



## **Cisco Nexus 5000 Series NX-OS Fundamentals Configuration Guide, Release 5.1(3)N2(1)**

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## CONTENTS

---

### Preface

#### Preface xi

Audience xi

Document Conventions xi

Documentation Feedback xiii

Obtaining Documentation and Submitting a Service Request xiii

---

### CHAPTER 1

#### New and Changed Information 1

New and Changed Information for this Release 1

---

### CHAPTER 2

#### Overview 3

Fibre Channel over Ethernet 3

Data Center I/O Consolidation 4

Virtual Interfaces 4

Typical Deployment Topologies 5

Ethernet Switching 5

FCoE and Fibre Channel Switching 5

QoS 5

Virtual Port Channels 6

Serviceability 6

Switched Port Analyzer 6

Ethalyzer 6

Call Home 6

Online Diagnostics 7

Switch Management 7

Simple Network Management Protocol 7

Role-Based Access Control 7

Configuration Methods 7

Configuring with CLI, XML Management Interface, or SNMP	7
Configuring with Cisco Data Center Network Manager	7
Configuring with Cisco MDS Fabric Manager	8
Network Security Features	8
Virtual Device Contexts	8
Licensing	8
Ethernet TOR Switch Topology	8
Fabric Extender Deployment Topology	10
Data Center I/O Consolidation Topology	11
Supported Standards	11

---

**CHAPTER 3****Using the Cisco NX-OS Setup Utility 13**

Configuring the Switch	13
Image Files on the Switch	13
Starting the Switch	13
Boot Sequence	14
Console Settings	15
Upgrading the Switch Software	15
Downgrading from a Higher Release	17
Initial Configuration	19
Configuration Prerequisites	19
Initial Setup	19
Preparing to Configure the Switch	19
Default Login	20
Configuring the Switch	20
Changing the Initial Configuration	24
Management Interface Configuration	24
About the mgmt0 Interface	25
Configuring the Management Interface	25
Displaying Management Interface Configuration	26
Shutting Down the Management Interface	26

---

**CHAPTER 4****Using PowerOn Auto Provisioning 27**

Information About PowerOn Auto Provisioning	27
Network Requirements for POAP	27

POAP Configuration Script	28
POAP Process	29
Power-Up Phase	30
DHCP Discovery Phase	30
Script Execution Phase	31
Post-Installation Reload Phase	32
Guidelines and Limitations for POAP	32
Setting Up the Network Environment To Use POAP	33
Configuring a Switch Using POAP	33
Verifying the Device Configuration	34
Related Documents for POAP	34

---

**CHAPTER 5**

<b>Understanding the Command-Line Interface</b>	<b>35</b>
Finding Feature Information	36
Information About the CLI Prompt	36
Command Modes	36
EXEC Command Mode	37
Global Configuration Command Mode	37
Interface Configuration Command Mode	37
Subinterface Configuration Command Mode	38
Saving and Restoring a Command Mode	38
Exiting a Configuration Command Mode	39
Command Mode Summary	39
Special Characters	40
Keystroke Shortcuts	41
Abbreviating Commands	43
Completing a Partial Command Name	44
Identifying Your Location in the Command Hierarchy	44
Using the no Form of a Command	45
Configuring CLI Variables	46
About CLI Variables	46
Configuring CLI Session-Only Variables	46
Configuring Persistent CLI Variables	47
Command Aliases	48
About Command Aliases	48

Defining Command Aliases	48
Configuring Command Aliases for a User Session	49
Command Scripts	49
Running a Command Script	50
Echoing Information to the Terminal	50
Delaying Command Action	51
Context-Sensitive Help	51
Understanding Regular Expressions	53
Special Characters	53
Multiple-Character Patterns	53
Anchoring	54
Searching and Filtering show Command Output	54
Filtering and Searching Keywords	55
diff Utility	56
grep and egrep Utilities	57
less Utility	58
sed Utility	58
sort Utility	58
Searching and Filtering from the --More-- Prompt	59
Using the Command History	60
Recalling a Command	60
Controlling CLI History Recall	61
Configuring the CLI Edit Mode	61
Displaying the Command History	61
Enabling or Disabling the CLI Confirmation Prompts	62
Setting CLI Display Colors	62
Sending Commands to Modules	63
BIOS Loader Prompt	64
Examples Using the CLI	64
Defining Command Aliases	64
Using CLI Session Variables	64
Using the System-Defined Timestamp Variable	65
Running a Command Script	65
Additional References for the CLI	66
Related Documents for the CLI	66

---

**CHAPTER 6****Configuring Terminal Settings and Sessions 67**

- Finding Feature Information 67
- Information About Terminal Settings and Sessions 67
  - Terminal Session Settings 68
    - Console Port 68
    - COM1 Port 68
    - Virtual Terminals 69
  - Licensing Requirements for Terminal Settings and Sessions 69
  - Configuring the Console Port 69
  - Configuring the COM1 Port 71
  - Configuring Virtual Terminals 72
    - Configuring the Inactive Session Timeout 72
    - Configuring the Session Limit 73
  - Configuring Modem Connections 74
    - Enabling a Modem Connection 74
    - Downloading the Default Initialization String 75
    - Configuring and Downloading a User-Specified Initialization String 77
    - Initializing a Modem for a Powered-Up Cisco NX-OS Device 78
  - Clearing Terminal Sessions 78
  - Displaying Terminal and Session Information 79
  - Default Settings for File System Parameters 79
  - Additional References for Terminal Settings and Sessions 80
    - Related Documents for Terminal Settings and Sessions 80

---

**CHAPTER 7****Basic Device Management 81**

- Finding Feature Information 81
- Information About Basic Device Management 82
  - Device Hostname 82
  - Message-of-the-Day Banner 82
  - EXEC Banner 82
  - Device Clock 82
  - Clock Manager 82
  - Time Zone and Summer Time (Daylight Saving Time) 82
  - User Sessions 83

Licensing Requirements for Basic Device Management	83
Changing the Device Hostname	83
Configuring the MOTD Banner	84
Configuring the EXEC Banner	85
Configuring the Time Zone	86
Configuring Summer Time (Daylight Saving Time)	87
Manually Setting the Device Clock	88
Setting the Clock Manager	88
Managing Users	89
Displaying Information about the User Sessions	89
Sending a Message to Users	90
Verifying the Device Configuration	90
Default Settings for Basic Device Parameters	90
Additional References for Basic Device Management	91
Related Documents for Basic Device Management	91

**CHAPTER 8****Using the Device File Systems, Directories, and Files 93**

Finding Feature Information	93
Information about the External Storage Devices, Device File Systems, Directories, and Files	93
File Systems	94
Directories	94
Files	95
Licensing Requirements for File Systems, Directories, and Files	95
Working with Directories	95
Identifying the Current Directory	95
Changing the Current Directory	95
Creating a Directory	96
Displaying Directory Contents	96
Deleting a Directory	97
Accessing Directories on the Standby Supervisor Module	97
Working with Files	98
Moving Files	98
Copying Files	98
Deleting Files	99

Displaying File Contents	100
Displaying File Checksums	100
Compressing and Uncompressing Files	100
Displaying the Last Lines in a File	101
Redirecting show Command Output to a File	101
Finding Files	102
Working with Archive Files	102
Creating an Archive Files	102
Appending Files to an Archive File	103
Extracting Files from an Archive File	104
Displaying the Filenames in an Archive File	105
Examples of Using the File System	105
Accessing Directories on Standby Supervisor Modules	105
Moving Files	105
Copying Files	106
Deleting a Directory	106
Displaying File Contents	107
Displaying File Checksums	107
Compressing and Uncompressing Files	107
Redirecting show Command Output	108
Finding Files	108
Default Settings for File System Parameters	108
Additional References for File Systems	108
Related Documents for File Systems	109
<b>CHAPTER 9</b>	
<b>Working with Configuration Files</b>	<b>111</b>
Finding Feature Information	111
Information About Configuration Files	111
Types of Configuration Files	112
Licensing Requirements for Configuration Files	112
Managing Configuration Files	112
Saving the Running Configuration to the Startup Configuration	112
Copying a Configuration File to a Remote Server	113
Downloading the Running Configuration From a Remote Server	114
Downloading the Startup Configuration From a Remote Server	115

Copying Configuration Files to an External Flash Memory Device	116
Copying the Running Configuration from an External Flash Memory Device	117
Copying Configuration Files to an Internal File System	117
Rolling Back to a Previous Configuration	118
Removing the Configuration for a Missing Module	119
Erasing a Configuration	120
Clearing Inactive Configurations	120
Verifying the Device Configuration	121
Examples of Working with Configuration Files	122
Copying Configuration Files	122
Backing Up Configuration Files	122
Rolling Back to a Previous Configuration	122
Additional References for Configuration Files	122
Related Documents for Configuration Files	123



## Preface

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The Preface contains the following sections:

- [Audience, page xi](#)
- [Document Conventions, page xi](#)
- [Documentation Feedback, page xiii](#)
- [Obtaining Documentation and Submitting a Service Request, page xiii](#)

## Audience

This publication is for network administrators who configure and maintain Cisco Nexus devices and Cisco Nexus 2000 Series Fabric Extenders.

## Document Conventions



### Note

As part of our constant endeavor to remodel our documents to meet our customers' requirements, we have modified the manner in which we document configuration tasks. As a result of this, you may find a deviation in the style used to describe these tasks, with the newly included sections of the document following the new format.

Command descriptions use the following conventions:

Convention	Description
<b>bold</b>	Bold text indicates the commands and keywords that you enter literally as shown.
<i>Italic</i>	Italic text indicates arguments for which the user supplies the values.
[x]	Square brackets enclose an optional element (keyword or argument).

Convention	Description
[x   y]	Square brackets enclosing keywords or arguments separated by a vertical bar indicate an optional choice.
{x   y}	Braces enclosing keywords or arguments separated by a vertical bar indicate a required choice.
[x {y   z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
<i>variable</i>	Indicates a variable for which you supply values, in context where italics cannot be used.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Examples use the following conventions:

Convention	Description
<code>screen font</code>	Terminal sessions and information the switch displays are in screen font.
<b><code>boldface screen font</code></b>	Information you must enter is in boldface screen font.
<i><code>italic screen font</code></i>	Arguments for which you supply values are in italic screen font.
<>	Nonprinting characters, such as passwords, are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

This document uses the following conventions:



**Note**

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.



**Caution**

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

## Documentation Feedback

To provide technical feedback on this document, or to report an error or omission, please send your comments to: [ciscodfa-docfeedback@cisco.com](mailto:ciscodfa-docfeedback@cisco.com).

We appreciate your feedback.

## Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation*, at: <http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html>.

Subscribe to *What's New in Cisco Product Documentation*, which lists all new and revised Cisco technical documentation as an RSS feed and delivers content directly to your desktop using a reader application. The RSS feeds are a free service.





# CHAPTER 1

## New and Changed Information

This chapter contains the following sections:

- [New and Changed Information for this Release](#) , page 1

## New and Changed Information for this Release

The following table provides an overview of the significant changes to this guide for this current release. The table does not provide an exhaustive list of all changes made to the configuration guide or of the new features in this release.

**Table 1: New Features**

Feature	Description	Where Documented
Power On Auto-Provisioning	Power On Auto Provisioning (POAP) automates the process of upgrading software images and installing configuration files on Nexus switches that are being deployed in the network for the first time.	<a href="#">Using PowerOn Auto Provisioning, on page 27</a>





## CHAPTER 2

# Overview

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This chapter contains the following sections:

- [Fibre Channel over Ethernet, page 3](#)
- [Data Center I/O Consolidation, page 4](#)
- [Virtual Interfaces, page 4](#)
- [Typical Deployment Topologies, page 5](#)
- [Supported Standards, page 11](#)

## Fibre Channel over Ethernet

Fibre Channel over Ethernet (FCoE) allows Fibre Channel traffic to be encapsulated over a physical Ethernet link. FCoE frames use a unique EtherType so that FCoE traffic and standard Ethernet traffic can be carried on the same link.

Classic Ethernet is a best-effort protocol; in the event of congestion, Ethernet will discard packets, relying on higher level protocols to provide retransmission and other reliability mechanisms. Fibre Channel traffic requires a lossless transport layer; as a data storage protocol, it is unacceptable to lose a single data packet. Native Fibre Channel implements a lossless service at the transport layer using a buffer-to-buffer credit system.

For FCoE traffic, the Ethernet link must provide a lossless service. Ethernet links on Cisco Nexus devices provide two mechanisms to ensure lossless transport for FCoE traffic: link-level flow control and priority flow control.

IEEE 802.3x link-level flow control allows a congested receiver to signal the far end to pause the data transmission for a short period of time. The pause functionality is applied to all the traffic on the link.

The priority flow control (PFC) feature applies pause functionality to specific classes of traffic on the Ethernet link. For example, PFC can provide lossless service for the FCoE traffic and best-effort service for the standard Ethernet traffic. PFC can provide different levels of service to specific classes of Ethernet traffic (using IEEE 802.1p traffic classes).

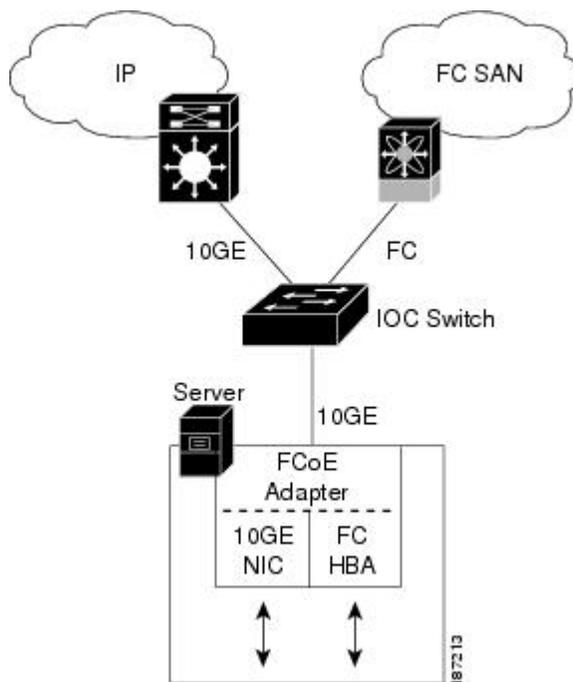
# Data Center I/O Consolidation

I/O consolidation allows a single network technology to carry IP, SAN, and IPC traffic. FCoE is the single network technology that allows I/O consolidation. The upper Fibre Channel layers are unchanged, so the Fibre Channel operational model is maintained. FCoE network management and configuration is similar to a native Fibre Channel network.

Cisco Nexus devices use FCoE to carry Fibre Channel and Ethernet traffic on the same physical Ethernet connection between the switch and the server. At the server, the connection terminates to a converged network adapter (CNA). The adapter presents two interfaces to the server's operating system (OS): one Ethernet NIC interface and one Fibre Channel host bus adapter (HBA) interface.

The server OS is not aware of the FCoE encapsulation (see the following figure). At the switch, the incoming Ethernet port separates the Ethernet and Fibre Channel traffic (using EtherType to differentiate the frames). Ethernet frames and Fibre Channel frames are switched to their respective network-side interfaces.

**Figure 1: I/O Consolidation**



Cisco Nexus devices provide quality of service (QoS) capabilities to ensure lossless or best-effort service across the switch. For Fibre Channel traffic (FCoE) you should apply the lossless QoS classes. By default, best-effort service is applied to all of the Ethernet traffic. You can configure different QoS levels for specific classes of Ethernet traffic.

## Virtual Interfaces

When FCoE is enabled, a physical Ethernet cable carries traffic for a logical Fibre Channel connection.

The Cisco Nexus device uses virtual interfaces to represent the logical Fibre Channel connections. For configuration purposes, virtual Fibre Channel interfaces are implemented as Layer 2 subinterfaces of the physical Ethernet interface.

Ethernet features (such as the link debounce timer and VLAN membership) are configured on the physical Ethernet interface. Logical Fibre Channel features (such as VSAN membership) are configured on the virtual Fibre Channel interfaces.

## Typical Deployment Topologies

### Ethernet Switching

Cisco Nexus devices are Layer 2 devices, which run Cisco NX-OS.

Cisco Nexus devices are designed to support high-density, high-performance Ethernet systems and provide the following Ethernet switching features:

- IEEE 802.1D-2004 Rapid and Multiple Spanning Tree Protocols (802.1w and 802.1s)
- IEEE 802.1Q VLANs and trunks
- IEEE 802.3ad link aggregation
- Private VLANs
- EtherChannels and virtual port channels (vPCs)
- Traffic suppression (unicast, multicast, and broadcast)

### FCoE and Fibre Channel Switching

Cisco Nexus devices support data center I/O consolidation by providing FCoE interfaces (to the servers) and native Fibre Channel interfaces (to the SAN).

FCoE and Fibre Channel switching includes the following features:

- Cisco fabric services
- N-port virtualization
- VSANs and VSAN trunking
- Zoning
- Distributed device alias service
- SAN port channels

### QoS

Cisco Nexus devices provide quality of service (QoS) capabilities such as traffic prioritization and bandwidth allocation on egress interfaces.

The default QoS configuration on the switch provides lossless service for Fibre Channel and FCoE traffic. QoS must be configured to use native FC or FCoE or FC and FCoE.

The following commands will enable the default QoS configuration which must be configured for native FC or FCoE or FC and FCoE:

```
switch(config)# system qos
switch(config-sys-qos)# service-policy type queuing input fcoe-default-in-policy
switch(config-sys-qos)# service-policy type queuing output fcoe-default-out-policy
switch(config-sys-qos)# service-policy type qos input fcoe-default-in-policy
switch(config-sys-qos)# service-policy type network-qos fcoe-default-nq-policy
```

**Note**

Before enabling FCoE on the Cisco Nexus 5500 Series device, you must attach the pre-defined FCoE policy maps to the type qos, type network-qos, and type queuing policy maps.

## Virtual Port Channels

A virtual port channel (vPC) allows links that are physically connected to two different Cisco Nexus devices or Cisco Nexus 2000 Series Fabric Extenders to appear as a single port channel. A vPC can provide multipathing, which allows you to create redundancy by enabling multiple parallel paths between nodes and load balancing traffic where alternative paths exist.

## Serviceability

The Cisco Nexus device serviceability functions provide data for network planning and help to improve problem resolution time.

### Switched Port Analyzer

The switched port analyzer (SPAN) feature allows an administrator to analyze all traffic between ports by nonintrusively directing the SPAN session traffic to a SPAN destination port that has an external analyzer attached to it.

### Ethalyzer

Ethalyzer is a Cisco NX-OS protocol analyzer tool based on the Wireshark (formerly Ethereal) open source code. Ethalyzer is a command-line version of Wireshark for capturing and decoding packets. You can use Ethalyzer to troubleshoot your network and analyse the control-plane traffic.

### Call Home

The Call Home feature continuously monitors hardware and software components to provide e-mail-based notification of critical system events. A versatile range of message formats is available for optimal compatibility with pager services, standard e-mail, and XML-based automated parsing applications. The feature offers alert grouping capabilities and customizable destination profiles. This feature can be used, for example, to directly page a network support engineer, send an e-mail message to a network operations center (NOC), and employ Cisco AutoNotify services to directly generate a case with the Cisco Technical Assistance Center (TAC). This

feature is a step toward autonomous system operation, which enables networking devices to inform IT when a problem occurs and helps to ensure that the problem is resolved quickly.

## Online Diagnostics

Cisco generic online diagnostics (GOLD) is a suite of diagnostic facilities to verify that hardware and internal data paths are operating as designed. Boot-time diagnostics, continuous monitoring, and on-demand and scheduled tests are part of the Cisco GOLD feature set. GOLD allows rapid fault isolation and continuous system monitoring.

# Switch Management

## Simple Network Management Protocol

Cisco NX-OS is compliant with Simple Network Management Protocol (SNMP) version 1, version 2, and version 3. A full set of Management Information Bases (MIBs) is supported.

## Role-Based Access Control

With role-based access control (RBAC), you can limit access to switch operations by assigning roles to users. Administrators can customize access and restrict it to the users who require it.

## Configuration Methods

### Configuring with CLI, XML Management Interface, or SNMP

You can configure Cisco Nexus devices using the command-line interface (CLI), the XML management interface over SSH, or SNMP as follows:

- CLI—You can configure switches using the CLI from an SSH session, a Telnet session, or the console port. SSH provides a secure connection to the device.
- XML Management Interface over SSH—You can configure switches using the XML management interface, which is a programming interface based on the NETCONF protocol that complements the CLI functionality. For more information, see the *Cisco NX-OS XML Interfaces User Guide*.
- SNMP—SNMP allows you to configure switches using Management Information Bases (MIBs).

### Configuring with Cisco Data Center Network Manager

You can configure Cisco Nexus Series switches using the Data Center Network Manager (DCNM) client, which runs on a local PC and uses the DCNM server.

For more information, see the *Cisco DCNM Configuration Guides*.

### Configuring with Cisco MDS Fabric Manager

You can configure Cisco Nexus Series switches using the Fabric Manager client, which runs on a local PC and uses the Fabric Manager server.

For more information, see the Cisco Nexus Fabric Manager Software guide for your device.

## Network Security Features

Cisco NX-OS includes the following security features:

- Authentication, authorization, and accounting (AAA) and TACACS+
- RADIUS
- Secure Shell (SSH) Protocol Version 2
- Simple Network Management Protocol Version 3 (SNMPv3)
- MAC ACLs and IP ACLs, including port-based ACLs (PACLs) and VLAN-based ACLs (VACLs).

## Virtual Device Contexts

Cisco NX-OS can segment operating system and hardware resources into virtual device contexts (VDC) that emulate virtual devices. The Cisco Nexus device does not support multiple VDCs. All switch resources are managed in the default VDC.

For more information, see the *Cisco Nexus 7000 Series NX-OS Getting Started with Virtual Device Contexts*.

## Licensing

The Cisco Nexus device is shipped with its licenses installed. The switch provides commands to manage the licenses and install additional licenses.

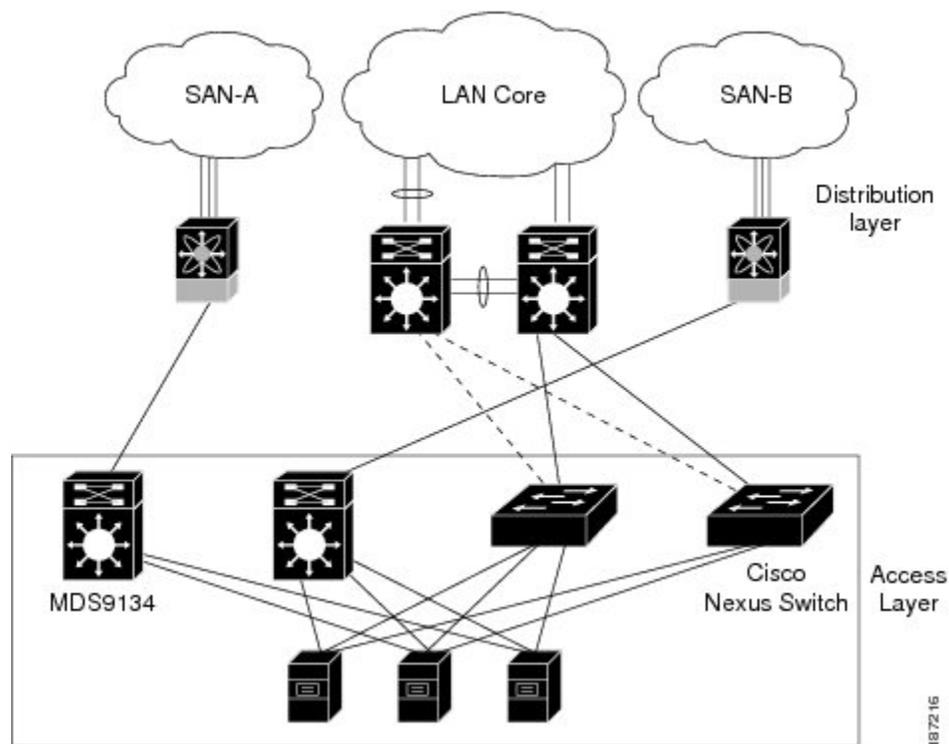
## Ethernet TOR Switch Topology

The Cisco Nexus device can be deployed as a 10-Gigabit Ethernet top-of-rack (TOR) switch, with uplinks to the data center LAN distribution layer switches. An example configuration is shown in the following figure.

In this example, the blade server rack incorporates blade switches that support 10-Gigabit Ethernet uplinks to the Cisco Nexus device. The blade switches do not support FCoE, so there is no FCoE traffic and no Fibre Channel ports on the Cisco Nexus device.

In the example configuration, the Cisco Nexus device has Ethernet uplinks to two Catalyst switches. If STP is enabled in the data center LAN, the links to one of the switches will be STP active and the links to the other switch will be STP blocked.

**Figure 2: Ethernet TOR Switch Topology**



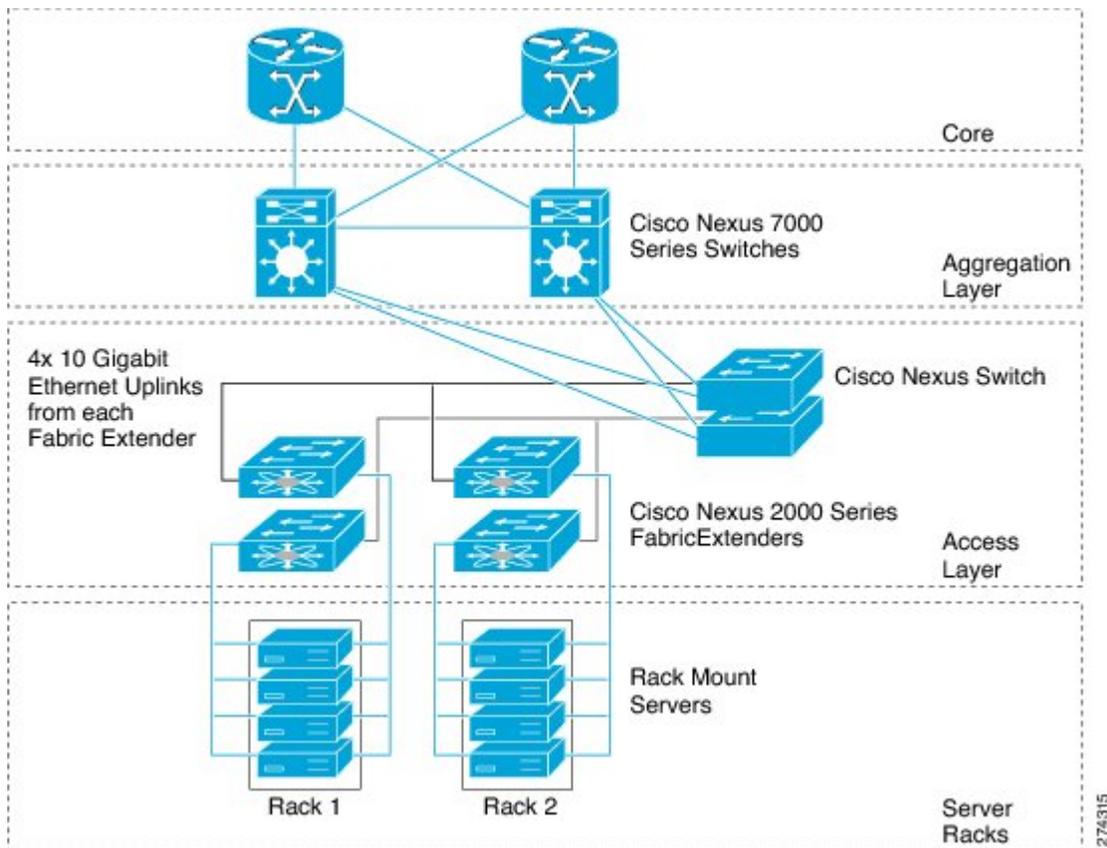
All of the server-side ports on the Cisco Nexus device are running standard Ethernet. FCoE is not required, so the server ports are connected using 10-Gigabit Ethernet NICs.

The servers are connected to the data center SAN through MDS 9134 SAN switches. The server Fibre Channel ports require standard Fibre Channel HBAs.

## Fabric Extender Deployment Topology

The following figure shows a simplified configuration using the Cisco Nexus 2000 Series Fabric Extender in combination with the Cisco Nexus device to provide a simplified and cost-effective 1-Gigabit TOR solution.

**Figure 3: Fabric Extender Deployment Topology**



In the example configuration, the Fabric Extender top-of-rack units provide 1-Gigabit host interfaces connected to the servers. The Fabric Extender units are attached to their parent Cisco Nexus devices with 10-Gigabit fabric interfaces.

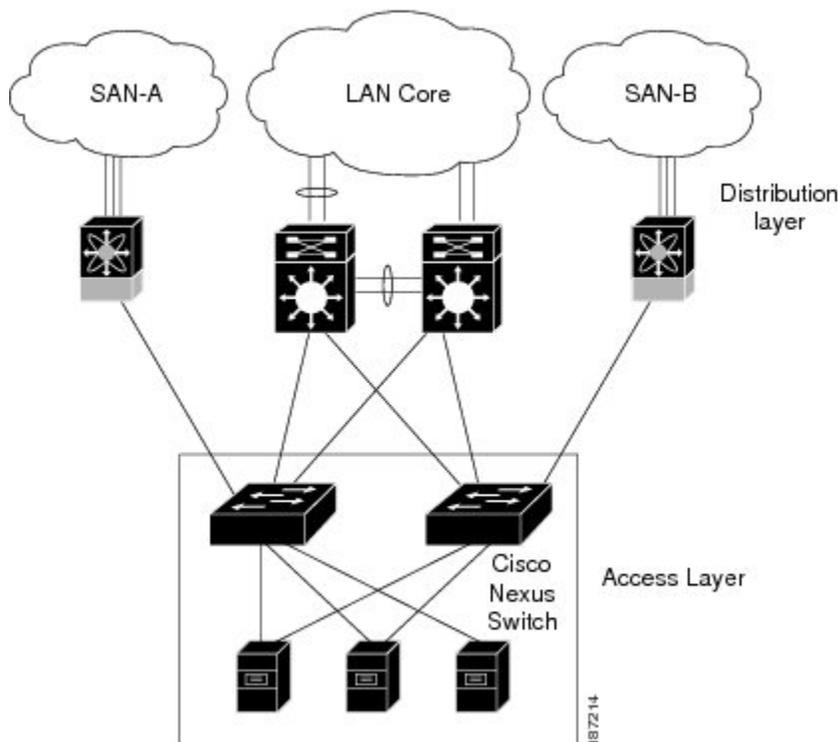
Each Fabric Extender acts as a Remote I/O Module on the parent Cisco Nexus device. All device configurations are managed on the Cisco Nexus device and configuration information is downloaded using inband communication to the Fabric Extender.

See the *Cisco Nexus 2000 Series Fabric Extender Software Configuration Guide* for an overview of the Fabric Extender and configuration details.

## Data Center I/O Consolidation Topology

The following figure shows a typical I/O consolidation scenario for the Cisco Nexus device.

**Figure 4: I/O Consolidation Topology**



The Cisco Nexus device connects to the server ports using FCoE. Ports on the server require converged network adapters. For redundancy, each server connects to both switches. Dual-port CNA adapters can be used for this purpose. The CNA is configured in active-passive mode, and the server needs to support server-based failover.

On the Cisco Nexus device, the Ethernet network-facing ports are connected to two Catalyst 6500 Series switches. Depending on required uplink traffic volume, there may be multiple ports connected to each Catalyst 6500 Series switch, configured as port channels. If STP is enabled in the data center LAN, the links to one of the switches will be STP active and the links to the other switch will be STP blocked.

The SAN network-facing ports on the Cisco Nexus device are connected to Cisco MDS 9000 Family switches. Depending on the required traffic volume, there may be multiple Fibre Channel ports connected to each MDS 9000 Family switch, configured as SAN port channels.

## Supported Standards

The following table lists the standards supported by the Cisco Nexus devices.

**Table 2: IEEE Compliance**

<b>Standard</b>	<b>Description</b>
802.1D	MAC Bridges
802.1s	Multiple Spanning Tree Protocol
802.1w	Rapid Spanning Tree Protocol
802.3ad	Link aggregation with LACP
802.3ae	10-Gigabit Ethernet
802.1Q	VLAN Tagging
802.1p	Class of Service Tagging for Ethernet frames



## Using the Cisco NX-OS Setup Utility

---

This chapter contains the following sections:

- [Configuring the Switch, page 13](#)

### Configuring the Switch

#### Image Files on the Switch

The Cisco Nexus devices have the following images:

- BIOS and loader images combined in one file
- Kickstart image
- System image that includes a BIOS image that can be upgraded

The switch has flash memory that consists of two separate flash parts:

- A 2 MB flash part holds two BIOS and loader images.
- A 1 GB flash part holds configuration files, kickstart images, systems images, and other files.

The upgradeable BIOS and the golden BIOS are programmed onto the 2 MB flash part. You cannot upgrade the golden BIOS.

When you download a new pair of kickstart and system images, you also get a new BIOS image because it is included in the system image. You can use the **install all** command to upgrade the kickstart, system, and upgradeable BIOS images.

#### Starting the Switch

A Cisco Nexus switch starts its boot process as soon as its power cord is connected to an A/C source. The switch does not have a power switch.

## Boot Sequence

When the switch boots, the golden BIOS validates the checksum of the upgradeable BIOS. If the checksum is valid, then control is transferred to the upgradeable BIOS image. The upgradeable BIOS launches the kickstart image, which then launches the system image. If the checksum of the upgradeable BIOS is not valid, then the golden BIOS launches the kickstart image, which then launches the system image.

You can force the switch to bypass the upgradeable BIOS and use the golden BIOS instead. If you press **Ctrl-Shift-6** within two seconds of when power is supplied to the switch, the golden BIOS will be used to launch the kickstart image, even if the checksum of the upgradeable BIOS is valid.



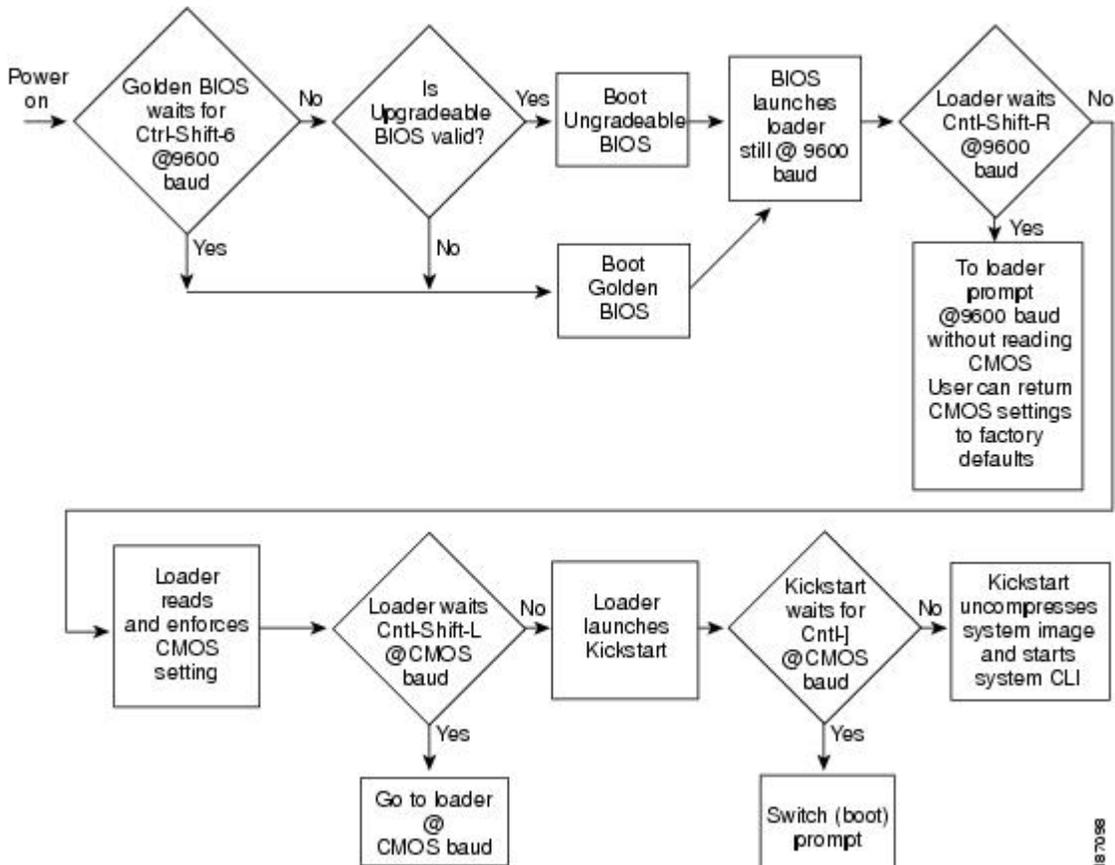
### Note

When you press **Ctrl-Shift-6**, the console settings must be set to their defaults: 9600 baud, 8 data bits, no parity, and 1 stop bit.

Before the boot sequence starts, the BIOS performs internal tests on the switch. If the tests fail, then the loader does not gain control. Instead, the BIOS image retains control and prints a message to the console at 9600 baud every 30 seconds that indicates a failure.

The following figure shows the normal and recovery boot sequence.

**Figure 5: Boot Sequence**



187088

For additional information, see *Troubleshooting*.

## Console Settings

The loader, kickstart, and system images have the following factory default console settings:

- Speed—9600 baud
- Databits—8 bits per byte
- Stopbits—1 bit
- Parity—none

These settings are stored on the switch, and all three images use the stored console settings.

To change a console setting, use the **line console** command in configuration mode. The following example configures a line console and sets the options for that terminal line:

```
switch# configure terminal
switch(config)# line console
switch(config-console)# databits 7
switch(config-console)# exec-timeout 30
switch(config-console)# parity even
switch(config-console)# stopbits 2
```

You cannot change the BIOS console settings. These are the same as the default console settings.

## Upgrading the Switch Software



---

**Note** You must have the network-admin role before you can upgrade the software image on the switch. You must log in to the switch on its console port connection.

---

To upgrade the software on the switch, follow these steps:

### Procedure

---

- Step 1** Log in to Cisco.com to access the Software Download Center. To log in to Cisco.com, go to the URL <http://www.cisco.com/> and click **Log In** at the top of the page. Enter your Cisco username and password.
- Note** Unregistered Cisco.com users cannot access the links provided in this document.
- Step 2** Access the Software Download Center using this URL: <http://www.cisco.com/cisco/web/download/index.html>
- Step 3** Navigate to the software downloads for Cisco Nexus devices. You see links to the download images for the switch.
- Step 4** Read the release notes for the related image file.
- Step 5** Select and download the kickstart and system software files to a local server.
- Step 6** Ensure that the required space is available in the bootflash: directory for the image file(s) to be copied.

**Example:**

```
switch# dir bootflash:
 4681      Nov 24 02:43:52 2008  config
13176836  Nov 24 07:19:36 2008  gdb.1
 49152    Jan 12 18:38:36 2009  lost+found/
 310556   Dec 23 02:53:28 2008  n1
20058112  Nov 07 02:35:22 2008  n5000-uk9-kickstart.4.0.1a.N1.0.62.bin
20217856  Jan 12 18:26:54 2009  n5000-uk9-kickstart.4.0.1a.N2.0.140.bin
76930262  Nov 07 02:35:22 2008  n5000-uk9.4.0.1a.N1.0.62.bin
103484727 Jan 12 18:29:08 2009  n5000-uk9.4.0.1a.N2.0.140.bin

Usage for bootflash://sup-local
 74934272 bytes used
 5550080 bytes free
80484352 bytes total
```

**Caution** We recommend that you keep the kickstart and system image files for at least one previous software release to use if the new image files do not load successfully.

**Step 7** If you need more space on the active supervisor module bootflash, delete unnecessary files to make space available.

**Example:**

```
switch# delete bootflash:n5000-uk9-kickstart.4.0.1a.N1.0.62.bin
switch# delete bootflash:n5000-uk9.4.0.1a.N1.0.62.bin
```

**Step 8** Copy the kickstart and system images to the switch bootflash using a transfer protocol. You can use **ftp**, **tftp**, **scp**, or **sftp**. The examples in this procedure use **scp**.

**Example:**

```
switch# copy scp://user@scpserver.cisco.com/downloads/n5000-uk9.4.1.3.N1.0.96.bin
bootflash:n5000-uk9.4.1.3.N1.0.96.bin
switch# copy scp://user@scpserver.cisco.com/downloads/n5000-uk9-kickstart.4.1.3.N1.0.96.bin
bootflash:n5000-uk9-kickstart.4.1.3.N1.0.96.bin
```

**Step 9** Install the new images, specifying the new image names that you downloaded in the previous step.

**Example:**

```
switch# install all kickstart bootflash:n5000-uk9-kickstart.4.1.3.N1.0.96.bin system
bootflash:n5000-uk9.4.1.3.N1.0.96.bin
```

The **install all** command performs the following actions:

- Performs compatibility checks (equivalent to the **show incompatibility** command) for the images that you have specified. If there are compatibility issues, an error message is displayed and the installation does not proceed.
- Displays the compatibility check results and displays whether the installation is disruptive.
- Provides a prompt to allow you to continue or abort the installation.

**Caution** After completing the installation, all traffic through the switch is disrupted while the switch reboots.

- Updates the boot variables to reference the specified images and saves the configuration to the startup configuration file.

**Step 10** After the switch completes the installation, log in and verify that the switch is running the required software version.

**Example:**

```
switch# show version
Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2009, Cisco Systems, Inc. All rights reserved.
The copyrights to certain works contained herein are owned by
other third parties and are used and distributed under license.
Some parts of this software are covered under the GNU Public
License. A copy of the license is available at
http://www.gnu.org/licenses/gpl.html.

Software
  BIOS:          version 1.2.0
  loader:        version N/A
  kickstart:     version 4.1(3)N1(1) [build 4.1(3)N1(0.96)]
  system:        version 4.1(3)N1(1) [build 4.1(3)N1(0.96)]
  BIOS compile time:      06/19/08
  kickstart image file is: bootflash:/n5000-uk9-kickstart.4.1.3.N1.0.96.bin
  kickstart compile time: 7/14/2009 4:00:00 [07/14/2009 04:27:38]
  system image file is:   bootflash:/n5000-uk9.4.1.3.N1.0.96.bin
  system compile time:    7/14/2009 4:00:00 [07/14/2009 05:20:12]

Hardware
  cisco Nexus5020 Chassis ("40x10GE/Supervisor")
  Intel(R) Celeron(R) M CPU with 2074240 kB of memory.
  Processor Board ID JAB1232002F

  Device name: switch
  bootflash: 1003520 kB

Kernel uptime is 13 day(s), 23 hour(s), 25 minute(s), 5 second(s)

Last reset at 720833 usecs after Tue Jul 14 11:18:32 2009

Reason: Reset by installer
System version: 4.1(3)N1(0.96)
Service:

plugin
  Core Plugin, Ethernet Plugin
```

## Downgrading from a Higher Release

The procedure to downgrade the switch is identical to a switch upgrade, except that the image files to be loaded are for an earlier release than the image currently running on the switch.

**Note**

Prior to downgrading to a specific release, check the release notes for the current release installed on the switch, to ensure that your hardware is compatible with the specific release. There are special caveats you must be aware of before you downgrade the switch software to a 4.0(0)-based release. See the Cisco Nexus release notes for your device for details.

**Procedure**

**Step 1** Locate the image files you will use for the downgrade by entering the **dir bootflash:** command.

If the image files are not stored on the bootflash memory, download the files from Cisco.com:

- a) Log in to Cisco.com to access the Software Download Center. To log in to Cisco.com, go to the URL <http://www.cisco.com/> and click **Log In** at the top of the page. Enter your Cisco username and password.  
**Note** Unregistered Cisco.com users cannot access the links provided in this document.
- b) Access the Software Download Center using this URL: <http://www.cisco.com/cisco/web/download/index.html>
- c) Navigate to the software downloads for Cisco Nexus Series switches.  
You see links to the download images for the switch.
- d) Read the release notes for the related image file then select and download the kickstart and system software files to a local server
- e) Ensure that the required space is available in the bootflash: directory for the image file(s) to be copied.  
**Caution** We recommend that you keep the kickstart and system image files for at least one previous software release to use if the new image files do not load successfully.
- f) Copy the kickstart and system images to the switch bootflash using a transfer protocol. You can use **ftp**, **tftp**, **scp**, or **sftp**.

**Step 2** Install the new images.

**Example:**

```
switch# install all kickstart bootflash:n5000-uk9-kickstart.4.0.1a.N1.0.62.bin system
bootflash:n5000-uk9.4.0.1a.N1.0.62.bin
```

The **install all** command performs the following actions:

- Performs compatibility checks (equivalent to the **show incompatibility** command) for the images that you have specified. If there are compatibility issues, an error message is displayed and the installation does not proceed.
- Displays the compatibility check results and displays whether the installation is disruptive.
- Provides a prompt to allow you to continue or abort the installation.  
**Note** A disruptive installation causes traffic disruption while the switch reboots.
- Updates the boot variables to reference the specified images and saves the configuration to the startup configuration file.

**Step 3** After the switch completes the installation, log in and verify that the switch is running the required software version.

**Example:**

```
switch# show version
```

---

# Initial Configuration

## Configuration Prerequisites

The following procedure is a review of the tasks you should have completed during hardware installation. These tasks must be completed before you can configure the switch.

### Procedure

---

- Step 1** Verify the following physical connections for the new Cisco Nexus device:
- The console port is physically connected to a computer terminal (or terminal server).
  - The management Ethernet port (mgmt0) is connected to an external hub, switch, or router.

Refer to the Cisco Nexus Hardware Installation guide for your device for more information.

**Tip** Save the host ID information for future use (for example, to enable licensed features). The host ID information is provided in the Proof of Purchase document that accompanies the switch.

- Step 2** Verify that the default console port parameters are identical to those of the computer terminal (or terminal server) attached to the switch console port:
- 9600 baud
  - 8 data bits
  - No parity
  - 1 stop bit
- 

## Initial Setup

The first time that you access a switch in your Cisco Nexus series, it runs a setup program that prompts you for the IP address and other configuration information necessary for the switch to communicate over the Ethernet interface. This information is required to configure and manage the switch.

**Note**

The IP address can only be configured from the CLI. When the switch powers up for the first time, you should assign the IP address. After you perform this step, the Cisco MDS 9000 Family Fabric Manager can reach the switch through the console port.

---

## Preparing to Configure the Switch

Before you configure Cisco Nexus device for the first time, you need the following information:

- Administrator password.



---

**Note** If a password is weak (short, easy-to-decipher), your password configuration is rejected. Be sure to configure a strong password.

---

- If you are using an IPv4 address for the management interface, you need the following information:
  - IPv4 subnet mask for the switch's management interface.
  - IPv4 address of the default gateway (optional).
- SSH service on the switch (optional).

To enable this service, select the type of SSH key (dsa/rsa/rsa1) and number of SSH key bits (768 to 2048).
- NTP server IPv4 address (optional).
- SNMP community string (optional).
- Switch name (optional).

This is your switch prompt.
- An additional login account and password (optional).



---

**Note** If you are using IPv4, be sure to configure the IPv4 route, the IPv4 default network address, and the IPv4 default gateway address to enable SNMP access.

---

## Default Login

The switch has the network administrator as a default user (admin). You cannot change the default user at any time.

There is no default password so you must explicitly configure a strong password. If a password is trivial (short, easy-to-decipher), your password configuration is rejected. Be sure to configure a strong password. If you configure and subsequently forget this new password, you have the option to recover this password.



---

**Note** If you enter the **write erase** command and reload the switch, you must reconfigure the default user (admin) password using the setup procedure.

---

## Configuring the Switch

This section describes how to initially configure the switch.



**Note** Press **Ctrl-C** at any prompt to skip the remaining configuration options and proceed with what you have configured up to that point. However, entering the new password for the administrator is a requirement and cannot be skipped.



**Tip** If you do not want to answer a previously configured question, or if you want to skip answers to any questions, press **Enter**. If a default answer is not available (for example, switch name), the switch uses what was previously configured and skips to the next question.

To configure the switch for first time, follow these steps:

### Procedure

**Step 1** Ensure that the switch is on. Switches in the Cisco Nexus series boot automatically.

**Step 2** Enter the new password for the administrator.

#### Example:

Enter the password for admin: <password>

**Note** Clear text passwords cannot contain dollar signs (\$) or spaces anywhere in the password. Also, they cannot include these special characters at the beginning of the password: quotation marks (" or '), vertical bars (|), or right angle brackets (>).

**Tip** If a password is weak (short, easy-to-decipher), your password configuration is rejected. Be sure to configure a strong password. Passwords are case-sensitive.

**Step 3** Enter yes to enter the setup mode.

#### Example:

This setup utility will guide you through the basic configuration of the system. Setup configures only enough connectivity for management of the system.

\*Note: setup is mainly used for configuring the system initially, when no configuration is present. So setup always assumes system defaults and not the current system configuration values.

Press Enter at anytime to skip a dialog. Use ctrl-c at anytime to skip the remaining dialogs.

Would you like to enter the basic configuration dialog (yes/no): **yes**

The setup utility guides you through the basic configuration process. Press **Ctrl-C** at any prompt to end the configuration process.

**Step 4** Enter the new password for the administrator (admin is the default).

#### Example:

Enter the password for admin: **admin**

**Step 5** Enter yes (no is the default) to create additional accounts.

**Example:**

Create another login account (yes/no) [n]: **yes**

While configuring your initial setup, you can create an additional user account (in the network-admin role) besides the administrator's account.

- a) Enter the user login ID.

**Example:**

Enter the user login ID: *user\_name*

- b) Enter the user password.

**Example:**

Enter the password for *user\_name*: *user-password*

- Step 6** Enter yes (yes is the default) to create an SNMP read-only community string.

**Example:**

Configure read-only SNMP community string (yes/no) [n]: **yes**  
SNMP community string: *snmp\_community*

- Step 7** Enter a name for the switch.

**Note** Starting with Cisco NX-OS Release 7.3(0)N1(1), the character limit of a switch name is increased from 32 to 63 alphanumeric characters. Also, 63 characters is the maximum length limit for setting hostname using SNMP. The default name is switch.

**Example:**

Enter the switch name: *switch\_name*

- Step 8** Enter yes (yes is the default) to configure out-of-band management and enter the mgmt0 IPv4 address.

**Example:**

Continue with Out-of-band (mgmt0) management configuration? [yes/no]: **yes**  
Mgmt0 IPv4 address: *ip\_address*

- Step 9** Enter yes (yes is the default) to configure the IPv4 default gateway (recommended) and enter the IPv4 address for the default gateway.

**Example:**

Configure the default-gateway: (yes/no) [y]: **yes**  
IPv4 address of the default-gateway: *default\_gateway*

- Step 10** Enter yes (yes is the default) to enable the Telnet service.

**Example:**

Enable the telnet service? (yes/no) [y]: **yes**

- Step 11** Enter yes (no is the default) to enable the SSH service.

**Example:**

```
Enabled SSH service? (yes/no) [n]: yes
```

- a) Enter the SSH key type that you would like to generate.

**Example:**

```
Type the SSH key you would like to generate (dsa/rsa/rsa1)? dsa
```

- b) Enter the number of key bits within the specified range.

**Example:**

```
Enter the number of key bits? (768 to 2048): 768
```

- Step 12** Enter yes (no is the default) to configure the NTP server and enter the IPv4 address for the NTP server.

**Example:**

```
Configure NTP server? (yes/no) [n]: yes  
NTP server IP address: ntp_server_IP_address
```

- Step 13** Enter yes (yes is the default) to configure basic Fibre Channel configurations.

**Example:**

```
Enter basic FC configurations (yes/no) [n]: yes
```

- Step 14** Enter shut (shut is the default) to configure the default Fibre Channel switch port interface to the shut (disabled) state.

**Example:**

```
Configure default physical FC switchport interface state (shut/noshut) [shut]: shut
```

- Step 15** Enter on (on is the default) to configure the switch port trunk mode.

**Example:**

```
Configure default physical FC switchport trunk mode (on/off/auto) [on]: on
```

- Step 16** Enter permit (deny is the default) to deny a default zone policy configuration.

**Example:**

```
Configure default zone policy (permit/deny) [deny]: permit
```

Permits traffic flow to all members of the default zone.

- Note** If you are executing the setup script after entering a **write erase** command, you explicitly must change the default zone policy to permit for VSAN 1 after finishing the script using the following command:

```
Configure read-only SNMP community string (yes/no) [n]: zone default-zone permit  
vsan 1
```

- Step 17** Enter yes (no is the default) to enable a full zone set distribution.

**Example:**

```
Enable full zoneset distribution (yes/no) [n]: yes
```

Overrides the switch-wide default for the full zone set distribution feature.

- Step 18** You see the new configuration. Review and edit the configuration that you have just entered. Enter no (no is the default) if you are satisfied with the configuration.

**Example:**

```
The following configuration will be applied:
username admin password <user-password> role network-admin
snmp-server community snmp_community ro
switchname switch
feature telnet
ssh key dsa 768 force
feature ssh
system default switchport shutdown san
system default switchport trunk mode on
system default zone default-zone permit
system default zone distribute full
Would you like to edit the configuration? (yes/no) [n]: no
```

- Step 19** Enter yes (yes is default) to use and save this configuration:

**Example:**

```
Use this configuration and save it? (yes/no) [y]: yes
```

**Caution** If you do not save the configuration at this point, none of your changes are updated the next time the switch is rebooted. Type yes to save the new configuration. This operation ensures that the kickstart and system images are also automatically configured.

## Changing the Initial Configuration

To make changes to the initial configuration at a later time, enter the **setup** command in EXEC mode:

```
switch# setup
---- Basic System Configuration Dialog ----
This setup utility will guide you through the basic configuration of
the system. Setup configures only enough connectivity for management
of the system.
*Note: setup is mainly used for configuring the system initially,
when no configuration is present. So setup always assumes system
defaults and not the current system configuration values.
Press Enter at anytime to skip a dialog. Use ctrl-c at anytime
to skip the remaining dialogs.
Would you like to enter the basic configuration dialog (yes/no): yes
```

The setup utility guides you through the basic configuration process.

## Management Interface Configuration

The management interface on the switch allows multiple simultaneous Telnet, SSH, or SNMP sessions. You can remotely configure the switch through the management interface (mgmt0), but first you must configure some IP parameters so that the switch is reachable. You can manually configure the management interface from the CLI through the console port.

## About the mgmt0 Interface

The mgmt0 interface on a Cisco Nexus device provides out-of-band management, which enables you to manage the switch by its IPv4 or IPv6 address. The mgmt0 interface is a 10/100/1000 Ethernet port.



**Note** Before you begin to configure the management interface manually, obtain the switch's IP address and subnet mask. Also make sure that the console cable is connected to the console port.

## Configuring the Management Interface

To configure the management (mgmt0) Ethernet interface to connect over IP, perform this task:

### Procedure

- 
- Step 1** switch# **configure terminal**  
Enters configuration mode.
- Step 2** switch(config)# **interface mgmt 0**  
Selects the management Ethernet interface on the switch and enters interface configuration submode.
- Step 3** Configure the IP address for IPv4 or IPv6:
- a) switch(config-if)# **ip address** *ipv4-address* [*length*]  
Configures the IPv4 address and its subnet mask.
  - b) switch(config-if)# **ip address** *ipv4-address* [*subnet-mask*]  
An alternative method that configures the IPv4 address and its subnet mask.
  - c) switch(config-if)# **ipv6 address** *ipv6-address* [*length*]  
Configures the IPv6 address and its subnet mask.
- Step 4** switch(config-if)# **no shutdown**  
Enables the interface.
- Step 5** switch(config-if)# **exit**  
Returns to configuration mode.
- Step 6** switch(config)# **vrf context management**  
Enters VRF context management configuration mode.
- Step 7** Configure the IP address (IPv4 or IPv6) for the next hop:
- a) switch(config-vrf)# **ip route** *ipv4-prefix* [*length*] *ipv4-nexthop-address*  
Configures the IPv4 address of the next hop.
  - b) switch(config-vrf)# **ipv6 route** *ipv6-prefix* [*length*] *ipv6-nexthop-address*  
Configures the IPv6 address of the next hop.
- Step 8** switch(config-vrf)# **end**  
Returns to EXEC mode.
- Step 9** (Optional) switch# **copy running-config startup-config**

Saves your configuration changes to the file system.

---

In some cases, a switch interface might be administratively shut down. You can check the status of an interface at any time by using the **show interface mgmt 0** command.

## Displaying Management Interface Configuration

To display the management interface configuration, use the **show interface mgmt 0** command.

```
switch# show interface mgmt0

mgmt0 is up
  Hardware is GigabitEthernet, address is 000d.ec8f.cb00 (bia 000d.ec8f.cb00)
  Internet Address is 172.16.131.202/24
  MTU 1500 bytes, BW 0 Kbit, DLY 0 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA
  full-duplex, 1000 Mb/s
  Input flow-control is off, output flow-control is off
  8540 packets input, 2835036 bytes
  5202 multicast frames, 0 compressed
  0 input errors, 0 frame, 0 overrun, 0 fifo
  570 packets output, 85555 bytes
  0 underrun, 0 output errors, 0 collisions
  0 fifo, 0 carrier errors
```

## Shutting Down the Management Interface

To shut down the management interface (mgmt0), you use the **shutdown** command. A system prompt requests you confirm your action before it executes the command. You can use the force option to bypass this confirmation.

The following example shuts down the interface without using the force option:

```
switch# configure terminal
switch(config)# interface mgmt 0
switch(config-if)# shutdown
Shutting down this interface will drop all telnet sessions.
Do you wish to continue (y/n)? y
```

The following example shuts down the interface using the force option:

```
switch# configure terminal
switch(config)# interface mgmt 0
switch(config-if)# shutdown force
```



## Using PowerOn Auto Provisioning

---

This chapter contains the following sections:

- [Information About PowerOn Auto Provisioning, page 27](#)
- [Guidelines and Limitations for POAP, page 32](#)
- [Setting Up the Network Environment To Use POAP, page 33](#)
- [Configuring a Switch Using POAP, page 33](#)
- [Verifying the Device Configuration, page 34](#)
- [Related Documents for POAP, page 34](#)

### Information About PowerOn Auto Provisioning

PowerOn Auto Provisioning (POAP) automates the process of upgrading software images and installing configuration files on Cisco Nexus switches that are being deployed in the network for the first time.

When a Cisco Nexus 5000 switch with the POAP feature boots and does not find the startup configuration, it enters POAP mode and locates a DHCP server. Later it bootstraps itself with its interface IP address, gateway, and DNS server IP addresses. The switch then obtains the IP address of a TFTP server or the URL of an HTTP server from which it downloads the necessary configuration files.



**Note**

---

The POAP over DHCP is the only supported method in the Cisco Nexus 5000 switch.

---

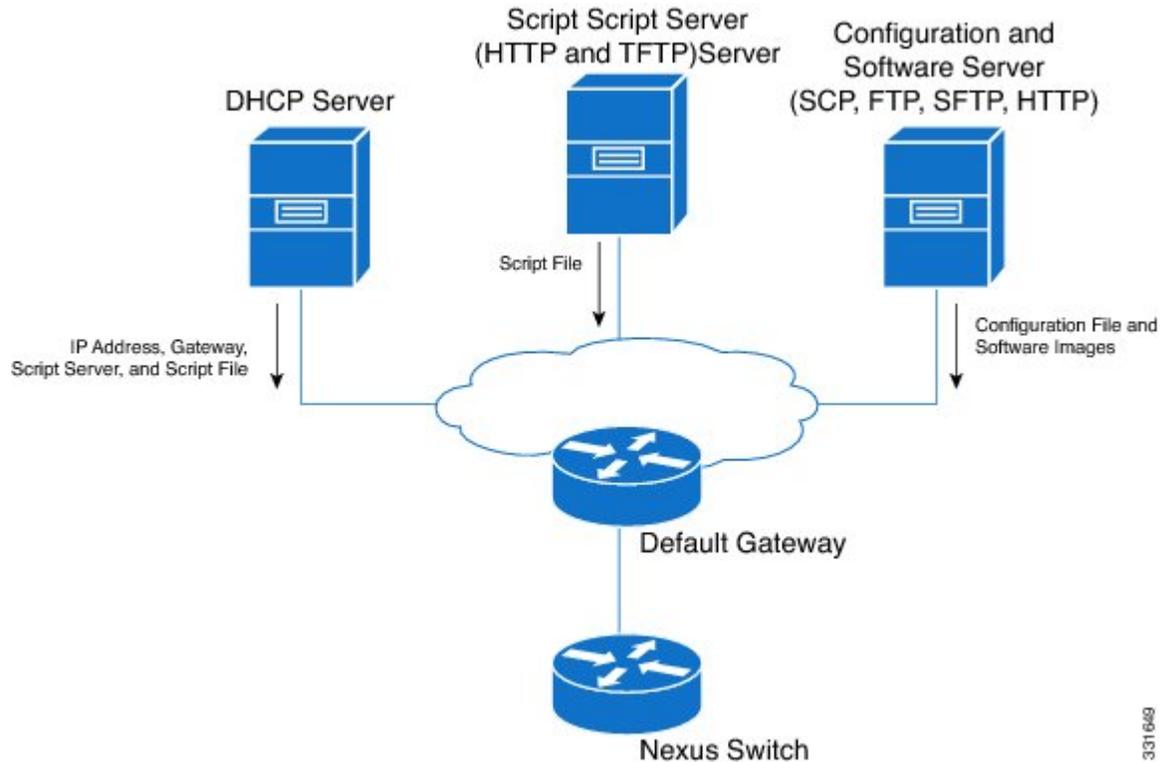
### Network Requirements for POAP

POAP requires the following network infrastructure:

- A DHCP server to bootstrap the interface IP address, gateway address, DNS server, and log server
- A TFTP or HTTP server containing the configuration script used to automate the software image installation and configuration process

- One or more servers containing the desired software images and configuration files

**Figure 6: POAP Network Infrastructure**



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## POAP Configuration Script

The reference script supplied by Cisco supports the following functionality:

- Downloads the configuration file based on the switch's serial number, hostname, MAC address, or location.
- Downloads the software image (system and kickstart images) if the files do not already exist on the switch. The software image is installed on the switch and is used at the next reboot.
- Schedules the downloaded configuration to be applied at the next switch reboot.
- Stores the configuration as the startup-configuration.

We provide sample configuration scripts that were developed using the Python programming language and Tool Command Language (Tcl). You can customize one of these scripts to meet the requirements of your network environment.

For information about customizing this script using Python, see the *Cisco NX-OS Python API Reference Guide* for your platform.

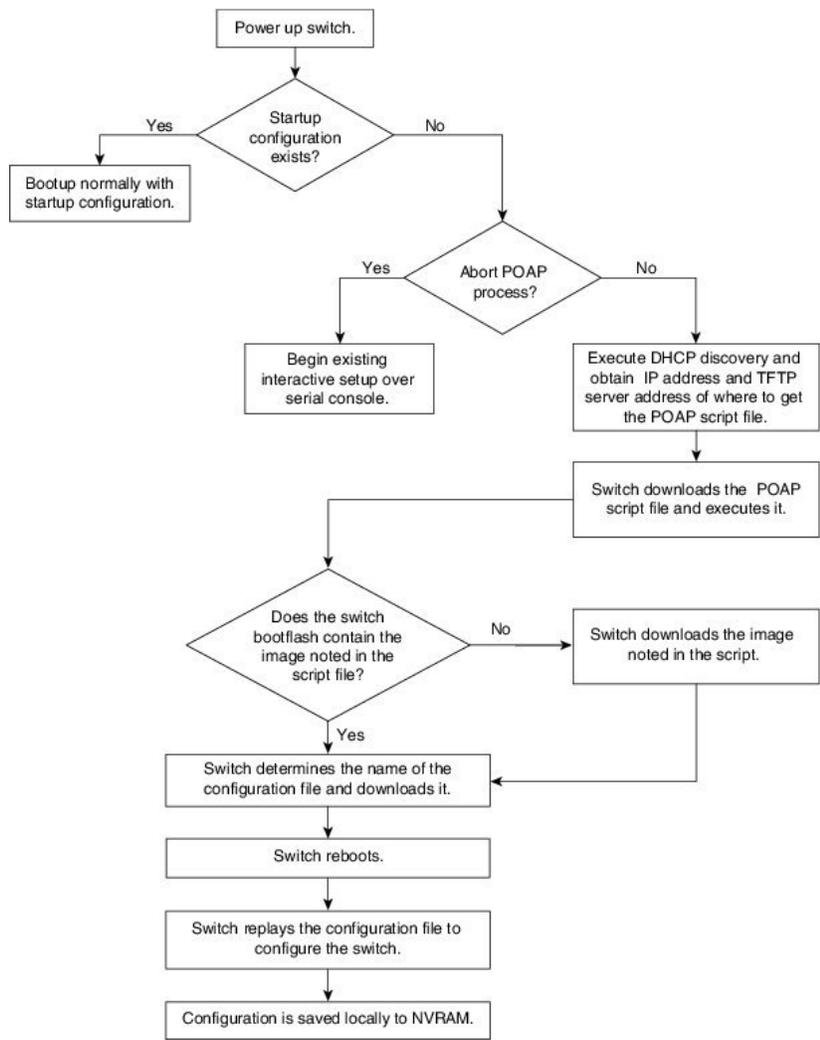
# POAP Process

The POAP process has the following phases:

- 1 Power up
- 2 DHCP discovery
- 3 Script execution
- 4 Post-installation reload

Within these phases, other process and decision points occur. The following illustration shows a flow diagram of the POAP process.

**Figure 7: POAP Process**



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## Power-Up Phase

When you power-up a switch for the first time, it loads the software image installed at manufacturing and tries to find a configuration file to apply after the switch boots. When no configuration file is found, POAP mode starts.

During startup, a prompt appears asking if you want to abort POAP and continue with normal setup. You can choose to exit or continue with POAP.

**Note**

No user intervention is required for POAP to continue. The prompt that asks if you want to abort POAP remains available until the POAP process is complete.

If you exit POAP mode, you enter the normal interactive setup script. If you continue in POAP mode, all the front-panel interfaces are set up in Layer 2 mode, which ensures that the device does not participate in any Layer 2 forwarding.

## DHCP Discovery Phase

The switch sends out DHCP discover messages on all of the active interfaces (including the mgmt interface) soliciting DHCP offers from the DHCP server or servers. The DHCP client on the Cisco Nexus switch uses the switch serial number or its MAC address in the client-identifier option to identify itself to the DHCP server. The DHCP server can use this identifier to send information, such as the IP address and script file name, back to the DHCP client.

POAP requires a minimum DHCP lease period of 3600 seconds (1 hour). POAP checks the DHCP lease period. If the DHCP lease period is set to less than 3600 seconds (1 hour), POAP does not complete DHCP negotiation.

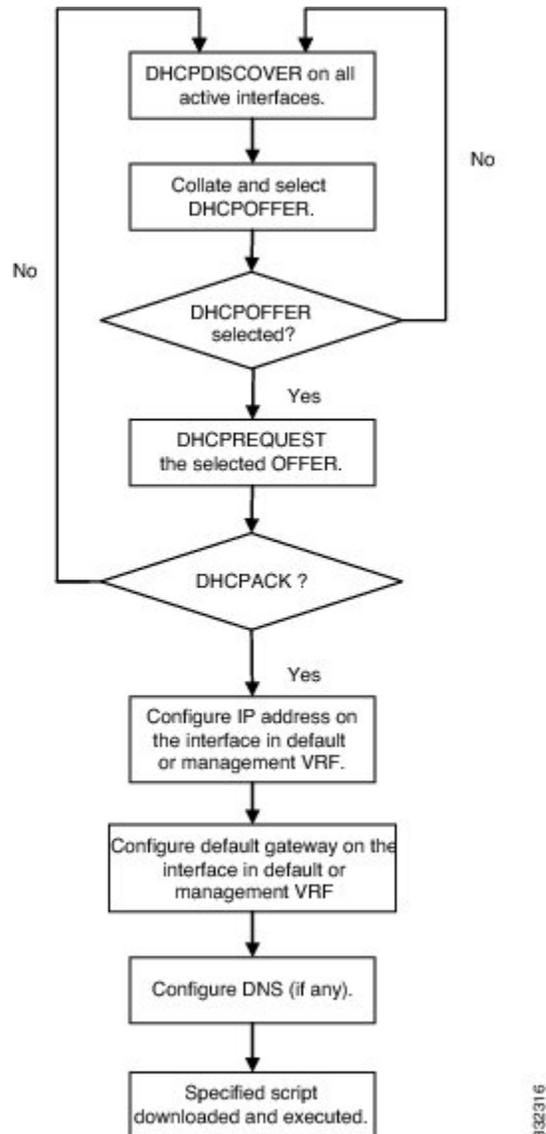
The DHCP discover message also mandates some of the options and solicits these options from the DHCP server after receiving the DHCP OFFER from the DHCP server.

- Option 66 ( TFTP server name) or Option 150 (TFTP server address)—The DHCP server relays the TFTP server name or TFTP server address to the DHCP client. The DHCP client uses this information to contact the TFTP server to obtain the script file.
- IP address
- Default gateway
- Option 67 (Bootfile name)—The DHCP server relays the bootfile name to the DHCP client. The bootfile name includes the complete path to the bootfile on the TFTP server. The DHCP client uses this information to download the script file.

When multiple DHCP offers that meet the requirement are received, an offer is randomly chosen. The device completes the DHCP negotiation (request and acknowledgment) with the selected DHCP server, and the DHCP server assigns an IP address to the switch. If there is a failure in any of the subsequent steps in the POAP process, the IP address is released back to the DHCP server.

If no DHCP offers meet the requirements, the switch does not complete the DHCP negotiation (request and acknowledgment) and an IP address is not assigned. The POAP process is reinitiated until it succeeds or you manually abort the POAP process.

**Figure 8: DHCP Discovery Phase**



## Script Execution Phase

Once the device has bootstrapped itself using the information in the DHCP acknowledgement, the switch downloads the script file from the TFTP server or the HTTP server.

The switch runs the configuration script, which downloads and installs the software image and downloads a switch-specific configuration file.

However, the configuration file is not applied to the switch at this point, because the software image currently running on the switch might not support all of the commands in the configuration file. After the switch reboots, it begins running the new software image, if one was installed. At that point, the configuration is applied to the switch.




---

**Note** If the switch loses connectivity, the script stops, and the switch reloads its original software images and bootup variables.

---

## Post-Installation Reload Phase

The switch restarts and applies (replays) the configuration on the upgraded software image. Afterward, the switch copies the running configuration to the startup configuration.

# Guidelines and Limitations for POAP

- The Cisco Nexus switch software image must support POAP for this feature to function.
- POAP can be triggered even when the startup-config is present using the **boot poap enable** command.
- If a LACP Layer 3 port-channel is configured on an uplink device connected to the Cisco Nexus device that is being bootstrapped using POAP, the port-channel is not active because all the member links are in a suspended state. Therefore, the Cisco Nexus device that is being bootstrapped using POAP cannot reach the DHCP server or any other infrastructure device needed for POAP. To work around this issue, configure a static L3 port-channel on the uplink device connected to the Cisco Nexus device that is being bootstrapped using POAP.
- If you use POAP to bootstrap a Cisco Nexus device that is a part of a vPC pair using static port-channels on the VPC links, the Cisco Nexus device activates all of its links upon POAP startup. The dually connected device at the end of the VPC links might start sending some or all of its traffic to the port-channel member links connected to the Cisco Nexus device, and the traffic would be lost.

To work around this issue, you can configure LACP on the vPC links so that the links do not incorrectly start forwarding traffic to the Cisco Nexus device that is being bootstrapped using POAP.

- If you use POAP to bootstrap a Cisco Nexus device that is connected downstream to a Cisco Nexus Series 7000 device through a LACP port-channel, the Cisco Nexus 7000 Series device defaults to suspend its member port if it cannot bundle it as a part of a port-channel. To work around this issue, configure the Cisco Nexus 7000 Series device to not suspend its member ports using the `no lacp suspend-individual` command from interface configuration mode.
- Important POAP updates are logged in the syslog and are available from the serial console.
- Critical POAP errors are logged to the bootflash. The filename format is `date-time_poap_PID_[init,1,2].log`, where *date-time* is in the YYYYMMDD\_hhmmss format and *PID* is the process ID.
- Script logs are saved in the bootflash directory. The filename format is `date-time_poap_PID_script.log`, where *date-time* is in the YYYYMMDD\_hhmmss format and *PID* is the process ID.
- The Scheduler configuration cannot be replayed using POAP. The reason that the Scheduler configuration cannot be replayed is that it is associated with the user (for example "admin") that was logged in when

the Scheduler configuration was created. Because the configuration replay using POAP is not associated with any specific user, the scheduler configuration cannot be replayed and fails.

Instead of configuring the Scheduler, configure the Embedded Event Manager (EEM). An EEM configuration can be downloaded and replayed using POAP.

- You can bypass password and basic POAP configuration by using the **skip** option at the POAP prompt. When you use the **skip** option, no password will be configured for the **admin** user. The **copy running-config startup-config** command will be blocked until a valid password is set for the **admin** user.
- DHCP for NX-OS will be successful, if the DHCP response is set to IP address 255.255.255.255. Since not all the DHCP server including IOS DHCP server sends the DHCP responses to 255.255.255.255, NX-OS is unable to get an IP address as a result POAP does not succeed.

## Setting Up the Network Environment To Use POAP

### Procedure

---

- Step 1** Modify the basic configuration script provided by Cisco or create your own script.
  - Step 2** Deploy a DHCP server and configure it with the interface, gateway, and TFTP server IP addresses and a bootfile with the path and name of the configuration script file. (This information is provided to the switch when it first boots.)
  - Step 3** Deploy a TFTP or HTTP server to host the configuration script.
  - Step 4** Deploy one or more servers to host the software images and configuration files.
- 

## Configuring a Switch Using POAP

### Before You Begin

Make sure that the network environment is set up to use POAP. For more information, see the [Setting Up the Network Environment To Use POAP](#), on page 33 section immediately preceding this section.

### Procedure

---

- Step 1** Install the switch in the network.
- Step 2** Power on the switch.  
If no configuration file is found, the switch boots in POAP mode and displays a prompt that asks if you want to abort POAP and continue with a normal setup.  
No entry is required to continue to boot in POAP mode.
- Step 3** (Optional) If you want to exit POAP mode and enter the normal interactive setup script, enter **y** (yes). The switch boots, and the POAP process begins. For more information, see the [POAP Process](#) section.

**What to Do Next**

Verify the configuration.

## Verifying the Device Configuration

To verify the configuration after bootstrapping the device using POAP, use one of the following commands:

Command	Purpose
<code>show running-config</code>	Displays the running configuration.
<code>show startup-config</code>	Displays the startup configuration.

For detailed information about the fields in the output from these commands, see the Cisco Nexus command reference for your device.

## Related Documents for POAP

Related Topic	Document Title
Configuration Script	<i>Cisco Nexus 3000 Series NX-OS Python API Reference Guide</i>
DHCP Options and BOOTP Vendor Extensions	RFC2132— <a href="http://tools.ietf.org/html/rfc2132">http://tools.ietf.org/html/rfc2132</a>
TFTP Server Address Option for DHCPv4	RFC5859— <a href="http://tools.ietf.org/html/rfc5859">http://tools.ietf.org/html/rfc5859</a>



## Understanding the Command-Line Interface

---

This chapter contains the following sections:

- [Finding Feature Information, page 36](#)
- [Information About the CLI Prompt, page 36](#)
- [Command Modes, page 36](#)
- [Special Characters, page 40](#)
- [Keystroke Shortcuts, page 41](#)
- [Abbreviating Commands, page 43](#)
- [Completing a Partial Command Name, page 44](#)
- [Identifying Your Location in the Command Hierarchy, page 44](#)
- [Using the no Form of a Command , page 45](#)
- [Configuring CLI Variables, page 46](#)
- [Command Aliases, page 48](#)
- [Command Scripts, page 49](#)
- [Context-Sensitive Help , page 51](#)
- [Understanding Regular Expressions, page 53](#)
- [Searching and Filtering show Command Output, page 54](#)
- [Searching and Filtering from the --More-- Prompt, page 59](#)
- [Using the Command History, page 60](#)
- [Enabling or Disabling the CLI Confirmation Prompts, page 62](#)
- [Setting CLI Display Colors, page 62](#)
- [Sending Commands to Modules, page 63](#)
- [BIOS Loader Prompt, page 64](#)
- [Examples Using the CLI , page 64](#)

- [Additional References for the CLI, page 66](#)

## Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at <https://tools.cisco.com/bugsearch/> and the release notes for your software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the “New and Changed Information” chapter.

## Information About the CLI Prompt

Once you have successfully accessed the device, the CLI prompt displays in the terminal window of your console port or remote workstation as shown in the following example:

```
User Access Verification
login: admin
Password:<password>
Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2009, Cisco Systems, Inc. All rights reserved.
The copyrights to certain works contained in this software are
owned by other third parties and used and distributed under
license. Certain components of this software are licensed under
the GNU General Public License (GPL) version 2.0 or the GNU
Lesser General Public License (LGPL) Version 2.1. A copy of each
such license is available at
http://www.opensource.org/licenses/gpl-2.0.php and
http://www.opensource.org/licenses/lgpl-2.1.php
switch#
```

You can change the default device hostname.

From the CLI prompt, you can do the following:

- Use CLI commands for configuring features
- Access the command history
- Use command parsing functions



---

**Note**

In normal operation, usernames are case sensitive. However, when you are connected to the device through its console port, you can enter a login username in all uppercase letters regardless of how the username was defined. As long as you provide the correct password, the device logs you in.

---

## Command Modes

This section describes command modes in the Cisco NX-OS CLI.

## EXEC Command Mode

When you first log in, the Cisco NX-OS software places you in EXEC mode. The commands available in EXEC mode include the **show** commands that display the device status and configuration information, the **clear** commands, and other commands that perform actions that you do not save in the device configuration.

## Global Configuration Command Mode

Global configuration mode provides access to the broadest range of commands. The term indicates characteristics or features that affect the device as a whole. You can enter commands in global configuration mode to configure your device globally or to enter more specific configuration modes to configure specific elements such as interfaces or protocols.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.  <b>Note</b> The CLI prompt changes to indicate that you are in global configuration mode.

## Interface Configuration Command Mode

One example of a specific configuration mode that you enter from global configuration mode is interface configuration mode. To configure interfaces on your device, you must specify the interface and enter interface configuration mode.

You must enable many features on a per-interface basis. Interface configuration commands modify the operation of the interfaces on the device, such as Ethernet interfaces or management interfaces (mgmt 0).

For more information about configuring interfaces, see the Cisco Nexus interfaces guide for your device.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
<b>Step 2</b>	<b>interface <i>type number</i></b>  <b>Example:</b>	Specifies the interface that you want to configure.  The CLI places you into interface configuration mode for the specified interface.

	Command or Action	Purpose
	switch(config)# interface ethernet 2/2 switch(config-if)#	<b>Note</b> The CLI prompt changes to indicate that you are in interface configuration mode.

## Subinterface Configuration Command Mode

From global configuration mode, you can access a configuration submode for configuring VLAN interfaces called subinterfaces. In subinterface configuration mode, you can configure multiple virtual interfaces on a single physical interface. Subinterfaces appear to a protocol as distinct physical interfaces.

Subinterfaces also allow multiple encapsulations for a protocol on a single interface. For example, you can configure IEEE 802.1Q encapsulation to associate a subinterface with a VLAN.

For more information about configuring subinterfaces, see the Cisco Nexus interfaces guide for your device. For details about the subinterface commands, see the command reference guide for your device.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>interface type number.subint</b>  <b>Example:</b> switch(config)# interface ethernet 2/2.1 switch(config-subif)#	Specifies the VLAN interface to be configured.  The CLI places you into a subinterface configuration mode for the specified VLAN interface.  <b>Note</b> The CLI prompt changes to indicate that you are in global configuration mode.

## Saving and Restoring a Command Mode

The Cisco NX-OS software allows you to save the current command mode, configure a feature, and then restore the previous command mode. The **push** command saves the command mode and the **pop** command restores the command mode.

This example shows how to save and restore a command mode:

```
switch# configure terminal
switch(config)# event manager applet test
switch(config-applet)# push
switch(config-applet)# configure terminal
switch(config)# username testuser password newtest
switch(config)# pop
switch(config-applet)#
```

## Exiting a Configuration Command Mode

To exit from any configuration command mode, perform one of the following tasks:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>exit</b>  <b>Example:</b> <pre>switch(config-if)# exit switch(config)#</pre>	Exits from the current configuration command mode and returns to the previous configuration command mode.
<b>Step 2</b>	<b>end</b>  <b>Example:</b> <pre>switch(config-if)# end switch#</pre>	Exits from the current configuration command mode and returns to EXEC mode.
<b>Step 3</b>	<b>Ctrl-Z</b>  <b>Example:</b> <pre>switch(config-if)# ^Z switch#</pre>	(Optional) Exits the current configuration command mode and returns to EXEC mode.  <b>Caution</b> If you press <b>Ctrl-Z</b> at the end of a command line in which a valid command has been typed, the CLI adds the command to the running configuration file. In most cases, you should exit a configuration mode using the <b>exit</b> or <b>end</b> command.

## Command Mode Summary

This table summarizes information about the main command modes.

**Table 3: Command Mode Summary**

Mode	Access Method	Prompt	Exit Method
EXEC	From the login prompt, enter your username and password.	switch#	To exit to the login prompt, use the <b>exit</b> command.
Global configuration	From EXEC mode, use the <b>configure terminal</b> command.	switch(config)#	To exit to EXEC mode, use the <b>end</b> or <b>exit</b> command or press <b>Ctrl-Z</b> .
Interface configuration	From global configuration mode, use an interface command and specify an interface with an <b>interface</b> command.	switch(config-if)#	To exit to global configuration mode, use the <b>exit</b> command.  To exit to EXEC mode, use the <b>exit</b> command or press <b>Ctrl-Z</b> .
Subinterface configuration	From global configuration mode, specify a subinterface with an <b>interface</b> command.	switch(config-subif)#	To exit to global configuration mode, use the <b>exit</b> command.  To exit to EXEC mode, use the <b>end</b> command or press <b>Ctrl-Z</b> .

## Special Characters

This table lists the characters that have special meaning in Cisco NX-OS text strings and should be used only in regular expressions or other special contexts.

**Table 4: Special Characters**

Character	Description
%	Percent
#	Pound, hash, or number
...	Ellipsis
	Vertical bar
<>	Less than or greater than
[ ]	Brackets

Character	Description
{ }	Braces

## Keystroke Shortcuts

This table lists command key combinations that can be used in both EXEC and configuration modes.

**Table 5: Keystroke Shortcuts**

Keystokes	Description
Ctrl-A	Moves the cursor to the beginning of the line.
Ctrl-B	Moves the cursor one character to the left. When you enter a command that extends beyond a single line, you can press the Left Arrow or Ctrl-B keys repeatedly to scroll back toward the system prompt and verify the beginning of the command entry, or you can press the Ctrl-A key combination.
Ctrl-C	Cancels the command and returns to the command prompt.
Ctrl-D	Deletes the character at the cursor.
Ctrl-E	Moves the cursor to the end of the line.
Ctrl-F	Moves the cursor one character to the right.
Ctrl-G	Exits to the previous command mode without removing the command string.
Ctrl-K	Deletes all characters from the cursor to the end of the command line.
Ctrl-L	Redisplays the current command line.
Ctrl-N	Displays the next command in the command history.
Ctrl-O	Clears the terminal screen.
Ctrl-P	Displays the previous command in the command history.
Ctrl-R	Redisplays the current command line.

Keystrokes	Description
Ctrl-T	Transposes the character under the cursor with the character located to the right of the cursor. The cursor is then moved one character to the right.
Ctrl-U	Deletes all characters from the cursor to the beginning of the command line.
Ctrl-V	Removes any special meaning for the following keystroke. For example, press Ctrl-V before entering a question mark (?) in a regular expression.
Ctrl-W	Deletes the word to the left of the cursor.
Ctrl-X, H	Lists the history of commands you have entered. When using this key combination, press and release the Ctrl and X keys together before pressing H.
Ctrl-Y	Recalls the most recent entry in the buffer (press keys simultaneously).
Ctrl-Z	Ends a configuration session, and returns you to EXEC mode. When used at the end of a command line in which a valid command has been typed, the resulting configuration is first added to the running configuration file.
Up arrow key	Displays the previous command in the command history.
Down arrow key	Displays the next command in the command history.
Right arrow key Left arrow key	Moves your cursor through the command string, either forward or backward, allowing you to edit the current command.
?	Displays a list of available commands.

Keystokes	Description
Tab	<p>Completes the word for you after you enter the first characters of the word and then press the Tab key. All options that match are presented.</p> <p>Use tabs to complete the following items:</p> <ul style="list-style-type: none"> <li>• Command names</li> <li>• Scheme names in the file system</li> <li>• Server names in the file system</li> <li>• Filenames in the file system</li> </ul> <p><b>Example:</b></p> <pre>switch(config)# xm&lt;Tab&gt; switch(config)# xml&lt;Tab&gt; switch(config)# xml server</pre> <p><b>Example:</b></p> <pre>switch(config)# c&lt;Tab&gt; callhome class-map clock cts cdp cli control-plane switch(config)# cl&lt;Tab&gt; class-map cli clock switch(config)# cla&lt;Tab&gt; switch(config)# class-map</pre> <p><b>Example:</b></p> <pre>switch# cd bootflash:&lt;Tab&gt; bootflash: bootflash://sup-1/ bootflash:/// bootflash://sup-2/ bootflash://module-5/ bootflash://sup-active/ bootflash://module-6/ bootflash://sup-local/</pre> <p><b>Example:</b></p> <pre>switch# cd bootflash://mo&lt;Tab&gt; bootflash://module-5/ bootflash://module-6/cv switch# cd bootflash://module-</pre>

## Abbreviating Commands

You can abbreviate commands and keywords by entering the first few characters of a command. The abbreviation must include sufficient characters to make it unique from other commands or keywords. If you are having trouble entering a command, check the system prompt and enter the question mark (?) for a list of available commands. You might be in the wrong command mode or using incorrect syntax.

This table lists examples of command abbreviations.

**Table 6: Examples of Command Abbreviations**

Command	Abbreviation
configure terminal	conf t
copy running-config startup-config	copy run start
interface ethernet 1/2	int e 1/2
show running-config	sh run

## Completing a Partial Command Name

If you cannot remember a complete command name, or if you want to reduce the amount of typing you have to perform, enter the first few letters of the command, and then press the **Tab** key. The command line parser will complete the command if the string entered is unique to the command mode. If your keyboard does not have a **Tab** key, press **Ctrl-I** instead.

The CLI recognizes a command once you have entered enough characters to make the command unique. For example, if you enter **conf** in EXEC mode, the CLI will be able to associate your entry with the **configure** command, because only the **configure** command begins with **conf**.

In the following example, the CLI recognizes the unique string for **conf** in EXEC mode when you press the **Tab** key:

```
switch# conf<Tab>
switch# configure
```

When you use the command completion feature the CLI displays the full command name. The CLI does not execute the command until you press the **Return** or **Enter** key. This feature allows you to modify the command if the full command was not what you intended by the abbreviation. If you enter a set of characters that could indicate more than one command, a list of matching commands displays.

For example, entering **co<Tab>** lists all commands available in EXEC mode beginning with **co**:

```
switch# co<Tab>
configure  copy
switch# co
```

Note that the characters you entered appear at the prompt again to allow you to complete the command entry.

## Identifying Your Location in the Command Hierarchy

Some features have a configuration submode hierarchy nested more than one level. In these cases, you can display information about your present working context (PWC).

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>where detail</b>  <b>Example:</b>  <pre>switch# configure terminal switch(config)# interface mgmt0 switch(config-if)# where detail mode:                conf                     interface mgmt0 username:            admin</pre>	Displays the PWC.

## Using the no Form of a Command

Almost every configuration command has a **no** form that can be used to disable a feature, revert to a default value, or remove a configuration. The Cisco NX-OS command reference publications describe the function of the **no** form of the command whenever a **no** form is available.

This example shows how to disable a feature:

```
switch# configure terminal
switch(config)# feature tacacs+
switch(config)# no feature tacacs+
```

This example shows how to revert to the default value for a feature:

```
switch# configure terminal
switch(config)# banner motd #Welcome to the switch#
switch(config)# show banner motd
Welcome to the switch

switch(config)# no banner motd
switch(config)# show banner motd
User Access Verification
```

This example shows how to remove the configuration for a feature:

```
switch# configure terminal
switch(config)# radius-server host 10.10.2.2
switch(config)# show radius-server
retransmission count:0
timeout value:1
deadtime value:1
total number of servers:1

following RADIUS servers are configured:
 10.10.1.1:
    available for authentication on port:1812
    available for accounting on port:1813
 10.10.2.2:
    available for authentication on port:1812
    available for accounting on port:1813

switch(config)# no radius-server host 10.10.2.2
switch(config)# show radius-server
retransmission count:0
```

```

timeout value:1
deadtime value:1
total number of servers:1

following RADIUS servers are configured:
  10.10.1.1:
    available for authentication on port:1812
    available for accounting on port:1813

```

This example shows how to use the **no** form of a command in EXEC mode:

```

switch# cli var name testinterface ethernet1/2
switch# show cli variables
SWITCHNAME="switch"
TIMESTAMP="2009-05-12-13.43.13"
testinterface="ethernet1/2"

switch# cli no var name testinterface
switch# show cli variables
SWITCHNAME="switch"
TIMESTAMP="2009-05-12-13.43.13"

```

## Configuring CLI Variables

This section describes CLI variables in the Cisco NX-OS CLI.

### About CLI Variables

The Cisco NX-OS software supports the definition and use of variables in CLI commands.

You can refer to CLI variables in the following ways:

- Entered directly on the command line.
- Passed to a script initiated using the **run-script** command. The variables defined in the parent shell are available for use in the child **run-script** command process.

CLI variables have the following characteristics:

- Cannot have nested references through another variable
- Can persist across switch reloads or exist only for the current session

Cisco NX-OS supports one predefined variable: **TIMESTAMP**. This variable refers to the current time when the command executes in the format **YYYY-MM-DD-HH.MM.SS**.



#### Note

---

The **TIMESTAMP** variable name is case sensitive. All letters must be uppercase.

---

### Configuring CLI Session-Only Variables

You can define CLI session variables to persist only for the duration of your CLI session. These variables are useful for scripts that you execute periodically. You can reference the variable by enclosing the name in parentheses and preceding it with a dollar sign (\$), for example  $\$(variable-name)$ .

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>cli var name</b> <i>variable-name</i> <i>variable-text</i>  <b>Example:</b> switch# cli var name testinterface ethernet 2/1	Configures the CLI session variable. The <i>variable-name</i> argument is alphanumeric, case sensitive, and has a maximum length of 31 characters. The <i>variable-text</i> argument is alphanumeric, case sensitive, can contain spaces, and has a maximum length of 200 characters.
<b>Step 2</b>	<b>show cli variables</b>  <b>Example:</b> switch# show cli variables	(Optional) Displays the CLI variable configuration.

## Configuring Persistent CLI Variables

You can configure CLI variables that persist across CLI sessions and device reloads.

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>cli var name</b> <i>variable-name</i> <i>variable-text</i>  <b>Example:</b> switch(config)# cli var name testinterface ethernet 2/1	Configures the CLI persistent variable. The variable name is a case-sensitive, alphanumeric string and must begin with an alphabetic character. The maximum length is 31 characters.
<b>Step 3</b>	<b>exit</b>  <b>Example:</b> switch(config)# exit switch#	Exits global configuration mode.
<b>Step 4</b>	<b>show cli variables</b>  <b>Example:</b> switch# show cli variables	(Optional) Displays the CLI variable configuration.
<b>Step 5</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config)# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

# Command Aliases

This section provides information about command aliases.

## About Command Aliases

You can define command aliases to replace frequently used commands. The command aliases can represent all or part of the command syntax.

Command alias support has the following characteristics:

- Command aliases are global for all user sessions.
- Command aliases persist across reboots if you save them to the startup configuration.
- Command alias translation always takes precedence over any keyword in any configuration mode or submode.
- Command alias configuration takes effect for other user sessions immediately.
- The Cisco NX-OS software provides one default alias, **alias**, which is the equivalent to the **show cli alias** command that displays all user-defined aliases.
- You cannot delete or change the default command alias **alias**.
- You can nest aliases to a maximum depth of 1. One command alias can refer to another command alias that must refer to a valid command, not to another command alias.
- A command alias always replaces the first command keyword on the command line.
- You can define command aliases for commands in any command mode.
- If you reference a CLI variable in a command alias, the current value of the variable appears in the alias, not the variable reference.
- You can use command aliases for **show** command searching and filtering.

## Defining Command Aliases

You can define command aliases for commonly used commands.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.

	Command or Action	Purpose
<b>Step 2</b>	<b>cli alias name</b> <i>alias-name alias-text</i>  <b>Example:</b> switch(config)# cli alias name ethint interface ethernet	Configures the command alias. The alias name is an alphanumeric string that is not case sensitive and must begin with an alphabetic character. The maximum length is 30 characters.
<b>Step 3</b>	<b>exit</b>  <b>Example:</b> switch(config)# exit switch#	Exits global configuration mode.
<b>Step 4</b>	<b>alias</b>  <b>Example:</b> switch# alias	(Optional) Displays the command alias configuration.
<b>Step 5</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

## Configuring Command Aliases for a User Session

You can create a command alias for the current user session that is not available to any other user on the Cisco NX-OS device. You can also save the command alias for future use by the current user account.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>terminal alias</b> [ <b>persist</b> ] <i>alias-name</i> <i>command -string</i>  <b>Example:</b> switch# terminal alias shintbr show interface brief	Configures a command alias for the current user session. Use the <b>persist</b> keyword to save the alias for future use by the user account.  <b>Note</b> Do not abbreviate the <b>persist</b> keyword.

## Command Scripts

This section describes how you can create scripts of commands to perform multiple tasks.

## Running a Command Script

You can create a list of commands in a file and execute them from the CLI. You can use CLI variables in the command script.



### Note

You cannot create the script files at the CLI prompt. You can create the script file on a remote device and copy it to the bootflash:, slot0:, or volatile: directory on the Cisco NX-OS device.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>run-script</b> [bootflash:   slot0:   volatile:] <i>filename</i>  <b>Example:</b> switch# run-script testfile	Executes the commands in the file on the default directory.

## Echoing Information to the Terminal

You can echo information to the terminal, which is particularly useful from a command script. You can reference CLI variables and use formatting options in the echoed text.

This table lists the formatting options that you can insert in the text.

**Table 7: Formatting Options for the echo Command**

Formatting Option	Description
\b	Inserts back spaces.
\c	Removes the new line character at the end of the text string.
\f	Inserts a form feed character.
\n	Inserts a new line character.
\r	Returns to the beginning of the text line.
\t	Inserts a horizontal tab character.
\v	Inserts a vertical tab character.
\\	Displays a backslash character.

Formatting Option	Description
<code>\nnn</code>	Displays the corresponding ASCII octal character.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>echo</b> [ <b>backslash-interpret</b> ] [ <i>text</i> ]  <b>Example:</b> <pre>switch# echo This is a test. This is a test.</pre>	The <b>backslash-interpret</b> keyword indicates that the text string contains formatting options. The <i>text</i> argument is alphanumeric, case sensitive, and can contain blanks. The maximum length is 200 characters. The default is a blank line.

## Delaying Command Action

You can delay a command action for a period of time, which is particularly useful within a command script.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>sleep</b> <i>seconds</i>  <b>Example:</b> <pre>switch# sleep 30</pre>	Causes a delay for a number of seconds. The range is from 0 to 2147483647.

## Context-Sensitive Help

The Cisco NX-OS software provides context-sensitive help in the CLI. You can use a question mark (?) at any point in a command to list the valid input options.

CLI uses the caret (^) symbol to isolate input errors. The ^ symbol appears at the point in the command string where you have entered an incorrect command, keyword, or argument.

This table shows example outputs of context sensitive help.

Table 8: Context-Sensitive Help Example

Example Outputs	Description
<pre>switch# clock ?   set HH:MM:SS Current Time switch# clock</pre>	<p>Displays the command syntax for the <b>clock</b> command in EXEC mode.</p> <p>The switch output shows that the <b>set</b> keyword is required for using the <b>clock</b> command.</p>
<pre>switch# clock set ?   WORD HH:MM:SS Current Time switch# clock set</pre>	<p>Displays the command syntax for setting the time.</p> <p>The help output shows that the current time is required for setting the clock and how to format the time.</p>
<pre>switch# clock set 13:32:00&lt;CR&gt; % Incomplete command switch#</pre>	<p>Adds the current time.</p> <p>The CLI indicates the command is incomplete.</p>
<pre>switch# &lt;Ctrl-P&gt; switch# clock set 13:32:00</pre>	<p>Displays the previous command that you entered.</p>
<pre>switch# clock set 13:32:00 ?  &lt;1-31&gt; Day of the month switch# clock set 13:32:00</pre>	<p>Displays the additional arguments for the <b>clock set</b> command.</p>
<pre>switch# clock set 13:32:00 18 ?   April      Month of the year   August     Month of the year   December  Month of the year   February   Month of the year   January    Month of the year   July       Month of the year   June       Month of the year   March      Month of the year   May        Month of the year   November   Month of the year   October    Month of the year   September  Month of the year switch# clock set 13:32:00 18</pre>	<p>Displays the additional arguments for the <b>clock set</b> command.</p>
<pre>switch# clock set 13:32:00 18 April 08&lt;CR&gt; % Invalid input detected at '^' marker.</pre>	<p>Adds the date to the clock setting.</p> <p>The CLI indicates an error with the caret symbol (^) at 08.</p>
<pre>switch# clock set 13:32:00 18 April ?  &lt;2000-2030&gt; Enter the year (no  abbreviation) switch# clock set 13:32:00 18 April</pre>	<p>Displays the correct arguments for the year.</p>
<pre>switch# clock set 13:32:00 18 April 2008&lt;CR&gt; switch#</pre>	<p>Enters the correct syntax for the <b>clock set</b> command.</p>

# Understanding Regular Expressions

The Cisco NX-OS software supports regular expressions for searching and filtering in CLI output, such as the **show** commands. Regular expressions are case sensitive and allow for complex matching requirements.

## Special Characters

You can also use other keyboard characters (such as ! or ~) as single-character patterns, but certain keyboard characters have special meanings when used in regular expressions.

This table lists the keyboard characters that have special meanings.

**Table 9: Special Characters with Special Meaning**

Character	Special Meaning
.	Matches any single character, including white space.
*	Matches 0 or more sequences of the pattern.
+	Matches 1 or more sequences of the pattern.
?	Matches 0 or 1 occurrences of the pattern.
^	Matches the beginning of the string.
\$	Matches the end of the string.
_ (underscore)	Matches a comma (,), left brace ({}), right brace (}), left parenthesis ( ( ), right parenthesis ( ) ), the beginning of the string, the end of the string, or a space.  <b>Note</b> The underscore is only treated as a regular expression for BGP related commands.

To use these special characters as single-character patterns, remove the special meaning by preceding each character with a backslash (\). This example contains single-character patterns that match a dollar sign (\$), an underscore (\_), and a plus sign (+), respectively:

```
\$ \_ \+
```

## Multiple-Character Patterns

You can also specify a pattern that contains multiple characters by joining letters, digits, or keyboard characters that do not have special meanings. For example, a4% is a multiple-character regular expression.

With multiple-character patterns, the order is important. The regular expression a4% matches the character a followed by a 4 followed by a percent sign (%). If the string does not have a4%, in that order, pattern matching

fails. The multiple-character regular expression `a.` (the character `a` followed by a period) uses the special meaning of the period character to match the letter `a` followed by any single character. With this example, the strings `ab`, `a!`, or `a2` are all valid matches for the regular expression.

You can remove the special meaning of a special character by inserting a backslash before it. For example, when the expression `a\.` is used in the command syntax, only the string `a.` will be matched.

## Anchoring

You can match a regular expression pattern against the beginning or the end of the string by anchoring these regular expressions to a portion of the string using the special characters.

This table lists the special characters that you can use for anchoring.

**Table 10: Special Characters Used for Anchoring**

Character	Description
<code>^</code>	Matches the beginning of the string.
<code>\$</code>	Matches the end of the string.

For example, the regular expression `^con` matches any string that starts with `con`, and `sole$` matches any string that ends with `sole`.



### Note

The `^` symbol can also be used to indicate the logical function "not" when used in a bracketed range. For example, the expression `[^abcd]` indicates a range that matches any single letter, as long as it is not `a`, `b`, `c`, or `d`.

## Searching and Filtering show Command Output

Often, the output from `show` commands can be lengthy and cumbersome. The Cisco NX-OS software provides the means to search and filter the output so that you can easily locate information. The searching and filtering options follow a pipe character (`|`) at the end of the `show` command. You can display the options using the CLI context-sensitive help facility:

```
switch# show running-config | ?
cut      Print selected parts of lines.
diff     Show difference between current and previous invocation (creates temp files:
         remove them with 'diff-clean' command and don't use it on commands with big
         outputs, like 'show tech!')
egrep    Egrep - print lines matching a pattern
grep     Grep - print lines matching a pattern
head     Display first lines
human    Output in human format
last     Display last lines
less     Filter for paging
no-more  Turn-off pagination for command output
perl     Use perl script to filter output
section  Show lines that include the pattern as well as the subsequent lines that are
         more indented than matching line
sed      Stream Editor
```

```

sort      Stream Sorter
sscp     Stream SCP (secure copy)
tr       Translate, squeeze, and/or delete characters
uniq     Discard all but one of successive identical lines
vsh     The shell that understands cli command
wc       Count words, lines, characters
xml     Output in xml format (according to .xsd definitions)
begin    Begin with the line that matches
count    Count number of lines
end      End with the line that matches
exclude  Exclude lines that match
include  Include lines that match

```

## Filtering and Searching Keywords

The Cisco NX-OS CLI provides a set of keywords that you can use with the **show** commands to search and filter the command output.

This table lists the keywords for filtering and searching the CLI output.

**Table 11: Filtering and Searching Keywords**

Keyword Syntax	Description
<b>begin</b> <i>string</i> <b>Example:</b> <code>show version   begin Hardware</code>	Starts displaying at the line that contains the text that matches the search string. The search string is case sensitive.
<b>count</b> <b>Example:</b> <code>show running-config   count</code>	Displays the number of lines in the command output.
<b>cut</b> [-d <i>character</i> ] {-b   -c   -f   -s} <b>Example:</b> <code>show file testoutput   cut -b 1-10</code>	Displays only part of the output lines. You can display a number of bytes (-b), characters (-vcut [-d <i>character</i> ] {-b   -c   -f   -s}), or fields (-f). You can also use the -d keyword to define a field delimiter other than the tag character default. The -s keyword suppresses the display of the lines that do not contain the delimiter.
<b>end</b> <i>string</i> <b>Example:</b> <code>show running-config   end interface</code>	Displays all lines up to the last occurrence of the search string.
<b>exclude</b> <i>string</i> <b>Example:</b> <code>show interface brief   exclude down</code>	Displays all lines that do not include the search string. The search string is case sensitive.
<b>head</b> [ <i>lines lines</i> ] <b>Example:</b> <code>show logging logfile   head lines 50</code>	Displays the beginning of the output for the number of lines specified. The default number of lines is 10.

Keyword Syntax	Description
<b>human</b> <b>Example:</b> <code>show version   human</code>	Displays the output in normal format if you have previously set the output format to XML using the <b>terminal output xml</b> command.  <b>Note</b> The <b>terminal output xml</b> command, having 1.0 and 6.x / 7.x versions is used to set the schema (.xsd) file while validating xml. Setting 1.0, the switch will validate /isan/etc/schema/<comp>.xsd file, and if 6.x / 7.x the switch validates /isan/ect/schema/6.x/<comp>.xsd file and /isan/ect/schema/7.x/<comp>.xsd file accordingly based on the version of the image, the switch is running.
<b>include string</b> <b>Example:</b> <code>show interface brief   include up</code>	Displays all lines that include the search string. The search string is case sensitive.
<b>last [lines]</b> <b>Example:</b> <code>show logging logfile   last 50</code>	Displays the end of the output for the number of lines specified. The default number of lines is 10.
<b>no-more</b> <b>Example:</b> <code>show interface brief   no-more</code>	Displays all the output without stopping at the end of the screen with the <b>—More—</b> prompt.
<b>sscp SSH-connection-name filename</b> <b>Example:</b> <code>show version   sscp MyConnection show_version_output</code>	Redirects the output using streaming secure copy (sscp) to a named SSH connection. You can create the SSH named connection using the <b>ssh name</b> command.
<b>wc [bytes   lines   words]</b> <b>Example:</b> <code>show file testoutput   wc bytes</code>	Displays counts of characters, lines, or words. The default is to display the number of lines, words, and characters.
<b>xml</b> <b>Example:</b> <code>show version   xml</code>	Displays the output in XML format.

## diff Utility

You can compare the output from a **show** command with the output from the previous invocation of that command.

**diff-clean [all-session] [all-users]**

This table describes the keywords for the diff utility.

Keyword	Description
<b>all-sessions</b>	Removes diff temporary files from all sessions (past and present sessions) of the current user.
<b>all-users</b>	Removes diff temporary files from all sessions (past and present sessions) of all users.

The Cisco NX-OS software creates temporary files for the most current output for a **show** command for all current and previous users sessions. You can remove these temporary files using the **diff-clean** command.

**diff-clean** [**all-sessions** | **all-users**]

By default, the **diff-clean** command removes the temporary files for the current user's active session. The **all-sessions** keyword removes temporary files for all past and present sessions for the current user. The **all-users** keyword removes temporary files for all past and present sessions for the all users.

## grep and egrep Utilities

You can use the Global Regular Expression Print (grep) and Extended grep (egrep) command-line utilities to filter the **show** command output.

The grep and egrep syntax is as follows:

```
{grep | egrep} [count] [ignore-case] [invert-match] [line-exp] [line-number] [next lines] [prev lines] [word-exp expression]
```

This table lists the **grep** and **egrep** parameters.

**Table 12: grep and egrep Parameters**

Parameter	Description
<b>count</b>	Displays only the total count of matched lines.
<b>ignore-case</b>	Specifies to ignore the case difference in matched lines.
<b>invert-match</b>	Displays lines that do not match the expression.
<b>line-exp</b>	Displays only lines that match a complete line.
<b>line-number</b>	Specifies to display the line number before each matched line.
<b>next lines</b>	Specifies the number of lines to display after a matched line. The default is 0. The range is from 1 to 999.
<b>prev lines</b>	Specifies the number of lines to display before a matched line. The default is 0. The range is from 1 to 999.

Parameter	Description
<b>word-exp</b>	Displays only lines that match a complete word.
<i>expression</i>	Specifies a regular expression for searching the output.

## less Utility

You can use the less utility to display the contents of the **show** command output one screen at a time. You can enter **less** commands at the `:` prompt. To display all **less** commands you can use, enter `h` at the `:` prompt.

## sed Utility

You can use the Stream Editor (sed) utility to filter and manipulate the **show** command output as follows:

**sed** *command*

The *command* argument contains sed utility commands.

## sort Utility

You can use the sort utility to filter **show** command output.

The sort utility syntax is as follows:

**sort** [-M] [-b] [-d] [-f] [-g] [-i] [-k *field-number*[.*char-position*][*ordering*]] [-n] [-r] [-t *delimiter*] [-u]

This table describes the sort utility parameters.

**Table 13: sort Utility Parameters**

Parameter	Description
<b>-M</b>	Sorts by month.
<b>-b</b>	Ignores leading blanks (space characters). The default sort includes the leading blanks.
<b>-d</b>	Sorts by comparing only blanks and alphanumeric characters. The default sort includes all characters.
<b>-f</b>	Folds lowercase characters into uppercase characters.
<b>-g</b>	Sorts by comparing a general numeric value.
<b>-i</b>	Sorts only using printable characters. The default sort includes nonprintable characters.

Parameter	Description
<b>-k</b> <i>field-number</i> [ <i>.char-position</i> ][ <i>ordering</i> ]	Sorts according to a key value. There is no default key value.
<b>-n</b>	Sorts according to a numeric string value.
<b>-r</b>	Reverses order of the sort results. The default sort output is in ascending order.
<b>-t</b> <i>delimiter</i>	Sorts using a specified delimiter. The default delimiter is the space character.
<b>-u</b>	Removes duplicate lines from the sort results. The sort output displays the duplicate lines.

## Searching and Filtering from the --More-- Prompt

You can search and filter output from --More-- prompts in the **show** command output.

This table describes the --More-- prompt commands.

**Table 14: --More-- Prompt Commands**

Commands	Description
[ <i>lines</i> ]<space>	Displays output lines for either the specified number of lines or the current screen size.
[ <i>lines</i> ]z	Displays output lines for either the specified number of lines or the current screen size. If you use the <i>lines</i> argument, that value becomes the new default screen size.
[ <i>lines</i> ]<return>	Displays output lines for either the specified number of lines or the current default number of lines. The initial default is 1 line. If you use the optional <i>lines</i> argument, that value becomes the new default number of lines to display for this command.
[ <i>lines</i> ]d or [ <i>lines</i> ]Ctrl+shift+D	Scrolls through output lines for either the specified number of lines or the current default number of lines. The initial default is 11 lines. If you use the optional <i>lines</i> argument, that value becomes the new default number of lines to display for this command.
q or Q or Ctrl-C	Exits the --More-- prompt.

Commands	Description
<code>[lines]s</code>	Skips forward in the output for either the specified number of lines or the current default number of lines and displays a screen of lines. The default is 1 line.
<code>[lines]f</code>	Skips forward in the output for either the specified number of screens or the current default number of screens and displays a screen of lines. The default is 1 screen.
<code>=</code>	Displays the current line number.
<code>[count]/expression</code>	Skips to the line that matches the regular expression and displays a screen of output lines. Use the optional <i>count</i> argument to search for lines with multiple occurrences of the expression. This command sets the current regular expression that you can use in other commands.
<code>[count]n</code>	Skips to the next line that matches the current regular expression and displays a screen of output lines. Use the optional <i>count</i> argument to skip past matches.
<code>{!   :![shell-cmd]}</code>	Executes the command specified in the <i>shell-cmd</i> argument in a subshell.
<code>.</code>	Repeats the previous command.

## Using the Command History

The Cisco NX-OS software CLI allows you to access the command history for the current user session. You can recall and reissue commands, with or without modification. You can also clear the command history.

## Recalling a Command

You can recall a command in the command history to optionally modify and enter again.

This example shows how to recall a command and reenter it:

```
switch(config)# show cli history
0 11:04:07  configure terminal
1 11:04:28  show interface ethernet 2/24
2 11:04:39  interface ethernet 2/24
3 11:05:13  no shutdown
4 11:05:19  exit
5 11:05:25  show cli history
switch(config)# !1
switch(config)# show interface ethernet 2/24
```

You can also use the **Ctrl-P** and **Ctrl-N** keystroke shortcuts to recall commands.

## Controlling CLI History Recall

You can control the commands that you recall from the CLI history using the **Ctrl-P** and **Ctrl-N** keystroke shortcuts. By default, the Cisco NX-OS software recalls all commands from the current command mode and higher command modes. For example, if you are working in global configuration mode, the command recall keystroke shortcuts recall both EXEC mode and global configuration mode commands. Using the **terminal history no-exec-in-config** command, you can avoid recalling EXEC mode commands when you are in a configuration mode.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<p>[no] <b>terminal history no-exec-in-config</b></p> <p><b>Example:</b>  switch# terminal history  no-exec-in-config</p>	Configures the CLI history to remove the EXEC commands when you use the recall keystroke shortcuts in a configuration mode. The default recalls EXEC commands. You can revert to the default using the <b>no</b> form of the command.

## Configuring the CLI Edit Mode

You can recall commands from the CLI history using the **Ctrl-P** and **Ctrl-N** keystroke shortcuts and edit them before reissuing them. The default edit mode is emacs. You can change the edit mode to vi.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<p>[no] <b>terminal edit-mode vi [persist]</b></p> <p><b>Example:</b>  switch# terminal edit-mode vi</p>	Changes the CLI edit mode to vi for the user session. The <b>persist</b> keyword makes the setting persistent across sessions for the current username. Use the <b>no</b> to revert to using emacs.

## Displaying the Command History

You can display the command history using the **show cli history** command.

The **show cli history** command has the following syntax:

```
show cli history [lines] [unformatted]
```

```
show cli history [lines] [config-only | exec-only | this-mode-only] [unformatted]
```

By default, the number of lines displayed is 12 and the output includes the command number and timestamp. The example shows how to display default number of lines of the command history:

```
switch# show cli history
```

The example shows how to display 20 lines of the command history:

```
switch# show cli history 20
```

The example shows how to display only the configuration commands in the command history:

```
switch(config)# show cli history config-only
```

The example shows how to display only the EXEC commands in the command history:

```
switch(config)# show cli history exec-only
```

The example shows how to display only the commands in the command history for the current command mode:

```
switch(config-if)# show cli history this-mode-only
```

The example shows how to display only the commands in the command history without the command number and timestamp:

```
switch(config)# show cli history unformatted
```

## Enabling or Disabling the CLI Confirmation Prompts

For many features, the Cisco NX-OS software displays prompts on the CLI that ask for confirmation before continuing. You can enable or disable these prompts. The default is enabled.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	[no] terminal dont-ask [persist]  <b>Example:</b> switch# terminal dont-ask	Disables the CLI confirmation prompt. The <b>persist</b> keyword makes the setting persistent across sessions for the current username. The default is enabled.  Use the <b>no</b> form of the command to enable the CLI confirmation prompts.

## Setting CLI Display Colors

You can change the CLI colors to display as follows:

- The prompt displays in green if the previous command succeeded.

- The prompt displays in red of the previous command failed.
- The user input displays in blue.
- The command output displays in the default color.

The default colors are those set by the terminal emulator software.

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>terminal color</b> [evening] [persist]  <b>Example:</b> switch# terminal color	Sets the CLI display colors for the terminal session. The <b>evening</b> keyword is not supported. The <b>persist</b> keyword makes the setting persistent across sessions for the current username. The default setting is not persistent.

# Sending Commands to Modules

You can send commands directly to modules from the supervisor module session using the **slot** command.

The **slot** has the following syntax:

```
slot slot-number [quoted] command-string
```

By default, the keyword and arguments in the *command-string* argument are separated by a space. To send more than one command to a module, separate the commands with a space character, a semicolon character (;), and a space character.

The **quoted** keyword indicates that the command string begins and ends with double quotation marks ("). Use this keyword when you want to redirect the module command output to a filtering utility, such as diff, that is supported only on the supervisor module session.

The following example shows how to display and filter module information:

```
switch# slot 2 show version | grep lc
```

This example shows how to filter module information on the supervisor module session:

```
switch# slot 2 quoted "show version" | diff
switch# slot 4 quoted "show version" | diff -c
*** /volatile/vsh_diff_1_root_8430_slot__quoted_show_version.old      Wed Apr 29 20:10:41
    2009
--- -      Wed Apr 29 20:10:41 2009
*****
*** 1,5 ****
! RAM 1036860 kB
! lc2
  Software
    BIOS:      version 1.10.6
    system:    version 4.2(1) [build 4.2(0.202)]
--- 1,5 ----
! RAM 516692 kB
! lc4
  Software
    BIOS:      version 1.10.6
    system:    version 4.2(1) [build 4.2(0.202)]
```

```

*****
*** 12,16 ****
Hardware
    bootflash: 0 blocks (block size 512b)

!    uptime is 0 days 1 hours 45 minute(s) 34 second(s)

--- 12,16 ----
Hardware
    bootflash: 0 blocks (block size 512b)

!    uptime is 0 days 1 hours 45 minute(s) 42 second(s)

```

## BIOS Loader Prompt

When the supervisor modules power up, a specialized BIOS image automatically loads and tries to locate a valid kickstart image for booting the system. If a valid kickstart image is not found, the following BIOS loader prompt displays:

```
loader>
```

For information on how to load the Cisco NX-OS software from the `<loader>` prompt, see the Cisco Nexus troubleshooting guide for your device.

## Examples Using the CLI

This section includes examples of using the CLI.

### Defining Command Aliases

This example shows how to define command aliases:

```
cli alias name ethint interface ethernet
cli alias name shintbr show interface brief
cli alias name shintupbr shintbr | include up | include ethernet
```

This example shows how to use a command alias:

```
switch# configure terminal
switch(config)# ethint 2/3
switch(config-if)#
```

### Using CLI Session Variables

You can reference a variable using the syntax `$(variable-name)`.

This example shows how to reference a user-defined CLI session variable:

```
switch# show interface $(testinterface)
Ethernet2/1 is down (Administratively down)
  Hardware is 10/100/1000 Ethernet, address is 0000.0000.0000 (bia 0019.076c.4dac)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
```

```

Encapsulation ARPA
auto-duplex, auto-speed
Beacon is turned off
Auto-Negotiation is turned on
Input flow-control is off, output flow-control is off
Auto-mdix is turned on
Switchport monitor is off
Last clearing of "show interface" counters never
5 minute input rate 0 bytes/sec, 0 packets/sec
5 minute output rate 0 bytes/sec, 0 packets/sec
L3 in Switched:
  ucast: 0 pkts, 0 bytes - mcast: 0 pkts, 0 bytes
L3 out Switched:
  ucast: 0 pkts, 0 bytes - mcast: 0 pkts, 0 bytes
Rx
  0 input packets 0 unicast packets 0 multicast packets
  0 broadcast packets 0 jumbo packets 0 storm suppression packets
  0 bytes
Tx
  0 output packets 0 multicast packets
  0 broadcast packets 0 jumbo packets
  0 bytes
  0 input error 0 short frame 0 watchdog
  0 no buffer 0 runt 0 CRC 0 ecc
  0 overrun 0 underrun 0 ignored 0 bad etype drop
  0 bad proto drop 0 if down drop 0 input with dribble
  0 input discard
  0 output error 0 collision 0 deferred
  0 late collision 0 lost carrier 0 no carrier
  0 babble
  0 Rx pause 0 Tx pause 0 reset

```

## Using the System-Defined Timestamp Variable

This example uses `$(TIMESTAMP)` when redirecting `show` command output to a file:

```

switch# show running-config > rcfg.$(TIMESTAMP)
Preparing to copy...done
switch# dir
      12667      May 01 12:27:59 2008  rcfg.2008-05-01-12.27.59

Usage for bootflash://sup-local
8192 bytes used
20963328 bytes free
20971520 bytes total

```

## Running a Command Script

This example displays the CLI commands specified in the script file:

```

switch# show file testfile
configure terminal
interface ethernet 2/1
no shutdown
end
show interface ethernet 2/1

```

This example displays the `run-script` command execution output:

```

switch# run-script testfile
`configure terminal`
`interface ethernet 2/1`
`no shutdown`

```

```

`end`
`show interface ethernet 2/1 `
Ethernet2/1 is down (Link not connected)
  Hardware is 10/100/1000 Ethernet, address is 0019.076c.4dac (bia 0019.076c.4dac)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA
  Port mode is trunk
  auto-duplex, auto-speed
  Beacon is turned off
  Auto-Negotiation is turned on
  Input flow-control is off, output flow-control is off
  Auto-mdix is turned on
  Switchport monitor is off
  Last clearing of "show interface" counters 1d26.2uh
  5 minute input rate 0 bytes/sec, 0 packets/sec
  5 minute output rate 0 bytes/sec, 0 packets/sec
Rx
  0 input packets 0 unicast packets 0 multicast packets
  0 broadcast packets 0 jumbo packets 0 storm suppression packets
  0 bytes
Tx
  0 output packets 0 multicast packets
  0 broadcast packets 0 jumbo packets
  0 bytes
  0 input error 0 short frame 0 watchdog
  0 no buffer 0 runt 0 CRC 0 ecc
  0 overrun 0 underrun 0 ignored 0 bad etype drop
  0 bad proto drop 0 if down drop 0 input with dribble
  0 input discard
  0 output error 0 collision 0 deferred
  0 late collision 0 lost carrier 0 no carrier
  0 babble
  0 Rx pause 0 Tx pause 0 reset

```

## Additional References for the CLI

This section includes additional information related to the CLI.

## Related Documents for the CLI

Related Topic	Document Title
Cisco NX-OS Licensing	<i>Cisco NX-OS Licensing Guide</i>
Command reference	<i>Cisco Nexus 5000 Series NX-OS Command Reference</i>



## Configuring Terminal Settings and Sessions

This chapter contains the following sections:

- [Finding Feature Information, page 67](#)
- [Information About Terminal Settings and Sessions, page 67](#)
- [Licensing Requirements for Terminal Settings and Sessions, page 69](#)
- [Configuring the Console Port, page 69](#)
- [Configuring the COM1 Port, page 71](#)
- [Configuring Virtual Terminals, page 72](#)
- [Configuring Modem Connections, page 74](#)
- [Clearing Terminal Sessions, page 78](#)
- [Displaying Terminal and Session Information, page 79](#)
- [Default Settings for File System Parameters, page 79](#)
- [Additional References for Terminal Settings and Sessions, page 80](#)

### Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at <https://tools.cisco.com/bugsearch/> and the release notes for your software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the “New and Changed Information” chapter.

### Information About Terminal Settings and Sessions

This section includes information about terminal settings and sessions.

## Terminal Session Settings

The Cisco NX-OS software features allow you to manage the following characteristics of terminals:

### Terminal type

Name used by Telnet when communicating with remote hosts

### Length

Number of lines of command output displayed before pausing

### Width

Number of characters displayed before wrapping the line

### Inactive session timeout

Number of minutes that a session remains inactive before the device terminates it

## Console Port

The console port is an asynchronous serial port that allows you to connect to the device for initial configuration through a standard RS-232 port with an RJ-45 connector. Any device connected to this port must be capable of asynchronous transmission. You can configure the following parameters for the console port:

### Data bits

Specifies the number of bits in an 8-bit byte that is used for data.

### Inactive session timeout

Specifies the number of minutes a session can be inactive before it is terminated.

### Parity

Specifies the odd or even parity for error detection.

### Speed

Specifies the transmission speed for the connection.

### Stop bits

Specifies the stop bits for an asynchronous line.

Configure your terminal emulator with 9600 baud, 8 data bits, 1 stop bit, and no parity.

## COM1 Port

A COM1 port is an RS-232 port with a DB-9 interface that enables you to connect to an external serial communication device such as a modem. You can configure the following parameters for the COM1 port:

### Data bits

Specifies the number of bits in an 8-bit byte that is used for data.

**Hardware flowcontrol**

Enables the flow-control hardware.

**Parity**

Specifies the odd or even parity for error detection.

**Speed**

Specifies the transmission speed for the connection.

**Stop bits**

Specifies the stop bits for an asynchronous line.

Configure your terminal emulator with 9600 baud, 8 data bits, 1 stop bit, and no parity.

## Virtual Terminals

You can use virtual terminal lines to connect to your Cisco NX-OS device. Secure Shell (SSH) and Telnet create virtual terminal sessions. You can configure an inactive session timeout and a maximum sessions limit for virtual terminals.

## Licensing Requirements for Terminal Settings and Sessions

The following table shows the licensing requirements for this feature:

Product	License Requirement
Cisco NX-OS	Terminal setting configuration requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the Cisco NX-OS licensing scheme, see the <i>Cisco NX-OS Licensing Guide</i> .

## Configuring the Console Port

You can set the following characteristics for the console port:

- Data bits
- Inactive session timeout
- Parity
- Speed
- Stop bits

**Before You Begin**

Log in to the console port.

**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>line console</b>  <b>Example:</b> switch# line console switch(config-console)#	Enters console configuration mode.
<b>Step 3</b>	<b>databits <i>bits</i></b>  <b>Example:</b> switch(config-console)# databits 7	Configures the number of data bits per byte. The range is from 5 to 8. The default is 8.
<b>Step 4</b>	<b>exec-timeout <i>minutes</i></b>  <b>Example:</b> switch(config-console)# exec-timeout 30	Configures the timeout for an inactive session. The range is from 0 to 525600 minutes (8760 hours). A value of 0 minutes disables the session timeout. The default is 30 minutes.
<b>Step 5</b>	<b>parity {even   none   odd}</b>  <b>Example:</b> switch(config-console)# parity even	Configures the parity. The default is <b>none</b> .
<b>Step 6</b>	<b>speed {300   1200   2400   4800   9600   38400   57600   115200}</b>  <b>Example:</b> switch(config-console)# speed 115200	Configures the transmit and receive speed. The default is <b>115200</b> .
<b>Step 7</b>	<b>stopbits {1   2}</b>  <b>Example:</b> switch(config-console)# stopbits 2	Configures the stop bits. The default is <b>1</b> .
<b>Step 8</b>	<b>exit</b>  <b>Example:</b> switch(config-console)# exit switch(config)#	Exits console configuration mode.
<b>Step 9</b>	<b>show line console</b>  <b>Example:</b> switch(config)# show line console	(Optional) Displays the console settings.

	Command or Action	Purpose
<b>Step 10</b>	<b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch(config)# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

## Configuring the COM1 Port

You can set the following characteristics for the COM1 port:

- Data bits
- Flow control on the hardware
- Parity
- Speed
- Stop bits

### Before You Begin

Log in to the console port or COM1 port.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
<b>Step 2</b>	<b>line com1</b>  <b>Example:</b> <pre>switch# line com1 switch(config-com1)#</pre>	Enters COM1 configuration mode.
<b>Step 3</b>	<b>databits <i>bits</i></b>  <b>Example:</b> <pre>switch(config-com1)# databits 7</pre>	Configures the number of data bits per byte. The range is from 5 to 8. The default is 8.
<b>Step 4</b>	<b>flowcontrol hardware</b>  <b>Example:</b> <pre>switch(config-com1)# flowcontrol hardware</pre>	<p>Enables flow control on the hardware. The default is enabled.</p> <p>Use the <b>no flowcontrol hardware</b> command to disable flow control on the hardware.</p>

	Command or Action	Purpose
<b>Step 5</b>	<b>parity</b> {even   none   odd}  <b>Example:</b> switch(config-com1)# parity even	Configures the parity. The default is <b>none</b> .
<b>Step 6</b>	<b>speed</b> {300   1200   2400   4800   9600   38400   57600   115200}  <b>Example:</b> switch(config-com1)# speed 115200	Configures the transmit and receive speed. The default is <b>9600</b> .
<b>Step 7</b>	<b>stopbits</b> {1   2}  <b>Example:</b> switch(config-com1)# stopbits 2	Configures the stop bits. The default is <b>1</b> .
<b>Step 8</b>	<b>exit</b>  <b>Example:</b> switch(config-com1)# exit switch(config)#	Exits COM1 configuration mode.
<b>Step 9</b>	<b>show line com1</b>  <b>Example:</b> switch(config)# show line com1	(Optional) Displays the COM1 port settings.
<b>Step 10</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config)# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

## Configuring Virtual Terminals

This section describes how to configure virtual terminals on Cisco NX-OS devices.

### Configuring the Inactive Session Timeout

You can configure a timeout for inactive virtual terminal sessions on a Cisco NX-OS device.

**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>line vty</b>  <b>Example:</b> switch# line vty switch(config-line)#	Enters line configuration mode.
<b>Step 3</b>	<b>exec-timeout <i>minutes</i></b>  <b>Example:</b> switch(config-line)# exec-timeout 30	Configures the inactive session timeout. The range is from 0 to 525600 minutes (8760 hours). A value of 0 minutes disables the timeout. The default value is 30.
<b>Step 4</b>	<b>exit</b>  <b>Example:</b> switch(config-line)# exit switch(config)#	Exits line configuration mode.
<b>Step 5</b>	<b>show running-config all   begin vty</b>  <b>Example:</b> switch(config)# show running-config all   begin vty	(Optional) Displays the virtual terminal configuration.
<b>Step 6</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config)# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

## Configuring the Session Limit

You can limit the number of virtual terminal sessions on your Cisco NX-OS device.

**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.

	Command or Action	Purpose
<b>Step 2</b>	<b>line vty</b>  <b>Example:</b> switch# line vty switch(config-line)#	Enters line configuration mode.
<b>Step 3</b>	<b>session-limit <i>sessions</i></b>  <b>Example:</b> switch(config-line)# session-limit 10	Configures the maximum number of virtual sessions for the Cisco NX-OS device. The range is from 1 to 60. The default is 32.
<b>Step 4</b>	<b>exit</b>  <b>Example:</b> switch(config-line)# exit switch(config)#	Exits line configuration mode.
<b>Step 5</b>	<b>show running-config all   begin vty</b>  <b>Example:</b> switch(config)# show running-config all   begin vty	(Optional) Displays the virtual terminal configuration.
<b>Step 6</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config)# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

## Configuring Modem Connections

You can connect a modem to either the COM1 port or the console port.

We recommend that you use the COM1 port to connect the modem.

### Enabling a Modem Connection

You must enable the modem connection on the port before you can use the modem.

#### Before You Begin

Log in to the console port.

## Procedure

	Command or Action	Purpose						
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.						
<b>Step 2</b>	Enter one of the following commands: <table border="1" data-bbox="537 562 1068 779"> <thead> <tr> <th>Command</th> <th>Purpose</th> </tr> </thead> <tbody> <tr> <td><b>line com1</b></td> <td>Enters COM1 configuration mode.</td> </tr> <tr> <td><b>line console</b></td> <td>Enters console configuration mode.</td> </tr> </tbody> </table> <b>Example:</b> <pre>switch# line com1 switch(config-com1)#</pre>	Command	Purpose	<b>line com1</b>	Enters COM1 configuration mode.	<b>line console</b>	Enters console configuration mode.	Enters COM1 configuration mode or console configuration mode.
Command	Purpose							
<b>line com1</b>	Enters COM1 configuration mode.							
<b>line console</b>	Enters console configuration mode.							
<b>Step 3</b>	<b>modem in</b>  <b>Example:</b> <pre>switch(config-com1)# modem in</pre>	Enables modem input on the COM1 or console port.						
<b>Step 4</b>	<b>exit</b>  <b>Example:</b> <pre>switch(config-com1)# exit switch(config)#</pre>	Exits COM1 or console configuration mode.						
<b>Step 5</b>	<b>show line</b>  <b>Example:</b> <pre>switch(config)# show line</pre>	(Optional) Displays the console and COM1 settings.						
<b>Step 6</b>	<b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch(config)# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.						

## Downloading the Default Initialization String

The Cisco NX-OS software provides a default initialization string that you can download for connecting with the modem. The default initialization string is ATE0Q1&D2&C1S0=1\015.

**Before You Begin**

Log in to the console port.

**Procedure**

	Command or Action	Purpose						
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.						
<b>Step 2</b>	Enter one of the following commands: <table border="1"> <thead> <tr> <th>Option</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><b>line com1</b></td> <td>Enters COM1 configuration mode.</td> </tr> <tr> <td><b>line console</b></td> <td>Enters console configuration mode.</td> </tr> </tbody> </table>  <b>Example:</b> <pre>switch# line com1 switch(config-com1)#</pre>	Option	Description	<b>line com1</b>	Enters COM1 configuration mode.	<b>line console</b>	Enters console configuration mode.	
Option	Description							
<b>line com1</b>	Enters COM1 configuration mode.							
<b>line console</b>	Enters console configuration mode.							
<b>Step 3</b>	<b>modem init-string default</b>  <b>Example:</b> <pre>switch(config-com1)# modem init-string default</pre>	Writes the default initialization string to the modem.						
<b>Step 4</b>	<b>exit</b>  <b>Example:</b> <pre>switch(config-com1)# exit switch(config)#</pre>	Exits COM1 or console configuration mode.						
<b>Step 5</b>	<b>show line</b>  <b>Example:</b> <pre>switch(config)# show line</pre>	(Optional) Displays the COM1 and console settings.						
<b>Step 6</b>	<b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch(config)# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.						

## Configuring and Downloading a User-Specified Initialization String

You can configure and download your own initialization when the default initialization string is not compatible with your modem.

### Before You Begin

Log in to the console port.

### Procedure

	Command or Action	Purpose						
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.						
<b>Step 2</b>	Enter one of the following commands: <table border="1"> <thead> <tr> <th>Option</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><b>line com1</b></td> <td>Enters COM1 configuration mode.</td> </tr> <tr> <td><b>line console</b></td> <td>Enters console configuration mode.</td> </tr> </tbody> </table>  <b>Example:</b> <pre>switch# line com1 switch(config-com1)#</pre>	Option	Description	<b>line com1</b>	Enters COM1 configuration mode.	<b>line console</b>	Enters console configuration mode.	
Option	Description							
<b>line com1</b>	Enters COM1 configuration mode.							
<b>line console</b>	Enters console configuration mode.							
<b>Step 3</b>	<b>modem set-string user-input <i>string</i></b>  <b>Example:</b> <pre>switch(config-com1)# modem set-string user-input ATE0Q1&amp;D2&amp;C1S0=3\015</pre>	Sets the user-specified initialization string for the COM1 or console port. The initialization string is alphanumeric and case sensitive, can contain special characters, and has a maximum of 100 characters.  <b>Note</b> You must first set the user-input string before initializing the string.						
<b>Step 4</b>	<b>modem init-string user-input</b>  <b>Example:</b> <pre>switch(config-com1)# modem init-string user-input</pre>	Writes the user-specified initialization string to the modem connected to the COM1 or console port.						
<b>Step 5</b>	<b>exit</b>  <b>Example:</b> <pre>switch(config-com1)# exit switch(config)#</pre>	Exits COM1 or console configuration mode.						

	Command or Action	Purpose
<b>Step 6</b>	<b>show line</b>  <b>Example:</b> switch(config)# show line	(Optional) Displays the COM1 and console settings.
<b>Step 7</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config)# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

## Initializing a Modem for a Powered-Up Cisco NX-OS Device

If you connect a modem to a powered-up physical device, you must initialize the modem before you can use it.

### Before You Begin

After waiting until the Cisco NX-OS device has completed the boot sequence and the system image is running, connect the modem to either the COM1 port or the console port on the device.

Enable the modem connection on the port.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>modem connect line {com1   console}</b>  <b>Example:</b> switch# modem connect line com1	Initializes the modem connected to the device.

### Related Topics

[Enabling a Modem Connection, on page 74](#)

## Clearing Terminal Sessions

You can clear terminal sessions on the Cisco NX-OS device.

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>show users</b>  <b>Example:</b> switch# show users	(Optional) Displays the user sessions on the device.
<b>Step 2</b>	<b>clear line <i>name</i></b>  <b>Example:</b> switch# clear line pts/0	Clears a terminal session on a specific line. The line name is case sensitive.

## Displaying Terminal and Session Information

To display terminal and session information, perform one of the following tasks:

Command	Purpose
<b>show terminal</b>	Displays terminal settings.
<b>show line</b>	Displays the COM1 and console ports settings.
<b>show users</b>	Displays virtual terminal sessions.
<b>show running-config [all]</b>	Displays the user account configuration in the running configuration. The <b>all</b> keyword displays the default values for the user accounts.

For detailed information about the fields in the output from these commands, see the Cisco Nexus command reference guide for your device.

## Default Settings for File System Parameters

This table lists the default settings for the file system parameters.

**Table 15: Default File System Settings**

Parameters	Default
Default filesystem	bootflash:

# Additional References for Terminal Settings and Sessions

This section includes additional references for terminal settings and sessions on NX-OS devices.

## Related Documents for Terminal Settings and Sessions

Related Topic	Document Title
Licensing	<i>Cisco NX-OS Licensing Guide</i>
Command reference	<i>Cisco Nexus 5000 Series Command Reference</i>



# Basic Device Management

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This chapter contains the following sections:

- [Finding Feature Information, page 81](#)
- [Information About Basic Device Management, page 82](#)
- [Licensing Requirements for Basic Device Management, page 83](#)
- [Changing the Device Hostname, page 83](#)
- [Configuring the MOTD Banner, page 84](#)
- [Configuring the EXEC Banner, page 85](#)
- [Configuring the Time Zone, page 86](#)
- [Configuring Summer Time \(Daylight Saving Time\), page 87](#)
- [Manually Setting the Device Clock, page 88](#)
- [Setting the Clock Manager, page 88](#)
- [Managing Users, page 89](#)
- [Verifying the Device Configuration, page 90](#)
- [Default Settings for Basic Device Parameters, page 90](#)
- [Additional References for Basic Device Management, page 91](#)

## Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at <https://tools.cisco.com/bugsearch/> and the release notes for your software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the “New and Changed Information” chapter or the Feature History table below.

# Information About Basic Device Management

This section provides information about basic device management.

## Device Hostname

You can change the device hostname displayed in the command prompt from the default (switch) to another character string. When you give the device a unique hostname, you can easily identify the device from the command-line interface (CLI) prompt.

## Message-of-the-Day Banner

The message-of-the-day (MOTD) banner displays before the user login prompt on the device. This message can contain any information that you want to display for users of the device.

## EXEC Banner

Starting with the Cisco NX-OS Release , the EXEC banner is displayed after a user logs in to a switch. This banner can be used to post reminders to your network administrators.

## Device Clock

If you do not synchronize your device with a valid outside timing mechanism, such as an NTP clock source, you can manually set the clock time when your device boots.

## Clock Manager

The Cisco Nexus chassis may contain clocks of different types that may need to be synchronized. These clocks are a part of various components (such as the supervisor, LC processors, or line cards) and each may be using a different protocol.

The clock manager provides a way to synchronize these different clocks.

## Time Zone and Summer Time (Daylight Saving Time)

You can configure the time zone and summer time (daylight saving time) setting for your device. These values offset the clock time from Coordinated Universal Time (UTC). UTC is International Atomic Time (TAI) with leap seconds added periodically to compensate for the Earth's slowing rotation. UTC was formerly called Greenwich Mean Time (GMT).

## User Sessions

You can display the active user session on your device. You can also send messages to the user sessions. For more information about managing user sessions and accounts, see the Cisco Nexus security configuration guide for your device.

## Licensing Requirements for Basic Device Management

The following table shows the licensing requirements for this feature:

Product	License Requirement
Cisco NX-OS	Basic device management requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the Cisco NX-OS licensing scheme, see the <i>Cisco NX-OS Licensing Guide</i> .

## Changing the Device Hostname

You can change the device hostname displayed in the command prompt from the default (switch) to another character string.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
<b>Step 2</b>	<b>{hostname   switchname} name</b>  <b>Example:</b> Using the <b>hostname</b> command: <pre>switch(config)# hostname Engineering1 Engineering1(config)#</pre> Using the <b>switchname</b> command: <pre>Engineering1(config)# switchname Engineering2 Engineering2(config)#</pre>	Changes the device hostname. The <i>name</i> argument is alphanumeric, case sensitive, and has a maximum length of 63 characters. The default name is switch.  <b>Note</b> The <b>switchname</b> command performs the same function as the <b>hostname</b> command.

	Command or Action	Purpose
<b>Step 3</b>	<b>exit</b>  <b>Example:</b> Engineering2 (config) # exit Engineering2 #	Exits global configuration mode.
<b>Step 4</b>	<b>copy running-config startup-config</b>  <b>Example:</b> Engineering2 # copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

## Configuring the MOTD Banner

You can configure the MOTD to display before the login prompt on the terminal when a user logs in. The MOTD banner has the following characteristics:

- Maximum of 80 characters per line
- Maximum of 40 lines

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch (config) #	Enters global configuration mode.
<b>Step 2</b>	<b>banner motd <i>delimiting-character message delimiting-character</i></b>  <b>Example:</b> switch (config) # banner motd #Welcome to the Switch# switch (config) #	Configures the MOTD banner. Do not use the <i>delimiting-character</i> in the <i>message</i> text.  <b>Note</b> Do not use " or % as a delimiting character.
<b>Step 3</b>	<b>exit</b>  <b>Example:</b> switch (config) # exit switch #	Exits global configuration mode.
<b>Step 4</b>	<b>show banner motd</b>  <b>Example:</b> switch # show banner motd	(Optional) Displays the configured MOTD banner.

	Command or Action	Purpose
<b>Step 5</b>	<b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

## Configuring the EXEC Banner

You can configure the EXEC banner to display a message when a user logs in to a device. The EXEC banner has the following characteristics:

- Maximum of 254 characters per line including the delimiting characters
- Maximum of 40 lines

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
<b>Step 2</b>	<b>banner exec <i>delimiting-character message delimiting-character</i></b>  <b>Example:</b> <pre>switch(config)# banner exec #Welcome to the Test# switch(config)#</pre>	Configures the EXEC banner. Do not use the <i>delimiting-character</i> in the <i>message</i> text.
<b>Step 3</b>	<b>no banner exec</b>  <b>Example:</b> <pre>switch(config)# no banner exec</pre>	(Optional) Resets the value of EXEC banner to the default value.  <b>Note</b> The default value of the EXEC banner is blank.
<b>Step 4</b>	<b>exit</b>  <b>Example:</b> <pre>switch(config)# exit switch#</pre>	Exits global configuration mode.
<b>Step 5</b>	<b>show banner exec</b>  <b>Example:</b> <pre>switch# show banner exec</pre>	(Optional) Displays the configured EXEC banner.

	Command or Action	Purpose
<b>Step 6</b>	<b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

### Configuring the EXEC Banner

This example shows how to configure the EXEC banner.

```
# config t
Enter configuration commands, one per line. End with CNTL/Z.
switch(config)# banner exec #Unauthorized access to this device is prohibited!#
switch(config)# exit
switch# show banner exec
Unauthorized access to this device is prohibited!
```

## Configuring the Time Zone

You can configure the time zone to offset the device clock time from UTC.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
<b>Step 2</b>	<b>clock timezone zone-name offset-hours offset-minutes</b>  <b>Example:</b> <pre>switch(config)# clock timezone EST -5 0</pre>	Configures the time zone. The <i>zone-name</i> argument is a 3-character string for the time zone acronym (for example, PST or EST). The <i>offset-hours</i> argument is the offset from the UTC and the range is from -23 to 23 hours. The range for the <i>offset-minutes</i> argument is from 0 to 59 minutes.
<b>Step 3</b>	<b>exit</b>  <b>Example:</b> <pre>switch(config)# exit switch#</pre>	Exits global configuration mode.
<b>Step 4</b>	<b>show clock</b>  <b>Example:</b> <pre>switch# show clock</pre>	(Optional) Displays the time and time zone.

	Command or Action	Purpose
Step 5	<b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

## Configuring Summer Time (Daylight Saving Time)

You can configure when summer time, or daylight saving time, is in effect for the device and the offset in minutes.

### Procedure

	Command or Action	Purpose
Step 1	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
Step 2	<b>clock summer-time zone-name start-week start-day start-month start-time end-week end-day end-month end-time offset-minutes</b>  <b>Example:</b> <pre>switch(config)# clock summer-time PDT 1 Sunday March 02:00 1 Sunday November 02:00 60</pre>	<p>Configures summer time or daylight saving time.</p> <p>The <i>zone-name</i> argument is a three character string for the time zone acronym (for example, PST and EST).</p> <p>The values for the <i>start-day</i> and <i>end-day</i> arguments are <b>Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday</b>.</p> <p>The values for the <i>start-month</i> and <i>end-month</i> arguments are <b>January, February, March, April, May, June, July, August, September, October, November, and December</b>.</p> <p>The value for the <i>start-time</i> and <i>end-time</i> arguments are in the format <i>hh:mm</i>.</p> <p>The range for the <i>offset-minutes</i> argument is from 0 to 1440 minutes.</p>
Step 3	<b>exit</b>  <b>Example:</b> <pre>switch(config)# exit switch#</pre>	Exits global configuration mode.
Step 4	<b>show clock detail</b>  <b>Example:</b> <pre>switch(config)# show clock detail</pre>	(Optional) Displays the configured MOTD banner.

	Command or Action	Purpose
<b>Step 5</b>	<b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

## Manually Setting the Device Clock

You can set the clock manually if your device cannot access a remote time source.

### Before You Begin

Configure the time zone.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>clock set <i>time day month year</i></b>  <b>Example:</b> <pre>switch# clock set 15:00:00 30 May 2008 Fri May 30 15:14:00 PDT 2008</pre>	Configures the device clock.  The format for the <i>time</i> argument is <i>hh:mm:ss</i> .  The range for the <i>day</i> argument is from 1 to 31.  The values for the <i>month</i> argument are <b>January, February, March, April, May, June, July, August, September, October, November, and December</b> .  The range for the <i>year</i> argument is from 2000 to 2030.
<b>Step 2</b>	<b>show clock</b>  <b>Example:</b> <pre>switch(config)# show clock</pre>	(Optional) Displays the current clock value.

### Related Topics

[Configuring the Time Zone, on page 86](#)

## Setting the Clock Manager

You can configure the clock manager to synchronize all the clocks of the components in the Cisco Nexus chassis.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>clock protocol <i>protocol</i> vdc <i>vdc-num</i></b>  <b>Example:</b> <pre># clock protocol ptp vdc 2</pre>	Configures the clock manager.  The values for the <i>protocol</i> argument are <b>ptp</b> , <b>ntp</b> , and <b>none</b> .  The following describes the values: <ul style="list-style-type: none"> <li>• <b>ptp</b>—Synchronizes clocks with Precision Time Protocol (PTP) as described by IEEE 1588.</li> <li>• <b>ntp</b>—Synchronizes clocks with Network Time Protocol (NTP).</li> <li>• <b>none</b>—Use <b>clock set</b> to set supervisor clocks.</li> </ul> <p><b>Note</b> When <b>none</b> is used, the clock in the specified VDC must be configured.</p> <p><b>Note</b> Once the protocol is configured, the clock in the specified VDC must use that protocol.</p> <p>For example, if the <b>clock protocol ptp vdc 2</b> command is entered, then PTP should be configured in VDC 2.</p> <p>The range for the <i>vdc</i> argument is 1 to 8.</p>
<b>Step 2</b>	<b>show run clock_manager</b>  <b>Example:</b> <pre>#show run clock_manager</pre>	(Optional) Displays the configuration of the clock manager.

## Managing Users

You can display information about users logged into the device and send messages to those users.

### Displaying Information about the User Sessions

You can display information about the user session on the device.

#### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>show users</b>  <b>Example:</b> <pre>switch# show users</pre>	Displays the user sessions.

## Sending a Message to Users

You can send a message to active users currently using the device CLI.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>show users</b>  <b>Example:</b> switch# show users	(Optional) Displays the active user sessions.
<b>Step 2</b>	<b>send [session line] message-text</b>  <b>Example:</b> switch# send Reloading the device is 10 minutes!	Sends a message to all active users or to a specific user. The message can be up to 80 alphanumeric characters and is case sensitive.

## Verifying the Device Configuration

To verify the configuration after bootstrapping the device using POAP, use one of the following commands:

Command	Purpose
<b>show running-config</b>	Displays the running configuration.
<b>show startup-config</b>	Displays the startup configuration.

For detailed information about the fields in the output from these commands, see the Cisco Nexus command reference for your device.

## Default Settings for Basic Device Parameters

This table lists the default settings for basic device parameters.

**Table 16: Default Basic Device Parameters**

Parameters	Default
MOTD banner text	User Access Verification
Clock time zone	UTC

# Additional References for Basic Device Management

You can find additional information related to basic device management.

## Related Documents for Basic Device Management

Related Topic	Document Title
Licensing	<i>Cisco NX-OS Licensing Guide</i>
Command reference	<i>Cisco Nexus 7000 Series NX-OS Fundamentals Command Reference</i> <i>Cisco Nexus 5000 Series NX-OS Command Reference</i>





# Using the Device File Systems, Directories, and Files

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This chapter contains the following sections:

- [Finding Feature Information](#), page 93
- [Information about the External Storage Devices, Device File Systems, Directories, and Files](#), page 93
- [Licensing Requirements for File Systems, Directories, and Files](#), page 95
- [Working with Directories](#), page 95
- [Working with Files](#), page 98
- [Working with Archive Files](#), page 102
- [Examples of Using the File System](#), page 105
- [Default Settings for File System Parameters](#), page 108
- [Additional References for File Systems](#), page 108

## Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at <https://tools.cisco.com/bugsearch/> and the release notes for your software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the “New and Changed Information” chapter or the Feature History table below.

## Information about the External Storage Devices, Device File Systems, Directories, and Files

This section describes file systems, directories, and files on the Cisco NX-OS device.

## File Systems

The syntax for specifying a local file system is `filesystem:[//modules/]`. This table describes file systems that you can reference on your device.

**Table 17: File System Syntax Components**

File System Name	Module	Description
bootflash	sup-active sup-local	Internal CompactFlash memory located on the active supervisor module used for storing image files, configuration files, and other miscellaneous files. The initial default directory is bootflash.
	sup-standby sup-remote	Internal CompactFlash memory located on the standby supervisor module used for storing image files, configuration files, and other miscellaneous files.
volatile	—	Volatile random-access memory (VRAM) located on a supervisor module used for temporary or pending changes.
log	—	Memory on the active supervisor that stores logging file statistics.
system	—	Memory on a supervisor module used for storing the running-configuration file.
debug	—	Memory on a supervisor module used for debug logs.

## Directories

You can create directories on bootflash: and external flash memory (slot0:, usb1:, and usb2:). You can navigate through these directories and use them for files.

## Files

You create and access files on bootflash:, volatile:, slot0:, usb1:, and usb2: file systems. You can only access files on the system: file systems. You can use the debug: file system for debug log files specified in the **debug logfile** command.

You can download files, such as system image files, from remote servers using FTP, Secure Copy (SCP), Secure Shell FTP (SFTP), and TFTP. You can also copy files from an external server to the device, because the device can act as an SCP server.

## Licensing Requirements for File Systems, Directories, and Files

The following table shows the licensing requirements for this feature:

Product	License Requirement
Cisco NX-OS	Using the file systems, directories, and files requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the Cisco NX-OS licensing scheme, see the <i>Cisco NX-OS Licensing Guide</i> .

## Working with Directories

This section describes how to work with directories on the Cisco NX-OS device.

### Identifying the Current Directory

You can display the directory name of your current directory.

#### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<p><b>pwd</b></p> <p><b>Example:</b> switch# pwd</p>	Displays the name of your current directory.

### Changing the Current Directory

You can change the current directory for file system operations. The initial default directory is bootflash:.

**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>pwd</b>  <b>Example:</b> switch# pwd	(Optional) Displays the name of your current default directory.
<b>Step 2</b>	<b>cd</b> { <i>directory</i>   <i>filesystem:[//module/][directory]</i> }  <b>Example:</b> switch# cd slot0:	Changes to a new current directory. The file system, module, and directory names are case sensitive.

## Creating a Directory

You can create directories in the bootflash: and flash device file systems.

**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>pwd</b>  <b>Example:</b> switch# pwd	(Optional) Displays the name of your current default directory.
<b>Step 2</b>	<b>cd</b> { <i>directory</i>   <i>filesystem:[//module/][directory]</i> }  <b>Example:</b> switch# cd slot0:	(Optional) Changes to a new current directory. The file system, module, and directory names are case sensitive.
<b>Step 3</b>	<b>mkdir</b> [ <i>filesystem:[//module/]</i> ] <i>directory</i>  <b>Example:</b> switch# mkdir test	Creates a new directory. The <i>filesystem</i> argument is case sensitive. The <i>directory</i> argument is alphanumeric, case sensitive, and has a maximum of 64 characters.

## Displaying Directory Contents

You can display the contents of a directory.

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>dir</b> [ <i>directory</i>   <i>filesystem:[//module/][directory]</i> ]  <b>Example:</b> switch# dir bootflash:test	Displays the directory contents. The default is the current working directory. The file system and directory names are case sensitive.

## Deleting a Directory

You can remove directories from the file systems on your device.

**Before You Begin**

Ensure that the directory is empty before you try to delete it.

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>pwd</b>  <b>Example:</b> switch# pwd	(Optional) Displays the name of your current default directory.
<b>Step 2</b>	<b>dir</b> [ <i>filesystem :[//module/][directory]</i> ]  <b>Example:</b> switch# dir bootflash:test	(Optional) Displays the contents of the current directory. The file system, module, and directory names are case sensitive.  If the directory is not empty, you must delete all the files before you can delete the directory.
<b>Step 3</b>	<b>rmdir</b> [ <i>filesystem :[//module/]</i> ] <i>directory</i>  <b>Example:</b> switch# rmdir test	Deletes a directory. The file system and directory name are case sensitive.

## Accessing Directories on the Standby Supervisor Module

You can access all file systems on the standby supervisor module (remote) from a session on the active supervisor module. This feature is useful when copying files to the active supervisor modules requires similar files to exist on the standby supervisor module. To access the file systems on the standby supervisor module from a session on the active supervisor module, you specify the standby supervisor module in the path to the file using either *filesystem://sup-remote/* or *filesystem://sup-standby/*.

# Working with Files

This section describes how to work with files on the Cisco NX-OS device.

## Moving Files

You can move a file from one directory to another directory.



### Caution

If a file with the same name already exists in the destination directory, that file is overwritten by the moved file.

You can use the **move** command to rename a file by moving the file within the same directory.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>pwd</b>  <b>Example:</b> switch# pwd	(Optional) Displays the name of your current default directory.
<b>Step 2</b>	<b>dir</b> [ <i>filesystem:[//module/][directory]</i> ]  <b>Example:</b> switch# dir bootflash	(Optional) Displays the contents of the current directory. The file system and directory name are case sensitive.
<b>Step 3</b>	<b>move</b> [ <i>filesystem:[//module/][directory /]   directory/</i> ] <i>source-filename</i> { <i>filesystem:[//module/][directory /]   directory/</i> } [ <i>target-filename</i> ]   <i>target-filename</i>  <b>Example:</b> switch# move test old_tests/test1	Moves a file.  The file system, module, and directory names are case sensitive.  The <i>target-filename</i> argument is alphanumeric, case sensitive, and has a maximum of 64 characters. If the <i>target-filename</i> argument is not specified, the filename defaults to the <i>source-filename</i> argument value.

## Copying Files

You can make copies of files, either within the same directory or on another directory.



### Note

Use the **dir** command to ensure that enough space is available in the target file system. If enough space is not available, use the **delete** command to remove unneeded files.

**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>pwd</b>  <b>Example:</b> switch# pwd	(Optional) Displays the name of your current default directory.
<b>Step 2</b>	<b>dir</b> [ <i>filesystem</i> : <i>//module</i> ][ <i>directory</i> ]  <b>Example:</b> switch# dir bootflash	(Optional) Displays the contents of the current directory. The file system and directory name are case sensitive.
<b>Step 3</b>	<b>copy</b> [ <i>filesystem</i> : <i>//module</i> ][ <i>directory</i> ]/   <i>directory</i> /} <i>source-filename</i>   { <i>filesystem</i> : <i>//module</i> }[ <i>directory</i> /]]   <i>directory</i> /{ <i>target-filename</i> }  <b>Example:</b> switch# copy test old_tests/test1	Copies a file. The file system, module, and directory names are case sensitive. The <i>source-filename</i> argument is alphanumeric, case sensitive, and has a maximum of 64 characters. If the <i>target-filename</i> argument is not specified, the filename defaults to the <i>source-filename</i> argument value.  The copy command supports ftp, scp, sftp, tftp and http protocols.

## Deleting Files

You can delete a file from a directory.

**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>dir</b> [ <i>filesystem</i> : <i>//module</i> ][ <i>directory</i> ]  <b>Example:</b> switch# dir bootflash	(Optional) Displays the contents of the current directory. The file system and directory name are case sensitive.
<b>Step 2</b>	<b>delete</b> { <i>filesystem</i> : <i>//module</i> }[ <i>directory</i> ]/   <i>directory</i> /} <i>filename</i>  <b>Example:</b> switch# delete test old_tests/test1	Deletes a file. The file system, module, and directory names are case sensitive. The <i>source-filename</i> argument is case sensitive.  <b>Caution</b> If you specify a directory, the <b>delete</b> command deletes the entire directory and all its contents.

## Displaying File Contents

You can display the contents of a file.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>show file</b> [ <i>filesystem:[//module/]</i> ][ <i>directory/</i> ] <i>filename</i>  <b>Example:</b> switch# show file bootflash:test-results	Displays the file contents.

## Displaying File Checksums

You can display checksums to check the file integrity.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>show file</b> [ <i>filesystem:[//module/]</i> ][ <i>directory/</i> ] <i>filename</i> { <i>cksum</i>   <i>md5sum</i> }  <b>Example:</b> switch# show file bootflash:trunks2.cfg cksum	Displays the checksum or MD5 checksum of the file.

## Compressing and Uncompressing Files

You can compress and uncompress files on your Cisco NX-OS device using Lempel-Ziv 1977 (LZ77) coding.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>dir</b> [ <i>filesystem:[//module/]directory</i> ]  <b>Example:</b> switch# dir bootflash:	(Optional) Displays the contents of the current directory. The file system and directory name are case sensitive.

	Command or Action	Purpose
<b>Step 2</b>	<b>gzip</b> [ <i>filesystem</i> :// <i>module</i> ]/[ <i>directory</i> ]/   <i>directory</i> ]/ <i>filename</i>  <b>Example:</b> switch# gzip show_tech	Compresses a file. After the file is compressed, it has a .gz suffix.
<b>Step 3</b>	<b>gunzip</b> [ <i>filesystem</i> :// <i>module</i> ]/[ <i>directory</i> ]/   <i>directory</i> ]/ <i>filename</i> .gz  <b>Example:</b> switch# gunzip show_tech.gz	Uncompresses a file. The file to uncompress must have the .gz suffix. After the file is uncompressed, it does not have the .gz suffix.

## Displaying the Last Lines in a File

You can display the last lines of a file.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>tail</b> [ <i>filesystem</i> :// <i>module</i> ]/[ <i>directory</i> ]/ <i>filename</i> [ <i>lines</i> ]  <b>Example:</b> switch# tail ospf-gr.conf	Displays the last lines of a file. The default number of lines is 10. The range is from 0 to 80 lines.

## Redirecting show Command Output to a File

You can redirect **show** command output to a file on bootflash:, slot0:, volatile:, or on a remote server. You can also specify the format for the command output.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>terminal redirection-mode</b> {ascii   zipped}  <b>Example:</b> switch# terminal redirection-mode zipped	(Optional) Sets the redirection mode for the <b>show</b> command output for the user session. The default mode is <b>ascii</b> .

	Command or Action	Purpose
<b>Step 2</b>	<pre>show-command &gt; [filesystem:[//module/][directory]   [directory /]]filename</pre> <p><b>Example:</b> switch# show tech-support &gt; bootflash:techinfo</p>	Redirects the output from a <b>show</b> command to a file.

## Finding Files

You can find the files in the current working directory and its subdirectories that have names that begin with a specific character string.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<pre>pwd</pre> <p><b>Example:</b> switch# pwd</p>	(Optional) Displays the name of your current default directory.
<b>Step 2</b>	<pre>cd {filesystem:[//module/][directory]   directory}</pre> <p><b>Example:</b> switch# cd bootflash:test_scripts</p>	(Optional) Changes the default directory.
<b>Step 3</b>	<pre>find filename-prefix</pre> <p><b>Example:</b> switch# find bgp_script</p>	Finds all filenames in the default directory and in its subdirectories beginning with the filename prefix. The filename prefix is case sensitive.

## Working with Archive Files

The Cisco NX-OS software supports archive files. You can create an archive file, append files to an existing archive file, extract files from an archive file, and list the files in an archive file.

### Creating an Archive Files

You can create an archive file and add files to it. You can specify the following compression types:

- bzip2
- gzip

- Uncompressed

The default is `gzip`.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<code>tar create {bootflash:   volatile;}archive-filename [absolute] [bz2-compress] [gz-compress] [remove] [uncompressed] [verbose] filename-list</code>	<p>Creates an archive file and adds files to it. The filename is alphanumeric, not case sensitive, and has a maximum length of 240 characters.</p> <p>The <b>absolute</b> keyword specifies that the leading backslash characters (\) should not be removed from the names of the files added to the archive file. By default, the leading backslash characters are removed.</p> <p>The <b>bz2-compress</b>, <b>gz-compress</b>, and <b>uncompressed</b> keywords determine the compression utility used when files are added, or later appended, to the archive and the decompression utility to use when extracting the files. If you do not specify an extension for the archive file, the defaults are as follows:</p> <ul style="list-style-type: none"> <li>• For <b>bz2-compress</b>, the extension is <code>.tar.bz2</code>.</li> <li>• For <b>gz-compress</b>, the extension is <code>.tar.gz</code>.</li> <li>• For <b>uncompressed</b>, the extension is <code>.tar</code>.</li> </ul> <p>The <b>remove</b> keyword specifies that the Cisco NX-OS software should delete the files from the file system after adding them to the archive. By default, the files are not deleted.</p> <p>The <b>verbose</b> keyword specifies that the Cisco NX-OS software should list the files as they are added to the archive. By default, the files are listed as they are added.</p>

This example shows how to create a `gzip` compressed archive file:

```
switch# tar create bootflash:config-archive gz-compress bootflash:config-file
```

## Appending Files to an Archive File

You can append files to an existing archive file on your Cisco NX-OS device.

### Before You Begin

You have created an archive file on your Cisco NX-OS device.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<code>tar append {bootflash:   volatile;}archive-filename</code>	Adds files to an existing archive file. The archive filename is not case sensitive.

	Command or Action	Purpose
	[ <b>absolute</b> ] [ <b>remove</b> ] [ <b>verbose</b> ] <i>filename-list</i>	<p>The <b>absolute</b> keyword specifies that the leading backslash characters (\) should not be removed from the names of the files added to the archive file. By default, the leading backslash characters are removed.</p> <p>The <b>remove</b> keyword specifies that the Cisco NX-OS software should delete the files from the filesystem after adding them to the archive. By default, the files are not deleted.</p> <p>The <b>verbose</b> keyword specifies that the Cisco NX-OS software should list the files as they are added to the archive. By default, the files are listed as they are added.</p>

This example shows how to append a file to an existing archive file:

```
switch# tar append bootflash:config-archive.tar.gz bootflash:new-config
```

## Extracting Files from an Archive File

You can extract files to an existing archive file on your Cisco NX-OS device.

### Before You Begin

You have created an archive file on your Cisco NX-OS device.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>tar extract</b> { <b>bootflash:</b>   <b>volatile:</b> } <i>archive-filename</i> [ <b>keep-old</b> ] [ <b>screen</b> ] [ <b>to</b> { <b>bootflash:</b>   <b>volatile:</b> }] [ <i>directory-name</i> ] [ <b>verbose</b> ]	<p>Extracts files from an existing archive file. The archive filename is not case sensitive.</p> <p>The <b>keep-old</b> keyword indicates that the Cisco NX-OS software should not overwrite files with the same name as the files being extracted.</p> <p>The <b>screen</b> keyword specifies that the Cisco NX-OS software should display the contents of the extracted files to the terminal screen.</p> <p>The <b>to</b> keyword specifies the target file system. You can include a directory name. The directory name is alphanumeric, case sensitive, and has a maximum length of 240 characters.</p> <p>The <b>verbose</b> keyword specifies that the Cisco NX-OS software should display the names of the files as they are extracted.</p>

This example shows how to extract files from an existing archive file:

```
switch# tar extract bootflash:config-archive.tar.gz
```

## Displaying the Filenames in an Archive File

You can display the names of the files in an archive files using the **tar list** command.

```
tar list {bootflash: | volatile:}archive-filename
```

The archive filename is not case sensitive.

```
switch# tar list bootflash:config-archive.tar.gz
config-file
new-config
```

## Examples of Using the File System

This section includes example of using the file system on the Cisco NX-OS device.

## Accessing Directories on Standby Supervisor Modules

This example shows how to list the files on the standby supervisor module:

```
switch# dir bootflash://sup-remote
 12198912   Aug 27 16:29:18 2003  m9500-sflek9-kickstart-mzg.1.3.0.39a.bin
  1864931   Apr 29 12:41:59 2003  dplug2
      12288   Apr 18 20:23:11 2003  lost+found/
 12097024   Nov 21 16:34:18 2003  m9500-sflek9-kickstart-mz.1.3.1.1.bin
 41574014   Nov 21 16:34:47 2003  m9500-sflek9-mz.1.3.1.1.bin

Usage for bootflash://sup-remote
 67747169 bytes used
116812447 bytes free
184559616 bytes total
```

This example shows how to delete a file on the standby supervisor module:

```
switch# delete bootflash://sup-remote/aOldConfig.txt
```

## Moving Files

This example shows how to move a file on an external flash device:

```
switch# move slot0:samplefile slot0:mystorage/samplefile
```

This example shows how to move a file in the default file system:

```
switch# move samplefile mystorage/samplefile
```

## Copying Files

This example shows how to copy the file called samplefile from the root directory of the slot0: file system to the mystorage directory:

```
switch# copy slot0:samplefile slot0:mystorage/samplefile
```

This example shows how to copy a file from the current directory level:

```
switch# copy samplefile mystorage/samplefile
```

This example shows how to copy a file from the active supervisor module bootflash to the standby supervisor module bootflash:

```
switch# copy bootflash:system_image bootflash://sup-2/system_image
```

You can also use the **copy** command to upload and download files from the slot0: or bootflash: file system to or from a FTP, TFTP, SFTP, or SCP server.

## Deleting a Directory

You can remove directories from the file systems on your device.

### Before You Begin

Ensure that the directory is empty before you try to delete it.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>pwd</b>  <b>Example:</b> switch# pwd	(Optional) Displays the name of your current default directory.
<b>Step 2</b>	<b>dir</b> [ <i>filesystem</i> :[ <i>//module/</i> ][ <i>directory</i> ]]  <b>Example:</b> switch# dir bootflash:test	(Optional) Displays the contents of the current directory. The file system, module, and directory names are case sensitive.  If the directory is not empty, you must delete all the files before you can delete the directory.
<b>Step 3</b>	<b>rmdir</b> [ <i>filesystem</i> :[ <i>//module/</i> ]] <i>directory</i>  <b>Example:</b> switch# rmdir test	Deletes a directory. The file system and directory name are case sensitive.

## Displaying File Contents

This example shows how to display the contents of a file on an external flash device:

```
switch# show file slot0:test
configure terminal
interface ethernet 1/1
no shutdown
end
show interface ethernet 1/1
```

This example shows how to display the contents of a file that resides in the current directory:

```
switch# show file myfile
```

## Displaying File Checksums

This example shows how to display the checksum of a file:

```
switch# show file bootflash:trunks2.cfg cksum
583547619
```

This example shows how to display the MD5 checksum of a file:

```
switch# show file bootflash:trunks2.cfg md5sum
3b94707198aabefcf46459de10c9281c
```

## Compressing and Uncompressing Files

This example shows how to compress a file:

```
switch# dir
 1525859      Jul 04 00:51:03 2003 Samplefile
...
switch# gzip volatile:Samplefile
switch# dir
 266069      Jul 04 00:51:03 2003 Samplefile.gz
...

```

This example shows how to uncompress a compressed file:

```
switch# dir
 266069      Jul 04 00:51:03 2003 Samplefile.gz
...
switch# gunzip samplefile
switch# dir
 1525859      Jul 04 00:51:03 2003 Samplefile
...

```

## Redirecting show Command Output

This example shows how to direct the output to a file on the bootflash: file system:

```
switch# show interface > bootflash:switch1-intf.cfg
```

This example shows how to direct the output to a file on external flash memory:

```
switch# show interface > slot0:switch-intf.cfg
```

This example shows how to direct the output to a file on a TFTP server:

```
switch# show interface > tftp://10.10.1.1/home/configs/switch-intf.cfg
Preparing to copy...done
```

This example shows how to direct the output of the **show tech-support** command to a file:

```
switch# show tech-support > Samplefile
Building Configuration ...
switch# dir
 1525859      Jul 04 00:51:03 2003 Samplefile
Usage for volatile://
 1527808 bytes used
 19443712 bytes free
 20971520 bytes total
```

## Finding Files

This example shows how to find a file in the current default directory:

```
switch# find smm_shm.cfg
/usr/bin/find: ./lost+found: Permission denied
./smm_shm.cfg
./newer-fs/isan/etc/routing-sw/smm_shm.cfg
./newer-fs/isan/etc/smm_shm.cfg
```

## Default Settings for File System Parameters

This table lists the default settings for the file system parameters.

**Table 18: Default File System Settings**

Parameters	Default
Default filesystem	bootflash:

## Additional References for File Systems

This section includes additional information related to the file systems.

## Related Documents for File Systems

Related Topic	Document Title
Licensing	<i>Cisco NX-OS Licensing Guide</i>
Command reference	<i>Cisco Nexus 7000 Series NX-OS Fundamentals Command Reference</i> <i>Cisco Nexus 5000 Series NX-OS Command Reference</i>





## Working with Configuration Files

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This chapter contains the following sections:

- [Finding Feature Information, page 111](#)
- [Information About Configuration Files, page 111](#)
- [Licensing Requirements for Configuration Files, page 112](#)
- [Managing Configuration Files, page 112](#)
- [Verifying the Device Configuration, page 121](#)
- [Examples of Working with Configuration Files, page 122](#)
- [Additional References for Configuration Files, page 122](#)

### Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at <https://tools.cisco.com/bugsearch/> and the release notes for your software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the “New and Changed Information” chapter or the Feature History table below.

### Information About Configuration Files

Configuration files contain the Cisco NX-OS software commands used to configure the features on a Cisco NX-OS device. Commands are parsed (translated and executed) by the Cisco NX-OS software when the system is booted (from the startup-config file) or when you enter commands at the CLI in a configuration mode.

To change the startup configuration file, you can either save the running-configuration file to the startup configuration using the **copy running-config startup-config** command or copy a configuration file from a file server to the startup configuration.

## Types of Configuration Files

The Cisco NX-OS software has two types of configuration files, running configuration and startup configuration. The device uses the startup configuration (startup-config) during device startup to configure the software features. The running configuration (running-config) contains the current changes that you make to the startup-configuration file. The two configuration files can be different. You might want to change the device configuration for a short time period rather than permanently. In this case, you would change the running configuration by using commands in global configuration mode but not save the changes to the startup configuration.

To change the running configuration, use the **configure terminal** command to enter global configuration mode. As you use the Cisco NX-OS configuration modes, commands generally are executed immediately and are saved to the running configuration file either immediately after you enter them or when you exit a configuration mode.

To change the startup-configuration file, you can either save the running configuration file to the startup configuration or download a configuration file from a file server to the startup configuration.

### Related Topics

[Saving the Running Configuration to the Startup Configuration, on page 112](#)

[Downloading the Startup Configuration From a Remote Server, on page 115](#)

## Licensing Requirements for Configuration Files

The following table shows the licensing requirements for this feature:

Product	License Requirement
Cisco NX-OS	Configuration files require no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the Cisco NX-OS licensing scheme, see the <i>Cisco NX-OS Licensing Guide</i> <a href="#">Cisco NX-OS Licensing Guide</a> .

## Managing Configuration Files

This section describes how to manage configuration files.

### Saving the Running Configuration to the Startup Configuration

You can save the running configuration to the startup configuration to save your changes for the next time you that reload the device.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>show running-config</b>  <b>Example:</b> switch# show running-config	(Optional) Displays the running configuration.
<b>Step 2</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch# copy running-config startup-config	Copies the running configuration to the startup configuration.

## Copying a Configuration File to a Remote Server

You can copy a configuration file stored in the internal memory to a remote server as a backup or to use for configuring other Cisco NX-OS devices.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>copy running-config</b> <i>scheme://server/[url /]filename</i>  <b>Example:</b> switch# copy running-config tftp://10.10.1.1/sw1-run-config.bak	Copies the running-configuration file to a remote server.  For the <i>scheme</i> argument, you can enter <b>tftp:</b> , <b>ftp:</b> , <b>scp:</b> , or <b>sftp:</b> . The <i>server</i> argument is the address or name of the remote server, and the <i>url</i> argument is the path to the source file on the remote server.  The <i>server</i> , <i>url</i> , and <i>filename</i> arguments are case sensitive.
<b>Step 2</b>	<b>copy startup-config</b> <i>scheme://server/[url /]filename</i>  <b>Example:</b> switch# copy startup-config tftp://10.10.1.1/sw1-start-config.bak	Copies the startup-configuration file to a remote server.  For the <i>scheme</i> argument, you can enter <b>tftp:</b> , <b>ftp:</b> , <b>scp:</b> , or <b>sftp:</b> . The <i>server</i> argument is the address or name of the remote server, and the <i>url</i> argument is the path to the source file on the remote server.  The <i>server</i> , <i>url</i> , and <i>filename</i> arguments are case sensitive.

This example shows how to copy the bootflash file using FTP:

```
switch# copy ftp: bootflash:
Enter source filename: n5000-uk9-kickstart.5.0.2.N2.1.bin
Warning: There is already a file existing with this name. Do you want to
overwrite (y/n)?[n] y
Enter vrf (If no input, current vrf 'default' is considered): management
Enter hostname for the ftp server: 172.1.1.10
Enter username: xxx
Password:
```

```
***** Transfer of file Completed Successfully *****
Note: Boot variable kickstart is set to
bootflash:/n5000-uk9-kickstart.5.0.2.N2.1.bin
```

## Downloading the Running Configuration From a Remote Server

You can configure your Cisco NX-OS device by using configuration files that you created on another Cisco NX-OS device and uploaded to a remote server. You then download the file from the remote server to your device using TFTP, FTP, Secure Copy (SCP), or Secure Shell FTP (SFTP) to the running configuration.

### Before You Begin

Ensure that the configuration file that you want to download is in the correct directory on the remote server.

Ensure that the permissions on the file are set correctly. Permissions on the file should be set to world-read.

Ensure that your Cisco NX-OS device has a route to the remote server. The Cisco NX-OS device and the remote server must be in the same subnetwork if you do not have a router or a default gateway to route traffic between subnets.

Check connectivity to the remote server using the **ping** or **ping6** command.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>copy <i>scheme://server/[url]/filename</i> running-config</b>  <b>Example:</b> <pre>switch# copy tftp://10.10.1.1/my-config running-config</pre>	Downloads the running-configuration file from a remote server.  For the <i>scheme</i> argument, you can enter <b>tftp:</b> , <b>ftp:</b> , <b>scp:</b> , or <b>sftp:</b> . The <i>server</i> argument is the address or name of the remote server, and the <i>url</i> argument is the path to the source file on the remote server.  The <i>server</i> , <i>url</i> , and <i>filename</i> arguments are case sensitive.
<b>Step 2</b>	<b>show running-config</b>  <b>Example:</b> <pre>switch# show running-config</pre>	(Optional) Displays the running configuration.
<b>Step 3</b>	<b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.
<b>Step 4</b>	<b>show startup-config</b>  <b>Example:</b> <pre>switch# show startup-config</pre>	(Optional) Displays the startup configuration.

## Downloading the Startup Configuration From a Remote Server

You can configure your Cisco NX-OS device by using configuration files that you created on another Cisco NX-OS device and uploaded to a remote server. You then download the file from the remote server to your device using TFTP, FTP, Secure Copy (SCP), or Secure Shell FTP (SFTP) to the startup configuration.



### Caution

This procedure disrupts all traffic on the Cisco NX-OS device.

### Before You Begin

Log in to a session on the console port.

Ensure that the configuration file that you want to download is in the correct directory on the remote server.

Ensure that the permissions on the file are set correctly. Permissions on the file should be set to world-read.

Ensure that your Cisco NX-OS device has a route to the remote server. The Cisco NX-OS device and the remote server must be in the same subnetwork if you do not have a router or a default gateway to route traffic between subnets.

Check connectivity to the remote server using the **ping** or **ping6** command.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>write erase</b>  <b>Example:</b> switch# write erase	Erases the startup configuration file.
<b>Step 2</b>	<b>reload</b>  <b>Example:</b> switch# reload This command will reboot the system. (y/n)? [n] y ... Enter the password for "admin": <password> Confirm the password for "admin": <password> ... Would you like to enter the basic configuration dialog (yes/no): n switch#	Reloads the Cisco NX-OS device.  <b>Note</b> Do not use the setup utility to configure the device.
<b>Step 3</b>	<b>copy <i>scheme://server/[url /]filename</i></b> <b>running-config</b>  <b>Example:</b> switch# copy tftp://10.10.1.1/my-config  running-config	Downloads the running configuration file from a remote server.  For the <i>scheme</i> argument, you can enter <b>tftp:</b> , <b>ftp:</b> , <b>scp:</b> , or <b>sftp:</b> . The <i>server</i> argument is the address or name of the remote server, and the <i>url</i> argument is the path to the source file on the remote server.

	Command or Action	Purpose
		The <i>server</i> , <i>url</i> , and <i>filename</i> arguments are case sensitive.
<b>Step 4</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch# copy running-config startup-config	Saves the running configuration file to the startup configuration file.
<b>Step 5</b>	<b>show startup-config</b>  <b>Example:</b> switch# show startup-config	(Optional) Displays the running configuration.

## Copying Configuration Files to an External Flash Memory Device

You can copy configuration files to an external flash memory device as a backup for later use.

### Before You Begin

Insert the external Flash memory device into the active supervisor module.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>dir {slot0:   usb1:   usb2:}[directory/]</b>  <b>Example:</b> switch# dir slot0:	(Optional) Displays the files on the external flash memory device.
<b>Step 2</b>	<b>copy running-config {slot0:   usb1:   usb2:}[directory/]filename</b>  <b>Example:</b> switch# copy running-config slot0:dsn-running-config.cfg	Copies the running configuration to an external flash memory device. The <i>filename</i> argument is case sensitive.
<b>Step 3</b>	<b>copy startup-config {slot0:   usb1:   usb2:}[directory/]filename</b>  <b>Example:</b> switch# copy startup-config slot0:dsn-startup-config.cfg	Copies the startup configuration to an external flash memory device. The <i>filename</i> argument is case sensitive.

## Copying the Running Configuration from an External Flash Memory Device

You can configure your Cisco NX-OS device by copying configuration files created on another Cisco NX-OS device and saved to an external flash memory device.

### Before You Begin

Insert the external flash memory device into the active supervisor module.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>dir</b> {slot0:   usb1:   usb2:}[ <i>directory</i> ]  <b>Example:</b> switch# dir slot0:	(Optional) Displays the files on the external flash memory device.
<b>Step 2</b>	<b>copy</b> {slot0:   usb1:   usb2:}[ <i>directory</i> ] <i>filename</i> <b>running-config</b>  <b>Example:</b> switch# copy slot0:dsn-config.cfg running-config	Copies the running configuration from an external flash memory device. The <i>filename</i> argument is case sensitive.
<b>Step 3</b>	<b>show running-config</b>  <b>Example:</b> switch# show running-config	(Optional) Displays the running configuration.
<b>Step 4</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.
<b>Step 5</b>	<b>show startup-config</b>  <b>Example:</b> switch# show startup-config	(Optional) Displays the startup configuration.

## Copying Configuration Files to an Internal File System

You can copy configuration files to the internal memory as a backup for later use.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>copy running-config</b> [ <i>filesystem</i> :][ <i>directory</i> /]   [ <i>directory</i> /] <i>filename</i>	Copies the running-configuration file to internal memory.

	Command or Action	Purpose
	<b>Example:</b> <pre>switch# copy running-config bootflash:swl-run-config.bak</pre>	The <i>filesystem</i> , <i>directory</i> , and <i>filename</i> arguments are case sensitive.
<b>Step 2</b>	<b>copy startup-config</b> [ <i>filesystem</i> :[ <i>directory</i> ]/]   [ <i>directory</i> ]/ <i>filename</i>  <b>Example:</b> <pre>switch# copy startup-config bootflash:swl-start-config.bak</pre>	Copies the startup-configuration file to internal memory.  The <i>filesystem</i> , <i>directory</i> , and <i>filename</i> arguments are case sensitive.

### Related Topics

[Copying Files](#), on page 98

## Rolling Back to a Previous Configuration

Problems, such as memory corruption, can occur that make it necessary for you to recover your configuration from a backed up version.



### Note

Each time that you enter a **copy running-config startup-config** command, a binary file is created and the ASCII file is updated. A valid binary configuration file reduces the overall boot time significantly. A binary file cannot be uploaded, but its contents can be used to overwrite the existing startup configuration. The **write erase** command clears the binary file.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>write erase</b>  <b>Example:</b> <pre>switch# write erase</pre>	Clears the current configuration of the switch.
<b>Step 2</b>	<b>reload</b>  <b>Example:</b> <pre>switch# reload</pre>	Restarts the device. You will be prompted to provide a kickstart and system image file for the device to boot and run.  <b>Note</b> By default, the <b>reload</b> command reloads the device from a binary version of the startup configuration.  Beginning with Cisco NX-OS 6.2(2), you can use the <b>reload ascii</b> command to copy an ASCII version of the configuration to the start up configuration when reloading the device.

	Command or Action	Purpose
<b>Step 3</b>	<b>copy <i>configuration_file</i> running-configuration</b>  <b>Example:</b> <pre>switch# copy bootflash:start-config.bak running-configuration</pre>	Copies a previously saved configuration file to the running configuration.  <b>Note</b> The <i>configuration_file</i> filename argument is case sensitive.
<b>Step 4</b>	<b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch# copy running-config startup-config</pre>	Copies the running configuration to the start-up configuration.

## Removing the Configuration for a Missing Module

When you remove an I/O module from the chassis, you can also remove the configuration for that module from the running configuration.



### Note

You can only remove the configuration for an empty slot in the chassis.

### Before You Begin

Remove the I/O module from the chassis.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>show hardware</b>  <b>Example:</b> <pre>switch# show hardware</pre>	(Optional) Displays the installed hardware for the device.
<b>Step 2</b>	<b>purge module <i>slot</i> running-config</b>  <b>Example:</b> <pre>switch# purge module 3 running-config</pre>	Removes the configuration for a missing module from the running configuration.
<b>Step 3</b>	<b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch# copy running-config startup-config</pre>	(Optional) Copies the running configuration to the startup configuration.

## Erasing a Configuration

You can erase the configuration on your device to return to the factory defaults.

You can erase the following configuration files saved in the persistent memory on the device:

- Startup
- Boot
- Debug



**Note** The **write erase** command erases the entire startup configuration, except for the following:

- Boot variable definitions
- The IPv4 configuration on the mgmt0 interface, including the following:
  - Address
  - Subnet mask

To remove the boot variable definitions and the IPv4 configuration on the mgmt0 interface, use the **write erase boot** command.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>write erase [boot   debug]</b>  <b>Example:</b>  <pre>switch# write erase Warning: This command will erase the startup-configuration. Do you wish to proceed anyway? (y/n) [n] <b>y</b></pre>	Erases configurations in persistent memory. The default action erases the startup configuration.  The <b>boot</b> option erases the boot variable definitions and the IPv4 configuration on the mgmt0 interface.  The <b>debug</b> option erases the debugging configuration.  <b>Note</b> The running configuration file is not affected by this command.

## Clearing Inactive Configurations

You can clear inactive Quality of Service (QoS) and/or access control list (ACL) configurations.

## Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>show running-config <i>type</i> inactive-if-config</b>  <b>Example:</b> <pre># show running-config ipqos inactive-if-config</pre>	(Optional) Displays any inactive ACL or QoS configurations.  The values for the <i>type</i> argument are <b>aclmgr</b> and <b>ipqos</b> . <ul style="list-style-type: none"> <li>• <b>aclmgr</b>— Displays any inactive configurations for aclmgr.</li> <li>• <b>ipqos</b>—Displays any inactive configurations for qosmgr.</li> </ul>
<b>Step 2</b>	<b>clear inactive-config <i>policy</i></b>  <b>Example:</b> <pre># clear inactive-config qos clear qos inactive config Inactive if config for QoS manager is saved at/bootflash/qos_inactive_if_config.cfg for vdc default &amp; for other than default vdc: /bootflash/vdc_x/qos_inactive_if_config.cfg (where x is vdc number) you can see the log file @ show inactive-if-config log</pre>	Clears inactive configurations.  The values for the <i>policy</i> argument are <b>qos</b> and <b>acl</b> .  The following describes the values: <ul style="list-style-type: none"> <li>• <b>qos</b>—Clears inactive QoS configurations.</li> <li>• <b>acl</b>— Clears inactive ACL configurations.</li> <li>• <b>acl qos</b>—Clears inactive ACL configurations and inactive QoS configurations.</li> </ul>
<b>Step 3</b>	<b>show inactive-if-config log</b>  <b>Example:</b> <pre># show inactive-if-config log</pre>	(Optional) Displays the commands that were used to clear the inactive configurations.

## Verifying the Device Configuration

To verify the configuration after bootstrapping the device using POAP, use one of the following commands:

Command	Purpose
<b>show running-config</b>	Displays the running configuration.
<b>show startup-config</b>	Displays the startup configuration.

For detailed information about the fields in the output from these commands, see the Cisco Nexus command reference for your device.

# Examples of Working with Configuration Files

This section includes examples of working with configuration files.

## Copying Configuration Files

This example shows how to copy a running configuration to the bootflash: file system:

```
switch# copy bootflash:running-config bootflash:my-config
```

## Backing Up Configuration Files

This example shows how to back up the startup configuration to the bootflash: file system (ASCII file):

```
switch# copy startup-config bootflash:my-config
```

This example shows how to back up the startup configuration to the TFTP server (ASCII file):

```
switch# copy startup-config tftp://172.16.10.100/my-config
```

This example shows how to back up the running configuration to the bootflash: file system (ASCII file):

```
switch# copy running-config bootflash:my-config
```

## Rolling Back to a Previous Configuration

To roll back your configuration to a snapshot copy of a previously saved configuration, you need to perform the following steps:

- 1 Clear the current running image with the **write erase** command.
- 2 Restart the device with the **reload** command.

**Note**

---

By default, the **reload** command reloads the device from a binary version of the startup configuration.

Beginning with Cisco NX-OS 6.2(2), you can use the **reload ascii** command to copy an ASCII version of the configuration to the start up configuration when reloading the device.

---

- 3 Copy the previously saved configuration file to the running configuration with the **copy configuration\_file running-configuration** command.
- 4 Copy the running configuration to the start-up configuration with the **copy running-config startup-config** command.

## Additional References for Configuration Files

This section includes additional information related to managing configuration files.

## Related Documents for Configuration Files

Related Topic	Document Title
Licensing	<i>Cisco NX-OS Licensing Guide</i>
Command reference	<i>Cisco Nexus 5000 Series NX-OS Command Reference</i>





## INDEX

- More-- prompt [59](#)
  - filtering output [59](#)
  - searching output [59](#)

### A

- aliases, See [command aliases](#)
- archive files [102, 103, 104, 105](#)
  - appending files [103](#)
  - creating [102](#)
  - displaying the contents to the screen [104](#)
  - extracting files [104](#)
  - listing archived filenames [105](#)

### B

- banners, See [EXEC banners](#)
- basic device management [83](#)
  - licensing [83](#)
- BIOS [64](#)
  - loader> prompt [64](#)
- boot variables [120](#)
  - erasing configuration [120](#)

### C

- changed information [1](#)
  - description [1](#)
- characters [40](#)
  - special [40](#)
- CLI [36, 44, 60, 61, 62, 64](#)
  - command history [60](#)
  - command modes [36](#)
  - command name completion [44](#)
  - command prompt [36](#)
  - configuring the edit mode [61](#)
  - disabling confirmation prompts [62](#)
  - enabling confirmation prompts [62](#)

- CLI (*continued*)
  - examples [64](#)
  - setting display colors [62](#)
- CLI history [61](#)
  - controlling command recall [61](#)
- CLI prompt [36](#)
  - description [36](#)
- CLI variables [46, 47, 64, 65](#)
  - characteristics [46](#)
  - description [46](#)
  - examples [64](#)
  - persistent [47](#)
  - referencing [46](#)
  - session-only [46](#)
  - system-defined variables [65](#)
- clocks [82, 88, 90](#)
  - clock manager [82](#)
  - default settings [90](#)
  - description [82](#)
  - setting clock manager [88](#)
  - setting manually [88](#)
- COM1 port [68](#)
  - settings [68](#)
- COM1 ports [71, 74](#)
  - configuring settings [71](#)
  - enabling modem connections [74](#)
- command aliases [48, 49, 64](#)
  - characteristics [48](#)
  - defining [48](#)
  - description [48](#)
  - examples [64](#)
  - user session only [49](#)
- command history [60, 61](#)
  - description [60](#)
  - displaying [61](#)
- command modes [36, 37, 38, 39](#)
  - description [36](#)
  - EXEC [37](#)
  - exiting [39](#)
  - global configuration [37](#)
  - interface [37](#)
  - restoring [38](#)

command modes (*continued*)  
 saving **38**  
 subinterface **38**  
 summary (table) **39**

command scripts **49, 50, 51, 65**  
 delaying command actions **51**  
 description **49**  
 echoing text to terminals **50**  
 examples **65**

commands **43, 45, 60**  
 abbreviations **43**  
 no form **45**  
 recalling **60**

commands scripts **50**  
 running **50**

configuration **34, 90, 121**  
 displaying **34, 90, 121**

configuration files **111, 112, 113, 116, 117, 118, 120, 122**  
 clear inactive-config **120**  
 copying from remote servers **113**  
 copying to external memory **116**  
 copying to internal file systems **117**  
 description **111**  
 erasing **120**  
 example backup **122**  
 example copy **122**  
 example roll back **122**  
 licensing **112**  
 rolling back to previous configurations **118**  
 types **112**

configuration prompts **62**  
 disabling **62**  
 enabling **62**

configuring devices **27, 28, 29, 30, 31, 32, 33**  
 POAP process **29, 30, 31, 32**  
   DHCP phase **30**  
   post-installation reload phase **32**  
   power up phase **30**  
   script execution phase **31**  
 using POAP **27, 28, 33**

console ports **68, 69, 74**  
 configuring settings **69**  
 enabling modem connections **74**  
 settings **68**

context-sensitive help **51**  
 syntax checking **51**

## D

daylight savings time, See [summer time](#)  
 default settings **79, 90, 108**  
 clocks **90**

default settings (*continued*)  
 file systems **79, 108**  
 MOTD banners **90**  
 Telnet servers **90**

default users **19**  
 description **19**

diff utility **56**  
 description **56**

directories **94, 95, 96**  
 changing current directories **95**  
 creating **96**  
 description **94**  
 displaying contents **96**  
 displaying current directory **95**  
 licensing requirements **95**  
 working with **95**

## E

egrep utility **57**  
 filtering show command output **57**  
 searching show command output **57**

examples **105, 106, 107, 108, 122**  
 accessing directories on standby supervisor modules **105**  
 backing up configuration files **122**  
 compressing files **107**  
 copying configuration files **122**  
 copying files **106**  
 displaying file checksums **107**  
 displaying file contents **107**  
 finding files **108**  
 moving files **105**  
 redirecting show command output **108**  
 rolling back to a previous configuration **122**  
 uncompressing files **107**

EXEC banner **85**  
 configuring **85**

EXEC banners **82**  
 See also [EXEC banners](#)  
 description **82**  
 See also [EXEC banners](#)

EXEC command mode **37**  
 description **37**

## F

FCoE **3**  
 Fibre Channel over Ethernet **3**  
 file systems **79, 94, 95, 97, 108**  
 accessing standby supervisor modules **97**  
 changing current directories **95**

file systems (*continued*)

- default settings [79, 108](#)
- description [94](#)
- licensing requirements [95](#)
- specifying [94](#)

files [95, 98, 99, 100, 101, 102, 105, 106, 107, 108](#)

- compressing [100](#)
- compressing, examples [107](#)
- copying [98](#)
- copying, examples [106](#)
- deleting [99](#)
- description [95](#)
- displaying checksums [100](#)
- displaying contents [100](#)
- displaying files checksums, examples [107](#)
- displaying files contents, examples [107](#)
- displaying last lines [101](#)
- finding [102](#)
- finding, example [108](#)
- licensing requirements [95](#)
- moving [98](#)
- moving, examples [105](#)
- redirecting command output [101](#)
- renaming [98](#)
- tar files [102](#)
- uncompressing [100](#)
- uncompressing, examples [107](#)

file systems [95](#)

- displaying current directory [95](#)

filtering [54, 55, 56, 57, 58, 59](#)

- More-- prompt [59](#)
- diff utility [56](#)
- egrep utility [57](#)
- grep utility [57](#)
- keywords [55](#)
- less utility [58](#)
- sed utility [58](#)
- show command output [54](#)

**G**global configuration command mode [37](#)

- description [37](#)

global configuration mode [39](#)

- summary [39](#)

grep utility [57](#)

- searching show command output [57](#)

grep utility filtering show command output [57](#)guidelines and limitations [32](#)

- POAP [32](#)

**H**hostname [82, 83](#)

- configuring [83](#)
- description [82](#)

**I**IEEE 802.1p [3](#)IEEE 802.3x [3](#)Interface configuration command mode [37](#)

- description [37](#)

interface configuration mode [39](#)

- summary [39](#)

**K**keystrokes [41](#)

- shortcuts [41](#)

**L**less utility [58](#)

- filtering show command output [58](#)
- searching show command output [58](#)

licensing [69, 83, 95, 112](#)

- basic device management [83](#)
- configuration files [112](#)
- directories [95](#)
- file systems [95](#)
- files [95](#)
- terminal settings [69](#)

loader> prompt [64](#)

- description [64](#)

**M**management access [24](#)

- description [24](#)

management interfaces [24, 26](#)

- displaying information [26](#)
- using force option during shutdown [26](#)

message-of-the-day banners, See [MOTD banners](#)mgmt0 interfaces [25](#)

- description [25](#)

modems [74, 75, 77, 78](#)

- configuring connections [74](#)
- configuring user-specific initialization strings [77](#)
- downloading initialization string [75](#)

modems (*continued*)

- enabling connections [74](#)
- initializing connection [78](#)

modes, See [command modes](#)

modules [63, 119](#)

- removing configuration after removal [119](#)
- sending commands from the supervisor module session [63](#)

MOTD banner [84](#)

- configuring [84](#)

MOTD banners [82, 90](#)

- default settings [90](#)
- description [82](#)

**N**

new information [1](#)

- description [1](#)

**P**

passwords [19, 20](#)

- administrator [19](#)
- setting administrator default [20](#)

POAP [27, 28, 29, 30, 32, 33, 34](#)

- configuration script [28](#)
- DHCP discovery phase [30](#)
- guidelines and limitations [32](#)
- post-installation reload phase [32](#)
- process [29](#)
- related documents [34](#)
- setting up the network environment [33](#)
- using to configure a switch [33](#)

Power On Auto Provisioning [30](#)

- power up phase [30](#)
- provisioning devices [30](#)
  - POAP process [30](#)
  - power up phase [30](#)

PowerOn Auto Provisioning [31](#)

- See also [POAP](#)
- script execution phase [31](#)
  - See also [POAP](#)

privileged EXEC mode [39](#)

- summary [39](#)

prompts, See [confirmation prompts](#)

provisioning devices [27, 28, 29, 30, 31, 32](#)

- POAP process [29, 30, 31, 32](#)
  - DHCP phase [30](#)
  - post-installation reload phase [32](#)
  - script execution phase [31](#)
- using POAP [27, 28](#)

**R**

regular expressions [53, 54](#)

- anchoring [54](#)
- filtering CLI output [53](#)
- multiple-character patterns [53](#)
- special characters [53](#)

running configuration [34, 90, 121](#)

- displaying [34, 90, 121](#)

running configurations [112, 114, 117, 118, 119, 122](#)

- copying from external memory devices [117](#)
- copying to internal file systems [117](#)
- downloading from remote servers [114](#)
- example backup [122](#)
- example copy [122](#)
- example roll back [122](#)
- removing configuration for missing modules [119](#)
- rolling back to previous configurations [118](#)
- saving to startup configurations [112](#)

**S**

scripts, See [command scripts](#)

searching [54, 55, 56, 57, 58, 59](#)

- More-- prompt [59](#)
- diff utility [56](#)
- egrep utility [57](#)
- grep utility [57](#)
- keywords [55](#)
- less utility [58](#)
- sed utility [58](#)
- show command output [54](#)

sed utility [58](#)

- filtering show command output [58](#)
- searching show command output [58](#)

shortcuts [41](#)

- keystrokes [41](#)
- show command output [108](#)
  - redirecting, example [108](#)

show commands [54](#)

- filtering output [54](#)
- searching output [54](#)

sort utility [58](#)

- description [58](#)
- special characters [40](#)
  - description [40](#)

sscp [55](#)

- redirecting show command output [55](#)

standby supervisor modules [97, 105](#)

- accessing directories, examples [105](#)
- accessing file systems [97](#)

startup configuration [34, 90, 120, 121](#)

- displaying [34, 90, 121](#)

startup configuration (*continued*)  
 erasing [120](#)

startup configurations [112, 115, 117, 118, 122](#)  
 copying from running configurations [112](#)  
 copying to internal file systems [117](#)  
 downloading from remote servers [115](#)  
 example backup [122](#)  
 example copy [122](#)  
 example roll back [122](#)  
 rolling back to previous configurations [118](#)

subinterface configuration command mode [38](#)  
 description [38](#)

subinterface configuration mode [39](#)  
 summary [39](#)

summer time [82, 87](#)  
 configuring [87](#)  
 description [82](#)

switchname [83](#)  
 See also [hostname](#)  
 configuring [83](#)  
 See also [hostname](#)

syntax checking, See [context-sensitive help](#)

## T

Telnet servers [90](#)  
 default settings [90](#)

terminal sessions [68, 78, 79](#)  
 clearing [78](#)  
 displaying information [79](#)

terminal sessions (*continued*)  
 settings [68](#)

terminal settings [69](#)  
 licensing [69](#)

time zones [82, 86](#)  
 configuring [86](#)  
 description [82](#)

## U

user sessions [83, 90](#)  
 description [83](#)  
 sending messages [90](#)

users [89](#)  
 managing [89](#)

users sessions [89](#)  
 displaying information [89](#)

## V

variables, See [CLI variables](#)

VDC [8](#)  
 defined [8](#)

virtual device contexts [8](#)

virtual terminals [69, 72, 73](#)  
 configuring [72](#)  
 configuring session limits [73](#)  
 settings [69](#)

