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Cisco Nexus 1000V Getting Started Guide, Release 4.0(4)SV1(1)

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Preface

This document, *Cisco Nexus 1000V Getting Started Guide, Release 4.0(4)SV1(1)*, is designed to provide enough information about the system to get you started configuring and using the Cisco Nexus 1000Vin your datacenter.

This preface includes the following topics:

- Audience and Prerequisites, page i
- Document Organization, page ii
- Document Conventions, page ii
- Related Documentation, page iii

Audience and Prerequisites

This guide is for network administrators and server administrators with the following experience and knowledge:

- An understanding of virtualization
- Using VMware tools to create a virtual machine and configure a vswitch

Note Knowledge of VMware vNetwork Distributed Switch is not a prerequisite.

Before installing or configuring the Cisco Nexus 1000V, Cisco recommends that you read and become familiar with the following documentation:

- *Cisco Nexus 1000V Getting Started Guide, Release 4.0(4)SV1(1)* (this document)
- *Cisco Nexus 1000V Port Profile Configuration Guide, Release 4.0(4)SV1(1)*
- *Cisco Nexus 1000V Software Installation Guide, Release 4.0(4)SV1(1)*
- *Cisco Nexus 1000V Virtual Ethernet Module Software Installation Guide, Release 4.0(4)SV1(1)* (server administrators)
- *Cisco VN-Link: Virtualization-Aware Networking* white paper

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Document Organization

This document is organized into the following chapters:

Chapter and Title	Description
Chapter 1, "Overview"	Provides an overview of the Cisco Nexus 1000V product and features.
Chapter 2, "Understanding the CLI"	Describes the command line interface including command modes, special characters, and keystrokes.
Chapter 3, "Configuring the Terminal"	Describes how to configure the terminal that is used to communicate with the Cisco Nexus 1000V.
Chapter 4, "List of Terms"	Lists and defines terminology used in the Cisco Nexus 1000V implementation.

Document Conventions

Command descriptions use these conventions:

boldface font	Commands and keywords are in boldface.
italic font	Arguments for which you supply values are in italics.
{ }	Elements in braces are required choices.
[ ]	Elements in square brackets are optional.
x | y | z	Alternative, mutually exclusive elements are separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Screen examples use these conventions:

`screen font`	Terminal sessions and information the device displays are in screen font.
`boldface screen font`	Information you must enter is in boldface screen font.
`italic screen font`	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 for notes and cautions:

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

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

Related Documentation

Cisco Nexus 1000V includes the following documents available on Cisco.com:

General Information

Cisco Nexus 1000V Release Notes, Release 4.0(4)SV1(1)

Cisco Nexus 1000V and VMware Compatibility Information, Release 4.0(4)SV1(1)

Install and Upgrade

Cisco Nexus 1000V Software Installation Guide, Release 4.0(4)SV1(1)

Cisco Nexus 1000V Virtual Ethernet Module Software Installation Guide, Release 4.0(4)SV1(1)

Configuration Guides

Cisco Nexus 1000V License Configuration Guide, Release 4.0(4)SV1(1)

Cisco Nexus 1000V Getting Started Guide, Release 4.0(4)SV1(1)

Cisco Nexus 1000V Interface Configuration Guide, Release 4.0(4)SV1(1)

Cisco Nexus 1000V Layer 2 Switching Configuration Guide, Release 4.0(4)SV1(1)

Cisco Nexus 1000V Port Profile Configuration Guide, Release 4.0(4)SV1(1)

Cisco Nexus 1000V Quality of Service Configuration Guide, Release 4.0(4)SV1(1)

Cisco Nexus 1000V Security Configuration Guide, Release 4.0(4)SV1(1)

Cisco Nexus 1000V System Management Configuration Guide, Release 4.0(4)SV1(1)

Cisco Nexus 1000V High Availability and Redundancy Reference, Release 4.0(4)SV1(1)

Reference Guides

Cisco Nexus 1000V Command Reference, Release 4.0(4)SV1(1)

Cisco Nexus 1000V MIB Quick Reference

Troubleshooting and Alerts

Cisco Nexus 1000V Troubleshooting Guide, Release 4.0(4)SV1(1)

Cisco Nexus 1000V Password Recovery Guide

Cisco NX-OS System Messages Reference

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http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

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CHAPTER 1

Overview

This chapter provides an overview of the product, Cisco Nexus 1000V, and includes the following sections:

- Information about Virtualization, page 1-1
- Information About Cisco Nexus 1000V, page 1-2

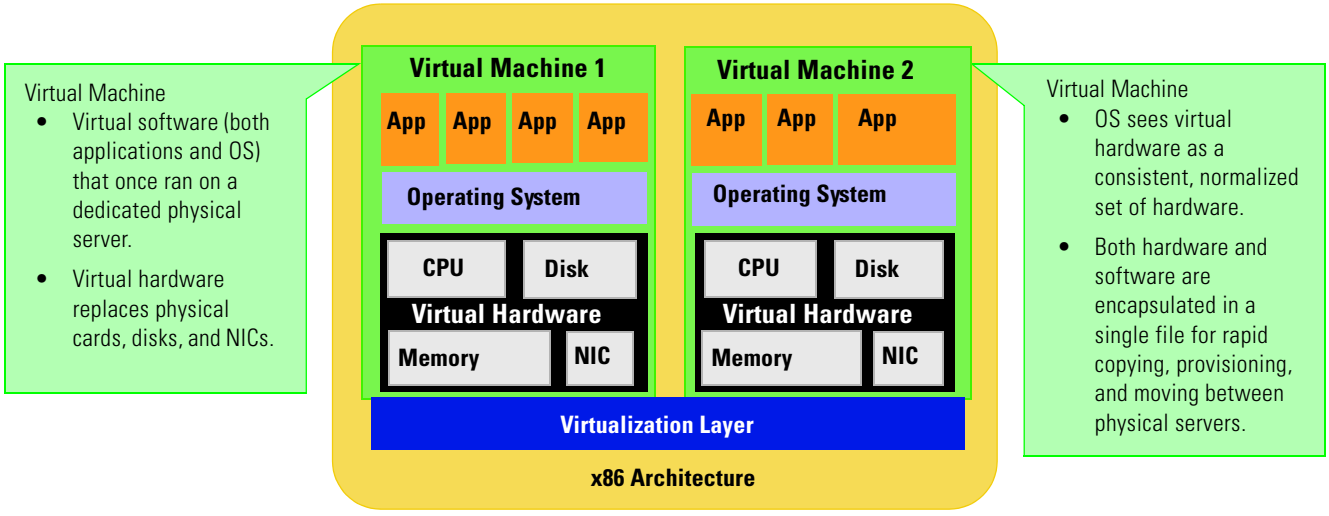
Information about Virtualization

Virtualization allows the creation of multiple virtual machines to run in isolation, side-by-side on the same physical machine.

Each virtual machine has its own set of virtual hardware (RAM, CPU, NIC) upon which an operating system and applications are loaded. The operating system sees a consistent, normalized set of hardware regardless of the actual physical hardware components.

Virtual machines are encapsulated into files, for rapid saving, copying and provisioning. Full systems (fully configured applications, operating systems, BIOS and virtual hardware) can be moved, within seconds, from one physical server to another for zero-downtime maintenance and continuous workload consolidation.

Two virtual machines running in isolation side-by-side on the same physical machine



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Information About Cisco Nexus 1000V

This section includes the following topics:

- System Description, page 1-2
- Administrator Roles, page 1-4
- Contrasting the Cisco Nexus 1000V with a Physical Switch, page 1-5
- Implementation Considerations, page 1-5
- Configuring Cisco Nexus 1000V with CLI, page 1-5

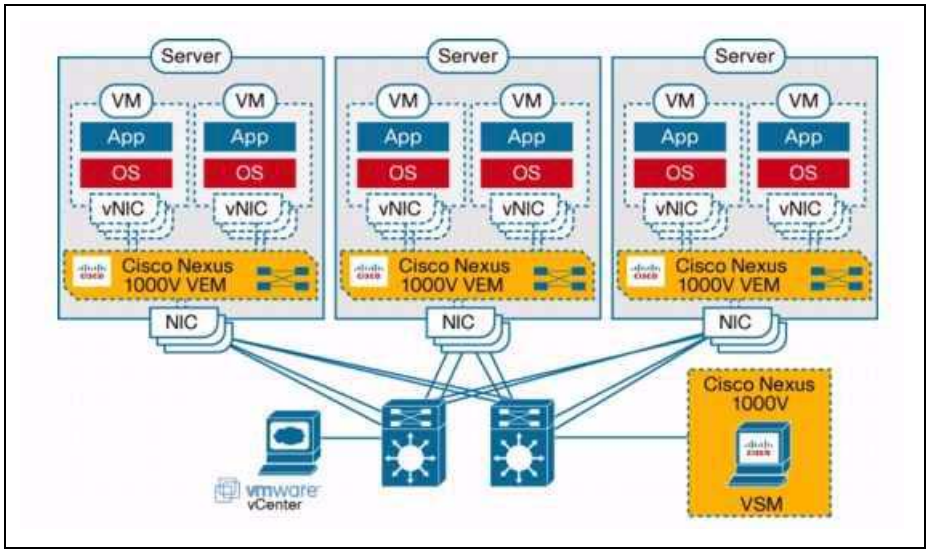
System Description

The Cisco Nexus 1000V is a virtual access software switch for vNetwork Distributed Switches that work with VMware vSphere 4.0. It has the following components:

- The Virtual Supervisor Module (VSM)— the control plane of the switch and a virtual machine that runs the NX-OS operating system.
- The Virtual Ethernet Module (VEM) —a virtual line card embedded in each VMware vSphere (ESX) host that is a part of the distributed switch. The VEM is partly inside the kernel of the hypervisor and partly in a user world process, called the VEM Agent.

Figure 1-1Cisco Nexus 1000V Distributed Virtual Switch, page 1-2shows the relationship between the Cisco Nexus 1000V components.

Figure 1-1 Cisco Nexus 1000V Distributed Virtual Switch



The VSM uses an external network fabric to communicate with the VEMs. The physical NICs on the VEM server are uplinks to the external fabric. VEMs switch traffic between the local virtual Ethernet ports connected to VM vNICs, but do not switch traffic to other VEMs. Instead, a source VEM switches

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packets to uplinks that the external fabric then delivers to the target VEM. The VSM runs the control plane protocols and configures the state of each VEM, but it never takes part in the actual forwarding of packets.

A single VSM can control up to 64 VEMs.Cisco recommends that you install two VSMs in an active-standby configuration for high availability. With the 64 VEMs and the redundant supervisors, the Cisco Nexus 1000V can be viewed as a 66-slot modular switch.

The VSM(s) and the VEMs must be in the same Layer 2 network. The VMware vCenter server can be separated from the VSM(s) and the VEM by a Layer 3 router.

A single Cisco Nexus 1000V instance, including dual redundant VSMs and managed VEMs, forms a switch domain. Each Cisco Nexus 1000V domain within a VMware vCenter Server needs to be distinguished by a unique integer called the Domain Identifier.

Control and Packet VLANs

The Control VLAN and the Packet VLAN are used for communication between the VSM and the VEMs within a switch domain: .

- The Packet VLAN is used by protocols such as CDP, LACP, and IGMP.
- The Control VLAN is used for the following:
  - VSM configuration commands to each VEM, and their responses
  - VEM notifications to the VSM, for example a VEM notifies the VSM of the attachment or detachment of ports to the DVS
  - VEM NetFlow exports are sent to the VSM, where they are then forwarded to a NetFlow Collector.

Cisco recommends that the Control VLAN and Packet VLAN be separate VLANs; and that they also be on separate VLANs from those that carry data.

Caution If you are installing more than one VSM within the same VMware vCenter Server, Cisco recommends the use of distinct Control/Packet VLAN pairs for each domain. If you must use the same VLAN pair for multiple domains, you must ensure that their domain identifiers are different.

Port Profiles

A port profile is a set of interface configuration commands that can be dynamically applied to either the physical (uplink) or virtual interfaces. A port profile can define a set of attributes including the following:

- VLAN
- port channels
- private VLAN (PVLAN),
- ACL
- port security
- NetFlow
- rate limiting
- QoS marking

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The network administrator defines port profiles in the VSM. When the VSM connects to vCenter Server, it creates a distributed virtual switch (DVS) and each port profile is published as a port group on the DVS. The server administrator can then apply those port groups to specific uplinks, VM vNICs, or management ports, such as virtual switch interfaces or VM kernel NICs.

A change to a VSM port profile is propagated to all ports associated with the port profile. The network administrator uses the Cisco NX-OS CLI to change a specific interface configuration from the port profile configuration applied to it. For example, a specific uplink can be shut down or a specific virtual port can have ERSPAN applied to it, without affecting other interfaces using the same port profile.

For more information about port profiles, see the *Cisco Nexus 1000V Port Profile Configuration Guide, Release 4.0(4)SV1(1)*.

System Port Profile and System VLAN

When a server administrator adds a host to the DVS, the VEM in that host needs to be able to configure the VSM. Since the ports and VLANs for this communication are not yet in place, System Port Profiles and System VLANs are configured to meet this need. VSM sends minimal early configuration to the vCenter Server, which then propagates it to the VEM when the host is added to the DVS.

A system port profile is designed to establish and protect vCenter Server connectivity. It can carry the following VLANs:

- System VLANs or VNICs used when bringing up the ports before communication is established between the VSM and VEM.
- The uplink that carries the control VLAN
- Management uplink(s) used for VMWare vCenter Server connectivity or SSH or Telnet connections. There can be more than one management port or VLAN, for example, one dedicated for vCenter Server connectivity, one for SSH, one for SNMP, a switch interface, and so forth.
- VMware kernel NIC for accessing VMFS storage over iSCSI or NFS.

Administrator Roles

The Nexus 1000V enables the network and server administrators to collaboratively manage the switch. The network administrator is responsible for the VSM, including its creation, configuration and maintenance. The server administrator manages the hosts and the VMs, including the connection of specific VM ports and host uplinks to specific port groups, which are published in the vCenter Server by the network administrator. The VEMs are part of the network administrator's domain, but the server administrator has a say in the installation, upgrade, or deletion of a VEM.

The following table describes the administrator roles.

Table 1-1 Administrator Roles

Network Administrator	Server Administrator
• Creates, configures, and manages vswitches. • Creates, configures, and manages port profiles, including the following: – security – port channels – QOS policies	• Assigns the following to port groups: – VNICs – vmkernel interfaces – service console interfaces • Assigns physical NICs (also called PNICs) to vswitches on each host.

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Contrasting the Cisco Nexus 1000V with a Physical Switch

The following are the differences between the Cisco Nexus 1000V and a physical switch:

- **Joint management by network and server administrators**
- **External fabric**
  The supervisor(s) and line cards in a physical switch have a shared internal fabric over which they communicate. The Cisco Nexus 1000V uses the external fabric.
- **No switch backplane**
  Line cards in a physical switch can forward traffic to each other on the switch's backplane. Since the Nexus 1000V lacks such a backplane, a VEM cannot directly forward packets to another VEM. Instead, it has to forward the packet via some uplink to the external fabric, which then switches it to the destination.
- **No Spanning Tree Protocol**
  The Nexus 1000V does not run STP because it will deactivate all but one uplink to an upstream switch, preventing full utilization of uplink bandwidth. Instead, each VEM is designed to prevent loops in the network topology.
- **Port channels only for uplinks**
  The uplinks in a host can be bundled in a port channel for load balancing and high availability. The virtual ports cannot be bundled into a port channel, since there is no reason to.

Implementation Considerations

The following are things to consider when implementing Cisco Nexus 1000V:

- Vmotion of the VSM VM is not supported. In particular, DRS should not be enabled for the VSM VM. Vmotion and DRS are supported for other VMs connected to the Cisco Nexus 1000V.
- VMware Fault Tolerance is not supported for the VSM VM. It is supported for other VMs connected to Cisco Nexus 1000V.
- The snapshot of the VSM VM will not contain the configuration changes made since the snapshot was taken. So, restoring the VSM VM from a snapshot may require some care.
- The server administrator should not assign more than one uplink on the same VLAN without port channels. In other words, it is not supported to assign more than one uplink on the same host to a profile without port channels or port profiles that share one or more VLANs.

Software Compatibility

Cisco Nexus 1000V VSM can be implemented as a virtual machine in the following VMware environments:

- VMware ESX/i 3.5U2 or higher
- ESX/i 4.0. (requires Enterprise Plus edition of vSphere 4)

Configuring Cisco Nexus 1000V with CLI

Cisco Nexus 1000V is configured using a command line interface (CLI) from any of the following:

- an SSH session (SSH provides a secure connection.)

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- a Telnet Session
- a service console for the VM running the VSM

For information about the CLI, see the "Understanding the CLI" section on page 2-1.

CHAPTER 2

Understanding the CLI

This chapter provides information about the CLI in the following sections:

- Information About the CLI Prompt, page 2-1
- Command Modes, page 2-2
- Special Characters, page 2-6
- Keystroke Shortcuts, page 2-6
- Abbreviating Commands, page 2-8
- Using the No Form of a Command, page 2-8
- Using CLI Variables, page 2-9
- Working with Command Scripts, page 2-11
- Using Help, page 2-13

Information About the CLI Prompt

Once you have successfully accessed the system, the CLI prompt displays in the terminal window of your console port or remote workstation, as follows.

```
switch#
```

You can change this switch prompt to another name or leave it as it is.

Example:

```
switch(config)# switchname n1000v
n1000v(config)# exit
n1000v#
```

From the CLI prompt, you can do the following:

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

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Command Modes

This section includes the following topics:

- About Command Modes, page 2-2
- EXEC Command Mode, page 2-3
- Global Configuration Command Mode, page 2-3
- Accessing Interface Configuration Command Mode, page 2-3
- Exiting a Configuration Mode, page 2-4
- Command Mode Summary, page 2-5

About Command Modes

Cisco Nexus 1000V CLI is divided into command modes which define the actions available to the user. Command modes are “nested” and are accessed in sequence. When you first log in, you are placed in CLI EXEC mode.

As you navigate from EXEC mode to Global Configuration mode, a larger set of commands are available to you. To transition to Global Configuration mode, enter the following command:

config t

The following table shows how command access builds from user EXEC to Global Configuration mode.

Command Mode	Prompt	Description
Exec	n1000v#	• Connect to remote devices. • Temporarily change terminal line settings. • Perform basic tests. • List system information (show).
Global Configuration	n1000v(config)#	• Configure features, such as the following: – port profile – VLANs – Interfaces • Includes access to EXEC commands. – Connect to remote devices. – Temporarily change terminal line settings. – Perform basic tests. – List system information (show).

All commands in EXEC command mode are accessible from the Global Configuration command mode. For example, the **show** commands are available from any command mode.

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EXEC Command Mode

When you first log in, you are placed into EXEC mode. The commands available in EXEC mode include the **show** commands that display 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 most broad range of commands, including those used to make configuration changes that are saved by the device, and can be stored and applied when the device is rebooted.

Commands entered in Global Configuration mode update the running configuration file as soon as they are entered, but must also be saved into the startup configuration file by using the following command:

copy running-config startup-config

In Global Configuration mode, you can access a number of protocol-specific, platform-specific, and feature-specific configuration modes.

Accessing Interface Configuration Command Mode

To access and list the interface configuration commands, follow these steps:

	Command	Purpose

Step 1	**configure terminal**
	
	Example:
	`n1000v# configure terminal`
	`n1000v(config)#`
		Places you into the CLI Global Configuration mode.

Step 2	**interface** *type number*
	
	Example:
	`n1000v(config)# interface ethernet 3/2`
	`n1000v(config-if)#`
		Places you in a CLI Interface Configuration mode for the interface you want to configure.

For details about interface commands and configuration, see the document, *Cisco Nexus 1000V Interface Configuration Guide, Release 4.0(4)SV1(1).*

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Exiting a Configuration Mode

To exit from any Configuration mode, use any of the following commands:

Command	Purpose

exit
 	
Example:
`svs(config-if)# exit`
`svs(config)#`
	Exits from the current configuration command mode and return to the previous configuration command mode.

end
 	
Example:
`svs(config)# end`
`svs#`
	Exits from the configuration command mode and returns to EXEC mode.

Ctrl-z
 	
Example:
`svs(config)# ^z`
`svs#`
	Exits the current configuration command mode and returns to EXEC mode.
	
	Caution If you use Ctrl-Z 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. We recommend that you exit a configuration mode using the **exit** or **end** command.

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Command Mode Summary

Table 2-1 summarizes information about command modes.

Table 2-1 Command Mode Summary

Mode	Access Method	Prompt	Exit Method
EXEC	From the login prompt, enter your username and password.	`n1000v#`	To exit to the login prompt, use the **exit** command.
Global Configuration	From EXEC mode, enter the command, **configure terminal**.	`n1000v(config)#`	To exit to EXEC mode, use the **end** or **exit** command or press **Ctrl-Z**.
Port Profile Configuration	From Global Configuration mode, enter the command, **port-profile** *name*.	`n1000v(config-port-prof)#`	To exit to Global Configuration mode, use the **exit** command. To exit to EXEC mode, use the **end** command or press **Ctrl-Z**.
Interface Configuration	From Global Configuration mode, enter the **interface** command for a specific interface, for example, `interface veth 2`	`n1000v(config-if)#`	To exit to Global Configuration mode, use the **exit** command. To exit to EXEC mode, use the **end** command or press **Ctrl-Z**.
VLAN Configuration	Use a **vlan** command.	`n1000v(config-vlan)#`	To exit to Global Configuration mode, use the **exit** command. To exit to EXEC mode, use the **end** command or press **Ctrl-Z**.
`Console Configuration`	From Global Configuration mode, use the **line console** command.	`n1000v(config-console)`	To exit to Global Configuration mode, use the **exit** command. To exit to EXEC mode, use the **end** command or press **Ctrl-Z**.
Virtual Terminal Line Configuration	From Global Configuration mode, use the **line vty** command.	`n1000v(config-line)#`	To exit to Global Configuration mode, use the **exit** command. To exit to EXEC mode, use the **end** command or press **Ctrl-Z**.
SVS Domain Configuration	From Global Configuration mode, use the **svs-domain** command.	`n1000v(config-svs-domain)#`	To exit to Global Configuration mode, use the **exit** command. To exit to EXEC mode, use the **end** command or press **Ctrl-Z**.
Policy Map QoS Configuration	From Global Configuration mode, use the **policy-map** command.	`n1000v(config-pmap-qos)#`	To exit to Global Configuration mode, use the **exit** command. To exit to EXEC mode, use the **end** command or press **Ctrl-Z**.

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Table 2-1 (continued)Command Mode Summary (continued)

Mode	Access Method	Prompt	Exit Method
Policy Map Class QoS Configuration	From Policy-Map QoS Configuration mode, use the class command.	`n1000v(config-pmap-c-qos)#`	To exit to Global Configuration mode, use the **exit** command. To exit to EXEC mode, use the **end** command or press **Ctrl-Z**.
Class Map QoS Configuration	From Global Configuration mode, use the **class-map** command.	`n1000v(config-cmap-qos)#`	To exit to Global Configuration mode, use the **exit** command. To exit to EXEC mode, use the **end** command or press **Ctrl-Z.**

Special Characters

Table 2-2 lists the characters that have special meaning in Cisco Nexus 1000V text strings and should be used only in regular expressions or other special contexts.

Table 2-2 Special Characters

Character	Description .
|	Vertical bar
< >	Less than or greater than

Keystroke Shortcuts

Table 2-3 lists command key combinations that can be used in both EXEC and configuration modes:

Table 2-3 Keystroke Shortcuts

Key(s)	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.

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Table 2-3 Keystroke Shortcuts (continued)

Key(s)	Description
Ctrl-R	Redisplays the current command line.
Ctrl-T	Transposes the character to the left of the cursor with the character located to the right of the cursor.
Ctrl-U	Deletes all characters from the cursor to the beginning of the command line.
Ctrl-W	Deletes the word to the left of the cursor.
Ctrl-X, H	List history. 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.
↑	Displays the previous command in the command history.
↓	Displays the next command in the command history.
→ ←	Moves your cursor through the command history directionally to locate a command string.
?	Displays a list of available commands.

Tab	Completes the word for you after entering the first characters of the word, and then pressing the Tab key. All options that match are presented.
	Used to complete:
	• command names
	• scheme names in the file system
	• server names in the file system
	• file names in the file system
	Example
	`n1000v(config)# xm<Tab>`
	`n1000v(config)# xml <Tab>`
	`n1000v(config)# xml server`
	
	Example
	`n1000v(config)# c<Tab>`
	`callhome  class-map  clock  cts`
	`cdp  cli  control-plane`
	
	`n1000v(config)# cl<Tab>`
	`class-map  cli  clock`
	`n1000v(config)# cla<Tab>`
	`n1000v(config)# class-map`

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Table 2-3 Keystroke Shortcuts (continued)

Key(s)	Description

	Example
	`n1000v# cd bootflash:<Tab>`
	`bootflash:  bootflash://sup-1/`
	`bootflash://sup-remote/`
	`bootflash:///  bootflash://sup-2/`
	`bootflash://sup-standby/`
	`bootflash://module-5/  bootflash://sup-active/`
	`bootflash://module-6/  bootflash://sup-local/`
	Example
	`n1000v# cd bootflash://mo<Tab>`
	`bootflash://module-5/  bootflash://module-6/`
	`n1000v# cd bootflash://module-`

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.

Table 2-4 lists examples of command abbreviations.

Table 2-4 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	**sho run**

Using the *No* Form of a Command

Almost every configuration command has a **no** form that can be used to disable a feature or function. For example, to remove a VLAN, use the **no vlan** command. To reenable it, use the plain **vlan** command form. The *Cisco Nexus 1000V Command Reference, Release 4.0(4)SV1(1)* describes the **no** form of a command when available.

For example, if you use the **boot** command in Global Configuration mode, you can then use the **no boot** command undo the results:

```
n1000v(config)# boot system bootflash: svs1.bin
n1000v(config)# no boot system bootflash: svs1.bin
```

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Using CLI Variables

The Cisco Nexus 1000V supports the definition and use of variables in CLI commands. You can use CLI variables as follows:

- Entered directly on the command line.
- Passed to the child 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 (the "Running a Script" section on page 2-11).
- Passed as command line arguments to the **run-script** command (the "Running a Script" section on page 2-11).

CLI variables have the following characteristics:

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

The Cisco Nexus 1000V software provides one predefined system variable, the TIMESTAMP variable.

User-Defined CLI Session Variables

You can define CLI session variables to persist only for the duration of your CLI session using the **cli var name** command in EXEC mode. CLI session variables are useful for scripts that you execute periodically.

The following example shows how to create a user-defined CLI session variable.

```
svs# cli var name testinterface ethernet 3/2
```

You can reference a variable using the syntax **$**(variable).

The following example shows how to reference a user-defined CLI session variable.

```
n1000v# show interface $(testinterface)
Ethernet3/2 is up
    Hardware is Ethernet, address is 0050.565a.2341 (bia 0050.565a.2341)
    MTU 1500 bytes, BW -332641784 Kbit, DLY 10 usec,
       reliability 255/255, txload 1/255, rxload 1/255
    Encapsulation ARPA
    Port mode is trunk
    full-duplex, 1000 Mb/s
    Beacon is turned off
    Auto-Negotiation is turned on
    Input flow-control is off, output flow-control is off
    Rx
    222045 Input Packets 24263 Unicast Packets
    89347 Multicast Packets 108435 Broadcast Packets
    22529316 Bytes
    Tx
    33710 Output Packets 31393 Unicast Packets
    1898 Multicast Packets 419 Broadcast Packets 461 Flood Packets
    5221175 Bytes
    91323 Input Packet Drops 0 Output Packet Drops

n1000v#

Use the show cli variables command to display user-defined CLI session variables.
The following example displays user-defined CLI session variables.
```

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```
n1000v# show cli variables
VSH Variable List
-----------------
TIMESTAMP="2008-07-02-13.45.15"
testinterface="ethernet 3/1"
n1000v#
```

Use the **cli no var name** command to remove user-defined CLI session variables.

The following example removes a user-defined CLI session variable.

```
n1000v# cli no var name testinterface
```

User-Defined CLI Persistent Variables

You can define CLI variables that persist across CLI sessions and switch reloads using the **cli var name** command in configuration mode. These CLI persistent variables are defined in configuration mode and are saved in the running configuration file.

The following example shows how to create a user-defined CLI persistent variable.

```
n1000v# config t
n1000v(config)# cli var name mgmtport mgmt 0
n1000v(config)# exit
n1000v#
```

You can reference a variable using the syntax **$(**variable**)**.

The following example shows how to reference a user-defined CLI persistent variable.

```
n1000v# show interface $(mgmtport)
mgmt0 is up
    Hardware is GigabitEthernet, address is 0000.0000.0000 (bia 0050.5681.5578)
    Internet Address is 10.78.1.63/24
    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
    Beacon is turned off
    Auto-Negotiation is turned on
    Input flow-control is off, output flow-control is off
    321949 packets input, 67199373 bytes
    0 multicast frames, 0 compressed
    0 input errors, 0 frame, 0 overrun, 0 fifo
    30178 packets output, 7071526 bytes
    0 underrun, 0 output errors, 0 collisions
    0 fifo, 0 carrier errors

n1000v#
```

Use the **show cli variables** command to display user-defined CLI persistent variables.

The following example displays user-defined CLI persistent variables.

```
n1000v# show cli variables
VSH Variable List
-----------------
TIMESTAMP="2005-10-24-21.37.13"
mgmtport="mgmt 0"
```

Use the **no cli var name** command in configuration mode to remove user-defined CLI persistent variables.

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The following example removes a user-defined CLI persistent variable.

```
n1000v# config t
n1000v(config)# cli no var name mgmtport
```

System-Defined Variables

Cisco Nexus 1000V supports one predefined variable: TIMESTAMP. This variable refers to the time of execution of the command in the format YYYY-MM-DD-HH.MM.SS.

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

The following example uses $(TIMESTAMP) when redirecting **show** command output to a file.

```
Example:
n1000v# show running-config > rcfg.$(TIMESTAMP)
n1000v# dir
       5718     Jul 02 14:09:58 2008  rcfg.2008-07-02-14.09.58

Usage for volatile://
       8192 bytes used
   20963328 bytes free
   20971520 bytes total
n1000v#
```

Working with Command Scripts

This section includes the following sections:

- Running a Script, page 2-11
- Using CLI Variables in Scripts, page 2-12
- Delaying Command Action, page 2-13

Running a Script

The **run-script** command executes the commands specified in a file. To use this command, be sure to create the file and specify commands in the required order.

Note You cannot create the script files at the switch prompt. You can create the script file on an external machine and copy it into the bootflash: directory. This section assumes that the script file resides in the bootflash: directory.

The syntax for this command is **run-script** *filename*.

This example displays the CLI commands specified in the testfile that resides in bootflash.

```
n1000v# show file bootflash:testfile
conf t
show interface mgmt 0
```

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This file output is in response to the **run-script** command executing the contents in the testfile file:

```
pvk-s33# run-script bootflash:testfile
`conf t`
`show interface mgmt 0`
mgmt0 is up
Hardware: Ethernet, address: 0050.5682.4ace (bia 0050.5682.4ace)
Internet Address is 10.78.1.99/24
MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA
full-duplex, 1000 Mb/s
Auto-Negotiation is turned on
25427 packets input, 2602757 bytes
0 multicast frames, 0 compressed
0 input errors, 0 frame, 0 overrun, 0 fifo
9077 packets output, 2433391 bytes
0 underrun, 0 output errors, 0 collisions
0 fifo, 0 carrier errors
...
```

Using CLI Variables in Scripts

You can use CLI variables defined by the **cli var** command (the "Using CLI Variables" section on page 2-9) or passed as arguments in the **run-script** command.

The following example shows how to use CLI session variables in a script file used by the **run-script** command.

```
n1000v# cli var name testinterface e 3/1

n1000v# show file bootflash:test1.vsh
show interface $(testvar)

n1000v# run-script bootflash:test1.vsh
`show interface $(testvar)`
Ethernet3/1 is down (Administratively down)
  Hardware is 10/100/1000 Ethernet, address is 0000.0000.0000 (bia 0019.076c.4da
c)
  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
```

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```
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
```

The following example shows how you can pass CLI session variable as arguments to a child **run-script** command process.

```
n1000v# show file bootflash:test1.vsh
show interface $(var1) $(var2)

n1000v# run bootflash:test2.vsh var1="e3/1" var2="brief"
`show interface $(var1) $(var2)`
--------------------------------------------------------------------------------
Ethernet      VLAN    Type Mode   Status  Reason                   Speed     Port
Interface                                                                    Ch #
--------------------------------------------------------------------------------
Eth2/45       --      eth  routed down    Administratively down      auto(D) --
```

Delaying Command Action

The **sleep** command delays an action by a specified number of seconds, and is particularly useful within a script.

The syntax for this command is **sleep** *seconds*.

```
n1000v# sleep 30
```

You will the switch prompt return after 30 seconds.

Using Help

The CLI provides the following help features.

Feature	Description
?	You can type the question mark (?) to list the valid input options
^	The CLI prints the caret (^) symbol below a line of syntax to point to an input error in the command string keyword, or argument.
↑	You can use the up arrow to have the CLI display the previous command you entered so that you can correct an error.

The following example describes how to use syntax error isolation and context-sensitive help.

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Step	Command	Purpose

Step 1	**show interface virtual ?**
	Example:
	`n1000v# show interface virtual ?`
	`  <CR>`
	`  >  Redirect it to a file`
	`  module  Limit display to interfaces on module`
	`  vm  Show interfaces owned by a Virtual Machine`
	`  vmk  Show interfaces owned by the Virtual Machine Kernel`
	`  vswif  Show interfaces owned by the Virtual Service Console`
	`  |  Pipe command output to filter`
	`n1000v# show interface virtual`
		Displays the optional parameters used with the **show interface virtual** command in EXEC mode.

Step 2	**show interface module ?**
	Example:
	`n1000v# show interface module ?`
	`  ^`
	`% invalid command detected at '^' marker.`
	`n1000v#`
		Displays an invalid command error message and points (^) to the syntax error.

Step 3	**Ctrl-P** or the Up Arrow
	Example:
	`n1000v# <Ctrl-P>`
	`n1000v# show interface virtual ?`
		Displays the previous command you entered so that you can correct the error.

Step 4	**show interface virtual module ?**
	Example:
	`n1000v# show interface virtual module ?`
	`  <1-256>  Enter module number`
	`n1000v# show interface virtual module`
		Displays the syntax for showing a virtual interface module.

Step 5	**show interface virtual module 3**
	Example:
	`n1000v# show interface virtual module 3`
	`---------------------------------------------`
	`Port  Adapter  Owner  Mod  Host`
	`---------------------------------------------`
	`n1000v#`
		Displays the virtual interface module 3.

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Step	Command	Purpose

Step 6	**show module ?**
	Example:
	`n1000v# show module ?`
	`  <CR>`
	`  <1-66>  Enter module number`
	`  >  Redirect it to a file`
	`  internal  Show line card manager related info`
	`  uptime  Show how long the module has been up and running`
	`  vem  Show Virtual Ethernet Module information`
	`  |  Pipe command output to filter`
		Displays the optional parameters for the show module command.

Step 7	**show module** **Example:** Example 2-1 on page 2-15.	Displays module information.

Example 2-1 Using Help

```
n1000v# show interface virtual ?
  <CR>
  >             Redirect it to a file
  module        Limit display to interfaces on module
  port-mapping  Show hypervisor port mapping
  vm            Show interfaces owned by a Virtual Machine
  vmk           Show interfaces owned by the Virtual Machine Kernel
  vswif         Show interfaces owned by the Virtual Service Console
  |             Pipe command output to filter
n1000v# show interface module ?
                              ^
% invalid command detected at '^' marker.
n1000v# <Ctrl-P>
n1000v# show interface virtual ?
n1000v# show interface virtual module ?
  <1-256>  Enter module number

n1000v# show interface virtual module ?
  <1-256>  Enter module number

n1000v# show interface virtual module 3

------------------------------------------------------------------------------
Port        Adapter        Owner                    Mod Host
------------------------------------------------------------------------------
n1000v# show module ?
  <CR>
  <1-32>    Enter module number
  >         Redirect it to a file
  internal  Show line card manager related info
  uptime    Show how long the module has been up and running
  |         Pipe command output to filter

n1000v# show module
show module
Mod  Ports  Module-Type                      Model              Status
---  -----  --------------------------------- ------------------ ------------
```

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```
1    0      Virtual Supervisor Module        Nexus1000V         ha-standby
2    0      Virtual Supervisor Module        Nexus1000V         active *
3    248    Virtual Ethernet Module          NA                 ok
4    248    Virtual Ethernet Module          NA                 ok

Mod  Sw               Hw
---  ---------------  ------
1    4.0(4)SV1(0.33)  0.0
2    4.0(4)SV1(0.33)  0.0
3    4.0(4)SV1(0.33)  0.4
4    4.0(4)SV1(0.33)  0.4

Mod  MAC-Address(es)                         Serial-Num
---  --------------------------------------  ----------
1    00-19-07-6c-5a-a8 to 00-19-07-6c-62-a8  NA
2    00-19-07-6c-5a-a8 to 00-19-07-6c-62-a8  NA
3    02-00-0c-00-03-00 to 02-00-0c-00-03-80  NA
4    02-00-0c-00-04-00 to 02-00-0c-00-04-80  NA

Mod  Server-IP        Server-UUID                           Server-Name
---  ---------------  ------------------------------------  --------------------
1    10.78.1.99       NA                                    NA
2    10.78.1.99       NA                                    NA
3    10.78.1.92       8aca99de-16b7-300b-b572-730ea83c3de7  10.78.1.92
4    10.78.1.93       44454c4c-4800-104e-804d-b7c04f563153  10.78.1.93


* this terminal session
```

CHAPTER 3

Configuring the Terminal

This chapter provides information about configuring the terminal in the following topics:

- Information about the Terminal, page 3-1
- Setting the Screen Length for the Console Terminal, page 3-2
- Setting the Screen Width for the Console Terminal, page 3-2
- Displaying Terminal Settings, page 3-3
- Setting the Timeout for Console Connections, page 3-3
- Setting the Timeout for SSH and Telnet Connections, page 3-4
- Clearing a Line Connection to the Switch, page 3-5
- Setting a Timeout for the Current Session, page 3-5

Information about the Terminal

You can configure the terminal type, display, timeout, and other settings for the console terminal connected to the Cisco Nexus 1000V.

Defining a Terminal Type

Use this procedure to define the type of terminal to use for the switch.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to a terminal session with the CLI in EXEC mode.

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DETAILED STEPS

	Command	Purpose

Step 1	**terminal terminal-type** *type*
	Example:
	`n1000v# terminal terminal-type vt100`
	`n1000v#`
		Configures a terminal type for the switch.
		• Valid types = vt100, xterm, etc.
		• Default = vt100
		• Maximum string length = 80 characters
		If an unknown terminal type is used for a Telnet or SSH session, then the switch uses the default, vt100.

Setting the Screen Length for the Console Terminal

Use this procedure to set the number of lines to display on the screen duirng the current console session.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- This procedure only applies to the console port. Telnet and SSH sessions set the terminal length automatically.
- You are logged in to a terminal session with the CLI in EXEC mode.

DETAILED STEPS

	Command	Purpose

Step 1	**terminal length** *number of lines*
	Example:
	`n1000v# terminal length 20`
	`n1000v#`
		Configures the number of lines to display on the screen for the current console session.
		• Range = 0 to 511 lines
		• Default = 24 lines
		• Disable = 0 (scrolls continuously)

Setting the Screen Width for the Console Terminal

Use this procedure to set the number of characters to display on a screen line during the current console session.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- This procedure only applies to the console port. Telnet and SSH sessions set the terminal width automatically.

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- You are logged in to a terminal session with the CLI in EXEC mode.

DETAILED STEPS

	Command	Purpose

Step 1	**terminal width** *number of characters*
	Example:
	`n1000v# terminal width 86`
	`n1000v#`
		Configures the number of characters to display on each line for the current console session.
		• Range = 24 to 511 characters
		• Default = 88 characters

Displaying Terminal Settings

Use this procedure to display the terminal settings for the current session.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to a terminal session with the CLI in any command mode.

DETAILED STEPS

	Command	Purpose

Step 1	**show terminal**
	Example:
	`n1000v# show terminal`
	`TTY: /dev/pts/8 type: "vt100"`
	`Length: 24 lines, Width: 88 columns`
	`Session Timeout: None`
	`n1000v#`
		Displays the terminal settings for the current session.

Setting the Timeout for Console Connections

Use this procedure to specify the duration of time, in minutes, that an inactive console session remains open.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to a terminal session with the CLI in EXEC mode.

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DETAILED STEPS

	Command	Purpose

Step 1	**config t**
	Example:
	`n1000v # config t`
	`n1000v(config)#`
		Places you into the CLI Global Configuration mode.

Step 2	**line console**
	Example:
	`n1000v(config)# line console`
	`n1000v(config-console)#`
		Places you into the Console Configuration mode.

Step 3	**exec-timeout** *minutes*
	Example:
	`n1000v(config-console)# exec-timeout 60`
	`n1000v(config-console)#`
		Configures the duration of time, in minutes, that an inactive console session remains open. If the session remains inactive longer than this specified time period, then it is automatically closed.
		• Range = 0 to 525, 600 minutes
		• Default = 30 minutes
		• Disable (no timeout) = 0 minutes
		If you set the timeout to zero, then the console connection remains alive until you close it.

Setting the Timeout for SSH and Telnet Connections

Use this procedure to specify the duration of time, in minutes, that an inactive SSH or Telnet session remains open.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to a terminal session with the CLI in EXEC mode.

DETAILED STEPS

	Command	Purpose

Step 1	**config t**
	Example:
	`n1000v # config t`
	`n1000v(config)#`
		Places you into the CLI Global Configuration mode.

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	Command	Purpose

Step 2	**line vty**
	Example:
	`n1000v(config)# line vty`
	`n1000v(config-line)#`
		Places you into the Virtual Terminal Line Configuration mode.

Step 3	**exec-timeout** *minutes*
	Example:
	`n1000v(config-line)# exec-timeout 60`
	`n1000v(config-line)#`
		Configures the duration of time, in minutes, that an inactive Telnet or SSH session remains open. If the session remains inactive longer than this specified time period, then it is automatically closed.
		• Range = 0 to 525, 600 minutes
		• Default = 30 minutes
		• Disable (no timeout) = 0 minutes
		If you set the timeout to zero, then the line connection remains alive until you close it.

Clearing a Line Connection to the Switch

Use this procedure to close a specific line connection to the switch.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to a terminal session with the CLI in EXEC mode.

DETAILED STEPS

	Command	Purpose

Step 1	**clear line aux**
	Example:
	`n1000v# clear line aux`
	`n1000v #`
		Closes a line connection.

Setting a Timeout for the Current Session

Use this procedure to establish a maximum duration of time, in minutes, that the current terminal session can remain open before the switch shuts it down.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to a terminal session with the CLI in EXEC mode.

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DETAILED STEPS

	Command	Purpose

Step 1	**terminal session** *minutes*
	
	Example:
	`n1000v# terminal session 600`
	`n1000v#`
		Configures the duration of time, in minutes, that the current terminal session can remain open before the switch shuts it down.
		• Range = 0 to 525, 600 minutes
		• Disable (no timeout) = 0 minutes
		This change is not saved in the configuration file since it only appies to the current session.

CHAPTER 4

List of Terms

The following terminology is used in the Cisco Nexus 1000V implementation.

Table 4-1 Cisco Nexus 1000V Terminology

Term	Description
Virtual Supervisor Module (VSM)	This is the control software of the Cisco Nexus 1000V distributed virtual switch. It runs on a virtual machine (VM) and is based on Cisco NX-OS.
Control VLAN	One of two VLANs for the communication between VSM and VEM. The control VLAN is used to exchange control messages. The network administrator configures the control VLAN. See packet VLAN.
Virtual Ethernet Module (VEM)	This is the part of Cisco Nexus 1000V that actually switches data traffic. It runs on a VMware ESX 4.0 host. Up to 64 VEMs are controlled by one VSM. All the VEMs that form a switch domain should be in the same virtual Data Center as defined by VMware vCenter Server.
Distributed Virtual Switch (DVS)	This is a logical switch that spans one or more VMware ESX 4.0 servers. It is controlled by one VSM instance.
ESX/ESXi	A virtualization platform used to create the virtual machines as a set of configuration and disk files that together perform all the functions of a physical machine. Each ESX/ESXi host has a VI Client available for management use. If your ESX/ESXi host is registered with the vCenter Server, a VI Client that accommodates the vCenter Server features is available.
Managed Object Browser (MOB)	A tool that enables you to browse managed objects on VirtualCenter Server and ESX Server systems.
Packet VLAN	One of two VLANs for the communication between VSM and VEM. The packet VLAN forwards relevant data packets, such as CDP, from the VEM to the VSM. The network administrator configures the packet VLAN. See control VLAN.
Virtual Machine (VM)	A virtualized x86 PC environment in which a guest operating system and associated application software can run. Multiple virtual machines can operate on the same host system concurrently.
vCenter Server	A service that acts as a central administrator for VMware ESX/ESXi hosts that are connected on a network. vCenter Server directs actions on the virtual machines and the virtual machine hosts (the ESX/ESXi hosts).

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Table 4-1 Cisco Nexus 1000V Terminology (continued)

Term	Description
vSphere Client	The user interface that lets users connect remotely to the vCenter Server or ESX/ESXi from any windows PC. The primary interface for creating, managing, and monitoring virtual machines, their resources, and their hosts. It also provides console access to virtual machines.
VMware Infrastructure Bundle (VIB)	The package format used by VMware ESX 4.0 release.
VMware update manager (VUM)	The software application that manages Cisco Nexus 1000V software installation. **Note** VUM is not a requirement. Software can be installed manually without using VUM. **Note** VUM does not support VEM upgrades.

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