

Configuring a Leased Line

The configuration in this chapter describes how to configure a Cisco 1700 router for IP and IPX over a synchronous serial line.

Before You Begin

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

- Your Cisco 1700 router hardware is correctly installed according to the *Cisco 1700 Router Hardware Installation Guide* that came with the router.
- Your Cisco 1700 router is using multilink Point-to-Point Protocol (PPP).
- Your Cisco 1700 router is using dynamic IP and IPX routing, in which IP Routing Information Protocol (RIP) resolves IP routes, and IPX RIP and IPX 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. You should substitute the values shown with values that are appropriate for your network.
- You should be familiar with Cisco IOS software and its conventions.

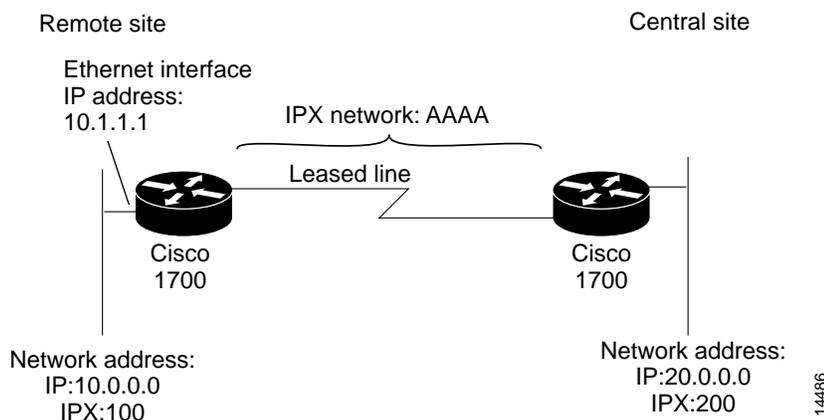
Note To use the verification steps described in this chapter, you must be familiar with Cisco IOS commands and command modes. When you use the verification steps, you need to change to different command modes. If you are not familiar with command modes, refer to the “Understanding Command Modes” section in the “Cisco IOS Basic Skills” chapter.

These are the major tasks when 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

Table 4-1 illustrates the example configuration used in this chapter.

Figure 4-1 Leased Line Example Configuration



Configuring Global Parameters

Use this table to configure the router for some global parameters.

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

Configuring Security

Use this table to configure the router with some security measures.

Step	Task	Router Prompt	Command
1	Specify a password to prevent unauthorized access to the router.	Router(config)#	enable password <1700user>
2	Configure the router with a host name, which is used in prompts and default configuration file names. For PPP authentication, the host name entered with this command must match the username of the central-site router.	Router(config)#	hostname 1700

Configuring the Fast Ethernet Interface

Use this table to configure the Fast Ethernet interface, which connects your router to the local network.

Step	Task	Router Prompt	Command
1	Enter configuration mode for the Fast Ethernet interface.	1700(config)#	interface fastethernet0
2	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.	1700(config-if)#	ip address 10.1.1.1 255.0.0.0
3	Enable IPX routing on this interface, assign the IPX network number, and configure the interface for IPX SAP encapsulation.	1700(config-if)#	ipx network 100 encapsulation sap
4	Configure a secondary IPX network on this interface that uses the default NetWare encapsulation.	1700(config-if)#	ipx network 100 encapsulation novell-ether secondary
5	Enable the interface and the configuration changes you have just made on the interface.	1700(config-if)#	no shutdown
6	Exit configuration mode for this interface.	1700(config-if)#	exit

Configuring the Serial Interface

Use this table to configure the serial interface, which connects your router to the central-site router.

Step	Task	Router Prompt	Command
1	Enter configuration mode for the serial interface.	1700(config)#	interface serial0
2	Add a description of this interface to help you remember what is attached to it.	1700(config-if)#	description leased line to headquarters
3	Enable IP routing on this interface without assigning an IP address.	1700(config-if)#	ip unnumbered FastEth0
4	Enable IPX routing on this interface and assign an IPX network number.	1700(config-if)#	ipx network AAAAA

Configuring Dynamic Routing Parameters

Step	Task	Router Prompt	Command
5	Configure this interface for PPP encapsulation.	1700(config-if)#	encapsulation PPP
6	Enable this interface and the configuration changes you have just made on the interface.	1700(config-if)#	no shutdown
7	Exit configuration mode for this interface.	1700(config-if)#	exit

Configuring Dynamic Routing Parameters

Use this table to configure some dynamic routing parameters.

Step	Task	Router Prompt	Command
1	Enable RIP routing on the router and enter router configuration mode.	1700(config)#	router rip
2	Specify the router to use RIP version 2.	1700(config-router)#	version 2
3	Enable Enhanced IGRP for this network.	1700(config-router)#	network 10.0.0.0
4	Disable automatic summarization of subnet routes into network-level routes.	1700(config-router)#	no auto-summary
5	Configure the router to forward packets addressed to a subnet of a network with no network default route.	1700(config-router)#	ip classless
6	Exit router configuration mode.	1700(config-router)#	exit

Configuring Command-Line Access to the Router

Use this table to configure some parameters that control access to the router.

Step	Task	Router Prompt	Command
1	Specify the console terminal line and enter line configuration mode.	1700(config)#	line console 0
2	Set the interval that the EXEC command interpreter waits until user input is detected.	1700(config-line)#	exec-timeout 5
3	Specify a virtual terminal for remote console access	1700(config-line)#	line vty 0 4
4	Specify a password on the line.	1700(config-line)#	password <lineaccess>
5	Enable password checking at terminal session login.	1700(config-line)#	login
6	Exit configuration mode.	1700(config-line)#	end

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 serial 0** command.

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

```
1700# 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 3 If you see the message shown in the example command output, continue configuration by re-entering global configuration mode.

If you see one of the following messages instead of the one shown in the example command output, refer to the “Troubleshooting Leased Line Problems” section for possible causes of the message and suggested actions:

- Serial x is down, line protocol is down.
- Serial x is up, line protocol is down.
- Serial x is up, line protocol is up (looped).
- Serial x is administratively down, line protocol is up.

Troubleshooting Leased Line Problems

Table 4-1 describes some common leased line problems, possible causes, and suggested actions that you can take to solve the problem.

Table 4-1 Leased Line Problems and Suggested Actions

Line State	Possible Cause	Suggested Actions
Serial x is down, line protocol is down.	<p>The router is not sensing a carrier detect (CD) signal due to one of the following reasons:</p> <ul style="list-style-type: none"> • Telephone company problem, such as the line is down or not connected to the DSU/CSU. • Faulty or incorrect cabling of the router. • Local DSU/CSU hardware failure. • Local router hardware failure. 	<p>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 <i>Cisco 1700 Router Hardware Installation Guide</i> to confirm that your router is correctly installed using the correct cables. • Contact the telephone company. • Connect the leased line to another port, if possible. If the connection come up, there is a hardware failure. Contact your Cisco reseller.
Serial x 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>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 is down. • Refer to the <i>Cisco 1700 Router Hardware Installation Guide</i> to confirm that your router is correctly installed using the correct cables. • Connect the leased line to another port, if possible. If the connection come up, there is a hardware failure. Contact your Cisco reseller.

Table 4-1 Leased Line Problems and Suggested Actions

Line State	Possible Cause	Suggested Actions
Serial x 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>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 if 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.
Serial x 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>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.