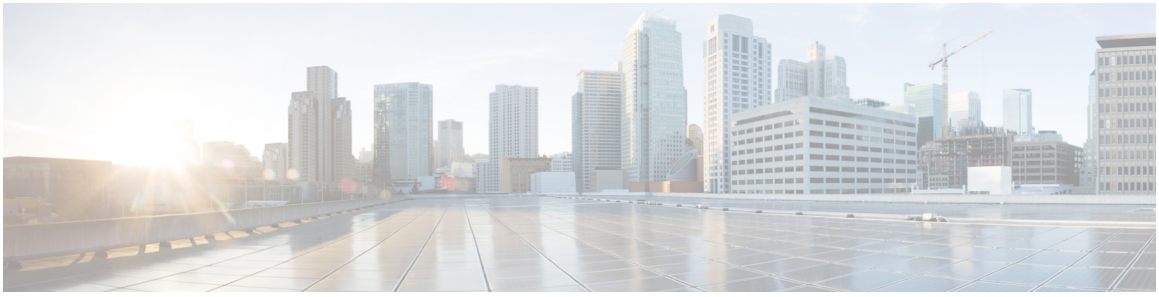


# Release Notes for Cisco Catalyst 9600 Series Switches, Cisco IOS XE Dublin 17.10.x

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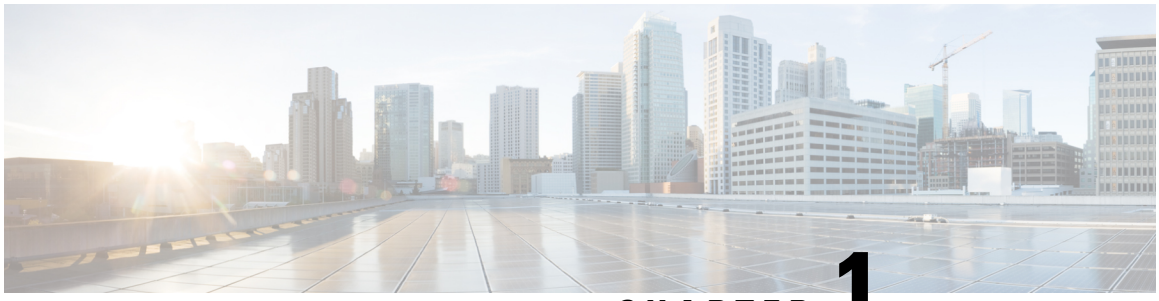
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CHAPTER 1

# Introduction

Cisco Catalyst 9600 Series Switches are the next generation purpose-built 40 GigabitEthernet, 50 GigabitEthernet, 100 GigabitEthernet, and 400 GigabitEthernet modular core and aggregation platform providing resiliency at scale with the industry's most comprehensive security while allowing your business to grow at the lowest total operational cost. They have been purpose-built to address emerging trends of Security, IoT, Mobility, and Cloud.

They deliver hardware and software convergence in terms of ASIC architecture with Unified Access Data Plane (UADP) 3.0 and Cisco Silicon One Q200. The platform runs an Open Cisco IOS XE that supports model driven programmability, Serial Advanced Technology Attachment (SATA) Solid State Drive (SSD) local storage, and a higher memory footprint). The series forms the foundational building block for SD-Access, which is Cisco's lead enterprise architecture.

It also supports features that provide high availability, advanced routing and infrastructure services, security capabilities, and application visibility and control.

• Supported Hardware, on page 1

# Supported Hardware

## Cisco Catalyst 9600 Series Switches—Model Numbers

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

| Switch Model<br>(append with "=" for spares) | Description |
|---|---|
| C9606R | Cisco Catalyst 9606R Switch<br>• Redundant supervisor module capability<br>• Four linecard slots<br>• Hot-swappable fan tray, front and rear serviceable, fan tray assembly with 9 fans.<br>• Four power supply module slots |

# Supported Hardware on Cisco Catalyst 9600 Series Switches

| Product ID<br>(append with "=" for spares) | Description |
|---|---|
| **Supervisor Modules** | |
| C9600-SUP-1 | Cisco Catalyst 9600 Series Supervisor 1 Module<br>This supervisor module is supported on the C9606R chassis. |
| C9600X-SUP-2 | Cisco Catalyst 9600 Series Supervisor Engine 2<br>This supervisor module is supported on the C9606R chassis. |
| **SATA[1] SSD[2] Modules (for the Supervisor)** | |
| C9K-F2-SSD-240GB | Cisco Catalyst 9600 Series 240GB SSD Storage |
| C9K-F2-SSD-480GB | Cisco Catalyst 9600 Series 480GB SSD Storage |
| C9K-F2-SSD-960GB | Cisco Catalyst 9600 Series 960GB SSD Storage |
| **Line Cards** | |
| C9600X-LC-32CD | Cisco Catalyst 9600 Series 30-Port QSFP28, 2-Port QSFP-DD line card.<br>• C9600X-SUP-2<br>  • 30 QSFP28 ports of 100G/40G<br>  • 2 QSFP-DD ports of 400G/200G/100G/40G<br>• C9600-SUP-1<br>  • Not supported |
| C9600-LC-40YL4CD | Cisco Catalyst 9600 Series 40-Port SFP56, 2-Port QSFP56, 2-Port QSFP-DD line card.<br>• C9600X-SUP-2<br>  • 40 SFP56 ports of 50G/25G/10G<br>  • 2 QSFP56 ports of 200G/100G/40G<br>  • 2 QSFP-DD ports of 400G/200G/100G/40G<br>• C9600X-SUP-1<br>  • 40 SFP28 ports of 25G/10G/1G<br>  • 2 QSFP28 ports of 100G/40G |

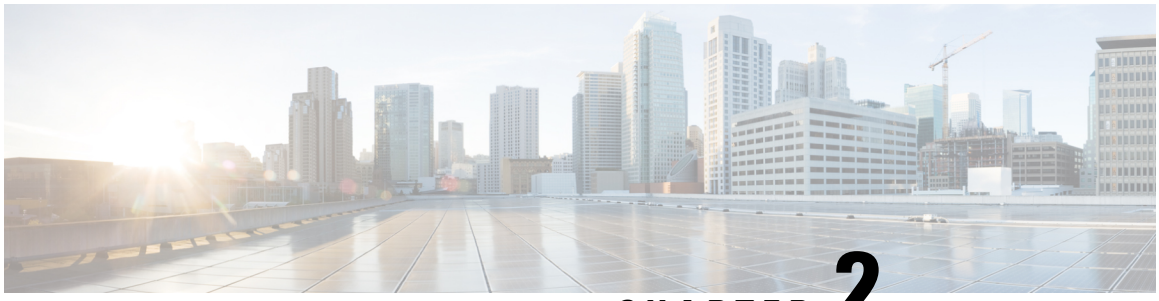
| Product ID<br>(append with "=" for spares) | Description |
|---|---|
| C9600-LC-48YL | Cisco Catalyst 9600 Series 48-Port SFP56 line card.<br>• C9600X-SUP-2<br>• 48 SFP56 ports of 50G/25G/10G<br>• C9600X-SUP-1<br>• 48 SFP28 ports of 25G/10G/1G |
| C9600-LC-24C | Cisco Catalyst 9600 Series 24-Port 40G/12-Port 100G line card.<br>• C9600X-SUP-2<br>• 24 QSFP28 ports of 100G/40G<br>• C9600-SUP-1<br>• 12 ports of 100G or 24 ports of 40G |
| C9600-LC-48TX | Cisco Catalyst 9600 Series 48-Port MultiGigabit RJ45 line card.<br>• C9600X-SUP-2<br>• 48 ports of 10G/5G/2.5G<br>• C9600X-SUP-1<br>• 48 ports of 10G/5G/2.5G/1G and 100M/10M |
| C9600-LC-48S | Cisco Catalyst 9600 Series 48-Port SFP line card.<br>• C9600X-SUP-2<br>• Not supported<br>• C9600-SUP-1<br>• 48 SFP ports of 1G |
| **AC Power Supply Modules** | |
| C9600-PWR-2KWAC | Cisco Catalyst 9600 Series 2000W AC Power Supply Module[3] |
| C9600-PWR-3KWAC | Cisco Catalyst 9600 Series 3000W AC Power Supply Module |
| **DC Power Supply Modules** | |
| C9600-PWR-2KWDC | Cisco Catalyst 9600 Series 2000W DC Power Supply Module |

[1] Serial Advanced Technology Attachment (SATA)

[2] Solid State Drive (SSD) Module
[3] Power supply output capacity is 1050W at 110 VAC.

# 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

# Whats New in Cisco IOS XE Dublin 17.10.x


- Hardware Features in Cisco IOS XE Dublin 17.10.1, on page 5
- Software Features in Cisco IOS XE Dublin 17.10.1, on page 6
- Hardware and Software Behavior Changes in Cisco IOS XE Dublin 17.10.1, on page 8


## Hardware Features in Cisco IOS XE Dublin 17.10.1

| Feature Name | Description |
|---|---|
| Cisco 50GBASE SFP56 Modules on C9600-LC-48YL and C9600-LC-40YL4CD | Supported transceiver module product numbers:<br>• SFP-50G-LR-S<br><br>For information about the module, see Cisco 50GBASE SFP56 Modules Data Sheet. For information about device compatibility, see the Transceiver Module Group (TMG) Compatibility Matrix. |
| Cisco 10GBASE SFP+ Module | Supported transceiver module product numbers:<br>• SFP-10G-T-X<br><br>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. |

# Software Features in Cisco IOS XE Dublin 17.10.1

| Feature Name | Description |
|---|---|
| BGP EVPN VXLAN support on Cisco Catalyst 9600 Series Supervisor 2 Module (C9600X-SUP-2) | The Cisco Catalyst 9600 Series Supervisor 2 Module supports the following BGP EVPN VXLAN features:<br>• Layer 2 and Layer 3 overlay with IPv4 and IPv6 hosts<br>• Multicast replication for Broadcast, Unknown Unicast, Multicast (BUM) traffic<br>• Distributed Anycast Gateway<br>• EVPN VXLAN External Connectivity with VRF-Lite and IEEE 802.1Q network<br>This release does not support Ingress Replication, Multi-Homing and Centralized Default Gateway. |
| BGP EVPN VXLAN with IPv6 in the Underlay (VXLANv6) | Introduces support for IPv6 addressing in the underlay of a BGP EVPN VXLAN fabric. In a new deployment, you can build your BGP EVPN VXLAN fabric with IPv6 underlay. For an existing BGP EVPN VXLAN fabric with IPv4 underlay, you can seamlessly migrate to an IPv6 or dual stack underlay. |
| Cisco DNA Service for Bonjour | Cisco DNA Service for Wide Area Bonjour (Multicast DNS Mode only) and Local Area Bonjour in Unicast Mode for Multi-Layer Network and Routed Access Network was introduced on Cisco Catalyst 9600 Series Supervisor 2 Module (C9600X-SUP-2). |
| Cisco StackWise Virtual | Cisco StackWise Virtual is a network system virtualization technology that pairs two switches into one virtual switch to simplify operational efficiency with a single control and management plane.<br>Starting with this release, the feature is supported on the Cisco Catalyst 9600 Series Supervisor 2 Module (C9600X-SUP-2).<br>(Network Advantage) |
| Custom EAPoL | Allows customization of the default EAPoL EtherType to configure MACsec with EtherType as 876F. |
| DHCP Gleaning | Introduces support for a read–only DHCP snooping functionality that allows components to register and glean only DHCP version 4 packets.<br>(Network Essentials and Network Advantage) |
| Enhanced Password Security Through Updated Combination Rule | The **character-repetition** and **restrict-consecutive-letters** keywords were introduced for the **aaa common-criteria** policy command. |

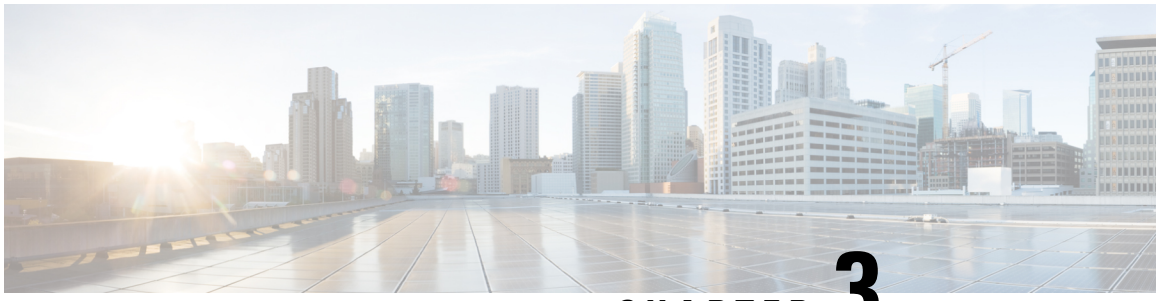
| Feature Name | Description |
|---|---|
| MACsec Fallback Key Support with High Availability | Introduces support for the MACsec Fallback Key feature with High Availability. The MACsec Fallback Key feature establishes an MKA session with the pre-shared fallback key whenever the PSK fails to establish a session because of key mismatch.<br><br>(Network Advantage) |
| NAT support on L3 Port Channel | Introduces support for configuring NAT on Layer 3 port channel using the **interface port-channel** command. |
| Programmability<br>• Upgrade YANG Models to YANG 1.1<br>• YANG Data Models | The following programmability features are introduced in this release:<br>• Upgrade YANG Models to YANG 1.1: Cisco-defined YANG models are in YANG Version 1.1 in Cisco IOS XE Dublin 17.10.1 and later releases.<br>(Network Advantage)<br>• YANG Data Models: For the list of Cisco IOS XE YANG models available with this release, navigate to: https://github.com/YangModels/yang/tree/master/vendor/cisco/xe/17101.<br>(Network Advantage) |
| PTPv2 with Cisco StackWise Virtual | Introduces support for PTPv2 with Cisco StackWise Virtual.<br><br>(Network Advantage) |
| RADIUS Automated Testing Probe-on | The command **automate-tester probe-on** was introduced. It starts a dead timer and packets are sent to the external RADIUS server after the timer expires. |
| Reflexive Access Lists (IPv4) | Reflexive access lists allow IP packets to be filtered based on upper-layer session information.<br><br>(Network Advantage) |
| Secure Data Wipe | Introduces support for performing factory reset by using the keyword **all secure** in the **factory-reset** command. This option performs data sanitisation and securely resets the device.<br><br>(Network Essentials and Network Advantage) |
| SGACL Monitor Mode and SGACL Logging | Introduces support for SGACL Monitor Mode and SGACL Logging on the Cisco Catalyst 9600 Series Supervisor 2 Module.<br><br>(Network Advantage) |

| Feature Name | Description |
|---|---|
| SHA256 based Password-masking support | You can use the **masked-secret** keyword on the **enable algorithm type** command and **username** command. The keyword masks the secret input and converts to the selected encryption.<br><br>(Network Essentials and Network Advantage) |
| Standalone Mode on Layer 3 EtherChannels | Introduces support for configuring standalone mode/independent mode on Layer 3 EtherChannels. |
| Stateful NAT64 | Introduces support for a translation mechanism that translates IPv6 packets into IPv4 packets and vice versa. Packets generated in an IPv6 network can be sent to an IPv4 network within the IPv6 network using the Stateful NAT64 translator. |

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

# Hardware and Software Behavior Changes in Cisco IOS XE Dublin 17.10.1

| Behavior Change | Description |
|---|---|
| **debug platform** command | The **debug platform software fed switch active inject packet-capture start** command was modified. **full-packet** keyword was added. It allows you to capture 1500 bytes of packet. The default packet capture was only for 128 bytes of the packet prior to Cisco IOS XE Dublin 17.10.1. |



CHAPTER 3

# Important Notes


- Important Notes, on page 9


# Important Notes

**Unsupported Features: Cisco Catalyst 9600 Series Supervisor 2 Module**

- **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
  - Cisco StackWise Virtual
  - L3TRM with Data MDT
  - EVPN L2TRM

- EVPN VXLAN Multi-Homing

- **Cisco TrustSec**
  - Cisco TrustSec Manual Configuration
  - Cisco TrustSec Security Association Protocol (SAP)
  - Cisco TrustSec Metadata Header Encapsulation
  - IPv6 Support for SGT and SGACL
  - Cisco TrustSec SGT Caching
  - TrustSec SGT Handling: L2 SGT Imposition and Forwarding
  - Cisco TrustSec SGT Inline Tagging

- **High Availability**
  - Quad-Supervisor with Route Processor Redundancy
  - Secure StackWise Virtual

- **Interface and Hardware**
  - Per-port MTU
  - 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

- **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)
  - VRF-Aware PBR
  - Local PBR
  - PBR for Object-Group Access Control List (OGACL) Based Matching
  - Multipoint GRE
  - Unicast and Multicast over Point-to-Multipoint GRE
  - GRE IPv6 Tunnels
  - IP Fast Reroute (IP FRR)

- **Layer 2**
  - Loop Detection Guard
  - Multi-VLAN Registration Protocol (MVRP)
  - Precision Time Protocol (PTP)

- **Multiprotocol Label Switching**
  - 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 MPLS Access
  - VPLS Routed Pseudowire IRB(v4) Unicast
  - MPLS VPN Inter-AS Options (options A, B, and AB)

- MPLS VPN Inter-AS IPv4 BGP Label Distribution
- Seamless Multiprotocol Label Switching

- **Network Management**
  - ERSPAN and RSPAN
  - Flow-Based Switch Port Analyser
  - 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:

    - MACsec EAP-TLS
    - Switch-to-host MACsec
    - Certificate-based MACsec
    - Cisco TrustSec SAP MACsec
  - 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 the Cisco Feature Navigator.

### Accessing Hidden Commands

This section provides information about hidden commands in Cisco IOS XE and the security measures that are in place, when they are accessed. These commands are only meant to assist Cisco TAC in advanced troubleshooting and are not documented.

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.

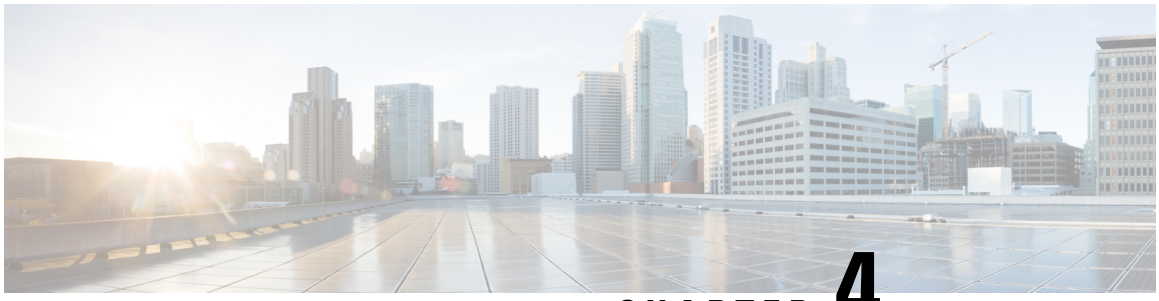


**Important** We recommend that you use any hidden command only under TAC supervision.

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).



CHAPTER 4

# Compatibility Matrix and Web UI System Requirements


- Compatibility Matrix, on page 15
- Web UI System Requirements, on page 15


## Compatibility Matrix

To view the software compatibility information between Cisco Catalyst 9600 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[4] | 512 MB[5] | 256 | 1280 x 800 or higher | Small |

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

### Software Requirements

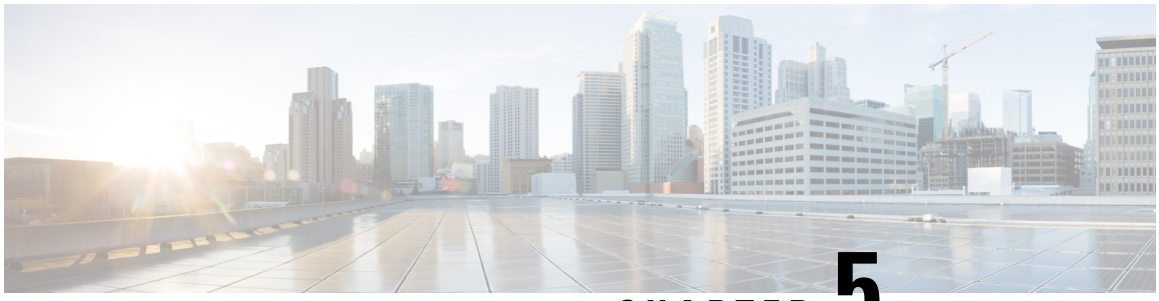
#### Operating Systems

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

#### Browsers

- Google Chrome—Version 59 or later (On Windows and Mac)

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



CHAPTER 5

# Licensing and Scaling Guidelines


- Licensing, on page 17
- Scaling Guidelines, on page 17


## 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 Gibraltar 16.11.1 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.

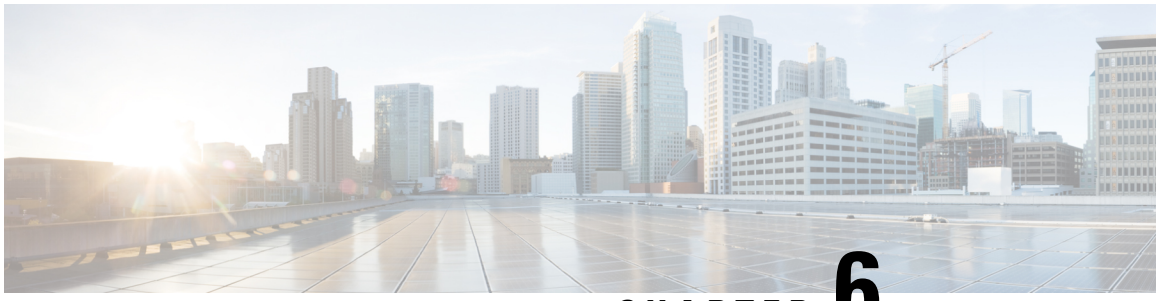
## Scaling Guidelines

For information about feature scaling guidelines, see the Cisco Catalyst 9600 Series Switches datasheets at:

https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9600-series-switches/nb-06-cat9600-series-data-sheet-cte-en.html

https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9600-series-switches/nb-06-cat9600-series-line-data-sheet-cte-en.html

https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9600-series-switches/nb-06-cat9600-ser-sup-eng-data-sheet-cte-en.html



CHAPTER 6

# Limitations and Restrictions


- Limitations and Restrictions, on page 19


## Limitations and Restrictions

- Auto negotiation: The SFP+ interface (TenGigabitEthernet0/1) on the Ethernet management port with a 1G transceiver does not support auto negotiation.
- 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.
- Convergence: During SSO, a higher convergence time is observed while removing the active supervisor module installed in slot 3 of a C9606R chassis.
- On the Cisco Catalyst 9600 Series Supervisor 2 Module (C9600X-SUP-2), when Cisco StackWise Virtual is configured, Federal Information Processing Standards (FIPS) is not supported.
- Cisco Catalyst 9600 Series Supervisor 2 Module (C9600X-SUP-2) on a C9606R chassis does not support Quad-Supervisor with RPR.
- Hardware Limitations—Optics:
  - Installation restriction for C9600-LC-24C linecard with CVR-QSFP-SFP10G adapter —This adapter must not be installed on an even numbered port where the corresponding odd numbered port is configured as 40GE port. For example, if port 1 is configured as 40GE, CVR-QSFP-SFP10G must not be installed in port 2.

    Installation restriction for C9600-LC-24C linecard with CVR-QSFP-SFP10G adapter — If you insert a 40-Gigabit Ethernet Transceiver Module to odd numbered port, the corresponding even numbered port does not work with CVR-QSFP-SFP10G adapter.
  - GLC-T and GLC-TE operating at 10/100Mbps speed are not supported with Cisco QSA Module (CVR-QSFP-SFP10G).
  - 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—Power Supply Modules:

- Input voltage for AC power supply modules—All AC-input power supply modules in the chassis must have the same AC-input voltage level.
- Using power supply modules of different types—When mixing AC-input and DC-input power supplies, the AC-input voltage level must be 220 VAC.

- In-Service Software Upgrade (ISSU)
  - While ISSU allows you to perform upgrades with zero downtime, we recommend you to do so during a maintenance window only.
  - If a new feature introduced in a software release requires a change in configuration, the feature should not be enabled during ISSU.
  - If a feature is not available in the downgraded version of a software image, the feature should be disabled before initiating ISSU.

- QoS restrictions
  - When configuring QoS queuing policy, the sum of the queuing buffer should not exceed 100%.
  - Policing and marking policy on sub interfaces is supported.
  - Marking policy on witched 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
```

- 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.
- 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 Cisco Catalyst 9600 Series Supervisor 2 Module, 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.
- 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.
- Starting from Cisco IOS XE Release 17.10, the following Key Exchange and MAC algorithms are removed from the default list:

  Key Exchange algorithm:

  - diffie-hellman-group14-sha1

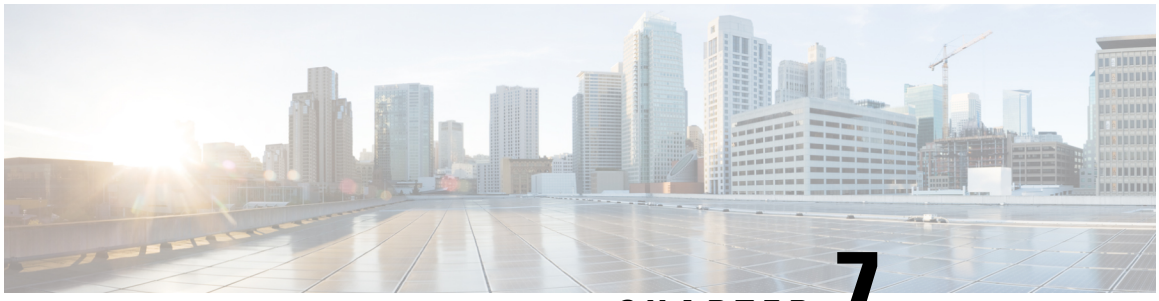
  MAC algorithms:

  - hmac-sha1
  - hmac-sha2-256
  - hmac-sha2-512



**Note** You can use the **ip ssh server algorithm kex** command to configure the Key Exchange algorithm and the **ip ssh server algorithm mac** command to configure the MAC algorithms.

Limitations and Restrictions



CHAPTER 7

# ROMMON Versions


- ROMMON Versions, on page 23


# 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:

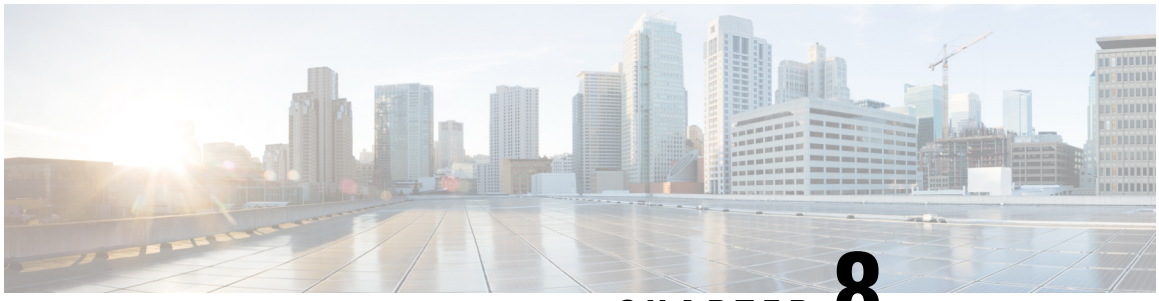
- Primary: The ROMMON stored here is the one the system boots every time the device is powered-on or reset.
- Golden: The ROMMON stored here is a backup copy. If the one in the primary is corrupted, the system automatically boots the ROMMON in the golden SPI flash device.

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 9600 Series Supervisor Modules. 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 (C9600-SUP-1) | ROMMON Version (C9600X-SUP-2) |
|---|---|---|
| Dublin 17.10.1 | 17.8.1r[FC1] | 17.10.1r |
| Cupertino 17.9.8 | 17.8.1r[FC1] | 17.7.1r[FC3] |
| Cupertino 17.9.7 | 17.8.1r[FC1] | 17.7.1r[FC3] |
| Cupertino 17.9.6a | 17.8.1r[FC1] | 17.7.1r[FC3] |
| Cupertino 17.9.6 | 17.8.1r[FC1] | 17.7.1r[FC3] |
| Cupertino 17.9.5 | 17.8.1r[FC1] | 17.7.1r[FC3] |
| Cupertino 17.9.4 | 17.8.1r[FC1] | 17.7.1r[FC3] |
| Cupertino 17.9.3 | 17.8.1r[FC1] | 17.7.1r[FC3] |
| Cupertino 17.9.2 | 17.8.1r[FC1] | 17.7.1r[FC3] |

| Release | ROMMON Version (C9600-SUP-1) | ROMMON Version (C9600X-SUP-2) |
|---|---|---|
| Cupertino 17.9.1 | 17.8.1r[FC1] | 17.7.1r[FC3] |
| Cupertino 17.8.1 | 17.8.1r[FC1] | 17.7.1r[FC3] |
| Cupertino 17.7.1 | 17.6.1r | 17.7.1r[FC3] |
| Bengaluru 17.6.8 | 17.6.1r | - |
| Bengaluru 17.6.7 | 17.6.1r | - |
| Bengaluru 17.6.6a | 17.6.1r | - |
| Bengaluru 17.6.6 | 17.6.1r | - |
| Bengaluru 17.6.5 | 17.6.1r | - |
| Bengaluru 17.6.4 | 17.6.1r | - |
| Bengaluru 17.6.3 | 17.6.1r | - |
| Bengaluru 17.6.2 | 17.6.1r | - |
| Bengaluru 17.6.1 | 17.6.1r | - |
| Bengaluru 17.5.1 | 17.3.1r[FC2] | - |
| Bengaluru 17.4.1 | 17.3.1r[FC2] | - |
| Amsterdam 17.3.8a | 17.3.1r[FC2] | - |
| Amsterdam 17.3.8 | 17.3.1r[FC2] | - |
| Amsterdam 17.3.7 | 17.3.1r[FC2] | - |
| Amsterdam 17.3.6 | 17.3.1r[FC2] | - |
| Amsterdam 17.3.5 | 17.3.1r[FC2] | - |
| Amsterdam 17.3.4 | 17.3.1r[FC2] | - |
| Amsterdam 17.3.3 | 17.3.1r[FC2] | - |
| Amsterdam 17.3.2a | 17.3.1r[FC2] | - |
| Amsterdam 17.3.1 | 17.3.1r[FC2] | - |
| Amsterdam 17.2.1 | 17.1.1[FC2] | - |
| Amsterdam 17.1.1 | 17.1.1[FC1] | - |



CHAPTER 8

# Upgrading the Switch Software


- Finding the Software Version, on page 25
- Software Images, on page 25
- Upgrading the ROMMON, on page 26
- Software Installation Commands, on page 26
- Upgrading in Install Mode, on page 27
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## 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 Dublin 17.10.1 | CAT9K_IOSXE | cat9k_iosxe.17.10.01.SPA.bin |
| | No Payload Encryption (NPE) | cat9k_iosxe_npe.17.10.01.SPA.bin |

# Upgrading the ROMMON

To know the ROMMON or bootloader version that applies to every major and maintenance release, see ROMMON Versions, on page 23.

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 Cisco StackWise Virtual setup, upgrade the active and standby supervisor modules.
- In case of a High Availability set up, upgrade the active and standby supervisor modules.

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

# Software Installation Commands

| **Summary of Software Installation Commands** | |
|---|---|
| To install and activate the specified file, and to commit changes to be persistent across reloads:<br>**`install add file`** *`filename`* [**`activate commit`**]<br>To separately install, activate, commit, cancel, or remove the installation file: **`install ?`** | |
| **add file tftp:** *filename* | Copies the install file package from a remote location to the device and performs a compatibility check for the platform and image versions. |
| **activate** [**auto-abort-timer**] | Activates the file, and reloads the device. The **auto-abort-timer** keyword automatically rolls back image activation. |
| **commit** | Makes changes persistent over reloads. |
| **rollback to committed** | Rolls back the update to the last committed version. |

| Summary of Software Installation Commands | |
|---|---|
| **abort** | Cancels file activation, and rolls back to the version that was running before the current installation procedure started. |
| **remove** | Deletes all unused and inactive software installation files. |

# Upgrading in Install Mode

Follow these instructions to upgrade from one release to another, 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

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

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

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

| When upgrading from ... | To... |
|---|---|
| Cisco IOS XE Cupertino 17.9.x or earlier releases | Cisco IOS XE Dublin 17.10.x |

The sample output in this section displays upgrade from Cisco IOS XE Cupertino 17.9.1 to Cisco IOS XE Dublin 17.10.1 using **install** commands.

### Procedure

**Step 1** Clean-up

**install remove inactive**

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

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

```
Switch# install remove inactive
install_remove: START Fri Nov 11 19:51:48 UTC 2022
Cleaning up unnecessary package files
```

```
Scanning boot directory for packages ... done.
Preparing packages list to delete ...
    cat9k-cc_srdriver.17.09.01.SPA.pkg
      File is in use, will not delete.
    cat9k-espbase.17.09.01.SPA.pkg
      File is in use, will not delete.
    cat9k-guestshell.17.09.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.09.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.09.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipbase.17.09.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.09.01.SPA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.09.01.SPA.pkg
      File is in use, will not delete.
    cat9k-webui.17.09.01.SPA.pkg
      File is in use, will not delete.
    cat9k-wlc.17.09.01.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.17.09.01.SPA.pkg
/flash/cat9k-espbase.17.09.01.SPA.pkg
/flash/cat9k-guestshell.17.09.01.SPA.pkg
/flash/cat9k-rpbase.17.09.01.SPA.pkg
/flash/cat9k-rpboot.17.09.01.SPA.pkg
/flash/cat9k-sipbase.17.09.01.SPA.pkg
/flash/cat9k-sipspa.17.09.01.SPA.pkg
/flash/cat9k-srdriver.17.09.01.SPA.pkg
/flash/cat9k-webui.17.09.01.SPA.pkg
/flash/cat9k-wlc.17.09.01.SPA.pkg
/flash/packages.conf

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

[switch 1]:
Deleting file flash:cat9k-cc_srdriver.17.09.01.SPA.pkg ... done.
Deleting file flash:cat9k-espbase.17.09.01.SPA.pkg ... done.
Deleting file flash:cat9k-guestshell.17.09.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpbase.17.09.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpboot.17.09.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipbase.17.09.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipspa.17.09.01.SPA.pkg ... done.
Deleting file flash:cat9k-srdriver.17.09.01.SPA.pkg ... done.
Deleting file flash:cat9k-webui.17.09.01.SPA.pkg ... done.
Deleting file flash:cat9k-wlc.17.09.01.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 Fri Nov 11 19:52:25 UTC 2022
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.17.10.01.SPA.bin flash:
destination filename [cat9k_iosxe.17.10.01.SPA.bin]?
Accessing tftp://10.8.0.6/image/cat9k_iosxe.17.10.01.SPA.bin...
Loading /cat9k_iosxe.17.10.01.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:*.bin**

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    Nov 11 2022 10:18:11 -07:00 cat9k_iosxe.17.10.01.SPA.bin
11353194496 bytes total (8976625664 bytes free)
```

**Step 3** Set boot variable

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

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

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

b) **no boot manual**

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

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

c) **write memory**

Use this command to save boot settings.

```
Switch# write memory
```

d) **show bootvar**

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

```
Switch# show bootvar
BOOT variable = bootflash:packages.conf
MANUAL_BOOT variable = no
BAUD variable = 9600
ENABLE_BREAK variable = yes
```

```
BOOTMODE variable does not exist
IPXE_TIMEOUT variable does not exist
CONFIG_FILE variable =

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

**Step 4** Install image to flash

**install add file activate commit**

Use this command to install the image.

We recommend that you point to the source image on a TFTP server or the flash , if you have copied the image to flash memory.

The following sample output displays installation of the Cisco IOS XE Dublin 17.10.1 software image to flash:

```
Switch# install add file flash:cat9k_iosxe.17.10.01.SPA.bin activate commit
_install_add_activate_commit: START Fri Nov 11 16:37:25 IST 2022

*Nov 11 16:37:26.544 IST: %INSTALL-5-INSTALL_START_INFO: R0/0: install_engine: Started
install one-shot flash:cat9k_iosxe.17.10.01.SPA.bin
install_add_activate_commit: Adding PACKAGE
install_add_activate_commit: Checking whether new add is allowed ....

This operation requires a reload of the system. Do you want to proceed?
Please confirm you have changed boot config to flash:packages.conf [y/n]y

--- Starting initial file syncing ---
Copying image file: flash:cat9k_iosxe.17.10.01.SPA.bin to standby
Info: Finished copying flash:cat9k_iosxe.17.10.01.SPA.bin to standby
Finished initial file syncing

--- Starting Add ---
Performing Add on Active/Standby
  [R0] Add package(s) on R0
  [R0] Finished Add on R0
  [R1] Add package(s) on R1
  [R1] Finished Add on R1
Checking status of Add on [R0 R1]
Add: Passed on [R0 R1]
Finished Add

Image added. Version: 17.10.01

install_add_activate_commit: Activating PACKAGE
Following packages shall be activated:
/flash/cat9k-wlc.17.10.01.SPA.pkg
/flash/cat9k-webui.17.10.01.SPA.pkg
/flash/cat9k-srdriver.17.10.01.SPA.pkg
/flash/cat9k-sipspa.17.10.01.SPA.pkg
/flash/cat9k-sipbase.17.10.01.SPA.pkg
/flash/cat9k-rpboot.17.10.01.SPA.pkg
/flash/cat9k-rpbase.17.10.01.SPA.pkg
/flash/cat9k-guestshell.17.10.01.SPA.pkg
/flash/cat9k-espbase.17.10.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.10.01.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
*Nov 11 16:45:21.695 IST: %INSTALL-5-INSTALL_AUTO_ABORT_TIMER_PROGRESS: R0/0: rollback_timer:
 Install auto abort timer will expire in 7200 seconds  [R0] Activate package(s) on R0
  [R0] Finished Activate on R0
  [R1] Activate package(s) on R1
  [R1] Finished Activate on R1
Checking status of Activate on [R0 R1]
Activate: Passed on [R0 R1]
Finished Activate

*Nov 11 16:45:25.233 IST: %INSTALL-5-INSTALL_AUTO_ABORT_TIMER_PROGRESS: R1/0: rollback_timer:
 Install auto abort timer will expire in 7200 seconds--- Starting Commit ---
Performing Commit on Active/Standby
  [R0] Commit package(s) on R0
  [R0] Finished Commit on R0
  [R1] Commit package(s) on R1
  [R1] Finished Commit on R1
Checking status of Commit on [R0 R1]
Commit: Passed on [R0 R1]
Finished Commit

Install will reload the system now!
SUCCESS: install_add_activate_commit  Fri Nov 11 16:46:18 IST 2022
```

**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:*.conf**

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

```
Switch# dir flash:*.pkg
Directory of flash:/*.pkg
Directory of flash:/
475140 -rw- 2012104    Jul 19 2022 09:52:41 -07:00 cat9k-cc_srdriver.17.09.01.SPA.pkg
475141 -rw- 70333380   Jul 19 2022 09:52:44 -07:00 cat9k-espbase.17.09.01.SPA.pkg
475142 -rw- 13256      Jul 19 2022 09:52:44 -07:00 cat9k-guestshell.17.09.01.SPA.pkg
475143 -rw- 349635524  Jul 19 2022 09:52:54 -07:00 cat9k-rpbase.17.09.01.SPA.pkg
475149 -rw- 24248187   Jul 19 2022 09:53:02 -07:00 cat9k-rpboot.17.09.01.SPA.pkg
475144 -rw- 25285572   Jul 19 2022 09:52:55 -07:00 cat9k-sipbase.17.09.01.SPA.pkg
475145 -rw- 20947908   Jul 19 2022 09:52:55 -07:00 cat9k-sipspa.17.09.01.SPA.pkg
475146 -rw- 2962372    Jul 19 2022 09:52:56 -07:00 cat9k-srdriver.17.09.01.SPA.pkg
475147 -rw- 13284288   Jul 19 2022 09:52:56 -07:00 cat9k-webui.17.09.01.SPA.pkg
475148 -rw- 13248      Jul 19 2022 09:52:56 -07:00 cat9k-wlc.17.09.01.SPA.pkg

491524 -rw- 25711568   Nov 11 2022 11:49:33 -07:00  cat9k-cc_srdriver.17.10.01.SPA.pkg
491525 -rw- 78484428   Nov 11 2022 11:49:35 -07:00  cat9k-espbase.17.10.01.SPA.pkg
491526 -rw- 1598412    Nov 11 2022 11:49:35 -07:00  cat9k-guestshell.17.10.01.SPA.pkg
491527 -rw- 404153288  Nov 11 2022 11:49:47 -07:00  cat9k-rpbase.17.10.01.SPA.pkg
491533 -rw- 31657374   Nov 11 2022 11:50:09 -07:00  cat9k-rpboot.17.10.01.SPA.pkg
491528 -rw- 27681740   Nov 11 2022 11:49:48 -07:00  cat9k-sipbase.17.10.01.SPA.pkg
491529 -rw- 52224968   Nov 11 2022 11:49:49 -07:00  cat9k-sipspa.17.10.01.SPA.pkg
491530 -rw- 31130572   Nov 11 2022 11:49:50 -07:00  cat9k-srdriver.17.10.01.SPA.pkg
491531 -rw- 14783432   Nov 11 2022 11:49:51 -07:00  cat9k-webui.17.10.01.SPA.pkg
```

```
491532 -rw- 9160       Nov 11 2022 11:49:51 -07:00  cat9k-wlc.17.10.01.SPA.pkg

11353194496 bytes total (8963174400 bytes free)
```

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

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

- `packages.conf`—the file that has been re-written with the newly installed .pkg files.
- `cat9k_iosxe.17.10.01.SPA.conf`— a backup copy of the newly installed packages.conf file.

```
Switch# dir flash:*.conf

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

16631  -rw- 4882 Nov 11 2022 05:39:42 +00:00  packages.conf
16634  -rw- 4882 Nov 11 2022 05:34:06 +00:00  cat9k_iosxe.17.10.01.SPA.conf
```

**Step 6** Verify version

**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 Dublin 17.10.1 image on the device:

```
Switch# show version
Cisco IOS XE Software, Version 17.10.01
Cisco IOS Software [Dublin], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.10.1,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2022 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 ... | To ... |
|---|---|
| Cisco IOS XE Dublin 17.10.x | Cisco IOS XE Cupertino 17.9.x or earlier releases. |

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

The sample output in this section shows downgrade from Cisco IOS XE Dublin 17.10.1 to Cisco IOS XE Cupertino 17.9.1, using **install** commands.

## Procedure

**Step 1** Clean-up

**install remove inactive**

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

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

```
Switch# install remove inactive
 install_remove: START Fri Nov 11 11:42:27 IST 2022

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.17.10.01.SSA.pkg
      File is in use, will not delete.
    cat9k-espbase.17.10.01.SSA.pkg
      File is in use, will not delete.
    cat9k-guestshell.17.10.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpbase.17.10.01.SSA.pkg
      File is in use, will not delete.
    cat9k-rpboot.17.10.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipbase.17.10.01.SSA.pkg
      File is in use, will not delete.
    cat9k-sipspa.17.10.01.SSA.pkg
      File is in use, will not delete.
    cat9k-srdriver.17.10.01.SSA.pkg
      File is in use, will not delete.
    cat9k-webui.17.10.01.SSA.pkg
      File is in use, will not delete.
    cat9k-wlc.17.10.01.SSA.pkg
      File is in use, will not delete.
    packages.conf
      File is in use, will not delete.
  done.
SUCCESS: No extra package or provisioning files found on media. Nothing to clean.

SUCCESS: install_remove  Fri Nov 11 11:42:39 IST 2022

--- Starting Post_Remove_Cleanup ---
```

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

SUCCESS: install_remove Fri Nov 11 19:52:25 UTC 2022
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.17.09.01.SPA.bin flash:
Destination filename [cat9k_iosxe.17.09.01.SPA.bin]?
Accessing tftp://10.8.0.6//cat9k_iosxe.17.09.01.SPA.bin...
Loading /cat9k_iosxe.17.09.01.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 11 2022 13:35:16 -07:00 cat9k_iosxe.17.09.01.SPA.bin
11353194496 bytes total (9055866880 bytes free)
```

**Step 3** Set boot variable

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

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

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

b) **no boot manual**

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

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

c) **write memory**

Use this command to save boot settings.

```
Switch# write memory
```

d) **show bootvar**

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

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

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

**Step 4** Downgrade software image

**install add file activate commit**

Use this command to install the image.

We recommend that you point to the source image on a TFTP server or the flash , if you have copied the image to flash memory.

The following example displays the installation of the Cisco IOS XE Cupertino 17.9.1 software image to flash, by using the **install add file activate commit** command.

```
Switch# install add file flash:cat9k_iosxe.17.09.01.SPA.bin activate commit
_install_add_activate_commit: START Fri Nov 11 21:37:25 IST 2022

*Nov 11 16:37:26.544 IST: %INSTALL-5-INSTALL_START_INFO: R0/0: install_engine: Started
install one-shot flash:cat9k_iosxe.17.09.01.SPA.bin
install_add_activate_commit: Adding PACKAGE
install_add_activate_commit: Checking whether new add is allowed ....

This operation requires a reload of the system. Do you want to proceed?
Please confirm you have changed boot config to flash:packages.conf [y/n]y

--- Starting initial file syncing ---
Copying image file: flash:cat9k_iosxe.17.09.01.SPA.bin to standby
Info: Finished copying flash:cat9k_iosxe.17.09.01.SPA.bin to standby
Finished initial file syncing

--- Starting Add ---
Performing Add on Active/Standby
  [R0] Add package(s) on R0
  [R0] Finished Add on R0
  [R1] Add package(s) on R1
  [R1] Finished Add on R1
Checking status of Add on [R0 R1]
Add: Passed on [R0 R1]
Finished Add

Image added. Version: 17.09.1
install_add_activate_commit: Activating PACKAGE
Following packages shall be activated:
/flash/cat9k-wlc.17.09.01.SPA.pkg
/flash/cat9k-webui.17.09.01.SPA.pkg
/flash/cat9k-srdriver.17.09.01.SPA.pkg
/flash/cat9k-sipspa.17.09.01.SPA.pkg
/flash/cat9k-sipbase.17.09.01.SPA.pkg
/flash/cat9k-rpboot.17.09.01.SPA.pkg
```

```
/flash/cat9k-rpbase.17.09.01.SPA.pkg
/flash/cat9k-guestshell.17.09.01.SPA.pkg
/flash/cat9k-espbase.17.09.01.SPA.pkg
/flash/cat9k-cc_srdriver.17.09.01.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

*Nov 11 21:45:21.695 IST: %INSTALL-5-INSTALL_AUTO_ABORT_TIMER_PROGRESS: R0/0: rollback_timer:
 Install auto abort timer will expire in 7200 seconds  [R0] Activate package(s) on R0
  [R0] Finished Activate on R0
  [R1] Activate package(s) on R1
  [R1] Finished Activate on R1
Checking status of Activate on [R0 R1]
Activate: Passed on [R0 R1]
Finished Activate


*Nov 11 21:45:25.233 IST: %INSTALL-5-INSTALL_AUTO_ABORT_TIMER_PROGRESS: R1/0: rollback_timer:
 Install auto abort timer will expire in 7200 seconds--- Starting Commit ---
Performing Commit on Active/Standby
  [R0] Commit package(s) on R0
  [R0] Finished Commit on R0
  [R1] Commit package(s) on R1
  [R1] Finished Commit on R1
Checking status of Commit on [R0 R1]
Commit: Passed on [R0 R1]
Finished Commit

Install will reload the system now!
SUCCESS: install_add_activate_commit  Fri Nov 11 21:46:18 IST 2022
```

**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 Cupertino 17.9.1 image on the device:

```
Switch# show version
Cisco IOS XE Software, Version 17.09.01
Cisco IOS Software [Cupertino], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 17.9.1,
 RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2022 by Cisco Systems, Inc.
<output truncated>
```

# Field-Programmable Gate Array Version Upgrade

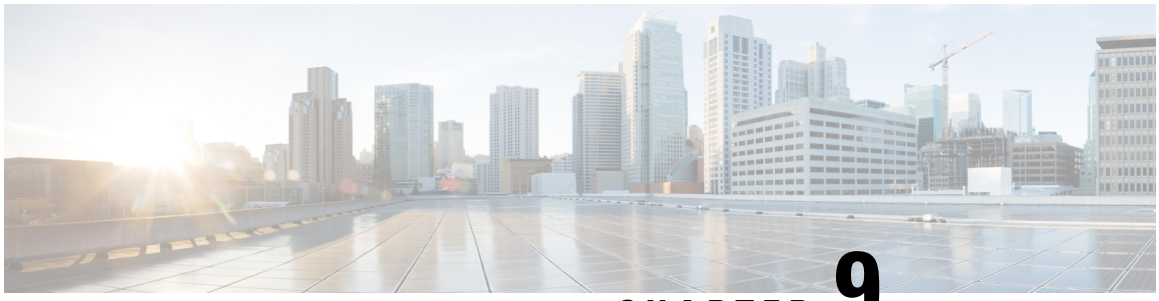
A field-programmable gate array (FPGA) is a type of programmable memory device that exists on Cisco switches. They are re-configurable logic circuits that enable the creation of specific and dedicated functions.

To check the current FPGA version, enter the **show firmware version all** command in privileged EXEC mode or 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.



CHAPTER 9

# Caveats


- Cisco Bug Search Tool, on page 39
- Open Caveats in Cisco IOS XE Dublin 17.10.x, on page 39
- Resolved Caveats in Cisco IOS XE Dublin 17.10.1, on page 39


## 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.

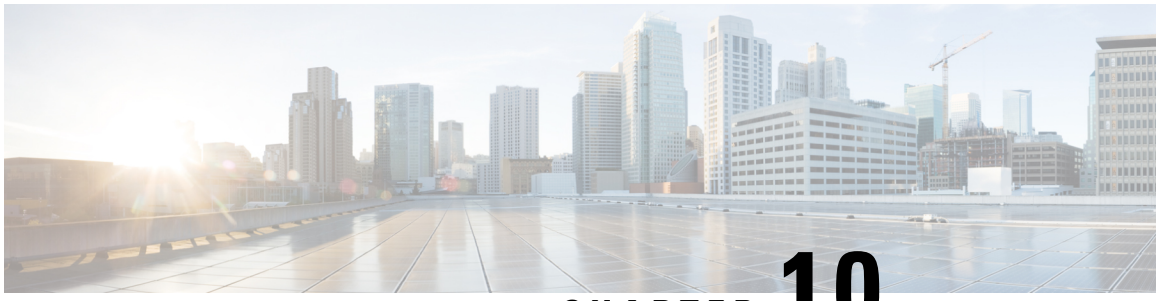
To view the details of a caveat, click on the identifier.

## Open Caveats in Cisco IOS XE Dublin 17.10.x

| Identifier | Headline |
|---|---|
| CSCwf67769 | 9500X/9600X SVL: Support permit/deny ACL logging on 9500X/9600X |
| CSCwq83338 | On the C9600 Dual-Sup, performing a redundancy force-switchover immediately after reaching STANDBY HOT causes the process to halt at "in progress to standby cold-config" |

## Resolved Caveats in Cisco IOS XE Dublin 17.10.1

| Identifier | Headline |
|---|---|
| CSCwb76541 | IOSd Crashes in "Call Home cert update" Process During Trustpool Download |



CHAPTER 10

# Additional Information


- Troubleshooting, on page 41
- Related Documentation, on page 41
- Communications, Services, and Additional Information, on page 41


## 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 9600 Series Switches is at this URL: https://www.cisco.com/c/en/us/support/switches/catalyst-9600-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.

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