



CHAPTER 1

Using Cisco IOS Software

This chapter provides information to prepare you to configure a SPA interface processor (SIP) or shared port adapter (SPA) using the Cisco IOS software. It includes the following sections:

- [Accessing the CLI Using a Switch Console, page 1-1](#)
- [Using Keyboard Shortcuts, page 1-6](#)
- [Using the History Buffer to Recall Commands, page 1-6](#)
- [Understanding Command Modes, page 1-6](#)
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Accessing the CLI Using a Switch Console

The following sections describe how to access the command-line interface (CLI) using a directly-connected console or by using Telnet or a modem to obtain a remote console:

- [Accessing the CLI Using a Directly-Connected Console, page 1-1](#)
- [Accessing the CLI from a Remote Console Using Telnet, page 1-3](#)
- [Accessing the CLI from a Remote Console Using a Modem, page 1-5](#)

For more detailed information about configuring and accessing a switch through various services, refer to the *Cisco IOS Terminal Services Configuration Guide* and *Cisco IOS Terminal Services Command Reference* publications.

For more information about making the console cable connections, refer to the *Catalyst 6500 Series Switch Module Installation Guide*.

Accessing the CLI Using a Directly-Connected Console

This section describes how to connect to the console port on the switch and use the console interface to access the CLI.

The console port on a Catalyst 6500 Series switch is an EIA/TIA-232 asynchronous, serial connection with hardware flow control and an RJ-45 connector. The console port is located on the front panel of the supervisor engine, as shown in [Figure 1-1](#) and [Figure 1-2](#).

Figure 1-1 Supervisor Engine 720 Console Port Connector

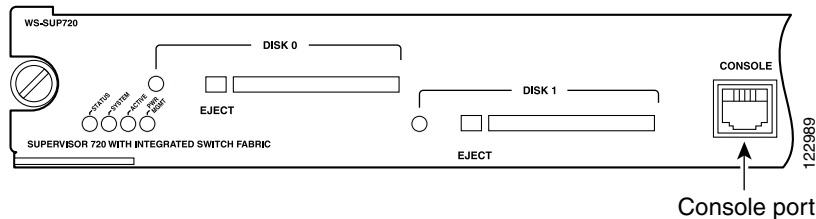
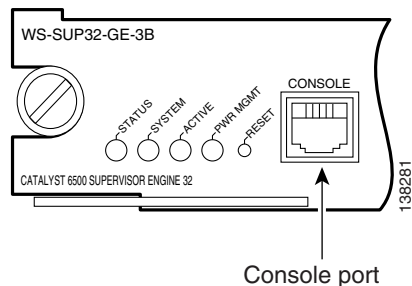


Figure 1-2 Supervisor Engine 32 Console Port Connector



Connecting to the Console Port

Before you can use the console interface on the switch using a terminal or PC, you must perform the following steps:

Step 1 Configure your terminal emulation software with the following settings:

- 9600 bits per second (bps)
- 8 data bits
- No parity
- 2 stop bits



Note

These are the default serial communication parameters on the switch. For information about how to change the default settings to meet the requirements of your terminal or host, refer to the [Cisco IOS Terminal Services Configuration Guide](#).

Step 2 Connect a terminal or PC to the console port using *one* of the following methods:

- a. To connect to the console port using the cable and adapters provided in the accessory kit that shipped with your Catalyst 6500 Series switch:
 - Place the console port mode switch in the in position (factory default).

- Connect to the port using the RJ-45-to-RJ-45 cable and RJ-45-to-DB-25 DTE adapter or using the RJ-45-to-DB-9 DTE adapter (labeled “Terminal”).
 - b. To connect to the console port using a Catalyst 5000 family Supervisor Engine III console cable:
 - Place the console port mode switch in the out position.
 - Connect to the port using the Supervisor Engine III cable and the appropriate adapter for the terminal connection.
-

Using the Console Interface

To access the CLI using the console interface, complete the following steps:

-
- Step 1** After you attach the terminal hardware to the console port on the switch and you configure your terminal emulation software with the proper settings, the following prompt appears:
- ```
Press Return for Console prompt
```
- Step 2** Press **Return** to enter user EXEC configuration mode. The following prompt appears:
- ```
Router>
```
- Step 3** From user EXEC configuration mode, enter the **enable** command as shown in the following example:
- ```
Router> enable
```
- Step 4** At the password prompt, enter your system’s password. (The following example shows entry of the password called “enablepass”):
- ```
Password: enablepass
```
- Step 5** When your enable password is accepted, the privileged EXEC configuration mode prompt appears:
- ```
Router#
```
- Step 6** You now have access to the CLI in privileged EXEC configuration mode and you can enter the necessary commands to complete your desired tasks.
- Step 7** To exit the console session, enter the **quit** command as shown in the following example:
- ```
Router# quit
```
-

Accessing the CLI from a Remote Console Using Telnet

This section describes how to connect to the console interface on a switch using Telnet to access the CLI.

Preparing to Connect to the Switch Console Using Telnet

Before you can access the switch remotely using Telnet from a TCP/IP network, you need to configure the switch to support virtual terminal lines (vty) using the **line vty** global configuration command. You also should configure the vty lines to require login and specify a password.

**Note**

To prevent disabling login on the line, be careful that you specify a password with the **password** command when you configure the **login** line configuration command. If you are using authentication, authorization, and accounting (AAA), you should configure the **login authentication** line configuration command. To prevent disabling login on the line for AAA authentication when you configure a list with the **login authentication** command, you must also configure that list using the **aaa authentication login** global configuration command. For more information about AAA services, refer to the *Cisco IOS Security Configuration Guide* and *Cisco IOS Security Command Reference* publications.

In addition, before you can make a Telnet connection to the switch, you must have a valid host name for the switch or have an IP address configured on the switch. For more information about requirements for connecting to the switch using Telnet, information about customizing your Telnet services, and using Telnet key sequences, refer to the *Cisco IOS Terminal Services Configuration Guide*.

Using Telnet to Access a Console Interface

To access a console interface using Telnet, complete the following steps:

Step 1 From your terminal or PC, enter one of the following commands:

- **connect** *host* [*port*] [*keyword*]
- **telnet** *host* [*port*] [*keyword*]

In this syntax, *host* is the switch host name or an IP address, *port* is a decimal port number (23 is the default), and *keyword* is a supported keyword. For more information, refer to the *Cisco IOS Terminal Services Command Reference*.

**Note**

If you are using an access server, then you will need to specify a valid port number such as **telnet 172.20.52.40 2004**, in addition to the host name or IP address.

The following example shows the **telnet** command to connect to the switch named router:

```
unix_host% telnet router
Trying 172.20.52.40...
Connected to 172.20.52.40.
Escape character is '^'.
unix_host% connect
```

Step 2 At the password prompt, enter your login password. The following example shows entry of the password called “mypass”:

```
User Access Verification
```

```
Password: mypass
```

**Note**

If no password has been configured, press **Return**.

Step 3 From user EXEC configuration mode, enter the **enable** command as shown in the following example:

```
Router> enable
```

- Step 4** At the password prompt, enter your system's password. (The following example shows entry of the password called "enablepass"):
- ```

Password: enablepass

```
- Step 5** When the enable password is accepted, the privileged EXEC configuration mode prompt appears:
- ```

Router#

```
- Step 6** You now have access to the CLI in privileged EXEC configuration mode and you can enter the necessary commands to complete your desired tasks.
- Step 7** To exit the Telnet session, use the **exit** or **logout** command as shown in the following example:
- ```

Router# logout

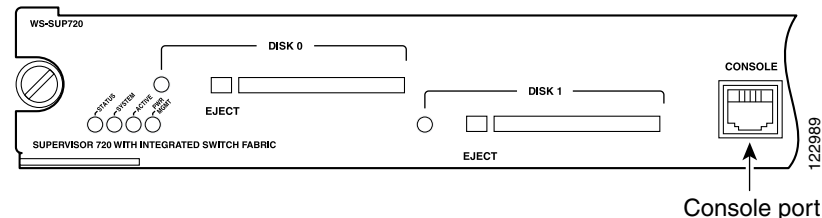
```

## Accessing the CLI from a Remote Console Using a Modem

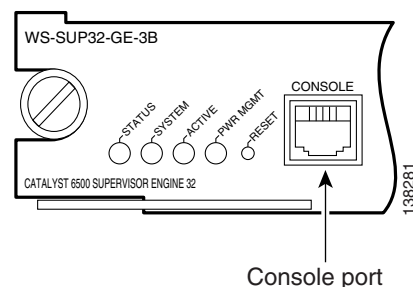
To access the switch remotely using a modem through an asynchronous connection, connect the modem to the console port.

The console port on a Catalyst 6500 Series switch is an EIA/TIA-232 asynchronous, serial connection with hardware flow control and an RJ-45 connector. The console port is located on the front panel of the supervisor engine, as shown in [Figure 1-3](#) and [Figure 1-4](#).

**Figure 1-3 Supervisor Engine 720 Console Port Connector**



**Figure 1-4 Supervisor Engine 32 Console Port Connector**



To connect a modem to the console port, place the console port mode switch in the in position. Connect to the port using the RJ-45-to-RJ-45 cable and the RJ-45-to-DB-25 DCE adapter (labeled "Modem").

## Using Keyboard Shortcuts

Commands are not case sensitive. You can abbreviate commands and parameters if the abbreviations contain enough letters to be different from any other currently available commands or parameters.

Table 1-1 lists the keyboard shortcuts for entering and editing commands.

**Table 1-1 Keyboard Shortcuts**

| Keystrokes                                               | Purpose                                              |
|----------------------------------------------------------|------------------------------------------------------|
| <b>Ctrl-B</b> or the <b>Left Arrow key</b> <sup>1</sup>  | Move the cursor back one character                   |
| <b>Ctrl-F</b> or the <b>Right Arrow key</b> <sup>1</sup> | Move the cursor forward one character                |
| <b>Ctrl-A</b>                                            | Move the cursor to the beginning of the command line |
| <b>Ctrl-E</b>                                            | Move the cursor to the end of the command line       |
| <b>Esc B</b>                                             | Move the cursor back one word                        |
| <b>Esc F</b>                                             | Move the cursor forward one word                     |

1. The arrow keys function only on ANSI-compatible terminals such as VT100s.

## Using the History Buffer to Recall Commands

The history buffer stores the last 20 commands you entered. History substitution allows you to access these commands without retyping them, by using special abbreviated commands.

Table 1-2 lists the history substitution commands.

**Table 1-2 History Substitution Commands**

| Command                                                 | Purpose                                                                                                                                       |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ctrl-P</b> or the <b>Up Arrow key</b> <sup>1</sup>   | Recall commands in the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands. |
| <b>Ctrl-N</b> or the <b>Down Arrow key</b> <sup>1</sup> | Return to more recent commands in the history buffer after recalling commands with <b>Ctrl-P</b> or the <b>Up Arrow key</b> .                 |
| Router# <b>show history</b>                             | While in EXEC mode, list the last several commands you have just entered.                                                                     |

1. The arrow keys function only on ANSI-compatible terminals such as VT100s.

## Understanding Command Modes

You use the CLI to access Cisco IOS software. Because the CLI is divided into many different modes, the commands available to you at any given time depend on the mode that you are currently in. Entering a question mark (?) at the CLI prompt allows you to obtain a list of commands available for each command mode.

When you log in to the CLI, you are in user EXEC mode. User EXEC mode contains only a limited subset of commands. To have access to all commands, you must enter privileged EXEC mode, normally by using a password. From privileged EXEC mode you can issue any EXEC command—user or privileged mode—or you can enter global configuration mode. Most EXEC commands are one-time commands. For example, **show** commands show important status information, and **clear** commands clear counters or interfaces. The EXEC commands are not saved when the software reboots.

Configuration modes allow you to make changes to the running configuration. If you later save the running configuration to the startup configuration, these changed commands are stored when the software is rebooted. To enter specific configuration modes, you must start at global configuration mode. From global configuration mode, you can enter interface configuration mode and a variety of other modes, such as protocol-specific modes.

ROM monitor mode is a separate mode used when the Cisco IOS software cannot load properly. If a valid software image is not found when the software boots or if the configuration file is corrupted at startup, the software might enter ROM monitor mode.

Table 1-3 describes how to access and exit various common command modes of the Cisco IOS software. It also shows examples of the prompts displayed for each mode.

**Table 1-3** Accessing and Exiting Command Modes

| Command Mode            | Access Method                                                                                                                                      | Prompt             | Exit Method                                                                                                                            |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| User EXEC               | Log in.                                                                                                                                            | Router>            | Use the <b>logout</b> command.                                                                                                         |
| Privileged EXEC         | From user EXEC mode, use the <b>enable</b> EXEC command.                                                                                           | Router#            | To return to user EXEC mode, use the <b>disable</b> command.                                                                           |
| Global configuration    | From privileged EXEC mode, use the <b>configure terminal</b> privileged EXEC command.                                                              | Router(config)#    | To return to privileged EXEC mode from global configuration mode, use the <b>exit</b> or <b>end</b> command.                           |
| Interface configuration | From global configuration mode, specify an interface using an <b>interface</b> command.                                                            | Router(config-if)# | To return to global configuration mode, use the <b>exit</b> command.<br>To return to privileged EXEC mode, use the <b>end</b> command. |
| ROM monitor             | From privileged EXEC mode, use the <b>reload</b> EXEC command. Press the <b>Break</b> key during the first 60 seconds while the system is booting. | >                  | To exit ROM monitor mode, use the <b>continue</b> command.                                                                             |

For more information on command modes, refer to the “Using the Command-Line Interface” chapter in the *Cisco IOS Configuration Fundamentals Configuration Guide, Release 12.2*.

## Getting Help

Entering a question mark (?) at the CLI prompt displays a list of commands available for each command mode. You can also get a list of keywords and arguments associated with any command by using the context-sensitive help feature.

To get help specific to a command mode, a command, a keyword, or an argument, use one of the following commands:

**Table 1-4** Help Commands and Purpose

| Command                                           | Purpose                                                                                                                  |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <code>help</code>                                 | Provides a brief description of the help system in any command mode.                                                     |
| <code>abbreviated-command-entry?</code>           | Provides a list of commands that begin with a particular character string. (No space between command and question mark.) |
| <code>abbreviated-command-entry&lt;Tab&gt;</code> | Completes a partial command name.                                                                                        |
| <code>?</code>                                    | Lists all commands available for a particular command mode.                                                              |
| <code>command ?</code>                            | Lists the keywords or arguments that you must enter next on the command line. (Space between command and question mark.) |

## Finding Command Options Example

This section provides an example of how to display syntax for a command. The syntax can consist of optional or required keywords and arguments. To display keywords and arguments for a command, enter a question mark (?) at the configuration prompt or after entering part of a command followed by a space. The Cisco IOS software displays a list and brief description of available keywords and arguments. For example, if you were in global configuration mode and wanted to see all the keywords or arguments for the `arap` command, you would type `arap ?`.

The `<cr>` symbol in command help output stands for “carriage return.” On older keyboards, the carriage return key is the Return key. On most modern keyboards, the carriage return key is the Enter key. The `<cr>` symbol at the end of command help output indicates that you have the option to press **Enter** to complete the command and that the arguments and keywords in the list preceding the `<cr>` symbol are optional. The `<cr>` symbol by itself indicates that no more arguments or keywords are available and that you must press **Enter** to complete the command.

Table 1-5 shows examples of how you can use the question mark (?) to assist you in entering commands.



**Table 1-5 Finding Command Options**

| Command                                                                                                                                                                                                                                                                                                                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre>Router&gt; enable Password: &lt;password&gt; Router#</pre>                                                                                                                                                                                                                                                        | <p>Enter the <b>enable</b> command and password to access privileged EXEC commands. You are in privileged EXEC mode when the prompt changes to a “#” from the “&gt;”; for example, Router&gt; to Router#.</p>                                                                                                                                                                                                                                                                                                                                                     |
| <pre>Router# configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)#</pre>                                                                                                                                                                                                     | <p>Enter the <b>configure terminal</b> privileged EXEC command to enter global configuration mode. You are in global configuration mode when the prompt changes to Router(config)#.</p>                                                                                                                                                                                                                                                                                                                                                                           |
| <pre>Router(config)# interface serial ? &lt;0-6&gt;      Serial interface number Router(config)# interface serial 4 ? / Router(config)# interface serial 4/ ? &lt;0-3&gt;      Serial interface number Router(config)# interface serial 4/0 ? &lt;cr&gt; Router(config)# interface serial 4/0 Router(config-if)#</pre> | <p>Enter interface configuration mode by specifying the serial interface that you want to configure using the <b>interface serial</b> global configuration command.</p> <p>Enter ? to display what you must enter next on the command line. In this example, you must enter the serial interface slot number and port number, separated by a forward slash.</p> <p>When the &lt;cr&gt; symbol is displayed, you can press <b>Enter</b> to complete the command.</p> <p>You are in interface configuration mode when the prompt changes to Router(config-if)#.</p> |

Table 1-5 Finding Command Options (continued)

| Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Comment                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre>Router(config-if)# ? Interface configuration commands: . . . ip                Interface Internet Protocol config commands keepalive         Enable keepalive lan-name          LAN Name command llc2              LLC2 Interface Subcommands load-interval     Specify interval for load calculation for an                   interface locaddr-priority  Assign a priority group logging           Configure logging for interface loopback          Configure internal loopback on an interface mac-address       Manually set interface MAC address mls               mls router sub/interface commands mpoa              MPOA interface configuration commands mtu               Set the interface Maximum Transmission Unit (MTU) netbios           Use a defined NETBIOS access list or enable                   name-caching no                Negate a command or set its defaults nrzi-encoding     Enable use of NRZI encoding ntp               Configure NTP . . . Router(config-if)#</pre> | <p>Enter ? to display a list of all the interface configuration commands available for the serial interface. This example shows only some of the available interface configuration commands.</p>                                                                           |
| <pre>Router(config-if)# ip ? Interface IP configuration subcommands: access-group      Specify access control for packets accounting        Enable IP accounting on this interface address           Set the IP address of an interface authentication    authentication subcommands bandwidth-percent Set EIGRP bandwidth limit broadcast-address Set the broadcast address of an interface cgmp              Enable/disable CGMP directed-broadcast Enable forwarding of directed broadcasts dvmrp             DVMRP interface commands hello-interval    Configures IP-EIGRP hello interval helper-address    Specify a destination address for UDP broadcasts hold-time         Configures IP-EIGRP hold time . . . Router(config-if)# ip</pre>                                                                                                                                                                                                                                                           | <p>Enter the command that you want to configure for the interface. This example uses the <b>ip</b> command.</p> <p>Enter ? to display what you must enter next on the command line. This example shows only some of the available interface IP configuration commands.</p> |

**Table 1-5** Finding Command Options (continued)

| Command                                                                                                                                                                                            | Comment                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre>Router(config-if)# ip address ?   A.B.C.D          IP address   negotiated       IP Address negotiated over PPP Router(config-if)# ip address</pre>                                           | <p>Enter the command that you want to configure for the interface. This example uses the <b>ip address</b> command.</p> <p>Enter <b>?</b> to display what you must enter next on the command line. In this example, you must enter an IP address or the <b>negotiated</b> keyword.</p> <p>A carriage return (&lt;cr&gt;) is not displayed; therefore, you must enter additional keywords or arguments to complete the command.</p> |
| <pre>Router(config-if)# ip address 172.16.0.1 ?   A.B.C.D          IP subnet mask Router(config-if)# ip address 172.16.0.1</pre>                                                                   | <p>Enter the keyword or argument that you want to use. This example uses the 172.16.0.1 IP address.</p> <p>Enter <b>?</b> to display what you must enter next on the command line. In this example, you must enter an IP subnet mask.</p> <p>A &lt;cr&gt; is not displayed; therefore, you must enter additional keywords or arguments to complete the command.</p>                                                                |
| <pre>Router(config-if)# ip address 172.16.0.1 255.255.255.0 ?   secondary       Make this IP address a secondary address   &lt;cr&gt; Router(config-if)# ip address 172.16.0.1 255.255.255.0</pre> | <p>Enter the IP subnet mask. This example uses the 255.255.255.0 IP subnet mask.</p> <p>Enter <b>?</b> to display what you must enter next on the command line. In this example, you can enter the <b>secondary</b> keyword, or you can press <b>Enter</b>.</p> <p>A &lt;cr&gt; is displayed; you can press <b>Enter</b> to complete the command, or you can enter another keyword.</p>                                            |
| <pre>Router(config-if)# ip address 172.16.0.1 255.255.255.0 Router(config-if)#</pre>                                                                                                               | <p>In this example, <b>Enter</b> is pressed to complete the command.</p>                                                                                                                                                                                                                                                                                                                                                           |

## Using the no and default Forms of Commands

Almost every configuration command has a **no** form. In general, use the **no** form to disable a function. Use the command without the **no** keyword to re-enable a disabled function or to enable a function that is disabled by default. For example, IP routing is enabled by default. To disable IP routing, use the **no ip routing** command; to re-enable IP routing, use the **ip routing** command. The Cisco IOS software command reference publications provide the complete syntax for the configuration commands and describe what the **no** form of a command does.

Many CLI commands also have a **default** form. By issuing the command **default** *command-name*, you can configure the command to its default setting. The Cisco IOS software command reference publications describe the function of the **default** form of the command when the **default** form performs a different function than the plain and **no** forms of the command. To see what default commands are available on your system, enter **default ?** in the appropriate command mode.

## Saving Configuration Changes

Use the **copy running-config startup-config** command to save your configuration changes to the startup configuration so that the changes will not be lost if the software reloads or a power outage occurs. For example:

```
Router# copy running-config startup-config
Building configuration...
```

It might take a minute or two to save the configuration. After the configuration has been saved, the following output appears:

```
[OK]
Router#
```

On most platforms, this task saves the configuration to NVRAM. On the Class A Flash file system platforms, this task saves the configuration to the location specified by the CONFIG\_FILE environment variable. The CONFIG\_FILE variable defaults to NVRAM.

## Filtering Output from the show and more Commands

You can search and filter the output of **show** and **more** commands. This functionality is useful if you need to sort through large amounts of output or if you want to exclude output that you need not see.

To use this functionality, enter a **show** or **more** command followed by the “pipe” character (`|`); one of the keywords **begin**, **include**, or **exclude**; and a regular expression on which you want to search or filter (the expression is case sensitive):

```
show command | {begin | include | exclude} regular-expression
```

The output matches certain lines of information in the configuration file. The following example illustrates how to use output modifiers with the **show interface** command when you want the output to include only lines in which the expression “protocol” appears:

```
Router# show interface | include protocol

FastEthernet0/0 is up, line protocol is up
Serial4/0 is up, line protocol is up
Serial4/1 is up, line protocol is up
Serial4/2 is administratively down, line protocol is down
Serial4/3 is administratively down, line protocol is down
```

For more information on the search and filter functionality, refer to the “Using the Command-Line Interface” chapter in the [Cisco IOS Configuration Fundamentals and Network Management Configuration Guide](#).

# Finding Support Information for Platforms and Cisco Software Images

Cisco IOS software is packaged in feature sets consisting of software images that support specific platforms. The feature sets available for a specific platform depend on which Cisco IOS software images are included in a release. To identify the set of software images available in a specific release or to find out if a feature is available in a given Cisco IOS software image, you can use Cisco Feature Navigator or the software release notes.

## Using Cisco Feature Navigator

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://tools.cisco.com/ITDIT/CFN/jsp/index.jsp>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Using Software Advisor

To see if a feature is supported by a Cisco IOS release, to locate the software document for that feature, or to check the minimum software requirements of Cisco IOS software with the hardware installed on your switch, Cisco maintains the Software Advisor tool on Cisco.com at <http://tools.cisco.com/Support/Fusion/FusionHome.do>

You must be a registered user on Cisco.com to access this tool.

## Using Software Release Notes

Cisco IOS software releases include release notes that provide the following information:

- Platform support information
- Memory recommendations
- New feature information
- Open and resolved severity 1 and 2 caveats for all platforms

Release notes are intended to be release-specific for the most current release, and the information provided in these documents may not be cumulative in providing information about features that first appeared in previous releases. Refer to Cisco Feature Navigator for cumulative feature information.

