C H A P T E R 4

Configuring Cisco IOS CNS Agents

This chapter describes how to configure the Cisco IOS CNS agents on the Cisco ME 3400E switch.

Note For complete configuration information for the Cisco Configuration Engine, see this URL on Cisco.com
http://www.cisco.com/en/US/products/sw/netmgtsw/ps4617/tsd_products_support_series_home.html

For complete syntax and usage information for the commands used in this chapter, see the *Cisco IOS Network Management Command Reference, Release 12.4*
http://www.cisco.com/en/US/products/ps6350/products_command_reference_book09186a008042df72.html

This chapter consists of these sections:

Understanding Cisco Configuration Engine Software

The Cisco Configuration Engine is network management software that acts as a configuration service for automating the deployment and management of network devices and services (see Figure 4-1). Each Configuration Engine manages a group of Cisco devices (switches and routers) and the services that they deliver, storing their configurations and delivering them as needed. The Configuration Engine automates initial configurations and configuration updates by generating device-specific configuration changes, sending them to the device, executing the configuration change, and logging the results.

The Configuration Engine supports standalone and server modes and has these CNS components:

- Configuration service (web server, file manager, and namespace mapping server)
- Event service (event gateway)
- Data service directory (data models and schema)

In standalone mode, the Configuration Engine supports an embedded Directory Service. In this mode, no external directory or other data store is required. In server mode, the Configuration Engine supports the use of a user-defined external directory.

Figure 4-1   Configuration Engine Architectural Overview
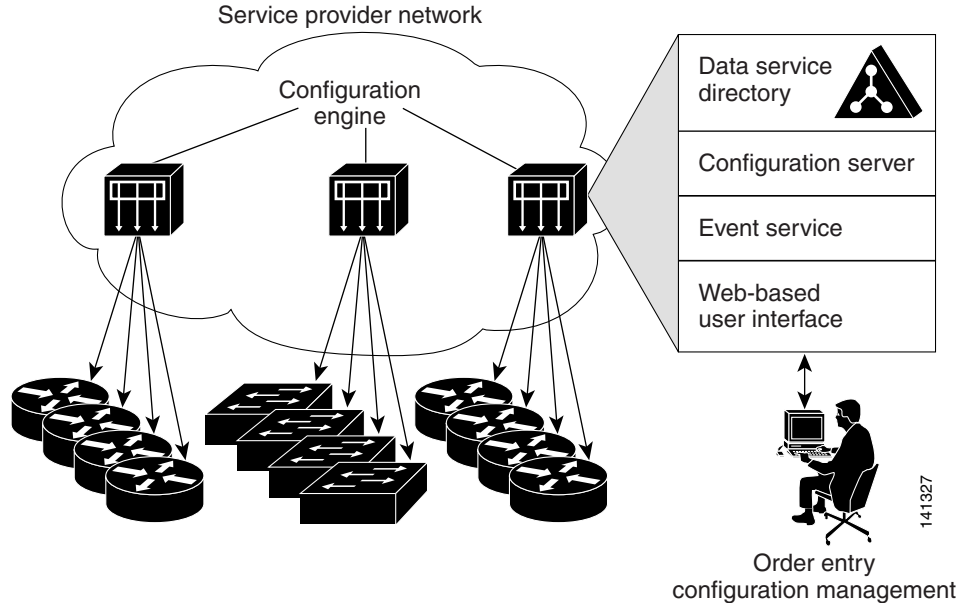
These sections contain this conceptual information:

Configuration Service

commands. In the templates, variables are specified using Lightweight Directory Access Protocol (LDAP) URLs that reference the device-specific configuration information stored in a directory.

The Cisco IOS agent can perform a syntax check on received configuration files and publish events to show the success or failure of the syntax check. The configuration agent can either apply configurations immediately or delay the application until receipt of a synchronization event from the configuration server.

Event Service

uses subject-based addressing to send messages to their destinations. Subject-based addressing conventions define a simple, uniform namespace for messages and their destinations.

NameSpace Mapper

software; for example, cisco.cns.config.load. You can use the namespace mapping service to designate events by using any desired naming convention. When you have populated your data store with your subject names, NSM changes your event subject-name strings to those known by Cisco IOS.

For a subscriber, when given a unique device ID and event, the namespace mapping service returns a set of events to which to subscribe. Similarly, for a publisher, when given a unique group ID, device ID, and event, the mapping service returns a set of events on which to publish.

What You Should Know About the CNS IDs and Device Hostnames

The Configuration Engine assumes that a unique identifier is associated with each configured switch. This unique identifier can take on multiple synonyms, where each synonym is unique within a particular namespace. The event service uses namespace content for subject-based addressing of messages.

The Configuration Engine intersects two namespaces, one for the event bus and the other for the configuration server. Within the scope of the configuration server namespace, the term *ConfigID*

DeviceID

Because the Configuration Engine uses both the event bus and the configuration server to provide configurations to devices, you must define both ConfigID and Device ID for each configured switch.

Within the scope of a single instance of the configuration server, no two configured switches can share the same value for ConfigID. Within the scope of a single instance of the event bus, no two configured switches can share the same value for DeviceID.

ConfigID

Each configured switch has a unique ConfigID, which serves as the key into the Configuration Engine directory for the corresponding set of switch CLI attributes. The ConfigID defined on the switch must match the ConfigID for the corresponding switch definition on the Configuration Engine.

The ConfigID is fixed at startup time and cannot be changed until the device restarts, even if the switch hostname is reconfigured.

DeviceID

Each configured switch participating on the event bus has a unique DeviceID, which is analogous to the switch source address so that the switch can be targeted as a specific destination on the bus. All switches configured with the **cns config partial**

Hostname and DeviceID

no cns event

cns event

⚠ **Caution**

–not *before*–you use the   global configuration command at the switch. Otherwise, subsequent   global configuration command operations malfunction.

Using Hostname, DeviceID, and ConfigID

In standalone mode, when a hostname value is set for a switch, the configuration server uses the hostname as the DeviceID when an event is sent on hostname. If the hostname has not been set, the event is sent on the cn=<*value*> of the device.

In server mode, the hostname is not used. In this mode, the unique DeviceID attribute is always used for sending an event on the bus. If this attribute is not set, you cannot update the switch.

These and other associated attributes (tag value pairs) are set when you run **Setup** on the Configuration Engine.

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For more information about running the setup program on the Configuration Engine, see the Configuration Engine setup and configuration guide at this URL on Cisco.com:
http://www.cisco.com/en/US/products/sw/netmgtsw/ps4617/prod_installation_guides_list.html

Understanding Cisco IOS Agents

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Initial Configuration

The switch automatically configures the assigned IP address on interface VLAN 1 (the default) and downloads the bootstrap configuration file from the TFTP server. Upon successful download of the bootstrap configuration file, the switch loads the file in its running configuration.

The Cisco IOS agents initiate communication with the Configuration Engine by using the appropriate ConfigID and EventID. The Configuration Engine maps the Config ID to a template and downloads the full configuration file to the switch.

Figure 4-2 shows a sample network configuration for retrieving the initial bootstrap configuration file by using DHCP-based autoconfiguration.

Figure 4-2   Initial Configuration Overview
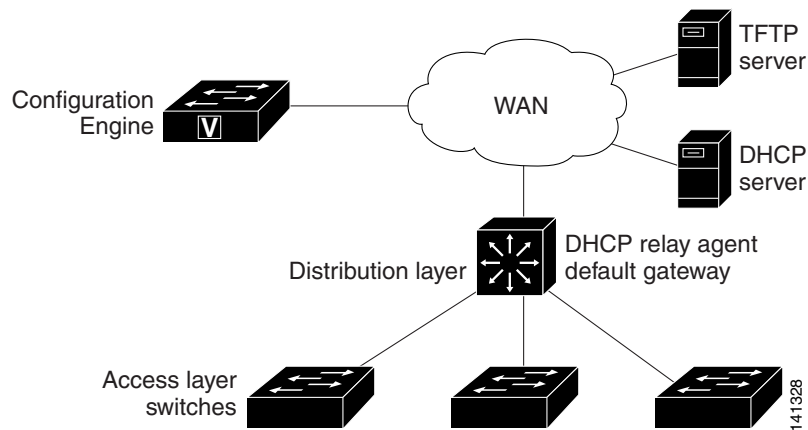
Incremental (Partial) Configuration

Synchronized Configuration

Configuring Cisco IOS Agents

. If you want to change the configuration or install a custom configuration, see these sections for instructions:

- Enabling the CNS Event Agent, page 4-7
- Enabling the Cisco IOS CNS Agent, page 4-9
- Upgrading Devices with Cisco IOS Image Agent, page 4-14

Enabling Automated CNS Configuration

To enable automated CNS configuration of the switch, you must first complete the prerequisites in Table 4-1. When you complete them, power on the switch. At the   prompt, do nothing: The switch begins the initial configuration as described in the "Initial Configuration" section on page 4-5. When the full configuration file is loaded on your switch, you need to do nothing else.

Table 4-1   Prerequisites for Enabling Automatic Configuration

Device	Required Configuration
	•
	•
	•

Prerequisites for Enabling Automatic Configuration (continued)

Note

Cisco Configuration Engine Installation and Setup Guide, 1.5 for Linux

Beginning in privileged EXEC mode, follow these steps to enable the CNS event agent on the switch:

	Command	Purpose
Step 1	**configure terminal**	
Step 2	| } [[**backup failover-time keepalive** *retry-count* **reconnect** *time* **source** *ip-address*	*hostname* | *ip-address* *port number* **backup** **failover-time** *seconds* **keepalive** *seconds* *retry-count* **reconnect** *time* **source** *ip-address* **encrypt** **clock-timeout**
Step 3	**end**	
Step 4	**show cns event connections**	
Step 5	**show running-config**	
Step 6		

To disable the CNS event agent, use the {*ip-address* | *hostname*} global configuration command.

This example shows how to enable the CNS event agent, set the IP address gateway to 10.180.1.27, set 120 seconds as the keepalive interval, and set 10 as the retry count.

```
Switch(config)# cns event 10.180.1.27 keepalive 120 10
```

Enabling the Cisco IOS CNS Agent

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Enabling an Initial Configuration

	Command	Purpose
Step 1		
Step 2		
Step 3		
Step 4		
Step 5	**exit**	
Step 6	**cns connect** *retries* *retry-interval* *sleep* *timeout*	 - - *retries* - *retry-interva* - *sleep* - *timeout*

	Command	Purpose
Step 7		
		•
		•
		•
		•
Step 8		
Step 9		
Step 10		
Step 11		
Step 12		

Command	Purpose
Step 13	
	•
	•
	•
	•
	Note
	• **hostname**| **string** **udi** **hardware-serial** **hostname** **string** **udi**

no cns config initial

configuration is unknown (the CNS Zero Touch feature).

```
                cns template connect template-dhcp
Switch(config-tmpl-conn)# cli ip address dhcp
Switch(config-tmpl-conn)# exit
                cns template connect ip-route
                        cli ip route 0.0.0.0 0.0.0.0 ${next-hop}
                        exit
                cns connect dhcp
Switch(config-cns-conn)# discover interface gigabitethernet
                        template template-dhcp
                        template ip-route
                        exit
                hostname RemoteSwitch
RemoteSwitch(config)#
```

```
Switch(config)#
Switch(config-tmpl-conn)#
Switch(config-tmpl-conn)#
Switch(config)#
Switch(config-tmpl-conn)#
Switch(config-tmpl-conn)#
Switch(config)#
Switch(config-cns-conn)#
Switch(config-cns-conn)#
Switch(config-cns-conn)#
Switch(config-cns-conn)#
Switch(config)#
RemoteSwitch(config)# ip route 172.28.129.22 255.255.255.255 11.11.11.1
                      cns id ethernet 0 ipaddress
                      cns config initial 172.28.129.22 no-persist
```

Enabling a Partial Configuration

	Command	Purpose
Step 1		
Step 2		•
		•
		•
		Note
Step 3		
Step 4		
Step 5		
Step 6		

Upgrading Devices with Cisco IOS Image Agent

Prerequisites for the CNS Image Agent

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Restrictions for the CNS Image Agent

uring automated image loading operations you must try to prevent the Cisco IOS device from losing connectivity with the file server that is providing the image. Image reloading is subject to memory issues and connection issues. Boot options must also be configured to allow the Cisco IOS device to boot another image if the first image reload fails.

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Cisco IOS Configuration Fundamentals Configuration Guide, Release 12.2.

	Command	Purpose
Step 1		
Step 2	*ip-address* *hostname*	
Step 3	*hostname*	
Step 4	*ip-address* *port number*	

	Command	Purpose
Step 5		
Step 6		
Step 7		

✎

Note   **172.20.249.20:**

```
Switch(config)>
Switch(config)# ip host cns-dsbu.cisco.com 172.20.249.20
            cns trusted-server all-agents cns-dsbu.cisco.com
            no cns aaa enable cns event 172.20.249.20 22022
            cns image retry 1
            cns image server http://172.20.249.20:80/cns/HttpMsgDispatcher
http://172.20.249.20:80/cns/HttpMsgDispatcher
Switch(config)#
```

Displaying CNS Configuration

Displaying CNS Configuration

show cns event subject	