Release Notes for Cisco Catalyst 9300 Series Switches, Cisco IOS XE Bengaluru 17.6.x

First Published: 2021-08-02

Last Modified: 2024-04-06

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Introduction

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

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

Whats New In Cisco IOS XE Bengaluru 17.6.8

Hardware Features in Cisco IOS XE Bengaluru 17.6.8

There are no new hardware features in this release.

Software Features in Cisco IOS XE Bengaluru 17.6.8

There are no new software features in this release.

Whats New in Cisco IOS XE Bengaluru 17.6.7

Hardware Features in Cisco IOS XE Bengaluru 17.6.7

There are no new hardware features in this release.

Software Features in Cisco IOS XE Bengaluru 17.6.7

There are no new software features in this release.

Whats New in Cisco IOS XE Bengaluru 17.6.6a

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 Bengaluru 17.6.6

Hardware Features in Cisco IOS XE Bengaluru 17.6.6

There are no new hardware features in this release.

Software Features in Cisco IOS XE Bengaluru 17.6.6

There are no new software features in this release.

Whats New in Cisco IOS XE Bengaluru 17.6.5

Hardware Features in Cisco IOS XE Bengaluru 17.6.5

There are no new hardware features in this release.

Software Features in Cisco IOS XE Bengaluru 17.6.5

There are no new software features in this release.

Whats New in Cisco IOS XE Bengaluru 17.6.4

Hardware Features in Cisco IOS XE Bengaluru 17.6.4

There are no hardware features in this release.

Software Features in Cisco IOS XE Bengaluru 17.6.4

There are no new software features in this release.

Whats New in Cisco IOS XE Bengaluru 17.6.3

Hardware Features in Cisco IOS XE Bengaluru 17.6.3

There are no new hardware features in this release.

Software Features in Cisco IOS XE Bengaluru 17.6.3

There are no new software features in this release.

Whats New in Cisco IOS XE Bengaluru 17.6.2

Hardware Features in Cisco IOS XE Bengaluru 17.6.2

Feature Name	Description and Documentation Link
Cisco Catalyst 9300 SeriesSwitches (C9300X)	The following new models have been introduced in the series: • C9300X-48HX: Stackable 48 Multigigabit Ethernet (100 Mbps or 1/2.5/5/10 Gbps) UPOE+ports; PoE budget of 590 W with 1100 WAC power supply; supports StackPower+,StackWise-1T and C9300X-NM network modules. • C9300X-48TX: Stackable 48 Multigigabit Ethernet (100 Mbps or 1/2.5/5/10 Gbps) ports; 715WAC power supply; supports StackPower+, StackWise-1T and C9300X-NM network modules. For information about the hardware including installation and technical specifications, see the Cisco Catalyst 9300 Series Switches Hardware Installation Guide. For information about the software, see the Software Configuration Guide, Cisco IOS XE Bengaluru 17.6.x (Catalyst 9300 Switches).

Feature Name	Description and Documentation Link
Cisco Catalyst 9300 SeriesSwitches (C9300X)—Uplink Network Modules	The following new models have been introduced in the series: • C9300X-NM-4C: This module has four 40 GE/100 GE slots with a QSFP+ connector in eachslot. **Note** C9300X network modules are supported only on C9300X switches. For information about the hardware including installation and technical specifications, see the Cisco Catalyst 9300 Series Switches Hardware Installation Guide. For information about the software, see the Software Configuration Guide, Cisco IOS XE Bengaluru 17.6.x (Catalyst 9300 Switches).

Software Features in Cisco IOS XE Bengaluru 17.6.2

Feature Name	Description and License Level Information
Data MDT Support for L3 TRM	Introduces support for data multicast distribution tree (MDT) for Layer 3 Tenant Routed Multicast (TRM). Data MDTs are purpose built underlay MDTs to provide optimized forwarding in the MVPN and EVPN core. See BGP EVPN VXLAN → Configuring Tenant Routed Multicast. (Network Advantage)
Export Control Key for High Security (HSECK9)	Introduces support for the HSECK9 key on Cisco Catalyst 9300X Series Switches. The HSECK9 key is an export-controlled license, which authorizes the use of cryptographic features that are restricted by U.S. export control laws. If you want to use a restricted cryptographic feature, an HSECK9 key is required. The list of cryptographic features that require an HSECK9 key currently includes only the IPsec feature. An HSECK9 key is required for each UDI where you want to configure and use the cryptographic feature. A Smart Licensing Authorization Code (SLAC) must be installed for each HSECK9 key that you want to use. See System Management → Available Licenses and Smart Licensing Using Policy. (DNA Advantage)

Feature Name	Description and License Level Information
IPsec • IPsec Virtual Tunnel Interfaces • IPsec Dead Peer Detection Periodic Message Option • IPsec Anti-Replay Window • Encrypted Preshared Key • IKE for IPsec VPNs • Transform Sets for IKEv2 Proposals	IPsec is a framework of open standards developed by the Internet Engineering Task Force. It provides security for the transmission of sensitive information over unprotected networks such as the Internet. • IPsec Virtual Tunnel Interfaces: Provides a routable interface type for terminating IPsec tunnels and an easy to define protection between sites to form an overlay network. • IPsec Dead Peer Detection Periodic Message Option: Enables configuring the device to query the liveliness of its Internet Key Exchange (IKE) peers at regular intervals. • IPsec Anti-Replay Window: Enables the configuration of the window size of the anti-replay protection against an attacker duplicating encrypted packets. The default window size is 64 packets. Only a window size of 64 packets is supported. • Encrypted Preshared Key: Enables secure storage of plain text passwords in type 6 (encrypted) format in NVRAM. • IKE for IPsec VPNs: Enables configuring the Internet Key Exchange (IKE) protocol for basic IP Security (IPsec) Virtual Private Networks (VPNs). IKE is a key management protocol standard that is used in conjunction with the IPsec standard. • Transform sets for IKEv2 Proposals: Enables the configuration of transform sets for IKEV2 proposals. A transform set represents a certain combination of security protocols and algorithms. During the IPsec SA negotiation, the peers agree to use a particular transform set for protecting a particular data flow. (DNA Advantage with HSECK9 key enabled)
High Speed Stacking	The High Speed Stacking feature allows you to configure a homogenous stack of switches to run at the speed of 1Tbps. This feature is supported on the C9300X-48HX and the C9300X-48TX models of the Cisco Catalyst9300 Series Switches.

Whats New in Cisco IOS XE Bengaluru 17.6.1

Hardware Features in Cisco IOS XE Bengaluru 17.6.1

Feature Name	Description and Documentation Link
Cisco 10GBASE SFP+ modules	• Supported transceiver module product numbers: SFP-10G-T-X • Compatible switch models—C9300X-12Y, C9300X-24Y See Limitations and Restrictions, on page 37 → Hardware Limitations — Optics, before using this module. For information about the module, see Cisco 10GBASE SFP+ Modules Data Sheet. For information about device compatibility, see the Transceiver Module Group (TMG) Compatibility Matrix.

Feature Name	Description and Documentation Link
Cisco QSFP to SFP or SFP+ Adapter (QSA) Module	• Supported adapter module product number: CVR-QSFP-SFP10G This module offers 10 Gigabit Ethernet and 1 Gigabit Ethernet connectivity for Quad Small Form-Factor Pluggable (QSFP)-only platforms by converting a QSFP port into an SFP or SFP+ port. • Compatible switch models: All 9300X SKUs • Compatible network modules: All network modules supported on the C9300X SKUs. For information about the module, see Cisco 40GBASE QSFP Modules Data Sheet. For information about device compatibility, see the Transceiver Module Group (TMG) Compatibility Matrix.
Direct-Attach Cables for Cisco QSA Module CVR-QSFP-SFP10G	Supported cable product numbers: SFP-H10GB-CU4M For information about these cables, see Cisco 10GBASE SFP+ Modules Data Sheet. For information about device compatibility, see the Transceiver Module Group (TMG) Compatibility Matrix.

Software Features in Cisco IOS XE Bengaluru 17.6.1

Feature Name	Description and License Level Information
IEEE 1588v2 Precision Time Protocol (PTP) on SDA Fabric	Allows users to send PTP messages in Layer 2 and Layer 3 format in Software-Defined Access (SDA) fabric through overlay, using multicast protocols. (DNA Advantage)
IEEE 1588v2 PTP interoperability with MACsec and EtherChannel	Introduces support for PTP with MACsec and EtherChannel interface. (DNA Advantage)
IPv6 Explicit Null Label	Allows you to use IPv6 Explicit Null Label as a VPN label to exchange IPv6 reachability information over the MPLS core. The label has a value of 2. (Network Advantage)
LACP and PAGP over EoMPLS	Allows forwarding of Link Aggregation Control Protocol (LACP) and Port Aggregation Protocol (PAgP) packets over Ethernet-over-MPLS (EoMPLS) pseudowire in the port mode. (Network Advantage)
MLD Snooping over VPLS	Introduces support for Multicast Listener Discovery (MLD) Snooping over Virtual Private LAN Services (VPLS). This feature allows traffic to be forwarded over pseudowires that receive Internet Group Management Protocol (IGMP) or MLD reports from remote provider edge (PE) devices. (Network Advantage)

Feature Name	Description and License Level Information
MPLS Traffic Engineering • IP Explicit Address Exclusion • LSP Attributes • Bundled Interface • Configurable Path Calculation Metric for Tunnels	Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) provides an integrated approach to traffic engineering by incorporating capabilities of Layer 2 into Layer 3. • IP Explicit Address Exclusion: Provides a means to exclude a link or node from the path for MPLS TE label switched path (LSP). • LSP Attributes: Provides an LSP Attribute List feature and a Path Option for Bandwidth Override feature. • Bundled Interface: Enables MPLS Traffic Engineering tunnels over the bundled interfaces, EtherChannel and Gigabit EtherChannel. • Configurable Path Calculation Metric for Tunnels: Enables the user to control the metric used in path calculation for traffic engineering tunnels on a per-tunnel basis. (Network Advantage)
Programmability • Front-Panel Application Hosting • ThousandEyes BrowerBot • ThousandEyes Enterprise Agent • NETCONF Access from Guest Shell • YANG Data Models	The following programmability features are introduced in this release: • Front-Panel Application Hosting: Introduces support for two app-hosting ports on the Catalyst 9300X Series Switches. Use the **app-vnic AppGigabitEthernet port** command to specify the port to be used for app hosting. This feature is supported only on Cisco Catalyst 9300X Series Switches. (Network Essentials and Network Advantage) • ThousandEyes BrowerBot: Introduces support for BrowserBot with the ThousandEyes Enterprise Agent, for transaction scripting test. The BrowserBot allows you to enable customized JavaScript tests which mimic your web browser actions on the ThousandEyes Cloud Portal. (Network Essentials and Network Advantage) • ThousandEyes Enterprise Agent: ThousandEyes is a cloud-ready, enterprise network-monitoring tool that provides an end-to-end view across networks and services. This feature is supported only on Cisco Catalyst 9300X Series Switches. (DNA Advantage) • NETCONF Access from Guest Shell: Introduces support for accessing NETCONF from within the Guest Shell, to run Python scripts and invoke Cisco-custom package CLIs using the NETCONF protocol. (DNA Essentials and DNA Advantage) • 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/1761. 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.

Feature Name	Description and License Level Information
RadSec CoA over same tunnel	Introduces support for RadSec Change of Authorization (CoA) request reception and CoA response transmission over the same authentication channel. (Network Essentials and Network Advantage)
SCP improvement in large RTT scenario	Introduces support for secure copy (SCP) in large round trip time (RTT) settings by using the window-size variable option of the **ip ssh bulk-mode** command. (Network Essentials and Network Advantage)
WCCP - VRF support	Introduces support for virtual routing and forwarding (VRF) with Web Cache Communication Protocol (WCCP). (Network Advantage)
SSO Support for VRRPv3	Introduces support for Stateful Switchover (SSO) with Virtual Router Redundancy Protocol version 3 (VRRPv3). Use the **fhrp sso** command to enable this feature. (Network Essentials and Network Advantage)

New on the WebUI	
BFD Echo Mode for OSPFv3	Provides a mechanism to detect failures in the network between two adjacent switches, including the interfaces, data links, and forwarding planes. This feature can be configured globally, or per interface.
SDM Templates	Introduces device specific custom SDM templates that help to optimise the use of physical resources on the device.

Serviceability	
show consistency-checker	The command was modified. The following keywords were introduced: • **mcast**: Runs the consistency-checker on the multicast forwarding tables • **objects**: Runs the consistency-checker on objects • **run-id**: Runs the consistency-checker by run ID
show platform software fed switch punt packet-capture cpu-top-talker	The command was modified. **cpu-top-talker** keyword was introduced. It displays the occurrences of an attribute of a packet capture.
match device-type regex *regular-expression*	The command was modified. **regex** keyword was introduced. It allows you to define a regular expression for the device type.
protocol **tlv-type** *number* **value** {*string* | *integer* | {**regex** *regular-expression*}}	The command was modified. **regex** keyword was introduced. It allows you to define a regular expression for the Type-Length-Value (TLV).

Important Notes

- Unsupported Features, on page 9
- Complete List of Supported Features, on page 9
- Accessing Hidden Commands, on page 9
- Default Behaviour, on page 10

Unsupported Features

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

Complete List of Supported Features

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

Accessing Hidden Commands

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

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

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

- Category 1—Hidden commands in privileged or User EXEC mode. Begin by entering the **service internal** command to access these commands.
- Category 2—Hidden commands in one of the configuration modes (global, interface and so on). These commands do not require the **service internal** command.

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

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

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

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

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

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

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

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

Default Behaviour

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

Supported Hardware

Cisco Catalyst 9300 Series Switches—Model Numbers

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

Table 1: Cisco Catalyst 9300 Series Switches

Switch Model	Default License Level	Description
C9300-24H-A	Network Advantage	Stackable 24 10/100/1000 Mbps UPOE+ ports; PoE budget of 830 W with 1100 WAC power supply; supports StackWise-480 and StackPower
C9300-24H-E	Network Essentials	
C9300-24P-A	Network Advantage	Stackable 24 10/100/1000 PoE+ ports; PoE budget of 437W; 715 WAC power supply; supports StackWise-480 and StackPower
C9300-24P-E	Network Essentials	
C9300-24S-A	Network Advantage	Stackable 24 1G SFP ports; two power supply slots with 715 WAC power supply installed by default; supports StackWise-480 and StackPower.
C9300-24S-E	Network Essentials	

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

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

Table 2: Cisco Catalyst 9300L Series Switches

Switch Model	Default License Level	Description
C9300L-24T-4G-A	Network Advantage	Stackable 24x10/100/1000M Ethernet ports; 4x1G SFP fixed uplink ports; 350 WAC power supply; supports StackWise-320.
C9300L-24T-4G-E	Network Essentials	

Switch Model	Default License Level	Description
C9300L-24P-4G-A	Network Advantage	Stackable 24x10/100/1000M PoE+ ports; 4x1G SFP fixed uplink ports; PoE budget of 505W with 715 WAC power supply; supports StackWise-320.
C9300L-24P-4G-E	Network Essentials	
C9300L-24T-4X-A	Network Advantage	Stackable 24x10/100/1000M Ethernet ports; 4x10G SFP+ fixed uplink ports; 350 WAC power supply; supports StackWise-320.
C9300L-24T-4X-E	Network Essentials	
C9300L-24P-4X-A	Network Advantage	Stackable 24x10/100/1000M PoE+ ports; 4x10G SFP+ fixed uplink ports; PoE budget of 505W with 715 WAC power supply; supports StackWise-320.
C9300L-24P-4X-E	Network Essentials	
C9300L-48T-4G-A	Network Advantage	Stackable 48x10/100/1000M Ethernet ports; 4x1G SFP fixed uplink ports; 350 WAC power supply; supports StackWise-320.
C9300L-48T-4G-E	Network Essentials	
C9300L-48P-4G-A	Network Advantage	Stackable 48x10/100/1000M PoE+ ports; 4x1G SFP fixed uplink ports; PoE budget of 505W with 715 WAC power supply; supports StackWise-320.
C9300L-48P-4G-E	Network Essentials	
C9300L-48T-4X-A	Network Advantage	Stackable 48x10/100/1000M Ethernet ports; 4x10G SFP+ fixed uplink ports; 350 WAC power supply; supports StackWise-320.
C9300L-48T-4X-E	Network Essentials	
C9300L-48P-4X-A	Network Advantage	Stackable 48x10/100/1000M PoE+ ports; 4x10G SFP+ fixed uplink ports; PoE budget of 505W with 715 WAC power supply; supports StackWise-320.
C9300L-48P-4X-E	Network Essentials	
C9300L-48PF-4G-A	Network Advantage	Stackable 48 10/100/1000 Mbps PoE+ ports; 4x1G SFP+ fixed uplink ports; PoE budget of 890 W with 1100 WAC power supply; supports StackWise-320.
C9300L-48PF-4G-E	Network Essentials	

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

Table 3: Cisco Catalyst 9300X Series Switches

Switch Model	Default License Level	Description
C9300X-12Y-A	Network Advantage	Stackable 12 1/10/25 GE SFP28 downlink ports; 715 WAC power supply; supports StackPower+, StackWise-1T and C9300X-NM network modules.
C9300X-12Y-E	Network Essentials	
C9300X-24Y-A	Network Advantage	Stackable 24 1/10/25 GE SFP28 downlink ports; 715 WAC power supply; supports StackPower+, StackWise-1 and C9300X-NM network modules.
C9300X-24Y-E	Network Essentials	
C9300X-48HX-A	Network Advantage	Stackable 48 Multigigabit Ethernet (100 Mbps or 1/2.5/5/10 Gbps) UPOE+ports; PoE budget of 590W with 1100 WAC power supply; supports StackPower+, StackWise-1T and C9300X-NM network modules.
C9300X-48HX-E	Network Essentials	
C9300X-48TX-A	Network Advantage	Stackable 48 Multigigabit Ethernet (100 Mbps or 1/2.5/5/10 Gbps) ports; 715WAC powersupply; supports StackPower+, StackWise-1T and C9300X-NM network modules.
C9300X-48TX-E	Network Essentials	
C9300X-48HXN-E	Network Essentials	

Network Modules

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

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

Note

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

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

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

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

Optics Modules

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

Compatibility Matrix

To view the software compatibility information between Cisco Catalyst 9300 Series Switches, Cisco Identity Services Engine, and Cisco Prime Infrastructure, go to Cisco Catalyst 9000 Series Switches Software Version Compatibility Matrix.

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[1]	512 MB[2]	256	1280 x 800 or higher	Small

[1] We recommend 1 GHz
[2] We recommend 1 GB DRAM

Software Requirements

Operating Systems

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

Browsers

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

ROMMON Versions

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

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

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

Release	ROMMON Version (C9300 Models)	ROMMON Version (C9300L Models)	ROMMON Version (C9300X Models)	ROMMON Version (C9300LM Models)
Bengaluru 17.6.8	17.6.6r	17.6.1r[FC2]	17.5.1r	-
Bengaluru 17.6.7	17.6.6r	17.6.1r[FC2]	17.5.1r	-
Bengaluru 17.6.6a	17.6.6r	17.6.1r[FC2]	17.5.1r	-
Bengaluru 17.6.6	17.6.6r	17.6.1r[FC2]	17.5.1r	-
Bengaluru 17.6.5	17.6.6r	17.6.1r[FC2]	17.5.1r	-
Bengaluru 17.6.4	17.6.1r[FC2]	17.6.1r[FC2]	17.5.1r	-
Bengaluru 17.6.3	17.6.1r[FC2]	17.6.1r[FC2]	17.5.1r	-
Bengaluru 17.6.2	17.6.1r[FC2]	17.6.1r[FC2]	17.5.1r	-
Bengaluru 17.6.1	17.6.1r[FC2]	17.6.1r[FC2]	17.5.1r	-
Bengaluru 17.5.1	17.5.2r	17.4.1r[FC2]	17.5.1r	-
Bengaluru 17.4.1	17.4.1r	17.4.1r[FC2]	-	-
Amsterdam 17.3.8a	17.3.8r	17.8.1r[FC2]	-	-

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

Upgrading the Switch Software

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

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

Finding the Software Version

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

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

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

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

Software Images

Release	Image Type	File Name
Cisco IOS XE Bengaluru 17.6.8	CAT9K_IOSXE	cat9k_lite_iosxe.17.06.08.S
	No Payload Encryption (NPE)	cat9k_iosxe_npe.17.06.08.
Cisco IOS XE Bengaluru 17.6.7	CAT9K_IOSXE	cat9k_iosxe.17.06.07.SPA.
	No Payload Encryption (NPE)	cat9k_iosxe_npe.17.06.07.
Cisco IOS XE Bengaluru 17.6.6a	CAT9K_IOSXE	cat9k_iosxe.17.06.06a.SPA
	No Payload Encryption (NPE)	cat9k_iosxe_npe.17.06.06a
Cisco IOS XE Bengaluru 17.6.6	CAT9K_IOSXE	cat9k_iosxe.17.06.06.SPA.
	No Payload Encryption (NPE)	cat9k_iosxe_npe.17.06.06.
Cisco IOS XE Bengaluru 17.6.5	CAT9K_IOSXE	cat9k_iosxe.17.06.05.SPA.
	No Payload Encryption (NPE)	cat9k_iosxe_npe.17.06.05.
Cisco IOS XE Bengaluru 17.6.4	CAT9K_IOSXE	cat9k_iosxe.17.06.04.SPA.
	No Payload Encryption (NPE)	cat9k_iosxe_npe.17.06.04.
Cisco IOS XE Bengaluru 17.6.3	CAT9K_IOSXE	cat9k_iosxe.17.06.03.SPA.
	No Payload Encryption (NPE)	cat9k_iosxe_npe.17.06.03.
Cisco IOS XE Bengaluru 17.6.2	CAT9K_IOSXE	cat9k_iosxe.17.06.02.SPA.
	No Payload Encryption (NPE)	cat9k_iosxe_npe.17.06.02.
Cisco IOS XE Bengaluru 17.6.1	CAT9K_IOSXE	cat9k_iosxe.17.06.01.SPA.
	No Payload Encryption (NPE)	cat9k_iosxe_npe.17.06.01.

Upgrading the ROMMON

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

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

- Upgrading the ROMMON in the primary SPI flash device

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

- Upgrading the ROMMON in the golden SPI flash device

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

Note

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

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

Software Installation Commands

Summary of Software Installation Commands **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: **`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.

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

Summary of request platform software Commands	
`Device# request platform software package ?`	
clean	Cleans unnecessary package files from media
copy	Copies package to media
describe	Describes package content

Summary of request platform software Commands	
expand	Expands all-in-one package to media
install	Installs the package
uninstall	Uninstalls the package
verify	Verifies In Service Software Upgrade (ISSU) software package compatibility

Upgrading in Install Mode

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

Before you begin

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

When upgrading from ...	Use these commands...	To upgrade to...
Cisco IOS XE Everest 16.5.1a or Cisco IOS XE Everest 16.6.1	Only **request platform software** commands	Cisco IOS XE Bengaluru 17.6.x
Cisco IOS XE Everest 16.6.2 and all later releases	Either **install** commands or **request platform software** commands[3].	

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

The sample output in this section displays upgrade from Cisco IOS XE Bengaluru 17.5.1 to Cisco IOS XE Bengaluru 17.6.1 using **install** commands only.

Procedure

Step 1 Clean-up

install remove inactive

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

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

```
Switch# install remove inactive

install_remove: START Mon Jul 19 19:51:48 PDT 2021
Cleaning up unnecessary package files
Scanning boot directory for packages ... done.
Preparing packages list to delete ...
    cat9k-cc_srdriver.17.05.01.SPA.pkg
      File is in use, will not delete.
    cat9k-espbase.17.05.01.SPA.pkg
```

```
      File is in use, will not delete.
    cat9k-guestshell.17.05.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.05.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.05.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipbase.17.05.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.05.01.SPA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.05.01.SPA.pkg
      File is in use, will not delete.
    cat9k-webui.17.05.01.SPA.pkg
      File is in use, will not delete.
    cat9k-wlc.17.05.01.SPA.pkg
      File is in use, will not delete.
    packages.conf
      File is in use, will not delete.
  done.
The following files will be deleted:
[switch 1]:
/flash/cat9k-cc_srdriver.17.05.01.SPA.pkg
/flash/cat9k-espbase.17.05.01.SPA.pkg
/flash/cat9k-guestshell.17.05.01.SPA.pkg
/flash/cat9k-rpbase.17.05.01.SPA.pkg
/flash/cat9k-rpboot.17.05.01.SPA.pkg
/flash/cat9k-sipbase.17.05.01.SPA.pkg
/flash/cat9k-sipspa.17.05.01.SPA.pkg
/flash/cat9k-srdriver.17.05.01.SPA.pkg
/flash/cat9k-webui.17.05.01.SPA.pkg
/flash/cat9k-wlc.17.05.01.SPA.pkg
/flash/packages.conf

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

[switch 1]:
Deleting file flash:cat9k-cc_srdriver.17.05.01.SPA.pkg ... done.
Deleting file flash:cat9k-espbase.17.05.01.SPA.pkg ... done.
Deleting file flash:cat9k-guestshell.17.05.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpbase.17.05.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpboot.17.05.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipbase.17.05.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipspa.17.05.01.SPA.pkg ... done.
Deleting file flash:cat9k-srdriver.17.05.01.SPA.pkg ... done.
Deleting file flash:cat9k-webui.17.05.01.SPA.pkg ... done.
Deleting file flash:cat9k-wlc.17.05.01.SPA.pkg ... done.
Deleting file flash:packages.conf ... done.
SUCCESS: Files deleted.
--- Starting Post_Remove_Cleanup ---
Performing Post_Remove_Cleanup on all members
[1] Post_Remove_Cleanup package(s) on switch 1
[1] Finished Post_Remove_Cleanup on switch 1
Checking status of Post_Remove_Cleanup on [1]
Post_Remove_Cleanup: Passed on [1]
Finished Post_Remove_Cleanup

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

Step 2 Copy new image to flash

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

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

```
Switch# copy tftp://10.8.0.6/image/cat9k_iosxe.17.06.01.SPA.bin flash:
destination filename [cat9k_iosxe.17.06.01.SPA.bin]?
Accessing tftp://10.8.0.6/image/cat9k_iosxe.17.06.01.SPA.bin...
Loading /cat9k_iosxe.17.06.01.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 19 2021 10:18:11 -07:00 cat9k_iosxe.17.06.01.SPA.bin
11353194496 bytes total (8976625664 bytes free)
```

Step 3 Set boot variable

a) **no boot system**

Use this command to reset the boot variable. This command removes the startup system image specification. Otherwise, the switch may boot a previously configured boot image.

```
Switch(config)# no boot system
```

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

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

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

c) **no boot manual**

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

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

d) **write memory**

Use this command to save boot settings.

```
Switch# write memory
```

e) **show boot**

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

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

Boot Variables on next reload:
BOOT variable = flash:packages.conf;
```

```
Manual Boot = no
Enable Break = yes
Boot Mode = DEVICE
iPXE Timeout = 0
```

Step 4 Install image to flash

install add file activate commit

Use this command to install the image.

We recommend that you point to the source image on your TFTP server or the flash drive of the *active* switch, if you have copied the image to flash memory. If you point to an image on the flash or USB drive of a member switch (instead of the active), you must specify the exact flash or USB drive - otherwise installation fails. For example, if the image is on the flash drive of member switch 3 (flash-3): `Switch# install add file flash-3:cat9k_iosxe.17.06.01.SPA.bin activate commit`.

The following sample output displays installation of the Cisco IOS XE Bengaluru 17.6.1 software image in the flash memory:

```
Switch# install add file flash:cat9k_iosxe.17.06.01.SPA.bin activate commit

install_add_activate_commit: START Mon Jul 19 15:37:20 PDT 2021
install_add_activate_commit: Adding PACKAGE
install_add_activate_commit: Checking whether new add is allowed ....

--- Starting initial file syncing ---
[2]: Copying flash:cat9k_iosxe.17.06.01.SPA.bin from switch 2 to switch 1 3 4
[1 3 4]: Finished copying to switch 1 switch 3 switch 4
Info: Finished copying flash:cat9k_iosxe.17.06.01.SPA.bin to the selected switch(es)
Finished initial file syncing

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

Image added. Version: 17.06.01
install_add_activate_commit: Activating PACKAGE
Following packages shall be activated:
/flash/cat9k-wlc.17.06.01.SPA.pkg
/flash/cat9k-webui.17.06.01.SPA.pkg
/flash/cat9k-srdriver.17.06.01.SPA.pkg
/flash/cat9k-sipspa.17.06.01.SPA.pkg
/flash/cat9k-sipbase.17.06.01.SPA.pkg
/flash/cat9k-rpboot.17.06.01.SPA.pkg
/flash/cat9k-rpbase.17.06.01.SPA.pkg
/flash/cat9k-lni.17.06.01.SPA.pkg
/flash/cat9k-guestshell.17.06.01.SPA.pkg
/flash/cat9k-espbase.17.06.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.06.01.SPA.pkg
--- Starting Activate ---
Performing Activate on all members
  [1] Activate package(s) on switch 1
    --- Starting list of software package changes ---
```

```
  Old files list:
    Removed cat9k-cc_srdriver.17.05.01.SPA.pkg
    Removed cat9k-espbase.17.05.01.SPA.pkg
    Removed cat9k-guestshell.17.05.01.SPA.pkg
    Removed cat9k-rpbase.17.05.01.SPA.pkg
    Removed cat9k-rpboot.17.05.01.SPA.pkg
    Removed cat9k-sipbase.17.05.01.SPA.pkg
    Removed cat9k-sipspa.17.05.01.SPA.pkg
    Removed cat9k-srdriver.17.05.01.SPA.pkg
    Removed cat9k-webui.17.05.01.SPA.pkg
    Removed cat9k-wlc.17.05.01.SPA.pkg
  New files list:
    Added cat9k-cc_srdriver.17.06.01.SPA.pkg
    Added cat9k-espbase.17.06.01.SPA.pkg
    Added cat9k-guestshell.17.06.01.SPA.pkg
    Added cat9k-lni.17.06.01.SPA.pkg
    Added cat9k-rpbase.17.06.01.SPA.pkg
    Added cat9k-rpboot.17.06.01.SPA.pkg
    Added cat9k-sipbase.17.06.01.SPA.pkg
    Added cat9k-sipspa.17.06.01.SPA.pkg
    Added cat9k-srdriver.17.06.01.SPA.pkg
    Added cat9k-webui.17.06.01.SPA.pkg
    Added cat9k-wlc.17.06.01.SPA.pkg
  Finished list of software package changes
[1] Finished Activate on switch 1
[2] Activate package(s) on switch 2
  --- Starting list of software package changes ---
  Old files list:
    Removed cat9k-cc_srdriver.17.05.01.SPA.pkg
    Removed cat9k-espbase.17.05.01.SPA.pkg
    Removed cat9k-guestshell.17.05.01.SPA.pkg
    Removed cat9k-rpbase.17.05.01.SPA.pkg
    Removed cat9k-rpboot.17.05.01.SPA.pkg
    Removed cat9k-sipbase.17.05.01.SPA.pkg
    Removed cat9k-sipspa.17.05.01.SPA.pkg
    Removed cat9k-srdriver.17.05.01.SPA.pkg
    Removed cat9k-webui.17.05.01.SPA.pkg
    Removed cat9k-wlc.17.05.01.SPA.pkg
  New files list:
    Added cat9k-cc_srdriver.17.06.01.SPA.pkg
    Added cat9k-espbase.17.06.01.SPA.pkg
    Added cat9k-guestshell.17.06.01.SPA.pkg
    Added cat9k-lni.17.06.01.SPA.pkg
    Added cat9k-rpbase.17.06.01.SPA.pkg
    Added cat9k-rpboot.17.06.01.SPA.pkg
    Added cat9k-sipbase.17.06.01.SPA.pkg
    Added cat9k-sipspa.17.06.01.SPA.pkg
    Added cat9k-srdriver.17.06.01.SPA.pkg
    Added cat9k-webui.17.06.01.SPA.pkg
    Added cat9k-wlc.17.06.01.SPA.pkg
  Finished list of software package changes
[2] Finished Activate on switch 2
[3] Activate package(s) on switch 3
  --- Starting list of software package changes ---
  Old files list:
    Removed cat9k-cc_srdriver.17.05.01.SPA.pkg
    Removed cat9k-espbase.17.05.01.SPA.pkg
    Removed cat9k-guestshell.17.05.01.SPA.pkg
    Removed cat9k-rpbase.17.05.01.SPA.pkg
    Removed cat9k-rpboot.17.05.01.SPA.pkg
    Removed cat9k-sipbase.17.05.01.SPA.pkg
    Removed cat9k-sipspa.17.05.01.SPA.pkg
    Removed cat9k-srdriver.17.05.01.SPA.pkg
    Removed cat9k-webui.17.05.01.SPA.pkg
```

```
      Removed cat9k-wlc.17.05.01.SPA.pkg
    New files list:
      Added cat9k-cc_srdriver.17.06.01.SPA.pkg
      Added cat9k-espbase.17.06.01.SPA.pkg
      Added cat9k-guestshell.17.06.01.SPA.pkg
      Added cat9k-lni.17.06.01.SPA.pkg
      Added cat9k-rpbase.17.06.01.SPA.pkg
      Added cat9k-rpboot.17.06.01.SPA.pkg
      Added cat9k-sipbase.17.06.01.SPA.pkg
      Added cat9k-sipspa.17.06.01.SPA.pkg
      Added cat9k-srdriver.17.06.01.SPA.pkg
      Added cat9k-webui.17.06.01.SPA.pkg
      Added cat9k-wlc.17.06.01.SPA.pkg
    Finished list of software package changes
  [3] Finished Activate on switch 3
  [4] Activate package(s) on switch 4
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.05.01.SPA.pkg
      Removed cat9k-espbase.17.05.01.SPA.pkg
      Removed cat9k-guestshell.17.05.01.SPA.pkg
      Removed cat9k-rpbase.17.05.01.SPA.pkg
      Removed cat9k-rpboot.17.05.01.SPA.pkg
      Removed cat9k-sipbase.17.05.01.SPA.pkg
      Removed cat9k-sipspa.17.05.01.SPA.pkg
      Removed cat9k-srdriver.17.05.01.SPA.pkg
      Removed cat9k-webui.17.05.01.SPA.pkg
      Removed cat9k-wlc.17.05.01.SPA.pkg
    New files list:
      Added cat9k-cc_srdriver.17.06.01.SPA.pkg
      Added cat9k-espbase.17.06.01.SPA.pkg
      Added cat9k-guestshell.17.06.01.SPA.pkg
      Added cat9k-lni.17.06.01.SPA.pkg
      Added cat9k-rpbase.17.06.01.SPA.pkg
      Added cat9k-rpboot.17.06.01.SPA.pkg
      Added cat9k-sipbase.17.06.01.SPA.pkg
      Added cat9k-sipspa.17.06.01.SPA.pkg
      Added cat9k-srdriver.17.06.01.SPA.pkg
      Added cat9k-webui.17.06.01.SPA.pkg
      Added cat9k-wlc.17.06.01.SPA.pkg
    Finished list of software package changes
  [4] Finished Activate on switch 4
Checking status of Activate on [1 2 3 4]
Activate: Passed on [1 2 3 4]
Finished Activate

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

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

*Jul 19 15:47:28.095: %IOSXEBOOT-4-BOOTLOADER_UPGRADE: (local/local): Starting boot preupgrade
```

```
300+0 records in
300+0 records out
307200 bytes (307 kB, 300 KiB) copied, 0.315817 s, 973 kB/s

AppGigabitEthernet port has the latest Firmware

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

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


MCU UPGRADE COMPLETED!!...  SUCCESS: Upgrade_Service finished
Install will reload the system now!
SUCCESS: install_add_activate_commit  Mon Jul 19 15:52:33 PDT 2021
Switch#
Chassis 2 reloading, reason - Reload command
Jul 19 15:52:36.588: %PMAN-5-EXITACTION: F0/0: pvp: Process manager is exiting: reload fp
action requested
Jul 19 15:52:38.199: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: rp processes
 exit with reload switch code



Initializing Hardware......

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

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

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

```
###################################################################################################################################

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

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

Step 5 Verify installation

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

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

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

```
Switch# dir flash:*.pkg

Directory of flash:/
75140 -rw- 2012104     Mar 17 2021 09:52:41 -07:00 cat9k-cc_srdriver.17.05.01.SPA.pkg
475141 -rw- 70333380   Mar 17 2021 09:52:44 -07:00 cat9k-espbase.17.05.01.SPA.pkg
475142 -rw- 13256      Mar 17 2021 09:52:44 -07:00 cat9k-guestshell.17.05.01.SPA.pkg
475143 -rw- 349635524  Mar 17 2021 09:52:54 -07:00 cat9k-rpbase.17.05.01.SPA.pkg
475149 -rw- 24248187   Mar 17 2021 09:53:02 -07:00 cat9k-rpboot.17.05.01.SPA.pkg
475144 -rw- 25285572   Mar 17 2021 09:52:55 -07:00 cat9k-sipbase.17.05.01.SPA.pkg
475145 -rw- 20947908   Mar 17 2021 09:52:55 -07:00 cat9k-sipspa.17.05.01.SPA.pkg
475146 -rw- 2962372    Mar 17 2021 09:52:56 -07:00 cat9k-srdriver.17.05.01.SPA.pkg
475147 -rw- 13284288   Mar 17 2021 09:52:56 -07:00 cat9k-webui.17.05.01.SPA.pkg
475148 -rw- 13248      Mar 17 2021 09:52:56 -07:00 cat9k-wlc.17.05.01.SPA.pkg

491524 -rw- 25711568   Jul 19 2021 11:49:33 -07:00 cat9k-cc_srdriver.17.06.01.SPA.pkg
491525 -rw- 78484428   Jul 19 2021 11:49:35 -07:00 cat9k-espbase.17.06.01.SPA.pkg
491526 -rw- 1598412    Jul 19 2021 11:49:35 -07:00 cat9k-guestshell.17.06.01.SPA.pkg
491527 -rw- 404153288  Jul 19 2021 11:49:47 -07:00 cat9k-rpbase.17.06.01.SPA.pkg
491533 -rw- 31657374   Jul 19 2021 11:50:09 -07:00 cat9k-rpboot.17.06.01.SPA.pkg
491528 -rw- 27681740   Jul 19 2021 11:49:48 -07:00 cat9k-sipbase.17.06.01.SPA.pkg
491529 -rw- 52224968   Jul 19 2021 11:49:49 -07:00 cat9k-sipspa.17.06.01.SPA.pkg
491530 -rw- 31130572   Jul 19 2021 11:49:50 -07:00 cat9k-srdriver.17.06.01.SPA.pkg
491531 -rw- 14783432   Jul 19 2021 11:49:51 -07:00 cat9k-webui.17.06.01.SPA.pkg
491532 -rw- 9160       Jul 19 2021 11:49:51 -07:00 cat9k-wlc.17.06.01.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.17.06.01.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 19 2021 10:59:16 -07:00 packages.conf
516098 -rw- 7406 Jul 19 2021 10:58:08 -07:00 cat9k_iosxe.17.06.01.SPA.conf
11353194496 bytes total (8963174400 bytes free)
```

Step 6 **show version**

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

The following sample output of the **show version** command displays the Cisco IOS XE Bengaluru 17.6.1 image on the device:

```
Switch# show version
Cisco IOS XE Software, Version 17.06.01
Cisco IOS Software [Bengaluru], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.6.1,
 RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2021 by Cisco Systems, Inc.
<output truncated>
```

Downgrading in Install Mode

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

Before you begin

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

When downgrading from ...	Use these commands...	To downgrade to...
Cisco IOS XE Bengaluru 17.6.x	Either **install** commands or **request platform software** command[4].	Cisco IOS XE Bengaluru 17.5.x or earlier releases.

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

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

The sample output in this section shows downgrade from Cisco IOS XE Bengaluru 17.6.1 to Cisco IOS XE Bengaluru 17.5.1, using **install** commands.

Microcode Downgrade Prerequisite:

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

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

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

Procedure

Step 1 Clean-up

install remove inactive

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

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

```
Switch# install remove inactive

install_remove: START Mon Jul 19 19:51:48 PDT 2021
Cleaning up unnecessary package files
Scanning boot directory for packages ... done.
  Preparing packages list to delete ...
    cat9k-cc_srdriver.17.06.01.SSA.pkg
      File is in use, will not delete.
    cat9k-espbase.17.06.01.SSA.pkg
      File is in use, will not delete.
    cat9k-guestshell.17.06.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.06.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.06.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipbase.17.06.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.06.01.SSA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.06.01.SSA.pkg
      File is in use, will not delete.
    cat9k-webui.17.06.01.SSA.pkg
      File is in use, will not delete.
    cat9k-wlc.17.06.01.SSA.pkg
      File is in use, will not delete.
    packages.conf
      File is in use, will not delete.
```

```
  done.
SUCCESS: No extra package or provisioning files found on media. Nothing to clean.

SUCCESS: install_remove  Mon Jul 19 11:42:39 PDT 2021
```

Step 2 Copy new image to flash

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

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

```
Switch# copy tftp://10.8.0.6/image/cat9k_iosxe.17.05.01.SPA.bin flash:
Destination filename [cat9k_iosxe.17.05.01.SPA.bin]?
Accessing tftp://10.8.0.6//cat9k_iosxe.17.05.01.SPA.bin...
Loading /cat9k_iosxe.17.05.01.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 19 2021 13:35:16 -07:00 cat9k_iosxe.17.05.01.SPA.bin
11353194496 bytes total (9055866880 bytes free)
```

Step 3 Set boot variable

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

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

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

b) **no boot manual**

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

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

c) **write memory**

Use this command to save boot settings.

```
Switch# write memory
```

d) **show boot**

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

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

Boot Variables on next reload:
BOOT variable = flash:packages.conf;
```

```
Manual Boot = no
Enable Break = yes
Boot Mode = DEVICE
iPXE Timeout = 0
```

Step 4 Downgrade software image

install add file activate commit

Use this command to install the image.

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

The following example displays the installation of the Cisco IOS XE Bengaluru 17.5.1 software image to flash, by using the **install add file activate commit** command.

```
Switch# install add file flash:cat9k_iosxe.17.05.01.SPA.bin activate commit
install_add_activate_commit: START Mon Jul 19 14:59:46 PDT 2021
install_add_activate_commit: Adding PACKAGE
install_add_activate_commit: Checking whether new add is allowed ....

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

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

Image added. Version: 17.05.01.0.306
install_add_activate_commit: Activating PACKAGE
Following packages shall be activated:
/flash/cat9k-wlc.17.05.01.SPA.pkg
/flash/cat9k-webui.17.05.01.SPA.pkg
/flash/cat9k-srdriver.17.05.01.SPA.pkg
/flash/cat9k-sipspa.17.05.01.SPA.pkg
/flash/cat9k-sipbase.17.05.01.SPA.pkg
/flash/cat9k-rpboot.17.05.01.SPA.pkg
/flash/cat9k-rpbase.17.05.01.SPA.pkg
/flash/cat9k-guestshell.17.05.01.SPA.pkg
/flash/cat9k-espbase.17.05.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.05.01.SPA.pkg
--- Starting Activate ---
Performing Activate on all members
  [1] Activate package(s) on switch 1
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.06.01.SPA.pkg
```

```
    Removed cat9k-espbase.17.06.01.SPA.pkg
    Removed cat9k-guestshell.17.06.01.SPA.pkg
    Removed cat9k-lni.17.06.01.SPA.pkg
    Removed cat9k-rpbase.17.06.01.SPA.pkg
    Removed cat9k-rpboot.17.06.01.SPA.pkg
    Removed cat9k-sipbase.17.06.01.SPA.pkg
    Removed cat9k-sipspa.17.06.01.SPA.pkg
    Removed cat9k-srdriver.17.06.01.SPA.pkg
    Removed cat9k-webui.17.06.01.SPA.pkg
    Removed cat9k-wlc.17.06.01.SPA.pkg
  New files list:
    Added cat9k-cc_srdriver.17.05.01.SPA.pkg
    Added cat9k-espbase.17.05.01.SPA.pkg
    Added cat9k-guestshell.17.05.01.SPA.pkg
    Added cat9k-rpbase.17.05.01.SPA.pkg
    Added cat9k-rpboot.17.05.01.SPA.pkg
    Added cat9k-sipbase.17.05.01.SPA.pkg
    Added cat9k-sipspa.17.05.01.SPA.pkg
    Added cat9k-srdriver.17.05.01.SPA.pkg
    Added cat9k-webui.17.05.01.SPA.pkg
    Added cat9k-wlc.17.05.01.SPA.pkg
  Finished list of software package changes
[1] Finished Activate on switch 1
[2] Activate package(s) on switch 2
  --- Starting list of software package changes ---
  Old files list:
    Removed cat9k-cc_srdriver.17.06.01.SPA.pkg
    Removed cat9k-espbase.17.06.01.SPA.pkg
    Removed cat9k-guestshell.17.06.01.SPA.pkg
    Removed cat9k-lni.17.06.01.SPA.pkg
    Removed cat9k-rpbase.17.06.01.SPA.pkg
    Removed cat9k-rpboot.17.06.01.SPA.pkg
    Removed cat9k-sipbase.17.06.01.SPA.pkg
    Removed cat9k-sipspa.17.06.01.SPA.pkg
    Removed cat9k-srdriver.17.06.01.SPA.pkg
    Removed cat9k-webui.17.06.01.SPA.pkg
    Removed cat9k-wlc.17.06.01.SPA.pkg
  New files list:
    Added cat9k-cc_srdriver.17.05.01.SPA.pkg
    Added cat9k-espbase.17.05.01.SPA.pkg
    Added cat9k-guestshell.17.05.01.SPA.pkg
    Added cat9k-rpbase.17.05.01.SPA.pkg
    Added cat9k-rpboot.17.05.01.SPA.pkg
    Added cat9k-sipbase.17.05.01.SPA.pkg
    Added cat9k-sipspa.17.05.01.SPA.pkg
    Added cat9k-srdriver.17.05.01.SPA.pkg
    Added cat9k-webui.17.05.01.SPA.pkg
    Added cat9k-wlc.17.05.01.SPA.pkg
  Finished list of software package changes
[2] Finished Activate on switch 2
[3] Activate package(s) on switch 3
  --- Starting list of software package changes ---
  Old files list:
    Removed cat9k-cc_srdriver.17.06.01.SPA.pkg
    Removed cat9k-espbase.17.06.01.SPA.pkg
    Removed cat9k-guestshell.17.06.01.SPA.pkg
    Removed cat9k-lni.17.06.01.SPA.pkg
    Removed cat9k-rpbase.17.06.01.SPA.pkg
    Removed cat9k-rpboot.17.06.01.SPA.pkg
    Removed cat9k-sipbase.17.06.01.SPA.pkg
    Removed cat9k-sipspa.17.06.01.SPA.pkg
    Removed cat9k-srdriver.17.06.01.SPA.pkg
    Removed cat9k-webui.17.06.01.SPA.pkg
    Removed cat9k-wlc.17.06.01.SPA.pkg
```

```
    New files list:
      Added cat9k-cc_srdriver.17.05.01.SPA.pkg
      Added cat9k-espbase.17.05.01.SPA.pkg
      Added cat9k-guestshell.17.05.01.SPA.pkg
      Added cat9k-rpbase.17.05.01.SPA.pkg
      Added cat9k-rpboot.17.05.01.SPA.pkg
      Added cat9k-sipbase.17.05.01.SPA.pkg
      Added cat9k-sipspa.17.05.01.SPA.pkg
      Added cat9k-srdriver.17.05.01.SPA.pkg
      Added cat9k-webui.17.05.01.SPA.pkg
      Added cat9k-wlc.17.05.01.SPA.pkg
    Finished list of software package changes
  [3] Finished Activate on switch 3
  [4] Activate package(s) on switch 4
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.06.01.SPA.pkg
      Removed cat9k-espbase.17.06.01.SPA.pkg
      Removed cat9k-guestshell.17.06.01.SPA.pkg
      Removed cat9k-lni.17.06.01.SPA.pkg
      Removed cat9k-rpbase.17.06.01.SPA.pkg
      Removed cat9k-rpboot.17.06.01.SPA.pkg
      Removed cat9k-sipbase.17.06.01.SPA.pkg
      Removed cat9k-sipspa.17.06.01.SPA.pkg
      Removed cat9k-srdriver.17.06.01.SPA.pkg
      Removed cat9k-webui.17.06.01.SPA.pkg
      Removed cat9k-wlc.17.06.01.SPA.pkg
    New files list:
      Added cat9k-cc_srdriver.17.05.01.SPA.pkg
      Added cat9k-espbase.17.05.01.SPA.pkg
      Added cat9k-guestshell.17.05.01.SPA.pkg
      Added cat9k-rpbase.17.05.01.SPA.pkg
      Added cat9k-rpboot.17.05.01.SPA.pkg
      Added cat9k-sipbase.17.05.01.SPA.pkg
      Added cat9k-sipspa.17.05.01.SPA.pkg
      Added cat9k-srdriver.17.05.01.SPA.pkg
      Added cat9k-webui.17.05.01.SPA.pkg
      Added cat9k-wlc.17.05.01.SPA.pkg
    Finished list of software package changes
  [4] Finished Activate on switch 4
Checking status of Activate on [1 2 3 4]
Activate: Passed on [1 2 3 4]
Finished Activate

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

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

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

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

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

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

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

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

Install will reload the system now!
SUCCESS: install_add_activate_commit  Mon Jul 19 15:14:57 PDT 2021
stack-4mnyq#
Chassis 1 reloading, reason - Reload command
Jul 20 15:15:01.382: %PMAN-5-EXITACTION: F0/0: pvp: Process manager is exiting: reload fp
action requested
Jul 20 15:15:03.101: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: rp processes
 exit with reload switch code

Initializing Hardware......

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

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

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

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

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

Switch console is now available

Press RETURN to get started.
```

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

Step 5 Verify version

show version

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

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

The following sample output of the **show version** command displays the Cisco IOS XE Bengaluru 17.5.1 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>
```

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.

Licensing

For information about licenses required for the features available on Cisco Catalyst 9000 Series Switches, see Configuring Licenses on Cisco Catalyst 9000 Series Switches.

All licensing information relating to Cisco Catalyst 9000 Series Switches are available on this collection page: Cisco Catalyst 9000 Switching Family Licensing.

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.
- 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.

Scaling Guidelines

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

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

Limitations and Restrictions

- Control Plane Policing (CoPP)—The **show run** command does not display information about classes configured under `system-cpp policy`, when they are left at default values. Use the **show policy-map system-cpp-policy** or the **show policy-map control-plane** commands in privileged EXEC mode instead.
- Cisco TrustSec restrictions—Cisco TrustSec can be configured only on physical interfaces, not on logical interfaces.
- Flexible NetFlow limitations
  - You cannot configure NetFlow export using the Ethernet Management port (GigabitEthernet0/0).
  - You can not configure a flow monitor on logical interfaces, such as layer 2 port-channels, loopback, tunnels.
  - You can not configure multiple flow monitors of same type (ipv4, ipv6 or datalink) on the same interface for same direction.
- Hardware Limitations — Optics:
  - SFP-10G-T-X supports 100Mbps/1G/10G speeds based on auto negotiation with the peer device. 10Mbps speed is not supported and you cannot force speed settings from the transceiver.
  - PHY Loopback test is not supported on SFP-10G-T-X.
- 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.
- Stack Queuing and Scheduling (SQS) drops CPU bound packets exceeding 1.4 Gbps.

- Secure Shell (SSH)
  - Use SSH Version 2. SSH Version 1 is not supported.
  - When the device is running SCP and SSH cryptographic operations, expect high CPU until the SCP read process is completed. SCP supports file transfers between hosts on a network and uses SSH for the transfer.

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

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

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

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

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

    The following additional restriction applies to the C9300-24UB, C9300-24UXB, and C9300-48UB models of the series: These models can be stacked only with each other. They cannot be stacked with other C9300 SKUs.

  - Auto upgrade for a new member switch is supported only in the install mode.

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

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

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

- MACsec is not supported on Software-Defined Access deployments.

- VLAN Restriction—It is advisable to have well-defined segregation while defining data and voice domain during switch configuration and to maintain a data VLAN different from voice VLAN across the switch stack. If the same VLAN is configured for data and voice domains on an interface, the resulting high CPU utilization might affect the device.
- Wired Application Visibility and Control limitations:
  - NBAR2 (QoS and Protocol-discovery) configuration is allowed only on wired physical ports. It is not supported on virtual interfaces, for example, VLAN, port channel nor other logical interfaces.
  - NBAR2 based match criteria 'match protocol' is allowed only with marking or policing actions. NBAR2 match criteria will not be allowed in a policy that has queuing features configured.
  - 'Match Protocol': up to 256 concurrent different protocols in all policies.
  - NBAR2 and Legacy NetFlow cannot be configured together at the same time on the same interface. However, NBAR2 and wired AVC Flexible NetFlow can be configured together on the same interface.
  - Only IPv4 unicast (TCP/UDP) is supported.
  - AVC is not supported on management port (Gig 0/0)
  - NBAR2 attachment should be done only on physical access ports. Uplink can be attached as long as it is a single uplink and is not part of a port channel.
  - Performance—Each switch member is able to handle 2000 connections per second (CPS) at less than 50% CPU utilization. Above this rate, AVC service is not guaranteed.
  - Scale—Able to handle up to 20000 bi-directional flows per 24 access ports and per 48 access ports.
- YANG data modeling limitation—A maximum of 20 simultaneous NETCONF sessions are supported.
- Embedded Event Manager—Identity event detector is not supported on Embedded Event Manager.
- In the following conditions power is not shared to any switch on the stack even if there is enough power available:
  - 30W systems with PoE availability equal to or lesser than 32W.
  - 60W systems with PoE availability equal to or lesser than 62W.
  - 90W systems with PoE availability equal to or lesser than 92W.
- The File System Check (fsck) utility is not supported in install mode.
- Power supply index value (ciscoEnvMonSupplyStatusIndex) changes after the re-seating of power supply unit.
- 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 17.6.x

Identifier	Description
CSCvw99523	Dynamic power budget negotiation take too long in Ring stack-power on C9300

Resolved Caveats in Cisco IOS XE Bengaluru 17.6.8

Identifier	Description
CSCwi79020	Unexpected reload on C9K switch while running dot1X and device tracking
CSCwk44644	xFSU failure on stacked switches with SMU installed
CSCwh56886	C9300-48UXM (V03) may loop packets internally on tenGig downlinks on boot up in certain conditions.
CSCwj67804	C9300 - QSFP Accelink displaying 0.0 dBM in TX lane transceiver output
CSCwk57170	C9300L stack standby interface config removed when the standby added to stack

Resolved Caveats in Cisco IOS XE Bengaluru 17.6.7

Identifier	Description
CSCwi35710	Interface on C9300X-12Y/24Y remains down when configured with speed nonegotiate
CSCwf47727	9300: SNMP traps are not being generated when the device temperature crosses the threshold
CSCwh24851	Catalyst 9300L switch reports Stack Adapter Authentication Failure
CSCwe83840	C9300 power supply index value remain old value onetime
CSCwi37669	macro is getting pushed on closed and open auth ports when macro is global enabled
CSCwh94840	Interfaces stop forwarding traffic and not releasing QoS buffers

Identifier	Description
CSCwf10970	fed process crashing after AVB policy-map manipulation

Resolved Caveats in Cisco IOS XE Bengaluru 17.6.6a

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

Resolved Caveats in Cisco IOS XE Bengaluru 17.6.6

Identifier	Description
CSCwb76541	IOSd Crashes in "Call Home cert update" Process During Trustpool Download
CSCwd56049	Some C9300 mGig switches do not link up fully with certain 100Mbit end devices
CSCwd28734	Cat9k memory leak in pubd causes switch reload
CSCwd78924	Cat9300 | PoE Imax error detected for PD requesting 30W (non class 4 PDs)
CSCwe09745	Memory leak in Pubd when continuously trying to connect to remote peer
CSCwe18993	PoE devices connected to C9300-24P/48P series of switches losing power and staying in "down" state
CSCwe54047	C9300X booted as Standalone will Observe packet loss between Inter-ASIC Traffic Flows
CSCwe95691	PnP | Cat9k sends DHCP Discover with IP Source address 192.168.1.1 instead of 0.0.0.0
CSCwe36743	Segmentation Fault - Crash - SSH - When Changing AAA Group Configs

Resolved Caveats in Cisco IOS XE Bengaluru 17.6.5

Identifier	Description
CSCwc29733	C9300L uplink using GLC-SX-MMD not coming up
CSCwc88452	hw-module breakout command not working on C9300-48UN IOS version 17.6.3
CSCwd17488	Cat9300 Stack port remains down after standby power cord OIR
CSCwd39377	BGP timers not supported after upgrade
CSCwd39892	'no ip dhcp excluded-address' doesn't work post 17.2.1 release

Identifier	Description
CSCwd23435	C9300X with SFP-10G-T-X Copper transceiver has random packet loss with 1G speed after OIR
CSCwd99665	C9300L-48UXG-4X: TMPFS leak due to excessive logging to debug_logging_file

Resolved Caveats in Cisco IOS XE Bengaluru 17.6.4

Identifier	Description
CSCwa85199	High CPU Utilization and memory utilization by Smart Licensing Agent
CSCwa93776	Few ip phones connected to c9300-mGig switches unable to link up if "no mdix auto" is configured
CSCwb11032	Cat9300 : snmp get/set does not change the integer value.
CSCwb18988	some notification-type is missing for "snmp-server host xxx" command

Resolved Caveats in Cisco IOS XE Bengaluru 17.6.3

Identifier	Description
CSCvx95005	xFSU-C9300L, xFSU from 17.3.x to 17.6.1 fails and switch does normal upgrade traffic dwn for 200 sec
CSCvy08148	Multicast packets replicates twice after redundant switch take power off
CSCvy74900	Unexpected reload in HTTP CORE process
CSCvz51752	Randomly CTS enforcement not happening if multiple Tabs are used from the ISE to push COA
CSCvz60442	Unable to delete ip helper-address from the VLAN interface
CSCvz85562	Link may not come up between C9300 and C9500 at 25G with SFP-10/25G-CSR-S
CSCvz89443	BinOS: linux_iosd-imag_rp_0 memory leak with chasfs_ctx_int_t upon insert/remove events in PM
CSCwa07035	Linecard stops forwarding traffic
CSCwa10331	Cat9300-48UX ports may not link up when connected to peer Intel NIC I219
CSCwa17969	Cat9k | standby unexpected reload when no ip helper-address global is executed
CSCwa57656	C9300 Rcv-Err counter keeps increasing on connected to 2960 port
CSCwa67012	Error seen when deleting ip igmp snooping querier
CSCwa67435	Excessive btrace loggign of chasync.sh causes TMPFS exhaustion on stack of Switches.

Resolved Caveats in Cisco IOS XE Bengaluru 17.6.2

Identifier	Description
CSCvy40384	Cat9300L: 1G SFP uplink does not come up after reload
CSCvy98214	Flexlink+ preempt not work normally and cause traffic down

Resolved Caveats in Cisco IOS XE Bengaluru 17.6.1

There are no resolved caveats in this release.

Troubleshooting

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

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

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

Related Documentation

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

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

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

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

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