Getting Started

This chapter describes what is required before you begin configuring the CSM and contains these sections:

- Operating System Support, page 3-1
- Preparing to Configure the CSM, page 3-2
- Saving and Restoring Configurations, page 3-3
- Configuring SLB Modes, page 3-3
- Configuration Overview, page 3-9
- Upgrading to a New Software Release, page 3-12

Operating System Support

The CSM is supported on switches running both the Catalyst operating system software on the supervisor engine and Cisco IOS software on the Multilayer Switch Feature Card (MSFC). The CSM is also supported on switches running Cisco IOS software on both the supervisor engine and the MSFC.

Because the CSM is configured through the MSFC CLI, if you are using a switch running both the Catalyst operating system and Cisco IOS software, you must first session into the MSFC for access to the MSFC CLI, from where the CSM is configured. When you access the MSFC CLI, the CSM configuration is identical for the Catalyst operating system and Cisco IOS switch.

All the Layer 2 configurations (such as VLAN and port associations) are performed on the supervisor engine when using a switch running both the Catalyst operating system and Cisco IOS software.

Note When running the CSM on a switch with only the Cisco IOS software, configured VLANs are automatically added to the trunk or channel that connects the CSM to the switch backplane. In a switch running both the Catalyst operating system and the Cisco IOS software, you will have to manually add the CSM VLANs to the trunk or channel.

Preparing to Configure the CSM

Before you configure the CSM, you must take these actions:

- Be sure that the Cisco IOS versions for the switch and the module match. Refer to the *Catalyst 6500 Series Switch Content Switching Module Installation Guide*.

- Before you can configure server load balancing, you must obtain the following information:
  - Network topology that you are using in your installation
  - Real server IP addresses
  - An entry for the CSM VIPs in the Domain Name Server (DNS) (if you want them to be reached through names)
  - Each virtual server's IP address

- Configure VLANs on the Catalyst 6500 series switch before you configure VLANs for the CSM. VLAN IDs must be the same for the switch and the module. Refer to the *Catalyst 6500 Series Switch Software Configuration Guide* for details.

  This example shows how to configure VLANs:

  ```
  Router# configure terminal
  Enter configuration commands, one per line.  End with CNTL/Z.
  Router(config)# vlan 130
  Router(config-vlan)# name CLIENT_VLAN
  Router(config-vlan)# exit
  Router(config)# vlan 150
  Router(config-vlan)# name SERVER_VLAN
  Router(config-vlan)# end
  ```

- Place physical interfaces that connect to the servers or to the clients in the corresponding VLAN.

  This example shows how to configure a physical interface as a Layer 2 interface and assign it to a VLAN:

  ```
  Router>
  Router> enable
  Router# config
  Router(config)# interface 3/1
  Router(config-if)# switchport
  Router(config-if)# switchport access vlan 150
  Router(config-if)# no shutdown
  Router(vlan)# exit
  ```

- If the MSFC is used on the next-hop router on either the client or the server-side VLAN, then you must configure the corresponding Layer 3 VLAN interface.

⚠️ **Caution**   You cannot use the MSFC simultaneously as the router for both the client and the server side unless policy-based routing or source NAT is used and the CSM is configured in router mode. This situation occurs because the CSM must see both flow directions that load balances or forwards. If you use the CSM in bridge (single subnet) mode, do not configure the Layer 3 VLAN interface on the MSFC for both the client and the server side. If you use the CSM in router mode, do not configure the Layer 3 VLAN interface on the MSFC for both the client and the server side unless you properly configure policy-based routing or source NAT to direct return traffic back to the CSM.

This example shows how to configure the Layer 3 VLAN interface:

```
Router>
Router> enable
Router# config
Router(config)# interface vlan 130
Router(config-if)# ip address 10.10.1.10 255.255.255.0
Router(config-if)# no shutdown
Router(vlan)# exit
```

Using the Command-Line Interface

The software interface for the CSM is the Cisco IOS command-line interface. To understand the Cisco IOS command-line interface and Cisco IOS command modes, refer to Chapter 2 in the *Catalyst 6500 Series Switch Cisco IOS Software Configuration Guide*.

Note   Because each prompt has a character limit, some prompts may be truncated. For example Router(config-slb-vlan-server)# may appear as Router(config-slb-vlan-serve)#.

Accessing Online Help

In any command mode, you can get a list of available commands by entering a question mark (?) as follows:

```
Router> ?
```

or

```
Router(config)# module csm 5
Router(config-module-csm)# ?
```

Note   Online help shows the default configuration values and ranges available to commands.

Saving and Restoring Configurations

For information about saving and restoring configurations, refer to the *Catalyst 6500 Series Switch Cisco IOS Software Configuration Guide*.

Configuring SLB Modes

Server load balancing on the Catalyst 6500 series switch can be configured to operate in two modes: the routed processor (RP) mode and the CSM mode. The switch configuration does not affect CSM operation. By default, the CSM is configured in RP mode. The RP mode allows you to configure one or multiple CSMs in the same chassis and run Cisco IOS SLB on the same switch.

Note   The RP mode is the default mode and is the recommended mode. The CSM mode is used only for backward compatibility with CSM software images previous to 2.1. When installing a new CSM or CSM image, use the RP mode.

The CSM mode allows you to configure a single CSM only. The CSM mode is supported for backward compatibility with previous software releases. The single CSM configuration will not allow Cisco IOS SLB to run on the same switch.

The following sections provide information about the modes:

Mode Command Syntax

Before you can enter the CSM configuration commands on the switch, you must specify the CSM that you want to configure. To specify a CSM for configuration, use the **module csm** *slot-number* command. The *slot-number* value is the chassis slot where the CSM being configured is located.

The **module csm** command places you in CSM configuration submode. All additional configuration commands that you enter apply to the CSM installed in the slot that you have specified.

Note   Unless otherwise specified, all the examples in this publication assume that you have already entered this command and entered the configuration submode for the CSM that you are configuring.

The command syntax for the CSM mode and RP mode configuration is identical with these exceptions:

- When configuring in the CSM mode, you must prefix each top-level command with **ip slb**.
- Prompts are different for the CSM mode and RP mode configurations.

To configure a virtual server for a CSM in slot 5, perform this task:

	Command	Purpose
Step 1	Router(config)# **module csm 5**	Specifies the location of the CSM that you are configuring.
Step 2	Router(config-module-csm)# **vserver VS1**	Configures the virtual server.

This example shows the complete list of CSM commands in the config-module-csm mode:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# module csm 5
Router(config-module-csm)# ?
SLB CSM module config
  arp        configure a static ARP entry
  capp       configure Content Application Peering Protocol
  default    Set a command to its defaults
  dfp        configure Dynamic Feedback Protocol manager
  exit       exit SLB CSM module submode
```

```
ft          configure CSM fault tolerance (ft) feature
map         configure an SLB map
natpool     configure client nat pool
no          Negate a command or set its defaults
owner       configure server owner
policy      configure an SLB policy
probe       configure an SLB probe
real        configure module real server
script      configure script files and tasks
serverfarm  configure a SLB server farm
standby
static      configure static NAT for server initiated connections
sticky      configure a sticky group
variable    configure an environment variable
vlan        configure a vlan
vserver     configure an SLB virtual server
xml-config  settings for configuration via XML
```

Migrating Between Modes

Existing CSM configurations are migrated to the new configuration when the mode is changed from CSM to RP using the **ip slb mode** command. If a CSM configuration exists, you are prompted for the slot number.

You can migrate from an RP mode configuration to CSM mode configuration on the Catalyst 6500 series switch. You can migrate manually only from a Cisco IOS SLB configuration to a CSM configuration.

Differences Between the CSM and RP Modes

The CSM and RP modes only affect the way in which the CSM is configured from the CLI, not the operation and functionalities of the CSM itself. The RP mode is required to configure multiple CSMs in one chassis as well as the Cisco IOS SLB in the same chassis with a CSM.

CSM Mode

You can use the **ip slb mode csm** command mode to configure a CSM in 1.x releases. This mode allows the configuration of a single CSM in the chassis. (Other CSMs or Cisco IOS SLB cannot be configured in the same chassis.)

In this mode, all the CSM configuration commands begin with **ip slb**.

The CSM **show** commands begin with **show ip slb**.

This mode is not recommended if you are using CSM 2.1 or later releases, where it is provided as an option in the Cisco IOS CLI for backward compatibility.

The following is an example of a configuration for a single CSM in the chassis:

```
Cat6k# show running-config
Building configuration...
Current configuration : 5617 bytes

ip slb mode csm
ip slb vlan 110 server
ip address 10.10.110.1 255.255.255.0
```

```
ip slb vlan 111 client
ip address 10.10.111.2 255.255.255.0
gateway 10.10.111.1

ip slb probe HTTP_TEST http
request method get url /probe/http_probe.html
expect status 200
interval 5
failed 5

ip slb serverfarm WEBFARM
nat server
no nat client
real 10.10.110.10
inservice
real 10.10.110.20
inservice
probe HTTP_TEST

ip slb vserver HTTPVIP
virtual 10.10.111.100 tcp www
persistent rebalance
serverfarm WEBFARM
inservice
```

RP Mode

You can use the **ip slb mode rp** command mode (the default) to configure multiple CSMs in a chassis with Cisco IOS SLB. You can only configure the CSM using this mode starting from release 2.1.

In this mode, the CSM is configured from this command submode:

mod csm *X*

The *X* is the slot number of the CSM that you want to configure.

CSM show commands start with **show mod csm** *X*.

Beginning with CSM software release 2.1, the RP mode is the recommended mode when configuring the CSM. While in this mode, all the commands apply to Cisco IOS SLB and not to a CSM in the chassis. These commands begin with **ip slb**.

The following is an example of a configuration for a single CSM in the chassis:

```
Cat6k# show running-config
Building configuration...

Current configuration : 5597 bytes
!---

module ContentSwitchingModule 5
vlan 110 server
ip address 10.10.110.1 255.255.255.0

vlan 111 client
ip address 10.10.111.2 255.255.255.0
gateway 10.10.111.1

probe HTTP_TEST http
request method get url /probe/http_probe.html
expect status 200
interval 5
failed 5
```

```
serverfarm WEBFARM
nat server
no nat client
real 10.10.110.10
inservice
real 10.10.110.20
inservice
probe HTTP_TEST

vserver HTTPVIP
virtual 10.10.111.100 tcp www
persistent rebalance
serverfarm WEBFARM
inservice
```

Changing Modes

You can change the CSM operating mode from CSM mode to RP mode or RP mode to CSM mode. The next sections provide examples of how to change the modes.

CSM Mode to RP Mode

This example shows how to change from the CSM mode to the RP mode. This example is typical of a migration from CSM 1.x to 2.1 or later releases and does not require a module reset.

```
Cat6k# configure terminal
 Enter configuration commands, one per line.  End with CNTL/Z.

Cat6k(config)# ip slb mode ?
   csm  SLB in Content Switching Module
   rp   SLB in IOS system

Cat6k(config)# ip slb mode rp
 % The current SLB mode is CSM-SLB.
 % You are selecting RP-SLB mode.
 % All configuration for CSM-SLB will be moved to module submode.
 % Confirm switch to RP-SLB mode? [no]: yes
 % Enter slot number for CSM module configuration, 0 for none [5]: 5
 % Please save the configuration.
Cat6k(config)# end

Cat6k# write
 Building configuration...
 [OK]
Cat6k#
```

RP Mode to CSM Mode

This example shows how to migrate from the RP mode to the CSM mode and requires a module reset:

```
Cat6k# configure terminal
 Enter configuration commands, one per line.  End with CNTL/Z.

Cat6k(config)# ip slb mode ?
   csm  SLB in Content Switching Module
   rp   SLB in IOS system

Cat6k(config)# ip slb mode csm
 % The current SLB mode is RP-SLB.
 % You are selecting CSM-SLB.
 % All SLB configurations for RP will be ERASED.
 % After execution of this command, you must
 % write the configuration to memory and reload.
 % CSM-SLB module configuration will be moved to ip slb submodes.
 % Confirm switch to CSM-SLB mode? [no]: yes
 % Enter slot number for CSM module configuration, 0 for none [5]: 5
 % Please save the configuration and reload.

Cat6k(config)# end
Cat6k# write
 Building configuration...
Cat6k# reload
 Proceed with reload? [confirm] y
Verify Mode Operation
```

Verifying the Configuration

To confirm that your configuration is working properly, use these commands in the RP mode:

```
Cat6k# show ip slb mode
     SLB configured mode = rp

Cat6k# configure terminal
 Enter configuration commands, one per line.  End with CNTL/Z.

Catk6-1(config)# ip slb ?
   dfp           configure Dynamic Feedback Protocol manager
   entries       initial and maximum SLB entries
   firewallfarm  configure an SLB firewall farm
   mode          configure SLB system mode
   natpool       define client nat pool
   probe         configure an SLB probe
   serverfarm    configure an SLB server farm
   vserver       configure an SLB virtual server
```

To confirm that your configuration is working properly, use these commands in the Cisco IOS SLB mode:

```
Cat6k(config)# module csm 5
Cat6k(config-module-csm)# ?
 SLB CSM module config
   default    Set a command to its defaults
   dfp        configure Dynamic Feedback Protocol manager
   exit       exit SLB CSM module submode
   ft         configure CSM fault tolerance (ft) feature
   map        configure an SLB map
   natpool    configure client nat pool
   no         Negate a command or set its defaults
```

```
    policy      configure an SLB policy
    probe       configure an SLB probe
    serverfarm  configure an SLB server farm
    static      configure static NAT for server initiated connections
    sticky      configure a sticky group
    vlan        configure a vlan
    vserver     configure an SLB virtual server
```

To confirm that a single CSM in the chassis configuration is working properly, use these commands in the CSM mode:

```
Cat6k# show ip slb mode
    SLB configured mode = csm

Catk6-1# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.

Cat6k(config)# ip slb ?
    dfp         configure Dynamic Feedback Protocol manager
    ft          configure CSM fault tolerance (ft) feature
    map         configure an SLB map
    mode        configure SLB system mode
    natpool     configure client nat pool
    policy      configure an SLB policy
    probe       configure an SLB probe
    serverfarm  configure an SLB server farm
    static      configure static NAT for server initiated connections
    sticky      configure a sticky group
    vlan        configure a vlan
    vserver     configure an SLB virtual server
```
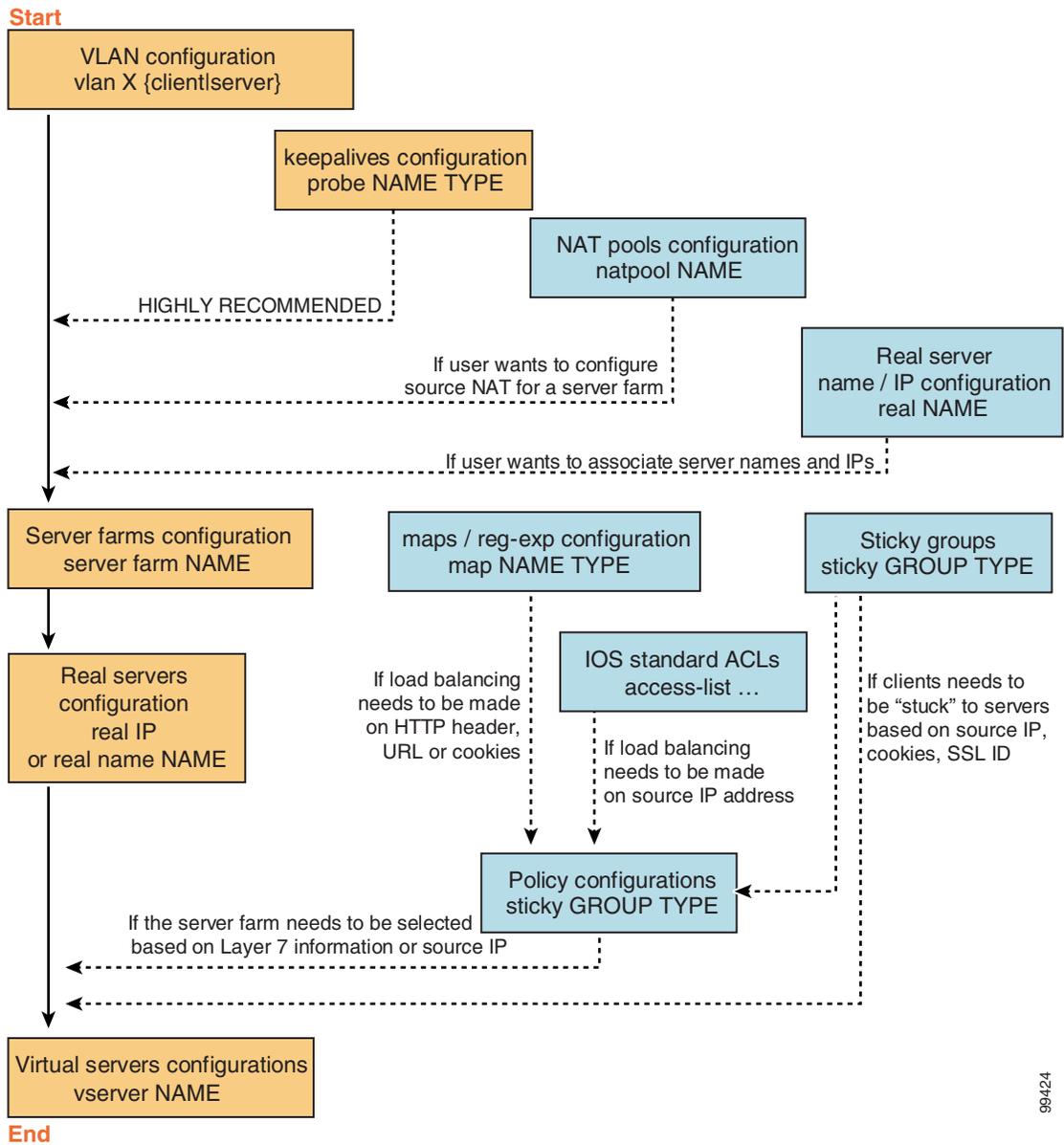
Configuration Overview

The configuration process described here assumes that the switch is in the RP mode. Figure 3-1 shows an overview of the required and optional operations in the configuration process.

> **Note**   Configuring policies is not necessary for Layer 4 load balancing.

■ Configuration Overview

Figure 3-1   Configuration Overview

Start

VLAN configuration
vlan X {client|server}

keepalives configuration
probe NAME TYPE

NAT pools configuration
natpool NAME

Real server
name / IP configuration
real NAME

HIGHLY RECOMMENDED

If user wants to configure
source NAT for a server farm

If user wants to associate server names and IPs

Server farms configuration
server farm NAME

maps / reg-exp configuration
map NAME TYPE

Sticky groups
sticky GROUP TYPE

Real servers
configuration
real IP
or real name NAME

If load balancing
needs to be made
on HTTP header,
URL or cookies

IOS standard ACLs
access-list …

If clients needs to
be "stuck" to servers
based on source IP,
cookies, SSL ID

If load balancing
needs to be made
on source IP address

Policy configurations
sticky GROUP TYPE

If the server farm needs to be selected
based on Layer 7 information or source IP

Virtual servers configurations
vserver NAME

End

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To configure the required parameters, see the following sections:

After you configure the required load-balancing parameters on the CSM, you can configure the optional parameters in the following sections:

To work with advanced configurations, refer to the following sections in Chapter 2 through Chapter 11:

Upgrading to a New Software Release

This section describes three methods for upgrading the CSM:

Note When upgrading to a new software release, you must upgrade the CSM image before upgrading the Cisco IOS image. Failure to do so causes the supervisor engine not to recognize the CSM. In this case, you would have to downgrade the Cisco IOS image, upgrade the CSM image, and then upgrade the Cisco IOS image.

To upgrade the CSM, you need to session into the CSM module being upgraded. During the upgrade, enter all commands on a console connected to the supervisor engine. Enter each configuration command on a separate line. To complete the upgrade, enter the **exit** command to return to the supervisor engine prompt. See the "Configuring SLB Modes" section on page 3-3.

Caution You must enter the **exit** command to terminate sessions with the CSM that is being upgraded. If you do not terminate the session and you remove the CSM from the Catalyst 6500 series chassis, you cannot enter configuration commands to the CSM unless you press **Ctrl + ^**, enter **x**, and enter the **disconnect** command at the prompt.

Upgrading from the Supervisor Engine Bootflash

Note Refer to the *Catalyst 6500 Series Supervisor Engine Flash PC Card Installation Note* for instructions on loading images into bootflash.

To upgrade the CSM from the supervisor engine bootflash, perform these steps:

Step 1 Enable the TFTP server to supply the image from bootflash as follows:

```
Router>
Router> enable
Router# configure terminal
Router(config)# tftp-server sup-bootflash:c6slb-apc.revision-num.bin
Router(config)
```

Step 2 Set up a session between the supervisor engine and the CSM:

```
Router# session slot csm-slot-number processor 0
```

Step 3 Load the image from the supervisor engine to the CSM:

```
CSM> upgrade 127.0.0.zz c6slb-apc.revision-num.bin
```

where *zz* is the following:

- 12 if the Supervisor Engine 1 or 2 is installed in chassis slot 1
- 22 if the Supervisor Engine 1 or 2 is installed in chassis slot 2

- 51 if the Supervisor Engine 720 is installed in chassis slot 5
- 61 if the Supervisor Engine 720 is installed in chassis slot 6
- 71 if the Supervisor Engine 720 is installed in chassis slot 7
- 81 if the Supervisor Engine 720 is installed in chassis slot 8

Step 4   Close the session to the CSM, and return to the Cisco IOS prompt:

```
CSM> exit
```

Step 5   Reboot the CSM by power cycling the CSM or by entering the following commands on the supervisor engine console:

```
Router(config)# hw-module module csm-slot-number reset
```

Upgrading from a PCMCIA Card

Note   Throughout this publication, the term *Flash PC card* is used in place of the term *PCMCIA card*.

To upgrade the CSM from a removable Flash PC card inserted in the Supervisor Engine 1 or 2, perform these steps:

Step 1   Enable the TFTP server to supply the image from the removable Flash PC card:

```
Router>
Router> enable
Router# configure terminal
Router(config)# tftp-server slotx:c6slb-apc.revision-num.bin
```

The *x* value is 0 if the Flash PC card is installed in supervisor engine PCMCIA slot 0.

Step 2   Set up a session between the supervisor engine and the CSM:

```
Router# session slot csm-slot-number processor 0
```

Step 3   Load the image from the supervisor engine to the CSM:

```
CSM> upgrade slot0: c6slb-apc.revision-num.bin
```

Note   The supervisor engine can only be installed in chassis slot 1 or slot 2.

Step 4   Close the session to the CSM and return to the Cisco IOS prompt:
```
CSM> exit
```

Step 5   Reboot the CSM by power cycling the CSM or by entering the following commands on the supervisor engine console:

```
Router# hw-module module csm-slot-number reset
```

Upgrading from a CompactFlash Card

To upgrade the CSM from a CompactFlash card inserted in the Supervisor Engine 720, perform these steps:

Step 1   Enable the TFTP server to supply the image from the removable CompactFlash card:

```
Router>
Router> enable
Router# configure terminal
Router(config)# tftp-server diskx:c6slb-apc.revision-num.bin
```

The *x* value is 0 or 1.

Step 2   Set up a session between the supervisor engine and the CSM:

```
Router# session slot csm-slot-number processor 0
```

Step 3   Load the image from the supervisor engine to the CSM:

```
CSM> upgrade 127.0.0.zz c6slb-apc.revision-num.bin
```

where *zz* is the following:

- 51 if the supervisor engine is installed in chassis slot 5
- 61 if the supervisor engine is installed in chassis slot 6
- 71 if the supervisor engine is installed in chassis slot 7
- 81 if the supervisor engine is installed in chassis slot 8

Step 4   Close the session to the CSM and return to the Cisco IOS prompt:

```
CSM> exit
```

Step 5   Reboot the CSM by power cycling the CSM or by entering the following commands on the supervisor engine console:

```
Router# hw-module module csm-slot-number reset
```

Upgrading from an External TFTP Server

To upgrade the CSM from an external TFTP server, perform these steps:

Step 1   Create a VLAN on the supervisor engine for the TFTP CSM run-time image download.

✎

Note   You can use an existing VLAN; however, for a reliable download, you should create a VLAN specifically for the TFTP connection.

Step 2   Configure the interface that is connected to your TFTP server.

Step 3   Add the interface to the VLAN.

Step 4   Enter the CSM **vlan** command.

See Chapter 4, "Configuring VLANs" for more information.

Step 5   Add an IP address to the VLAN for the CSM.

Step 6   Enter the **show csm** *slot* **vlan detail** command to verify your configuration.

See Chapter 4, "Configuring VLANs" for more information.

Step 7   Verify the CSM connectivity to the TFTP server:

```
Router# ping module csm csm-slot-number TFTP-server-IP-address
```

Step 8   Set up a session between the supervisor engine and the CSM:

```
Router# session slot csm-slot-number processor 0
```

Step 9   Upgrade the image:

```
CSM> upgrade TFTP-server-IP-address c6slb-apc.rev-number.bin
```

Step 10   Close the session to the CSM and return to the Cisco IOS prompt:

```
CSM> exit
```

Step 11   Reboot the CSM by power cycling the CSM or by entering the following commands on the supervisor engine console:

```
Router# hw-module module csm-slot-number reset
```

Upgrading to a New Software Release