CHAPTER 3

Starting and Configuring the Router

This chapter describes how to start the system and perform a basic configuration for your Cisco 7201 router. The chapter contains the following sections:

This chapter guides you through a basic router configuration, which is sufficient for you to access your network. Complex configuration procedures are beyond the scope of this publication and can be found in the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

To configure a Cisco 7201 router from a console, you need to connect a terminal to the router console port.

Functional Overview

This section provides a functional overview of the Cisco 7201 router. It describes the numbering and addressing scheme of the port adapter for the router, the environmental monitoring and reporting functions, and online insertion and removal (OIR). These descriptions help you become familiar with the capabilities of the Cisco 7201 router.

Chassis Slot and Logical Interface Numbering

In the Cisco 7201 router, the *port-adapter-slot-number* is the chassis slot in which a port adapter is installed, whereas the *logical-interface-number* is the physical location of the interface port on a port adapter.

The port adapter slot in the Cisco 7201 router is numbered slot 1. Port adapter slot 0 is always reserved for logical port 10/100/1000.

The Media Access Control (MAC) or hardware address is a standardized data link layer address that is required for certain network interface types. These addresses are not used by other devices in the network; they are specific and unique to each port. The Cisco 7201 router uses a specific method to assign and control the MAC addresses of its port adapters. For a description of the MAC address, see the "MAC Address" section on page 3-3.

You can identify port adapter slots by using software commands. To display information about all port adapter slots, use the **show interfaces** command. To display information about a specific port adapter slot, use the **show interfaces** command with the port adapter type and slot number in the format **show interfaces** *port-adapter-type slot-number/port-number*. If you abbreviate the command (**sh int**) and do not specify port adapter type and slot number (or arguments), the system interprets the command as **show interfaces** and displays the status of all port adapters and ports.

The following example shows how the **show interfaces** command, used without arguments, displays status information (including the physical port adapter number) for the port adapter in a Cisco 7201 router.

In the following example, most of the status information for each interface is omitted.

```
Router# show interfaces
GigabitEthernet0/0 is up, line protocol is up
  Hardware is MV64460 Internal MAC, address is 0019.56c5.2adb (bia
0019.56c5.2adb)
  Internet address is 209.165.200.225
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 45/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 1000Mb/s, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:07:03, output 00:00:07, output hang never
  Last clearing of "show interface" counters 00:00:04
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 180240000 bits/sec, 430965 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     2222975 packets input, 133378500 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier, 0 pause output
     0 output buffer failures, 0 output buffers swapped out
```

You can also use arguments such as the interface type (Ethernet, Token Ring, ATM, and so forth) and the port address (*slot-number/port-number*) to display information about a specific interface only.

The following example shows the display for the first port on the Gigabit Ethernet port:

```
Router# show interfaces g0/0
GigabitEthernet0/0 is up, line protocol is up
  Hardware is MV64460 Internal MAC, address is 0019.56c5.2adb (bia0019.56c5.2adb)
  Internet address is 11.1.1.1/16
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 45/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 1000Mb/s, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:07:03, output 00:00:07, output hang never
  Last clearing of "show interface" counters 00:00:04
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0

(display text omitted)
```

For complete descriptions and instructions of the commands used to configure your Cisco 7201 router, refer to the *Cisco IOS Configuration Fundamentals Configuration Guide* and *Cisco IOS Configuration Fundamentals Command Reference* publications .

MAC Address

All LAN interfaces (ports) require unique MAC addresses, also known as *hardware addresses*. Typically, the MAC address of an interface is stored on a memory component that resides directly on the interface circuitry; however, the OIR feature requires a different method. (For a description of OIR, see the "Online Insertion and Removal" section on page 3-3.)

Using OIR, you can remove a port adapter and replace it with another identically configured one. If the new port adapter matches the port adapter you removed, the system immediately brings it online. In order to enable OIR, an address allocator with unique MAC addresses is stored in an EEPROM on the system board. Each address is reserved for a specific port and slot in the router regardless of whether or not a port adapter resides in that slot. The MAC address for the port adapter slot in the Cisco 7201 is designated slot 0. You can remove a port adapter and insert it into another router without causing the MAC addresses to move around the network or be assigned to multiple devices.

Note that if the MAC addresses were stored on each port adapter, OIR would not function because you could never replace one port adapter with an identical one; the MAC addresses would always be different. Also, each time a port adapter was replaced, other devices on the network would have to update their data structures with the new address. If the other devices did not update quickly enough, the same MAC address could appear in more than one device at the same time.

Note Storing the MAC addresses for every slot in one central location means the addresses stay with the memory device on which they are stored.

Online Insertion and Removal

All port adapters and service adapters in the Cisco 7201 router support online insertion and removal (OIR). However, it is wise to shut down the interface before removing a port adapter that has active traffic moving through it. Removing a port adapter while traffic is flowing through the ports can cause system disruption. Once the port adapter is inserted, the ports can be brought back up.

Caution As you disengage the port adapter from the router or switch, online insertion and removal (OIR) administratively shuts down all active interfaces in the port adapter.

OIR allows you to install and replace port adapters and service adapters while the router is operating; you do not need to notify the software or shut down the system power, although you should not run traffic through the port adapter you are removing while it is being removed. OIR is a method that is seamless to end users on the network, maintains all routing information, and preserves sessions.

The following is a functional description of OIR for background information only; for specific procedures for installing and replacing a port adapter or service adapter in a Cisco 7201 router, refer to the online configuration note for each port adapter or service adapter.

Each port adapter or service adapter has a bus connector that connects it to the router. The connector has a set of tiered pins in three lengths that send specific signals to the system as they make contact with the port adapter or service adapter. The system assesses the signals it receives and the order in which it receives them to determine if a port adapter or service adapter is being removed or inserted into the system. From these signals, the system determines whether to reinitialize a new interface or shut down a removed interface.

For example, when you insert a port adapter or service adapter, the longest pins make contact with the port adapter or service adapter first, and the shortest pins make contact last. The system recognizes the signals and the sequence in which it receives them.

When you remove or insert a port adapter or service adapter in a Cisco 7201 router, the pins send signals to notify the system, which then performs as follows:

1. Rapidly scans the system for configuration changes.
2. Initializes all newly inserted port adapters or service adapters, noting any removed interfaces and placing them in the administratively shutdown state.
3. Brings all previously configured interfaces on the port adapter back to the state they were in when they were removed. Any newly inserted interface is put in the administratively shutdown state, as if it was present (but not configured) at boot time. If a similar port adapter type is reinserted into a slot, its ports are configured and brought online up to the port count of the original port adapter. (A service adapter has no configurable ports.)

Environmental Monitoring and Reporting Functions

Environmental monitoring and reporting functions allow you to maintain normal system operation by identifying and resolving adverse conditions prior to loss of operation. The environmental monitoring functions constantly monitor the internal chassis air temperature and DC supply voltages and currents. If conditions reach shutdown thresholds, the system shuts down to avoid equipment damage from excessive heat. The reporting functions periodically log the values of measured parameters so that you can retrieve them for analysis later, and the reporting functions display warnings on the console if any of the monitored parameters exceed defined thresholds.

Environmental Monitoring

The environmental monitoring functions use two sensors, Sensor 1 (U12) on the underneath front edge of the system board, and Sensor 2 (U20), near the fans. If the air temperature exceeds a defined threshold, the system controller displays warning messages on the console terminal, and if the temperature exceeds

the shutdown threshold, the system controller shuts down the system. The system stores the present parameter measurements for both temperature and DC voltage in NVRAM so you can retrieve them later as a report of the last shutdown parameters.

If an internal power supply temperature or voltage reaches a critical level, the power supply shuts down without any interaction with the system processor.

The environmental monitoring functions use the following levels of status conditions to monitor the system:

- Normal—All monitored parameters are within normal tolerances.
- Warning—The system has exceeded a specified threshold. The system continues to operate, but operator action is recommended to bring the system back to a normal state.
- Critical—An out-of-tolerance temperature or voltage condition exists. The system continues to operate; however, the system is approaching shutdown. Immediate operator action is required.
- Shutdown—The processor has detected a temperature condition that could result in physical damage to system components and has disabled DC power to all internal components. This condition requires immediate operator action. All DC power remains disabled until you toggle the power switch. Before any shutdown, the system logs the status of monitored parameters in NVRAM so you can retrieve it later to help determine the cause of the problem.
- Power supply shutdown—The power supply detected an internal out-of-tolerance overvoltage, overcurrent, or temperature condition and shut itself down. All DC power remains disabled until you toggle the power switch.

Table 3-1 lists the typical temperature thresholds for the Cisco 7201 router, and Table 3-2 lists the DC power thresholds for the normal, warning, and critical (power supply-monitored) levels.

Table 3-1 Typical Processor-Monitored Temperature Thresholds

Parameter	High Warning	High Critical	Shutdown
Sensor 1: Inlet (U12, at the front edge of the board, top of the system board)	111°F (44°C)	138°F (59°C)	176°F (80°C)
Sensor 2: Outlet (U20, near the fans, top of system board)	120°F (49°C)	147°F (64°C)	183°F (84°C)
CPU die	194°F (90°C)	221°F (105°C)	230°F (110°C)

Table 3-2 shows typical power supply-monitored DC-voltage thresholds.

Table 3-2 Typical Power Supply-Monitored DC-Voltage Thresholds

Parameter	Low Critical	Low Warning	High Warning	High Critical
+12.15V	+11.39V	+11.67V	+12.62V	+12.91V

Reporting Functions

The Cisco 7201 router displays warning messages on the console if chassis interface-monitored parameters exceed a desired threshold. You can also retrieve and display environmental status reports with the **show environment**, **show environment all**, **show environment last**, and **show environment table** commands. Parameters are measured and reporting functions are updated every 60 seconds. A brief description of each of these commands follows.

Caution To prevent overheating the chassis, ensure that your system is drawing cool inlet air. Overtemperature conditions can occur if the system is drawing in the exhaust air of other equipment. Ensure adequate clearance around the sides of the chassis so that cooling air can flow through the chassis interior unimpeded and exhaust air exits the chassis and is not drawn into the inlet vent of another device.

The **show environment** command displays reports of the current environmental system status. The report displays parameters that are out of the normal values. No parameters are displayed if the system status is normal. The example that follows shows the display for a system in which all monitored parameters are within normal range:

```
Router# show environment

All measured values are normal
```

If the environmental status is *not* normal, the system reports the worst-case status level. Following is a sample overvoltage warning:

```
Router# show environment

Warning:+3.45 V measured at +3.27 V
```

The **show environment last** command retrieves and displays the NVRAM log, which shows the reason for the last system shutdown (if the shutdown was related to voltage or temperature) and the environmental status at that time. Air temperature is measured and displayed, and the DC voltage supplied by the power supply is also displayed.

Following is sample output of the **show environment last** command:

```
Router# show environment last
  NPE Inlet          previously measured at 28C/82F
  NPE Outlet         previously measured at 30C/86F
  CPU Die            previously measured at 42C/107F
  +3.30 V            previously measured at +3.24
  +1.50 V            previously measured at +1.48
  +2.50 V            previously measured at +2.46
  +5.15 V            previously measured at +4.96
  +1.20 V            previously measured at +1.17
  VDD_CPU            previously measured at +1.25
  -11.95             previously measured at -12.04
  VTT                previously measured at +1.23
  last shutdown reason - power supply shutdown 7201_creg6#
```

The **show environment table** command displays the temperature and voltage thresholds for each temperature sensor and for each monitored status level. These thresholds are related to those listed in Table 3-1 and Table 3-2. The display also lists the shutdown threshold for the system.

Following is sample output of the **show environment table** command for a Cisco 7201 router:

```
Router# show environment table

Sample Point      LowShut   LowCrit   LowWarn   HighWarn  HighCrit  HighShut
NPE Inlet                                        44C/111F  59C/138F
NPE Outlet                                       49C/120F  64C/147F
CPU Die                                          90C/194F  105C/221F
System shutdown for NPE Inlet is 80C/176F System shutdown for NPE Outlet is 84C/183F
System shutdown for CPU Die is 110C/230F
+3.30 V           +2.30     +3.12                          +3.47     +4.29
+1.50 V           +1.05     +1.40                          +1.56     +1.95
+2.50 V           +1.71     +2.34                          +2.61     +3.28
+5.15 V           +3.63     +4.84                          +5.46     +6.75
+1.20 V           +0.82     +1.13                          +1.28     +1.56
VDD_CPU           +0.89     +1.21                          +1.36     +1.71
-11.95            -7.22     -9.63                          -14.45    -16.30
VTT               +0.85     +1.17                          +1.32     +1.64
```

Note Temperature ranges and values are subject to change.

The **show environment all** command displays an extended report that includes temperature readings and voltage readings. The **show environment all** command also displays a report showing which power supply slots are occupied and which are empty.

Following is sample output of the **show environment all** command with an AC power supply installed:

```
Router# show environment all
Power Supplies:
        Power Supply 1 is C7201 AC Power Supply. Unit is on.
        Power Supply 2 is empty.

Temperature readings:
        NPE Inlet        measured at 31C/87F
        NPE Outlet       measured at 34C/93F
        CPU Die          measured at 48C/118F

Voltage readings:
        +3.30 V       measured at +3.28 V
        +1.50 V       measured at +1.50 V
        +2.50 V       measured at +2.48 V
        +5.15 V       measured at +5.07 V
        +1.20 V       measured at +1.20 V
        VDD_CPU       measured at +1.27 V
        -11.95        measured at -12.04 V
        VTT           measured at +1.25 V

Fans:
        Fan 1 is believed to be working
        Fan 1 RPM is 10070
        Fan 2 is believed to be working
        Fan 2 RPM is 10600
        Fan 3 is believed to be working
        Fan 3 RPM is 10600
        Fan 4 is believed to be working
        Fan 4 RPM is 10600

Envm stats saved 0 time(s) since reload
```

Fan Failures

When the system power is on, all five fans should be operational. The system continues to operate if a fan fails. When a fan fails, the system displays the following message:

```
router: 00:03:46:%ENVM-3-BLOWER:Fan 2 may have failed
```

If the air temperature exceeds a defined threshold, the system controller displays warning messages on the console terminal, and if the temperature exceeds the shutdown threshold, the system controller shuts down the system.

If the system does shut down because the temperature exceeded the shutdown threshold, the system displays the following message on the console screen and in the environment display when the system restarts:

```
Queued messages:
%ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown
```

For complete descriptions and instructions for the environmental monitor commands, refer to the *Cisco IOS Configuration Fundamentals Configuration Guide* and *Cisco IOS Configuration Fundamentals Command Reference* publications, which are available online.

Checking Conditions Prior to System Startup

Check the following conditions before you start your router:

- The port adapter is inserted in its slot and the port adapter lever is in the locked position.
- The network interface cable is connected to the port adapter.
- A CompactFlash Disk is installed.
- SFP modules and their optical-fiber cables are installed.
- The optional USB Flash memory module or Aladdin USB eToken Pro key is installed.
- The optional Fast Ethernet Management port cable is installed.
- The console terminal is turned on.

You are now ready to start your router. Proceed to the "Starting the System and Observing Initial Conditions" section on page 3-8.

Starting the System and Observing Initial Conditions

After installing your Cisco 7201 router and connecting cables, start the router as follows:

Step 1 At the front of the router, place the power switch on the power supply in the on (O) position.

Step 2 Listen for the fans; you should immediately hear them operating.

Step 3 During the boot process, observe the system LEDs. The LEDs on the port adapter go on and off in irregular sequence. They may go on, go out, and go on again for a short time. On the router, the green STATUS LED comes on and stays on.

Step 4 Observe the initialization process. When the system boot is complete (a few seconds), the processor begins to initialize the port adapter and the I/O subsystem. During this initialization, the LEDs on the port adapter probably will flash on and off.

The ENABLED LED on the port adapter goes on when initialization is completed, and the console screen displays a script and system banner similar to the following:

```
Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version
12.4(7201XD.2006-12-03), INTERIM SOFTWARE
Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sun 03-Dec-06 00:44 by biff
Image text-base: 0x0000A3F8, data-base: 0x0327A000
```

Step 5 When you start up the router for the first time, the system automatically enters the setup facility, which determines which port adapter is installed and prompts you for configuration information. On the console terminal, after the system displays the system banner and hardware configuration, you will see the following System Configuration Dialog prompt:

```
         --- System Configuration Dialog ---

At any point you may enter a questions mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.

continue with configuration dialog? [yes]:
```

You have the option of proceeding with the setup facility to configure the interfaces, or exiting from setup and using configuration commands to configure global (system-wide) and interface-specific parameters. You do not have to configure the interfaces immediately; however, you cannot enable the interfaces or connect them to any networks until you have configured them.

Many of the port adapter LEDs do not go on until you have configured the interfaces. To verify correct operation of each interface, complete the first-time startup procedures and configuration, and then refer to the configuration note for the port adapter for LED descriptions and to check the status of the interfaces.

If the system does not complete each of the steps in the startup procedure, proceed to Chapter 5, "Troubleshooting Initial Startup Problems" for troubleshooting recommendations and procedures.

Configuring a Cisco 7201 Router

You can configure your Cisco 7201 router using one of the procedures described in the following sections:

- Performing a Basic Configuration Using AutoInstall, page 3-10
- Performing a Basic Configuration Using the Setup Facility, page 3-10
- Performing a Basic Configuration Using Global Configuration Mode, page 3-21

Follow the procedure that best fits the needs of your network configuration.

Note You need to acquire the correct network addresses from your system administrator or consult your network plan to determine correct addresses before you can complete the router configuration.

Before continuing the configuration process, check the current state of the router by entering the **show version** command. The **show version** command displays the release of Cisco IOS software that is available on the router. Sample output of the **show version** command appears in the "Viewing Your System Configuration" section on page 3-30.

Performing a Basic Configuration Using AutoInstall

The AutoInstall process is designed to configure the Cisco 7201 router automatically after connection to your WAN. For AutoInstall to work properly, a TCP/IP host on your network must be preconfigured to provide the required configuration files. The TCP/IP host may exist anywhere on the network as long as the following two conditions are maintained:

1. The host must be on the remote side of the router synchronous serial connection to the WAN.
2. User Datagram Protocol (UDP) broadcasts to and from the router and the TCP/IP host are enabled.

This functionality is coordinated by your system administrator at the site where the TCP/IP host is located. You should not use AutoInstall unless the required files are available on the TCP/IP host. Refer to the *Cisco IOS Configuration Fundamentals Configuration Guide* and *Cisco IOS Configuration Fundamentals Command Reference* publications for information about how AutoInstall works.

Complete the following steps to prepare your Cisco 7201 router for the AutoInstall process:

Step 1 Attach the appropriate synchronous serial cable to synchronous serial interface 0 on the router.

Step 2 Turn the power switch on the power supply to the on (O) position. (This action turns on AC power to the router.)

The router loads the operating system image from flash memory. If the remote end of the WAN connection is connected and properly configured, the AutoInstall process begins.

Step 3 Once the AutoInstall process is completed, use the **copy running-config startup-config** command to write the configuration data to the router's nonvolatile random-access memory (NVRAM). Perform the following step to complete this task.

Step 4 At the # prompt, enter the following command:

```
Hostname# copy running-config startup-config
```

Note Completing Step 3 saves the configuration settings that the AutoInstall process created to NVRAM. If you fail to do this, your configuration will be lost the next time you reload the router.

Performing a Basic Configuration Using the Setup Facility

If you do not plan to use AutoInstall, do not connect the router's serial (WAN) cable to the channel service unit/data service unit (CSU/DSU). If the WAN cable is not connected, the router boots from flash memory and goes automatically into the setup facility.

Note You can run the setup facility any time you are at the enable prompt (#) by entering the **setup** command.

If the serial (WAN) cable is connected to the CSU/DSU and the router does not have a configuration stored in NVRAM, the router attempts to run AutoInstall at startup. The router may take several minutes to determine that AutoInstall is not set up to a remote TCP/IP host. Once the router determines that AutoInstall is not configured, it defaults to the setup facility.

Configuring Global Parameters

When you first start the setup program, you must configure the global parameters. These parameters are used for controlling system-wide settings. Complete the following steps to enter the global parameters:

Step 1 Connect a console terminal to the console port, and then boot the router.

The system boots from flash memory. The following information appears after about 30 seconds. When you see this information, you have successfully booted your router:

```
Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706

Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version
12.4(TAZ3XD.2006-12-03), INTERIM SOFTWARE
Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sun 03-Dec-06 00:44 by
Image text-base: 0x0000A3F8, data-base: 0x0327A000

This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to
export@cisco.com.

Cisco 7201 (c7201) processor (revision A) with 917504K/65536K bytes of memory.
Processor board ID 4294967295
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.1
1 slot midplane, Version 2.255
Last reset from power-on
1 FastEthernet interface
4 Gigabit Ethernet interfaces
4 Channelized T1/PRI ports
2045K bytes of NVRAM.
250200K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 512K).

Press RETURN to get started!
```

The first two sections of the configuration script (the banner and the installed hardware) appear only at initial system startup. On subsequent uses of the setup facility, the script begins with a System Configuration Dialog as shown in the following example.

```
--- System Configuration Dialog ---
```

Step 2 When asked if you would like to enter the initial configuration dialog, enter **yes**.

```
Would you like to enter the initial configuration dialog? [yes/no] yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.

Basic management setup configures only enough connectivity for management of the system,
extended setup will ask you to confiuure each interface on the system.
```

Step 3 When asked if you want to enter the basic management setup, enter **no**.

```
Would you like to enter the basic management setup [yes/no]: no
```

Step 4 When asked if you want to enter the initial configuration dialog and see the current interface summary, enter **yes** or press **Return**:

```
First, would you like to see the current interface summary? [yes]:
```

In the following example, the summary shows a Cisco 7201 router at first-time startup; that is, nothing is configured.

```
Interface           IP-Address     OK?    Method     Status  Protocol
FastEthernet0/0     unassigned     NO     unset      up      up
GigabitEthernet0/0 unassigned      NO     unse       up      up
GigabitEthernet0/1 unassigned      NO     unset      up      up
GigabitEthernet0/2 unassigned      NO     unset      up      up
GigabitEthernet0/3 unassigned      NO     unset      up      up
```

Step 5 Choose which protocols to support on your interfaces. For Internet Protocol (IP)-only installations, you can accept the default values for most of the questions. A typical configuration using IP, IPX, and AppleTalk follows and continues through Step 10:

```
Configuring global parameters:

Enter host name [Router]:
```

Step 6 Enter enable secret, enable, and virtual terminal passwords:

```
The enable secret is a password used to protect access to privileged EXEC and
configuration modes. This password, after entered, becomes encrypted in the configuration.
Enter enable secret: barney

The enable password is used when you do not specify an
enable secret password, with some older software versions, and
some boot images.
Enter enable password: betty

The virtual terminal password is used to protect access to the router over a network
interface.

Enter virtual terminal password: fred
```

Step 7 When asked whether you want to configure System Management, enter **no**.

```
Configure System Management? [yes/no]: no
```

Step 8 The Simple Network Management Protocol (SNMP) is the most widely supported open standard for network management. It provides a means to access and set configuration and run-time parameters of routers and communication servers. SNMP defines a set of functions that can be used to monitor and control network elements.

Enter **yes** or press **Return** to accept SNMP management; enter **no** to refuse it:

```
Configure SNMP Network Management? [yes]: no
Community string [public]:
```

Step 9 For the following queries, do not enable LAT, IP, RIP routing, bridging, AppletTalk, DECnet, CLNS, or IPX:

```
Configure LAT? [no]:
Configure IP? [yes]:
Configure RIP routing? [no]:
Configure bridging? [no]:
Configure AppleTalk? [no]:
Configure DECnet? [no]:
Configure CLNS? [no]:
Configure IPX? [no]:
```

Step 10 In most cases you use IP routing. If you are using IP routing, you must also select an interior routing protocol. You can specify only one of two interior routing protocols to operate on your system using the setup facility: Interior Gateway Routing Protocol (IGRP) or Routing Information Protocol (RIP).

To configure IP routing, enter **yes** (the default) or press **Return**, and then select an interior routing protocol:

```
Do you want to configure FastEthernet0/0 interface? [yes]:
Use the 100 Base-TX (RJ-45) connector? [yes]:
Operate in full-duplex mode? [no]: yes
Configure IP on this interface? [yes]:
IP address for this interface: 10.2.2.1
Subnet mask for this interface [255.0.0.0] : 255.255.255.0
Class A network is 10.0.0.0, 24 subnet bits; mask is /24

Do you want to configure GigabitEthernet0/0 interface? [yes]:
Configure IP on this interface? [yes]:
IP address for this interface: 25.2.4.10
Subnet mask for this interface [255.0.0.0] : 255.255.0.0
Class A network is 25.0.0.0, 16 subnet bits; mask is /16

Do you want to configure GigabitEthernet0/1 interface? [yes]:
Configure IP on this interface? [yes]:
IP address for this interface: 70.1.1.2
Subnet mask for this interface [255.0.0.0] : 255.255.255.0
Class A network is 70.0.0.0, 24 subnet bits; mask is /24

Do you want to configure GigabitEthernet0/2 interface? [yes]: no
```

```
Do you want to configure GigabitEthernet0/3 interface? [yes]: no


Would you like to go through AutoSecure configuration? [yes]: no
AutoSecure dialog can be started later using "auto secure" CLI
```

The following sample display includes a listing of configuration parameters selected in Step 5 through Step 10. Only IP is the selected protocol for this example.

```
Configuring global parameters:

  Enter host name [Router]: router

The enable secret is a one-way cryptographic secret used instead of the enable password
when it exists.

  Enter enable secret: barney

The enable password is used when there is no enable secret and when using older software
and some boot images.

  Enter enable password: betty

line vty 0 4
password cisco
no snmp-server
!
ip routing
no bridge 1
no appletalk routing
no decnet routing
no clns routing
no ipx routing
!
interface FastEthernet0/0
media-type 100BaseX
full-duplex
ip address 10.2.2.1 255.255.255.0
no mop enabled
!
interface GigabitEthernet0/0
ip address 25.2.4.10 255.255.0.0
no mop enabled
!
interface GigabitEthernet0/1
ip address 70.1.1.2 255.255.255.0
no mop enabled
!
interface GigabitEthernet0/2
shutdown
no ip address
!
interface GigabitEthernet0/3
shutdown
no ip address
!
end
```

Step 11 If you choose not to save your configuration, go directly into the router command structure by choosing 0, or choose one from the menu to go back to the start of the setup menu. See the following output for options 0, 1, and 2. Choose option 2 to save your settings to NVRAM. (See the "Checking the Running Configuration Settings" section on page 3-22, and then the "Saving the Running Configuration to NVRAM" section on page 3-22.) If you do not save the configuration settings that you created in the router using configuration mode and the setup facility, your configuration will be lost the next time you reload the router.

```
[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.
Enter your selection [2]: 2
media-type 100BaseX
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.

Press RETURN to get started!
```

Configuring the Native Gigabit Ethernet Interfaces

The Cisco 7201 router reports the Gigabit Ethernet SFP ports as GigabitEthernet 0/0, GigabitEthernet 0/1, GigabitEthernet 0/2, and GigabitEthernet 0/3. The Cisco 7201 router reports the RJ-45 ports as GigabitEthernet 0/0 and Gigabit Ethernet 0/1. Before configuring either the GigabitEthernet 0/0 or Gigabit Ethernet 0/1 interfaces, you must first use the **media-type** interface command to select the media type, **sfp** or **rj45**.

Changing the Media Type

To be able to use a particular media type, use Cisco IOS to select the media type. This is done by using the **media-type** interface command:

media-type { **sfp** | **rj45** }

Example:

```
interface GigabitEthernet 0/0
media-type rj45
end
```

Configuring the Interface Transmission and Speed Modes

After changing the media type, configure the speed and duplex transmission modes to appropriately match the new interface characteristics. Changing the speed and duplex of a Cisco 7201 router Gigabit Ethernet interface is done using the **speed** and **duplex** interface commands.

Table 3-3 Supported Speed and Duplex Settings

Media Type	Speed	Duplex
SFP	1000, auto	full, half, auto[1]
RJ-45	10, 100, 1000, auto	full, half, auto

1. GE 0/3 only supports full duplex mode.

When using the **sfp** media type, there is also the additional **negotiation auto** command that is used to enable the IEEE 802.1z Gigabit Ethernet (1000 Mbps) autonegotiation protocol.

To turn this **negotiation auto** feature off (it is on by default), issue the interface command **no negotiation auto**. This is useful for connecting to other Gigabit Ethernet equipment that does not support IEEE 802.1z autonegotiation. We recommend that a fixed **speed** and **duplex** setting should be used.

When the interface is configured for **negotiation auto**, the interface advertises all modes of which it is capable. The link only comes up if the negotiation process succeeds in finding a common mode between the Cisco 7201 SFP media type and its link partner.

The **sfp** media type always defaults to 1000-Mbps, full-duplex operation. The only available speed in this mode is 1000 Mbps; there is no difference whether **1000** or **auto** is selected. GE 0/0, GE 0/1 and GE 0/2 support half and full duplex mode; GE 0/3 only supports full duplex mode.

Note Copper SFP modules are considered to be SFP media types, not RJ-45 media types. GE 0/2 and GE 0/3 are optical ports, whether or not a copper SFP module with an RJ-45 connector, or a standard SFP module is installed.

Note The **negotiation auto** feature is not supported when using the **rj-45** media type and will be ignored if implementation is attempted. (Autonegotiation is always on in RJ-45 mode.)

Note The laser source in Cisco 7200 series router is not shut down even if the SFP interface is in shut down state.

When an RJ-45 interface is enabled, it advertises all modes of which it is capable. The link only comes up if the negotiation process succeeds in finding a common mode between the Cisco 7201 RJ-45 media type and its link partner.

If you change from the **sfp** to the **rj-45** media type, you must set **speed** and **duplex** after you have executed the **media type** command to ensure the interface operates in the correct mode.

For information on flow control, see the "Gigabit Ethernet Flow Control Information" section on page A-9.

Debugging

Cisco IOS provides two commands to provide information on your interfaces: **show interface GigabitEthernet 0/X** (where X is 0, 1, 2, or 3) and **show controllers GigabitEthernet 0/X** (where X is 0, 1, 2, or 3).

The output of the **show interface** command is useful for determining the current operating mode of the interface (speed/duplex/media type) and the current interface statistics.

The output of the **show controllers** command displays more information specific to the Cisco 7201 router Gigabit Ethernet interface. For example, it shows the detected link status, speed, and duplex, and also determines the current status of autonegotiation and the link partners' abilities (if it is an autonegotiation-capable interface).

The **show controllers** command also displays the current operating state of the driver and the Ethernet controller hardware. The **show controllers** command is a very powerful debugging aid, especially for Cisco engineers should you need help in debugging a problem. If you have any problems with your Gigabit Ethernet interfaces, you will need to provide this information to Cisco for analysis.

Resetting the Interface

Should you have a problem with your interface and you want to try and reset it, use the command:

clear interface GigabitEthernet 0/X (where X is 0, 1, 2, or 3)

Clearing Counters

Interface counters may be cleared (reset) by using the command:

clear counters GigabitEthernet 0/X (where X is 0, 1, 2, or 3)

Note Using this command will not reset the interface.

Configuring Port Adapter Interfaces

Following are the steps for configuring interfaces to allow communication over a LAN or WAN. To configure the interface parameters, you need your interface network addresses and subnet mask information. Consult with your network administrator for this information.

Note Only one port adapter can be installed in the Cisco 7201 router. Following are three examples of three different interfaces that might be used.

Configuring ATM Interfaces

In the following example, an ATM interface in slot 1 is configured for an ATM LAN using IP. Follow these steps to configure an ATM interface:

Step 1 Using your own addresses and mask at the setup prompts, respond to the prompts as follows:

```
Configuring interface parameters:

Configuring interface ATM1/0:
Is this interface in use? [yes]:
Configure IP on this interface? [yes]:
IP address for this interface: 1.1.1.10
Number of bits in subnet field [0]:
Class C network is 1.1.1.0, 0 subnet bits; mask is /24
```

Step 2 Determine if you are going to enable IPX on this interface; if you are, enter the unique IPX network number:

```
Configure IPX on this interface? [no]: yes
IPX network number [2]:
```

Step 3 If you are using AppleTalk on the interface, enter **yes**. Enter **yes** to configure for extended AppleTalk networks, and then enter the cable range number. Enter the zone name and any other additional zones that are associated with your local zone:

```
Configure AppleTalk on this interface? [no]: yes
Extended AppleTalk network? [no]: yes
AppleTalk starting cable range [0]:
```

Step 4 Save your settings to NVRAM. (See the "Checking the Running Configuration Settings" section on page 3-22, and then the "Saving the Running Configuration to NVRAM" section on page 3-22.) If you do not save the configuration settings that you created in the router using configuration mode and the setup facility, your configuration will be lost the next time you reload the router.

Note If additional ATM interfaces are available in your system, you are prompted for their configurations as well.

Configuring Fast Ethernet Interfaces

In the following example, a Fast Ethernet interface in slot 1 is configured for a Fast Ethernet LAN using IP. Follow these steps to configure Fast Ethernet interfaces:

Step 1 Using your own addresses and mask at the setup prompts, respond to the prompts as follows:

```
Configuring interface parameters:

Configuring interface FastEthernet1/0:
Is this interface in use? [yes]:
Use the 100 Base-TX (RJ-45) connector? [yes]:
Operate in full-duplex mode? [no]:
Configure IP on this interface? [yes]:
IP address for this interface: 1.1.1.20
Number of bits in subnet field [0]:
Class C network is 1.1.1.0, 0 subnet bits; mask is /24
```

Step 2 Determine if you are going to enable IPX on this interface; if you are, enter the unique IPX network number:

```
Configure IPX on this interface? [no]: yes
IPX network number [2]:
```

Step 3 If you are using AppleTalk on the interface, enter **yes**. Enter **yes** to configure for extended AppleTalk networks, and then enter the cable range number. Enter the zone name and any other additional zones that are associated with your local zone:

```
Configure AppleTalk on this interface? [no]: yes
Extended AppleTalk network? [no]: yes
AppleTalk starting cable range [0]:
```

Step 4 Save your settings to NVRAM. (See the "Checking the Running Configuration Settings" section on page 3-22, and then the "Saving the Running Configuration to NVRAM" section on page 3-22.) If you do not save the configuration settings that you created in the router using configuration mode and the setup facility, your configuration will be lost the next time you reload the router.

Note If additional Fast Ethernet interfaces are available in your system, you are prompted for their configurations as well.

Configuring Synchronous Serial Interfaces

Synchronous serial interfaces are configured to allow connection to WANs through a CSU/DSU. In the following example, a synchronous serial interface in slot 1 is configured for a WAN connection using IP. Follow these steps to configure synchronous serial interfaces:

Step 1 Using your own addresses and mask at the setup prompts, respond to the prompts as follows:

```
Configuring interface parameters:

Configuring interface serial 1/0:
Is this interface in use? [yes]:
Configure IP on this interface? [yes]:
IP address for this interface: 1.1.1.30
Number of bits in subnet field [0]:
Class A network is 1.1.1.0, 0 subnet bits; mask is /24
```

Step 2 Determine if you are going to enable IPX on this interface; if you are, enter the unique IPX network number:

```
Configure IPX on this interface? [no]: yes
IPX network number [2]:
```

Step 3 If you are using AppleTalk on the interface, enter **yes**. Enter **yes** to configure for extended AppleTalk networks, and then enter the cable range number. Enter the zone name and any other additional zones that are associated with your local zone:

```
Configure AppleTalk on this interface? [no]: yes
Extended AppleTalk network? [no]: yes
AppleTalk starting cable range [0]:
```

Step 4 Save your settings to NVRAM. (See the "Checking the Running Configuration Settings" section on page 3-22, and then the "Saving the Running Configuration to NVRAM" section on page 3-22.) If you do not save the configuration settings that you created in the router using configuration mode and the setup facility, your configuration will be lost the next time you reload the router.

Note If additional synchronous serial interfaces are available in your system, you are prompted for their configurations as well.

The following example display lists the ATM configuration parameters:

```
Configuring interface ATM1/0:
  Is this interface in use? [yes]:
  Configure IP on this interface? [yes]:
    IP address for this interface: 1.1.1.10
    Number of bits in subnet field [0]: 0
    Class C network is 1.1.1.0, 0 subnet bits; mask is /24
  Configure IPX on this interface? [yes]:
    IPX network number [2]:
  Configure AppleTalk on this interface? [no]: yes
    Extended AppleTalk network? [no]: yes
    AppleTalk starting cable range [0]:


The following configuration command script was created:

hostname Router
```

```
enable secret 5 $1$u8z3$PMYY8em./8sszhzk78p/Y0
enable password betty
line vty 0 4
password fred
snmp-server community public
!
ip routing
no vines routing
ipx routing
appletalk routing
no apollo routing
no decnet routing
no xns routing
no clns routing
no bridge 1
! Turn off IPX to prevent network conflicts.

interface ATM1/0
ip address 1.1.1.10 255.0.0.1
appletalk cable-range 0-0 0.0
appletalk discovery
!
router igrp 15
network 1.0.0.0
!
end

Use this configuration? [yes/no]: yes
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.

Press RETURN to get started!
```

Your router is now minimally configured and ready to use. You can use the **setup** command if you want to modify the parameters after the initial configuration. To perform more complex configurations, use the **configure** command.

For information on additional interface configuration and specific system configurations, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

Performing a Basic Configuration Using Global Configuration Mode

You can configure a Cisco 7201 router manually if you prefer not to use the setup facility or AutoInstall. Complete the following steps to configure the router manually:

Step 1 Connect a console terminal to the console port.

Step 2 When asked if you want to enter the initial dialog, answer **no** to go into the normal operating mode of the router:

```
Would you like to enter the initial dialog? [yes]: no
```

Step 3 After a few seconds the user EXEC prompt `(Router>)` is displayed. Type **enable** to enter enable mode (configuration changes can only be made in enable mode):

```
Router> enable
```

The prompt changes to the privileged EXEC prompt:

```
Router#
```

Step 4 Enter the **configure terminal** command at the enable prompt to enter configuration mode from the terminal:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
```

At the `Router(config)#` prompt, enter the **interface** *type slot/port* command to enter the interface configuration mode:

```
Router(config)# interface serial 0/1
Router(config-int)#
```

In either configuration mode, you can now enter any changes to the configuration. Press **Ctrl-Z** (hold down the **Control** key while you press **Z**) or enter **end** to exit configuration mode and return to the EXEC command interpreter.

Step 5 Save your settings to NVRAM. (See the "Checking the Running Configuration Settings" section on page 3-22, and then the "Saving the Running Configuration to NVRAM" section on page 3-22.) If you do not save the configuration settings that you created in the router using configuration mode and the setup facility, your configuration will be lost the next time you reload the router.

Your router is now minimally configured and will boot with the configuration you have entered. To see a list of the configuration commands available to you, enter **?** at the prompt while in configuration mode.

Checking the Running Configuration Settings

To check the value of the settings you have entered, enter the **show running-config** command at the `Router#` prompt:

```
Router# show running-config
```

To review changes you make to the configuration, use the EXEC mode **show startup-config** command to display the information stored in NVRAM.

Saving the Running Configuration to NVRAM

To review changes you make to the configuration, use the EXEC mode **show startup-config** command to display the information stored in NVRAM.

To store the configuration or changes to your startup configuration in NVRAM, enter the **copy running-config startup-config** command at the `Router#` prompt:

```
Router# copy running-config startup-config
```

Using this command saves the configuration settings that you created in the router using configuration mode and the setup facility. If you fail to do this, your configuration will be lost the next time you reload the router.

Performing Other Configuration Tasks

To make advanced configuration changes after you establish the basic startup configuration for your router, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware. These publications contain additional information on using the **configure** command.

The configuration publications also provide information about the following tasks:

- Understanding and working with the user interface on your router
- Booting and rebooting the router
- Setting the configuration register
- Loading configuration files or system images using remote copy protocol (rcp) or Trivial File Transfer Protocol (TFTP)
- Reloading the operating system

Upgrading ROMmon on the Cisco 7201

Upgrading the rewriteable ROM monitor (ROMmon) allows you to download a new ROMmon image instead of having to replace hardware (Cisco 7201) to get a new image.

There are two ROMmon images: the ReadOnly image that ships with your system (and is always available if you have Cisco 7201 hardware EPROM Version 1.4 and software C7201:Rommon version is 12.3(4r)T2 or later), and the upgradable ROMmon image that is downloaded from a specified TFTP file location. You can choose to configure the system to point to the upgradable ROMmon image. At bootup, the system starts with the ReadOnly image and then, if configured, jumps to the upgradable ROMmon image. If the upgradable ROMmon image fails to boot, the router marks this ROMmon image as invalid and reverts to the ReadOnly ROMmon image.

The first time a new ROMmon image is executed, you must allow the system to boot ROMmon before doing any additional resets or power cycling. If the ROMmon-executing process is interrupted, the system interprets this as a bootup failure of the new ROMmon image. The router reverts to the ReadOnly image.

Note The ROMmon upgradable image is marked as invalid if it fails to boot. Do not reset the router when it is doing an initial bootup.

Using the show rom-monitor Command and showmon Command

Use the **show rom-monitor** command if you are in Cisco IOS, or the **showmon** command if you are in ROMmon, to determine which ROMmon images are available. See the following examples for information shown in the output of the **show rom-monitor** or **showmon** commands:

- If you are in Cisco IOS, use the **show rom-monitor** command:

```
Router> show rom-monitor

ReadOnly ROMMON version:

System Bootstrap, Version 12.2(20031011:151758)
Copyright (c) 1994-2003 by cisco Systems, Inc.

Upgrade ROMMON version:

System Bootstrap, Version 12.2(20031011:151758)
Copyright (c) 1994-2003 by cisco Systems, Inc.

Currently running ROMMON from Upgrade region
ROMMON from Upgrade region is selected for next boot
```

- If you are in ROMmon, use the **showmon** command:

```
rommon 1 > rommon CLI showmon

ReadOnly ROMMON version is:
System Bootstrap, Version 12.4(4r)XD5, RELEASE SOFTWARE (fc1) Technical Support:
http://www.cisco.com/techsupport
Copyright (c) 2006 by cisco Systems, Inc.

No upgrade ROMMON version present
ReadOnly ROMMON currently running
ReadOnly ROMMON is selected for next boot rommon 3 >
```

Using the upgrade rom-monitor Command

Use the **upgrade rom-monitor file** *file_id* command to program the ROMmon.

See the following example of the **upgrade rom-monitor** command:

```
Router# upgrade rom-monitor file tftp://00.0.00.0/biff/C7200_c7200p-kboot-mz
Loading pgettner/C7200_NPEG2_RMFUR.srec from 00.0.00.0 (via GigabitEthernet0/1):
 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 392348 bytes]

This command will reload the router. Continue? [yes/no]:yes
ROMMON image upgrade in progress.
Erasing boot flash eeeeeeeeeeeeeeeeee
Programming boot flash ppppp
Now Reloading via hard watchdog timeout

Unexpected exception, CP
System Bootstrap, Version 12.2(20031011:151758) [biff]
Copyright (c) 1994-2003 by cisco Systems, Inc.

 Running new upgrade for first time
```

```
System Bootstrap, Version 12.2(20031011:151758) [biff]
Copyright (c) 1994-2003 by cisco Systems, Inc.

ROM:Rebooted by watchdog hard reset
C7201 platform with 1048576 Kbytes of main memory


Upgrade ROMMON initialized
rommon 1 >
```

Note Loading a known good Cisco IOS image after a ROMmon upgrade is advisable.

Changing Preferences to Change the ROMmon Image

To change the ROMmon image (readonly or upgrade), use one of the following commands to make the change depending on whether you are in Cisco IOS or in ROMmon:

- In Cisco IOS, use the **upgrade rom-monitor preference** command to change the ROMmon image:

  upgrade rom-monitor preference [**readonly** | **upgrade**]

  Example:

  ```
  Router: upgrade rom-monitor preference readonly
  You are about to mark ReadOnly region of ROMMON for the highest boot preference.
  Proceed? [confirm]
  Done! Router must be reloaded for this to take effect.
  ```

In ROMmon, use the ROMmon CLI **rommon-pref** [**readonly** | **upgrade**] command to change the ROMmon image:

Example:

```
rommon 2 > rommon-pref readonly
```

Troubleshooting the Upgrade

This section contains sample error messages that appear if an upgrade fails, or if an upgrade is successful but the upgrade image is corrupted.

ROMmon Upgrade Error Messages

One if these error message appears when the upgrade has failed or if the upgrade image is corrupted:

- ROMmon image is not compatible with ReadOnly image:

  ```
  Router: upgrade rom-monitor file tftp://00.0.00.0/biff/c7200p-kboot-mz
  Loading biff/C7200_NPEG2_RMFUR.srec from 00.0.00.0 (via GigabitEthernet0/1):
   !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
  [OK - 392348 bytes]

  ROMMON upgrade aborted; new ROMMON image version is not compatible with ReadOnly
  ```

- ROMmon upgrade image is too big:

```
Router: upgrade rom-monitor file tftp://00.0.00.0/biff/c7200p-kboot-mz
Loading biff/C7200_NPEG2_RMFUR.srec from 00.0.00.0 (via GigabitEthernet0/1):
 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 392348 bytes]

ROMMON upgrade aborted; new ROMMON is too big
```

- Hardware does not support ROMmon upgrade:

```
Router: upgrade rom-monitor file tftp://00.0.00.0/biff/c7200p-kboot-mz
Loading biff/C7200_NPEG2_RMFUR.srec from 00.0.00.0 (via GigabitEthernet0/1):
 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 392348 bytes]

ROMMON upgrade aborted; Current ROMMON does not support upgrade capability
```

- Upgrade command with incorrect file type:

```
Router# upgrade rom-monitor file tftp://00.0.00.0/biff/c7200p-kboot-mz
from 00.0.00.0 (via GigabitEthernet0/1):!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 524288 bytes]

%Error:not srec file
Router#
```

- A boot of a corrupted upgrade image:

```
System Bootstrap, Version 12.2(20031011:151758) [pgettner-npeg1-fur 135], DEVELOPMENT
SOFTWARE
Copyright (c) 1994-2003 by cisco Systems, Inc.

 Upgrade ROMMON corrupted.
 Falling to ReadOnly ROMMON

ROM:Rebooted by watchdog hard reset
C7201 platform with 1048576 Kbytes of main memory

Readonly ROMMON initialized
rommon 1 >
```

Upgrading FPGA

A field-programmable gate array (FPGA) device exists on the Cisco 7201. FPGA devices are a type of field-programmable device (FPD) that support separate software upgrades. Whenever a Cisco image is released that supports the FPD feature, a companion FPD image package is also released for that Cisco IOS software release. The FPD image package is available from Cisco.com and is accessible from the Cisco Software Center page where you go to download your Cisco IOS software image.

For FPGA upgrade information and procedures, see the *Field-Programmable Device Upgrades* document at

http://www.cisco.com/en/US/docs/routers/7200/configuration/feature_guides/fpd.html

Replacing or Recovering a Lost Password

This section describes how to recover a lost enable or console login password, and how to replace a lost enable secret password on your Cisco 7201 router.

Note It is possible to recover the enable or console login password. The enable secret password is encrypted, however, and must be replaced with a new enable secret password.

Overview of the Password Recovery Procedure

Following is an overview of the steps in the password recovery procedure:

Step 1 If you can log in to the router, enter the **show version** command to determine the existing configuration register value.

Step 2 Press the **Break** key to get to the bootstrap program prompt (ROM monitor). You might need to reload the system image by power cycling the router.

Note To recover a lost password if the Break function is disabled on the router, you must have physical access to the router.

Step 3 Change the configuration register so the following functions are enabled:

a. Break
b. Ignore startup configuration
c. Boot from flash memory

Note The key to recovering a lost password is to set the configuration register bit 6 (0x0040) so that the startup configuration (usually in NVRAM) is ignored. This allows you to log in without using a password and to display the startup configuration passwords.

Note When powering off the router, wait 30 seconds before powering it on again.

Step 4 Power cycle the router by turning power off and then back on.

Step 5 Log in to the router and enter the privileged EXEC mode.

Step 6 Enter the **show startup-config** command to display the passwords.

Step 7 Recover or replace the displayed passwords.

Step 8 Change the configuration register back to its original setting.

Details of the Password Recovery Procedure

Complete the following steps to recover or replace a lost enable, enable secret, or console login password:

Step 1 Attach an ASCII terminal to the console port on your router.

Step 2 Configure the terminal to operate at 9600 baud, 8 data bits, no parity, and 1 stop bit (9600 8N1).

Step 3 If you can log in to the router as a nonprivileged user, enter the **show version** command to display the existing configuration register value. Note the value for use later and proceed to Step 6. If you cannot log in to the router at all, go to the next step.

Step 4 Press the **Break** key or send a Break from the console terminal. If Break is enabled, the router enters the ROM monitor, indicated by the ROM monitor prompt (`rommon1>`). Proceed to Step 6. If Break is disabled, power cycle the router (turn the router off or unplug the power cord, and then restore power after waiting 30 seconds). Then proceed to Step 5.

Step 5 Within 60 seconds of restoring the power to the router, press the **Break** key or send a Break. This action causes the router to enter the ROM monitor and display the ROM monitor prompt (`rommon1>`).

Step 6 Set the configuration register using the configuration register utility; enter the **confreg** command at the ROM monitor prompt as follows:

```
rommon1> confreg
```

Step 7 Answer **yes** to the enable "ignore system config info?" question, and note the current configuration register settings.

Step 8 Initialize the router by entering the **reset** command as follows:

```
rommon2> reset
```

The router initializes, the configuration register is set to 0x142, and the router boots the system image from flash memory and enters the System Configuration Dialog prompt as follows:

```
--- System Configuration Dialog --
```

Step 9 Enter **no** in response to the System Configuration Dialog prompts until the following message is displayed:

```
Press RETURN to get started!
```

Step 10 Press **Return**. The user EXEC prompt is displayed as follows:

```
Router>
```

Step 11 Enter the **enable** command to enter privileged EXEC mode. Then enter the **show startup-config** command to display the passwords in the configuration file as follows:

```
Router# show startup-config
```

Step 12 Scan the configuration file display looking for the passwords (the enable passwords are usually near the beginning of the file, and the console login or user EXEC password is near the end). The passwords displayed look something like this:

```
enable secret 5 $1$ORPP$s9syZt4uKn3SnpuLDrhuei
enable password 23skiddoo
.
.
line con 0
 password onramp
```

The enable secret password is encrypted and cannot be recovered; it must be replaced. The enable and console login passwords may be encrypted or clear text. Proceed to the next step to replace an enable secret, console login, or enable password. If there is no enable secret password, note the enable and console login passwords, if they are not encrypted, and proceed to Step 17.

Caution *Do not* execute the next step unless you have determined you must change or replace the enable, enable secret, or console login passwords. Failure to follow the steps as shown might cause you to erase your router configuration.

Step 13 Enter the **configure memory** command to load the startup configuration file into running memory. This action allows you to modify or replace passwords in the configuration.

```
Router# configure memory
```

Step 14 Enter the privileged EXEC **configure terminal** command to enter configuration mode:

```
Hostname# configure terminal
```

Step 15 Change all three passwords using the following commands:

```
Hostname(config)# enable secret newpassword1
Hostname(config)# enable password newpassword2
Hostname(config)# line con 0
Hostname(config-line)# password newpassword3
```

Change only the passwords necessary for your configuration. You can remove individual passwords by using the **no** form of the above commands. For example, entering the **no enable secret** command removes the enable secret password.

Step 16 You must configure all interfaces to be *not* administratively shut down as follows:

```
Hostname(config)# interface gigabitethernet 0/0
Hostname(config-int)# no shutdown
```

Enter the equivalent commands for all interfaces that were originally configured. If you omit this step, all interfaces are administratively shut down and unavailable when the router is restarted.

Step 17 Use the **config-register** command to set the configuration register to the original value noted in Step 3 or Step 8, or to the factory default value 0x2102 as follows:

```
Hostname(config)# config-register 0x2102
```

Step 18 Press **Ctrl-Z** (hold down the **Control** key while you press **Z**) or enter **end** to exit configuration mode and return to the EXEC command interpreter.

Caution *Do not* execute the next step unless you have changed or replaced a password. If you skipped Step 13 through Step 16, skip to Step 20. Failure to observe this caution causes you to erase your router configuration file.

Step 19 Enter the **copy running-config startup-config** command to save the new configuration to NVRAM.

Step 20 Enter the **reload** command to reboot the router.

Step 21 Log in to the router with the new or recovered passwords.

This completes the steps for recovering or replacing a lost enable, enable secret, or console login password.

Viewing Your System Configuration

You can use the **show version**, **show hardware,** and the **show diag** commands to view information specific to the hardware configuration of your Cisco 7201 router.

Use the **show version** (or **show hardware**) command to display the system hardware, processor and the number of interfaces installed, the software version, the names and sources of configuration files, and the boot images.

The following is Cisco 7201 sample output of the **show version** command:

```
Router# show version
Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version
12.4(biffDEV.061001), INTERIM SOFTWARE Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sun 01-Oct-06 23:42 by biff
ROM: System Bootstrap, Version 12.4(4r)XD5, RELEASE SOFTWARE (fc1)
BOOTLDR: Cisco IOS Software, 7200 Software (C7200P-KBOOT-M), Version 12.4(TAZ3DEV.060927),
INTERIM SOFTWARE
c7201alpha1 uptime is 5 days, 18 hours, 32 minutes System returned to ROM by power-on
System image file is "disk0:c7200p-adventerprisek9-mz.2006-10-01.biffdev"
This product contains cryptographic features and is subject to United States and local
country laws governing import, export, transfer and use. Delivery of Cisco cryptographic
products does not imply third-party authority to import, export, distribute or use
encryption.
Importers, exporters, distributors and users are responsible for compliance with U.S. and
local country laws. By using this product you agree to comply with applicable laws and
regulations. If you are unable to comply with U.S. and local laws, return this product
immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to export@cisco.com.
Cisco 7201 (c7201) processor (revision A) with 917504K/65536K bytes of memory.
Processor board ID 2222222222222
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.2
1 slot midplane, Version 2.255
Last reset from power-on
1 FastEthernet interface
4 Gigabit Ethernet interfaces
2045K bytes of NVRAM.
62443K bytes of USB Flash usbflash0 (Read/Write)
250880K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 512K).
Configuration register is 0x2
```

Use the **show diag** command to determine what type of Gigabit Ethernet port is active or what type of port adapter is installed in your Cisco 7201 router. You can also use the **show diag** *slot* command to display information about the port adapter slot.

The following example shows the **show diag** command output from a Cisco 7201 router. Note that slot 0 is reserved for the native Gigabit Ethernet ports:

Note Both native SFP and RJ-45 Gigabit Ethernet ports are reported as Gigabit Ethernet ports. To select either optical Gigabit Ethernet or copper Gigabit Ethernet ports, use the **media-type** command. See the "Configuring the Native Gigabit Ethernet Interfaces" section on page 3-15.

```
Router# show diag
Slot 1:
Dual OC3 POS Port adapter, 2 ports
Port adapter is analyzed
Port adapter insertion time 00:02:19 ago
```

```
EEPROM contents at hardware discovery:
Hardware Revision : 1.0
PCB Serial Number : JAE07520DYL
Part Number : 73-8220-02
Board Revision : A0
RMA Test History : 00
RMA Number : 0-0-0-0
RMA History : 00
Deviation Number : 0
Product (FRU) Number : PA-POS-2OC3
Top Assy. Part Number : 800-21857-02
EEPROM format version 4
EEPROM contents (hex):
0x00: 04 FF 40 03 E3 41 01 00 C1 8B 4A 41 45 30 37 35
0x10: 32 30 44 59 4C 82 49 20 1C 02 42 41 30 03 00 81
0x20: 00 00 00 00 04 00 88 00 00 00 00 CB 94 50 41 2D
0x30: 50 4F 53 2D 32 4F 43 33 20 20 20 20 20 20 20 20
0x40: 20 C0 46 03 20 00 55 61 02 FF FF FF FF FF FF FF
0x50: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x60: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
```

For specific information on the **show version**, **show hardware**, **show diag**, and other software commands, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

Performing Complex Configurations

After you have installed your Cisco 7201 router hardware, checked all external connections, turned on the system power, allowed the system to boot up, and minimally configured the system, you might need to perform more complex configurations, which are beyond the scope of this publication.

For specific information on system and interface configuration, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.