CHAPTER 1

Managing Cisco Device Configurations

This chapter describes the configuration features that enable you to control your Cisco Systems device configurations and provides information in the following sections:

- Managing Cisco Device Configuration Files
- Adding New Remote Routers Using AutoInstall
- Managing Cisco Systems Software and Microcode Upgrades
- Scheduling Batch Commands
- Using the Global Command Scheduler
- Using the Configuration Snap-In Manager to Configure Devices

Device Configuration Applications

Several CiscoWorks applications help manage the configuration of the Cisco devices in your network. A brief description of each application discussed in this chapter follows:

- Configuration Management—Manages the Cisco device configuration files by allowing you to create, edit, copy, download, browse, delete, and run batch processing for configuration files.
- AutoInstall Manager—Automates a remote router installation via the workstation running CiscoWorks.
- Software Library Manager—Provides a list of available Cisco system software and microcode. Allows you to sort and view these files, as well as importing images from CiscoWorks master storage.
- Software Inventory Manager—Updates the Sybase database to include current device software and hardware status.
- Device Software Manager—Provides an automated method to upgrade the system software or microcode on a Cisco device.
- Global Command Manager—Automates the task of upgrading remote devices on your network by providing a tool that can send common configuration changes or software upgrades across the network.
- Global Command Scheduler—Allows you to schedule global commands and other routine administrative tasks to occur during off-peak hours to maximize your network performance.
- Configuration Snap-In Manager—Allows you to send a few configuration commands to a set of devices.

These applications enhance your capabilities as a network administrator by collecting network data as a baseline before your network develops problems. These applications are discussed in detail in the following sections.

Managing Cisco Device Configuration Files

This section describes the Configuration Management application and provides information on the following topics:

- Understanding Configuration File Requirements
- Selecting a Text Editor
- Creating a New Configuration File
- Copying a File to the Database
- Editing Configuration Files
- Loading a Configuration File
- Browsing a Configuration File or Comments File on a Device
- Editing Configuration Comments Files
- Deleting Configuration Files
- Comparing a Configuration in a Device with the Database Version
- Comparing Two Device Configuration Files in the Database
- Using the nmconfig Command for Batch Processing

The CiscoWorks Configuration Management application can be used with Cisco Systems devices only. Cisco Systems device software must be Software Release 8.2 or later.

Note Before using the configuration management features, make sure that Trivial File Transfer Protocol (TFTP) has been set up for your system. TFTP is used to transfer configuration files between devices. TFTP is defined in RFC 783. For instructions on setting up TFTP, refer to the CiscoWorks administration and installation guide.

Overview of the Configuration Management Process

Figure 1-1 illustrates the configuration management data flow concept. You create the configuration file with a text editor. This data is then converted to a configuration file or series of commands used to configure a device. When a configuration file is loaded onto a device, a copy of the file is retained in the database.

The file sent to the device is also optionally retained in a separate boot file and is available if needed by the remote device for booting after failure or any other restart requirement. Configurations can be retrieved from devices, edited and returned to those devices, retained for future use, or used for analysis and troubleshooting. Configuration files are always archived in the CiscoWorks database.

TFTP is used to accomplish the transfer of configuration files between devices. If TFTP was not configured on your system, make sure you do so by following the instructions in the CiscoWorks administration and installation guide.

Figure 1-1 Configuration Management Concept

Configuration Management Window

The following sections describe the scroll windows, options, and command buttons in the Configuration Management window. Figure 1-2 shows a Configuration Management window where a device is highlighted to display the different configuration versions identified with it.

The letter L beside a version in the Configuration Versions scroll window indicates that this version was loaded to the device from the CiscoWorks database. If the configuration file has been changed by any action other than the CiscoWorks configuration management applications, the database will not recognize the new configuration version. As a result of this functionality, the configuration marked with an L may not be the last file loaded into the device. An asterisk (*) beside a version indicates that this version of the configuration file was created but was never loaded to the device.

Note Only Cisco devices that are included in the Sybase database will display in the Devices scroll window. If a new Cisco device is added to the Sybase database, it will be displayed in the Devices scroll window automatically. To add the device to the database, run the Sync w/Sybase application.

Figure 1-2 Configuration Management Window

Table 1-1 describes the components of the Configuration Management window, and Table 1-2 lists each command button and the tasks you can accomplish by using these command buttons.

Table 1-1 Configuration Management Window Components

Component	Subcomponent	Description
File	Print	Prints a snapshot of the selected configuration file.
	Exit	Exits the current window.
Security	Change Domain	Changes the group of devices which this user has access.
	Change User	Changes user ID to another user.
	Privileges	Views current user ID privileges.
Edit	Edit Config	Edit a configuration file used by a device or from the database. Refer to "Creating a New Configuration File."
	Edit Comments	Edit or add information about the configuration file that is unique, critical to its operation, and so on. Each configuration version file has a comments file. Refer to "Editing Configuration Comments Files."

Component	Subcomponent	Description
View	Browse Config	View the contents of a configuration file from a device or from the database. You can search forward or backward for text strings. You cannot make any changes when you are browsing a configuration file. Refer to “Loading a Device Configuration File to the Database.”
	Browse Comments	View the contents of a comments file from the database. You cannot make any changes when you are browsing a comments file. You can search forward and backward for text strings. Refer to “Deleting Configuration Files.”
Options	Delete From Database	Delete a configuration file from the database. Refer to the section “Deleting Configuration Files.”
	File to Database	Enables you to copy a configuration file from your system’s directory to the database. After a configuration file exists in the database, it can be loaded to the device.
	NVRAM Properties	Writes the configuration file from the database to the device’s NVRAM. Toggle switch is on or off. The default is on.
Help	On Version	Displays the CiscoWorks version information.
	On Configuration Management	Provides a manual page about the current window.
Device scroll window	Find	Enables you to quickly find a device listed in the CiscoWorks database. Devices with tables in the CiscoWorks database are listed in the Devices scroll window. The configuration files are displayed only if you created and associated configuration files with that device. The configuration file that the database believes is loaded on the device will have the letter L in the entry. New configuration files that were created but never loaded on the device are indicated by an asterisk (*).
Configuration Versions scroll window	Find	Enables you to quickly find a specific version of a configuration file from the CiscoWorks database. To display the list of configuration files associated with a device, click on a device name in the Devices scroll window within the Configuration Management window. If you did not create and store a configuration file for a device, or if no device name has been highlighted, the Configuration Versions scroll window will be blank.

Table 1-2 Configuration Management Command Buttons

Command Buttons	Task Description
Database To Device	Load a configuration file from the database to a device. Refer to the section “Loading a Configuration File.”
Device To Database	Load a device’s configuration file to the database. Refer to the section “Loading a Device Configuration File to the Database.”
Delete From Database	Delete a device’s configuration file from the database. Refer to the section “Deleting Configuration Files.”
Browse Config	View the contents of a configuration file from a device or from the database. You can search forward or backward for text strings. Refer to “Browsing a Configuration File or Comments File on a Device.”
Edit Config	Edit a configuration file used by a device or from the database. Refer to “Editing Configuration Files.”

Command Buttons	Task Description
Browse Comments	View the contents of a comments file from the database. You can search forward and backward for text strings. Refer to “Browsing a Configuration File or Comments File on a Device.”
Edit Comments	Edit or add information about the configuration file that is unique, critical to its operation, and so on. Each configuration version file has a comments file. Refer to “Editing Configuration Comments Files.”
Compare Configs	Compare a loaded device configuration file with a configuration file in the database or with a configuration file from another device. You can list the differences between files to troubleshoot configuration problems on a device. Refer to the section “Comparing Configuration Files.”

Understanding Configuration File Requirements

The *Router Products Getting Started Guide* explains the different ways to create a configuration file for a Cisco device at the time of setting it up. You can create configuration files by using a UNIX text editor such as vuepad, vi, or e3. You can also use the AutoInstall Manager application to create a configuration file for a Cisco device. For more information on the AutoInstall Manager, refer to the section on “Adding New Remote Routers Using AutoInstall.”

Knowledge of configuration files and device requirements will help you to create configuration files that can be saved to the CiscoWorks database and downloaded to a device. For information on device requirements, refer to the hardware documentation for the appropriate Cisco device. You can use the following CiscoWorks applications to help you with configuration or image file changes: Software Library Manager, Software Inventory Manager, Device Software Manager, Global Command Manager, and Configuration Snap-In Manager. For more information on these applications, refer to their individual sections later in this chapter.

Configuration File Requirements

Before you create or load configuration files, note that configuration files have certain restrictions regarding syntax and file size. In addition, make sure that the device version number is correct and that an appropriate community string is assigned to the device. For more information, see the section “Requirements for Loading a Configuration File to a Device.” If you are not using any name resolution server, ensure that the */etc/hosts* file includes both the device name with the domain and the name without the domain in the hosts file.

Syntax

The syntax you use to create a device configuration file is unique to the individual device. When you enter configuration data, be certain the sequence, syntax, and other parameters are in accordance with the requirements for the particular device. In most instances, you enter commands as though you were entering them from the appropriate device console. For more information on configuration file commands, refer to your *Router Products Command Reference* guide.

Note The Configuration Management software does not provide syntax checking. You should be fully knowledgeable about applicable device requirements.

Maximum File Size

The maximum size of a single device configuration file is 128 kilobytes (KB). The number of configurations that can be stored in the database depends on how much of available disk memory CiscoWorks allocates to database functions.

For each version of a configuration file, you can store information up to 128 KB for the configuration file comments file. A configuration comments file can be used to store information such as the historical usage of a configuration file or the reasons why a specific change was made to a configuration file on a device.

Selecting a Text Editor

You can define a text editor to create or edit configuration files. The default text editor for creating configuration files within CiscoWorks depends on which NMS you are using. Refer to the specific section to define your NMS text editor.

Skip this section if you have already specified a text editor or if you plan to use the default NMS text editor. For SNM, the default text editor is *textedit*. For HP OpenView, the default text editor is *vuepad*. For NetView for AIX, the default text editor is *e3*.

Redefining the SNM Text Editor

You can define the SNM text editor in the *$HOME/.Xdefaults* file or at the command line. Changes you enter in the *.Xdefaults* file remain in effect until you override them by setting the editor at the command line. Changes you enter at the command line will remain in effect (in the shell in which the command was executed) until you change the EDITOR variable again.

Note Ensure that the editor or program you want to use, as well as xterm, is in your PATH statement. For information on adding the PATH information to your *.cshrc* or *.kshrc* file, refer to the CiscoWorks administration and installation guide.

Editing the .Xdefaults File Entry to Specify the Text Editor

The *.Xdefaults* file on your system contains information that is specific to the OPEN LOOK environment. To define the look of your text editor window, add the following command to the *.Xdefaults* file, substituting the appropriate options:

***EditorFormat:** *command string* **%s**

The command string is the editor, command, or file to be executed. With EditorFormat, you can create a file or command to represent your own customized editor.

If other editor parameters are defined in the *.Xdefaults* file, the EditorFormat parameter will override these parameters.

To specify the emacs editor in */usr/local/bin*, add the following line to the *.Xdefaults* file:

***.EditorFormat:** */usr/local/bin/emacs* **%s**

This string tells the Configuration Management application (or any CiscoWorks application) to replace the **%s** symbol with the name of the actual configuration file being opened. The file will be opened using the emacs text editor.

If *%s* is not entered into the string, the Configuration Management application will append the actual configuration filename to the end of the string.

⚠ **Caution** You must update your environment after changing the *.Xdefaults* file.

To add the changes to the file, enter the following command:

```
% xrdb -merge $HOME/.Xdefaults
```

To write over the existing information in the *.Xdefaults* file, enter the following command:

```
% xrdb -load $HOME/.Xdefaults
```

If you receive the following error message, “Unable to start xterm System error: <Error>, check your PATH to see that xterm is included.” For instructions on specifying a path for xterm, refer to the CiscoWorks Administration and Installation Guide.

Defining the EDITOR Variable from the Command Line

To set the environment variable for the text editor, enter the following command at the UNIX prompt:

setenv EDITOR “emacs”

This EDITOR environment variable remains in effect in the shell it was created until you reset it. For a more permanent default, perform the tasks in the following section “Editing the .Xdefaults File Entry to Specify the Text Editor.”

Redefining the HP OpenView Text Editor

You can redefine the HP OpenView text editor at the command line or in the *$HOME/.Xdefaults* file. Changes you enter at the command line will remain in effect (in the shell in which the command was executed) until you change the EDITOR variable again. Changes you enter in the *.Xdefaults* file remain in effect until you override them by setting the editor at the command line.

The HP OpenView text editor default is set to vuepad, located in the */usr/vue/bin* directory.

Redefining your Text Editor on NetView for AIX

You can redefine the text editor that the NetView for AIX uses at the command line or in the *$HOME/.Xdefaults* file. Changes you enter at the command line will remain in effect (in the shell in which the command was executed) until you change the EDITOR variable again. Changes you enter in the *.Xdefaults* file remain in effect until you override them by setting the editor at the command line.

The text editor default on NetView for AIX is set to e3, located in the */etc* directory.

Creating a New Configuration File

A remote device configuration file is a text file created by any standard text editor.

Use your text editor to create and save a new device configuration file. This file is saved in a directory on your system.

After you create a configuration file, transfer the file to the database by selecting a device and using the **File to Database** command in the Configuration Management window. To load this configuration file to the device, use the **Database to Device** command in the Configuration Management window.

For an example of a configuration file, refer to the router products manual set.

Copying a File to the Database

After you create or edit an existing configuration file and save it, use the **File To Database** command from the Options menu in the Configuration Management window to copy and store it in the database. Configuration files in the database can be downloaded to a specific device.

Note Adding the edited file to your database does not destroy the original file. The file remains under its original name in the directory on your system and a copy of the file is added to the database.

To copy a file from a directory on your system to the database, perform the following steps:

Step 1 Select **Config Management**.

On SNM, select **Tools>Config Management**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Management**.

The Configuration Management window displays. (See Figure 1-2.) CiscoWorks might require you to identify yourself and enter your password, as described in Chapter 7, “Setting Up Domains and Securing Applications.” If you encounter an invalid password error, the password may have been changed, or you may have made an error in entering the password. If the password was changed, check with the system administrator for assistance. Also check to ensure you have the correct permissions for this device or domain.

Step 2 In the Configuration Management window, select a device in the Devices scroll window.

If you do not select a device before selecting the **File to Database** command, the following message will appear: No device has been selected. If you do not see the device in the Devices scroll window, run the Sync w/Sybase application to add the device to the Sybase database. If the device does not appear after running Sync w/Sybase, check your Sybase permissions to ensure you have access to the domain and privileges to alter the configuration on this device.

Click on **OK**, select the device, and try again.

Step 3 After you select a device, select **Options>File to Database**.

The File Selection scroll window displays the files and directories within the current directory. (See Figure 1-3.)

Figure 1-3 File Selection Window

Step 4 If the configuration file exists in the current directory, click on the appropriate filename and click on **OK** or enter the filename in the Selection field and click on **OK**. If the configuration file is located in a different directory, specify the complete path and filename in the Path filter. Then click on **OK**.

The Configuration Management application will read the file, assign it a new version number and copy it to the database.

Files added to the database are assigned the next sequential version number and appear at the top of the list of existing versions in the Configuration Versions scroll window.

Editing Configuration Files

This section describes three methods used to edit a device configuration file:

- Editing an existing configuration file on your system. If you store configuration files on your system, you can access, edit, and save the configuration file by using a text editor.
- Editing a configuration file loaded on a device.
- Editing a configuration file that exists in the database.

Caution When editing configuration files, do not delete lines because this may cause the configuration file to become corrupt. Instead, change parameters. For example, if you want a protocol enabled, do not delete the line containing the parameter. Instead, modify the parameter to show that the protocol is enabled.

Editing a Configuration File on Your System

If you already have configuration files in a directory on your system, you can use the text editor to access a specific configuration file, edit it, and save it.

Use the **Options>File to Database** command in the Configuration Management window to transfer the new device configuration file to the CiscoWorks Sybase database. When this configuration file is added to the database, it can be loaded to a device you specify by using the **Database to Device** command.

Editing a Configuration File Current Running on a Device

To edit a configuration file that is currently loaded on a device, perform the following steps:

Step 1 Select **Config Management**.

On SNM, select **Tools>Config Management**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Management**.

The Configuration Management window displays. (See Figure 1-2.)

Step 2 Select the appropriate device from the Devices scroll window in the Configuration Management window.

Step 3 Click on **Database to Device** to download the configuration file running on the device to the Sybase database.

Step 4 Select the latest configuration file from the Configuration Versions scroll window in the Configuration Management window.

Step 5 Click on **Edit Config** to open your text editor.

A copy of the current device configuration displays in the Text Editor window, similar to the one in Figure 1-4.

Figure 1-4 Editing a Configuration File Loaded on a Device

Step 6 Edit the file and save it by using the **save** command.

When you exit the editor, the edited configuration file is assigned the next sequential version number, added to the database, and displayed in the Configuration Versions scroll window. If you do not save the configuration file before you exit the editor, the file will be discarded and not saved.

Step 7 Close or exit the window using the Window menu.

Step 8 If you want to return this configuration file to the device, select the configuration file and click on **Database to Device**.

For more information on loading a configuration file to a device, refer to the section “Loading a Configuration File to a Device.”

Editing a Configuration File That Exists in the Database

To edit a configuration file that currently exists in the CiscoWorks Sybase database, perform the following steps:

Step 1 Select **Config Management**.

On SNM, select **Tools>Config Management**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Management**.

The Configuration Management window displays. (See Figure 1-2.)

Step 2 In the Configuration Management window, select a device in the Devices scroll window.

Step 3 In the Configuration Versions scroll window, select a version of the configuration file.

Step 4 Click on **Edit Config** to edit the selected configuration file.

Your text editor opens and reads the selected configuration file from the database and assigns a temporary filename to the file. (See Figure 1-4.)

Step 5 Edit the configuration file as your needs determine.

Step 6 Save the file using the **save** command.

When you exit the editor, the edited configuration file is assigned the next sequential version number, added to the database, and displayed in the Configuration Versions scroll window. If you do not save the configuration file before you exit the editor, it will be discarded.

Step 7 Close or exit the text edit window using the Window menu.

Loading a Configuration File

You can load a configuration file from the database to a device or from a device to the database. When a configuration file is loaded to a device, your original copy of the loaded configuration file is appended to the comments file associated with this configuration file. In addition, the configuration file that you download to the device can be written to the nonvolatile random-access memory (NVRAM) in the device. As a result, the existing configuration information in NVRAM of the device is replaced with the new configuration information. For detailed information on configuration information in NVRAM, refer to the *Router Products Getting Started Guide*. You can change the default option to write to NVRAM by selecting **Options>NVRAM Properties** and toggling the selection to **Off**.

Requirements for Loading a Configuration File to a Device

Before a configuration file is loaded to a Cisco device, there are three critically important requirements:

- Ensure that the device is running the appropriate software release version.
- Ensure that the ReadWrite community string is appropriately specified for the device.
- Ensure that an IP address-to-host name mapping exists for the new router. Add the information to the Domain Name System (DNS) database file or other name resolver such as NIS.

For information on appropriate software release versions, refer to your *Router Products Release Notes* or contact your technical support representative.

Device Version Number

Configuration files created or loaded by using the Configuration Management application can be used for Cisco devices running Software Release 8.2 or later.

Community String

Before a configuration file is downloaded to a device, the community string for the device must be specified as RW (ReadWrite). If the community string is ReadOnly (RO), a configuration file cannot be downloaded to a device. To verify the community string for a device, refer to "Modifying a Device" in Chapter 6. For details regarding router settings, refer to the *Router Products Configuration and Reference* publication.

IP Address-to-Host Name Mapping

In order for a new device to display in Configuration Management, or other CiscoWorks applications, you must run Sync w/Sybase and ensure that the new device name is included in the Domain Name System (DNS) database file or other name resolver such as NIS. Add a line similar to the following to the ensure that the IP address-to-host name mapping exists for the new router:

```
131.108.62.14 new_device.cisco.com new_device
```

Also ensure that the domain name in the Device Management window agrees with the name resolver domain, for example cisco.com.

Option for Enabling Boot File Generation

When a configuration file is loaded from the database to a device, an image of the loaded configuration file can be saved in a TFTP boot file in the TFTP boot directory. If the device is down, you have the choice of retrieving the image of the configuration file from the TFTP boot directory that is defined in the */etc/syslog.conf* file (usually */tftpboot* or */usr/tftpdir*); however, the TFTP boot directory may not provide a secure storage location because almost all users can access this directory. Therefore, you may want the boot file generation feature to be turned on.

By default, CiscoWorks does not enable the boot file generation feature in the TFTP boot directory, unless you activate it by editing the *.Xdefaults* file and turn it on.

To edit the *.Xdefaults* file, perform the following steps:

Step 1 To turn on the boot file generation, add the following line to the *.Xdefaults* file in your home directory.

```
*Bootfile:on
```

Step 2 Save the changes to the *.Xdefaults* file using the save command in your text editor.

Step 3 To write over the existing information in the *.Xdefaults* file, enter the following command at the UNIX command line:

```
# xrdb -merge $HOME/.Xdefaults
```

Loading a Configuration File to a Device

After you create and add a configuration file to the database, you can load the configuration file from the database to the device, if the TFTP feature was already set up for your system. For instructions on setting up TFTP, refer to the CiscoWorks administration and installation guide.

To load a configuration file to a device, perform the following steps:

Step 1 Select **Config Management**.

On SNM, select **Tools>Config Management**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Management**.

The Configuration Management window displays. (See Figure 1-2.)

Step 2 In the Configuration Management window, select a device in the Devices scroll window.

If the device name of your choice is not displayed in the Devices scroll window, enter the device name in the Device field next to **Find** and click on **Find**.

The device name will appear highlighted in the Devices scroll window.

Step 3 From the Configuration Versions scroll window, select a configuration version.

Step 4 If the configuration version of your selection is not displayed in the Configuration Versions scroll window, enter the version number on the blank line beside the Version Number field and click on **Find**.

The configuration version will appear highlighted in the Configuration Versions scroll window.

Step 5 Click on **Database to Device**.

A popup window appears with the following text: The upload operation will write the configuration to both RAM and NVRAM. Do you wish to load the configuration to the device?

Step 6 Click on **OK** to confirm your choice.

Or, click on **Cancel** if you do not want to load the configuration file to the device.

If you clicked on **OK**, the configuration file is loaded to the device, and the letter L will display to indicate that this configuration file was loaded to the device. When a configuration file is loaded to a device, the text file is called from the database and converted to a format appropriate to send to the device.

If this operation cannot be completed, a message appears stating that a file could not be created for the selected configuration. The most probable reason for this message is insufficient disk space available to conduct the process. If you suspect this is the case, adjust your memory allocation as required before attempting to repeat a load operation. For information on database memory allocation, refer to Chapter 8, “Database Administration.” Other reasons for this problem may be that a disk error occurred; the link to the database failed; the community string in the device table is not enabled for ReadWrite; or the file was corrupted during the File to Database operation.

Loading a Device Configuration File to the Database

If a configuration file is loaded on a device, you can load that file to the database by selecting the device name from the Devices scroll window and clicking on **Device To Database**. This gets the configuration file from the device and copies it to the database.

When the configuration file is read from the device, it is assigned a new version number, added to the database as a machine record version, and listed at the top of the list of configurations in the Configuration Versions scroll window.

If you receive the following error message, “Confman error in device to Database. Unable to open peer,” it may indicate a device name resolution problem. For information on fixing this error, refer to the section “IP Address-to-Host Name Mapping.”

If problems still persist, check to see that you have the correct password and permissions to alter configurations on this device.

Browsing a Configuration File or Comments File on a Device

You can browse a configuration or comments file that is either loaded on a device or in the database.

Note You cannot make any changes to a file when you are browsing it. If you need to make any changes, use **Edit Config** or **Edit Comments**.

To view a configuration or comments file from a device without making revisions, perform the following steps:

Step 1 In the Configuration Management window, select a device from the Devices scroll window.

Step 2 To view the configuration file on the device, click on **Browse Config**.

A window similar to Figure 1-5 appears, displaying the appropriate configuration file for the device you chose.

Figure 1-5 Browse Config Window Displaying a Configuration File from a Device

Step 3 To view the device comment file, click on **Browse Comments**.

A Browse Comments window similar to Figure 1-6 appears.

Figure 1-6 Browse Comments Window

Step 4 To view a configuration file or comments file from the database, select a configuration from the Configuration Versions scroll window and then click **Browse Config** or **Browse Comments**.

A browse window containing the file you selected appears.

Step 5 To save a configuration file as a text file, from the Browse Config window, select **File>Save As**.

You can then extract the configuration file to other servers on the network.

Step 6 To scroll up or down in the file, click on either arrow in the scroll bar on the right.

Step 7 To locate a text string in the file, enter the text string in the Search field and click on **Search Forward** or **Search Reverse**.

Step 8 Close or exit the window using the Window menu.

Editing Configuration Comments Files

When a configuration file is created for a device, it will also have a blank comments file associated with it. If the configuration file is loaded to the device, a copy of the original configuration file is appended to the comments file.

The maximum size of a comments file is 128 KB. It can be edited and used to record information about a configuration file. For example, you could add some comments on how a configuration file differs from other versions of the file, or specify the names of other devices that use identical versions of this configuration file. If you provide a brief history of the configuration file in this comments file, other users may find it useful to refer to the comments file for general information.

To edit a comments file associated with a configuration file, perform the following steps:

Step 1 In the Configuration Management window, from the Devices scroll window, select a device.

Step 2 From the Configuration Versions scroll window, select the configuration file.

Step 3 Click on **Edit Comments**.

This invokes your text editor and a window similar to Figure 1-7 appears with the comments file.

Step 4 Enter or change comments text as appropriate in the window.

Step 5 Save your comments using the appropriate command for your text editor.

Step 6 Close or exit the window using the Window menu.

Figure 1-7 Edit Comments Window

Deleting Configuration Files

You can delete configuration files from your database. When you accumulate several versions of configuration files in the database, you may want to delete older versions that you no longer use. Periodically, you can also free up disk space and reduce confusion by eliminating outdated configuration files in the database that are outdated.

Note When you delete a configuration file from the database, you cannot undo your action. However, if a copy of the configuration file exists as a file on your system, you can always load it back in to the database.

To delete a device configuration file from the database, perform the following steps:

Step 1 In the Configuration Management window, from the Devices scroll window, select a device.

Step 2 From the Configuration Versions scroll window, select the configuration file.

Step 3 Click on **Delete From Database**.

A popup window with the following message: Do you want to delete this configuration? prompts you to confirm your action.

Step 4 To confirm the deletion, click on **OK**.

Or, if you do not want to delete this configuration file from the database, click on **Cancel**.

Configuration version numbers deleted from the database are not reassigned and will not appear again in the configuration version list.

If you try to delete a configuration loaded on a device (identified in Configuration Versions scroll window with the letter L), the following message appears: Could not delete the loaded version of the configuration file.

You cannot delete a configuration file that is marked as L (loaded), unless the file is the last configuration left in the database. This is a security feature of CiscoWorks. However, you can synchronize the information between the database and the actual device configuration.

Click on **OK** to cancel your request.

To obtain a new version of this configuration file, perform a device-to-database operation. To download the newer version of the file to the device, perform a database-to-device operation. The new version will be marked as L to indicate that it is the loaded file. Because the new version is marked L, you can now delete the previously loaded version of the configuration file.

Comparing Configuration Files

The Configuration Management application enables you to compare the following:

- The loaded configuration file in a device with a version of the configuration file stored in the database to analyze any network problems.
- Two versions of a configuration file that are stored in the database. Both versions should have been previously loaded to the device at least once.

In the Compare Configurations window, use the following descriptions to help you determine which files to compare:

- **Device Config** toggle button—Indicates the configuration file that is currently in the device is being compared with any selected configuration file in the Configuration Versions scroll window.
- **Database Config** toggle button—Indicates any two configuration files selected in the Configuration Versions scroll window will be compared.
- L-marked configuration file—Indicates the device configuration file the database recognizes as the last file that was loaded to this device using CiscoWorks configuration management applications.

Timesaver You do not need to load a device configuration in order to compare it with configuration files from the database.

Comparing a Configuration in a Device with the Database Version

To compare the configuration file in a device with the configuration file in the database, perform the following steps:

Step 1 In the Configuration Management window, from the Devices scroll window, select a device.

Step 2 From the Configuration Versions scroll window, select the configuration file.

A configuration file that the database believes is loaded on a device will have the letter L displayed.

Step 3 Click on **Compare Configs**.

The Compare Configurations window appears. (See Figure 1-8.)

Figure 1-8 Compare Configurations Window

Step 4 If you want the comparison to include the differences between uppercase and lowercase letters, click **On** in the Compare Case Sensitive field.

Step 5 Click on **Compare** to perform the comparison.

CiscoWorks reads the configuration data from the device and compares it to the version stored in the database. The results of the comparison are presented as an exception list of line number comparison notations. (See Figure 1-9.) The comparison list shows the differences between the device and database configuration files, allowing you to quickly find any problems.

If there are no differences in the files selected, an Information Dialog window displays the following message: No differences were found in the two configurations.

Figure 1-9 Compare Configuration Exception List

The compare function uses the **diff** command described in the UNIX documentation accompanying your workstation. For more information on **diff**, refer to the manual page on **diff**. In **diff**, operator characters are located in the left column and are in the form of !, *, +, and - . These operators tell you how to interpret the relationship between the two command strings. Table 1-3 describes three of these operators.

Table 1-3 Compare Config diff Operators

Operators	Description
!	The line placement and function is the same in the database and device sourced versions, but the line has been modified. Both versions are in the exception list so you can compare them. In Figure 1-10, you can see that the addresses in lines 73 and 74 have been modified in the device named tassle’s version.
+	The line has been added in the version configuration file, when compared to the other configuration file. In the database configuration file, a plus sign means the database version has command lines that the device configuration file version does not. Viewed from the device configuration file list side, a plus sign means the device version has a command line that does not exist in the database version.
-	The line has been deleted in the version command file, when compared to the other configuration file. In the database command file, a minus sign means the database version does not have command lines that the device configuration file version does. Viewed from the device side, a minus sign means the device version is missing a command line that exists in the database version.
a	The line has been appended in the version command file, when compared to the other configuration file. In the database command file, a minus sign means the database version does not have command lines that the device configuration file version does. Viewed from the device side, a minus sign means the device version is missing a command line that exists in the database version.
d	Delete. After the line number preceding the d, delete the lines specified.

The exception list in Figure 1-10 illustrates how you can clearly determine where command lines differ, in what way they differ, and to what extent.

Figure 1-10 Compare Configuration Exception List

Comparing Two Device Configuration Files in the Database

If your database contains numerous configuration files for a device, you can compare two configuration files in the database for the same device. This feature is helpful if you revised a configuration file for a device and wish to compare the new configuration file with an older version.

To compare the configuration files in the database for a device, perform the following steps:

Step 1 In the Configuration Management window, from the Devices scroll window, select a device.

Step 2 Click on **Compare Configs**.

The Compare Configurations window appears. (See Figure 1-8.)

Step 3 In the Compare Configurations window, click on **Database Config**.

Step 4 Select the configuration file(s) you wish to compare by clicking on the file(s) in the Configurations in Database scroll window.

Step 5 If you want the comparison to include the differences between the uppercase and lowercase letters, click on **On** in the Compare Case Sensitive field.

Step 6 Click on **Compare** to perform the comparison.

CiscoWorks compares the versions of the configuration files that are stored in the database. The results of the comparison are presented as an exception list of line number comparison notations.

Using the nmconfig Command for Batch Processing

In addition to using the graphical-based Configuration Management window, you can use the **nmconfig** command at the UNIX command line to perform batch processing tasks. This section describes using the **nmconfig** command line interface to perform these tasks.

The **nmconfig** command parameters are described in Table 1-4.

Table 1-4 nmconfig Command Parameters

Parameter	Description
-l *dirname*	Specifies the directory to which **nmconfig** saves its results, in this case, the *log* directory. *dirname* is the path of the directory. If the directory does not exist, **nmconfig** flags an error and exits.[1] If this parameter is not specified, the program will use *$NMSROOT/log* as the default log file directory.
-U*username*	Specifies the Sybase user account name. This is a required entry. (A space between **-U** and the username is mandatory.)
-P*password*	Specifies the Sybase user account password. This is a required entry. (A space between **-P** and the password is mandatory.) The default password is commonly NULL; you can specify **-P** only.
-i	Specifies the comparison to be case insensitive (or to ignore the difference between uppercase and lowercase characters). The default is case sensitive.
-m *maillist*	Specifies a list of email names or an address to whom the program will send the result summary file. The default is no mail.
-d *device*	Specifies a device name or a device list. Separate devices with a comma. Use the percent sign, %, as the wild card symbol. For example, **-d z%,firewall**.
-v	Prints current CiscoWorks version information. This must be the first argument; all other arguments are ignored.
-h	Prints help information. This must be the first argument; all other arguments are ignored.

Parameter	Description
-o	Specifies the configuration function option: Device To Database (**getconf** command) or Compare Configs (**compare** command).
-D or **-g**	Specifies the security domain for the device or device list. If not specified, the default World domain is used.
-dom	Internet domain name of the device or device list. Use this argument if you have devices in different Internet domain names.
-C *cmdfile*	A file containing the previous set of parameters. A cmdfile can be created with the above parameters and reused. The keyword options of this file follow: *maillist, device, ignorecase, username, password,* and *logdir.* A sample file could include, but not be limited to, the following keywords: *maillist* = sybase, nms *devices* = x%, d% *ignorecase* = yes *security-domain* = World *username* = your_name *password* = your_password *logdir* = your_logdir *option* = getconf or compare *internet-domain*=cisco.com *community* = secret
-s *community string*	When you use this option, the community string you enter overrides the device community string. When you are loading a configuration file to a device, this temporary community string is sent to the device.

[1] Do not use a tilde (~) character when specifying a log file directory name; use the full path name.

nmconfig Syntax

The command line syntax of the **nmconfig** command follows:

nmconfig [-v] [-h] <-d device> **<-U** syb_user> **<-P** password> **<-O** option> **<-D** group>
<-m maillist> **<-l** logdir> **<-c** command_file> **<-s** community_string> **<-g** group> **<-dom** domain>

An example of the **nmconfig** command and the use of parameters follows:

```
nmconfig -d hq_device% -s secret -l $NMSROOT/des -D cw_domain -O getconf -U username
-P password
```

In this example, the **nmconfig** command selects a given device name list, mails the output to the user, places the log file in a specified directory, specifies a CiscoWorks domain, and specifies the **getconf** option. You must enter the Sybase username and password each time you run this command.

Comparing Configurations Using nmconfig

Using the **nmconfig** command, you can compare a current device configuration file with the version identified by the letter L in the Configuration Versions in Database window. As a result, any changes to the configuration file on the device can be immediately reviewed.

You can automate the comparison of the configuration files on a daily basis by adding the **nmconfig** command to the Global Command Scheduler application. The results of the comparison will indicate whether any changes occurred in the configuration file on the device. You can use the **nmconfig** command either with one device, a set of specified devices, or all devices listed in the database.

An example of the compare configuration **nmconfig** command follows:

```
nmconfig -d device -s community_string -l logdir -D cw_domain -O compare -U username -P
password
```

Copying the Device Configuration File to the Database Using nmconfig

Using the **nmconfig** command, you can get the current device configuration file and copy it to the log file using the -l option.

An example of the compare configuration **nmconfig** command follows:

```
nmconfig -d device -s community_string -l logdir -D cw_domain -O getconf -U username
-P password
```

Adding nmconfig Command to the Scheduler

To automate **nmconfig**, you can use the Global Command Scheduler.

To add the **nmconfig** command to the Global Command Scheduler from the command line interface, enter the following:

```
nmscheduler -U cw_user_name -C “nmconfig -d device -s community_string -i -l dirname
-U username -P password -o option” -N MyGlobalCmd
```

To use a command file to add **nmconfig** command (or any command) to the Global Command Scheduler, enter the following:

```
nmscheduler -U cw_user_name -C "nmconfig -C /usr/tmp/MyCommandOptionsFile" -N MyGlobalCmd
```

For more information on the Global Command Scheduler, refer to the section “Scheduling a Command for Periodic Execution.”

Output Files

The **nmconfig** command generates three output files: the log file (*nmconfig.log.XXXXX)*, the summary file (*nmconfig.summary.XXXXX*), the compare diff file (*nmconfig.diff.XXXXX*), and the configuration file, <*device_name*>*.confg*. *XXXX* stands for the process identification number or pid.

The log file captures messages indicating whether or not the configuration comparison between files matches or produces differences, if the device is unreachable, or if there are any other errors. The following is a sample log file:

```
******** Nmconfig Log File ********
******** Started : Thu Jul 21 11:46:22 1994

---------- Reading Command File cmdfile
---------- End of Reading Command File cmdfile
---------- Input Arguments Sanity Check
---------- End of Input Arguments Sanity Check
--------------------------------------------------
<bones.cisco.com>:Unable to compare config.

Toolkit getting configuration error.
Success of TFTP transfer is unverified
Please check system setup
and community string.
--------------------------------------------------
--------------------------------------------------
<bones-con.cisco.com>:Unable to get loaded(L version) config from database.
```

```
Database reading record error.
No rows found in the DevConfHist table
--------------------------------------------------
--------------------------------------------------
<smith.cisco.com>:The loaded version of config is
identical to the current device config.
--------------------------------------------------
--------------------------------------------------
<backwall.cisco.com>:The loaded version of config is
identical to the current device config.
--------------------------------------------------
--------------------------------------------------
<zangbutt.cisco.com>:The loaded version of config is
different than the current device config.
--------------------------------------------------
```

The summary file briefly lists the results of the configuration option performed.The following is a sample summary file:

```
#Compare Device Configuration Summary
#Started : Thu Jul 21 11:46:22 1994

bones.cisco.com // Result: Other problems(see log file)
bones-con.cisco.com // Result: Other problems(see log file)
smith.cisco.com // Result: Identical
backwall.cisco.com // Result: Identical
zangbutt.cisco.com // Result: Different
```

The *diff* file displays the results of the configuration comparison between a loaded device and the database version. For an explanation of the *diff* file output, refer to the section “Comparing Configuration Files” earlier in this chapter. A sample *diff* file follows:

```
#Compare Result File
#Started : Thu Jul 21 11:46:22 1994

*** /tmp/confman1531/zangbuttThu Jul 21 11:46:49 1994
--- /tmp/confman1531/zangbutt_LoadedThu Jul 21 11:46:47 1994
***************
*** 12,23 ****
 !
 !
 !
- vines routing 30039474:1
 !
 !
 !
  !
- !
 interface Ethernet 0
 ip address 131.108.165.71 255.255.255.0
 no mop enabled
--- 12,21 ----
***************
*** 24,33 ****
 !
 interface Serial 0
 ip address 131.108.170.71 255.255.255.0
! encapsulation X25
! vines metric 35
! x25 address 12
! x25 map VINES 30015800:1 11 BROADCAST
 !
 !
 router igrp 109
```

```
--- 22,30 ----
 !
 interface Serial 0
 ip address 131.108.170.71 255.255.255.0
! encapsulation FRAME-RELAY
! frame-relay map VINES 30011E7A:1 113 broadcast
! frame-relay map IP 131.108.170.31 113 broadcast
 !
 !
 router igrp 109
```

The following is an example of an email **nmconfig** sends once the program is finished:

```
From: Joe Garlabeadaface <jgarlaface@cisco.com>
Received: from localhost (jgarlaface@localhost) by jg-ss10.cisco.com (8.6.5/8.6.5) id
LAA01553 for joe; Thu, 21 Jul 1994 11:46:50 -0700
Date: Thu, 21 Jul 1994 11:46:50 -0700
Message-Id: <199407211846.LAA01553@joe-ss10.cisco.com>
To: jgarlaface@cisco.com
Subject: nmconfig is finished at Thu Jul 21 11:46:49 1994

#Compare Device Configuration Summary
#Started : Thu Jul 21 11:46:22 1994

bones.cisco.com // Result: Other problems(see log file)
bones-con.cisco.com // Result: Other problems(see log file)
smith.cisco.com // Result: Identical
backwall.cisco.com // Result: Identical
zangbutt.cisco.com // Result: Different
```

Adding New Remote Routers Using AutoInstall

The AutoInstall Manager application works in conjunction with the AutoInstall feature, which is built into every Cisco router. AutoInstall Manager enables you to perform autoinstall tasks remotely via the workstation running CiscoWorks. All control is exercised from a central site, which leverages your administrative resources.

The AutoInstall Manager application effectively creates a plug-and-play environment for installers and central staff, simplifying tasks without compromising full routing services at remote locations. Using AutoInstall Manager for serially connected routers, you need only enter a few pieces of information along with identifying the nearest router interface.

Figure 1-11 AutoInstall Concept

An overview of the AutoInstall Manager tasks to remotely deploy a new router follow:

- Enter the name for new device
- Define the nearest neighbor and helper address
- Enter the basic information and create a default configuration file

or

- Select an existing configuration file
- Enable the new router

Before proceeding with the AutoInstall Manager procedures, ensure that all the requirements listed in the following section “AutoInstall Manager Requirements” are followed.

For more information on the AutoInstall feature in the router software, refer to your router products documentation.

AutoInstall Manager Requirements

For AutoInstall Manager to work, the following requirements must be met:

- The neighbor and the new router must have the correct Cisco device icon.
- The neighbor router must be running Software Release 8.3 or later. It must also exist in the Sybase database.
- The new router must be running Software Release 9.1(7) or later.
- The new router must be connected to the neighbor router via serial interface with HDLC encapsulation. The neighbor’s IP address must be either the first or second address for the given subnet mask.
- An IP address-to-host name mapping for the new router must be added to a Domain Name System (DNS) database file or other name resolver such as NIS.
- The new router and neighbor router must be in a domain that is accessible, if this application is secured by the Security Manager application.

Note If you change map views or attempt to exit out of your NMS during the autoinstall process, the AutoInstall Manager application responds with a warning message.

How to Use AutoInstall Manager

There are two methods you can follow when using the AutoInstall Manager. An overview of the methods follows:

- Minimal Configuration—Enter the required information and use the default configuration for the new device. You then enable the device and contact the remote site to turn the router on to load the configuration file.

  After the device is turned on, it automatically loads the default configuration file. The default configuration file allows you to telnet to the device, and get SNMP information. If you want to expand the configuration file, you can use the Configuration Management application to upload a new, or edit the existing configuration file for the new device. If you enable SNMP in your configuration, you can perform an SNMP query on the device to ensure it is up and running. Lastly, you would save the configuration file changes to NVRAM using the Configuration Management option, NVRAM Properties, or Telnet to the device and perform a **write mem** command.

- Full Configuration—Use the File to Database configuration option to load an existing configuration file into the database for the new device. You then enable the device and contact the remote site to turn the router on to load the configuration file.

  After the device is turned on, it automatically loads the configuration file. If you enable SNMP in your configuration, you can perform an SNMP query on the device to ensure it is up and running. Lastly, you would save the configuration file changes to NVRAM using the Configuration Management option, NVRAM Properties, or telnet to the device and perform a **write mem** command.

For more detailed instructions on how to perform an autoinstall of a Cisco device, continue to read the following sections. For a description of the NVRAM Properties option in the Configuration Management application, refer to the section “Loading a Configuration File to a Device,” earlier in this chapter.

AutoInstall Manager Window

The AutoInstall Manager window should be viewed as a “to do” list. This to do list contains the devices that need to be installed or are in the process of being installed.

Figure 1-12 illustrates the AutoInstall Manager window. Table 1-5 describes its components.

Figure 1-12 AutoInstall Manager Window

Table 1-5 AutoInstall Manager Window Components

Component	Subcomponent	Description
File	Print	Prints a snapshot of the current window.
	Exit	Exits the current window.
Security	Change Domain	Enables you to change your domain.
	Change User	Enables you to change your username in order to access this application.
	Privileges	Displays the current user's security privileges.
Edit	New	Brings up a window where the user can define a new autoinstall device.
	Modify	Brings up the selected device information in the Device Details window.
	Remove	Removes the selected device information from the autoinstall list.
Options	Enable	Performs the autoinstall procedure on the selected device.
	Disable	Remove the device configuration from the */tftpboot* directory.
Help	On Version	Provides information on the application version.
	On AutoInstall Manager	Provides information on the current window.
Device list		Contains new device name and status of device (enabled or disabled).

Figure 1-13 illustrates the AutoInstall Manager Device Details window. Table 1-6 describes its components.

Figure 1-13 AutoInstall Manager Device Details Window

Table 1-6 AutoInstall Manager Device Details Window Components

Component	Subcomponent	Description
File	Print	Prints a snapshot of the current window.
	Close	Closes the current window.
Configuration	Create Default	Creates a minimal configuration file to autoinstall into the new device.
	File to Database	Allows you to use an existing file from a UNIX directory to autoinstall into the new device.
Help	On Version	Provides information on the application version.
	On AutoInstall Manager	Provides information on the current window.
Neighbor Device information	Neighbor	Choose the pick menu to pick from a list of device names.
	Interface	Contains a list of possible interfaces for neighbor device.
	Helper Address field	Contains the IP address of the network management station. For multihomed workstations, you may choose the interface.
New Device information	Name	Device name field. This specifies the name of the autoinstall device.
	Device Type	Device type option menu. Includes support for the following device types: unknown, non-Cisco, Cisco-generic, CGS/MGS/AGS, IGS Generic, Terminal Server, Trouter, Protocol-translator, Cisco 3000, Cisco 4000, Cisco 7000, Cisco 2000, AGS+.

Component	Subcomponent	Description
	IP Address	Contains the IP address serial interfaces. Is obtained automatically via SLARP. Read Only.
	Enable Password	The enable password for the device.
	Vty Password	The virtual terminal password for the device.
	SNMP RO SNMP RW	Enables SNMP and defines the ReadWrite and ReadOnly community strings for the device.
	Config Version	Current version number in the device.
OK		Saves the data to the database and closes the window.
Apply		Saves the data to the database and leaves the window open.
Cancel		Closes the window without saving the changes.

Adding New AutoInstall Device Data

Before you can deploy a new router from the CiscoWorks workstation, you need to ensure the following tasks are completed by the remote installer:

- Physically connect the LAN/WAN interface cables
- Turn on the router

These actions do not need to occur before you perform these procedures, but need to happen for the autoinstall of the device to occur.

To add new autoinstall device data, perform the following steps:

Step 1 Select **AutoInstall Mgr**.

On SNM, select **Tools>AutoInstall Mgr**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>AutoInstall Mgr**.

The AutoInstall Manager window appears. (See Figure 1-12.)

Step 2 Click on **New**.

A Devices selection window displays.

Step 3 Select a device name from the scroller or enter your own device name, then click on **OK**.

The new device name appears in the AutoInstall Manager window as a disabled device. If the device does not appear in the scroller, run the Sync w/Sybase application to add the new device to the database.

Step 4 From the AutoInstall Manager window, select the device and click on **Modify**.

The AutoInstall Manager Device Details window appears. (See Figure 1-13.) The new device name appears in the Name field.

Step 5 To select the type of device you are autoinstalling, click on the option menu for the device Type field.

An option menu appears displaying the supported Cisco devices. If the device type does not appear on this list, CiscoWorks is unable to tell the difference between devices in the same platform series (for example, the Cisco 3000 and Cisco 2500). Use your NMS to reset the device type if it is incorrect. On SNM, use the **Change Type** command. On HP OpenView or NetView for AIX, use the **Change Object** command.

Step 6 Click on a device type.

Step 7 Define the nearest neighbor device by clicking on the pick menu for the Neighbor field.

Step 8 Select the device name from the pick menu and click on **OK**.

The neighbor device must have the correct Cisco device icon. Use your NMS to reset the device type if it is incorrect. On SNM, use the **Change Type** command. On HP OpenView or NetView for AIX, use the **Change Object** command.

Note If you cannot locate the neighbor device in the pick menu, from the Security menu, select **Change Domains** to select another domain. Also ensure that you have the privileges for this domain/device.

Step 9 Define the interface of the neighbor device by clicking on the pick menu for the Interface field.

Step 10 Select one of the serial interface names from the pick menu and click on **OK**.

After you select the interface, the IP Address field is automatically entered by the AutoInstall Manager. If you do not select an interface name, you cannot manually enter the IP address field since it is ReadOnly.

Step 11 From the option menu, select the helper address from the list of interfaces on the network management station.

Step 12 Define all additional attributes for this new device, such as SNMP community strings and enable and VTY passwords, by entering the data into the appropriate fields.

Step 13 To send this information to the database and keep the window open, click on **Apply**. To send this information to the database and close the window, click on **OK**. To close the window without saving the changes, click on **Cancel**.

To complete the autoinstall procedure, continue to the next section, “Choosing a Configuration File for AutoInstall Manager.”

Choosing a Configuration File for AutoInstall Manager

Before you can choose a configuration file for your new autoinstall device, you need to complete the steps in the section “Adding New AutoInstall Device Data.”

There are two ways you can define a configuration file for your new router:

- Create a default configuration file
- Select an existing configuration file

Procedures for defining a configuration file follow.

Creating a Default Configuration File for AutoInstall Manager

The minimal configuration file allows you to Telnet to the device and perform SNMP queries.

To create a default configuration file, perform the following steps:

Step 1 From the Configuration menu on the AutoInstall Manager Device Details window, select **Create Default**.

A minimal configuration file is created for the new device and is stored in the database.

The default configuration file consists of the following information:

```
! Default config file for the autoinstall device <device_name>
!
!
hostname <device_name>
enable-password secret
snmp-server community public RO
snmp-server community public RW
!
ip route 0.0.0.0 192.31.6.62
!
line console 0
password mypasswd
login
!
line vty 0 4
password mypasswd
login
!
end
```

Step 2 To send this information to the database and keep the window open, click on **Apply**. To send this information to the database and close the window, click on **OK**. To close the window without saving the changes, click on **Cancel**.

You are ready to enable the autoinstall feature on the device from the AutoInstall Manager window. To complete the procedure to autoinstall your new device, refer to the section “Enabling a New Device Using the Enable Command.”

Selecting an Existing Configuration File for AutoInstall Manager

You can select a configuration file you want to load into the new router and store it in the database. You access the configuration file through the File to Database option in AutoInstall Manager. AutoInstall Manager copies the selected configuration file into the database to load into the new device.

To select a configuration file, perform the following steps:

Step 1 From the Configuration menu on the AutoInstall Manager Device Details window, select **File to Database**.

A file selection window displays.

Step 2 Select the file you want to autoinstall into the new Cisco device and click on **OK**.

Step 3 To send this information to the database and keep the window open, click on **Apply**. To send this information to the database and close the window, click on **OK**. To close the window without saving the changes, click on **Cancel**.

The AutoInstall Manager looks for the enable password, vty password, and community strings for this device, and updates the configuration file in the Config Version field by incrementally added one to the existing version number.

You are ready to enable the autoinstall feature on the device from the AutoInstall Manager window. To complete the procedure to autoinstall your new device, refer to the section “Enabling a New Device Using the Enable Command.”

Enabling a New Device Using the Enable Command

Enabling a device performs the following procedures:

- Sends a partial configuration file to the neighbor device to set the IP helper address.
- The original *network-confg* file is backed up and saved as *network-confg.BAK*. Adds an entry in the *network-confg* file for the new device.
- Copies the configuration file from the device into the TFTP boot directory.
- On SNM, the Device Monitor daemon (nmdevmond) receives a signal to monitor the new Cisco device (log events and monitor interface options). On HP OpenView or NetView for AIX, if you select the options in the event browser, the browser will receive the signal to monitor the new Cisco device.

By performing autoinstall with a minimum configuration file in the device, you can now Telnet and get SNMP information from the new device.

To enable a new Cisco device and complete the autoinstall procedure, perform the following steps:

Step 1 From the AutoInstall Manager window, select a device by clicking on the device name in the scroll window.

Step 2 Select **Options>Enable**.

If the configuration file cannot be transferred, the following error message displays: Toolkit loading configuration error. Success of TFTP transfer is unverified.

If the enable command is successful, the device will display the word *Enable* next to it in the AutoInstall Manager scroll window.

Step 3 Contact the remote site and request they power on the device.

After the device is turned on, you will be able to monitor using CiscoWorks or your NMS applications. On SNM, if you use the Device Monitor, its daemon reports that the device is up and the device icon status will change. On HP OpenView or NetView for AIX, if you select the options in the event browser, the browser will receive the signal to monitor the new Cisco device.

Removing an AutoInstalled Device from AutoInstall Manager

After you confirm that the Cisco device is operational, we recommend you remove the device from the AutoInstall Manager “to do” list. Removing the device performs the following functions:

- Removes the configuration file, *<device_name>.confg*, from the TFTP boot directory.
- Sends another partial configuration file to remove the IP helper address.

To remove your new autoinstalled device from the AutoInstall Manager application, perform the following steps:

Step 1 From the AutoInstall Manager window, select the device you want to remove by clicking on the device name.

Step 2 Click on **Remove** to remove the device.

A confirmation window displays.

Step 3 To remove the device, click on **OK**. To cancel your request, click on **Cancel**.

If you select OK, the configuration file of the device, *<device_name>.confg*, is removed from the TFTP boot directory.

Step 4 To write the configuration file to the nonvolatile memory (NVRAM) of this device, continue with the following steps. If you do not want to save the file to NVRAM, skip the rest of these steps.

Note Since this procedure leaves the static route information in the configuration and this may not be a desirable option for this device, you will need to use the Configuration Management application to set the **no ip route** command.

Step 5 Select **Config Management**.

On SNM, select **Tools>Config Management**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Management**.

The Configuration Management window displays. (See Figure 1-2.) You may also choose to use the Configuration Snap-In Manager application.

Step 6 Select **Options>NVRAM Properties**.

The NVRAM Properties window displays.

Step 7 Click on **On** to enable the database to device write memory command.

Step 8 Click on **Done**.

Step 9 Select the new device from the Devices list in the Configuration Management window.

Step 10 Select the configuration file to write to NVRAM.

Step 11 To write this configuration file to the device’s NVRAM, click on **Database to Device**.

You have completed the autoinstall procedure. If you want to clean up any remnants of the autoinstall procedure, continue to the next section. This is an optional step.

For information on what to do next, refer to section “Where to Go After the AutoInstall Is Complete.”

Disabling a Device from AutoInstall Manager

The disable process cleans up the remnants of the autoinstall process. You can also disable the device if you are in the process of autoinstalling a new device and cannot complete the procedure.

Disabling the device performs the following:

- Removes the configuration file, *<device_name>.confg*, from the TFTP boot directory.
- Sends another partial configuration file to the neighbor to remove the IP helper address.

Note If you plan to remove the router immediately, you can skip this procedure and complete the section “Removing an AutoInstalled Device from AutoInstall Manager.” The remove procedure automatically disables the device before it removes it from the TFTP boot directory.

To disable the device from the AutoInstall Manager application scroll window, perform the following steps:

Step 1 From the AutoInstall Manager window, select the device you want to disable by clicking on the device name.

Step 2 Select **Options>Disable**.

The device is disabled and is removed from the TFTP boot directory.

Step 3 Select **File>Exit** to exit the AutoInstall Manager window.

For information on what to do next, refer to the following section, "Where to Go After the AutoInstall Is Complete."

Where to Go After the AutoInstall Is Complete

After the new device has been autoinstalled, you have several tasks to complete to ensure you can successfully manage your new Cisco device.

To completely manage this new device within CiscoWorks, you can perform the following tasks:

- Expand your default configuration file

  For information on editing in the Configuration Management application, refer to the section "Editing Configuration Files." For information on adding configuration snap-in commands, refer to the section "Using the Configuration Snap-In Manager to Configure Devices" later in this chapter.

- Monitor your interfaces, environmental data, or log events using the Device Monitor or other NMS applications.

  For information on monitoring your devices using the Device Monitor application, refer to the section "Monitoring Network Devices (SunNet Manager Platform)" in Chapter 3. For information on using the HP OpenView event browser, refer to the *HP OpenView User's Guide*.

- Add detailed device information in the Device Management application.

  For information on adding device information, refer to the section "Using Device Management" in Device Management.

- Collect poll data using Device Polling.

  For information on device polling, refer to the section "Creating Polling Tables Using Device Polling" in Chapter 4.

Managing Cisco Systems Software and Microcode Upgrades

The software management set of applications consist of three applications that assist it in managing system software and microcode in Cisco routers via the CiscoWorks network management workstation. The trio of applications that perform software management are described following.

These applications enable you to upgrade software and microcode images for routers with run-from-Flash and run-from-RAM capabilities which include the following routers: Cisco 2500, 3000, AGS+, Cisco 4000, Cisco 7000, CGS, and MGS routers.

Software Management Applications

There are three applications that perform software management include: Software Library Manager, Software Inventory Manager, and Device Software Manager. These applications work together to manage the system software and microcode in Cisco routers. For more details on each application, read the following sections.

Software Library Manager Overview

The Software Library Manager application enables you to perform the following tasks:

- Provide a list of available Cisco system software and microcode from a protected UNIX directory. Allows you to sort and view these files.
- Provide methods to import images from CiscoWorks master storage. These methods include loading images from a UNIX directory, a Cisco release diskette, or from the Flash card of a Cisco router. Some methods are unavailable based on the hardware configuration of your system.
- View and sort available Cisco software image information.
- Edit image information such as comments and aliases.
- Maintain the master storage of the Cisco software images.
- Delete image files from the master storage.

Software Inventory Manager Overview

The Software Inventory Manager application enables you to perform the following tasks:

- Update the Sybase database to include current device software and hardware status.
- Sort device information according to platform and software image.
- Invoke Device Software Manager to update specific devices.

Device Software Manager Overview

The Device Software Manager application enables you to perform the following tasks:

- Provide an automated method to upgrade the system software on a Cisco device. The method provided depends on which type of router you are upgrading.
- Select the import images for which a device is upgraded.

Software Management Requirements

For any of the software management applications to work, the following software and hardware requirements must be met:

- Based on your particular router, the Device Software Manager application requires a corresponding system software version. Before trying to run Device Software Manager, confirm that your router meets the software requirement as defined in the following table:

Table 1-7 Router and Software Requirements for Use with Device Software Manager

Cisco Router Type	Router System Software Requirement
Cisco 2500	Software Release 9.14(4)-9.14(8) or later
Cisco 3000	Software Release 9.1(7.5) or later
Cisco AGS+	Software Release 9.1(7.5) or later
Cisco 4000	Software Release 9.14(3.4) or later
Cisco 7000	Software Release 9.17(5.2) or later
All Cisco routers (collection of Cisco 3000, Cisco 4000, Cisco 7000, or AGS+ routers)	Software Release 9.21(0.26) or later or 9.1(8) or later
Cisco 7000 routers on which you want to perform microcode upgrades	Software Release 9.17(5.2) or later; 9.21(0.32) or later

  If you need a particular system software version to support your router environment, use your CIO account (Telnet to *cio.cisco.com*) to access Cisco software distribution services.

- The configuration register of the Cisco device must have a value of 2 (0x02) in order to boot from Flash and the Write protect jumper status of the Cisco device must be ON.

  If the device is a Cisco 7000, AGS+, CGS, or MGS, the Flash configuration register must be set manually. On other Cisco devices, the Flash configuration register can be set with software commands. You can use the **Show Version** command in the Show Commands application to confirm whether the Flash jumper is on.

- The CiscoWorks network management platform is set up as a TFTP server. Ensure that the TFTP Server configuration is not commented out in the *inetd.conf* file.

- The software management applications support the following device types with Flash memory:
  - Cisco 3000, Cisco 4000, Cisco 7000
  - Cisco AGS+
  - Cisco CGS and MGS

- The software management applications support the following device types with run-from-Flash images:
  - Cisco 2500
  - Cisco 3000

- If the Cisco device has the **service password-encryption** enabled, both the enable password and line passwords will be encrypted. CiscoWorks will be unable to provide the password for telneting to the device. Run the Device Management application and enter the enable password and vty password into the device table.

If you turn off the **service password-encryption** feature, the passwords in the current device configuration will not be returned to their original form. You must manually reenter the passwords one at a time or use the Configuration Snap-In Manager application to reenter the passwords.

For information on recovering from encrypted passwords, refer to the section "Encrypting Passwords" in the *Router Products Configuration and Reference* publication. For information on how to use the Configuration Snap-In Manager application, refer to the section "Using the Configuration Snap-In Manager to Configure Devices."

Allocating Disk Space for Software Management Applications

The Software Library Manager and Device Software Manager applications require at least 6 MB (6144 KB) of free space for the */tmp* directory and 6 MB (6144 KB) of free space for the TFTP directory. The TFTP directory name is dependent on which type of workstation you are using. For HP UNIX workstations, the default TFTP directory is */usr/tftpdir*. For Sun workstations, the default TFTP directory is */tftpboot*.

To confirm that your system meets the minimal requirements, perform the following steps:

Step 1 Enter one of the UNIX commands to determine the amount of available disk space on your workstation:

For HP UNIX workstations, enter:

```
% bdf
```

For Sun workstations, enter:

```
% df /tmp </tftpboot>
```

A list of the files on your system and the corresponding available space, similar to the following, will appear:

```
Filesystem            kbytes    used   avail capacity  Mounted on
/dev/sd0a              24207   12115    9672    56%    /
/dev/sd1b              62031   13230   42598    24%    /tmp
/dev/sd1g            1175742  730206  327962    69%    /work
```

Step 2 Confirm that you have at least 6 MB (6144 KB) of available space for */tmp* and 6 MB free space for the TFTP boot directory.

If, for example, both */tmp* and the TFTP directory are in the same partition, (for example, the root or /), you need at least 12 MB (12,288 KB) of free space on that file system.

Step 3 If you do not have enough space in the file system, you must find another partition that has enough space and make a symbolic link from that partition to */tmp* or the TFTP directory.

Contact your UNIX system administrator or your UNIX manuals for instructions on making a symbolic link.

Step 4 Depending on what you are currently running on your system, if you change the */tmp* location, you may need either to reboot your system or to restart your NMS.

How Device Software Manager Works

The Device Software Manager application determines which device it is upgrading and then performs the following checks to ensure the image transfer is accurate:

- Backs up the current system software from Flash, if possible.
- Looks at the device configuration register to ensure that it has a minimum value of 2. This value allows the device to boot from Flash memory.

  If the register is not set correctly, the Device Software Manager attempts to change the value.
- Looks at the amount of Flash memory on the device and sends a confirmation message if the Flash memory needs to be erased before loading the new system image.
- If the system software image is not in the database, and if the image is not in Flash memory, Device Software Manager attempts to back up the image onto the database.
- If the confirmation is accepted, Device Software Manager sends the selected image to the Flash memory of the device, gets a configuration file from NVRAM, handles boot system configuration, and disables the current boot system configuration in order to write a new system configuration.

  Device Software Manager then writes the updated configuration file back to NVRAM and displays a popup window asking for confirmation of the device system image reload. This message cautions that a reload temporarily disables communication to this device.
- If the reload is confirmed, Device Software Manager reloads the new image into NVRAM, updates the database with new system image information, and displays a confirmation message saying the reload is complete.

The sequence followed for boot system configuration follows:

- Boot from Flash
- Boot from CiscoWorks for backing up
- Boot from ReadOnly memory (ROM), if the above methods fail

Software Management Windows

There are several windows that are used to perform software management:

- Software Library Manager window (See Figure 1-14.)
- Software Inventory Manager window (See Figure 1-18.)
- For run-from-RAM devices, the Device Software Manager window (see Figure 1-26) that connects to the Software Image Update window is used. (See Figure 1-27.) For run-from-Flash devices, the Flash Image Manager windows are used. (See Figure 1-19.)

The software management window descriptions follow.

Figure 1-14 illustrates the Software Library Manager window. Table 1-8 describes its components.

Figure 1-14 Software Library Manager Window

Table 1-8 Software Library Manager Window Components

Component	Subcomponent	Description
File	Import from File	Enables importing from any UNIX directory.
	Import from Disk	Enables importing from a Cisco PC diskette. (Sun workstations only)
	Import from Flash	Enables importing from the Flash memory of a device.
	Print	Prints a snapshot of the current window.
	Exit	Exits the current window.
Security	Change Domain	Enables you to change your domain.
	Change User	Enables you to change your username in order to access this application.
	Privileges	Displays the current user’s security privileges.
Edit	Delete	Removes a selected device image.
	Edit Comments	Enables you to associate comments to software images.
Options	Software Inventory Manager	Opens the Software Inventory Manager window.
Help	On Version	Provides information on the application version.
	On Software Library Mgr	Provides information on the current window.

Component	Subcomponent	Description
System Software/ Microcode Toggle		Selects the type of image you plan to load to the Cisco device.
Version		Pick menu to select a Cisco image version.
Platform		Pick menu to select a Cisco device platform.
Interface Type		Pick menu to select an interface on the device.
Spreadsheet Scroller	Alias	User-given name for the Flash configuration file.
	File Name	Current file loaded into the Flash memory of the device.
	Version	Current software version on Flash memory.
	Platform	Current Cisco device platform.
	Compressed	Current status of software image.
Comments		User notes about configuration file or device.

Importing an Image File into Software Library Manager

You may need to import system or microcode images into CiscoWorks when you upgrade your Cisco devices. Image filenames cannot be changed.

Caution Do not attempt to change the Cisco release image file names when importing into CiscoWorks, because it will cause application errors. Also, do not attempt to upgrade without software images present in the Software Library Manager.

There are three ways to import these images:

- From a file
- From a diskette (dependent on your system's hardware configuration)
- From Flash memory

Procedures for importing images follow.

Importing From the UNIX File Directory

To import a file from the UNIX directory, perform the following steps:

Step 1 Select **Software Library Mgr**.

On SNM, select **Tools>Software Library Mgr**.

On HP OpenView or NetView for AIX, select **Administer>CiscoWorks Software Images>Software Library Mgr**.

The Software Library Manager window displays. (See Figure 1-14.)

Step 2 Select **File>Import from File**.

The File Selection window displays. (See Figure 1-15.)

Figure 1-15 File Selection Window—Import from File Option in Software Library Manager

Step 3 To select the directory from which to import the system image, enter your directory path in the Filter field and press Return.

It may be easier for you to work consistently in one directory when upgrading images. We recommend that you create a directory that will contain your system and microcode images.

Step 4 Select the filename in the Files scroll window.

Timesaver To save time, enter the directory and filename in the Selection field and click on **OK**.

Step 5 Click on **OK**.

This action causes your image to be checked into the CiscoWorks database. The file information should now be displayed in the Software Library Manager window.

Step 6 When you are finished with the File Selection window, click on **Cancel** to close the window.

Importing from a PC diskette

This task can be completed on a Sun workstation only. If you are using an HP-UX or RSC/6000 machine to import a file from a PC diskette, transfer the file to a UNIX directory that is accessible from the network and follow the instructions in the section "Importing From the UNIX File Directory" to import the file.

To import a file from a PC diskette, perform the following steps:

Step 1 Select **Software Library Mgr**.

On SNM, select **Tools>Software Library Mgr**.

On HP OpenView or NetView for AIX, select **Administer>CiscoWorks Software Images>Software Library Mgr**.

The Software Library Manager window displays. (See Figure 1-14.)

Step 2 Select **File>Import from Disk**.

The Install window displays. (See Figure 1-16.) The *fdinstall* program automatically fills in the text fields with the defaults for your floppy drive, the diskette directory where your images are stored, and the path for *$NMSROOT/software*.

Figure 1-16 Install Window—Import from Disk Option in Software Library Manager

Step 3 Ensure the text field entries on the Install window are accurate. If they are inaccurate, change the text entry.

Step 4 Insert your diskette into the floppy drive of your network management platform workstation.

Step 5 To view the *README* text information associated with the image on this diskette, click on **Install**.

CiscoWorks uses the PC NFS software to display the *README* information of the image file and copies this image to the CiscoWorks database. If the image is stored on more than one diskette, you will be prompted to insert any additional diskettes. The image filename should display in the Software Library Manager window.

Step 6 To exit the Install window, select **File>Exit**.

Importing from Flash Memory

To import a file from the Flash memory on a router, perform the following steps:

Step 1 Select **Software Library Mgr**.

On SNM, select **Tools>Software Library Mgr**.

On HP OpenView or NetView for AIX, select **Administer>CiscoWorks Software Images>Software Library Mgr**.

The Software Library Manager window displays. (See Figure 1-14.)

Step 2 Select **File>Import from Flash**.

The Import Flash window displays. (See Figure 1-17.)

Figure 1-17 Import Flash Window—Import from Flash Option in Software Library Manager

Step 3 Select a device from the Flash Devices scroll window.

The Flash device entries will display in the Flash Entries scroll window.

Step 4 Select a system software or microcode entry from the Flash Entries scroll window.

Step 5 To import the Flash entry into the database and update the Software Manager window, click on **Import**.

Step 6 To exit the Import Flash window, select **File>Close**.

Viewing and Sorting Available Cisco Release Images

To view or sort file image information in Software Library Manager, perform the following steps:

Step 1 From the Software Library Manager window, select the type of image you wish to view by selecting **System Software** or **Microcode**.

Step 2 To limit the version information you want to view, select the Versions pick menu and select your version number.

The files in the spreadsheet scroller update dynamically as you focus your search.

Step 3 To limit the platform information you want to view, select the Platform pick menu and select the platform type.

The files in the spreadsheet scroller update dynamically as you focus your search.

Step 4 To limit the interface type information you want to view, from the Interface Type pick menu, select an interface.

The files in the spreadsheet scroller update dynamically as you focus your search.

Editing Image Information

To edit image information such as comments and aliases, perform the following steps:

Step 1 From the Software Library Manager window, select which type of image you want to edit (System Software or Microcode).

Step 2 Select a filename in the spreadsheet scroller.

Step 3 To edit comments, select **Edit>Edit Comments**.

A generic text editor window displays.

Step 4 Add new or modify the existing comments.

Step 5 Save the file using the **save** command in the editor.

The new comments display in the Comments text field in the Software Library Manager window.

Step 6 To edit an alias, select the alias name and enter the new alias over the old alias name.

Deleting Images from Master Storage

The Software Library Manager window contains a view of the Software Library Manager records in the database. The CiscoWorks database is referred to as the *master storage area* for the system software and microcode files.

To delete image files from master storage, perform the following steps:

Step 1 From the Software Library Manager window, select the type of image you want to edit (System Software or Microcode).

Step 2 Select a filename from the spreadsheet scroller.

Step 3 Select **Edit>Delete**.

The file is deleted from the CiscoWorks database and is removed from the Software Library Manager window.

Determining Which Software Devices Are Running

After you finish adding new software or microcode images into master storage, you can determine what your current device and associated software inventory looks like. Viewing current software in devices gives you an idea of which devices need to be upgraded. To ensure that you are viewing the most current device software, you must update the inventory list in Software Inventory Manager.

The Software Inventory Manager application uses two separate methods to decide how to proceed with the upgrade of your Cisco devices. The method CiscoWorks uses depends on what Cisco device you are upgrading.

For run-from-Flash devices, such as the Cisco 2500 and Cisco 3000, the Software Inventory Manager invokes an upgrade procedure. For run-from-RAM devices, the application invokes the Device Software Manager application which allows you to select the software or microcode you wish to upgrade and takes you to the Software Image Update window to complete the upgrade.

Figure 1-18 illustrates the Software Inventory Manager window. Table 1-9 describes its components.

Figure 1-18 Software Inventory Manager Window

Table 1-9 Software Inventory Manager Window Components

Component	Subcomponent	Description
File	Print	Prints a snapshot of the current window.
	Exit	Exits the current window.
Security	Change Domain	Changes your current domain to another domain.
	Change User	Changes your username in order to access this application.
	Privileges	Displays the current user’s security privileges.
Help	On Version	Provides information on the application version.
	On Software Inventory Manager	Provides information on the current window.
Timestamp	Last Inventory Update	Date and time the Software Inventory Manager was synchronized to the database.

Component	Subcomponent	Description
System Software/ Microcode Toggle		Selects the type of image you plan to load to the Cisco device.
Version		Pick menu to select a Cisco image version.
Platform		Pick menu to select a Cisco device platform.
Interface Type		Pick menu to select an interface on the device.
Cisco Devices list	Device Name scroll window	Lists devices that correlate the options selected.
Upgrade Device		Upgrade device software after a device has been selected.
Update Inventory		Update the Sybase database to include current devices in the Software Inventory Manager.

Sorting Device Information by Platform and Software Image

To sort device information by platform and software image, perform the following steps:

Step 1 From the Software Inventory Manager window, select the options you plan to update. To select the image type, click on either the **System Software** or **Microcode** toggle button.

Step 2 To select the versions, click on the Versions pick menu and select the release version to view from the window.

The device list in the window updates automatically to display devices with the selected version.

Step 3 To select the platform, click on the Platform pick menu and select the Cisco device platform.

The device list in the window updates automatically to display devices with the selected platform.

Step 4 To view the sorted devices, click on the scroll bar to move around the device list.

Updating Device Information to View Current Database Devices

If devices are added to the network, they may not appear in the CiscoWorks database unless you have used the Sync w/Sybase application. You can update new or modified device information from the Software Inventory Manager application to ensure all devices appear in the window.

To update device information from the Software Inventory Manager window, perform the following steps:

Step 1 Select **Software Inventory Mgr**.

On SNM, select **Tools>Software Inventory Mgr**.

On HP OpenView or NetView for AIX, select **Administer>CiscoWorks Software Images>Software Inventory Mgr**.

You can also start this application from the Software Library Manager application menu. The Software Inventory Manager window appears. (See Figure 1-18.)

Step 2 To add any new devices that the CiscoWorks database may not yet know about, click on **Update Inventory**.

A window confirming the request to update this device using Sync w/Sybase displays.

Step 3 Click on **OK** to update the device in the Software Inventory Manager.

If the Cisco device or software does not appear in the Software Management suite of applications, check to see if one of the following problems exits:

- Ensure the Cisco device has the correct device icon. If the NMS or CiscoWorks has applied an incorrect device type, the CiscoWorks applications may not perform properly. Use your NMS to reset the correct device type. On SNM, use the **Change Type** command. On HP OpenView or NetView for AIX, use the **Change Object** command.
- If the device is not in the device list, check your privileges. You may not have permission to view this domain.

Upgrading a Device Using Software Inventory Manager

To update a device using the Software Inventory Manager, perform the following steps:

Step 1 Before you can upgrade a device, select the device you plan to update.

Step 2 Select **Software Inventory Mgr**.

On SNM, select **Tools>Software Inventory Mgr**.

On HP OpenView or NetView for AIX, select **Administer>CiscoWorks Software Images>Software Inventory Mgr**.

You can also start this application from the Software Library Manager application menu. The Software Inventory Manager window appears. (See Figure 1-18.)

Step 3 To select the image type, click on either the System Software or Microcode toggle button.

Step 4 Click on the Versions pick menu and select the release version of the device to view from the window. If you do not know the version, use the default All.

Step 5 From the Platform pick menu, select the Cisco device platform. If you do not know the platform, use the default All.

Step 6 From the Interface Type pick menu, select the interface.

Step 7 In the Device Names scroll window, click on the device name.

If the device you want to upgrade does not appear in the list, perform the procedure in the previous section “Updating Device Information to View Current Database Devices.”

Step 8 To update the software in this device, click on **Upgrade Device**.

Depending on which Cisco device you are upgrading, the application chooses an upgrade method. If the image name is unrecognizable, the application displays a message: `Unable to identify image name from system description string. Run-from-Flash verification failed. Is <device_name> currently running image from Flash?` Select **Yes** or **No**.

If you are upgrading a Cisco run-from-Flash device, the upgrade is performed using the ROM monitor mode and the Flash Image Manager. If you are upgrading a Cisco run-from-RAM device, the Device Software Manager window displays and performs the upgrade using NVRAM. If CiscoWorks cannot access the device software you selected, you will receive an error message.

Step 9 Continue to the following section “Upgrading the System Image on a Cisco Device” to complete the upgrade.

Upgrading the System Image on a Cisco Device

The Device Software Manager application uses two separate methods to upgrade Cisco devices. The method CiscoWorks uses depends on what Cisco device you are upgrading.

For run-from-Flash devices, such as the Cisco 2500 and Cisco 3000, the Device Software Manager takes you through an upgrade procedure. The run-from-Flash upgrade is supported on the Sun, HP, and RSC/6000 platforms. For run-from-RAM devices, the application allows you to select the software or microcode you wish to upgrade and takes you to the Software Image Update window to complete the upgrade.

To complete your Cisco device upgrades, refer to the following sections “Upgrading Cisco Run-From-Flash Devices” or “Upgrading Cisco Run-From-RAM Devices.”

Upgrading Cisco Run-From-Flash Devices

The Flash Image Manager application upgrades Cisco run-from-Flash devices using the Flash Image Manager window.

Figure 1-19 illustrates the Flash Image Manager window. Table 1-10 describes its components.

Figure 1-19 Flash Image Manager Window

Table 1-10 Flash Image Manager Window

Component	Description
Router Name	Run-from-Flash device to be upgraded. Enter the hostname without the domain name extension.
Router Telnet Address	Run-from-Flash device IP address.
Vty Password	Run-from-Flash device line password.

Component	Description
Enable Password	Run-from-Flash device enable password.
TFTP Server IP Address	Boot file server IP address. This is the workstation on which the **rxbmgr** command runs.
TFTP Directory Path	Boot file directory location. On Sun and RSC/6000 platforms, the default is */tftpboot*. On HP-UX, the default is */usr/tftpdir*.
Upgrade Image File Name	Cisco Internetworking Operating System (IOS) image name for Cisco 2500 or 4000 devices.
OK button	Backs up the existing router configuration and software image to the TFTP server and starts the upgrade process.

After the Software Inventory Manager invokes the Flash Image Manager window, perform the following steps to upgrade your run-from-Flash device:

Step 1 Enter the required device information into the Flash Image Manager: Enter Variables window and verify the read-only information.

Use the device hostname without the domain name extension if a router name entry is required. If all the information is present, continue to the next step. If all the information is present, continue to the next step. If you are missing information, Telnet to the device and retrieve the data using the appropriate commands.

Note that an icon representing a journal or log also appears when the Flash Image Manager window first appears. This icon will open after you click on **OK** in the next step.

Step 2 To back up the existing router configuration and software image to the TFTP boot directory, click on **OK**.

The Flash Image Manager Journal icon opens and the Flash Image Manager: Journal window appears. (See Figure 1-20.)

Figure 1-20 Flash Image Manager Journal Window

The Flash Image Manager also displays a window to select an interface. (See Figure 1-21.)

Step 3 From the Flash Image Manager: Select Interface window, select an interface on the run-from-Flash device which will be used to download the image. (See Figure 1-21.)

Figure 1-21 Flash Image Manager: Select Interface Window: Part 1

Step 4 If you select a Serial interface, click on **OK** to confirm your choice.

or

If you selected an Ethernet or Token Ring interface, ensure you have connectivity to the device and click on **OK** to continue.

After you click on **OK**, a window similar to the following appears. (See Figure 1-22.)

Figure 1-22 Flash Image Manager:Select Interface Window: Part 2

Step 5 Enter the last-hop address in the entry box provided in the window (Figure 1-22).

This address will be used to set the IP default gateway on the remote router.

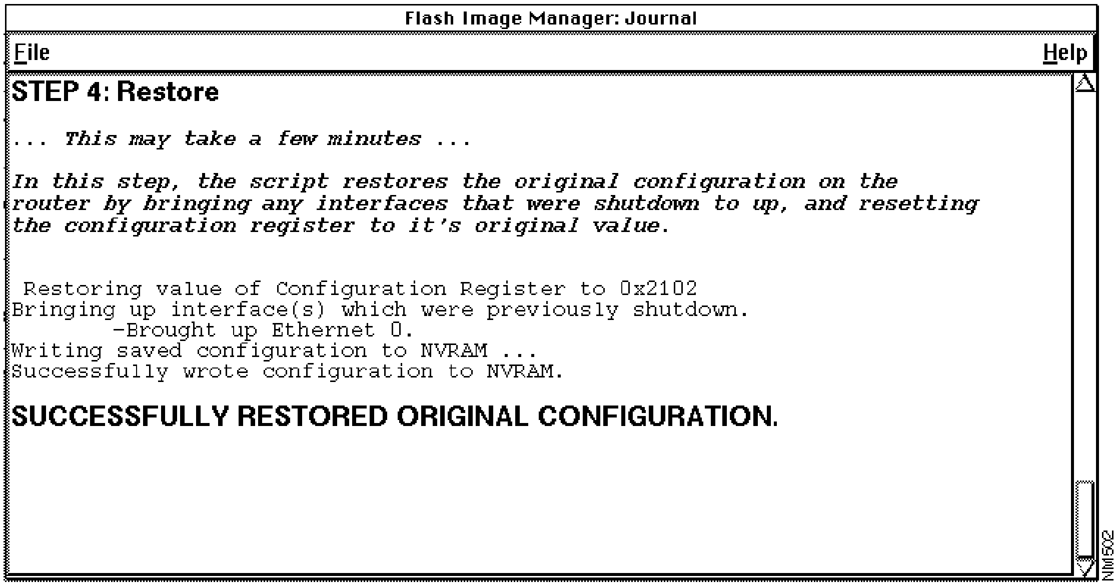
Step 6 When you click on **OK**, the device configuration and current image is backed up. Output similar to the following will display in the Flash Image Manager: Journal window. (See Figure 1-23.)

Figure 1-23 Flash Image Manager Journal Backup Output

After the backup is complete. The upgrade process starts. Output similar to the following displays in the Flash Image Manager: Journal window. (See Figure 1-24.)

Figure 1-24 Flash Image Manager Journal Upgrade Output

After the upgrade is complete the configuration file is restored to the router. Output similar to the following displays in the Flash Image Manager: Journal window. (See Figure 1-25.)



STEP 4: Restore

... This may take a few minutes ...

In this step, the script restores the original configuration on the router by bringing any interfaces that were shutdown to up, and resetting the configuration register to it's original value.

```
 Restoring value of Configuration Register to 0x2102
Bringing up interface(s) which were previously shutdown.
        -Brought up Ethernet 0.
Writing saved configuration to NVRAM ...
Successfully wrote configuration to NVRAM.
```

SUCCESSFULLY RESTORED ORIGINAL CONFIGURATION.

Figure 1-25 Flash Image Manager Journal Restore Output

After the upgrade completes, a message displays informing you the upgrade was successful.

Upgrading Cisco Run-From-RAM Devices

The Device Software Manager application upgrades Cisco run-from-RAM devices.

Figure 1-26 illustrates the Device Software Manager window. Table 1-11 describes its components.

Figure 1-26 Device Software Manager Window

Table 1-11 Device Software Manager Window Components

Component	Subcomponent	Description
File	Print	Prints a snapshot of the current window.
	Exit	Exits the current window.
Security	Change User	Changes your username in order to access this application.
	Privileges	Displays the current user’s security privileges.
Edit	Comments	Allows you to enter comments about this configuration file.
Help	On Version	Provides information on the application version.
	On Device Software Manager	Provides information on the current window.
Current System Running	Aliases	User-given name for the configuration file.
	System Files	Device system platform designation.
	File Name	Current file loaded into the device.
	Version	Current software version in the device.

Component	Subcomponent	Description
Flash Contents	Aliases	User-given name for the flash configuration file.
	Flash Files	Device system platform designation.
	File Name	Current file loaded into the flash memory of the device.
	Version	Current software version on Flash memory.
Comments		User notes about configuration file or device.
Upgrade Device		Opens the Software Image Upgrade window.
Update Inventory		Updates the device information in the database.

To upgrade the system image on a Cisco run-from-RAM device, perform the following steps:

Step 1 From the Device Software Manager window, select the software or microcode you want to upgrade on this device by clicking on the current system software or the Flash contents.

You can access the Device Software Manager window through the Software Inventory window or the Glyph menu.

Step 2 To upgrade comments with this image, select **Edit>Comments**.

Enter your comments in the Comments scroll window.

Step 3 To perform the upgrade on this device, click on **Upgrade**.

Depending on which Cisco device you are upgrading, the application chooses an upgrade method. If the image name is unrecognizable, the application displays a message: `Unable to identify image name from system description string. Run-from-Flash verification failed. Is <device_name> currently running image from Flash?` Select the appropriate response.

If you are upgrading a Cisco run-from-Flash device, the upgrade is performed using the ROM monitor mode and the Flash Image Manager. If you are upgrading a Cisco run-from-RAM device, the Device Software Manager window displays and performs the upgrade using NVRAM. If CiscoWorks cannot access the device software you selected, you will receive an error message.

The Software Image Update window appears. (See Figure 1-27.)

Figure 1-27 Software Image Update Window

Step 4 Select a current software filename which will be loaded to upgrade this device by clicking on a filename in the Current panel.

Step 5 To see the available software that you can upgrade on this device, click on Upgrade to **Select**.

The Available Software window displays. (See Figure 1-28.)

Figure 1-28 Available Software Window from Software Image Update Window

Step 6 Select the software image you want to load onto your device and click on **OK**.

The Software Image Update window updates and displays the name of the software image you will load onto your device.

Step 7 Click on **Apply** to begin the upgrade procedure.

The Device Software Manager attempts to upgrade the software. For more information on how the Device Software Manager works, refer to the section "How Device Software Manager Works" earlier in this chapter.

Step 8 If a popup window appears with a message asking you to confirm the configuration register change or a Flash memory erase, click on **OK** to proceed with the upgrade.

If you choose to erase the contents of Flash memory, Device Software Manager attempts to back up a copy if the system image is not in the database or if the software is not currently in Flash memory. This is the only backup of the old system image.

Note To disable the backup function for Device Software Manager, edit your *.Xresource* file and change the FlashBackup default option from On to Off.

If you choose to cancel the requested changes by clicking on **Cancel**, the Device Software Manager exits the upgrade procedure. You may be required to perform the steps in this procedure again because Device Software Manager requires configuration register settings and Flash memory space in order to complete its task.

If you chose to proceed with the upgrade, the next message that displays requests a confirmation of the device reload.

Caution Device reload temporarily disables communication to a device. This process may take up to 5 minutes.

Step 9 To continue with the system software image upgrade and start the device reload, click on **OK** in the popup window.

Device Software Manager reloads the system software image and updates the window with the new image information.

If the reload was not successful, an error message displays.

Updating Comments or Alias Information for a Device

To update comments or alias information for a device, perform the following steps:

Step 1 From the Device Software Manager window, select a device by double clicking on the device name.

Step 2 Select the filename or version for which you want to update information.

Step 3 To add comments information, move your cursor into the Comments box and enter the comments you desire.

Step 4 To change the alias, click on the alias name and reenter the new name.

Caution Be aware that if you upgrade CiscoWorks, the comments field of the Software Manager application will be cleared. To preserve the comments prior to upgrading, you need to develop and maintain a separate log.

Scheduling Batch Commands

The Global Command Manager application automatically schedules tasks such as backing up your database, purging log files, and running CiscoWorks applications during off-hours. The Global Command Scheduler application allows you to schedule these routine administrative tasks to occur during off-peak hours to maximize your network performance.

Global Command Manager Window

Figure 1-29 illustrates the Global Command Manager window. Table 1-12 describes its components.

Figure 1-29 Global Command Manager Window

Table 1-12 Global Command Window Components

Component	Subcomponent	Description
File	Print	Prints a snapshot of the current window.
	Exit	Exits the current window.
Security	Privileges	Displays the current user’s security privileges.
	Change User	Enables you to change your username in order to access this application.
Options	Execute Now	Executes selected global command.
	Schedule	Executes the Scheduler to schedule the global command.
Help	On Version	Provides help text on the application version and the current window.
	On Global Command Mgr	

Component	Subcomponent	Description
Global Commands list		Lists the global command options.
	New	Adds new commands to your global command list. You can enter any valid CiscoWorks or UNIX command executable.
	Modify	Edits an existing command.
	Delete	Deletes commands from the global command list.
Domains list		Lists the domain names on which to execute the global command. Double click on domain name for list of devices.
	Remove	Removes the domain selected. You cannot remove the World domain.
Execute Cmd		Executes selected global command.
Schedule		Displays the Scheduler window to schedule command execution.

Global Command Task List

The following tasks can be performed with the Global Command Manager application:

- Add or delete a global command.
- Associate a global command with a domain.
- Execute a global command immediately.
- Add a schedule to run a global command.
- Edit or delete a schedule.
- Enable or disable a regularly scheduled global command job.

The procedures for these tasks follow.

How the Global Command Manager Works

The Global Command Manager allows you to schedule the execution of any CiscoWorks or UNIX command. When you create a global command, CiscoWorks Global Command Manager creates a log file, *gcmd.log* and stores it in *$NMSROOT/log*. The *gcmd.log* file contains records with the following information: time, process ID, user ID, domain name, device name and the log message.

You can use the Global Command Manager application to schedule tasks in the following areas:

- **nmconfig**—Configuration Management
- Configuration Snap-In Manager
- Database tasks such as backups and purges
- Performance Management—Device Polling

Adding or Deleting Devices to the Domain

You cannot add or delete devices from the domain in the Global Command application. You must use the Domain Manager application to add or delete devices.

To add new devices to the domain list, refer to the section on the Domain Manager application in Chapter 7.

Adding or Deleting a Global Command

To add or delete a global command, perform the following steps:

Step 1 Select **Global Command Mgr**.

On SNM, select **Tools>Global Command Mgr**.

On HP OpenView or NetView for AIX, select **CiscoWorks>Global Command Mgr**.

The Global Command window appears. (See Figure 1-29.)

Step 2 To add a new global command, click on **New**.

The New Global Command window appears. (See Figure 1-30.)

Figure 1-30 **New Global Command Window**

Step 3 Enter the global command name and the global command in the appropriate fields.

For more information on CiscoWorks application command syntax, refer to the section “Running CiscoWorks Applications from the Command Line” in Appendix B. For more information on UNIX command syntax, refer to your UNIX manual pages.

Step 4 Click on **OK**.

The new global command should be displayed in the Global Command list in the Global Command window.

Step 5 If the Global Command application is secure, a domain selection window appears. Select the domain you want the global command to affect by clicking on the domain name.

Step 6 Click on **OK**.

Step 7 To delete a global command, first select the command name and domain name from the Global Command Manager window.

Step 8 Click on **Delete**.

The selected global command will be deleted from the Global Command list.

Caution There is no confirmation of the delete function. Be sure you want to delete a command before clicking on **Delete**.

Running a Global Command in a Domain

To run a global command in a domain, perform the following steps:

Step 1 Select **Global Command Mgr**.

On SNM, select **Tools>Global Command Mgr**.

On HP OpenView or NetView for AIX, select **CiscoWorks>Global Command Mgr**.

The Global Command window appears. (See Figure 1-29.)

Step 2 Select a global command you want to run from the Global Commands list.

Step 3 Select a domain to run which to run this global command from the Domains list.

This step is optional. You do not need to select a domain if your command does not have a domain associated with it.

Step 4 Click on **Execute Cmd** to run the global command.

An information window confirms that you are about to execute a global command.

Step 5 Click on **OK** to begin command execution.

Step 6 To verify the global command has been sent and to view the data, check the *gcmd.log* in *$NMSROOT/log*.

The *gcmd.log* file contains records with the following information: time, process ID, user ID, domain name, device name and the log message.

Using the Global Command Scheduler

The Global Command Scheduler application is a graphical user interface that uses the UNIX crontab utility to run commands or other jobs at regularly scheduled times. The crontab utility allows you to submit a list of jobs that the system will run for you at the times you specify. If you want to alter a schedule you have set, you can do so through the Global Command Scheduler.

You can choose to use the Global Command Scheduler graphical user interface or the command line interface. To use the Global Command Scheduler command line interface, enter **nmscheduler** at the command line. The Global Command Scheduler application has the following limitations:

- The command name (**-N** *cmdname*) must be a unique name. For example, you can have only one **confmanbat** command in the *cron* file. If you schedule a command with a duplicate command name (*cmdname*), the Scheduler will ask you to enter a new command name.
- To determine whether a scheduled command is correct, enter **crontab -l** as the user *cscworks*, or start the Global Command Scheduler again and click on **Edit CW Cron**.
- To edit a cron file, start the Global Command Scheduler with the appropriate command line syntax, and click on **Edit CW Cron**.
- You can run any command that is located in the following directories: *$NMSROOT/bin, $NMSROOT/usr/bin, $NMSROOT/usr/ucb, $NMSROOT/usr/etc,* and so on. You also can schedule any UNIX command.
- After adding a global command and clicking on **Schedule**, the job is added to the UNIX cron file for *cscworks* (and can be viewed through the CW Cron window).
- To view a **cron** command, click on **View Cmd**.
- The CW Cron window does not accept multiple selections. For example, a cron can accept any number of time selections to run a command, 0, 15, 30, 45, and so on. The Scheduler can only accept a single number, such as 30 minutes.

- When you edit the cron fields in the CiscoWorks Cron window, use the following parameters:
  - Minute: 0 to 59
  - Hour: 0 to 23

  The other parameters: day of the month, month, and week are read-only.

For more information on the Global Command Scheduler syntax, refer to Appendix B, "Troubleshooting CiscoWorks Errors."

How the Scheduler Works

The Scheduler has two options: schedule a command for one-time execution and schedule a command for periodic executions.

For a one-time execution of a command, the Scheduler adds two jobs into the *crontab* file. The first job is the global command itself. The second job is the one the Scheduler uses to delete the first job entry by command name. The delete command entry remains in the *crontab* file and is not used. It is recommended that you delete those commands from the *crontab* file interactively using the Scheduler application.

You can use the Global Command Scheduler application to perform tasks in the following areas:

- Configuration Management
- Configuration Snap-In Manager
- Database tasks such as backups and purges
- Performance Management—Device Polling

Global Command Scheduler Window

Figure 1-31 illustrates the Scheduler window. Table 1-13 describes its components.

Figure 1-31 Scheduler Window

Table 1-13 Scheduler Window Components

Component	Subcomponent	Description
File	Print	Prints a snapshot of the current window.
	Exit	Exits the current window.
Security	Change User	Enables you to change your username in order to access this application.
	Privileges	Displays the current user's security privileges.
Options	Schedule	Puts the schedule into the cron file for execution at a later time.
	Edit CW Cron	Displays the CW Cron window to schedule command execution.
Help	On Version	Provides help text on the application version.
	On Scheduler	Provides help on the current window.
User		Identifies which user is scheduling the Global Command Scheduler.
Command Name		Displays the command name that will be executed.
Domain		Identifies the domain of routers this command will reach.
Date		Identifies the current date and time.
Start		Identifies when the command has been started. Default start is set at 0:00 a.m. You can choose between 0:01 a.m. to 23:45 p.m.
Repeat	Daily, Weekly, Monthly, Hourly, or None	Identifies the periodic intervals of the schedule. Click on the Start button to select the desired frequency. Use None for one-time execution of the command.
Schedule		Places the schedule into the UNIX cron.
Edit CW Cron		Displays CW Cron window.

Scheduling a Command for Periodic Execution

To scheduling a command for periodic execution, perform the following steps

Step 1 Select **Global Command Mgr**.

On SNM, select **Tools>Global Command Mgr**.

On HP OpenView or NetView for AIX, select **Administer>CiscoWorks System>Global Command Mgr**.

The Global Command Manager window appears. (See Figure 1-29.)

Step 2 From the Global Commands list, select a global command to run on this domain by clicking on a global command.

Step 3 From the Domains list, select a domain to run a global command by clicking on a domain name.

This step is optional. You do not need to select a domain if your command does not have a domain associated with it.

Step 4 Click on **Schedule** to run the global command using the Scheduler.

The Scheduler window appears. (See Figure 1-31.)

Step 5 From the Start pick menu, select the start time delay you want to establish.

For example, if you choose 1:00, your global command will start running at 1:00 a.m. sharp. If you choose 14:00, your global command will start running at 2 p.m.

Step 6 From the Repeat pick menu, select the number of times to repeat this global command.

For example, if you want to schedule this global command to run weekly, from the Repeat pick menu, select the **Weekly** option. The Day of the Week window displays after you choose the weekly option. If you choose the None option, this command will execute only once.

Step 7 Select the day of the week, or in the case of the Monthly option, select the date of the month you want the global command to execute.

Step 8 Click on **Schedule** to schedule this global command for periodic execution.

This action enables the Global Command application to run this global command at the designated date and time until the number of repeat cycles is complete.

Editing a Global Command Schedule

To edit a global command schedule, perform the following steps:

Step 1 Select **Global Command Mgr**.

On SNM, select **Tools>Global Command Mgr**.

On HP OpenView or NetView for AIX, select **Administer>CiscoWorks System>Global Command Mgr**.

The Global Command Manager window appears. (See Figure 1-29.)

Step 2 From the Global Commands list, select a global command to run on this domain by clicking on a global command.

Step 3 From the Domains list, select a domain to run a global command by clicking on a domain name.

Step 4 Click on **Schedule** to run the global command using the Scheduler.

The Scheduler window appears. (See Figure 1-31.)

Step 5 To view the CiscoWorks Cron window and alter the schedule for a command, click on **Edit CW Cron**.

The CiscoWorks Cron window appears. (See Figure 1-32.)

Figure 1-32 CW Cron Window

Step 6 To change any fields in a global command schedule, click inside the field and enter the new information.

You cannot enter data into the read only fields.

Step 7 To enable or disable a regularly scheduled command job, from the Start pick menu, select the start time delay you want to establish.

Step 8 To view the syntax of a global command, click on **View Cmd**.

A Global Command View window displays. (See Figure 1-33.)

Figure 1-33 Global Command View Window

Step 9 When you are finished viewing the global command, click on **OK**.

Step 10 When you are finished, click on **OK** to save your CW Cron request.

Step 11 To delete a global command from the Cron window, select the global command name and click on **Delete**.

Deleting a Global Command Schedule

To delete a global command schedule, perform the following steps:

Step 1 Select **Global Command Mgr**.

On SNM, select **Tools>Global Command Mgr**.

On HP OpenView or NetView for AIX, select **Administer>CiscoWorks System>Global Command Mgr**.

The Global Command Manager window appears. (See Figure 1-29.)

Step 2 From the Global Commands list, select a global command to run on this domain by clicking on a global command.

Step 3 From the Domains list, select a domain to run a global command by clicking on a domain name.

Step 4 Click on **Schedule** to run the global command using the Scheduler.

The Scheduler window appears. (See Figure 1-31.)

Step 5 On the Scheduler window, click on **Edit CW Cron**.

The CiscoWorks Cron window appears. (See Figure 1-32.)

Step 6 To ensure you delete the correct command, view the syntax of a global command by clicking on **View Cmd**.

A Global Command View window displays. (See Figure 1-33.)

Step 7 Click on **OK** to close this window.

Step 8 Select the global command to be deleted, and click on **Delete**.

Use care when deleting a global command from the cron file, because the command is deleted without confirmation. You cannot delete a schedule created by another user.

Using the Configuration Snap-In Manager to Configure Devices

Configuration Snap-In Manager allows you to send a few configuration commands to a set of devices. An easy way to remember snap-ins is to view them as configuration building blocks that can be applied to a device set. This capability saves the network from a potential disruption.

The Configuration Snap-In Manager uses the domains, or groups of devices, that were set up in the Global Command Manager.

The Configuration Snap-In Manager application supports device interfaces that allow you to specify which interface to apply the command. For example, you can apply an access-list command to serial interface 1 of a router. The **DoItNow** button on the Command Set window means to send the command to the highlighted Cisco devices immediately. You can also choose to send the command or commands later using the **Schedule** button on the Configuration Snap-In Manager window. The Description field in the Command Set window is ReadWrite, so you can modify the descriptions.

You can only send the same group of snap-in commands together as part of one configuration snap-in file, and they must be the same command type. For example, you can send three community string commands in one command set, but you cannot send a community string and an enable password command in one command set.

The device set reference in the Edit Device Sets in Domain window allows you to add devices within a domain to a device set.

Note Before using the configuration snap-in command feature, make sure that Trivial File Transfer Protocol (TFTP) has been set up for your system. TFTP is used to transfer configuration files between devices. TFTP is defined in RFC 783. For instructions on setting up TFTP, refer to the CiscoWorks Administration and Installation Guide.

You can run the Configuration Snap-In Manager from the UNIX command line. For more information on command line syntax for this application, refer to Appendix B, "Troubleshooting CiscoWorks Errors."

Note After a configuration file is downloaded to a device, a new version of the snap-in command list configuration file is generated in Configuration Management automatically.

Timesaver Double-clicking on the Configuration Snap-In Manager command panels (Name, Command Type, Device Set, Description) displays the Command Set window.

Configuration Snap-In Window

Figure 1-34 illustrates the Configuration Snap-In Manager window. Table 1-14 describes its components.

Figure 1-34 Configuration Snap-In Manager Window

Table 1-14 Configuration Snap-In Window Components

Component	Subcomponent	Description
File	Print	Prints a snapshot of the current window.
	Exit	Exits the current window.
Security	Change Domain	Allows you to change domains.
	Change User	Allows you to change user IDs.
	Privileges	Views current user ID privileges.
Options	Save Command Set As	Allows you to save a command set to another name.
Help	On Version	Displays information on the application version.
	On Configuration Snap-In Manager	Provides information on the current window.
Name		Configuration Snap-In commands include: Enable Password Line/Password SNMP Host SNMP Community String SNMP Access List IP Host IP Domain Lookup Access List — IP Access List — Extended IP Access List — AppleTalk Access List — Novell Access List — Extended Novell Access List — Novell SAP Access List — DECnet Access List — Transparent Bridging Access List — Extended Transparent Bridging Access List — Source Route Bridging Priority Queue List User Command
Command Type		Type of configuration command.
Device Set		Name of a group of devices (not related to domain).
Description		Describes the configuration snap-in command.
Create Command pick menu		Provides a list of new commands to select from.
Modify		Edits a selected snap-in command. New commands can be created using an existing command.
Delete		Deletes a selected snap-in command.
Schedule		Provides the Scheduler facility to determine when this Configuration Snap-In is run.

Configuration Snap-In Manager Task List

The Configuration Snap-In Manager application performs the following tasks:

- Working with device sets (groups of devices)
- Adding commands to Configuration Snap-In Manager
- Editing commands in Configuration Snap-In Manager

- Deleting commands from Configuration Snap-In Manager
- Sending snap-in commands directly to the router or via the scheduler

Working with Device Sets

In order to use the Configuration Snap-In Manager application, you need to set up your device sets within your current domain. These are the groups of routers or other devices that you send snap-in commands via this application. The Configuration Snap-In Manager uses the domains set up in the Global Command Manager.

For example, if you are in the domain World using device_set_A and change domains to domain West, the device set (device_set_A) may not appear in the West domain.

It is important to review your device sets before executing snap-in commands; this allows you to check the devices in your set and review if any devices have been deleted.

Remember there are several ways to group devices into device sets. The following list is an example of some of the device sets you might find useful:

- All Cisco 7000 routers (cisco7000)
- All Cisco AGS+ routers (ciscoAGS+)
- All routers with 9.1 software (cisco_9.1)

Note Remember to set up device sets logically. Device sets should allow snap-in commands for the same sets of devices. For example, a device set for updating Cisco 7000s may not be the same as the device set for the Cisco AGS+.

Creating New Device Sets

In order to send snap-in commands to a router or set of routers, you need to create a device set that defines what devices the snap-in command should be sent to. The term device set is different from the term domain. The Configuration Snap-In Manager uses the domains you have set up in the Domain Manager application, but it allows you to create a subset of routers within the domain. All the device sets you use are within your current domain.

Once you create a device set for the first time, you can use this device set as a building block to build future device sets.

Timesaver Once you have created at least one device set, it is faster to use the procedure in the section “Creating New Device Sets from an Existing Device Set” to create new device sets.

Creating Device Sets For the First Time

To define a device set for the first time, perform the following steps:

Step 1 Select **Configuration Snap-In Mgr**.

On SNM, select **Tools>Configuration Snap-In Mgr**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Snap-In Mgr**.

The Configuration Snap-In Manager window appears. (See Figure 1-34.)

Step 2 From the Configuration Snap-In Manager window, click on the **Create Command** pick menu.

The Create Command window appears. (See Figure 1-35.)

Figure 1-35 Configuration Snap-In Create Command Window

Step 3 Click on the command you plan to create.

Step 4 Click on **OK**.

The Command Set window appears. (See Figure 1-36.)

Figure 1-36 Command Set Window

Step 5 Click on **New**.

The Add New Device Set window appears.

Step 6 Enter the new device set name and click on **OK**.

The Edit Device Sets in Domain window appears. (See Figure 1-37.)

Figure 1-37 Edit Device Sets in Domain Window in Configuration Snap-In Manager

The appearance of Edit Device Sets in Domain window will depend on which command you select. If you select an access list or priority list command, the Edit Device Sets in Domain window contains the Devices and Interfaces scroll windows. If you select any of the other commands, the Edit Device Sets in Domain window contains only the Devices scroll window.

Step 7 To add devices to your new device set, click on **Add** and select the devices from the Device List window.

Use the Shift key to select a contiguous groups of devices. Use the Control key to select several individual devices from the list.

Step 8 Click on **OK** to exit the Device List window.

The device or devices you select display in the Devices scroll window.

Step 9 If you are creating an access list or priority list command, select the interface for this command.

Step 10 Click on **Apply** to save any changes in the Edit Device Sets in Domain window.

Step 11 To exit the Edit Device Sets in Domain window, click on **OK**.

If you do not save before leaving the window, a confirmation message displays asking you if you want to close the window without saving.

Step 12 To close the Edit Device Sets in Domain window with autosaving, click on **OK**. To cancel and return to the Edit Domain window without autosaving, click on **Cancel**.

To add snap-in commands, refer to the section “Adding Snap-In Commands.”

Creating New Device Sets from an Existing Device Set

To define a device set from an existing device set, perform the following steps:

Step 1 Select **Configuration Snap-In Mgr**.

On SNM, select **Tools>Configuration Snap-In Mgr**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Snap-In Mgr**.

The Configuration Snap-In Manager window appears. (See Figure 1-34.)

Step 2 From the Configuration Snap-In Manager window, double-click on a snap-in command set from the Name scroll window.

The Command Set window appears. (See Figure 1-36.)

Step 3 Click on Device Set **Modify**.

A window similar to the Edit Device Sets in Domain window appears. (See Figure 1-37.) The appearance of Edit Device Sets in Domain window will depend on which command you select. If you select an access list or priority list command, the Edit Device Sets in Domain window contains the Devices and Interfaces scroll windows. If you select any of the other commands, the Edit Device Sets in Domain window contains only the Devices scroll window.

Step 4 Click on **Save As** to save this device set as a different name.

The Save As window displays.

Step 5 Enter the name of the new device set and click on **OK**.

Step 6 To delete devices from the existing device set, select the devices from the Devices list and click on **Delete**.

Use the Shift key to select a contiguous groups of devices. Use the Control key to select several individual devices from the list.

If you have added devices to this device set without saving, a confirmation message displays asking if you want to delete the selected devices.

Step 7 Click on **OK** to delete all the selected devices. Or, click on **Cancel** to return to the Edit Device Sets in Domain window to save the device set.

Step 8 To add devices to the new device set, click on **Add** and select the devices from the Device list window.

Step 9 Click on **OK**.

Step 10 To save this new device set, click on **Apply**.

If you do not save before leaving the window, a confirmation message displays asking you if you want to close the window without saving.

Step 11 To close the Edit Device Sets in Domain window without saving, click on **OK**. To cancel and return to the Edit Device Sets in Domain window to save, click on **Cancel**.

Editing or Viewing Device Sets

You can view device sets or modify existing device sets. View a device set to ensure the contents of the device set are what you expect. We recommend that you view your device set each time before sending a snap-in command.

When you modify device sets, you can perform the following tasks:

- Add or delete devices to an existing device set.
- Duplicate an existing device set as a different name.
- Delete device sets.

To edit or view a device set, perform the following steps:

Step 1 From the Configuration Snap-In Manager window, double-click on a snap-in command set from the Name scroll window.

The Command Set window appears. (See Figure 1-36.)

Step 2 Click on Device Set **Modify**.

The Edit Device Sets in Domain window appears. (See Figure 1-37.)

Step 3 To delete devices from the existing device set, select the devices from the Devices list and click on **Delete**.

Use the Shift key to select a contiguous groups of devices. Use the Control key to select several individual devices from the list.

If you have added devices to this device set without saving, a confirmation message displays asking if you want to delete the selected devices.

Step 4 Click on **OK** to delete all the selected devices. Or, click on **Cancel** to return to the Edit Device Sets in Domain window to save the device set.

Step 5 To add devices to the new device set, click on **Add** and select the devices from the Device list window.

Use the Shift key to select a contiguous groups of devices. Use the Control key to select several individual devices from the list.

Step 6 Click on **OK**.

Step 7 To view devices, use the Devices scroll bar.

Step 8 Click on **Save As** to save this device set as a different name.

A Save As window displays.

Step 9 Enter the name of the new device set and click on **OK**.

Step 10 To save the modified device set, click on **Apply**.

If you do not save before leaving the window, a confirmation message displays asking you if you want to close the window without saving.

Step 11 To close the Edit Domain window with autosaving, click on **OK**. To cancel and return to the Edit Domain window without saving, click on **Cancel**.

Deleting Device Sets

You can delete an entire device set, or delete devices from an existing device set.

To delete a device set or delete devices from a device set, perform the following steps:

Step 1 From the Configuration Snap-In Manager window, double-click on a snap-in command from the scroller.

The Command Set window appears. (See Figure 1-36.)

Step 2 To delete an entire device set, click on the Device Set pick menu.

A Device Set window displays.

Step 3 Select the device set you want to delete and click on **OK**.

Step 4 Click on **Delete** under the Device Set scroll window.

A confirmation message asks you to confirm the delete of this device set. If the device set is referenced by more than one command set, you cannot delete it.

Step 5 Click on **OK** to confirm the deletion of the device set.

Step 6 To close the Edit Device Set in Domain window with auto saving, click on **OK**. To cancel and return to the Edit Domain window without saving, click on **Cancel**.

Adding Snap-In Commands

Each configuration snap-in command displays a unique command set window. For a detailed description of the commands found in the Configuration Snap-In Manager application, refer to the *Router Products Command Summary* or *Router Products Configuration Guide* publications.

TFTP is used to accomplish the transfer of configuration files between devices. If TFTP was not configured on your system, make sure you do so by following the instructions in the CiscoWorks Administration and Installation Guide.

To add commands for partial configuration of a router, perform the following steps:

Step 1 Select **Configuration Snap-In Mgr**.

On SNM, select **Tools>Configuration Snap-In Mgr**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Snap-In Mgr**.

The Configuration Snap-In Manager window appears. (See Figure 1-34.)

Step 2 To add a new command, click on the **Create Command** pick menu.

The Create Command window appears. (See Figure 1-35.)

Step 3 Select a command name from the list and click on **OK**.

The Command Set window appears. (See Figure 1-36.) The only fields with entries are the Domain and Device Set fields.

Step 4 Click inside the Description field and enter a meaningful name for this command.

The description you enter will appear in the Description panel of the Configuration Snap-In Manager window after you complete these steps.

Step 5 Click on **Add** under the Command window.

A view of the command window you have selected displays. Each command in the Configuration Snap-In Manager application has an individual or series of windows in which you add specific information.

Step 6 Add the required information and click on **OK** in all required windows.

For detailed command syntax and descriptions, refer to the *Router Products Command Summary* and *Router Products Configuration Guide* publications.

Step 7 If the device set is ok, click on **Apply**.

The Save Current Set window displays.

If you want to add a device set for this command, refer to the section "Creating New Device Sets." If you want to change an existing device set for this command, refer to the section "Editing or Viewing Device Sets."

Step 8 To save this command set, enter the new command set name and click on **OK**.

Step 9 If a device set selection is required (as it is in the access list and priority list commands), click on the Device Set pick menu.

Step 10 Select the device set name and click on **OK**.

Step 11 To modify an existing device set, click on **Modify** under the Device Set scroll window.

The Edit Device Sets in Domain window appears. (See Figure 1-37.) This window displays if you are editing access list and priority list commands. If you are editing other commands, the Edit Domain window will contain only a Devices scroll window.

If you need to create a device set, refer to the section "Creating New Device Sets." If you need to edit a device set, refer to the section "Editing or Viewing Device Sets."

Step 12 To add devices to the current device set, click on **Add** and select the devices from the device list.

Step 13 To select interfaces for commands that require it, click on an interface in the Interfaces list. (See Figure 1-37.)

Step 14 From the Edit Device Sets in Domain window, click on **Apply** to save any changes.

Step 15 Click on **OK** to leave the window.

If you do not save before leaving the window, a confirmation message displays asking you if you want to close the window without saving.

You will be returned to the Command Set window.

Step 16 From the Command Set window, click on **OK** to save any changes and leave the window.

Editing Snap-In Commands

Use the Command Modify button to edit an existing configuration snap-in command or to create a new configuration snap-in command from an existing command.

Editing Commands within a Command Set

To edit snap-in commands within a command set, perform the following steps:

Step 1 Select **Configuration Snap-In Mgr**.

On SNM, select **Tools>Configuration Snap-In Mgr**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Snap-In Mgr**.

The Configuration Snap-In Manager window appears. (See Figure 1-34.)

Step 2 From the Command Set list, select the command set by double-clicking on the name.

The Command Set window appears. (See Figure 1-36.)

Step 3 From the Command scroll window, select a command by double-clicking on it.

The specific command edit window for this command appears.

Step 4 Add the required information and click on **OK** in all required windows.

For detailed command syntax and descriptions, refer to the *Router Products Command Summary* and *Router Products Configuration Guide* publications.

Step 5 If you need to create a device set, refer to “Creating New Device Sets.”

Step 6 If you need to edit or delete devices from a device set, refer to the sections “Editing or Viewing Device Sets” or “Deleting Device Sets.”

Step 7 From the Command Set window, click on **OK** to save any changes and leave the window.

Deleting Snap-In Commands

To delete commands in Configuration Snap-In Manager, perform the following steps:

Step 1 Select **Configuration Snap-In Mgr**.

On SNM, select **Tools>Configuration Snap-In Mgr**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Snap-In Mgr**.

The Configuration Snap-In Manager window appears. (See Figure 1-34.)

Step 2 To delete a command from a command set, double-click on the command set name.

The Command Set window appears. (See Figure 1-36.)

Step 3 From the Command Set window, select the command you want to delete from the list of commands and click on **Delete**.

A confirmation message displays asking you to confirm the deletion.

Step 4 Click on **OK** to delete the command.

Step 5 To save the changes, click on **Apply**.

Step 6 Click on **OK** to leave the window.

If you do not save before leaving the window, a confirmation message displays asking you if you want to close the window without saving.

Sending Snap-In Commands Directly to the Router

To send commands for directly to the router or other device, perform the following steps:

Step 1 From the Configuration Snap-In Manager window, select the snap-in command you want to send to the device or domain by clicking on the command name.

Step 2 Click on **Modify**.

The Command Set window for this specific command appears.

To edit the command set or command, refer to section "Editing Snap-In Commands."

Step 3 If you want to view command specifics such as device set details, click on Device Set **Modify**.

Step 4 If you want to edit the device set or sets, refer to the section "Working with Device Sets."

Step 5 Select a device/interface or device set from the Device Set scroll list.

Step 6 Click on **DoItNow** to send this command set to the device or domain directly.

The command is sent to the device(s). A log file is generated and stored in the *$NMSROOT/log* directory. A browser window appears to display the status of the download. After the download is complete, select **File>Close** to exit the window. If an error occurs, the error message displays in the browser window.

Step 7 To confirm that the command was sent to the device or domain, use the Configuration Management application to view the last configuration file loaded to this device.

For information about the Configuration Management application, refer to the section "Browsing a Configuration File or Comments File on a Device."

Scheduling Snap-In Commands for Device Configuration

To send commands for partial configuration of a device or domain, perform the following steps:

Step 1 Select **Configuration Snap-In Mgr**.

On SNM, select **Tools>Configuration Snap-In Mgr**.

On HP OpenView or NetView for AIX, select **Administer>Cisco Devices>Configuration Snap-In Mgr**.

The Configuration Snap-In Manager window appears. (See Figure 1-34.)

Step 2 Select the snap-in command you want to send to the device or domain by clicking on the command set name.

Step 3 To view command specifics such as command details, click on Command **Modify**.

The unique command edit window appears. To edit the command set or command, refer to section "Editing Snap-In Commands."

Step 4 To view command specifics such as domain and device details, click on Device Set **Modify**.

The Command Set window appears. (See Figure 1-36.)

Step 5 To edit the domain set or devices, refer to the section "Working with Device Sets."

Step 6 Click on **OK**.

Step 7 To save any changes and leave the window, click on **OK**.

If you do not save before leaving the window, a confirmation message displays asking you if you want to close the window without saving.

The window closes and returns you to the Configuration Snap-In Manager window.

Step 8 Click on **Schedule** to schedule the download of this command set to your device set.

The Schedule window appears. (See Figure 1-31.) For information on using the Scheduler, refer to the section “Scheduling a Command for Periodic Execution.”

Step 9 Enter the schedule information.

Note When the Domain field in the Global Command Scheduler window indicates “Not Specified,” the domain information has already been saved in the Command Set window, It will not display in the Domain field.

Step 10 Click on **Schedule**.

The command set is scheduled for periodic execution to the device or domain you selected. When the command set executes, a log file is generated and stored in the *$NMSROOT/log* directory.

Step 11 To confirm that the command set was sent to the device or domain, use the Configuration Management application to view the last configuration file loaded to this device.

For information about the Configuration Management application, refer to the section “Browsing a Configuration File or Comments File on a Device.”