:44 -07:00 cat9k-guestshell.17.04.01.SPA.pkg
475143 -rw- 349635524   Nov 17 2020 09:52:54 -07:00 cat9k-rpbase.17.04.01.SPA.pkg
475149 -rw- 24248187    Nov 17 2020 09:53:02 -07:00 cat9k-rpboot.17.04.01.SPA.pkg
475144 -rw- 25285572    Nov 17 2020 09:52:55 -07:00 cat9k-sipbase.17.04.01.SPA.pkg
475145 -rw- 20947908    Nov 17 2020 09:52:55 -07:00 cat9k-sipspa.17.04.01.SPA.pkg
475146 -rw- 2962372     Nov 17 2020 09:52:56 -07:00 cat9k-srdriver.17.04.01.SPA.pkg
475147 -rw- 13284288    Nov 17 2020 09:52:56 -07:00 cat9k-webui.17.04.01.SPA.pkg
475148 -rw- 13248       Nov 17 2020 09:52:56 -07:00 cat9k-wlc.17.04.01.SPA.pkg

491524 -rw- 25711568    Mar 19 2021 11:49:33 -07:00  cat9k-cc_srdriver.17.05.01.SPA.pkg
491525 -rw- 78484428    Mar 19 2021 11:49:35 -07:00  cat9k-espbase.17.05.01.SPA.pkg
491526 -rw- 1598412     Mar 19 2021 11:49:35 -07:00  cat9k-guestshell.17.05.01.SPA.pkg
491527 -rw- 404153288   Mar 19 2021 11:49:47 -07:00  cat9k-rpbase.17.05.01.SPA.pkg
491533 -rw- 31657374    Mar 19 2021 11:50:09 -07:00  cat9k-rpboot.17.05.01.SPA.pkg
491528 -rw- 27681740    Mar 19 2021 11:49:48 -07:00  cat9k-sipbase.17.05.01.SPA.pkg
491529 -rw- 52224968    Mar 19 2021 11:49:49 -07:00  cat9k-sipspa.17.05.01.SPA.pkg
491530 -rw- 31130572    Mar 19 2021 11:49:50 -07:00  cat9k-srdriver.17.05.01.SPA.pkg
491531 -rw- 14783432    Mar 19 2021 11:49:51 -07:00  cat9k-webui.17.05.01.SPA.pkg
491532 -rw- 9160        Mar 19 2021 11:49:51 -07:00  cat9k-wlc.17.05.01.SPA.pkg
11353194496 bytes total (8963174400 bytes free)
```

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:

```
Switch# dir flash:*.conf
```

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

16631  -rw- 4882 Mar 19 2021 05:39:42 +00:00  packages.conf
16634  -rw- 4882 Mar 19 2021 05:34:06 +00:00  cat9k_iosxe.17.05.01.SPA.conf
```

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

c) **show install summary**

The following is sample output of the **show install summary** command:

```
Switch# show install summary

[ R0 ] Installed Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
C - Activated & Committed, D - Deactivated & Uncommitted
--------------------------------------------------------------------------------
Type St Filename/Version
--------------------------------------------------------------------------------
IMG C 17.05.01.0.58

--------------------------------------------------------------------------------
Auto abort timer: inactive
--------------------------------------------------------------------------------
```

d) **show version**

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

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

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

Downgrading in Install Mode

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

Before you begin

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

When downgrading from ...	Permitted Supervisor Setup (Applies to the release you are downgrading from)	To ...
Cisco IOS XE Bengaluru 17.5.x	This procedure automatically copies the images to both active and standby supervisor modules. Both supervisor modules are simultaneously downgraded. **Note** Do not perform an Online Removal and Replacement (OIR) of either supervisor module during the process.	Cisco IOS XE Bengaluru 17.4.x or earlier releases.

Note New switch models that are introduced in a release cannot be downgraded. The release in which a module is introduced is the minimum software version for that model. We recommend upgrading all existing hardware to the same release as the latest hardware.

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

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 Fri Mar 19 11:42:27 UTC 2021

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.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-espbase.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-guestshell.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.05.01.SSA.pkg
      File is in use, will not delete.
```

```
    cat9k-sipbase.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-webui.17.05.01.SSA.pkg
      File is in use, will not delete.
    cat9k-wlc.17.05.01.SSA.pkg
      File is in use, will not delete.
    packages.conf
      File is in use, will not delete.
  done.
SUCCESS: No extra package or provisioning files found on media. Nothing to clean.

SUCCESS: install_remove  Fri Mar 19 11:42:39 UTC 2021

--- 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 Fri Mar 19 19:52:25 UTC 2021
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.17.04.01.SPA.bin flash:
Destination filename [cat9k_iosxe.17.04.01.SPA.bin]?
Accessing tftp://10.8.0.6//cat9k_iosxe.17.04.01.SPA.bin...
Loading /cat9k_iosxe.17.04.01.SPA.bin from 10.8.0.6 (via GigabitEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 508584771 bytes]
508584771 bytes copied in 101.005 secs (5035244 bytes/sec)
```

b) **dir flash:**

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

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

Directory of flash:/

434184 -rw- 508584771 Mar 19 2021 13:35:16 -07:00 cat9k_iosxe.17.04.01.SPA.bin
11353194496 bytes total (9055866880 bytes free)
```

Step 3 Set boot variable

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

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

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

b) **no boot manual**

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

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

```
Switch# show bootvar
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 =
```

Step 4 Downgrade software image

Use one of these options, to downgrade:

- **install add file activate commit**
- **install rollback to committed**

The following example displays the installation of the `cat9k_iosxe.17.04.01.SPA.bin` software image to flash, to downgrade the switch by using the **install add file activate commit** command. You can point to the source image on your tftp server or in flash if you have it copied to flash.

```
Switch# install add file flash:cat9k_iosxe.17.04.01.SPA.bin activate commit

install_add_activate_commit: START Fri 19 Mar 22:49:41 UTC 2021

*Mar 19 22:49:42.772: %IOSXE-5-PLATFORM: Switch 1 R0/0: Mar 19 22:49:42 install_engine.sh:
%INSTALL-5-INSTALL_START_INFO: Started install one-shot
flash:cat9k_iosxe.17.04.01.SPA.bininstall_add_activate_commit: Adding PACKAGE

--- Starting initial file syncing ---
Info: Finished copying flash:cat9k_iosxe.17.04.01.SPA.bin to the selected switch(es)
Finished initial file syncing

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

```
Checking status of Add on [1]
Add: Passed on [1]
Finished Add

install_add_activate_commit: Activating PACKAGE

/flash/cat9k-webui.17.04.01.SPA.pkg
/flash/cat9k-srdriver.17.04.01.SPA.pkg
/flash/cat9k-sipspa.17.04.01.SPA.pkg
/flash/cat9k-sipbase.17.04.01.SPA.pkg
/flash/cat9k-rpboot.17.04.01.SPA.pkg
/flash/cat9k-rpbase.17.04.01.SPA.pkg
/flash/cat9k-espbase.17.04.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.04.01.SPA.pkg

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

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

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

Install will reload the system now!

Chassis 1 reloading, reason - Reload command
SUCCESS: install_add_activate_commit
/flash/cat9k-webui.17.04.01.SPA.pkg
/flash/cat9k-srdriver.17.04.01.SPA.pkg
/flash/cat9k-sipspa.17.04.01.SPA.pkg
/flash/cat9k-sipbase.17.04.01.SPA.pkg
/flash/cat9k-rpboot.17.04.01.SPA.pkg
/flash/cat9k-rpbase.17.04.01.SPA.pkg
/flash/cat9k-guestshell.17.04.01.SPA.pkg
/flash/cat9k-espbase.17.04.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.04.01.SPA.pkg
Fri Mar 19 22:53:58 UTC 2021
Switch#
```

The following example displays sample output when downgrading the switch by using the **install rollback to committed** command.

Caution

Use the **install rollback to committed** command for downgrading, *only* if the version you want to downgrade to, is committed.

```
Switch# install rollback to committed

install_rollback: START Fri 19 Mar 14:24:56 UTC 2021

This operation requires a reload of the system. Do you want to proceed? [y/n]
*Mar 19 14:24:57.555: %IOSXE-5-PLATFORM: R0/0: Mar 19 14:24:57 install_engine.sh:
%INSTALL-5-INSTALL_START_INFO: Started install rollbacky
```

```
--- Starting Rollback ---
Performing Rollback on Active/Standby

WARNING: Found 55 disjoint TDL objects.
[R0] Rollback package(s) on R0
--- Starting rollback impact ---

Changes that are part of this rollback
Current : rp 0 0 rp_boot cat9k-rpboot.17.05.01.SPA.pkg
Current : rp 1 0 rp_boot cat9k-rpboot.17.05.01.SPA.pkg
Replacement: rp 0 0 rp_boot cat9k-rpboot.17.04.01.SPA.pkg
Replacement: rp 1 0 rp_boot cat9k-rpboot.17.04.01.SPA.pkg
Current : cc 0  0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 0  0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 0  0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : cc 1  0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 1  0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 1  0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : cc 10 0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 10 0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : cc 10 0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 2  0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 2  0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 2  0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : cc 3  0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 3  0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 3  0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : cc 4  0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 4  0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 4  0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : cc 5  0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 5  0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 5  0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : cc 6  0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 6  0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 6  0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : cc 7  0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 7  0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 7  0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : cc 8  0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 8  0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 8  0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : cc 9  0 cc_srdriver cat9k-cc_srdriver.17.05.01.SPA.pkg
Current : cc 9  0 cc cat9k-sipbase.17.05.01.SPA.pkg
Current : cc 9  0 cc_spa cat9k-sipspa.17.05.01.SPA.pkg
Current : fp 0  0 fp cat9k-espbase.17.05.01.SPA.pkg
Current : fp 1  0 fp cat9k-espbase.17.05.01.SPA.pkg
Current : rp 0  0 guestshell cat9k-guestshell.17.05.01.SPA.pkg
Current : rp 0  0 rp_base cat9k-rpbase.17.05.01.SPA.pkg
Current : rp 0  0 rp_daemons cat9k-rpbase.17.05.01.SPA.pkg
Current : rp 0  0 rp_iosd cat9k-rpbase.17.05.01.SPA.pkg
Current : rp 0  0 rp_security cat9k-rpbase.17.05.01.SPA.pkg
Current : rp 0  0 rp_webui cat9k-webui.17.05.01.SPA.pkg
Current : rp 0  0 rp_wlc cat9k-wlc.17.05.01.SPA.pkg
Current : rp 0  0 srdriver cat9k-srdriver.17.05.01.SPA.pkg
Current : rp 1  0 guestshell cat9k-guestshell.17.05.01.SPA.pkg
Current : rp 1  0 rp_base cat9k-rpbase.17.05.01.SPA.pkg
Current : rp 1  0 rp_daemons cat9k-rpbase.17.05.01.SPA.pkg
Current : rp 1  0 rp_iosd cat9k-rpbase.17.05.01.SPA.pkg
Current : rp 1  0 rp_security cat9k-rpbase.17.05.01.SPA.pkg
Current : rp 1  0 rp_webui cat9k-webui.17.05.01.SPA.pkg
Current : rp 1  0 rp_wlc cat9k-wlc.17.05.01.SPA.pkg
Current : rp 1  0 srdriver cat9k-srdriver.17.05.01.SPA.pkg
Replacement: cc 0  0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
```

```
Replacement: cc 0  0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 0  0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: cc 1  0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
Replacement: cc 1  0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 1  0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: cc 10 0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 10 0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: cc 10 0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
Replacement: cc 2  0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
Replacement: cc 2  0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 2  0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: cc 3  0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
Replacement: cc 3  0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 3  0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: cc 4  0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
Replacement: cc 4  0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 4  0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: cc 5  0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
Replacement: cc 5  0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 5  0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: cc 6  0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
Replacement: cc 6  0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 6  0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: cc 7  0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
Replacement: cc 7  0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 7  0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: cc 8  0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
Replacement: cc 8  0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 8  0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: cc 9  0 cc_srdriver cat9k-cc_srdriver.17.04.01.SPA.pkg
Replacement: cc 9  0 cc cat9k-sipbase.17.04.01.SPA.pkg
Replacement: cc 9  0 cc_spa cat9k-sipspa.17.04.01.SPA.pkg
Replacement: fp 0  0 fp cat9k-espbase.17.04.01.SPA.pkg
Replacement: fp 1  0 fp cat9k-espbase.17.04.01.SPA.pkg
Replacement: rp 0  0 guestshell cat9k-guestshell.17.04.01.SPA.pkg
Replacement: rp 0  0 rp_base cat9k-rpbase.17.04.01.SPA.pkg
Replacement: rp 0  0 rp_daemons cat9k-rpbase.17.04.01.SPA.pkg
Replacement: rp 0  0 rp_iosd cat9k-rpbase.17.04.01.SPA.pkg
Replacement: rp 0  0 rp_security cat9k-rpbase.17.04.01.SPA.pkg
Replacement: rp 0  0 rp_webui cat9k-webui.17.04.01.SPA.pkg
Replacement: rp 0  0 srdriver cat9k-srdriver.17.04.01.SPA.pkg
Replacement: rp 1  0 guestshell cat9k-guestshell.17.04.01.SPA.pkg
Replacement: rp 1  0 rp_base cat9k-rpbase.17.04.01.SPA.pkg
Replacement: rp 1  0 rp_daemons cat9k-rpbase.17.04.01.SPA.pkg
Replacement: rp 1  0 rp_iosd cat9k-rpbase.17.04.01.SPA.pkg
Replacement: rp 1  0 rp_security cat9k-rpbase.17.04.01.SPA.pkg
Replacement: rp 1  0 rp_webui cat9k-webui.17.04.01.SPA.pkg
Replacement: rp 1  0 srdriver cat9k-srdriver.17.04.01.SPA.pkg

Finished rollback impact
[R0] Finished Rollback on R0
Checking status of Rollback on [R0]
Rollback: Passed on [R0]
Finished Rollback

Install will reload the system now!
SUCCESS: install_rollback Fri 19 Mar 14:26:35 UTC 2021

Switch#
*Mar 19 14:26:35.880: %IOSXE-5-PLATFORM: R0/0: Mar 19 14:26:35 install_engine.sh:
%INSTALL-5-INSTALL_COMPLETED_INFO: Completed install rollback PACKAGE
*Mar 19 14:26:37.740: %IOSXE_OIR-6-REMCARD: Card (rp) removed from slot R1
*Mar 19 14:26:39.253: %IOSXE_OIR-6-INSCARD: Card (rp) inserted in slot R1 Mar 19 14:26:5
```

```
Initializing Hardware...

System Bootstrap, Version 17.3.1r
Compiled Tue 03/16/2021 10:19:23.77 by rel

Current image running:
Primary Rommon Image

Last reset cause: SoftwareResetTrig
C9400-SUP-1 platform with 16777216 Kbytes of main memory

Preparing to autoboot. [Press Ctrl-C to interrupt] 0
attempting to boot from [bootflash:packages.conf]

Located file packages.conf
#
################################################################################################################################


Warning: ignoring ROMMON var "BOOT_PARAM"
Warning: ignoring ROMMON var "USER_BOOT_PARAM"

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cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706
Cisco IOS XE Software, Version 17.04.01
Cisco IOS Software [Bengaluru], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.04.1,
 RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
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FIPS: Flash Key Check : Begin
FIPS: Flash Key Check : End, Not Found, FIPS Mode Not Enabled

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A summary of U.S. laws governing Cisco cryptographic products may be found at:
```

```
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

cisco C9410R (X86) processor (revision V00) with 868521K/6147K bytes of memory.
Processor board ID FXS2118Q1GM
312 Gigabit Ethernet interfaces
40 Ten Gigabit Ethernet interfaces
4 Forty Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
15958516K bytes of physical memory.
11161600K bytes of Bootflash at bootflash:.
1638400K bytes of Crash Files at crashinfo:.
0K bytes of WebUI ODM Files at webui:.

%INIT: waited 0 seconds for NVRAM to be available

Press RETURN to get started!
```

Step 5 Verify version

show version

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

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

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

```
Switch# show version
Cisco IOS XE Software, Version 17.04.01
Cisco IOS Software [Bengaluru], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.4.1,
 RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2019 by Cisco Systems, Inc.
<output truncated>
```

Upgrading the Complex Programmable Logic Device Version

You can trigger a CPLD version upgrade after upgrading the software image. During CPLD upgrade, the supervisor module automatically power cycles. This completes the CPLD upgrade process for the supervisor module but also causes traffic disruption. Therefore, auto-upgrade of CPLD is not supported. You must manually perform CPLD upgrade.

Upgrading the CPLD Version: High Availability Setup

Beginning in the privileged EXEC mode, complete the following steps:

Before you begin

When performing the CPLD version upgrade as shown, the **show platform** command can be used to confirm the CPLD version after the upgrade. This command output shows the CPLD version on all modules. However, the CPLD upgrade only applies to the supervisors, not the line cards. The line cards CPLD version is a cosmetic

display. After the upgrade is completed in a high availability setup, the supervisors will be upgraded, but the line cards will still show the old CPLD version. The version mismatch between the supervisors and line cards is expected until a chassis reload.

Procedure

Step 1 Upgrade the CPLD Version of the standby supervisor module

Enter the following commands on the active supervisor:

a) `Device# configure terminal`
b) `Device(config)# service internal`
c) `Device(config)# exit`
d) `Device# upgrade hw-programmable cpld filename bootflash: rp standby`

The standby supervisor module reloads automatically and the upgrade occurs in ROMMON. During the upgrade, the supervisor module automatically power cycles and remains inactive for approximately 5 minutes.

Wait until the standby supervisor module boots up and the SSO has formed (HOT) before you proceed to the next step; this takes approximately 17 minutes.

Step 2 Perform a switch over

a) `Device# redundancy force-switchover`

This causes the standby supervisor (on which you have completed the CPLD upgrade in Step 1) to become the active supervisor module

Step 3 Upgrade the CPLD Version of the new standby supervisor module

Repeat Step 1 and all its substeps.

Note
Do not operate an HA system with mismatched FPGA versions. FPGA version should be upgraded on both the supervisors one at a time.

Upgrading the CPLD Version: Cisco StackWise Virtual Setup

Beginning in the privileged EXEC mode, complete the following steps:

Procedure

Step 1 Upgrade the CPLD version of the standby supervisor module

Enter the following commands on the active supervisor:

a) `Device# configure terminal`
b) `Device(config)# service internal`
c) `Device(config)# exit`
d) `Device# upgrade hw-programmable cpld filename bootflash: switch standby r1`

Note
For the **upgrade hw-programmable cpld filename bootflash** command, configure with the **switch** keyword only. The other available keywords are not applicable when upgrading with Cisco StackWise Virtual.

Step 2 Reload the standby supervisor module

a) `Device# redundancy reload peer`

The upgrade occurs in ROMMON. During the upgrade, the supervisor module automatically power cycles and remains inactive for approximately 5 minutes.

Wait until the standby supervisor module boots up and the SSO has formed (HOT) before you proceed to the next step; this takes approximately 17 minutes.

Step 3 Perform a switch over

a) `Device# redundancy force-switchover`

This causes the standby supervisor (on which you have completed the CPLD upgrade in step 1) to become the active supervisor module

Step 4 Upgrade the CPLD version of the new standby supervisor module

Perfom Steps 1 and 2, including all substeps, on the new standby supervisor module

Upgrading the CPLD Version: Single Supervisor Module Setup

Beginning in the privileged EXEC mode, complete the following steps:

Procedure

Upgrade the CPLD version of the active supervisor module

Enter the following commands on the active supervisor:

a) `Device# configure terminal`
b) `Device(config)# service internal`
c) `Device(config)# exit`
d) `Device# upgrade hw-programmable cpld filename bootflash: rp active`

The supervisor module reloads automatically and the upgrade occurs in ROMMON. During the upgrade, the supervisor module automatically power cycles and remains inactive for approximately 5 minutes.

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 9400 Series Switches fall under these base or add-on license levels.

Base Licenses

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

Add-On Licenses

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

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

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

Available Licensing Models and Configuration Information

- Cisco IOS XE Fuji 16.8.x and earlier: RTU Licensing is the default and the only supported method to manage licenses.
- Cisco IOS XE Fuji 16.9.1 to Cisco IOS XE Amsterdam 17.3.1: Smart Licensing is the default and the only supported method to manage licenses.

  In the software configuration guide of the required release, see **System Management → Configuring Smart Licensing**.
- Cisco IOS XE Amsterdam 17.3.2a and later: Smart Licensing Using Policy, which is an enhanced version of Smart Licensing, is the default and the only supported method to manage licenses.

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

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

License Levels - Usage Guidelines

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

Smart Licensing Using Policy	Smart Licensing
• Perpetual: There is no expiration date for such a license. • 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. • Term: for a license level, and for a three, five, or seven year period. • 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 1: Permitted Combinations

	DNA Essentials	DNA Advantage
Network Essentials	Yes	No
Network Advantage	Yes[5]	Yes

[5] 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 these datasheets for Cisco Catalyst 9400 Series Switches:

https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9400-series-switches/nb-06-cat9400-ser-data-sheet-cte-en.html

https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9400-series-switches/nb-06-cat9600-series-line-data-sheet-cte-en.html

https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9400-series-switches/nb-06-cat9400-ser-sup-eng-data-sheet-cte-en.html

Limitations and Restrictions

- Control Plane Policing (CoPP)—The **show run** command does not display information about classes configured under `system-cpp policy`, when they are left at default values. Use the **show policy-map system-cpp-policy** or the **show policy-map control-plane** commands in privileged EXEC mode instead.
- Cisco TrustSec restrictions—Cisco TrustSec can be configured only on physical interfaces, not on logical interfaces.
- Flexible NetFlow limitations
  - You cannot configure NetFlow export using the Ethernet Management port (GigabitEthernet0/0).
  - You can not configure a flow monitor on logical interfaces, such as layer 2 port-channels, loopback, tunnels.
  - You can not configure multiple flow monitors of same type (ipv4, ipv6 or datalink) on the same interface for same direction.
- Hardware limitations—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.
- 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)
  - 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. This applies to both a single and dual supervisor module setup.
  - While performing ISSU from Cisco IOS XE Fuji 16.9.x to Cisco IOS XE Gibraltar 16.12.x, if **interface-id snmp-if-index**command is not configured with OSPFv3, packet loss can occur. Configure the **interface-id snmp-if-index** command either during the maintenance window or after isolating the device (by using maintenance mode feature) from the network before doing the ISSU.
  - 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.
- M.2 SATA SSD drive: With bootloader version 16.6.2r, you cannot access the M.2 SATA SSD drive at the ROMMON prompt (`rommon> dir disk0`). The system displays an error message indicating that the corresponding file system protocol is not found on the device. The only way to access the drive when on bootloader version 16.6.2r, is through the Cisco IOS prompt, after boot up.

- No service password recovery—With ROMMON versions R16.6.1r and R16.6.2r, the 'no service password-recovery' feature is not available.
- QoS restrictions
  - When configuring QoS queuing policy, the sum of the queuing buffer should not exceed 100%.
  - Policing and marking policy on sub interfaces is supported.
  - Marking policy on switched virtual interfaces (SVI) is supported.
  - QoS policies are not supported for port-channel interfaces, tunnel interfaces, and other logical interfaces.
  - Stack Queuing and Scheduling (SQS) drops CPU bound packets exceeding 1.4 Gbps.
- Redundancy—The supervisor module (hardware) supports redundancy. Software redundancy is supported starting with Cisco IOS XE Everest 16.6.2. However, the associated route processor redundancy (RPR) feature is not supported.

  Before performing a switchover, use the **show redundancy**, **show platform**, and **show platform software iomd redundancy** commands to ensure that both the SSOs have formed and that the IOMD process is completed.

  In the following sample output for the **show redundancy**, note that both the SSOs have formed.

```
Switch# show redundancy
Redundant System Information :
------------------------------
Available system uptime = 3 hours, 30 minutes
Switchovers system experienced = 2
Standby failures = 0
Last switchover reason = active unit removed

Hardware Mode = Duplex
Configured Redundancy Mode = sso
Operating Redundancy Mode = sso
Maintenance Mode = Disabled
Communications = Up

Current Processor Information :
------------------------------
Active Location = slot 3
Current Software state = ACTIVE
Uptime in current state = 2 hours, 57 minutes
Image Version = Cisco IOS Software [Fuji], Catalyst L3 Switch Software (CAT9K_IOSXE),
Version 16.8.1, RELEASE SOFTWARE (fc3)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2018 by Cisco Systems, Inc.
Compiled Tue 27-Mar-18 13:43 by mcpre
BOOT = bootflash:packages.conf;
CONFIG_FILE =
Configuration register = 0x1822

Peer Processor Information :
----------------------------
Standby Location = slot 4
Current Software state = STANDBY HOT
Uptime in current state = 2 hours, 47 minutes
Image Version = Cisco IOS Software [Fuji], Catalyst L3 Switch Software (CAT9K_IOSXE),
Version 16.8.1, RELEASE SOFTWARE (fc3)
Technical Support: http://www.cisco.com/techsupport
```

```
Copyright (c) 1986-2018 by Cisco Systems, Inc.
Compiled Tue 27-Mar-18 13:43 by mcpre
BOOT = bootflash:packages.conf;
CONFIG_FILE =
Configuration register = 0x1822
```

In the following sample output for the **show platform software iomd redundancy** command, note that both SSOs have formed and the `HA_STATE` field is `ready`.

```
Switch# show platform software iomd redundancy
Configured Redundancy Mode = sso
Operating Redundancy Mode = sso
Local RF state = ACTIVE
Peer RF state = STANDBY HOT

slot  PSM STATE   SPA INTF   HA_STATE HA_ACTIVE
   1     ready   started     ready    00:01:16
   2     ready   started     ready    00:01:22
   3     ready   started     ready    00:01:27 ***active RP
   4     ready   started     ready    00:01:27
<output truncated>
```

In the following sample output for the **show platform** command, note that the `State` for all the linecards and supervisor modules is `ok`. This indicates that the IOMD processes are completed.

```
Switch# show platform
Chassis type: C9407R

Slot      Type                State                 Insert time (ago)
--------- ------------------- --------------------- -----------------
1         C9400-LC-24XS       ok                    3d09h
2         C9400-LC-48U        ok                    3d09h
R0        C9400-SUP-1         ok, active            3d09h
R1        C9400-SUP-1         ok, standby           3d09h
P1        C9400-PWR-3200AC    ok                    3d08h
P2        C9400-PWR-3200AC    ok                    3d08h
P17       C9407-FAN           ok                    3d08h
<output truncated>
```

- 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.
- Uplink Symmetry—When a redundant supervisor module is inserted, we recommend that you have symmetric uplinks, to minimize packet loss during a switchover.

  Uplinks are said to be in symmetry when the same interface on both supervisor modules have the same type of transceiver module. For example, a TenGigabitEthernet interface with no transceiver installed operates at a default 10G mode; if the matching interface of the other supervisor has a 10G transceiver, then they are in symmetry. Symmetry provides the best SWO packet loss and user experience.

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

Caveats

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

Cisco Bug Search Tool

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

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

Open Caveats in Cisco IOS XE Bengaluru 17.5.x

Identifier	Description
CSCvv86775	9400 SVL damages the startup config on bootup when CSSM unreachable
CSCvx22097	interface running-config turns to default and no display in "show interface status"
CSCvx66769	Interface does not up if 100/full is set in certain port

Resolved Caveats in Cisco IOS XE Bengaluru 17.5.1

Identifier	Description
CSCvv34044	Need to stop the loop of POE devices flapping when power shedding is triggered
CSCvv42583	C9400 SVL linecard of standby in inserted(physical) status after boot up w/ single power module only
CSCvv60320	Cat9400: Line protocol flap observed in specific interface frequently on C9400-LC-24S/48S
CSCvw18565	GLC-GE-100FX Version 02 is not working with C9400-LC-48S (ACCELINK)
CSCvw67001	17.4.1 : With Macsec failover to standby switch port in portchannel causes multicast traffic drop.
CSCvx60124	Traffic failed if incoming interface MPLS and 2+ outgoing interfaces (ECMP) with recursive routing

Troubleshooting

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

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

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

Related Documentation

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

All support documentation for Cisco Catalyst 9400 Series Switches is at this URL: https://www.cisco.com/c/en/us/support/switches/catalyst-9400-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

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- 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.
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Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.

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