CHAPTER 6

Managing Virtual Machines

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A virtual machine is a software computer (just like a physical computer) that runs an operating system and applications. Virtual machines run on the VMware vSphere Hypervisor. You can use the same VMware vSphere Hypervisor to run several virtual machines. Use the vSphere Client GUI to create and manage virtual machines. Use the VMware vCenter Server to manage multiple VMware vSphere Hypervisor hosts.

Downloading and Installing the vSphere Client

To manage the virtual machine, you must download and install the vSphere Client on a Microsoft Windows system with Microsoft .NET 3.5 SP1 framework.

The vSphere Client contains an online tutorial for first-time users. It also contains embedded in-line getting started assistance, which allows you to set up your virtual infrastructure through an easy to use, step-by-step process. If you are an experienced user, you can choose to turn-off the getting started in-line assistance.

Note To download the vSphere Client, connection to the Internet is required. Before you download the vSphere Client, verify that you have network connectivity.

Procedure

Step 1 Go to https://*hypervisor-ip-address*.

You are directed to the VMware website and the Welcome page opens.

Step 2 Click **Download vSphere Client**, and then click **Run** to download the vSphere Client. The VMware vSphere Client is installed and a shortcut icon to the client appears on your desktop.

Step 3 Click the **VMware vSphere Client** icon to open the login window.

Step 4 To manage a single VMware vSphere Hypervisor, enter the IP address or hostname of the VMware vSphere Hypervisor and the username and password, and then click **Login**. The vSphere Client GUI opens.

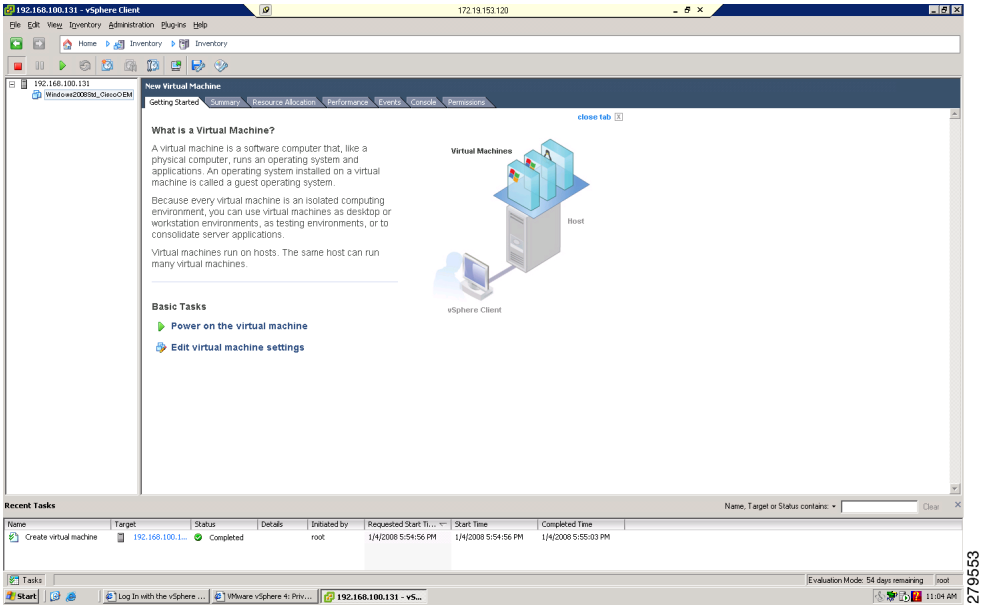
Note If you are a first-time user of the VMware vSphere Hypervisor, use **root** for the username; and for the password, leave the field empty. After you login, we recommend that you change the password.

Note If you purchased the Cisco SRE-V option 3 (hardware, plus virtualization software, plus Microsoft Windows software), a virtual machine is provided to you by default. For Cisco SRE-V options, see Figure 1-3.

Step 5 From the vSphere Client main page, do one of the following:

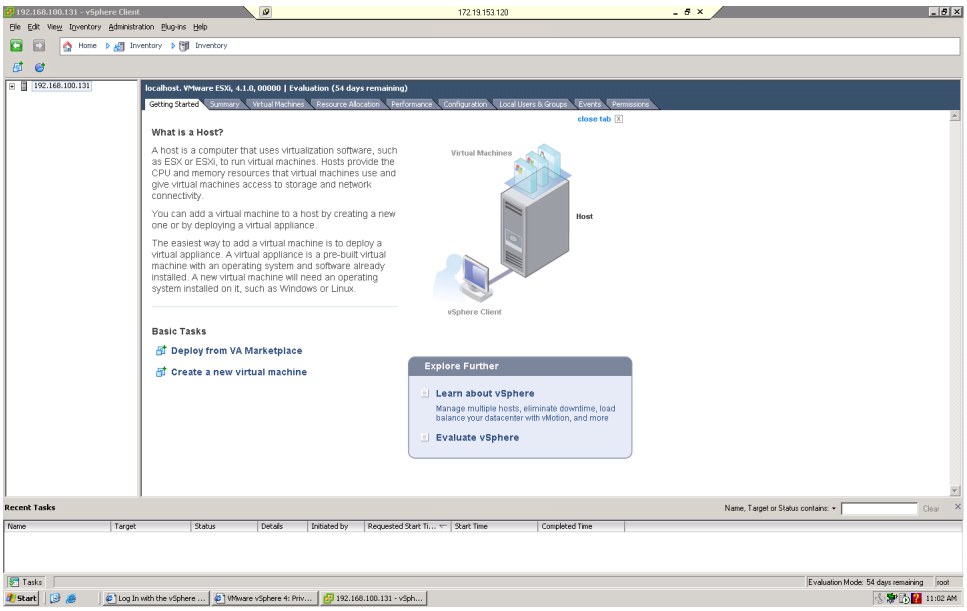
- To use the existing virtual machine that is provided to you by default with your Cisco SRE-V software option 3, do the following:
  - From the left navigation tree, click the host name to expand it, and then choose the virtual machine.
  - Follow the instructions that are displayed in the right pane under the Getting Started tab. See Figure 6-1.

Figure 6-1 vSphere Client Inventory Page with a Virtual Machine Selected



- To create a new virtual machine, see the "Important Information About Creating Virtual Machines" section on page 6-6, and then do the following:
  - From the left navigation tree, choose the host name.
  - Follow the instructions that are displayed in the right pane under the Getting Started tab. See Figure 6-2.

Figure 6-2 vSphere Client Inventory Page with the Host Name Selected



Note If you are an experienced user, you can choose to remove the Getting Started tab from your view. Go to **Edit > Client Settings**. The General tab is selected by default. From the Tasks pane, uncheck the **Show Getting Started Tab** checkbox.

Step 6 To manage the virtual machines, use the functionality provided by the vSphere Client.

Related Topics

- Downloading the VMware vCenter Server, page 6-4
- Managing the Cisco SRE Service Module with the VMware vCenter Server, page 6-4
- Important Information About Creating Virtual Machines, page 6-6

Downloading the VMware vCenter Server

To manage multiple VMware vSphere Hypervisor hosts, download the VMware vCenter Server.

Before You Begin

- Download and install the vSphere Client. See the "Downloading and Installing the vSphere Client" section on page 6-1.
- To download the VMware vCenter Server, connection to the Internet is required. Verify that you have network connectivity.

Procedure

Step 1 Go to https://*hypervisor-ip-address*.

You are directed to the VMware website and the Welcome page opens.

Step 2 Click **Download VMware vCenter**.

For information on the VMware vCenter Server, see *vSphere Installation and Setup* at http://pubs.vmware.com/vsphere-50/topic/com.vmware.ICbase/PDF/vsphere-esxi-vcenter-server-50-installation-setup-guide.pdf.

Managing the Cisco SRE Service Module with the VMware vCenter Server

Before You Begin

- Download and install the vSphere Client. See "Downloading and Installing the vSphere Client" section on page 6-1.
- Download the VMware vCenter Server. See "Downloading the VMware vCenter Server" section on page 6-4.

Procedure

Step 1 Click the **VMware vSphere Client** icon to open the login window.

Step 2 To manage multiple hosts, enter the IP address or hostname of the VMware vCenter Server, and the username and password of the VMware vCenter Server, and then click **Login**.

The vSphere Client GUI opens.

Step 3 From the vSphere Client main page, do the following:

a. Create a datastore.

b. Add a VMware vSphere Hypervisor host. The Add Host Wizard page opens.

c. Provide the IP address, and the username and password of the VMware vSphere Hypervisor host.

For details, see *vSphere Installation and Setup* at http://pubs.vmware.com/vsphere-50/topic/com.vmware.ICbase/PDF/vsphere-esxi-vcenter-server-50-installation-setup-guide.pdf.

About Lockdown Mode

The VMware vSphere Hypervisor allows a host to be in lockdown mode when it is controlled by the VMware vCenter Server.

Behavior When Lockdown Mode is Disabled

By default, lockdown mode is disabled. When lockdown mode is disabled, all router and module communication commands behave normally.

Behavior When Lockdown Mode is Enabled

When lockdown mode is enabled, the VMware vSphere Hypervisor host can be only be managed by the VMware vCenter Server using its internal user called vpxuser. All other configuration methods, such as the vSphere Client, PowerCLI, and vCLI are disabled.

Table 6-1 describes the behavior of commands when lockdown mode is enabled.

Table 6-1 Command Behavior in Lockdown Mode

Command	Behavior in Lockdown Mode
service-module *slot*/**0 status**	Works normally. Displays a status such as: `VMware ESXi 5.0.0 build-469512 running on SRE (LOCKDOWN).`
interface *slot*/**0** **service-module heartbeat-reset**	Works normally. **Note** This is the same behavior as when lockdown mode is disabled.
service-module sm *slot*/**0 reset**	Works normally. **Note** This is the same behavior as when lockdown mode is disabled.
interface *slot*/**0** **service-module ip address** **service-module ip default gateway**	Ignored. These command stays in the Cisco IOS configuration and visible when you enter the **show running-config** command. However, they do not change VMware vSphere Hypervisor settings.

Table 6-1 Command Behavior in Lockdown Mode

Command	Behavior in Lockdown Mode
service-module sm *slot*/**0 reload** **service-module sm** *slot*/**0 shutdown**	Change the status of the Service Module as reported by the host router, but have no affect on the VMware vSphere Hypervisor.

Determining if Lockdown Mode is Enabled

To see if lockdown mode is enabled, enter the **service-module sm** *slot*/**0 status** command. If lockdown mode is enabled, the system displays (LOCKDOWN) in the output. See the following example:

```
VMware ESXi 5.0.0 build-469512 running on SRE (LOCKDOWN)
```

Note It can take up to ten seconds after enabling lockdown mode before the system recognizes it.

For more details about the VMware vSphere Hypervisor lockdown mode, see the VMware Knowledge Base article at http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1008077.

Important Information About Creating Virtual Machines

If you purchased the Cisco SRE-V option 3 (hardware, plus virtualization software, plus Microsoft Windows software), a virtual machine with VMware tools and datastore(s) is provided to you by default. You can create additional virtual machines if needed.

If you purchased the Cisco SRE-V option 1 (hardware only, without the virtualization or Microsoft Windows software) or option 2 (hardware plus virtualization software), you must create virtual machines.

For information about the Cisco SRE-V options, see Figure 1-3.

See the following sections:

- Basic Workflow for Creating Virtual Machines, page 6-6
- Limitations for Creating Virtual Machines, page 6-7
- Networking Prerequisites for Creating Virtual Machines, page 6-7
- Installing VMware Tools, page 6-7

Basic Workflow for Creating Virtual Machines

1. (Optional) Create a datastore in Cisco SRE-V.
2. Create the virtual machine.
3. Install the operating system on the virtual machine.
4. Configure networking (external) for a virtual machine.
5. Configure networking (internal) for a virtual machine.

For instructions, see the vSphere Client online help.

Limitations for Creating Virtual Machines

Before creating virtual machines, note the following limitations:

- Each virtual machines has its own resource limitations, such as CPU core number and memory size.
- Virtual Symmetric Multiprocessing (vSMP) is not supported.
- Physical peripheral devices, such as serial port is not supported.
- The physical USB device, which is plugged into the USB port in the front panel of the Cisco SRE Service Module, must not exceed 500 mA (2.5 Watt). For information about assigning USB devices to a virtual machine, see the vSphere user guide.

Related Topic

- Downloading and Installing the vSphere Client, page 6-1

Networking Prerequisites for Creating Virtual Machines

If you want to assign virtual machines on different VLANs, you must configure VLANs on the ISR G2.

Example

```
interface SM1/1
description Internal switch interface connected to Service Module
 switchport mode trunk
!
interface Vlan50
 ip address 50.50.50.5 255.255.255.0
!
interface Vlan60
 ip address 60.60.60.6 255.255.255.0
```

Related Topic

- Downloading and Installing the vSphere Client, page 6-1

Installing VMware Tools

VMware Tools are a suite of utilities that enhances the performance of the virtual machine's guest operating system and improves the management of the virtual machine.

If you purchased the Cisco SRE-V option 3 (hardware, plus virtualization software, plus Microsoft Windows software), a virtual machine with VMware tools is provided to you by default so you do not need to install VMware tools on that machine. But, if you create a new virtual machine, you must install VMware tools on that virtual machine.

If you purchased the Cisco SRE-V option 1 (hardware only, without the virtualization or Microsoft Windows software) or option 2 (hardware plus virtualization software), you must install VMware tools after you create the virtual machine.

For information about the Cisco SRE-V options, see Figure 1-3.

Before You Begin

- Install the supported guest operating system on the virtual machine.

Procedure

Step 1 Go to the vSphere Client GUI main page.

Step 2 From the left navigation tree, click the host name to expand it.

Step 3 Right-click the virtual machine in which you want to install VMware tools, and then choose **Power > Power On**.

Step 4 Click the **Console** tab to make sure that the guest operating system starts successfully, and log in if necessary.

Step 5 Right-click the virtual machine in which you want to install VMware tools, choose **Guest**, and then choose **Install/Upgrade VMware Tools**.

The Install VMware Tools confirmation dialog box opens.

Step 6 Click **Ok** in the confirmation dialog box.

Step 7 Log into the virtual machine.

Step 8 Go to **Start > Open Windows Explorer**.

Step 9 Under Computer, click on the **VMware Tools** folder, and then choose **VMware Tools** or **VMware Tools 64** as appropriate.

The VMware Installation Wizard opens.

Step 10 Follow the steps in the wizard to complete the installation.

Step 11 Click **Finish**.

Step 12 Choose **Yes** when prompted to restart your system.

Step 13 To verify the VMware tools installation status, click the **Summary** tab in the vSphere Client GUI. You should see VM Tools - Status OK.

For more information, see *The VMware Tools Installation Guide For Operating System Specific Packages* document.

Related Topic

- Downloading and Installing the vSphere Client, page 6-1

Information About vSwitches

The system creates the following vSwitches in the VMware vSphere Hypervisor:

- vSwitch0—Uses the PCIe interface to connect to the VMware vSphere Hypervisor. The PCIe interface is sm slot/0.

  vSwitch0 contains the VMkernel port group for the Management Network. The Management Network is used by the vSphere client to connect to the VMware vSphere Hypervisor.

Note For the Cisco IOS **service-module** commands to take effect, make sure that the **Management Network** VMkernel port group is configured to use the vSwitch that has the PCIe interface as the uplink. We recommend that you do not change the default VMkernel port group name, which is Management Network.

- vSwitch1—By default, vSwitch1 is connected to the MGF interface of the Cisco SRE Service Module. The MGF interface is sm slot/1.

  vSwitch1 contains the VM Network port group, which can be used by guest virtual machines.

VMware vSphere Hypervisor Advanced Customization

Network Analysis Module Support

By default, the Network Analysis Module (NAM) capability is enabled on Cisco SRE-V. Only one NAM capable service module is supported in a ISR G2. Therefore, if the ISR G2 contains more than one NAM, make sure that you keep one NAM enabled, and disable the rest of the NAMs.

- To disable a NAM, use the following command from tech-support:

  ```
  # esxcfg-advcfg --user-var CiscoRBCPNAMCapable --set-user-var 0
  ```

- To enable a NAM, use the following command from tech-support:

  ```
  # esxcfg-advcfg --user-var CiscoRBCPNAMCapable --set-user-var 1
  ```

Reboot the Cisco SRE Service Module for the change to take effect.

Console Takes a Long Time to Reboot After Resetting System Configuration

When you choose the **Reset System Configuration** option from the vSphere console interface, the console reboots after a time interval of approximately two minutes. This is expected behavior.

Cannot Change the VMware vSphere Hypervisor IP Address from the vSphere Console Interface

When you use the vSphere console interface to change the IP address of the VMware vSphere Hypervisor, that IP address change is temporary and does not appear after you reboot the Cisco SRE Service Module. When you reboot the Cisco SRE Service Module, you notice that the IP address that you had configured using the following Cisco IOS command is in effect:

service-module ip address *hypervisor-ip-address subnet-mask*

If you want to change the IP address of the VMware vSphere Hypervisor, see the "Changing the IP Address of the VMware vSphere Hypervisor's Management Network" section on page 6-10.

Changing the IP Address of the VMware vSphere Hypervisor's Management Network

To change the IP address of the VMware vSphere Hypervisor, do the following:

1. Enter interface configuration mode for the slot and port where the Cisco SRE Service Module resides. For example:

```
Router(config)# interface sm 1/0
Router(config-if)#
```

2. Enter the following commands:

```
Router(config-if)# service-module heartbeat-reset disable
Router(config-if)# no service-module ip default-gateway hypervisor-gateway-ip-address
Router(config-if)# no service-module ip address hypervisor-ip-address subnet-mask
```

3. Use the vSphere console interface to change the IP address of the VMware vSphere Hypervisor.

Changing the Management Network Link

From the vSphere client, go to **Home > Inventory > Configuration > Networking**. Notice that under Virtual Network: vswitch0, the Management Network is connected to the Physical Adapter vmnic1, which is the PCIe link. To change this link, for example, from vmnic1 to vmic0, do the following:

1. Enter interface configuration mode for the slot and port where the Cisco SRE Service Module resides. For example:

```
Router(config)# interface sm 1/0
Router(config-if)#
```

2. Enter the following commands:

```
Router(config-if)# service-module heartbeat-reset disable
Router(config-if)# no service-module ip default-gateway hypervisor-gateway-ip-address
Router(config-if)# no service-module ip address hypervisor-ip-address subnet-mask
```

Modifying Access to the DCUI

The value for the VMkernel.Boot.tty2Port is **com1**. Do not change this value.

Cisco IOS uses the **com1** serial port to session into the console interface. The console interface allows you to access the VMware vSphere Hypervisor DCUI to perform Cisco SRE-V configuration. If you try to change the **com1** port value from Advanced Settings in the vSphere Client GUI, you will not be able to access the Cisco SRE Service Module. To access the Cisco SRE Service Module, you must reinstall Cisco SRE-V.

VMware vSphere Hypervisor Does Not Remain in a Shutdown State

VMware vSphere Hypervisor cannot remain in a shutdown state, unless you disable heartbeat reset.

To disable heartbeat reset, do the following:

1. Enter interface configuration mode for the slot and port where the Cisco SRE Service Module resides. For example:

```
Router(config)# interface sm 1/0
Router(config-if)#
```

2. Enter the **service-module heartbeat-reset disable** command to disable heartbeat-reset:

```
Router(config-if)# service-module heartbeat-reset disable
```

Adding the Virtual Machines in the Same Subnet as the VMware vSphere Hypervisor

To add virtual machines in the same subnet as the VMware vSphere Hypervisor, complete the following steps.

PREREQUISITES

See the "Prerequisites for Configuring the Cisco SRE Service Module Interfaces" section on page 3-2.

SUMMARY STEPS

From the Host-Router CLI, enter:

1. **enable**
2. **configure terminal**

Configure VLANs

1. **interface vlan** *vlan_number*
2. **ip address** *vlan-ip-address subnet mask*
3. **no shut**
4. **end**

Configure *slot*/0 of the VMware vSphere Hypervisor

1. **interface sm** *slot*/**0**
2. **ip unnumbered vlan** *vlan_number*
3. **service-module ip address** *hypervisor-ip-address subnet-mask*
4. **service-module ip default-gateway** *hypervisor-gateway-ip-address*
5. **no shut**
6. **exit**
7. **ip route** *hypervisor-ip-address subnet-mask* **sm** *slot*/**0**

Configure *slot*/1 of the VMware vSphere Hypervisor

1. **interface sm** *slot*/**1**
2. **switchport mode trunk**
3. **[switchport trunk allowed vlan** *vlan_numbers*]

4. **exit**

Save Configuration

1. **copy running-config startup-config**
2. **show running-config**

DETAILED STEPS

	Command or Action	Purpose
	From the Host-Router CLI	

Step 1	**enable** *<password>*
	
	Example:
	`Router> enable`
	`Router> <password>`
	`Router#`
		Enters privileged EXEC mode on the host router. Enter your password if prompted.

Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode on the host router.
	Configure VLANs	
Step 1	**interface vlan** *vlan_number* **Example:** `Router(config)# interface vlan1`	Enters VLAN configuration mode for the specified VLAN number.
Step 2	**ip address** *vlan-ip-address subnet-mask* **Example:** `Router(config-if)# ip address 10.0.0.100 255.255.255.0`	Specifies the IP address for the VLAN. • *vlan-ip-address*—IP address for the VLAN. • *subnet-mask*—Subnet mask to append to the IP address.
Step 3	**no shut** **Example:** `Router(config-if)# no shut`	Causes the interface to be administratively up.
Step 4	**end** **Example:** `Router(config)# end`	Returns to global configuration mode on the host router.
	Configure *slot*/**0 of the VMware vSphere Hypervisor**	
Step 1	**interface sm** *slot*/**0** **Example:** `Router(config)# interface sm 1/0`	Enters interface configuration mode for the slot and port where the Cisco SRE Service Module resides.

	Command or Action	Purpose
Step 2	**ip unnumbered vlan** *vlan_number* **Example:** `Router(config-if)# ip unnumbered vlan1`	The **ip unnumbered** command enables IP processing on the specified VLAN interface without assigning an explicit IP address to that interface. • *vlan_number*—Number of the VLAN interface on which the router has an assigned IP address. **Note** The unnumbered interface must be unique. It cannot be another unnumbered interface.The **ip unnumbered** command creates a point-to-point interface between devices. Broadcasting is not supported.
Step 3	**service-module ip address** *hypervisor-ip-address subnet-mask* **Example:** `Router(config-if)# service-module ip address 10.0.0.1 255.255.255.0`	Specifies the IP address of the VMware vSphere Hypervisor. • *hypervisor-ip-address*—IP address of the VMware vSphere Hypervisor. See Figure 3-2. • *subnet-mask*—Subnet mask to append to the IP address; must be in the same subnet as the host router.
Step 4	**service-module ip default-gateway** *hypervisor-gateway-ip-address* **Example:** `Router(config-if)# service-module ip default-gateway 10.0.0.100`	Specifies the IP address of the default gateway for the VMware vSphere Hypervisor. • *hypervisor-gateway-ip-address*—IP address for the default gateway router.
Step 5	**no shut** **Example:** `Router(config-if)# no shut`	Causes the interface to be administratively up.
Step 6	**exit** **Example:** `Router(config)# exit`	Returns to global configuration mode on the host router.
Step 7	**ip route** *hypervisor-ip-address subnet-mask* **sm** *slot***/0** **Example:** `Router(config)# ip route 10.0.0.1 255.255.255.255 SM1/0`	Creates a static route. If you used the **ip unnumbered** command in Step 2, you must use the **ip route** *hypervisor-ip-address subnet-mask* **sm** *slot***/0** command to create a static route. • *hypervisor-ip-address subnet-mask*—IP address and subnet mask of the VMware vSphere Hypervisor. • *slot/0*—slot and port where the Cisco SRE Service Module resides.
	Configure *slot***/1 of the VMware vSphere Hypervisor**	
Step 1	**interface sm** *slot***/1** **Example:** `Router(config)# interface sm 1/1`	Enters interface configuration mode for the slot and port where the Cisco SRE Service Module resides.

	Command or Action	Purpose
Step 2	**switchport mode trunk** **Example:** `Router(config-if)# switchport mode trunk`	Puts the port into permanent trunking mode. The default configuration is access mode.

Step 3	**[switchport trunk allowed vlan** *vlan_numbers***]**
	
	Example:
	`Router(config-if)# switchport mode trunk`
	`Router(config-if)# switchport trunk allowed vlan 1-2,40,60,1002-1005`
		(Optional) Allows trunking on the specified VLANs.
		• *vlan_numbers*—VLAN numbers on which you want to allow trunking.

Step 4	**exit** **Example:** `Router(config)# exit`	Returns to global configuration mode on the host router.
	Save Configuration	
Step 1	**copy running-config startup-config** **Example:** `Router# copy running-config startup-config`	Saves the new running configuration of the router as the startup configuration.
Step 2	**show running-config** **Example:** `Router# show running-config`	Displays the running configuration of the router so that you can verify the address configurations.