Release Notes for Cisco Catalyst 9500 Series Switches, Cisco IOS XE 17.14.x

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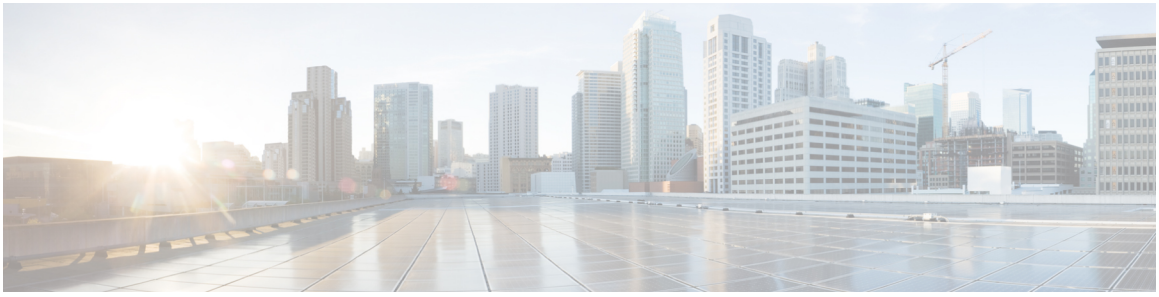
Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883



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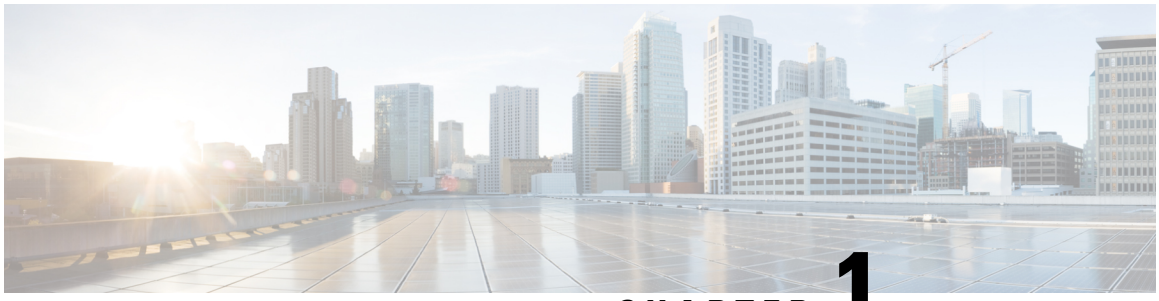


CHAPTER 1

Introduction

Cisco Catalyst 9500 Series Switches and Cisco Catalyst 9500 Series Switches - High Performance are Cisco's lead, fixed core and aggregation enterprise switching platforms. They have been purpose-built to address emerging trends of Security, IoT, Mobility, and Cloud.

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

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

Supported Hardware

Cisco Catalyst 9500 Series Switches—Model Numbers

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

Base PIDs are the model numbers of the switch.

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

Table 1: Cisco Catalyst 9500 Series Switches

Switch Model	Default License Level	Description
Base PIDs		

Switch Model	Default License Level	Description
C9500-12Q-E	Network Essentials	12 40-Gigabit Ethernet QSFP+ ports and two power supply slots
C9500-12Q-A	Network Advantage	
C9500-16X-E	Network Essentials	16 1/10-Gigabit Ethernet SFP/SFP+ ports and two power supply slots
C9500-16X-A	Network Advantage	
C9500-24Q-E	Network Essentials	24-Port 40-Gigabit Ethernet QSFP+ ports and two power supply slots
C9500-24Q-A	Network Advantage	
C9500-40X-E	Network Essentials	40 1/10-Gigabit Ethernet SFP/SFP+ ports and two power supply slots
C9500-40X-A	Network Advantage	
Bundled PIDs		
C9500-16X-2Q-E	Network Essentials	16 10-Gigabit Ethernet SFP+ port switch and a 2-Port 40-Gigabit Ethernet (QSFP) network module on uplink ports
C9500-16X-2Q-A	Network Advantage	
C9500-24X-E	Network Essentials	16 10-Gigabit Ethernet SFP+ port switch and an 8-Port 10-Gigabit Ethernet (SFP) network module on uplink ports
C9500-24X-A	Network Advantage	
C9500-40X-2Q-E	Network Essentials	40 10-Gigabit Ethernet SFP+ port switch and a 2-Port 40-Gigabit Ethernet (QSFP) network module on uplink ports
C9500-40X-2Q-A	Network Advantage	
C9500-48X-E	Network Essentials	40 10-Gigabit Ethernet SFP+ port switch and an 8-Port 10-Gigabit Ethernet (SFP) network module on uplink ports
C9500-48X-A	Network Advantage	

Table 2: Cisco Catalyst 9500 Series Switches-High Performance

Switch Model	Default License Level	Description
C9500-24Y4C-E	Network Essentials	24 SFP28 ports that support 1/10/25-GigabitEthernet connectivity, four QSFP uplink ports that support 100/40-GigabitEthernet connectivity; two power supply slots.
C9500-24Y4C-A	Network Advantage	
C9500-32C-E	Network Essentials	32 QSFP28 ports that support 40/100 GigabitEthernet connectivity; two power supply slots.
C9500-32C-A	Network Advantage	

Switch Model	Default License Level	Description
C9500-32QC-E	Network Essentials	32 QSFP28 ports, where you can have 24 ports that support 40-GigabitEthernet connectivity and 4 ports that support 100-GigabitEthernet connectivity, OR 32 ports that support 40-GigabitEthernet connectivity, OR 16 ports that support 100-GigabitEthernet connectivity; two power supply slots.
C9500-32QC-A	Network Advantage	
C9500-48Y4C-E	Network Essentials	48 SFP28 ports that support 1/10/25-GigabitEthernet connectivity; four QSFP uplink ports that supports up to 100/40-GigabitEthernet connectivity; two power supply slots.
C9500-48Y4C-A	Network Advantage	

Table 3: Cisco Catalyst 9500X Series Switches

Switch Model	Default License Level	Description
C9500X-28C8D-E	Network Essentials	28x100G QSFP28 and 8x400G QSFP-DD ports; two power supply slots
C9500X-28C8D-A	Network Advantage	
C9500X-60L4D-A	Network Advantage	60x50G SFP56 and 4x400G QSFP-DD ports; two power supply slots

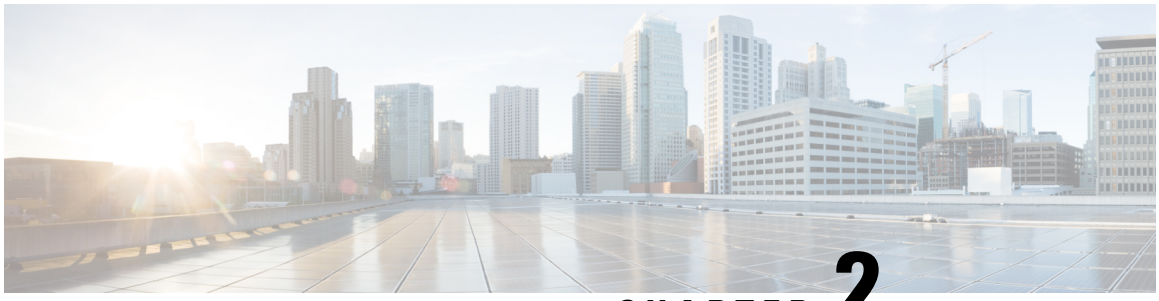
Network Modules

The following table lists optional network modules for uplink ports available with some configurations .

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

Optics Modules

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



CHAPTER 2

What's New in Cisco IOS XE 17.14.x

Hardware Features in Cisco IOS XE 17.14.1

Feature Name	Description
Cisco 25GBASE SFP28 Module	Supported transceiver module product number: • SFP-25G-ER-I Compatible switch models: • C9500-24Y4C • C9500-48Y4C For information about the module, see Cisco 25GBASE SFP28 Modules Data Sheet. For information about device compatibility, see the Transceiver Module Group (TMG) Compatibility Matrix.

Feature Name	Description
Cisco SFP Modules for Gigabit Ethernet Applications	Supported transceiver module product numbers: • SFP-1G-LH • SFP-1G-SX Compatible switch model: • C9500X-60L4D **Note** • A maximum of eight SFP-1G-LH and/or SFP-1G-SX transceiver modules are supported per system. • SFP-1G-LH or SFP-1G-SX transceiver modules with CVR or QSA adapter on QSFP front panel ports are not supported. For information about the module, see Cisco SFP Modules for Gigabit Ethernet Applications Data Sheet. For information about device compatibility, see the Transceiver Module Group (TMG) Compatibility Matrix.

Software Features in Cisco IOS XE 17.14.1

Feature Name	Applicable Models	Description
BGP EVPN VXLAN • **fast-detection** command • **show lisp instance** {**ipv4** | **ipv6** | **ethernet**} command	All Models	The following BGP EVPN VXLAN features are introduced in this release: • **fast-detection** command: **fast-detection** command enables SD-Access support for fast wireless roaming of end points. • **show lisp instance** {**ipv4** | **ipv6** | **ethernet**} command: The output of **show lisp instance** {**ipv4** | **ipv6** | **ethernet**} command is enhanced to display the affinity ID for the local device.
IP SLA Probe Configuration Modification Capability	All Models	Introduces support to reconfigure the parameters of a scheduled IP SLA session using the **configure replace** command.

Feature Name	Applicable Models	Description
mDNS Protocol Options	All Models	The mDNS protocol option is introduced in the **device sensor filter spec** command. This allows the user to apply the mDNS protocol TLV filter list to the device sensor output. The **device sensor filter list mdns** command is introduced to create a mDNS protocol filter containing a list of Type-Length-Value (TLV) fields that can be included or excluded in the device sensor output. The **tlv** command is introduced to configure the list of Type Length Value (TLVs) in mDNS protocol configuration mode.
NAT SSO support with StackWise Virtual	9500, 9500H	Introduces support for synchronization of the NAT state information across active and standby devices so that if the active device fails, the standby device can take over smoothly and update its software without interrupting In-Service Software Upgrade (ISSU).
OSPF Local RIB Path Limit Enhancement	All Models	The OSPF Local RIB Path Limit feature is designed to restrict the number of paths stored by OSPF in its Local RIB, offering enhanced control over network path selection. With the **maximum-paths** command enabled, the network administrators can now control the number of paths OSPF installs in the Local RIB for a specific prefix. (Network Essentials and Network Advantage)

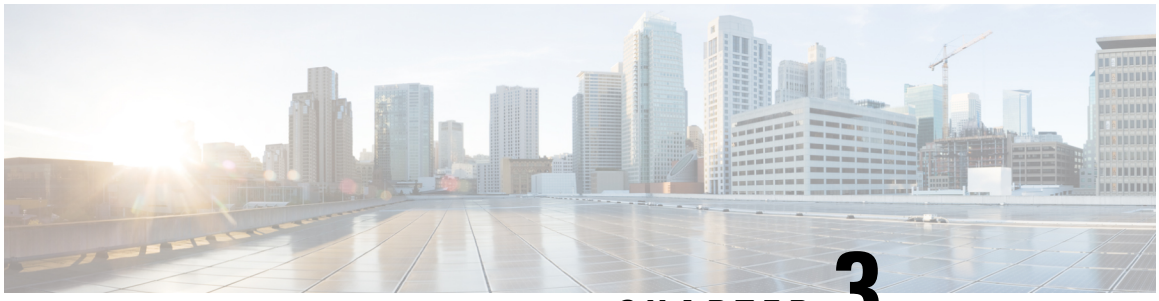
Feature Name	Applicable Models	Description
Programmability: • gNMI: Stream Subscriptions with on-Change Mode • gNMI: SubscribeResponse with sync_response • YANG Data Models • YANG Support for Mutiple Next-Hops	All Models	The following programmability features are introduced in this release: • gNMI: Stream Subscriptions with on-Change Mode: gNMI telemetry supports on-change subscriptions on the same set of models as other telemetry protocols. (Network Essentials) • gNMI: SubscribeResponse with sync_response: The sync_response is a boolean field that is part of the SubscribeResponse response message. The sync_response message is sent after the first update message. (Network Essentials) • YANG Data Models: For the list of Cisco IOS XE YANG models available with this release, navigate to: https://github.com/YangModels/yang/tree/main/vendor/cisco/xe/17141. (Network Advantage) • YANG Support for Mutiple Next-Hops: A new container is added under the next-hop-options choice node to retrieve all next-hops for a given route or prefix. Also, an uptime leaf node is added to provide the timestamp for each next hop. (Network Advantage)
show reload history command	All Models	The **show reload history** command is introduced. It displays the reason for device reload and its history.

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

Hardware and Software Behavior Changes in Cisco IOS XE 17.14.1

Behavior Change	Description
show crypto engine accelerator statistic command	The **show crypto engine accelerator statistic** command is now available on the C9500X-60YL4D model.

Behavior Change	Description
Switch Integrated Security Features (SISF) – Enhanced Throttling Limit for ARP Packets	In Cisco IOS XE Amsterdam 17.3.1, a throttling limit was introduced to mitigate high CPU utilization scenarios. In a five second window, a maximum of 50 ARP broadcast packets per source IP were processed by SISF. In Cisco IOS XE 17.14.1, this limit is increased to a maximum of 100 ARP broadcast packets for each source IP. All ARP (ARP REQUEST and ARP REPLY) packets are dropped if • the limit is reached and • the security level of the device tracking policy is set to guard
Telemetry: ios_event/platform_component_state_update service	If telemetry is enabled for ios_event/platform_component_state_update service, telemetry events are triggered upon online insertion and removal of SFP or QSFP interface. This is applicable to Cisco Catalyst 9500 Series Switches - High Performance and Cisco Catalyst 9500X Series Switches.



CHAPTER 3

Important Notes

Important Notes

- Unsupported Features: Cisco Catalyst 9500 Series Switches
- Unsupported Features: Cisco Catalyst 9500 Series Switches - High Performance
- Unsupported Features: Cisco Catalyst 9500X Series Switches
- Complete List of Supported Features
- Accessing Hidden Commands
- Default Behaviour—All Models
- Default Interface Behaviour on Cisco Catalyst 9500 Series Switches - High Performance and Cisco Catalyst 9500X Series Switches Only

Unsupported Features: Cisco Catalyst 9500 Series Switches

- **Cisco TrustSec**
  - Cisco TrustSec Network Device Admission Control (NDAC) on Uplinks
- **Interface and Hardware**
  - Network-Powered Lighting (including COAP Proxy Server, 2-event Classification)
  - Link Debounce Timer
  - M2 SATA Module
  - EnergyWise
- **IP Addressing Services**
  - GRE Redirection
  - VRRPv3: Object Tracking Integration

- GRE IPv6 Tunnels
- HSRP and Switch Stack
- HSRP Groups and Clustering

- **IP Multicast Routing**
  - Unicast over Point-to-Multipoint (P2MP)
  - Generic Routing Encapsulation (GRE)
  - Multicast over P2MP GRE

- **IP Routing**
  - PIM Bidirectional Forwarding Detection (PIM BFD), PIM Snooping
  - Border Gateway Protocol (BGP) Additional Paths
  - OSPF NSR
  - OSPFv3 NSR
  - OSPFv2 Loop-Free Alternate IP Fast Reroute

- **Layer 2**
  - Audio Engineering Society: AES67 Timing Profile
  - Q-in-Q on a Trunk Port

- **Multiprotocol Label Switching**
  - Hierarchical VPLS with MPLS Access

- **Network Management**
  - Flexible NetFlow
    - NetFlow v5 Export Protocol
    - 4-byte (32-bit) AS Number Support
    - TrustSec NetFlow IPv4 Security Group Access Control List (SGACL) Deny and Drop Export

- **Quality of Service**
  - Classification (Layer 3 Packet Length, Time-to-Live (TTL))
  - Per queue policer support
  - L2 Miss

- **Security**
  - Lawful Intercept

- **VLAN**

- QinQ VLAN Mapping

Unsupported Features: Cisco Catalyst 9500 Series Switches - High Performance

- **High Availability**
  - Switch Stacks
- **Interface and Hardware**
  - EnergyWise
- **IP Multicast Routing**
  - IPv6 Multicast and IPv6 Multicast over Point-to-Point GRE
- **IP Routing**
  - Unicast and Multicast over Point-to-Multipoint GRE
  - BFD Multihop Support for IPv4 Static Routes
- **Layer 2**
  - Flexlink+
  - VLAN Load Balancing for FlexLink+
  - Preemption for VLAN Load Balancing
  - FlexLink+ Dummy Multicast Packets
  - Resilient Ethernet Protocol
- **Multiprotocol Label Switching**
  - MPLS Label Distribution Protocol (MPLS LDP) VRF-Aware Static Labels
  - VPLS Routed Pseudowire IRB(v4) Unicast
- **Network Management**
  - Cisco Application Visibility and Control (AVC)
- **Security**
  - Wake-on-LAN (WoL)
- **System Management**
  - Network-Based Application Recognition (NBAR) and Next-Generation NBAR (NBAR2)

Unsupported Features: Cisco Catalyst 9500X Series Switches

- **BGP EVPN VXLAN**

- Layer 2 Broadcast, Unknown Unicast, and Multicast (BUM) Traffic Forwarding using Ingress Replication
- BUM Traffic Rate Limiting
- Dynamic ARP inspection (DAI) and DHCP Rogue Server Protection
- EVPN VXLAN Centralized Default Gateway
- VXLAN-Aware Flexible Netflow
- MPLS Layer 3 VPN Border Leaf Handoff
- MPLS Layer 3 VPN Border Spine Handoff
- VPLS over MPLS Border Leaf Handoff
- VPLS over MPLS Border Spine Handoff
- Interworking of Layer 3 TRM with MVPN Networks for IPv4 Traffic
- Private VLANs (PVLANs)
- BGP EVPN VXLAN with IPv6 in the Underlay (VXLANv6)
- EVPN Microsegmentation
- VRF aware NAT64 EVPN Fabric
- EVPN VXLAN Multi-Homing

- **Cisco TrustSec**
  - Cisco TrustSec Security Association Protocol (SAP)
  - Cisco TrustSec SGT Caching

- **High Availability**
  - Secure StackWise Virtual
  - Cisco Nonstop Forwarding with Stateful Switchover
  - Graceful Insertion and Removal
  - Switch Stacks

- **Interface and Hardware**
  - Link Debounce Timer
  - EnergyWise

- **IP Addressing Services**
  - Next Hop Resolution Protocol (NHRP)
  - Network Address Translation (NAT)
  - Gateway Load Balancing Protocol (GLBP)

- Web Cache Communication Protocol (WCCP)
- Switchport Block Unknown Unicast and Switchport Block Unknown Multicast
- Message Session Relay Protocol (MSRP)
- TCP MSS Adjustment
- GRE IPv6 Tunnels
- IP Fast Reroute (IP FRR)

- **IP Multicast Routing**
  - Multicast Routing over GRE Tunnel
  - Multicast VLAN Registration (MVR) for IGMP Snooping
  - IPv6 Multicast over Point-to-Point GRE
  - IGMP Proxy
  - Bidirectional PIM
  - Multicast VPN
  - MVPNv6
  - mVPN Extranet Support
  - MLDP-Based VPN
  - PIM Snooping
  - PIM Dense Mode

- **IP Routing**
  - OSPFv2 Loop-Free Alternate IP Fast Reroute
  - EIGRP Loop-Free Alternate IP Fast Reroute
  - Policy-Based Routing (PBR) for IPv6
  - VRF-Aware PBR
  - PBR for Object-Group Access Control List (OGACL) Based Matching
  - Multipoint GRE
  - Web Cache Communication Protocol (WCCP)

- **Layer 2**
  - Multi-VLAN Registration Protocol (MVRP)
  - Loop Detection Guard
  - Cross-Stack UplinkFast
  - Optional Spanning Tree Protocol

- Precision Time Protocol (PTP)
- Audio Engineering Society: AES67 Timing Profile
- PTPv2 on Cisco StackWise Virtual
- Fast UniDirectional Link Detection
- UniDirectional Link Detection (UDLD)
- IEEE 802.1Q Tunneling
- One-to-One VLAN Mapping
- Selective Q-in-Q
- Q-in-Q on a Trunk Port
- Audio Video Bridging (AVB): IEEE 802.1BA
- Flexlink+
- VLAN Load Balancing for FlexLink+
- Preemption for VLAN Load Balancing
- FlexLink+ Dummy Multicast Packets
- Resilient Ethernet Protocol

- **Multiprotocol Label Switching**
  - LAN MACsec over Multiprotocol Label Switching (MPLS)
  - BGP Multipath Load Sharing for Both eBGP and iBGP in an MPLS VPN
  - MPLS over GRE
  - MPLS Layer 2 VPN over GRE
  - MPLS Layer 3 VPN over GRE
  - Virtual Private LAN Service (VPLS)
  - VPLS Autodiscovery, BGP-based
  - VPLS Layer 2 Snooping: Internet Group Management Protocol or Multicast Listener Discovery
  - Hierarchical VPLS with Multiprotocol Label Switching Access
  - VPLS Routed Pseudowire IRB(v4) Unicast
  - MPLS VPN Inter-AS Options (options B and AB)
  - MPLS VPN Inter-AS IPv4 BGP Label Distribution
  - Seamless Multiprotocol Label Switching

- **Network Management**
  - Flow-Based Switch Port Analyser

- RSPAN
- FRSPAN
- Egress Netflow
- IP Aware MPLS Netflow
- NetFlow Version 5

- **Quality of Service**
  - QoS Ingress Shaping
  - VPLS QoS
  - Microflow Policers
  - Per VLAN Policy and Per Port Policer
  - Mixed COS/DSCP Threshold in a QoS LAN-queueing Policy
  - Easy QoS: match-all Attributes
  - Classify: Packet Length
  - Class-Based Shaping for DSCP/Prec/COS/MPLS Labels
  - CoPP Microflow Policing
  - Egress Policing
  - Egress Microflow Destination-Only Policing
  - Ethertype Classification
  - Packet Classification Based on Layer3 Packet-Length
  - PACLs
  - Per IP Session QoS
  - Per Queue Policer
  - QoS Data Export
  - QoS L2 Missed Packets Policing

- **Security**
  - Lawful Intercept
  - MACsec:
    - Switch-to-host MACsec
    - Cisco TrustSec Security Association Protocol
    - Fallback Key
    - MACsec EAP-TLS

- MAC ACLs
- Port ACLs
- VLAN ACLs
- IP Source Guard
- IPv6 Source Guard
- Web-based Authentication
- Port Security
- Weighted Random Early Detection mechanism (WRED) Based on DSCP, PREC, or COS
- IEEE 802.1x Port-Based Authentication
- Dynamic ARP Inspection
- Dynamic ARP Inspection Snooping

- **System Management**
  - Unicast MAC Address Filtering
- **VLAN**
  - Wired Dynamic PVLAN
  - Private VLANs

Complete List of Supported Features

For the complete list of features supported on a platform, see Cisco Feature Navigator.

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

- CAT9500: to see all the features supported on the C9500-12Q, C9500-16X, C9500-24Q, C9500-40X models
- CAT9500 High Performance: to see all the features supported on the C9500-24Y4C, C9500-32C, C9500-32QC, and C9500-48Y4C models
- CAT9500X: to see all the features supported on the C9500X-28C8D and C9500X-60L4D models

Accessing Hidden Commands

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

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

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

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

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

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

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

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

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

Apart from categories 1 and 2, there are other internal commands displayed on the CLI, for which the system does *not* generate the `%PARSER-5-HIDDEN` syslog message.

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

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

Default Behaviour—All Models

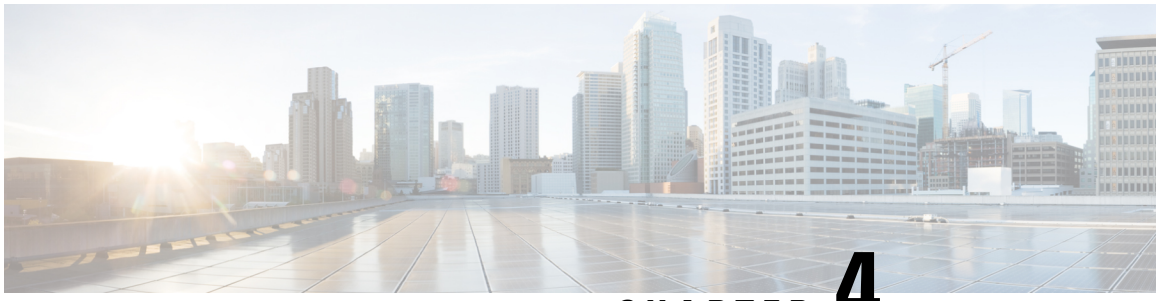
Beginning from Cisco IOS XE Gibraltar 16.12.5 and later, do not fragment bit (DF bit) in the IP packet is always set to 0 for all outgoing RADIUS packets (packets that originate from the device towards the RADIUS server).

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

From Cisco IOS XE Gibraltar 16.11.1, the default interface for all High Performance and 9500X models in the series changes from Layer 3 to Layer 2. Use the **no switchport** command to change the Layer 2 interface into Layer 3 mode.

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

Important Notes



CHAPTER 4

Compatibility Matrix and Web UI System Requirements

Compatibility Matrix

To view the software compatibility information between Cisco Catalyst 9500 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

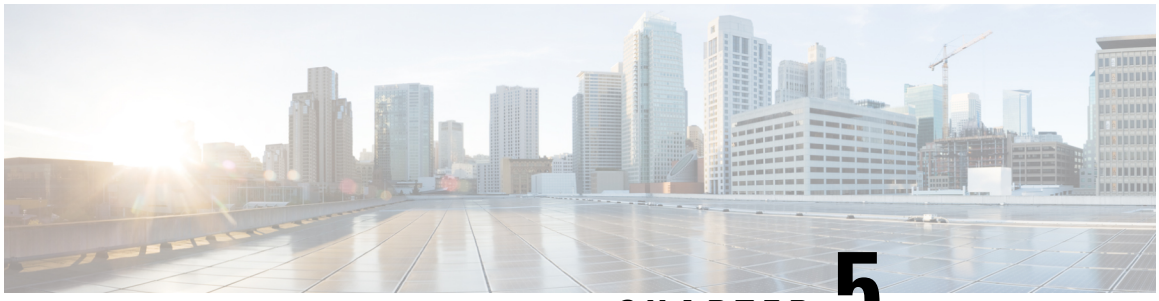
Operating Systems

- 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)



CHAPTER 5

Licensing and Scaling Guidelines

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.

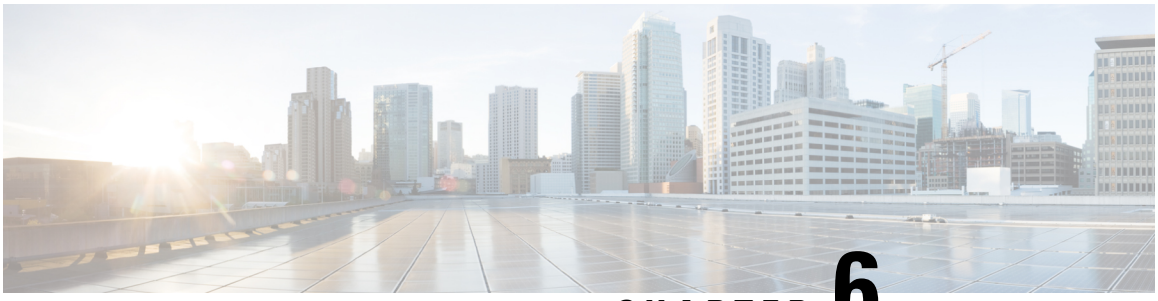
Note On the Cisco Catalyst 9500 Series Switches-High Performance, it is from Cisco IOS XE Fuji 16.8.1a to Cisco IOS XE Amsterdam 17.3.1.

- 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 9500 Series Switches datasheet at:

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



CHAPTER 6

Limitations and Restrictions

Limitations and Restrictions

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

- Auto negotiation

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

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

- Control Plane Policing (CoPP)—The **show run** command does not display information about classes configured under `system-cpp policy`, when they are left at default values. Use the **show policy-map system-cpp-policy** or the **show policy-map control-plane** commands in privileged EXEC mode instead.

- Cisco StackWise Virtual

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

  - On Cisco Catalyst 9500 Series Switches - High Performance,

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

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

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

- Cisco TrustSec restrictions—Cisco TrustSec can be configured only on physical interfaces, not on logical interfaces.
- Flexible NetFlow limitations
  - You cannot configure NetFlow export using the Ethernet Management port (GigabitEthernet0/0).
  - You can not configure a flow monitor on logical interfaces, such as layer 2 port-channels, loopback, tunnels.
  - You can not configure multiple flow monitors of same type (ipv4, ipv6 or datalink) on the same interface for same direction.
- Hardware Limitations—Optics:
  - 1G with Cisco QSA Module (CVR-QSFP-SFP10G) is not supported on the uplink ports of the C9500-24Y4C and C9500-48Y4C models.
  - Installation restriction for SFP-10G-T-X module on C9500-24Y4C and C9500-48Y4C— Only eight SFP-10G-T-X modules are supported at a time. If you insert a ninth SFP-10G-T-X module in a lower numbered port than the existing active eight SFP-10G-T-X module, a reload will bring up the ninth transceiver and moves the last existing port with SFP-10G-T-X module to error disabled state. This happens due to the order of sequence ports link bring up where the lower numbered port brings up the link first. This limitation applies in standalone and in Cisco StackWise Virtual setup with two C9500-24Y4C or C9500-48Y4C switches. Each switch can have eight SFP-10G-T-X modules.

    The following error displays on the console if you insert a ninth module with eight active modules:

    ```
    "%IOMD_ETHER_GEIM-4-MAX_LIMIT_XCVR: R0/0: iomd: Number of
    SFP-10G-T-X that can be supported has reached the max limit of 8,
     transceiver is err-disabled. Unplug the transceiver in interface
     TwentyFiveGigE1/0/29
    ```

  - SFP-10G-T-X supports 100Mbps/1G/10G speeds based on auto negotiation with the peer device. You cannot force speed settings from the transceiver.
- Hardware Limitations:
  - Use the MODE button to switch-off the beacon LED.
  - All port LED behavior is undefined until interfaces are fully initialized.
  - The following limitations apply to Cisco QSA Module (CVR-QSFP-SFP10G) when Cisco 1000Base-T Copper SFP (GLC-T) or Cisco 1G Fiber SFP Module for Multimode Fiber are plugged into the QSA module:
    - 1G Fiber modules over QSA do not support autonegotiation. Auto-negotiation should be disabled on the far-end devices.
    - Although visible in the CLI, the command [**no**] **speed nonegotiate** is not supported with 1G Fiber modules over QSA.

    - Only GLC-T over QSA supports auto-negotiation.
    - GLC-T supports only port speed of 1000 Mb/s over QSA. Port speeds of 10/100-Mb/s are not supported due to hardware limitation.

  - When you use Cisco QSFP-4SFP10G-CUxM Direct-Attach Copper Cables, autonegotiation is enabled by default. If the other end of the line does not support autonegotation, the link does not come up.
  - Autonegotiation is not supported on HundredGigabitEthernet1/0/49 to HundredGigabitEthernet1/0/52 uplink ports of the C9500-48Y4C models, and HundredGigabitEthernet1/0/25 to HundredGigabitEthernet1/0/28 uplink ports of the C9500-24Y4C models. Disable autonegotiation on the peer device if you are using QSFP-H40G-CUxx and QSFP-H40G-ACUxx cables.
  - For QSFP-H100G-CUxx cables, the C9500-48Y4C and C9500-24Y4C models support the cables only if both sides of the connection are either C9500-48Y4C or C9500-24Y4C.
  - For C9500-32C model, the power supply with serial number starting with POG has two fans and the power supply with serial number starting with QCS has a single fan. When you use **show environment status** command, the fan status of one fan is always displayed as `N/A` when the power supply with single fan is installed into the power supply slot. See Configuring Internal Power Supplies.

- 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)
  - Within a major release train (16.x or 17.x or 18.x), ISSU is supported between any two EMs that are released not more than 3 years apart.
  - Within a major release train, ISSU is supported from:
    - Any EM (EM1, EM2, EM3) to another EM (EM1, EM2, EM3)

      Example: 16.9.x to 16.12.x, 17.3.x to 17.6.x, 17.6.x to 17.9.x
    - Any release within the same EM

      Example: 16.9.2 to 16.9.3 or 16.9.4 or 16.9.x, 16.12.1 to 16.12.2 or 16.12.3 or 16.12.x, 17.3.1 to 17.3.2 or 17.3.3 or 17.3.x
  - Between major release trains, ISSU is not supported from:
    - An EM of a major release train to an EM of another major release train

      Example: 16.x.x to 17.x.x or 17.x.x to 18.x.x is not supported
    - An SM to EM or EM to SM

      Example: 16.10.x or 16.11.x to 16.12.x is not supported
  - ISSU is not supported on engineering special releases and .s (or similar) images.

- ISSU is not supported between Licensed Data Payload Encryption (LDPE) and No Payload Encryption (NPE) Cisco IOS XE software images.
- ISSU downgrades are not supported.
- On Cisco Catalyst 9500 Series Switches - High Performance (C9500-24Y4C, C9500-32C, C9500-32QC, and C9500-48Y4C), ISSU with Cisco StackWise Virtual is supported only starting from Cisco IOS XE Gibraltar 16.12.1. Therefore, ISSU upgrades can be performed only starting from this release to a later release.
- While ISSU allows you to perform upgrades with zero downtime, we recommend you to do so during a maintenance window only.
- If a new feature introduced in a software release requires a change in configuration, the feature should not be enabled during ISSU.
- If a feature is not available in the downgraded version of a software image, the feature should be disabled before initiating ISSU.

- QoS restrictions

  The following restrictions apply to UADP-powered Catalyst 9500 and Catalyst 9500 High Performance models only.

  - 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.

- 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).

  This limitation is removed from Cisco IOS XE Cupertino 17.9.1. If you configure a hostname and disable hostname privacy (**no license smart privacy hostname** global configuration command), hostname

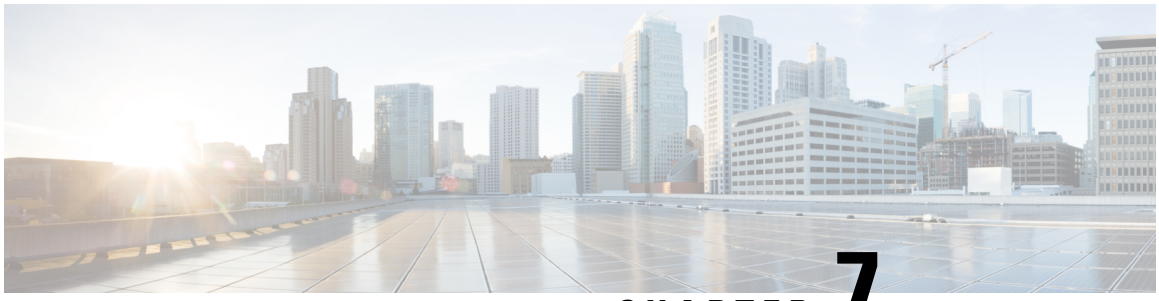
information is sent from the product instance and displayed on the applicable user interfaces (CSSM, CSLU, SSM On-Prem). For more information, see the command reference for this release.

- 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
```

- Catatyst 9000 Series Switches support MACsec switch-to-switch connections. We do not recommend configuring MACsec switch-to-host connections in an overlay network. For assistance with an existing switch-to-host MACsec implementation or a design review, contact your Cisco Sales Representative or Channel Partner.
- 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 500 connections per second (CPS) at less than 50% CPU utilization. Above this rate, AVC service is not guaranteed.
  - Scale—Able to handle up to 5000 bi-directional flows per 24 access ports and 10000 bi-directional flows per 48 access ports.
- YANG data modeling limitation—A maximum of 20 simultaneous NETCONF sessions are supported.
- Embedded Event Manager—Identity event detector is not supported on Embedded Event Manager.

- On the C9500X-28C8D model of the Cisco Catalyst 9500 Series Switches, TCAM space will not be reserved for different features. The available TCAM space will be shared across the features.
- The File System Check (fsck) utility is not supported in install mode.
- The command **service-routing mdns-sd** is being deprecated. Use the **mdns-sd gateway** command instead.
- 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.



CHAPTER 7

ROMMON Versions

ROMMON Versions

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

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

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

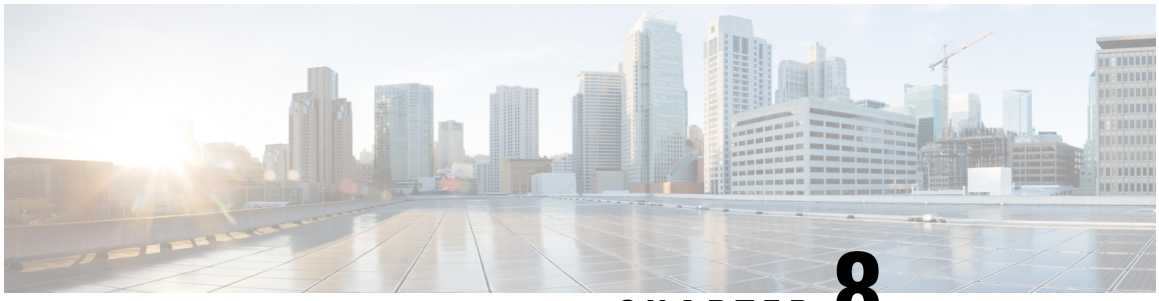
The following table provides ROMMON version information for the Cisco Catalyst 9500 Series Switches. For ROMMON version information of Cisco IOS XE 16.x.x releases, refer to the corresponding Cisco IOS XE 16.x.x release notes of the respective platform.

Release	ROMMON Version (C9500-12Q, C9500-24Q, C9500-16X, C9500-40X)	ROMMON Version (C9500-32C, C9500-32QC, C9500-24Y4C, C9500-48Y4C)	ROMMON Version (C9500X)
17.15.1	17.12.1r	17.8.1r[FC1]	17.12.1r
17.14.1	17.12.1r	17.8.1r[FC1]	17.11.1r
17.13.1	17.12.1r	17.8.1r[FC1]	17.11.1r
Dublin 17.12.5	17.12.1r	17.8.1r[FC1]	17.11.1r
Dublin 17.12.4	17.12.1r	17.8.1r[FC1]	17.11.1r
Dublin 17.12.3	17.12.1r	17.8.1r[FC1]	17.11.1r
Dublin 17.12.2	17.12.1r	17.8.1r[FC1]	17.11.1r

Release	ROMMON Version (C9500-12Q, C9500-24Q, C9500-16X, C9500-40X)	ROMMON Version (C9500-32C, C9500-32QC, C9500-24Y4C, C9500-48Y4C)	ROMMON Version (C9500X)
Dublin 17.12.1	17.12.1r	17.8.1r[FC1]	17.11.1r
Dublin 17.11.1	17.11.1r[FC1]	17.8.1r[FC1]	17.11.1r
Dublin 17.10.1	17.10.1r	17.8.1r[FC1]	17.8.1r
Cupertino 17.9.5	17.9.2r	17.8.1r[FC1]	17.8.1r
Cupertino 17.9.5	17.9.2r	17.8.1r[FC1]	17.8.1r
Cupertino 17.9.4	17.9.2r	17.8.1r[FC1]	17.8.1r
Cupertino 17.9.3	17.9.2r	17.8.1r[FC1]	17.8.1r
Cupertino 17.9.2	17.9.1r	17.8.1r[FC1]	17.8.1r
Cupertino 17.9.1	17.9.1r	17.8.1r[FC1]	17.8.1r
Cupertino 17.8.1	17.8.1r	17.7.1r[FC3]	17.8.1r
Cupertino 17.7.1	17.6.1r[FC1]	17.6.1r	-
Bengaluru 17.6.8	17.6.1r[FC1]	17.6.1r	-
Bengaluru 17.6.7	17.6.1r[FC1]	17.6.1r	-
Bengaluru 17.6.6a	17.6.1r[FC1]	17.6.1r	-
Bengaluru 17.6.6	17.6.1r[FC1]	17.6.1r	-
Bengaluru 17.6.5	17.6.1r[FC1]	17.6.1r	-
Bengaluru 17.6.4	17.6.1r[FC1]	17.6.1r	-
Bengaluru 17.6.3	17.6.1r[FC1]	17.6.1r	-
Bengaluru 17.6.2	17.6.1r[FC1]	17.6.1r	-
Bengaluru 17.6.1	17.6.1r[FC1]	17.6.1r	-
Bengaluru 17.5.1	17.5.1r	17.3.1r[FC2]	-
Bengaluru 17.4.1	17.4.1r	17.3.1r[FC2]	-
Amsterdam 17.3.8a	17.3.1r[FC2]	17.3.1r[FC2]	-
Amsterdam 17.3.8	17.3.1r[FC2]	17.3.1r[FC2]	-
Amsterdam 17.3.7	17.3.1r[FC2]	17.3.1r[FC2]	-
Amsterdam 17.3.6	17.3.1r[FC2]	17.3.1r[FC2]	-

Release	ROMMON Version (C9500-12Q, C9500-24Q, C9500-16X, C9500-40X)	ROMMON Version (C9500-32C, C9500-32QC, C9500-24Y4C, C9500-48Y4C)	ROMMON Version (C9500X)
Amsterdam 17.3.5	17.3.1r[FC2]	17.3.1r[FC2]	-
Amsterdam 17.3.4	17.3.1r[FC2]	17.3.1r[FC2]	-
Amsterdam 17.3.3	17.3.1r[FC2]	17.3.1r[FC2]	-
Amsterdam 17.3.2a	17.3.1r[FC2]	17.3.1r[FC2]	-
Amsterdam 17.3.1	17.3.1r[FC2]	17.3.1r[FC2]	-
Amsterdam 17.2.1	17.2.1r[FC1]	17.1.1[FC2]	-
Amsterdam 17.1.1	17.1.1r [FC1]	17.1.1[FC1]	-

ROMMON Versions



CHAPTER 8

Upgrading the Switch 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 17.14.1	CAT9K_IOSXE	cat9k_iosxe.17.14.01.SPA.
	No Payload Encryption (NPE)	cat9k_iosxe_npe.17.14.01.

Upgrading the ROMMON

To know the ROMMON or bootloader version that applies to every major and maintenance release, see ROMMON Versions, on page 31.

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. The manual upgrade applies to all models in the series. Enter the **upgrade rom-monitor capsule golden switch** command in privileged EXEC mode.

Note

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

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

Software Installation Commands

Summary of Software Installation Commands **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.

Summary of Software Installation Commands Supported starting from Cisco IOS XE Everest 16.6.2 and later releases	
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 Note This table of commands is not supported on Cisco Catalyst 9500 Series Switches - High Performance.	
`Device# request platform software package ?`	
clean	Cleans unnecessary package files from media
copy	Copies package to media
describe	Describes package content
expand	Expands all-in-one package to media
install	Installs the package
uninstall	Uninstalls the package
verify	Verifies In Service Software Upgrade (ISSU) software package compatibility

Upgrading in Install Mode

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

Before you begin

When upgrading from ...	Use these commands...	To upgrade to...
Cisco IOS XE Everest 16.5.1a or Cisco IOS XE Everest 16.6.1	Only **request platform software** commands	Cisco IOS XE 17.14.x
Cisco IOS XE Everest 16.6.2 and all later releases	On Cisco Catalyst 9500 Series Switches, either **install** commands or **request platform software** commands[3]. On Cisco Catalyst 9500 Series Switches - High Performance, only install commands[4].	

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

The sample output in this section displays upgrade from Cisco IOS XE 17.13.1 to Cisco IOS XE 17.14.1 using **install** commands only.

Procedure

Step 1 Clean-up

install remove inactive

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

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

```
Switch# install remove inactive

install_remove: START Mon Mar 25 19:51:48 UTC 2024
Cleaning up unnecessary package files
Scanning boot directory for packages ... done.
Preparing packages list to delete ...
    cat9k-cc_srdriver.17.13.01.SPA.pkg
      File is in use, will not delete.
    cat9k-espbase.17.13.01.SPA.pkg
      File is in use, will not delete.
    cat9k-guestshell.17.13.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.13.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.13.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipbase.17.13.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.13.01.SPA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.13.01.SPA.pkg
      File is in use, will not delete.
    cat9k-webui.17.13.01.SPA.pkg
```

```
      File is in use, will not delete.
    cat9k-wlc.17.13.01.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.17.13.01.SPA.pkg
/flash/cat9k-espbase.17.13.01.SPA.pkg
/flash/cat9k-guestshell.17.13.01.SPA.pkg
/flash/cat9k-rpbase.17.13.01.SPA.pkg
/flash/cat9k-rpboot.17.13.01.SPA.pkg
/flash/cat9k-sipbase.17.13.01.SPA.pkg
/flash/cat9k-sipspa.17.13.01.SPA.pkg
/flash/cat9k-srdriver.17.13.01.SPA.pkg
/flash/cat9k-webui.17.13.01.SPA.pkg
/flash/cat9k-wlc.17.13.01.SPA.pkg
/flash/packages.conf

Do you want to remove the above files? [y/n]y
[R0]:
Deleting file flash:cat9k-cc_srdriver.17.13.01.SPA.pkg ... done.
Deleting file flash:cat9k-espbase.17.13.01.SPA.pkg ... done.
Deleting file flash:cat9k-guestshell.17.13.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpbase.17.13.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpboot.17.13.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipbase.17.13.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipspa.17.13.01.SPA.pkg ... done.
Deleting file flash:cat9k-srdriver.17.13.01.SPA.pkg ... done.
Deleting file flash:cat9k-webui.17.13.01.SPA.pkg ... done.
Deleting file flash:cat9k-wlc.17.13.01.SPA.pkg ... done.
Deleting file flash:packages.conf ... done.
SUCCESS: Files deleted.
--- Starting Post_Remove_Cleanup ---
Performing Post_Remove_Cleanup on all members
[1] Post_Remove_Cleanup package(s) on switch 1
[1] Finished Post_Remove_Cleanup on switch 1
Checking status of Post_Remove_Cleanup on [1]
Post_Remove_Cleanup: Passed on [1]
Finished Post_Remove_Cleanup

SUCCESS: install_remove Mon Mar 25 19:52:25 UTC 2024
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.17.14.01.SPA.bin flash:
destination filename [cat9k_iosxe.17.14.01.SPA.bin]?
Accessing tftp://10.8.0.6/image/cat9k_iosxe.17.14.01.SPA.bin...
Loading /cat9k_iosxe.17.14.01.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 25 2024 10:18:11 -07:00 cat9k_iosxe.17.14.01.SPA.bin
11353194496 bytes total (8976625664 bytes free)
```

Step 3 Set boot variable

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

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

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

b) **no boot manual**

Use this command to configure the switch to auto-boot. Settings are synchronized with the standby switch, if applicable.

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

c) **write memory**

Use this command to save boot settings.

```
Switch# write memory
```

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

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

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

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

```
Switch# show boot                        <<on the C9500-12Q,C9500-16X C9500-24Q, and
C9500-40X models
Current Boot Variables:
BOOT variable = flash:packages.conf;

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

```
Boot Mode = DEVICE
iPXE Timeout = 0
```

Step 4 Install image to flash

install add file activate commit

Use this command to install the image.

We recommend that you point to the source image on your TFTP server or the flash drive of the *active* switch, if you have copied the image to flash memory. If you point to an image on the flash or USB drive of a member switch (instead of the active), you must specify the exact flash or USB drive - otherwise installation fails. For example, if the image is on the flash drive of member switch 3 (flash-3): `Switch# install add file flash-3:cat9k_iosxe.17.14.01.SPA.bin activate commit`.

The following sample output displays installation of the Cisco IOS XE 17.14.1 software image in the flash memory:

```
Switch# install add file flash:cat9k_iosxe.17.14.01.SPA.bin activate commit
install_add_activate_commit: Adding PACKAGE
install_add_activate_commit: Checking whether new add is allowed ....
--- Starting Add ---
Performing Add on Active/Standby
 [1] Add package(s) on R0
 [1] Finished Add on R0

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

Image added. Version: 17.14.01

install_add_activate_commit: Activating PACKAGE
Following packages shall be activated:
/flash/cat9k-wlc.17.14.01.SPA.pkg
/flash/cat9k-webui.17.14.01.SPA.pkg
/flash/cat9k-srdriver.17.14.01.SPA.pkg
/flash/cat9k-sipspa.17.14.01.SPA.pkg
/flash/cat9k-sipbase.17.14.01.SPA.pkg
/flash/cat9k-rpboot.17.14.01.SPA.pkg
/flash/cat9k-rpbase.17.14.01.SPA.pkg
/flash/cat9k-guestshell.17.14.01.SPA.pkg
/flash/cat9k-espbase.17.14.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.14.01.SPA.pkg

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

--- Starting Activate ---

Performing Activate on Active/Standby
[1] Activate package(s) on R0
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.13.01.SPA.pkg
      Removed cat9k-espbase.17.13.01.SPA.pkg
      Removed cat9k-guestshell.17.13.01.SPA.pkg
      Removed cat9k-rpbase.17.13.01.SPA.pkg
      Removed cat9k-rpboot.17.13.01.SPA.pkg
      Removed cat9k-sipbase.17.13.01.SPA.pkg
      Removed cat9k-sipspa.17.13.01.SPA.pkg
      Removed cat9k-srdriver.17.13.01.SPA.pkg
      Removed cat9k-webui.17.13.01.SPA.pkg
      Removed cat9k-wlc.17.13.01.SPA.pkg
    New files list:
```

```
      Added cat9k-cc_srdriver.17.14.01.SSA.pkg
      Added cat9k-espbase.17.14.01.SSA.pkg
      Added cat9k-guestshell.17.14.01.SSA.pkg
      Added cat9k-lni.17.14.01.SSA.pkg
      Added cat9k-rpbase.17.14.01.SSA.pkg
      Added cat9k-rpboot.17.14.01.SSA.pkg
      Added cat9k-sipbase.17.14.01.SSA.pkg
      Added cat9k-sipspa.17.14.01.SSA.pkg
      Added cat9k-srdriver.17.14.01.SSA.pkg
      Added cat9k-webui.17.14.01.SSA.pkg
      Added cat9k-wlc.17.14.01.SSA.pkg
    Finished list of software package changes
  [1] Finished Activate on R0
Checking status of Activate on [R0]
Activate: Passed on [R0]
Finished Activate

--- Starting Commit ---
Performing Commit on Active/Standby
  [1] Commit package(s) on R0
  [1] Finished Commit on R0
Checking status of Commit on [R0]
Commit: Passed on [R0]
Finished Commit
Send model notification for install_add_activate_commit before reload
Install will reload the system now!
SUCCESS: install_add_activate_commit  Mon Mar 25 12:13:05 IST 2023

Switch#Mar 25 12:13:11.023: %PMANTACTION: F0/0vp: Process manager is exiting: n requested
Mar 25 12:13:11.028: %PMAN-5-EXITACTION: C1/0: pvp: Process manager is exiting: reload fru
 action requested
Mar 25 12:13:11.825: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: reload
action requested

Initializing Hardware...
System Bootstrap, Version 17.4.1r[FC2], RELEASE SOFTWARE (P)

Compiled 11-27-2023 12:00:00.00 by rel
Current ROMMON image : Primary Rommon Image
Last reset cause:LocalSoft
C9500-32QC platform with 16777216 Kbytes of main memory
Preparing to autoboot. [Press Ctrl-C to interrupt]  5     5     /-\|/-\|/-4     \|/-\|/-\|3
     /-\|/-\|/-2     \|/-\|/-\|1     /-\|/-\|/-0

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

boot: reading file packages.conf
<output truncated>
```

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

Step 5 Verify installation

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

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

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

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

```
Directory of flash:/
475140 -rw- 2012104   Nov 20 2023 09:52:41 -07:00 cat9k-cc_srdriver.17.13.01.SPA.pkg
475141 -rw- 70333380  Nov 20 2023 09:52:44 -07:00 cat9k-espbase.17.13.01.SPA.pkg
475142 -rw- 13256     Nov 20 2023 09:52:44 -07:00 cat9k-guestshell.17.13.01.SPA.pkg
475143 -rw- 349635524 Nov 20 2023 09:52:54 -07:00 cat9k-rpbase.17.13.01.SPA.pkg
475149 -rw- 24248187  Nov 20 2023 09:53:02 -07:00 cat9k-rpboot.17.13.01.SPA.pkg
475144 -rw- 25285572  Nov 20 2023 09:52:55 -07:00 cat9k-sipbase.17.13.01.SPA.pkg
475145 -rw- 20947908  Nov 20 2023 09:52:55 -07:00 cat9k-sipspa.17.13.01.SPA.pkg
475146 -rw- 2962372   Nov 20 2023 09:52:56 -07:00 cat9k-srdriver.17.13.01.SPA.pkg
475147 -rw- 13284288  Nov 20 2023 09:52:56 -07:00 cat9k-webui.17.13.01.SPA.pkg
475148 -rw- 13248     Nov 20 2023 09:52:56 -07:00 cat9k-wlc.17.13.01.SPA.pkg

491524 -rw- 25711568  Mar 25 2024 11:49:33 -07:00 cat9k-cc_srdriver.17.14.01.SPA.pkg
491525 -rw- 78484428  Mar 25 2024 11:49:35 -07:00 cat9k-espbase.17.14.01.SPA.pkg
491526 -rw- 1598412   Mar 25 2024 11:49:35 -07:00 cat9k-guestshell.17.14.01.SPA.pkg
491527 -rw- 404153288 Mar 25 2024 11:49:47 -07:00 cat9k-rpbase.17.14.01.SPA.pkg
491533 -rw- 31657374  Mar 25 2024 11:50:09 -07:00 cat9k-rpboot.17.14.01.SPA.pkg
491528 -rw- 27681740  Mar 25 2024 11:49:48 -07:00 cat9k-sipbase.17.14.01.SPA.pkg
491529 -rw- 52224968  Mar 25 2024 11:49:49 -07:00 cat9k-sipspa.17.14.01.SPA.pkg
491530 -rw- 31130572  Mar 25 2024 11:49:50 -07:00 cat9k-srdriver.17.14.01.SPA.pkg
491531 -rw- 14783432  Mar 25 2024 11:49:51 -07:00 cat9k-webui.17.14.01.SPA.pkg
491532 -rw- 9160      Mar 25 2024 11:49:51 -07:00 cat9k-wlc.17.14.01.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.17.14.01.SPA.conf`—a backup copy of the newly installed packages.conf file

```
Switch# dir flash:*.conf

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

434197 -rw- 7406 Mar 25 2024 10:59:16 -07:00 packages.conf
516098 -rw- 7406 Mar 25 2024 10:58:08 -07:00 cat9k_iosxe.17.14.01.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 17.14.1 image on the device:

```
Switch# show version

Cisco IOS XE Software, Version 17.14.01
Cisco IOS Software, Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.14.1, RELEASE
SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2024 by Cisco Systems, Inc.
<output truncated>
```

Downgrading in Install Mode

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

Before you begin

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

When downgrading from ...	Use these commands...	To downgrade to...
Cisco IOS XE 17.14.x	• On Cisco Catalyst 9500 Series Switches, either **install** commands or **request platform software** commands[5]. • On Cisco Catalyst 9500 Series Switches - High Performance, only **install** commands	Cisco IOS XE 17.13.x or earlier releases.

[5] 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 17.14.1 to Cisco IOS XE 17.13.1, 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 Mon Nov 20 11:42:27 IST 2023

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.17.14.01.SSA.pkg
      File is in use, will not delete.
    cat9k-espbase.17.14.01.SSA.pkg
      File is in use, will not delete.
    cat9k-guestshell.17.14.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.14.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.14.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipbase.17.14.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.14.01.SSA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.14.01.SSA.pkg
      File is in use, will not delete.
    cat9k-webui.17.14.01.SSA.pkg
      File is in use, will not delete.
    cat9k-wlc.17.14.01.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 Nov 20 11:42:39 IST 2023
```

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.17.13.01.SPA.bin flash:
Destination filename [cat9k_iosxe.17.13.01.SPA.bin]?
Accessing tftp://10.8.0.6//cat9k_iosxe.17.13.01.SPA.bin...
Loading /cat9k_iosxe.17.13.01.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 Nov 20 2023 13:35:16 -07:00 cat9k_iosxe.17.13.01.SPA.bin
11353194496 bytes total (9055866880 bytes free)
```

Step 3 Set boot variable

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

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

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

b) **no boot manual**

Use this command to configure the switch to auto-boot. Settings are synchronized with the standby switch, if applicable.

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

c) **write memory**

Use this command to save boot settings.

```
Switch# write memory
```

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

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

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

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

```
Switch# show boot                          <<on the C9500-12Q,C9500-16X C9500-24Q, and
C9500-40X models
Current Boot Variables:
BOOT variable = flash:packages.conf;

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

Step 4 Downgrade software image

install add file activate commit

Use this command to install the image.

We recommend that you point to the source image on your TFTP server or the flash drive of the *active* switch, if you have copied the image to flash memory. If you point to an image on the flash or USB drive of a member switch (instead of the active), you must specify the exact flash or USB drive - otherwise installation fails. For example, if the image is on the flash drive of member switch 3 (flash-3): `Switch# install add file flash-3:cat9k_iosxe.17.13.01.SPA.bin activate commit`.

The following example displays the installation of the Cisco IOS XE 17.13.1 software image to flash, by using the **install add file activate commit** command.

```
Switch# install add file flash:cat9k_iosxe.17.13.01.SPA.bin activate commit
install_add_activate_commit: Adding PACKAGE
```

```
install_add_activate_commit: Checking whether new add is allowed ....
--- Starting Add ---
Performing Add on Active/Standby
[1] Add package(s) on R0
[1] Finished Add on R0
Checking status of Add on [R0]
Add: Passed on [R0]
Finished Add
Image added. Version: 17.13.01.0.269
install_add_activate_commit: Activating PACKAGE

Following packages shall be activated:
/flash/cat9k-wlc.17.13.01.SPA.pkg
/flash/cat9k-webui.17.13.01.SPA.pkg
/flash/cat9k-srdriver.17.13.01.SPA.pkg
/flash/cat9k-sipspa.17.13.01.SPA.pkg
/flash/cat9k-sipbase.17.13.01.SPA.pkg
/flash/cat9k-rpboot.17.13.01.SPA.pkg
/flash/cat9k-rpbase.17.13.01.SPA.pkg
/flash/cat9k-guestshell.17.13.01.SPA.pkg
/flash/cat9k-espbase.17.13.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.13.01.SPA.pkg

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


Performing Activate on Active/Standby
1] Activate package(s) on R0
    --- Starting list of software package changes ---
    Old files list:
      Removed cat9k-cc_srdriver.17.14.01.SSA.pkg
      Removed cat9k-espbase.17.14.01.SSA.pkg
      Removed cat9k-guestshell.17.14.01.SSA.pkg
      Removed cat9k-lni.17.14.01.SSA.pkg
      Removed cat9k-rpbase.17.14.01.SSA.pkg
      Removed cat9k-rpboot.17.14.01.SSA.pkg
      Removed cat9k-sipbase.17.14.01.SSA.pkg
      Removed cat9k-sipspa.17.14.01.SSA.pkg
      Removed cat9k-srdriver.17.14.01.SSA.pkg
      Removed cat9k-webui.17.14.01.SSA.pkg
      Removed cat9k-wlc.17.14.01.SSA.pkg
    New files list:
      Added cat9k-cc_srdriver.17.13.01.SPA.pkg
      Added cat9k-espbase.17.13.01.SPA.pkg
      Added cat9k-guestshell.17.13.01.SPA.pkg
      Added cat9k-rpbase.17.13.01.SPA.pkg
      Added cat9k-rpboot.17.13.01.SPA.pkg
      Added cat9k-sipbase.17.13.01.SPA.pkg
      Added cat9k-sipspa.17.13.01.SPA.pkg
      Added cat9k-srdriver.17.13.01.SPA.pkg
      Added cat9k-webui.17.13.01.SPA.pkg
      Added cat9k-wlc.17.13.01.SPA.pkg
    Finished list of software package changes
  [1] Finished Activate on R0
Checking status of Activate on [R0]
Activate: Passed on [R0]
Finished Activate

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

```
Finished Commit

Send model notification for install_add_activate_commit before reload
Install will reload the system now!
SUCCESS: install_add_activate_commit  Mon Nov 20 11:51:01 IST 2023

Nov 20 11:51:07.505: %PMANTvp: Process manager is exiting: ren requested
Nov 20 11:51:07.505: %PMAN-5-EXITACTION: F0/0: pvp: Process manager is exiting: reload fru
 action requested
Nov 20 11:51:07.834: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: reload
action requested

Initializing Hardware...

System Bootstrap, Version 17.3.1r[FC2], RELEASE SOFTWARE (P)
Compiled 30-03-2023 12:00:00.00 by rel
Current ROMMON image : Primary Rommon Image

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

<output truncated>
```

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

Step 5 Verify version

show version

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

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

The following sample output of the **show version** command displays the Cisco IOS XE 17.13.1 image on the device:

```
Switch# show version
Cisco IOS XE Software, Version 17.13.01
Cisco IOS Software [Dublin], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.13.1,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2023 by Cisco Systems, Inc.
<output truncated>
```

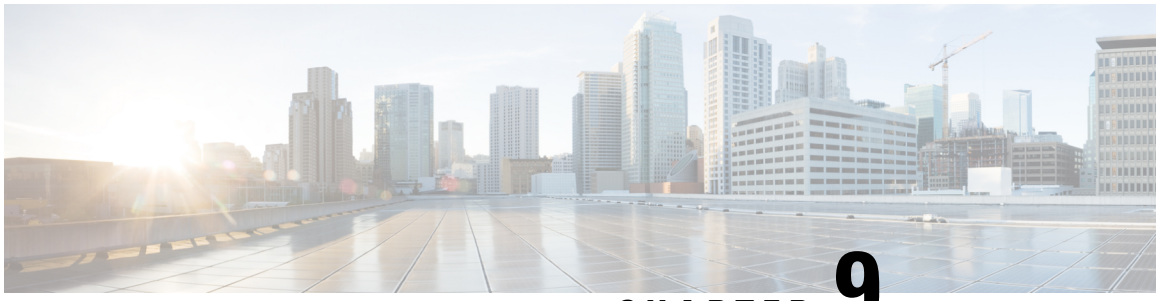
Field-Programmable Gate Array Version Upgrade

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. For Cisco Catalyst 9500X Series Switches, enter the **show firmware version all** command in privileged EXEC 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.



CHAPTER 9

Caveats

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.

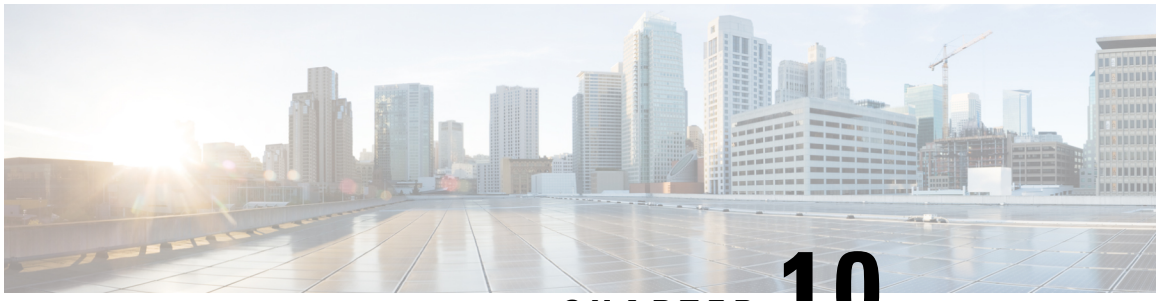
To view the details of a caveat, click on the identifier.

Open Caveats in Cisco IOS XE 17.14.x

Identifier	Applicable Models	Headline
CSCwj38294	C9500X	C9600X and C9500X is dropping IPv6 ND packets.

Resolved Caveats in Cisco IOS XE 17.14.1

There are no resolved caveats in this release.



CHAPTER 10

Additional Information

Troubleshooting

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

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

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

Related Documentation

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

All support documentation for Cisco Catalyst 9500 Series Switches is at this URL: https://www.cisco.com/c/en/us/support/switches/catalyst-9500-series-switches/tsd-products-support-series-home.html

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

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

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
- To get the business results you're looking for with the technologies that matter, visit Cisco Services.
- To submit a service request, visit Cisco Support.
- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit Cisco DevNet.

- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

Cisco Bug Search Tool

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.