



Configuring a Leased Line

The configuration in this chapter describes how to configure a Cisco router for IP and Internetwork Packet Exchange (IPX) over a synchronous serial line.

Before You Begin

The configuration in this chapter is based on the following assumptions:

- Your Cisco router hardware is correctly installed in accordance with the Hardware Installation Guide for your Cisco router.
- Your Cisco router is using multilink Point-to-Point Protocol (PPP).
- Your Cisco router is using dynamic IP and IPX routing, in which IP Routing Information Protocol (RIP) resolves IP routes, and IPX RIP and IPX Service Advertising Protocol (SAP) dynamically resolve IPX routes and services.

Before you begin configuration, be aware of the following:

- You need to enter the commands in the order shown in the task tables.
- The values shown in *italic* are examples. For the values shown, you should instead enter values appropriate for your network.
- You should be familiar with Cisco IOS software and its conventions.

**Note**

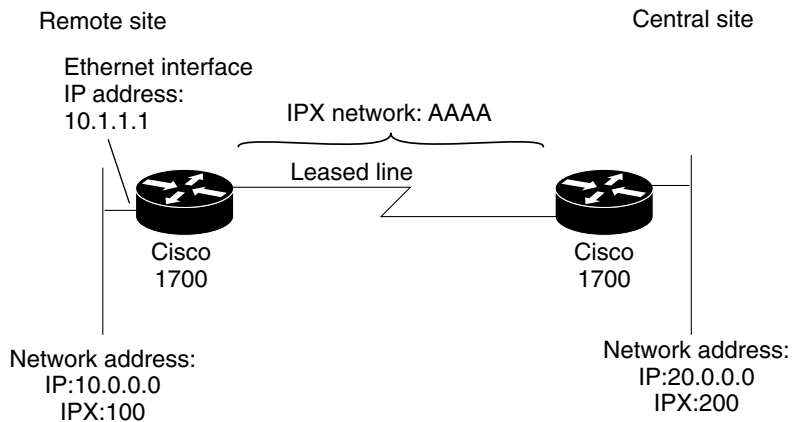
To use the verification steps described in this chapter, you must be familiar with Cisco IOS commands and command modes. When you use the verification steps, you need to change to different command modes. If you are not familiar with command modes, see the “[Understanding Command Modes](#)” section in the “[Introduction to Router Configuration](#)” chapter.

These are the major tasks in configuring the router:

- [Configuring Global Parameters](#)
- [Configuring Security](#)
- [Configuring the Fast Ethernet Interface](#)
- [Configuring the Serial Interface](#)
- [Configuring Dynamic Routing Parameters](#)
- [Configuring Command-Line Access to the Router](#)

Figure 6-1 shows the configuration example used in this chapter.

Figure 6-1 Configuration Example for Leased Line



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Configuring Global Parameters

Follow these steps to configure the router for global parameters.

	Command	Task
Step 1	configure terminal	Enter configuration mode.
Step 2	service timestamps debug datetime msec	Configure the router to show the date and time of all debug messages. This command is optional, but it is recommended if you use debug commands to troubleshoot your configuration.
Step 3	service timestamps log datetime msec	Configure the router to show the date and time of all log messages. This command is optional, but it is recommended if you use the verification steps described in this guide. This feature is enabled for all the command output examples shown in this guide.
Step 4	ip subnet-zero	Configure the router to use subnet zero for interface addresses and routing updates.
Step 5	no ip domain-lookup	Disable the IP Domain Name System (DNS)-based host name-to-address translation on the router.
Step 6	ipx routing 0000.0caa.1111	Enable IPX routing, and configure the router with an IPX address.

Configuring Security

Follow these steps to configure the router with security measures.

	Command	Task
Step 1	enable password <i><user></i>	Specify a password to prevent unauthorized access to the router.
Step 2	hostname <i>Router</i>	Configure the router with a host name, which is used in prompts and default configuration filenames. For PPP authentication, the host name entered with this command must match the username of the central-site router.

Configuring the Fast Ethernet Interface

Follow these steps to configure the Fast Ethernet interface, which connects your router to the local network.

	Command	Task
Step 1	interface fastethernet0	Enter configuration mode for the Fast Ethernet interface.
Step 2	ip address <i>10.1.1.1 255.0.0.0</i>	Configure this interface with an IP address and a subnet mask. This interface must have an IP address assigned in order for the serial interface to be configured for IP unnumbered routing.
Step 3	ipx network <i>100 encapsulation sap</i>	Enable IPX routing on this interface, assign the IPX network number, and configure the interface for IPX SAP encapsulation.
Step 4	ipx network <i>100 encapsulation novell-ether secondary</i>	Configure a secondary IPX network that uses the default NetWare encapsulation.
Step 5	no shutdown	Enable the interface and the configuration changes you have just made on the interface.
Step 6	exit	Exit configuration mode for this interface.

Configuring the Serial Interface

Follow these steps to configure the serial interface, which connects your router to the central-site router.

	Command	Task
Step 1	interface serial0	Enter configuration mode for the serial interface.
Step 2	description <i>leased line to headquarters</i>	Add a description of this interface to help you remember what is attached to it.
Step 3	ip unnumbered FastEth0	Enable IP routing on this interface without assigning an IP address.
Step 4	ipx network AAAA	Enable IPX routing on this interface, and assign an IPX network number.
Step 5	encapsulation PPP	Configure this interface for PPP encapsulation.
Step 6	no shutdown	Enable this interface and the configuration changes you have just made on the interface.
Step 7	exit	Exit configuration mode for this interface.

Configuring Dynamic Routing Parameters

Follow these steps to configure some dynamic routing parameters.

	Command	Task
Step 1	router rip	Enable RIP routing on the router, and enter router configuration mode.
Step 2	version 2	Specify the router to use RIP version 2.
Step 3	network 10.0.0.0	Enable Enhanced Interior Gateway Routing Protocol (EIGRP) for this network.
Step 4	no auto-summary	Disable automatic summarization of subnet routes into network-level routes.

	Command	Task
Step 5	<code>ip classless</code>	Configure the router to forward packets addressed to a subnet of a network with no network default route.
Step 6	<code>exit</code>	Exit router configuration mode.

Configuring Command-Line Access to the Router

Follow these steps to configure parameters that control access to the router.

	Command	Task
Step 1	<code>line console 0</code>	Specify the console terminal line, and enter line configuration mode.
Step 2	<code>exec-timeout 5</code>	Set the interval that the EXEC command interpreter waits until user input is detected.
Step 3	<code>line vty 0 4</code>	Specify a virtual terminal for remote console access.
Step 4	<code>password <lineaccess></code>	Specify a password on the line.
Step 5	<code>login</code>	Enable password checking at terminal session login.
Step 6	<code>end</code>	Exit configuration mode.

Verifying Your Configuration

You can verify your configuration by checking the serial interface configuration:

- Step 1** From privileged EXEC command mode, enter the **show interface serial0** command. You should see output similar to the following:

```
Router# show interface ser0
Serial0 is up, line protocol is up
  Hardware is PowerQUICC Serial
  Description: leased line to headquarters
  Interface is unnumbered.  Using address of FastEthernet0 (10.1.1.1)
```

```
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load
1/255
Encapsulation PPP, loopback not set, keepalive set (10 sec)
LCP Closed
.
.
.
```

Step 2 Confirm that the “Serial0 is up, line protocol is up” message appears, as shown in the command output example.

Step 3 Proceed as appropriate:

- If you see the “Serial0 is up, line protocol is up” message shown in the example command output, continue configuration by reentering global configuration mode.
- If you see one of the following messages instead of the “Serial0 is up, line protocol is up” message, see the [“Troubleshooting Problems with Leased Lines”](#) section for possible causes of the message and suggested actions:
 - Serial0 is down, line protocol is down.
 - Serial0 is up, line protocol is down.
 - Serial0 is up, line protocol is up (looped).
 - Serial0 is administratively down, line protocol is up.

Troubleshooting Problems with Leased Lines

[Table 6-1](#) describes some common problems with leased lines, possible causes, and suggested actions for solving the problems. The table uses Serial 0 port as the location of the problems.

Table 6-1 Possible Causes of and Suggested Actions for Solving Problems with Leased Lines

Line State	Possible Cause	Suggested Actions
Serial0 is down, line protocol is down.	<p>The router is not sensing a Carrier Detect (CD) signal as a result of one of the following:</p> <ul style="list-style-type: none"> • Telephone company problem, such as the line is down or not connected to the data service unit / channel service unit (DSU/CSU). • Faulty or incorrect cabling of the router. • Local DSU/CSU hardware failure. • Local router hardware failure. 	<p>The following are some steps you can take to isolate the problem:</p> <ul style="list-style-type: none"> • Check the LEDs on the external DSU/CSU for CD activity. • Refer to the Hardware Installation Guide to confirm that your router is correctly installed, using the appropriate cables. • Contact the telephone company to determine if the leased line is down or not connected. • Connect the leased line to another port, if possible. If the connection comes up, there is a hardware failure on the Serial 0 port. Contact your Cisco reseller.
Serial0 is up, line protocol is down.	<p>Possible causes for this line state are</p> <ul style="list-style-type: none"> • Local or remote router misconfigured. • The remote router is not sending keepalive packets. • Problem with the leased line. • The serial clock transmit external is not set on the DSU/CSU. • Local or remote DSU/CSU hardware failure. • Router hardware failure. 	<p>The following are some steps you can take to isolate the problem:</p> <ul style="list-style-type: none"> • Perform DSU/CSU loopback tests. During local loopback, enter the show interface ser0 command. If the line protocol is shown as up, there might be a problem with the telephone company, or the remote router might be down. • Refer to the Hardware Installation Guide to confirm that your router is correctly installed, using the appropriate cables. • Connect the leased line to another port, if possible. If the connection comes up, there is a hardware failure on the Serial 0 port. Contact your Cisco reseller.

Table 6-1 Possible Causes of and Suggested Actions for Solving Problems with Leased Lines

Line State	Possible Cause	Suggested Actions
Serial0 is up, line protocol is up (looped).	<p>The possible cause is that a loop exists in the circuit. The sequence number in the keepalive packet changes to a random number when a loop is first detected. If the same random number is returned over the line, a loop exists.</p>	<p>The following are some steps you can take to isolate the problem:</p> <ul style="list-style-type: none"> • Use the write terminal privileged EXEC command to display any instances of the loopback command. If the router has been configured with the loopback command, enter the no loopback command to remove the loop. • Check to see whether the DSU/CSU is configured in manual loopback mode. If it is, disable manual loopback. • Reset the DSU/CSU. • If you are unable to isolate the problem, contact the telephone company for help with troubleshooting.
Serial0 is administratively down, line protocol is up.	<p>The possible causes for this state are</p> <ul style="list-style-type: none"> • The serial interface has been disabled with the shutdown interface configuration command. • Different interfaces on the router are using the same IP address. 	<p>The following are some steps you can take to isolate the problem:</p> <ul style="list-style-type: none"> • Use the show configuration privileged EXEC command to display the serial port configuration. If “shutdown” is displayed after “interface Serial0,” use the no shutdown interface configuration command to enable the interface. • Use the show interface privileged EXEC command to display the IP addresses for all router interfaces. Use the ip address interface configuration command to assign unique IP addresses to the router interfaces.

