Release Notes for Cisco Catalyst 9400 Series Switches, Cisco IOS XE Everest 16.6.x

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This release note gives an overview of the hardware and software with the Cisco IOS XE Everest 16.6.x, on the Cisco Catalyst 9400 Series Switches.

- For information about unsupported features, see Important Notes, page 2
- For information about software and hardware restrictions and limitations, see Limitations and Restrictions, page 30.
- For information about open issues with the software, see Caveats, page 31.

Introduction

Cisco Catalyst 9400 Series Switches are Cisco's leading modular enterprise switching access platform built for security, IoT and Cloud.

Cisco Catalyst 9400 Series Switches deliver complete convergence in terms of ASIC architecture with a Unified Access Data Plane (UADP) 2.0. The series forms the foundational building block for Software Defined-Access (SD-Access), which is Cisco's lead enterprise architecture.

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

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Important Notes

The following are the unsupported hardware and software features for the Cisco Catalyst 9400 Series Switches. For the list of supported features, go to http://www.cisco.com/go/cfn.

Unsupported hardware features

- The SFP or SFP+ port set-enabled LED remain off on the supervisor module. They remain Off even if the SFP or SFP+ ports are enabled.

Unsupported software features

- Audio Video Bridging (including IEEE802.1AS, IEEE 802.1Qat, and IEEE 802.1Qav)
- Bluetooth
- Boot Integrity Visibility
- Cisco Plug-in for OpenFlow 1.3
- Cisco StackWise Virtual
- Cisco TrustSec Network Device Admission Control (NDAC) on Uplinks
- Converged Access for Branch Deployments
- Gateway Load Balancing Protocol (GLBP)
- MACSec Encryption—Both host link encryption (downlinks) and inter network device encryption (uplinks), with 128-bit and 256-bit AES MACsec (IEEE 802.1AE)
- Network-Powered Lighting (including COAP Proxy Server, 2-event Classification, Perpetual POE, Fast PoE)
- VRF Aware Web-Authentication

Whats New in Cisco IOS XE Everest 16.6.2

Hardware Features in Cisco IOS XE Everest 16.6.2

Feature Name	Description and License Level Information
C9400-LC-24XS	Cisco Catalyst 9400 Series 24-Port SFP/SFP+ Module
C9400-LC-48UX	Cisco Catalyst 9400 Series 48-port, UPOE Multigigabit Ethernet Module with: • 24 ports (Ports 1 to 24) 1G UPOE 10/100/1000 (RJ-45) • 24 ports (Ports 25 to 48) UPOE Multigigabit
C9400-SUP-1XL	Cisco Catalyst 9400 Series Supervisor 1XL Module This supervisor module is supported on C9407R, C9410R chassis.

Software Features in Cisco IOS XE Everest 16.6.2

Feature Name	Description and License Level Information
New in Wired Switching	
Bidirectional Forwarding Detection	Bidirectional Forwarding Detection (BFD) is a detection protocol designed to provide fast forwarding path failure detection times for all media types, encapsulations, topologies, and routing protocols. In addition to fast forwarding path failure detection, BFD provides a consistent failure detection method for network administrators. (Network Essentials)
Cisco Discovery Protocol Bypass	A backward compatible mode, equivalent to not having Cisco Discovery Protocol support. When the feature is enabled, Cisco Discovery Protocol packets are received and transmitted unchanged. Received packets are not processed; no packets are generated. In this mode, 'bump-in-the-wire' behavior is applied to Cisco Discovery Protocol packets. See Security -> Cisco Discovery Protocol Bypass. (Network Essentials and Network Advantage)
EIGRP BFD	The EIGRP-BFD Support feature helps configure the Enhanced Interior Gateway Routing Protocol (EIGRP) with Bidirectional Forwarding Detection (BFD) so that EIGRP registers with BFD and receives all forwarding path detection failure messages from BFD. (Network Essentials)
Encrypted Traffic Analytics (ETA)	Studies the packet flow behavior of an application to determine the flow characteristics such as, malware analysis, and crypto audit. See Network Management -> Configuring Encrypted Traffic Analytics. (DNA Advantage)

Nonstop Forwarding with Stateful Switchover	The switch supports high availability or stateful switchover (SSO) by allowing a redundant supervisor engine to take over if a primary supervisor engine fails. Stateful switchover minimizes the time a network is unavailable to users following a switchover, while continuing to forward IP packets. The user session information is maintained during a switchover, and line cards continue to forward network traffic with no loss of sessions. Nonstop Forwarding (Network Advantage) Stateful Switchover (Network Essentials)
Software-Defined Access (SDA)	Provides the basic infrastructure for building virtual networks on policy-based segmentation constructs. It is based on Locator ID Separator Protocol (LISP) overlay network built on top of an arbitrary underlay network. Cisco IOS XE Everest 16.6.2 supports Layer 2 and Layer 3 overlay networks. This release introduces support for wireless devices on fabric edge nodes. You can now connect traditional Layer 2 networks, wireless access points, or end hosts to the fabric edge nodes. See *Campus Fabric* (Network Advantage)

Multiprotocol Label Switching • MPLS EM—MPLS Multipath (ECMP) LSP Tree Trace • MPLS Label Distribution Protocol (LDP) • MPLS LDP—Graceful Restart • MPLS LDP—Inbound Label Binding Filtering • MPLS LDP—Session Protection • MPLS Static Labels • MPLS Traceroute • MPLS Virtual Private Networks (VPNs) – MPLS VPN ID	The following MPLS features are introduced in this release: • MPLS—Combines the performance and capabilities of Layer 2 (data link layer) switching with the proven scalability of Layer 3 (network layer) routing. • MPLS Multipath LSP Tree Trace—Provides the means to discover all possible equal-cost multipath (ECMP) routing paths of a label switched path (LSP) between an egress and ingress router. Once discovered, these paths can be retested on a periodic basis using MPLS LSP ping or traceroute. • MPLS LDP—This protocol supports MPLS hop-by-hop forwarding by distributing bindings between labels and network prefixes. • MPLS LDP Graceful Restart—Assists a neighboring device that has MPLS LDP Stateful Switchover/Nonstop Forwarding (SSO/NSF) Support and Graceful Restart to recover gracefully from an interruption in service. • MPLS LDP Inbound Label Binding Filtering—MPLS LDP Inbound Label Binding Filtering helps to configure access control lists (ACLs) for controlling the label bindings a label switch router (LSR) accepts from its peer LSRs. • MPLS LDP Session Protection—Provides faster label distribution protocol convergence when a link recovers following an outage. MPLS LDP Session Protection protects an LDP session between directly connected neighbors or an LDP session established for a traffic engineering (TE) tunnel. • MPLS Static Labels—MPLS Static Labels provides the means to configure statically: – The binding between a label and an IPv4 prefix. – The contents of an LFIB crossconnect entry. • MPLS Traceroute—Helps service providers monitor label switched paths (LSPs) and quickly isolate MPLS forwarding problems. • MPLS VPN ID—Helps identify VPNs by a VPN identification number, as described in RFC 2685. The MPLS VPN ID feature is not used to control the distribution of routing information or to associate IP addresses with MPLS VPN ID numbers in routing updates. (Network Advantage)

Programmability • Zero-Touch Provisioning (ZTP) • Guest Shell • Preboot Execution Environment Client (iPXE) • Python APIs • Python CLI Module • EEM Python Module • NETCONF Programmable Interface • Model-Driven Telemetry • YANG Data Models • In-Service Model Updates	Programmability features introduced or enhanced in this release: • ZTP—Zero-Touch Provisioning automates the process of installing or upgrading software images, and installing configuration files on Cisco devices that are deployed in a network for the first time. It reduces manual tasks required to scale the network capacity. It also supports HTTP file download along with TFTP file download. (Network Essentials) • Guest Shell is a virtualized Linux-based environment, designed to run custom Linux applications, including Python for automated control and management of Cisco devices. It also includes the automated provisioning (Day zero) of systems. (DNA Essentials) • iPXE—An open Preboot eXecution Environment (PXE) client that allows a device to boot from a network boot image. iPXE is supported with IPv4 only. (Network Essentials) • Python APIs—Python programmability supports Python APIs. (DNA Essentials) • Python CLI Module—Python Programmability provides a Python module that allows users to interact with IOS using CLIs. (DNA Essentials) • EEM Python Module—Embedded Event Manager (EEM) policies support Python scripts. Python scripts can be executed as part of EEM actions in EEM applets. (DNA Essentials) • NETCONF—provides a simpler mechanism to install, manipulate, and delete the configuration of network devices. It uses an Extensible Markup Language (XML)-based data encoding for the configuration data as well as the protocol messages. (Network Essentials) • Model-Driven Telemetry—Provides a mechanism to stream data from a Model-Driven Telemetry-capable device, to a destination. The data to be streamed is driven through subscription. The feature is enabled automatically, when NETCONF-YANG is started on a device. (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/master/vendor/cisco/xe/1662. (Network Essentials) Revision statements embedded in the YANG files indicate if there has been a model revision. The *README.md* file in the same github location highlights changes that have been made in the release. • In-Service Model Updates—Adds new data models or extend functionality to existing data models. The In Service Model Update provides YANG model enhancements outside of a release cycle. (Network Essentials) See the Programmability Configuration Guide, Cisco IOS XE Everest 16.6.x.

Supported Hardware

Supported Cisco Catalyst 9400 Series Switches

For information about the available license levels, see section License Levels, page 27.

Table 1 Supported Switch Models

Product ID (PID) (append with "=" for spares)	Description
C9407R	Cisco Catalyst 9400 Series 7 slot chassis • Redundant supervisor module capability • Five switching module slots • Hot-swappable, front and rear serviceable fan tray assembly • Eight power supply module slots
C9410R	Cisco Catalyst 9400 Series 10 slot chassis • Redundant supervisor module capability • Eight switching module slots • Hot-swappable, front and rear serviceable fan tray assembly • Eight power supply module slots

Supported Hardware on Cisco Catalyst 9400 Series Switches

Table 2 Supported Hardware on Cisco Catalyst 9400 Series Switches

Product ID (append with "=" for spares)	Description
Supervisor Engines	
C9400-SUP-1	Cisco Catalyst 9400 Series Supervisor 1 Module This supervisor module is supported on C9407R, C9410R chassis
C9400-SUP-1XL	Cisco Catalyst 9400 Series Supervisor 1XL Module This supervisor module is supported on C9407R, C9410R chassis
Gigabit Ethernet Switching Modules	
C9400-LC-48T	Cisco Catalyst 9400 Series 48-Port 10/100/1000 (RJ-45)
C9400-LC-48U	Cisco Catalyst 9400 Series 48-Port UPOE 10/100/1000 (RJ-45)
TenGigabit Ethernet Switching Modules	
C9400-LC-24XS	Cisco Catalyst 9400 Series 24-Port SFP/SFP+ Module
Multigigabit Ethernet Switching Modules	

Table 2 Supported Hardware on Cisco Catalyst 9400 Series Switches

C9400-LC-48UX	Cisco Catalyst 9400 Series 48-port, UPOE Multigigabit Ethernet Module with: • 24 ports (Ports 1 to 24) 1G UPOE 10/100/1000 (RJ-45) • 24 ports (Ports 25 to 48) UPOE Multigigabit (mGig)
M.2 SATA SSD Modules[1] (for the Supervisor)	
C9400-SSD-240GB	Cisco Catalyst 9400 Series 240GB M2 SATA memory
C9400-SSD-480GB	Cisco Catalyst 9400 Series 480GB M2 SATA memory
C9400-SSD-960GB	Cisco Catalyst 9400 Series 960GB M2 SATA memory
Power Supply Modules	
C9400-PWR-3200AC	Cisco Catalyst 9400 Series 3200W AC Power Supply

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

Optics Modules

Catalyst switches support a wide range of optics. Because the list of supported optics is updated on a regular basis, consult the tables at this URL for the latest compatibility information:

http://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html

Compatibility Matrix

Table 3 Software Compatibility Matrix

Catalyst 9400 Release	Cisco Identity Services Engine	Cisco Access Control Server	Prime Infrastructure
Everest 16.6.2	2.2 2.3	5.4 5.5	PI 3.1.6 + Device Pack 13 See Prime Infrastructure 3.1 on cisco.com.
Everest 16.6.1	2.2	5.4 5.5	PI 3.1.6 + Device Pack 13 See Prime Infrastructure 3.1 on cisco.com.

Web UI System Requirements

The following sections list the hardware and software required to access the Web UI:

Hardware Requirements

Table 4 Minimum Hardware Requirements

Processor Speed	DRAM	Number of Colors	Resolution	Font Size
233 MHz minimum[1]	512 MB[2]	256	1024 x 768	Small

1. We recommend 1 GHz.
2. We recommend 1 GB DRAM.

Software Requirements

- Operating Systems
  - Windows 7 or later
  - Mac OS X 10.11 or later
- Browsers
  - Google Chrome—Version 38 and later (On Windows and Mac)
  - Microsoft Internet Explorer—Version 11 or later (On Windows 7 and Windows XP), and Microsoft Edge (On Windows 10)
  - Mozilla Firefox—Version 33 and later (On Windows and Mac)
  - Safari—Version 7 and later (On Mac)

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.

Table 5 Software Images

Release	Image	File Name
Cisco IOS XE Everest 16.6.2	CAT9K_IOSXE	cat9k_iosxe.16.06.02.SPA.bin
Cisco IOS XE Everest 16.6.2	Licensed Data Payload Encryption (LDPE)	cat9k_iosxeldpe.16.06.02.SPA.bin

Release	Image	File Name
Cisco IOS XE Everest 16.6.1	CAT9K_IOSXE	cat9k_iosxe.16.06.01.SPA.bin
Cisco IOS XE Everest 16.6.1	Licensed Data Payload Encryption (LDPE)	cat9k_iosxeldpe.16.06.01.SPA.bin

Upgrading the Switch Software

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

This section covers the following:

- Automatic Boot Loader Upgrade and CPLD Upgrade
- Upgrading in Install Mode
- Downgrading in Install Mode

Switch# **install add file** *filename* [**activate commit**]—Use this command to install and activate the specified file, and to commit changes to be persistent across reloads.	
Switch# **install ?** —You can also use the **install** command to separately install, activate, commit, abort, or remove the installation file.	
add file *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 the image activation.
commit	Makes changes persistent over reloads.
rollback to committed	Rolls back the update to the last committed version.
abort	Aborts the 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.

Automatic Boot Loader Upgrade and CPLD Upgrade

Automatic Boot Loader Upgrade

When you upgrade from the existing release on your switch to a later or newer release for the first time, the boot loader may be automatically upgraded, based on the hardware version of the switch. If the boot loader is upgraded, supervisor will automatically reload to enable the new boot loader. If you go back to the older release after this, the boot loader is not downgraded. The updated boot loader supports all previous releases.

For subsequent IOS XE Everest 16.x.x releases, if there is a new bootloader in that release, it may be automatically upgraded based on the hardware version of the switch when you boot up your switch with the new image for the first time.

During an upgrade, reload is not required; the system will auto reload, and the new rommon image will be available.

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

Note If Catalyst 9400 Supervisor1 power is removed and reapplied within a 5-second window, the boot SPI may get corrupted.

When upgrading from IOS XE Everest 16.6.1 to 16.6.2, for the first time, upgrade a single supervisor, and complete the boot loader and CPLD upgrade. After completing the first supervisor upgrade, remove and swap in the second supervisor. Once both supervisors are upgraded to IOS XE16.6.2, they can be inserted in high availability setup.

Note Do not upgrade dual supervisors from IOS XE Everest 16.6.1 to 16.6.2 at the same time to avoid hardware damage.

Caution Do not power cycle your switch during the upgrade.

Scenario	Automatic Boot Loader Response

If you boot Cisco IOS XE Everest 16.6.2 the first time	The boot loader may be upgraded to version 16.6.2r [FC1]. For example:
	`ROM: IOS-XE ROMMON`
	`BOOTLDR: System Bootstrap, Version 16.6.2r [FC1], RELEASE SOFTWARE (P)`
	
	If the automatic boot loader upgrade occurs while booting Cisco IOS XE Everest 16.6.2, you will see the following on the console:
	`%IOSXEBOOT-4-BOOTLOADER_UPGRADE: (rp/0): ### Fri Nov 03 18:42:58 Universal 2017 PLEASE DO NOT POWER CYCLE ### BOOT LOADER UPGRADING`
	`%IOSXEBOOT-4-BOOTLOADER_UPGRADE: (rp/0): boot loader upgrade successful`
	`%IOSXEBOOT-4-BOOTLOADER_UPGRADE: (rp/0): Reloading the Supervisor to enable the New BOOTLOADER`

If you boot Cisco IOS XE Everest 16.6.1 the first time	The boot loader may be upgraded to version 16.6.1r [FC2]. For example:
	`ROM: IOS-XE ROMMON`
	`BOOTLDR: System Bootstrap, Version 16.6.1r [FC2], RELEASE SOFTWARE`
	
	If the automatic boot loader upgrade occurs while booting Cisco IOS XE Everest 16.6.1, you will see the following on the console:
	`%IOSXEBOOT-Wed-###: (rp/0): Jul 26 16:57:44 Universal 2017 PLEASE DO NOT POWER CYCLE ###BOOT LOADER UPGRADING 4`
	
	`Both links down, not waiting for other switches`
	`Switch number is 1`
	`%IOSXEBOOT-loader-boot: (rp/0): upgrade successful 4`

CPLD Upgrade

During the automatic boot loader upgrade, mcnewfpgaclose.hdr and mcnewfpgaclose.img are copied to the bootflash. The supervisor automatically reloads to enable the new boot loader.

When the new boot loader boots up, the complex programmable logic device (CPLD) upgrade process starts automatically. The CPLD upgrade process will take approximately from 7 to 10 minutes. The supervisor will power cycle itself during the CPLD upgrade.

Caution Do not unplug power or remove the supervisor during the upgrade.

The following is sample output from CPLD upgrade:

```
Initializing Hardware...
Initializing Hardware...
Initializing Hardware...

System Bootstrap, Version 16.6.2r, RELEASE SOFTWARE (P)
Compiled Thu 10/26/2017 8:30:34.63 by rel

Current image running:
Primary Rommon Image
Last reset cause: SoftwareResetTrig
C9400-SUP-1 platform with 16777216 Kbytes of main memory
```

```
Starting System FPGA Upgrade .....
Programming SPI Primary image is completed.
Authenticating SPI Primary image .....
IO FPGA image is authenticated successfully.

Programming Header .....
FPGA HDR file size: 12
Image page count: 1
Verifying programmed header .....
Verifying programmed header .....
Programmed header is verified successfully.

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

Power Cycle is needed to complete System firmware upgrade.
It takes ~7 mins to upgrade firmware after power cycle starts.

DO NOT DISRUPT AFTER POWER CYCLE UNTIL ROMMON PROMPT APPEARS.

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

Power Cycling the Supervisor card now !
Initializing Hardware...
Initializing Hardware...

System Bootstrap, Version 16.6.2r, RELEASE SOFTWARE (P)
Compiled Thu 10/26/2017 8:30:34.63 by rel
Current image running:
Primary Rommon Image
Last reset cause: PowerOn
C9400-SUP-1 platform with 16777216 Kbytes of main memory

rommon 1 >version -v
System Bootstrap, Version 16.6.2r, RELEASE SOFTWARE (P)
Compiled Thu 10/26/2017 8:30:34.63 by rel

Current image running:
Primary Rommon Image
Last reset cause: PowerOn
C9400-SUP-1 platform with 16777216 Kbytes of main memory
Fpga Version: 0x17101705
System Integrity Status: C334ABCE 6A40 6A48
```

Upgrading in Install Mode

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

The sample output in this section covers upgrade from Cisco IOS XE Everest 16.6.1 to Cisco IOS XE Everest 16.6.2 in Install Mode.

Summary Steps—Clean Up > Copy New Image to Flash > Software Install Image to Flash > Reload

Clean Up

Step 1 Ensure that you have at least 1GB of space in flash to expand a new image. Clean up old installation files in case of insufficient space.

```
Switch# install remove inactive
```

```
install_remove: START Tue Jun 20 14:14:40 PDT 2017
Cleaning up unnecessary package files
No path specified, will use booted path flash:packages.conf
Cleaning flash:
  Scanning boot directory for packages ... done.
  Preparing packages list to delete ...
    cat9k-cc_srdriver.16.06.01.SPA.pkg
      File is in use, will not delete.
    cat9k-espbase.16.06.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpbase.16.06.01.SPA.pkg
      File is in use, will not delete.
    cat9k-rpboot.16.06.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipbase.16.06.01.SPA.pkg
      File is in use, will not delete.
    cat9k-sipspa.16.06.01.SPA.pkg
      File is in use, will not delete.
    cat9k-srdriver.B16.06.01.SPA.pkg
      File is in use, will not delete.
    cat9k-webui.16.06.01.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.16.06.01.SPA.pkg
/flash/cat9k-espbase.16.06.01.SPA.pkg
/flash/cat9k-rpbase.16.06.01.SPA.pkg
/flash/cat9k-rpboot.16.06.01.SPA.pkg
/flash/cat9k-sipbase.16.06.01.SPA.pkg
/flash/cat9k-sipspa.16.06.01.SPA.pkg
/flash/cat9k-srdriver.16.06.01.SPA.pkg
/flash/cat9k-webui.16.06.01.SPA.pkg
/flash/cat9k_1.bin
/flash/cat9k_1.conf
/flash/cat9k_2.1.conf
/flash/cat9k_2.bin
/flash/cat9k_2.conf
/flash/cat9k_iosxe.16.06.01.SSA.bin
/flash/packages.conf.00-

Do you want to remove the above files? [y/n]y
[R0]:
Deleting file flash:cat9k-cc_srdriver.16.06.01.SPA.pkg ... done.
Deleting file flash:cat9k-espbase.16.06.01.SPA.pkg ... done.
Deleting file
Deleting file flash:cat9k-rpbase.16.06.01.SPA.pkg ... done.
Deleting file flash:cat9k-rpboot.16.06.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipbase.B16.06.01.SPA.pkg ... done.
Deleting file flash:cat9k-sipspa.16.06.01.SPA.pkg ... done.
Deleting file flash:cat9k-srdriver.16.06.01.SPA.pkg ... done.
Deleting file flash:cat9k-webui.16.06.01.SPA.pkg ... done.
Deleting file flash:cat9k_1.bin ... done.
Deleting file flash:cat9k_1.conf ... done.
Deleting file flash:cat9k_2.1.conf ... done.
Deleting file flash:cat9k_2.bin ... done.
Deleting file flash:cat9k_2.conf ... done.
Deleting file flash:cat9k_iosxe.16.06.01.SSA.bin ... done.
Deleting file flash:packages.conf.00- ... done.
SUCCESS: Files deleted.
```

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

SUCCESS: install_remove  Tue Jun 20 14:16:29 PDT 2017
Switch#
```

Copy New Image to Flash

Step 2 Copy the new image to flash: (or skip this step if you want to use the new image from your TFTP server)

```
Switch# copy tftp://10.8.0.6//cat9k_iosxe.16.06.02.SPA.bin flash:
Destination filename [cat9k_iosxe.16.06.02.SPA.bin]?

Accessing tftp://10.8.0.6//cat9k_iosxe.16.06.02.SPA.bin...
Loading /cat9k_iosxe.16.06.02.SPA.bin from 10.8.0.6 (via GigabitEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 601216545 bytes]

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

Step 3 Use the **dir flash** command to confirm that the image has been successfully copied to flash.

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

Directory of flash:/

434184  -rw-   601216545  Jul 26 2017 10:18:11 -07:00  cat9k_iosxe.16.06.02.SPA.bin
11353194496 bytes total (8976625664 bytes free)
```

Software Install Image to Flash

Step 4 Use the **install add file activate commit** command to install the target image to flash. You can point to the source image on your TFTP server or in flash if you have it copied to flash.

```
Switch# install add file flash:cat9k_iosxe.16.06.02.SPA.bin activate commit

install_add_activate_commit: START Fri Jun  9 22:49:41 UTC 2017

*Jun  9 22:49:42.772: %IOSXE-5-PLATFORM: Switch 1 R0/0: Jun  9 22:49:42
install_engine.sh: %INSTALL-5-INSTALL_START_INFO: Started install one-shot
flash:cat9k_iosxe.16.06.02.SPA.bin
install_add_activate_commit: Adding PACKAGE

--- Starting initial file syncing ---
Info: Finished copying flash:cat9k_iosxe.16.06.02.SPA.bin to the selected switch(es)
Finished initial file syncing

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

install_add_activate_commit: Activating PACKAGE
```

```
/flash/cat9k-webui.16.06.02.SPA.pkg
/flash/cat9k-srdriver.16.06.02.SPA.pkg
/flash/cat9k-sipspa.16.06.02.SPA.pkg
/flash/cat9k-sipbase.16.06.02.SPA.pkg
/flash/cat9k-rpboot.16.06.02.SPA.pkg
/flash/cat9k-rpbase.16.06.02.SPA.pkg
/flash/cat9k-guestshell.16.06.02.SPA.pkg
/flash/cat9k-espbase.16.06.02.SPA.pkg
/flash/cat9k-cc_srdriver.16.06.02.SPA.pkg

This operation requires a reload of the system. Do you want to proceed? [y/n]y
--- Starting Activate ---
Performing Activate on all members
  [1] Activate package(s) on switch 1
  [1] Finished Activate on switch 1
Checking status of Activate on [1]
Activate: Passed on [1]
Finished Activate

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

Install will reload the system now!

Chassis 1 reloading, reason - Reload command
SUCCESS: install_add_activate_commit
/flash/cat9k-webui.16.06.02.SPA.pkg
/flash/cat9k-srdriver.16.06.02.SPA.pkg
/flash/cat9k-sipspa.16.06.02.SPA.pkg
/flash/cat9k-sipbase.16.06.02.SPA.pkg
/flash/cat9k-rpboot.16.06.02.SPA.pkg
/flash/cat9k-rpbase.16.06.02.SPA.pkg
/flash/cat9k-guestshell.16.06.02.SPA.pkg
/flash/cat9k-espbase.16.06.02.SPA.pkg
/flash/cat9k-cc_srdriver.16.06.02.SPA.pkg
Fri Jun  9 22:53:58 UTC 2017
Switch#
```

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

Step 5 After the software has been successfully installed, verify that the flash partition has nine new .pkg files and three .conf files. See sample output below.

```
Switch# dir flash:*.pkg

Directory of flash:/*.pkg

Directory of flash:/

475140  -rw-     2012104  Jul 26 2017 09:52:41 -07:00
cat9k-cc_srdriver.16.05.01a.SPA.pkg
475141  -rw-    70333380  Jul 26 2017 09:52:44 -07:00  cat9k-espbase.16.06.02.SPA.pkg
475142  -rw-       13256  Jul 26 2017 09:52:44 -07:00
cat9k-guestshell.16.06.02.SPA.pkg
475143  -rw-   349635524  Jul 26 2017 09:52:54 -07:00  cat9k-rpbase.16.06.02.SPA.pkg
475149  -rw-    24248187  Jul 26 2017 09:53:02 -07:00  cat9k-rpboot.16.06.02.SPA.pkg
```

```
475144  -rw-    25285572  Jul 26 2017 09:52:55 -07:00  cat9k-sipbase.16.06.02.SPA.pkg
475145  -rw-    20947908  Jul 26 2017 09:52:55 -07:00  cat9k-sipspa.16.06.02.SPA.pkg
475146  -rw-     2962372  Jul 26 2017 09:52:56 -07:00  cat9k-srdriver.16.06.02.SPA.pkg
475147  -rw-    13284288  Jul 26 2017 09:52:56 -07:00  cat9k-webui.16.06.02.SPA.pkg
475148  -rw-       13248  Jul 26 2017 09:52:56 -07:00  cat9k-wlc.16.06.02.SPA.pkg
516099  -rw-     5297096  Jul 26 2017 10:57:44 -07:00
cat9k-cc_srdriver.16.06.02.SPA.pkg
516100  -rw-    80946116  Jul 26 2017 10:57:46 -07:00  cat9k-espbase.16.06.02.SPA.pkg
516101  -rw-     1536964  Jul 26 2017 10:57:47 -07:00
cat9k-guestshell.16.06.02.SPA.pkg
516102  -rw-   376865728  Jul 26 2017 10:57:57 -07:00  cat9k-rpbase.16.06.02.SPA.pkg
516107  -rw-    29545049  Jul 26 2017 10:58:08 -07:00  cat9k-rpboot.16.06.02.SPA.pkg
516103  -rw-    27669444  Jul 26 2017 10:57:58 -07:00  cat9k-sipbase.16.06.02.SPA.pkg
516104  -rw-    55440320  Jul 26 2017 10:58:00 -07:00  cat9k-sipspa.16.06.02.SPA.pkg
516105  -rw-    11813828  Jul 26 2017 10:58:00 -07:00  cat9k-srdriver.16.06.02.SPA.pkg
516106  -rw-    12248000  Jul 26 2017 10:58:00 -07:00  cat9k-webui.16.06.02.SPA.pkg
11353194496 bytes total (8963174400 bytes free)
```

In the following sample output that displays the .conf files in the flash partition, note the three .conf files:

- packages.conf— the file that has been re-written with the newly installed .pkg files.
- packages.conf.00—backup file of the previously installed image.
- cat9k_iosxe.16.06.02.SPA.conf— a copy of packages.conf and not used by the system.

```
Switch# dir flash:*.conf

Directory of flash:/*.conf

Directory of flash:/

434197  -rw-        7406  Jul 26 2017 10:59:16 -07:00  packages.conf
434196  -rw-        7504  Jul 26 2017 10:59:16 -07:00  packages.conf.00-
516098  -rw-        7406  Jul 26 2017 10:58:08 -07:00  cat9k_iosxe.16.06.02.SPA.conf
11353194496 bytes total (8963174400 bytes free)
```

Reload

Step 6 Reload the switch

```
Switch# reload
```

Step 7 If your switches are configured with auto boot, then the switch will automatically boot up with the new image. If not, you can manually boot flash:packages.conf

```
Switch: boot flash:packages.conf
```

Step 8 When the new image boots up, verify the version of the new image, using the **show version** command:

Note When you boot the new image, it will automatically update the boot loader, but the new bootloader version is not displayed in the output until the next reload.

```
Switch# show version

Cisco IOS XE Software, Version 16.06.02
Cisco IOS Software [Everest], Catalyst L3 Switch Software (CAT9K_IOSXE), Version
16.6.2, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
```

```
Copyright (c) 1986-2017 by Cisco Systems, Inc.
Compiled Wed 01-Nov-17 07:26 by mcpre


Cisco IOS-XE software, Copyright (c) 2005-2017 by cisco Systems, Inc.
All rights reserved.  Certain components of Cisco IOS-XE software are
licensed under the GNU General Public License ("GPL") Version 2.0.  The
software code licensed under GPL Version 2.0 is free software that comes
with ABSOLUTELY NO WARRANTY.  You can redistribute and/or modify such
GPL code under the terms of GPL Version 2.0.  For more details, see the
documentation or "License Notice" file accompanying the IOS-XE software,
or the applicable URL provided on the flyer accompanying the IOS-XE
software.


ROM: IOS-XE ROMMON
BOOTLDR: System Bootstrap, Version 16.6.2r[FC1], RELEASE SOFTWARE (P)

Switch uptime is 7 hours, 36 minutes
Uptime for this control processor is 7 hours, 24 minutes
System returned to ROM by SSO Switchover
System image file is "flash:packages.conf"
Last reload reason: redundancy force-switchover



This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

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


Technology Package License Information:

------------------------------------------------------------------
Technology-package                  Technology-package
Current             Type            Next reboot
------------------------------------------------------------------
network-essentials  Evaluation      network-essentials

cisco C9407R (X86) processor (revision V00) with 869104K/6147K bytes of memory.
Processor board ID FXS2119Q2U7
1 Virtual Ethernet interface
96 Gigabit Ethernet interfaces
88 Ten Gigabit Ethernet interfaces
4 Forty Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
15958488K bytes of physical memory.
11161600K bytes of Bootflash at bootflash:.
1638400K bytes of Crash Files at crashinfo:.
0K bytes of WebUI ODM Files at webui:.

Configuration register is 0x102
Switch#
```

Downgrading in Install Mode

Note New hardware introduced in this release cannot be downgraded, so we recommend upgrading all existing switches to Cisco IOS XE Everest 16.6.2. For the list of models introduced in this release, see Hardware Features in Cisco IOS XE Everest 16.6.2

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

The sample output in this section covers downgrade from Cisco IOS XE Everest 16.6.2 to Cisco IOS XE Everest 16.6.1 in Install Mode.

Summary Steps—Clean Up > Copy New Image to Flash > Downgrade Software Image > Reload

Clean Up

Step 1 Ensure that you have at least 1GB of space in flash to expand a new image. Clean up old installation files in case of insufficient space.

```
Switch# install remove inactive

install_remove: START Tue Jun 20 14:14:40 PDT 2017
Cleaning up unnecessary package files
No path specified, will use booted path flash:packages.conf
Cleaning flash:
  Scanning boot directory for packages ... done.
  Preparing packages list to delete ...
    cat9k-cc_srdriver.16.06.02.SPA.pkg
      File is in use, will not delete.
    cat9k-espbase.16.06.02.SPA.pkg
      File is in use, will not delete.
    cat9k-guestshell.16.06.02.SPA.pkg
      File is in use, will not delete.
    cat9k-rpbase.16.06.02.SPA.pkg
      File is in use, will not delete.
    cat9k-rpboot.16.06.02.SPA.pkg
      File is in use, will not delete.
    cat9k-sipbase.16.06.02.SPA.pkg
      File is in use, will not delete.
    cat9k-sipspa.16.06.02.SPA.pkg
      File is in use, will not delete.
    cat9k-srdriver.16.06.02.SPA.pkg
      File is in use, will not delete.
    cat9k-webui.16.06.02.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.16.06.02.SPA.pkg
/flash/cat9k-espbase.16.06.02.SPA.pkg
/flash/cat9k-guestshell.16.06.02.SPA.pkg
/flash/cat9k-rpbase.16.06.02.SPA.pkg
/flash/cat9k-rpboot.16.06.02.SPA.pkg
/flash/cat9k-sipbase.16.06.02.SPA.pkg
```

```
/flash/cat9k-sipspa.16.06.02.SPA.pkg
/flash/cat9k-srdriver.16.06.02.SPA.pkg
/flash/cat9k-webui.pkg
/flash/cat9k_1.bin
/flash/cat9k_1.conf
/flash/cat9k_2.1.conf
/flash/cat9k_2.bin
/flash/cat9k_2.conf
/flash/cat9k_iosxe.16.06.02.SSA.bin
/flash/packages.conf.00-

Do you want to remove the above files? [y/n]y
[R0]:
Deleting file flash:cat9k-cc_srdriver.16.06.02.SPA.pkg ... done.
Deleting file flash:cat9k-espbase.16.06.02.SPA.pkg ... done.
Deleting file flash:cat9k-guestshell.16.06.02.SPA.pkg ... done.
Deleting file flash:cat9k-rpbase.16.06.02.SPA.pkg ... done.
Deleting file flash:cat9k-rpboot.16.06.02.SPA.pkg ... done.
Deleting file flash:cat9k-sipbase.16.06.02.SPA.pkg ... done.
Deleting file flash:cat9k-sipspa.16.06.02.SPA.pkg ... done.
Deleting file flash:cat9k-srdriver.16.06.02.SPA.pkg ... done.
Deleting file flash:cat9k-webui.16.06.02.SPA.pkg ... done.
Deleting file flash:cat9k_1.bin ... done.
Deleting file flash:cat9k_1.conf ... done.
Deleting file flash:cat9k_2.1.conf ... done.
Deleting file flash:cat9k_2.bin ... done.
Deleting file flash:cat9k_2.conf ... done.
Deleting file flash:cat9k_iosxe.B16.06.02.bin ... done.
Deleting file flash:packages.conf.00- ... done.
SUCCESS: Files deleted.
--- Starting Post_Remove_Cleanup ---
Performing Post_Remove_Cleanup on Active/Standby
  [R0] Post_Remove_Cleanup package(s) on R0
  [R0] Finished Post_Remove_Cleanup on R0
Checking status of Post_Remove_Cleanup on [R0]
Post_Remove_Cleanup: Passed on [R0]
Finished Post_Remove_Cleanup

SUCCESS: install_remove  Tue Jun 20 14:16:29 PDT 2017
Switch#
```

Copy New Image to Flash

Step 2 Copy the target Cisco IOS XE Everest 16.6.1 image to flash: (you can skip this step if you want to use the image from your TFTP server).

```
Switch# copy tftp://10.8.0.6//cat9k_iosxe.16.06.01.SPA.bin flash:
Destination filename [cat9k_iosxe.16.06.01.SPA.bin]?

Accessing tftp://10.8.0.6//cat9k_iosxe.16.06.01.SPA.bin...
Loading /cat9k_iosxe.16.06.01.SPA.bin from 10.8.0.6 (via GigabitEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 508584771 bytes]

508584771 bytes copied in 101.005 secs (5035244 bytes/sec)
```

Step 3 Use the **dir flash** command to confirm that the image has been successfully copied to flash.

```
Switch# dir flash:*.bin

Directory of flash:/*.bin
```

```
Directory of flash:/

434184  -rw-   508584771  Jul 26 2017 13:35:16 -07:00  cat9k_iosxe.16.06.01.SPA.bin
11353194496 bytes total (9055866880 bytes free)
```

Downgrade Software Image

Step 4 Use the **install add file activate commit** command, to downgrade your switch. You can point to the source image on your tftp server or in flash if you have it copied to flash.

```
Switch# install add file flash:cat9k_iosxe.16.06.01.SPA.bin activate commit

install_add_activate_commit: START Fri Jun  9 22:49:41 UTC 2017

*Jun  9 22:49:42.772: %IOSXE-5-PLATFORM: Switch 1 R0/0: Jun  9 22:49:42
install_engine.sh: %INSTALL-5-INSTALL_START_INFO: Started install one-shot
flash:cat9k_iosxe.16.06.01.SPA.bin
install_add_activate_commit: Adding PACKAGE

--- Starting initial file syncing ---
Info: Finished copying flash:cat9k_iosxe.16.06.01.SPA.bin to the selected switch(es)
Finished initial file syncing

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

install_add_activate_commit: Activating PACKAGE

/flash/cat9k-webui.16.06.01.SPA.pkg
/flash/cat9k-srdriver.16.06.01.SPA.pkg
/flash/cat9k-sipspa.16.06.01.SPA.pkg
/flash/cat9k-sipbase.16.06.01.SPA.pkg
/flash/cat9k-rpboot.16.06.01.SPA.pkg
/flash/cat9k-rpbase.16.06.01.SPA.pkg
/flash/cat9k-espbase.16.06.01.SPA.pkg
/flash/cat9k-cc_srdriver.16.06.01.SPA.pkg

This operation requires a reload of the system. Do you want to proceed? [y/n]y
--- Starting Activate ---
Performing Activate on all members
  [1] Activate package(s) on switch 1
  [1] Finished Activate on switch 1
Checking status of Activate on [1]
Activate: Passed on [1]
Finished Activate

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

Install will reload the system now!

Chassis 1 reloading, reason - Reload command
```

```
SUCCESS: install_add_activate_commit
/flash/cat9k-webui.16.06.01.SPA.pkg
/flash/cat9k-srdriver.16.06.01.SPA.pkg
/flash/cat9k-sipspa.16.06.01.SPA.pkg
/flash/cat9k-sipbase.16.06.01.SPA.pkg
/flash/cat9k-rpboot.16.06.01.SPA.pkg
/flash/cat9k-rpbase.16.06.01.SPA.pkg
/flash/cat9k-guestshell.16.06.01.SPA.pkg
/flash/cat9k-espbase.16.06.01.SPA.pkg
/flash/cat9k-cc_srdriver.16.06.01.SPA.pkg
Fri Jun  9 22:53:58 UTC 2017
Switch#
```

To downgrade your switch, you can also use the **install rollback to committed** command.

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

```
Switch# install rollback to committed

install_rollback: START Thu Nov  2 14:24:56 UTC 2017

This operation requires a reload of the system. Do you want to proceed? [y/n]
                                                                          *Nov  2
14:24:57.555: %IOSXE-5-PLATFORM:  R0/0: Nov  2 14:24:57 install_engine.sh:
%INSTALL-5-INSTALL_START_INFO: Started install rollbacky
--- Starting Rollback ---
Performing Rollback on Active/Standby

WARNING: Found 55 disjoint TDL objects.
  [R0] Rollback package(s) on R0
    --- Starting rollback impact ---
    Changes that are part of this rollback
    Current    :  rp 0 0   rp_boot         cat9k-rpboot.16.06.02.SPA.pkg
    Current    :  rp 1 0   rp_boot         cat9k-rpboot.16.06.02.SPA.pkg
    Replacement:  rp 0 0   rp_boot         cat9k-rpboot.16.06.01.SPA.pkg
    Replacement:  rp 1 0   rp_boot         cat9k-rpboot.16.06.01.SPA.pkg
    Current    :   cc 0  0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
    Current    :   cc 0 0   cc              cat9k-sipbase.16.06.02.SPA.pkg
    Current    :   cc 0 0   cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
    Current    :   cc 1  0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
    Current    :   cc 1 0   cc              cat9k-sipbase.16.06.02.SPA.pkg
    Current    :   cc 1 0   cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
    Current    :   cc 10 0  cc              cat9k-sipbase.16.06.02.SPA.pkg
    Current    :   cc 10 0  cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
    Current    :   cc 10 0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
    Current    :   cc 2  0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
    Current    :   cc 2 0   cc              cat9k-sipbase.16.06.02.SPA.pkg
    Current    :   cc 2 0   cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
    Current    :   cc 3  0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
    Current    :   cc 3 0   cc              cat9k-sipbase.16.06.02.SPA.pkg
    Current    :   cc 3 0   cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
    Current    :   cc 4  0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
    Current    :   cc 4 0   cc              cat9k-sipbase.16.06.02.SPA.pkg
    Current    :   cc 4 0   cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
    Current    :   cc 5  0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
    Current    :   cc 5 0   cc              cat9k-sipbase.16.06.02.SPA.pkg
    Current    :   cc 5 0   cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
    Current    :   cc 6  0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
    Current    :   cc 6 0   cc              cat9k-sipbase.16.06.02.SPA.pkg
    Current    :   cc 6 0   cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
```

```
Current     :   cc 7  0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
Current     :   cc 7 0   cc              cat9k-sipbase.16.06.02.SPA.pkg
Current     :   cc 7 0   cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
Current     :   cc 8  0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
Current     :   cc 8 0   cc              cat9k-sipbase.16.06.02.SPA.pkg
Current     :   cc 8 0   cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
Current     :   cc 9  0  cc_srdriver     cat9k-cc_srdriver.16.06.02.SPA.pkg
Current     :   cc 9 0   cc              cat9k-sipbase.16.06.02.SPA.pkg
Current     :   cc 9 0   cc_spa          cat9k-sipspa.16.06.02.SPA.pkg
Current     :   fp 0 0   fp              cat9k-espbase.16.06.02.SPA.pkg
Current     :   fp 1 0   fp              cat9k-espbase.16.06.02.SPA.pkg
Current     :   rp 0 0   guestshell      cat9k-guestshell.16.06.02.SPA.pkg
Current     :   rp 0 0   rp_base         cat9k-rpbase.16.06.02.SPA.pkg
Current     :   rp 0 0   rp_daemons      cat9k-rpbase.16.06.02.SPA.pkg
Current     :   rp 0 0   rp_iosd         cat9k-rpbase.16.06.02.SPA.pkg
Current     :   rp 0 0   rp_security     cat9k-rpbase.16.06.02.SPA.pkg
Current     :   rp 0 0   rp_webui        cat9k-webui.16.06.02.SPA.pkg
Current     :   rp 0 0   rp_wlc        cat9k-wlc.16.06.02.SPA.pkg
Current     :   rp 0 0   srdriver        cat9k-srdriver.16.06.02.SPA.pkg
Current     :   rp 1 0   guestshell      cat9k-guestshell.16.06.02.SPA.pkg
Current     :   rp 1 0   rp_base         cat9k-rpbase.16.06.02.SPA.pkg
Current     :   rp 1 0   rp_daemons      cat9k-rpbase.16.06.02.SPA.pkg
Current     :   rp 1 0   rp_iosd         cat9k-rpbase.16.06.02.SPA.pkg
Current     :   rp 1 0   rp_security     cat9k-rpbase.16.06.02.SPA.pkg
Current     :   rp 1 0   rp_webui        cat9k-webui.16.06.02.SPA.pkg
Current     :   rp 1 0   rp_wlc        cat9k-wlc.16.06.02.SPA.pkg
Current     :   rp 1 0   srdriver        cat9k-srdriver.16.06.02.SPA.pkg
Replacement:   cc 0  0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 0 0   cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 0 0   cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   cc 1  0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 1 0   cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 1 0   cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   cc 10 0  cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 10 0  cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   cc 10 0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 2  0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 2 0   cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 2 0   cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   cc 3  0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 3 0   cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 3 0   cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   cc 4  0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 4 0   cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 4 0   cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   cc 5  0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 5 0   cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 5 0   cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   cc 6  0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 6 0   cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 6 0   cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   cc 7  0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 7 0   cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 7 0   cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   cc 8  0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 8 0   cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 8 0   cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   cc 9  0  cc_srdriver     cat9k-cc_srdriver.16.06.01.SPA.pkg
Replacement:   cc 9 0   cc              cat9k-sipbase.16.06.01.SPA.pkg
Replacement:   cc 9 0   cc_spa          cat9k-sipspa.16.06.01.SPA.pkg
Replacement:   fp 0 0   fp              cat9k-espbase.16.06.01.SPA.pkg
Replacement:   fp 1 0   fp              cat9k-espbase.16.06.01.SPA.pkg
Replacement:   rp 0 0   guestshell      cat9k-guestshell.16.06.01.SPA.pkg
Replacement:   rp 0 0   rp_base         cat9k-rpbase.16.06.01.SPA.pkg
```

```
    Replacement:   rp 0 0   rp_daemons      cat9k-rpbase.16.06.01.SPA.pkg
    Replacement:   rp 0 0   rp_iosd         cat9k-rpbase.16.06.01.SPA.pkg
    Replacement:   rp 0 0   rp_security     cat9k-rpbase.16.06.01.SPA.pkg
    Replacement:   rp 0 0   rp_webui        cat9k-webui.16.06.01.SPA.pkg
    Replacement:   rp 0 0   srdriver        cat9k-srdriver.16.06.01.SPA.pkg
    Replacement:   rp 1 0   guestshell      cat9k-guestshell.16.06.01.SPA.pkg
    Replacement:   rp 1 0   rp_base         cat9k-rpbase.16.06.01.SPA.pkg
    Replacement:   rp 1 0   rp_daemons      cat9k-rpbase.16.06.01.SPA.pkg
    Replacement:   rp 1 0   rp_iosd         cat9k-rpbase.16.06.01.SPA.pkg
    Replacement:   rp 1 0   rp_security     cat9k-rpbase.16.06.01.SPA.pkg
    Replacement:   rp 1 0   rp_webui        cat9k-webui.16.06.01.SPA.pkg
    Replacement:   rp 1 0   srdriver        cat9k-srdriver.16.06.01.SPA.pkg
    Finished rollback impact
  [R0] Finished Rollback on R0
Checking status of Rollback on [R0]
Rollback: Passed on [R0]
Finished Rollback

Install will reload the system now!
SUCCESS: install_rollback  Thu Nov  2 14:26:35 UTC 2017

Switch#
*Nov  2 14:26:35.880: %IOSXE-5-PLATFORM:  R0/0: Nov  2 14:26:35 install_engine.sh:
%INSTALL-5-INSTALL_COMPLETED_INFO: Completed install rollback PACKAGE
*Nov  2 14:26:37.740: %IOSXE_OIR-6-REMCARD: Card (rp) removed from slot R1
*Nov  2 14:26:39.253: %IOSXE_OIR-6-INSCARD: Card (rp) inserted in slot R1Nov  2
14:26:5

Initializing Hardware...

System Bootstrap, Version 16.6.2r[FC1], RELEASE SOFTWARE (P)
Compiled Tue 10/31/2017 11:38:44.98 by rel

Current image running:
Primary Rommon Image

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

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

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

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

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           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706
```

```
Cisco IOS Software [Everest], Catalyst L3 Switch Software (CAT9K_IOSXE), Version
16.6.1, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
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software.



FIPS: Flash Key Check : Begin
FIPS: Flash Key Check : End, Not Found, FIPS Mode Not Enabled

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

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

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

%INIT: waited 0 seconds for NVRAM to be available

Press RETURN to get started!
```

Step 5 If your switches are configured with auto boot, then the switch will automatically boot up with the new image. If not, you can manually boot flash:packages.conf

```
Switch: boot flash:packages.conf
```

Step 6 When the new image boots up, you can verify the version of the new image, by checking **show version**

Note In the output, note that the boot loader is not automatically downgraded. It will remain updated.

```
Switch# show version

isco IOS XE Software, Version 16.06.01
Cisco IOS Software [Everest], Catalyst L3 Switch Software (CAT9K_IOSXE), Version
16.6.1, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
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Compiled Sat 22-Jul-17 05:51 by mcpre


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documentation or "License Notice" file accompanying the IOS-XE software,
or the applicable URL provided on the flyer accompanying the IOS-XE
software.


ROM: IOS-XE ROMMON
BOOTLDR: System Bootstrap, Version 16.6.2r[FC2], RELEASE SOFTWARE (P)

Switch uptime is 1 minute
Uptime for this control processor is 2 minutes
System returned to ROM by reload
System image file is "bootflash:packages.conf"
Last reload reason: LocalSoft



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Technology Package License Information:

------------------------------------------------------------------
Technology-package                  Technology-package
Current             Type            Next reboot
------------------------------------------------------------------
network-advantage   Permanent       network-advantage

cisco C9410R (X86) processor (revision V00) with 868521K/6147K bytes of memory.
Processor board ID FXS2118Q1GM
1 Virtual Ethernet interface
```

```
312 Gigabit Ethernet interfaces
24 Ten Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
15958516K bytes of physical memory.
11161600K bytes of Bootflash at bootflash:.
1638400K bytes of Crash Files at crashinfo:.
0K bytes of WebUI ODM Files at webui:.

Configuration register is 0x2
Switch#
```

Licensing

This section provides information about the licensing packages for features available on Cisco Catalyst 9000 Series Switches.

License Levels

The software features available on Cisco Catalyst 9000 Series Switches fall under the base or add-on license levels.

Base Licenses

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

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

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

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

License Types

The following license types are available:

- Permanent—for a license level, and without an expiration date.
- Term— for a license level, and for a three, five, or seven year period.
- Evaluation—for a license level, preinstalled on the device, and for a 90-day trial period only.

Ordering with Smart Accounts

We recommend that you use Smart Accounts to order devices as well as licenses. Smart Accounts enable you to manage all of your software licenses for switches, routers, firewalls, access-points or tools from one centralized website. To create Smart Accounts, use the Cisco Smart Software Manager (Cisco SSM).

Note This is especially relevant to the term licenses that you order, because information about the expiry of term licenses is available only through the Cisco SSM website.

For information more information about Cisco SSM, see:
http://www.cisco.com/c/en/us/buy/smart-accounts/software-licensing.html

The possible deployment modes are:

- Right-to-use (RTU) licensing mode—Supported on Cisco Catalyst 9000 Series Switches. See The RTU Licensing Mode, page 28.

The RTU Licensing Mode

This is the currently supported licensing mode for Cisco Catalyst 9000 Series Switches.

Right-to-use (RTU) licensing allows you to order and activate a specific license type for a given license level, and then to manage license usage on your switch.

Note The RTU licensing structure has been modified to match the packaging model that will be used with Smart Licensing mode in the future. Unified licensing structures across the RTU and Smart Licensing modes, along with usage reports, will simplify migration and reduce the implementation time required for Smart Licensing.

The **license right-to-use** command (privilege EXEC mode) provides options to activate or deactivate any license supported on the platform.

Options for Base Licenses

license right-to-use [**activate** | **deactivate**] [**network-essentials** | **network-advantage**] [**evaluation** | **subscription**] [**active** | **both** | **standby**] [**acceptEULA**]

Options for Add-On Licenses

license right-to-use [**activate** | **deactivate**] **addon** {**dna-essentials** | **dna-advantage**} {**evaluation** | **subscription**} [**active** | **both** | **standby**] [**acceptEULA**]

Usage Guidelines for the RTU Licensing Mode

- Base licenses (Network Essentials and Network-Advantage) may be ordered only with a permanent license type.
- Add-on licenses (DNA Essentials and DNA Advantage) may be ordered only with a term license type.

  You can set up Cisco SSM to receive daily e-mail alerts, to be notified of expiring add-on licenses that you want to renew.

  You must order an add-on license in order to purchase a switch. On term expiry, you can either renew the add-on license to continue using it, or deactivate the add-on license and then reload the switch to continue operating with the base license capabilities.
- When ordering an add-on license with a base license, note the combinations that are permitted and those that are not permitted:

Table 6 Permitted Combinations

	DNA Essentials	DNA Advantage
Network Essentials	Yes	No
Network Advantage	Yes[1]	Yes

1. For this combination, the DNA-Essentials license must be ordered separately using Cisco SSM.

- The following features are currently available only at the Network Advantage license level. However, the correct minimum license level for these features is Network Essentials and the CFN reflects this correct license level.

  You will be able to configure the feature with a Network Essentials license level after the correction is made in an upcoming release.

  – IPv6 Multicast

  – IPv6 ACL Support for HTTP Servers
- Evaluation licenses cannot be ordered. They can be activated temporarily, without purchase. Warning system messages about the evaluation license expiry are generated 10 and 5 days before the 90-day window. Warning system messages are generated every day after the 90-day period. An expired evaluation license cannot be reactivated after reload.

For detailed configuration information about using the RTU Licensing Mode, see the System Management > Configuring Right-To-Use Licenses chapter in the software configuration guide.

Scaling Guidelines

For information about feature scaling guidelines, see these datasheets for Cisco Catalyst 9400 Series Switches:

http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9400-series-switches/datasheet-c78-739055.html

http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-9400-series-switches/datasheet-c78-739053.html

Limitations and Restrictions

- Cisco TrustSec restrictions—Cisco TrustSec can be configured only on physical interfaces, not on logical interfaces.
- Flexible NetFlow (FNF) 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 switched virtual interfaces (SVIs), port-channel, loopback, tunnels.
  - You can not configure multiple flow monitors of the same type (ipv4, ipv6 or datalink) on the same interface, in the same direction.
- Memory leak—When a logging discriminator is configured and applied to a device, memory leak is seen under heavy syslog or debug output. The rate of the leak is dependent on the quantity of logs produced. In extreme cases, the device may fail. As a workaround, disable the logging discriminator on the device.
- QoS restrictions:
  - When configuring QoS queuing policy, the sum of the queuing buffer should not exceed 100%.
  - For QoS policies, only SVIs are supported for logical interfaces.
  - QoS policies are not supported for port-channel interfaces, tunnel interfaces, and other logical interfaces.
- Redundancy—The supervisor module (hardware) supports redundancy. Software redundancy is supported in IOS XE Everest 16.6.2. The associated route processor redundancy (RPR) feature is currently not supported.
  Use the **show redundancy** and **show platform software iomd redundancy** commands to ensure that both SSO formed and IOMD is ready before doing any switchover.
- Secure Shell (SSH)
  - Use SSH Version 2. SSH Version 1 is not supported.
  - When the device is running SCP (Secure Copy Protocol) 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 Install— The commands are visible on the CLI in Cisco IOS XE Everest 16.6.1, but the feature is not supported. Enter the **no vstack** command in global configuration mode and disable the feature.
- Uplink Symmetry—When a redundant supervisor is inserted, it is recommended to have symmetric uplinks, so that packet loss during a switchover is minimal.
  - Uplinks are said to be in symmetry when the same interface in both supervisors have the same type of transceiver module. A TenGigabitEthernet interface with no transceiver operates at default 10G mode, and if the matching interface of the other supervisor has a 10G transceiver, then they are in symmetry. Symmetry gives best SWO packet loss and user experience.
  - Asymmetric uplinks have at least one or more pairs of interfaces in one supervisor not matching the transceiver speed of the other supervisor.

Caveats

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

Cisco Bug Search Tool

The 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 Everest 16.6.x

The following are the open caveats in this release:

Identifier	Headline
CSCve21940	Catalyst 9400 cannot ping phone/data client with IPSG .
CSCvf98661	CISP/NEAT: When authenticator is re-booted CISP trunk goes to err-disabled state.
CSCvg00911	PVLAN client entry moves to STALE state when for Active client with DHCP Snooping.
CSCvg08401	Catalyst 9400 IOMD crashed on new active@iomd_timer_handler during 1st SWO (interim).
CSCvg09754	IPv6 PBR not working after an SSO.
CSCvg24428	CISP client table is empty after link connected and clients authz.
CSCvg26068	16.6.2 LDP traffic do not resume after SSO with multiple core facing SVI.
CSCvg38873	Catalyst 9400-LC-24XS: Some transceivers become unsupported when doing SFP OIR after Active Sup OIR.
CSCvf39207	L2pt tunnel moving to err-disable state when point-to-point lacp links are shut and no shut.
CSCvg39909	Catalyst 9400 switch will not increment output drop counters.
CSCvg46929	Catalyst 9400 Process flash_util,Hman crashed on latest v166_throttle on multiple reload issued.
CSCvg60597	Catalyst 9400-SUP-1: On uplinks, speed config of 10m/100m on GLC-T results in traffic failure.
CSCvg81945	Catalyst 9400: Standby SUP might crash during bootup on 10 slot chassis with 8 LC.
CSCvg55327	Catalyst 9400: 10 slot chassis may fail to boot with 4 or more than 4 linecards when slot 10 is empty.
CSCvg78413	Catalyst 9400: "sh idprom" for New ECI number.

Resolved Caveats in Cisco IOS XE Everest 16.6.2

The following are the resolved caveats in Cisco IOS XE Everest 16.6.2.

Identifier	Description
CSCve20614	Snmpset is failing for Dot3PauseExtAdminMode object on x86 image.
CSCve78881	Catalyst 9400: OIDs have to be unique for 40G QSFPs under 'show inventory oid' output.
CSCve95723	For few copper SFP, the **show inventory** command does not show PID data.
CSCvf06005	CRC error packets are observed on peer: (Local port: with 1G-->100M speed change).
CSCvf75518	Controller port error interface.

Troubleshooting

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

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

Choose **Product Support > Switches**. Then choose your product and click **Troubleshoot and Alerts** to find information for the problem that you are experiencing.

Related Documentation

- Cisco Catalyst 9400 Series Switches documentation at this URL:

  http://www.cisco.com/go/c9400
- Cisco IOS XE 16 documentation at this URL:

  http://www.cisco.com/c/en/us/products/ios-nx-os-software/ios-xe/index.html
- Cisco transceiver module documentation, including compatibility information at this URL:

  http://www.cisco.com/en/US/products/hw/modules/ps5455/tsd_products_support_series_home.html
- Cisco Validated Designs documents at this URL:

  http://www.cisco.com/go/designzone

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html

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