



CHAPTER 2

Configuring the Cable Modem Termination System for the First Time

This chapter describes how to start up and configure the Cisco uBR7200 series Cable Modem Termination System (CMTS) for the first time. This chapter contains the following sections:

Section	Purpose
“Configuration Fundamentals for the Cisco uBR7200 Series” section on page 2-2	Identifies tasks and analysis that you must complete prior to powering on and configuring the Cisco uBR7200 series router. This includes instructions for completing preconfiguration tasks and for using password procedures.
“Configuring the Cisco uBR7200 Series Using AutoInstall” section on page 2-10	Describes how to use the AutoInstall process, which is designed to configure the Cisco uBR7200 series router automatically <i>after</i> connection to your WAN.
“Configuring the Cisco uBR7200 Series Using the Setup Facility” section on page 2-17	Describes how to use the Setup facility (also called the System Configuration dialog) for configuring your CMTS, an alternative to AutoInstall. Use the Setup facility <i>prior to</i> completing a WAN or LAN connection to your router. The Setup facility supports several functions so that cable interfaces and cable interface line cards are fully operational (after initial setup).
“Configuring the Cable Interface with the Extended Setup Facility” section on page 2-25	Provides instructions for using the Setup facility to create an initial configuration. The extended setup prompts you to configure each interface on the system.
“Configuring the Cisco uBR7200 Series Manually Using Configuration Mode” section on page 2-27	Describes how to configure the Cisco uBR7200 series router manually if you prefer not to use the Setup or AutoInstall facilities.
“Saving Your Configuration Settings” section on page 2-29	Describes how to store the configuration or changes to your startup configuration in NVRAM using the copy running-config startup-config command.

Section	Purpose
“Reviewing Your Settings and Configurations” section on page 2-29	Provides commands to check your settings and review any changes to your configuration.
“Overview of the Cisco Network Registrar for the Cisco uBR7200 Series” section on page 7-1	Provides additional cable-specific instructions about the Cisco Network Registrar (CNR) that are pertinent to the Cisco uBR7200 series and CMTS management.

**Note**

These sections provide minimal configuration instructions. For additional configuration information, refer to subsequent chapters in this guide. For examples of Cisco uBR7200 series CMTS configuration files, refer to the [“Viewing Sample Configuration Files” section on page 2-29](#).

Additional feature configuration information is available in these documents on Cisco.com:

- [Cisco Cable Modem Termination System Feature Guide](#)
- [Cisco IOS Configuration Fundamentals Configuration Guide, Release 12.1](#)
- [Cisco IOS Configuration Fundamentals Command Reference, Release 12.1](#)

**Tip**

Be sure that you have appropriate addresses and values based on your network before you attempt to configure the router. Enter the **show version** command to display the release of Cisco IOS software on your router.

Configuration Fundamentals for the Cisco uBR7200 Series

This section describes the basic parameters of using passwords, and describes initial configuration utilities that are available to you. This section contains the following topics:

- [Preconfiguring the Cisco uBR7200 Series, page 2-2](#)
- [Booting and Logging onto the Cisco uBR7200 Series, page 2-5](#)
- [Setting Password Protection on the Cisco uBR7200 Series, page 2-5](#)
- [Recovering Passwords on the Cisco uBR7200 Series, page 2-6](#)

Preconfiguring the Cisco uBR7200 Series

Complete these prerequisite steps before you power on and configure the Cisco uBR7200 series router:

SUMMARY STEPS

1. Ensure that your network supports reliable broadband data transmission.
2. Ensure that your Cisco uBR7200 series router is installed in operational fashion.
3. Ensure that all other required headend or distribution hub routing and network interface equipment is installed, configured, and operational (based on the supported services).

4. Ensure that DHCP and DOCSIS configuration files have been created and pushed to appropriate servers.
5. Verify sufficient and proper CPE.
6. Be familiar with your channel plan to assign appropriate frequencies.
7. Be familiar with your dial plan.
8. Obtain additional IP and security information as necessary.

DETAILED STEPS

	Command or Action	Purpose
Step 1	Ensure that your network supports reliable broadband data transmission.	<p>Your plant must be swept, balanced, and certified based on National Television Standards Committee (NTSC) or appropriate international cable plant recommendations.</p> <p>Ensure that your plant meets all Data-over-Cable Service Interface Specifications (DOCSIS) downstream and upstream radio frequency (RF) requirements. These requirements are documented in the DOCSIS RF Specifications:</p> <p>http://www.cablemodem.com/specifications/</p> <p>Configuration information for downstream and upstream interfaces is contained in Chapter 3, “Configuring Cable Modem Interface Features.”</p>
Step 2	Ensure that your Cisco uBR7200 series router is installed in operational fashion.	<p>Ensure that your Cisco uBR7200 series router is installed according to the instructions in the hardware installation guide that came with your CMTS (for example, the <i>Cisco uBR7200 Series Hardware Installation Guide</i> on Cisco.com:</p> <p>http://www.cisco.com/en/US/docs/cable/cmts/ubr7200/installation/guide/ub72khig.html</p>
Step 3	Ensure that all other required headend or distribution hub routing and network interface equipment is installed, configured, and operational (based on the supported services).	<p>Headend installation requirements include:</p> <ul style="list-style-type: none"> • All routers • Servers (Dynamic Host Configuration Protocol (DHCP), TFTP, and time-of-day (ToD)) • Network management systems • Other configuration or billing systems • IP telephony equipment including gatekeepers and gateways • Backbone and other equipment if supporting VPN <p>Dial-up access servers, telephone circuits/connections and other equipment if supporting telco return</p>

	Command or Action	Purpose
Step 4	Ensure that DHCP and DOCSIS configuration files have been created and pushed to appropriate servers.	When initialized, each cable modem should be enabled to perform the following tasks: <ul style="list-style-type: none"> • Transmit a DHCP request • Receive an IP address • Obtain TFTP and ToD server addresses • Download a DOCSIS configuration file or updated software image if using Cisco uBR924 cable access routers or Cisco uBR910 cable data service units (DSUs) in your network.
Step 5	Verify sufficient and proper CPE.	Ensure that customer premises equipment (CPE)—CMs or set-top boxes (STBs), PCs, telephones, or facsimile machines—meet requirements for your network and service offerings.
Step 6	Be familiar with your channel plan to assign appropriate frequencies.	Outline your strategies for setting up bundling or VPN solution sets, if applicable to your headend or distribution hub.
Step 7	Be familiar with your dial plan.	Know your dial plan if using H.323 for VoIP services and setting up VoIP-enabled CM configuration files.
Step 8	Obtain additional IP and security information as necessary.	As appropriate, obtain: <ul style="list-style-type: none"> • Passwords • IP addresses • Subnet masks • Device names

After these prerequisites are met, you are ready to configure the Cisco uBR7200 series CMTS. This includes, at a minimum:

- Configuring a host name and password for the Cisco uBR7200 series router
- Configuring the router to support IP over the cable plant and network backbone


Caution

If you plan to use service-class-based provisioning, the service classes must be configured at the CMTS before CMs attempt to make a connection.

Booting and Logging onto the Cisco uBR7200 Series

The Cisco uBR7200 series router is administered using the Cisco command interpreter, called the EXEC. You must boot and log in to the router before you can enter an EXEC command.

SUMMARY STEPS

1. Connect a terminal to the I/O controller console port of the Cisco uBR7200 series router and establish a terminal session.
2. Power on the Cisco uBR7200 series router. Enter **no** to choose the normal operating mode of the router.
3. Continue to password definition or recovery and additional configuration.

DETAILED STEPS

	Command or Action	Purpose
Step 1	Connect a terminal to the I/O controller console port of the Cisco uBR7200 series router and establish a terminal session.	You can open a Terminal application (Hyper Terminal) on a PC as follows: <ol style="list-style-type: none"> a. Connect using: Direct to Com 1 b. Set bits per second: 9600 c. Set data bits: 8 d. Set parity: none e. Set stop bit: 1 f. Set flow control: hardware
Step 2	Power on the Cisco uBR7200 series router. Enter no to choose the normal operating mode of the router. Example: Would you like to enter the initial dialog?[yes]: no Router>	The user EXEC prompt appears.
Step 3	Continue to password definition or recovery and additional configuration.	Refer to the remaining procedures in this chapter.

Setting Password Protection on the Cisco uBR7200 Series



Note

For security purposes, the EXEC has two levels of access to commands: user EXEC mode and privileged EXEC mode. The commands available at the user level are a subset of those available at the privileged level.



Tip

Because many privileged-level EXEC commands are used to set operating parameters, password-protect these commands to prevent unauthorized use.

SUMMARY STEPS

- 1. **enable secret** *password* or **enable password**
- 2. *password*

DETAILED STEPS

	Command or Action	Purpose
Step 1	At the EXEC prompt, enter one of the following two commands to set password protection: enable secret <i>password</i> or enable password Example: Router> enable secret cisco	These command differ in their security level. <ul style="list-style-type: none">• enable secret <i>password</i> — Enters a very secure, encrypted password.• enable password — Enters a less secure, nonencrypted password.
Step 2	To gain access to privilege EXEd-level commands, enter the desired password.	
Step 3		
Step 4		



Note

- An enable secret password can contain from 1 to 25 alphanumeric characters in uppercase and lowercase.
- An enable password can contain any number of alphanumeric characters in uppercase and lowercase.
- A number cannot be the first character.
- Spaces are valid password characters; for example, “two words” is a valid password.
- Leading spaces are ignored. Trailing spaces are recognized.
- Alphanumeric characters are recognized as uppercase or lowercase.

Passwords should be different for maximum security. If you enter the same password for both during the setup script, the system accepts it, but you receive a warning message indicating that you should enter a different password.

Recovering Passwords on the Cisco uBR7200 Series

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 uBR7200 series 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 Process

Following is an overview of the general 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.
- Step 3** Change the configuration register so that the following functions are enabled:
- Break
 - Ignore startup configuration
 - 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. Cisco recommends setting the configuration register to 0x142.
-
- 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.
-

**Note**

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

Replacing or Recovering Passwords

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 Cisco uBR7200 series router.
- Step 2** Configure the terminal to operate at 9600 baud, 8 data bits, no parity, and 2 stop bits.
- 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 later use. If you cannot log in to the router at all, continue with 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 (`rommon n>`), where *n* is the number of the command line. 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). 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 (`rommon 1>`).

Step 6 To set the configuration register on a Cisco uBR7200 series router, use the configuration register utility by entering the **confreg** command at the ROM monitor prompt as follows:

```
rommon 1> confreg
```

Answer **yes** to the enable `ignore system config info?` prompt and note the current configuration register settings.

Step 7 Initialize the router by entering the **reset** command as follows:

```
rommon 2> reset
```

The router initializes, the configuration register is set to 0x142, the router boots the system image from Flash memory and enters the System Configuration dialog (setup), as follows:

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

Step 8 Enter **no** in response to the System Configuration dialog prompts until the following message appears:

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

Step 9 Press **Return**. The user EXEC prompt appears as follows:

```
Router>
```

Step 10 Enter the **enable** command to enter privileged EXEC mode.

Step 11 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 will appear similar to the following:

```
enable secret 5 $1$ORPP$9syZt4uKn3SnpuLDrhuei
enable password 23skiddoo
.
.
line con 0
password onramp
```



Note

The enable secret password is encrypted and cannot be recovered; it must be replaced. The enable and console passwords can be encrypted text 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 perform the next step unless you have determined that you must change or replace the enable, enable secret, or console login passwords. Failure to follow the steps as presented here could cause your router configuration to be erased.

- 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 **configure terminal** command for configuration mode:

```
Router# configure terminal
```

- Step 15** To change all three passwords, enter the following commands:

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

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

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

```
Router(config)# interface fast ethernet 0/0
Router(config)# 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 7.

- Step 18** Press **Ctrl-Z** or type **end** to exit configuration mode:

```
Router(config)# end
```

**Caution**

Do not perform the next step unless you have changed or replaced a password. If you have skipped [Step 13](#) through [Step 16](#) previously, then proceed now to [Step 20](#). Failure to observe this sequence causes the system to erase your router configuration file.

- Step 19** Enter the **copy running-config startup-config** command to save the new configuration to nonvolatile memory:

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

- Step 20** Enter the **reload** command to reboot the router:

```
Router# reload
```

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

Configuring the Cisco uBR7200 Series Using AutoInstall

This section provides information about AutoInstall, a Cisco IOS software feature that allows you to configure a new router automatically and dynamically. The AutoInstall process involves connecting a new router to a network where an existing router is preconfigured, turning on the new router, and enabling it with a configuration file that is automatically downloaded from a TFTP server.

The AutoInstall process begins any time a Cisco IOS software-based device is turned on and a valid configuration file is not found in nonvolatile random-access memory (NVRAM).



Note

If you wish to configure the device manually, you should connect directly to the console port and ensure that the router is not connected to the network via any of the interface ports before you turn on the router. Note that it may take several minutes for the device to determine that AutoInstall is not connected to the network.

This section contains the following information and procedures:

- [“Autoinstall Requirements” section on page 2-10](#)
- [“Understanding AutoInstall” section on page 2-11](#)
- [“Preparing for the AutoInstall Process” section on page 2-11](#)
- [“Performing the AutoInstall Procedure” section on page 2-12](#)
- [“Setting Up the TFTP Server for Autoinstall” section on page 2-15](#)
- [“Setting Up the BOOTP or RARP Server for Autoinstall” section on page 2-16](#)
- [“Connecting the New Router to the Network” section on page 2-16](#)

Autoinstall Requirements

For AutoInstall to work properly, the following conditions must be met:

- Routers must be attached physically to the network using one or more of the following interface types:
 - Ethernet
 - Token Ring
 - FDDI
 - Serial with High-Level Data Link Control (HDLC) encapsulation
 - Serial with Frame Relay encapsulation



Note

HDLC is the default serial encapsulation. If the AutoInstall process fails over HDLC, the Cisco IOS software automatically configures Frame Relay encapsulation.



Note

Of Token Ring interfaces, only those that set ring speed with physical jumpers support AutoInstall. AutoInstall does not work with Token Ring interfaces for which the ring speed must be set with software configuration commands. If the ring speed is not set, the interface is set to shutdown mode.

- A TCP/IP host on your network must be preconfigured to provide the required configuration files.
- The TCP/IP host can exist anywhere on the network as long as the following conditions are maintained:
 - The host must be on the LAN or WAN side of the router’s line card connection to the WAN.
 - The User Datagram Protocol (UDP) broadcasts to and from the router.
 - The TCP/IP host is 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.

Understanding AutoInstall

Once the requirements for using AutoInstall are met, the dynamic configuration of the new router occurs as follows:

1. The new router acquires its IP address. Depending on the interface connection between the two routers and/or access servers, the new router's IP address is dynamically resolved by either SLARP requests or BOOTP or RARP requests.
2. The new router resolves its name through network-config, cisco.net.cfg, or DNS.
3. The new router automatically requests and downloads its configuration file from a TFTP server.
4. If a host name is not resolved, the new router attempts to load router-config or ciscotr.cfg.

Preparing for the AutoInstall Process

Complete the following steps to prepare your Cisco uBR7200 series CMTS router for the AutoInstall process:

- Step 1** Attach the appropriate synchronous serial cable to the synchronous serial interface 0 on the router.
- Step 2** Turn the power switch on each power supply to the ON (I) position. This action turns on power to the router.
- The router loads the operating system image from Flash memory; this process can take several minutes. If the remote end of the WAN connection is connected and properly configured, the AutoInstall process begins.
- Step 3** When 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):
- ```
Router# copy running-config startup-config
```
- Completing this step 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.
- Step 4** Choose your preferred method to verify the required file configurations for the AutoInstall Facility:

| Task                                                                        | Description                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a. Verify that the configuration file is on the TFTP server.                | <i>Complete this task first (required).</i> Verify that a configuration file for the new router resides on a TFTP server. This file can contain the full or minimum-required configuration for the administrator to Telnet into the new router (for configuration using Autoinstall).<br><b>Note</b> In addition, complete one of the following two tasks. |
| b. Verify that a file named network-config also resides on the TFTP server. | <i>Complete this task, or task c.</i> In this task, verify that the network-config file on the TFTP server has an Internet Protocol (IP) host name entry for the new router. The TFTP server must be reachable from the new router.                                                                                                                        |
| c. Add IP-address-to-host name mapping to a DNS database file.              | <i>Complete this task, or task b.</i> In this task, add an IP address-to-host name mapping for the new router to a Domain Name System (DNS) database file on the TFTP server.                                                                                                                                                                              |

- Step 5** If the existing router is to help install the new router automatically via an HDLC-encapsulated serial interface using Serial Line Address Resolution Protocol (SLARP), that interface must be configured with an IP address whose host portion has the value 1 or 2. (AutoInstall over Frame Relay does not have this address constraint.) Subnet masks of any size are supported.

- Step 6** If the existing router is to help install the new router automatically using a Frame Relay-encapsulated serial interface, that interface must be configured with the following:
- An IP helper address pointing to the TFTP server. In the following example, 171.69.2.75 is the address of the TFTP server:  
ip helper 171.69.2.75
  - A Frame Relay map pointing back to the new router. In the following example, 172.21.177.100 is the IP address of the new router's serial interface, and 100 is the PVC identifier:  
frame-relay map ip 172.21.177.100 100 dlci
- Step 7** If the existing router is to help install the new router automatically via an Ethernet, Token Ring, or FDDI interface using BOOTP or Reverse Address Resolution Protocol (RARP), then a BOOTP or RARP server also must be set up to map the new router's Media Access Control (MAC) address to its IP address.
- Step 8** IP helper addresses might need to be configured to forward the TFTP and DNS broadcast requests from the new router to the host that is providing those services.

## Performing the AutoInstall Procedure

This procedure provides the steps to configure your Cisco uBR7200 series router using AutoInstall.



### Note

For a detailed description of the processes involved with AutoInstall, refer to the chapter titled “[Using Configuration Tools](#)” in the *Cisco IOS Configuration Fundamentals Configuration Guide, Release 12.1* on Cisco.com.

To dynamically configure a new router using AutoInstall, complete the following steps. Steps 1, 2, and 3 are completed by the central administrator. Step 4 is completed by the person at the remote site.

- Step 1** Modify the existing router's configuration to support the AutoInstall procedure.
- Step 2** Set up the TFTP server to support the AutoInstall procedure.
- Step 3** Set up the BOOTP or RARP server if needed. A BOOTP or RARP server is required for AutoInstall using an Ethernet, Token Ring, FDDI, or Frame Relay-encapsulated serial interface. With a Frame Relay-encapsulated serial interface, the existing router acts as the BOOTP server. A BOOTP or RARP server is not required for AutoInstall using an HDLC-encapsulated serial interface.
- Step 4** Connect the new router to the network.

## Configuring an Interface to Allow Use of AutoInstall

You can use AutoInstall through any of the following types of interfaces:

- [Using an HDLC-Encapsulated Serial Interface Connection](#) (the default configuration for a serial line)
- [Using an Ethernet, Token Ring, or FDDI Interface Connection](#)
- [Using a Frame Relay-Encapsulated Serial Interface Connection](#)

## Using an HDLC-Encapsulated Serial Interface Connection

To set up AutoInstall via a serial line with HDLC encapsulation (the default), you must configure the existing router. Use the following commands, beginning in global configuration mode:

|        | Command                                            | Purpose                                                                                                                                                                                                                                                  |
|--------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>interface serial</b><br><i>interface-number</i> | Configures the serial interface that connects to the new router with HDLC encapsulation (the default), and enters interface configuration mode for the specified interface number.                                                                       |
| Step 2 | <b>ip address</b> <i>address mask</i>              | Enters an IP address for the interface. The host portion of the address must have a value of 1 or 2. (AutoInstall over Frame Relay does not have this address constraint.)                                                                               |
| Step 3 | <b>ip helper-address</b> <i>address</i>            | Configures a helper address for the serial interface to forward broadcasts associated with the TFTP, BOOTP, and DNS requests.                                                                                                                            |
| Step 4 | <b>clock rate</b> <i>bps</i>                       | (Optional) Configures a DCE clock rate for the serial line, unless an external clock is being used. This step is needed only for DCE appliques.                                                                                                          |
| Step 5 | Ctrl-Z                                             | Exits configuration mode.                                                                                                                                                                                                                                |
| Step 6 | <b>copy running-config startup-config</b>          | Saves the configuration file to your startup configuration. On most platforms, this step saves the configuration to NVRAM. On the Cisco7000 family, this step saves the configuration to the location specified by the CONFIG_FILE environment variable. |

In the following example, the existing router's configuration file contains the commands needed to configure the router for AutoInstall on a serial line using HDLC encapsulation:

```
Router# more system:startup-config
...
interface serial 0
 ip address 172.31.10.1 255.255.255.0
 ip helper-address 172.31.20.5
...
```

## Using an Ethernet, Token Ring, or FDDI Interface Connection

To set up AutoInstall using an Ethernet, Token Ring, or FDDI interface, you must modify the configuration of the existing router. Use the following commands, beginning in global configuration mode:

|        | Command                                                                | Purpose                                                                                                                                                                                                                                                  |
|--------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>interface {ethernet   tokenring   fddi}</b> <i>interface-number</i> | Enters interface configuration mode for the specified LAN interface.                                                                                                                                                                                     |
| Step 2 | <b>ip address</b> <i>address mask</i>                                  | Specifies an IP address for the interface.                                                                                                                                                                                                               |
| Step 3 | <b>ip helper-address</b> <i>address</i>                                | (Optional) Configures a helper address to forward broadcasts associated with the TFTP, BOOTP, and DNS requests.                                                                                                                                          |
| Step 4 | Ctrl-Z                                                                 | Exits configuration mode.                                                                                                                                                                                                                                |
| Step 5 | <b>copy running-config startup-config</b>                              | Saves the configuration file to your startup configuration. On most platforms, this step saves the configuration to NVRAM. On the Cisco7000 family, this step saves the configuration to the location specified by the CONFIG_FILE environment variable. |

Typically, the LAN interface and IP address are already configured on the existing router. You might need to configure an IP helper address if the TFTP server is not on the same network as the new router.

In the following example, the existing router's configuration file contains the commands needed to configure the router for AutoInstall on an Ethernet interface:

```
Router# more system:startup-config
. . .
interface Ethernet 0
ip address 172.31.10.1 255.255.255.0
ip helper-address 172.31.20.5
. . .
```

## Using a Frame Relay-Encapsulated Serial Interface Connection

To set up AutoInstall via a serial line with Frame Relay encapsulation, you must configure the existing router. Use the following commands beginning in global configuration mode:

|        | Command                                                                                                                                                                  | Purpose                                                                                                                                                                                                                                                                      |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>interface serial 0</b>                                                                                                                                                | Configures the serial interface that connects to the new router, and enters interface configuration mode.                                                                                                                                                                    |
| Step 2 | <b>encapsulation frame-relay</b>                                                                                                                                         | Configures Frame Relay encapsulation on the interface that connects to the new router.                                                                                                                                                                                       |
| Step 3 | <b>frame-relay map ip <i>ip-address</i> <i>dlci</i></b><br>or<br><b>frame-relay interface-dlci <i>dlci</i></b><br><i>option</i> [ <b>protocol ip</b> <i>ip-address</i> ] | Creates a Frame Relay map pointing back to the new router.<br>or<br>For point-to-point subinterfaces, assigns a data link connection identifier (DLCI) to the interface that connects to the new router, and provides the IP address of the serial port on the new router.   |
| Step 4 | <b>ip address <i>address</i> <i>mask</i></b>                                                                                                                             | Specifies an IP address for the interface. This step sets the IP address of the existing router.                                                                                                                                                                             |
| Step 5 | <b>ip helper-address <i>address</i></b>                                                                                                                                  | Configures a helper address for the TFTP server.                                                                                                                                                                                                                             |
| Step 6 | <b>_(<i>IREFOBJ</i>:1006127_)</b><br><b>_clock rate <i>bps</i></b>                                                                                                       | (Optional) Configures a DCE clock rate for the serial line, unless an external clock is being used. This step is needed only for DCE appliances.                                                                                                                             |
| Step 7 | <b>Ctrl-Z</b>                                                                                                                                                            | Exits configuration mode.                                                                                                                                                                                                                                                    |
| Step 8 | <b>copy running-config</b><br><b>startup-config</b>                                                                                                                      | Saves the configuration file to your startup configuration.<br><br><b>Note</b> On most platforms, this step saves the configuration to NVRAM. On the Cisco 7000 family, this step saves the configuration to the location specified by the CONFIG_FILE environment variable. |

You must use a DTE interface on the new router because the network always provides the clock signal.

In the following example, the existing router's configuration file contains the commands needed to configure the router for Frame Relay AutoInstall on a serial line:

```
Router# more system:startup-config
. . .
interface serial 0
ip address 172.31.20.20 255.255.255.0
encapsulation frame-relay
frame-relay map ip 172.31.10.1 255.255.255.0 48
ip helper-address 172.31.20.5
. . .
```

## Setting Up the TFTP Server for Autoinstall

For AutoInstall to work correctly, the new router must be able to resolve its host name and then download a name-confg or a name.cfg file from a TFTP server. The new router can resolve its host name by using a network-confg or a cisco.net.cfg file downloaded from a TFTP server or by using the DNS.

To set up a TFTP server to support AutoInstall, perform the following steps:

- 
- Step 1** Enable TFTP on a server. For information on this process, consult your host vendor's TFTP server documentation and RFCs 906 and 783.
- Step 2** If you want to use a network-confg or cisco.net.cfg file to resolve the new router's name, create the network-confg or cisco.net.cfg file containing an IP address-to-host name mapping for the new router. Enter the ip host command into the TFTP config file, not into the router. The IP address must match the IP address that is to be dynamically obtained by the new router.
- If you want to use DNS to resolve the new router's name, create an address-to-name mapping entry for the new router in the DNS database. The IP address must match the IP address that is to be dynamically obtained by the new router. For more information on this step, contact your DNS administrator or refer to RFCs 1101 and 1183.
- Step 3** Create the name-confg or name.cfg file, which should reside in the tftpboot directory on the TFTP server. The name part of name-confg or name.cfg filename must match the host name you assigned for the new router in the previous step. Enter configuration commands for the new router into this file.
- The name-confg or the name.cfg file can contain either the new router's full configuration or a minimal configuration.
- The minimal configuration file is a virtual terminal password and an enable password. It allows an administrator to Telnet into the new router to configure it. If you are using BOOTP or RARP to resolve the address of the new router, the minimal configuration file must also include the IP address to be obtained dynamically using BOOTP or RARP.
- You can use the **copy running-config tftp** command to help you generate the configuration file that you later download during the AutoInstall process.
- 



### Note

The existing router might need to forward TFTP requests and response packets if the TFTP server is not on the same network segment as the new router. When you modified the existing router's configuration, you specified an IP helper address for this purpose.

You can save a minimal configuration under a generic newrouter-confg file. Use the **ip host** command in the network-confg or cisco.net.cfg file to specify newrouter as the host name with the address you will be dynamically resolving. The new router should then resolve its IP address, host name, and minimal configuration automatically.

Use Telnet to connect to the new router from the existing router and use the **setup** command facility to configure the rest of the interfaces. For example, the line in the network-confg or cisco.net.cfg file could be similar to the following:

```
ip host newrouter 131.108.170.1
```

The following host configuration file contains the minimal set of commands needed for AutoInstall using SLARP or BOOTP:

```
enable-password letmein
!
line vty 0
password letmein
!
end
```

The preceding example shows a minimal configuration for connecting from a router one hop away. From this configuration, use the setup facility to configure the rest of the interfaces. If the router is more than one hop away, you also must include routing information in the minimal configuration.

The following minimal network configuration file maps the new router's IP address, 131.108.10.2, to the host name newrouter. The new router's address was learned via SLARP and is based on the existing router's IP address of 131.108.10.1.

```
ip host newrouter 131.108.10.2
```

## Setting Up the BOOTP or RARP Server for Autoinstall

If the new router is connected to the existing router using an Ethernet, Token Ring, or FDDI interface, you must configure a BOOTP or RARP server to map the new router's MAC address to its IP address. If the new router is connected to the existing router using a serial line with HDLC encapsulation, or if you are configuring AutoInstall over Frame Relay, the tasks in this section are not required.

To configure a BOOTP or RARP server, use one of the following commands:

| Command                                                            | Purpose                                                                                     |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Refer to your host vendor's documentation and to RFCs 951 and 1395 | If BOOTP is to be used to resolve the new router's IP address, configure your BOOTP server. |
| Refer to your host vendor's documentation and to RFC 903           | If RARP is to be used to resolve the new router's IP address, configure your RARP server.   |



### Note

If the RARP server is not on the same subnet as the new router, use the **ip rarp-server** command to configure the existing router to act as a RARP server. For more information, see the "Configuring a Router as a RARP Server" section.

The following host configuration file contains the minimum set of commands needed for AutoInstall using RARP. It includes the IP address that will be obtained dynamically via BOOTP or RARP during the AutoInstall process. When RARP is used, this extra information is needed to specify the proper netmask for the interface.

```
interface ethernet 0
ip address 131.108.10.2 255.255.255.0
enable-password letmein
!
line vty 0
password letmein
!
end
```

## Connecting the New Router to the Network

Connect the new router to the network using either an HDLC-encapsulated or Frame Relay-encapsulated serial interface or an Ethernet, Token Ring, or FDDI interface. After the router successfully resolves its host name, newrouter sends a TFTP broadcast requesting the file name-config or name.cfg. The router name must be in all lowercase, even if the true host name is not. The file is downloaded to the new router, where the configuration commands take effect immediately. If the configuration file is complete, the new router should be fully operational.

To save the complete configuration to NVRAM, use the following commands in privileged EXEC mode:

|        | Command                                   | Purpose                                                                                                                                                                                                                                                                        |
|--------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>enable password</b>                    | Enters privileged mode on the new router.                                                                                                                                                                                                                                      |
| Step 2 | <b>copy running-config startup-config</b> | Saves the information from the name-config file into your startup configuration. On most platforms, this step saves the configuration to NVRAM. On the Cisco 7000 family, this step saves the configuration to the location specified by the CONFIG_FILE environment variable. |



**Caution**

Verify that the existing and new routers (or access servers) are connected before entering the **copy running-config startup-config EXEC** command to save configuration changes. Use the **ping EXEC** command to verify connectivity. If an incorrect configuration file is downloaded, the new router will load NVRAM configuration information before it can enter AutoInstall mode.

If the configuration file is a minimal configuration file, the new router comes up, but with only one interface operational. Use the following commands to connect to the new router and configure it:

|        | Command                 | Purpose                                                                      |
|--------|-------------------------|------------------------------------------------------------------------------|
| Step 1 | <b>telnet existing</b>  | Establishes a Telnet connection to the existing router.                      |
| Step 2 | <b>telnet newrouter</b> | From the existing router, establishes a Telnet connection to the new router. |
| Step 3 | <b>enable password</b>  | Enters privileged EXEC mode.                                                 |
| Step 4 | <b>setup</b>            | Enters setup mode to configure the new router.                               |

## Configuring the Cisco uBR7200 Series Using the Setup Facility

### Introduction to the Setup Facility

The Cisco uBR7200 series Setup facility (also called the System Configuration dialog) is a useful and efficient tool for configuring your CMTS. The Cable Interface Setup Facility is an alternative mechanism to enable or configure Cisco uBR7200 series parameters. The Setup facility supports automated configuration of upstream parameters.

In earlier releases, upstream ports were put in a default shut-down state after the Setup facility was run. You had to use the CLI to configure a fixed frequency or create a spectrum group, assign an interface to it, and enable each upstream port on a cable interface line card. The Setup facility now supports configuring and enabling upstream parameters.

The Setup facility supports the following functions so that cable interfaces and cable interface line cards are fully operational after initial setup:

- Cable-specific commands
- Upstream frequency definition

For each cable interface, the following information is mandatory:

```
Per upstream:
 cable upstream n frequency f
 no cable upstream n shutdown
```

Options include definition of the following information:

- DHCP server address.
- Options are also provided to set downstream frequency for the upconverter per interface.

If you do not plan to use AutoInstall, do not connect the router's WAN or LAN cable to the channel service unit (CSU) and data service unit (DSU). If the WAN or LAN cable is connected to the CSU and DSU and the router does not have a configuration stored in NVRAM, the router attempts to run AutoInstall at startup.

**Tip**

The router might take several minutes to determine that AutoInstall is not set up to a remote TCP/IP host.

When the router determines that AutoInstall is not configured, it defaults to the Setup facility. If the LAN or WAN cable is not connected, the router boots from Flash memory and automatically runs the Setup facility.

**Note**

You can run the Setup facility when the enable prompt (#) is displayed, by entering the **setup** command in privileged EXEC mode.

## Configuring Global Parameters with the Setup Facility

When you first start the program, configure the global parameters to control system-wide settings:

- Step 1** Connect a console terminal to the console port on the I/O controller, and then boot the router.
- Step 2** After booting from Flash memory, the following information appears after about 30 seconds. When you see this information, you have successfully booted your router:

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

Cisco Internetwork Operating System Software  
IOS (tm) 7200 Software (UBR7200-IK1S-M), Version 12.1(10)EC  
TAC Support: <http://www.cisco.com/tac>  
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Compiled Fri 24-Nov-01 12:59 by yiyi  
Image text-base: 0x60008950, data-base: 0x61478000

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Cisco uBR7246VXR (NPE300) processor (revision D) with 253952K/40960K bytes of memory.  
Processor board ID SAB0433019F  
R7000 CPU at 262Mhz, Implementation 39, Rev 2.1, 256KB L2, 2048KB L3 Cache  
6 slot VXR midplane, Version 2.0

```

Last reset from power-on
Bridging software.
X.25 software, Version 3.0.0.
2 FastEthernet/IEEE 802.3 interface(s)
4 Serial network interface(s)
4 Cable Modem network interface(s)
125K bytes of non-volatile configuration memory.

125440K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
4096K bytes of Flash internal SIMM (Sector size 256K).
cable submgmt default active

Press RETURN to get started!

```

**Note**

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 the following prompt.

```

--- System Configuration Dialog ---
Continue with 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 configure each interface on the system

```

- Step 3** When asked if you want to continue with the System Configuration dialog and enter basic management setup (displays the current interface summary), enter **yes** or press **Return**:

```

Continue with configuration dialog? [yes/no]: yes
.
.
.
Would you like to enter basic management setup? [yes/no]: yes

```

The interface summary appears, showing the state of configured and unconfigured interfaces.

- Step 4** Choose which protocols to support on your interfaces. For IP-only installations, you can accept the default values for most of the questions. A typical configuration using IP follows and continues through [Step 7](#):

Configuring global parameters:

```
Enter host name [Router]: router
```

- Step 5** Enter the enable secret password, the enable password, and the virtual terminal password:

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

```
Enter enable secret: *****
```

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

```
Enter enable password: *****
```

```
Enter virtual terminal password: *****
```

- Step 6** The Simple Network Management Protocol (SNMP) is the most widely supported open standard for network management. SNMP provides a means to access and set configuration and run-time parameters of routers and communication servers. SNMP also defines a set of functions that can be used to monitor and control network elements.

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

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

- Step 7** In all cases, you will use IP routing. When you are using IP routing, select an interior routing protocol. You can specify one of only two interior routing protocols to operate on your system using the Setup facility, either 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:

```
Configure IP? [yes]:
Configure IGRP routing? [yes]:
Your IGRP autonomous system number [1]: 15
```

- Step 8** Configure your line card interface parameters. The following example shows how an 8-port Ethernet line card is installed in line card slot 3. The Setup facility determines the status of all interfaces.

To configure each active interface port for IP, enter **yes** (the default) or press **Return**. For all inactive ports, the default is **no**. You can press **Return** to accept the default.

```
Configuring interface Ethernet 1/0:
Is this interface in use? [yes]:
Configure IP on this interface? [yes]:
IP address for this interface [19.2.22.4]:
Number of bits in subnet field [8]:
Class A network is 19.0.0.0, 8 subnet bits; mask is /16

Configuring interface Ethernet1/1:
Is this interface in use? [no]:

Configuring interface Ethernet1/2:
Is this interface in use? [no]:

Configuring interface Ethernet1/3:
Is this interface in use? [no]:

Configuring interface Ethernet1/4:
Is this interface in use? [no]:

Configuring interface Ethernet1/5:
Is this interface in use? [no]:

Configuring interface Ethernet1/6:
Is this interface in use? [no]:

Configuring interface Ethernet1/7:
Is this interface in use? [no]:
```

- Step 9** Configure your cable interface. The following example shows a Cisco uBR7200 series router with cable interface. The Setup facility, for the most part, determines the status of all interfaces.

To configure each active interface port, enter **yes** (the default) or press **Return**. For all inactive ports, the default is **no**. You can press **Return** to accept the default.

```
Configuring interface cable 5/0:
Is this interface in use? [yes]:
Configure this interface? [yes]:
IP address for this interface [19.2.22.5]:
Number of bits in subnet field [8]:
Class A network is 19.0.0.0, 8 subnet bits; mask is /16

Configuring interface cable 1/1:
```

```
Is this interface in use? [yes]:
Configure this interface? [yes]:
IP address for this interface [19.2.22.6]:
Number of bits in subnet field [8]:
Class A network is 19.0.0.0, 8 subnet bits; mask is /16
```

The configuration program displays the newly created command interface script:

The following command script was created:

```
hostname router
enable secret 5 1f0fc$A38P/KN/9yD3sEKSt6hKQ/
enable password betty
line vty 0 4
password wilma
snmp-server community public
!
ip routing
!
interface cable 5/0
ip address 19.2.22.5 255.255.0.0

router igrp 15
network 19.0.0.0
!
end
```

**Step 10** When asked if you want to use this configuration, enter **yes** or press **Return**.

```
Use this configuration? [yes/no]: yes
```

**Step 11** Save the configuration to NVRAM:

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



**Note**

You must always manually save the configuration settings to NVRAM whenever they are modified.

## Configuring Upstream Frequencies with the Setup Facility

Upstream parameters must be configured manually. After the **Setup facility** is run, upstream ports have a default state of “shutdown.” You have two methods to configure upstream channel frequencies:

- Configure a fixed frequency between 5 to 42 MHz for North American channel plans, and enable the upstream port.
- Create a global spectrum group, assign the interface to it, and enable the upstream port.

The cable interface card receiver accepts time-division multiplexed burst transmissions from cable interfaces (or CMs in set-top boxes), which are DOCSIS-based. The upstream port becomes “up” when it is assigned an upstream frequency and is configured to be administratively up.

The upstream port is frequency-agile. The frequency can change while the interface is up and carrying traffic, if you define spectrum groups per the example provided.

## Configuring Individual Upstream Modulation Profiles

You can define individual modulation profiles. A modulation profile consists of a table of physical layer characteristics for the different types of upstream bursts such as initial maintenance, long grant, request data, request, short grant, and station maintenance.



**Note**

Only qualified personnel should define upstream modulation profiles.

Complete these steps to activate upstream interfaces:

- 
- Step 1** After the Setup facility has initially configured noncable interfaces on the Cisco uBR7200 series router, enter the **enable** command and your password (privileged EXEC).
  - Step 2** Enter the **configure terminal** command to get into global configuration mode.
  - Step 3** In global configuration mode, configure modulation profiles and spectrum groups for your Cisco uBR7200 series router using the **cable modulation-profile** and **cable spectrum-group** commands.
  - Step 4** In cable interface configuration mode, configure various characteristics for the interface in question, using the **cable upstream** commands.

**Note**

Refer to [Chapter 2, “Configuring the Cable Modem Termination System for the First Time,”](#) for further information.

---

## Configuring Interfaces with the Setup Facility

Follow the procedure in this section to configure WAN or LAN interfaces. To configure interface parameters, have your interface network addresses and subnet mask information ready.

### Configuring Ethernet Interfaces

- 
- Step 1** In the following example, the system is being configured for an Ethernet LAN using IP. Respond to the prompts as follows, using your own addresses and mask at the setup prompts:

```
Configuring interface parameters:
Configuring interface Ethernet0/0:
Is this interface in use? [no]: yes
Configure IP on this interface? [no]: yes
IP address for this interface: 1.1.1.10
Number of bits in subnet field [0]:
Class A network is 1.0.0.0, 0 subnet bits; mask is 255.0.0.0
```

- Step 2** Do not enable Internetwork Package Exchange (IPX) on this interface; IPX is not supported on the Cisco uBR7200 series universal broadband router:

```
Configure IPX on this interface? [no]: no
```

- Step 3** If additional Ethernet interfaces are available in your system, enter their configurations when you are prompted.

- Step 4** Save the configuration to NVRAM:

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

**Note**

You must always manually save the configuration settings to NVRAM whenever they are modified.

---

## Configuring Synchronous Serial Interfaces

The synchronous serial interfaces are configured to allow connection to WANs through a CSU/DSU. Complete the following steps to configure the serial ports:

- 
- Step 1** To configure serial port 0 enter yes:
- ```
Configuring interface Serial0/0:
  Is this interface in use? [no]: yes
```
- Step 2** Determine which protocols you want on the synchronous serial interface and enter the appropriate responses:
- ```
Configure IP unnumbered on this interface? [no]:
 IP address for this interface: 10.1.1.20
Number of bits in subnet field [0]:
 Class A network is 10.0.0.0, 0 subnet bits; mask is 255.0.0.0
```
- Step 3** If additional synchronous serial interfaces are available in your system, enter their configurations when you are prompted.
- Step 4** Save the configuration to NVRAM:
- ```
Router# copy running-config startup-config
```



Note

You must always manually save the configuration settings to NVRAM whenever they are modified.

The following sample display includes a continuous listing of all interface configuration parameters selected for Ethernet and synchronous serial interfaces. These parameters are shown in the order in which they appear on your console terminal.



Tip

Only one Ethernet and one synchronous serial interface are configured for this example.

```
Configuring interface parameters:

Configuring interface Ethernet0/0:
  Is this interface in use? [no]: yes

  Configure IP on this interface? [no]: yes

    IP address for this interface: 10.1.1.10

    Number of bits in subnet field [0]:
      Class A network is 10.0.0.0, 0 subnet bits; mask is 255.0.0.0
  Configure IPX on this interface? [no]:
  Configure AppleTalk on this interface? [no]: no

Configuring interface Serial0/0:
  Is this interface in use? [no]: yes

  Configure IP on this interface? [no]: yes

  Configure IP unnumbered on this interface? [no]:
    IP address for this interface: 10.1.1.20

    Number of bits in subnet field [0]:
      Class A network is 10.0.0.0, 0 subnet bits; mask is 255.0.0.0
  Configure IPX on this interface? [no]:
  Configure AppleTalk on this interface? [no]:
```

The following configuration command script was created:

```
hostname Router
enable secret 5 $1$u8z3$PMYY8em./8sszhzk78p/Y0
enable password wilma
line vty 0 4
password s
snmp-server community public
!
ip routing
no vines routing
no ipx routing
no 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 Ethernet0/0
no ipx network
interface Ethernet0/1
no ipx network
!
interface Ethernet0/0
ip address 1.1.1.10 255.0.0.0
no mop enabled
!
interface serial0/0
ip address 1.1.1.20 255.0.0.0
ip route-cache cbus
no keepalive
!
!
router igrp 15
network 1.0.0.0
!
end
```

Use this configuration? [yes/no]: yes

[OK]

Use the enabled mode `configure' command to modify this configuration.

Press RETURN to get started!

Your Cisco uBR7200 series router is now minimally configured and is ready to use. Use the **setup** command in privileged EXEC mode if you want to modify the parameters after the initial configuration. To perform more complex configurations, use the **configure** privileged EXEC command in global configuration mode.

Setup Facility Examples

In the following example, the upstream parameters for a cable interface line card in slot 5 are configured and enabled. Press Return to accept the default.

```
Do you want to configure Cable 5/0 interface? [no]: yes
Downstream setting frequency: 531000000
For cable upstream [0]
Shut down this upstream? [yes/no]: no
Frequency: 33808000
Would you like to configure the DHCP server? [yes/no]: yes
```



```

IP address for the DHCP server [X.X.X.X]: 10.0.0.2
Configure IP on this interface? [yes]:
IP address for this interface [10.20.133.65]:
Subnet mask for this interface [255.0.0.0]: 255.255.255.248
Class A network is 10.0.0.0, 29 subnet bits; mask is /29
In this example, the input above generates the following command interface script:
interface Cable 5/0
no shutdown
cable downstream frequency 531000000
no shutdown
cable downstream modulation 64qam
cable downstream annex B
cable downstream interleave-depth 32
no cable upstream 0 shutdown
cable upstream 0 frequency 33808000
cable helper-address 10.0.0.2
ip address 10.20.133.65 255.255.255.248

```

**Note**

Cable modems or set-top boxes with integrated cable modems are brought online when the utility is run.

**Note**

For Dynamic Host Configuration Protocol (DHCP)/time of day (TOD)/Trivial File Transfer Protocol (TFTP), a static route must exist to the host.

Configuring the Cable Interface with the Extended Setup Facility

The Setup facility creates an initial configuration. The basic management setup configures only enough connectivity for management of the system. The Extended setup facility prompts you to configure each interface on the system.

To invoke the configuration facility, use the following command:

```
Router# setup
```

The following is the System Configuration dialog:

```
Continue with configuration dialog? [yes/no]: yes
```

Identifying the Cable Interface Line Card

Identifying Cable Modem Line Cards

The following Cisco cable interfaces can be installed in a Cisco CMTS:

- The Cisco uBR7200 series router supports one downstream modulator and one upstream demodulator.
 - The Cisco uBR7200 series router supports the following defaults: QAM-256 at 40 MBps downstream, and QAM-16 at 5 Mbps upstream.
 - The card supports upstream channel widths of 200 kHz, 400 kHz, 800 kHz, 1.6 MHz, and 3.2 MHz.
 - The card outputs +42 dBmV and +/- 2 dBmV.
 - The downstream modulator has both an RF output, using the integrated upconverter, and an intermediate frequency (IF) output, which must be connected to an external upconverter.

Identifying Cable Modem Line Card Slots

On the Cisco uBR7200 series router, the cable interface line card is fixed and is always slot 1. To display information about a specific cable interface slot's downstream channel, use the **show interfaces cable** command with the CM card's slot number and downstream port number in the following format:

```
show interfaces cable slot/downstream-port [downstream]
```

Use the slot number and downstream port number to display information about a downstream interface. You can abbreviate the command to **sh int c**. The following example shows the display for upstream channel port 0 on a Cisco uBR7200 series router:

```
Router# sh int c 5/0
```

To display information about a specific cable interface slot's upstream channel, use the **show interfaces cable** command. Include these CM card parameters:

- Slot number
- Downstream port number
- Upstream port number

Use this format:

```
show interfaces cable slot/downstream-port [upstream] upstream-port
```

Use the slot number, downstream port number, and upstream port number to display information about an upstream interface. You can abbreviate the command to **sh int c**.

The following example shows the display for upstream channel port 0 in cable interface slot 3 of a Cisco uBR7200 series router that is turned up:

```
Router# sh int c3/0 upstream
```

Configuring Global Parameters in Extended Setup

Step 1 Access the host by responding to the following prompt:

```
Enter host name [cmts]:
```

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

Step 2 Respond to this prompt:

```
Enter enable secret [Use current secret]: aa
```

Next, the enable password is used when you do not specify an enable secret password, with some older software versions, and some boot images.

Step 3 Respond to this prompt:

```
Enter enable password [rHoz]: bb
```

Next, use the virtual terminal password to protect access to the router over a network interface.

Step 4 Respond to this prompt:

```
Enter virtual terminal password [cc]: cc
```

The following system information appears.

```
Configure SNMP Network Management? [no]:
```

```

Configure IP? [yes]:
Configure IGRP routing? [yes]:
Your IGRP autonomous system number [1]:
Configure CLNS? [no]:
Configuring interface parameters:
Do you want to configure FastEthernet0/0 interface? [yes]:
Use the 100 Base-TX (RJ-45) connector? [yes]:
Operate in full-duplex mode? [no]:
Configure IP on this interface? [yes]: no
Do you want to configure Ethernet1/0 interface? [yes]: n
Do you want to configure Cable5/0 interface? [yes]:
Downstream setting frequency : 531000000
For cable upstream [0]
Shut down this upstream ? [yes/no]: no
Frequency : 33808000
Would you like to configure the DHCP server ? [yes/no]: yes
IP address for the DHCP server
[X.X.X.X]: 10.0.0.2
Configure IP on this interface? [no]: yes
IP address for this interface: 10.20.133.65
Subnet mask for this interface [255.0.0.0] : 255.255.255.248
Class A network is 10.0.0.0, 29 subnet bits; mask is /29

```

The following configuration command script is created:

```

interface cable5/0
ip address 10.20.133.65 255.255.255.248
no ip mroute-cache
no keepalive
cable insertion-interval 500
cable downstream annex B
cable downstream modulation 64qam
cable downstream interleave-depth 32
cable downstream frequency 531000000
cable upstream 0 frequency 33808000
cable upstream 0 power-level 0
no cable upstream 0 shutdown
cable helper-address 10.0.0.2

```



Note

For modems to acquire an IP address, they must have direct access to DHCP, TFTP, or ToD servers, or have a static route set.

Configuring the Cisco uBR7200 Series Manually Using Configuration Mode

You can configure the Cisco uBR7200 series router manually if you prefer not to use the Setup facility or AutoInstall. Complete the following steps:

- Step 1** Connect a console terminal to the console port on the I/O controller.
- Step 2** When asked if you want to enter the initial dialog, respond **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>) appears. Type **enable** to enter enable mode (configuration changes can be made only in enable mode):

Router> **enable**

The prompt changes to the enable mode (also called privileged EXEC) prompt:

Router#

- Step 4** Enter the **configure terminal** command (**conf t**) 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)#
```

**Tip**

To see a list of the configuration commands available to you, enter **?** at the prompt or type **help** while in configuration mode.

- Step 5** At the Router(config)# prompt, enter the **interface type slot/port** command to enter the interface configuration mode:

```
Router(config)# interface cable slot/port
Router(config-if)#
```

- Step 6** Set the downstream center frequency to reflect the digital carrier frequency of the downstream RF carrier (the channel) for the downstream port:

```
Router(config-int)# cable downstream frequency down-freq-hz
```

**Note**

This command has no effect on the external upconverter. It is informational only.

- Step 7** Activate the downstream port on the cable interface line card to support digital data transmission over the hybrid fiber-coaxial network:

```
Router(config-int)# no shutdown
```

- Step 8** Enter the fixed center frequency in Hz for your downstream RF carrier and the port number:

```
Router(config-int)# cable upstream port frequency up-freq-hz
```

**Note**

Be sure not to select an upstream frequency that interferes with that used for any other upstream application in your cable plant.

- Step 9** Repeat Step 8 for each upstream port on the cable interface line card.

- Step 10** Activate the upstream port:

```
Router(config-int)# no cable upstream port shutdown
```

- Step 11** Repeat Step 10 to activate each port used on your cable interface line card.

- Step 12** Exit to return to the configuration mode:

```
Router(config-if)# exit
Router(config)#
```

- Step 13** Enter the next interface to configure, following Step 6 through Step 12, or type **exit** to return to enable mode.

```
Router(config)# exit
Router#
%SYS-5-CONFIG_I: Configured from console by console#
```

- Step 14** Save the configuration to NVRAM:

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

Saving Your Configuration Settings

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
```

This command saves the configuration settings you set using configuration mode, the Setup facility, or AutoInstall.



Tip

If you do not save your settings, your configuration will be lost the next time you reload the router.

Reviewing Your Settings and Configurations

You can check your settings and review any changes to your configuration using various software commands.

- To view information specific to the hardware and cable interface configuration on your Cisco uBR7200 series router, use **show** commands.
 - Use the following command to verify the downstream center frequency:

```
Router# show controllers cable slot/port downstream
```
 - Use the following command to verify the current value of an upstream port frequency:

```
Router# show controllers cable slot/port upstream
```
 - Use the following command to check the value of the settings you entered:

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

Viewing Sample Configuration Files

This section provides examples of Cisco uBR7200 series router configuration files. To view the current configuration of a Cisco uBR7200 series router, enter the **show running-config** command at the command-line interface (CLI) prompt in EXEC mode or privileged EXEC mode.

Baseline Privacy Interface Configuration Files

The Cisco uBR7200 series CMTS supports 56-bit and 40-bit encryption and decryption; 56 bit is the default. After you choose a CMTS image that supports Baseline Privacy Interface (BPI), BPI is enabled by default for the Cisco uBR7200 series CMTS. Key commands that appear in the Cisco uBR7200 series router configuration file that denote that encryption and decryption are supported include:

- `int cable 5/0`
- `cable privacy kek grace-time 800`
- `cable privacy kek life-time 750000`
- `cable privacy tek grace-time 800`
- `cable privacy tek life-time 56000`
- `cable privacy enable`
- `cable privacy mandatory`

**Note**

The cable interface must also support encryption and decryption.

When Baseline Privacy is enabled, the Cisco uBR7200 series router routes encrypted and decrypted packets from a host or peer to another host or peer. BPI is configured with key encryption keys (KEKs) and traffic encryption keys (TEKs). A KEK is assigned to a CM, based on the CM's service identifier (SID), and permits the CM to connect to the Cisco uBR7200 series router when Baseline Privacy is activated. The TEK is assigned to a CM when its KEK has been established. The TEK is used to encrypt data traffic between the CM and the Cisco uBR7200 series router.

KEKs and TEKs can be set for Baseline Privacy on the HFC network to expire based on a **grace-time** or a **life-time** value, defined in seconds. A **grace-time** value assigns a temporary key to a CM to access the network. A **life-time** value assigns a more permanent key to a CM. Each CM that has a **life-time** value assigned requests a new lifetime key from the Cisco uBR7200 series router before the current one expires.

To set the duration in *seconds* for KEK or TEK **grace-time** or **life-time**, use the following commands in global configuration mode. To restore the default values, use the **no** form of each command.

```
cable privacy kek {grace-time [seconds] | life-time [seconds]}
no cable privacy kek {grace-time | life-time}
```

```
cable privacy tek {grace-time [seconds] | life-time [seconds]}
no cable privacy tek {grace-time | life-time}
```

Syntax Description

grace-time <i>seconds</i>	(Optional) Length of key encryption grace-time in seconds. Valid range is 300 to 1800 seconds. The default <i>grace-time</i> value is 600 seconds.
life-time <i>seconds</i>	(Optional) Length of the key encryption life-time in seconds. Valid range is 86,400 to 604,800. The default <i>life-time</i> value is 604800 seconds.

**Tip**

Use the **show cable modem** command to identify a CM with encryption and decryption enabled. The *online(pk)* output of this command reveals a CM that is registered with BPI enabled and a KEK assigned. The *online(pt)* output reveals a CM that is registered with BPI enabled and a TEK assigned.

Should you want to change the Cisco uBR7200 series default of 56-bit encryption and decryption to 40-bit, use the “40 bit DES” option:

```
Router(config-if)# cable privacy ?
  40-bit-des          select 40 bit DES
  ^^^^^^^^^
  authenticate-modem  turn on BPI modem authentication
  authorize-multicast turn on BPI multicast authorization
  kek                 KEK Key Params
  mandatory           force privacy be mandatory
  tek                 TEK Key Params
```

Software then generates a 40-bit DES key, where the DES key that is generated and returned masks the first 16 bits of the 56-bit key to zero in software. To return to 56-bit encryption and decryption after changing to 40-bit, enter the **no** command in front of the “40 bit des” option.