



Configuring Asynchronous Connections

This chapter describes how to configure the Cisco router to dial into a central-site router over a standard telephone line and provides verification steps and troubleshooting tips.

This chapter contains the following sections:

- [Before You Begin](#)
- [Asynchronous Dial-Up Connection](#)
- [Asynchronous Dial-In Pool](#)
- [Troubleshooting Asynchronous Problems](#)

Before You Begin

The configurations in this chapter are 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 Point-to-Point Protocol (PPP).

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.

Asynchronous Dial-Up Connection

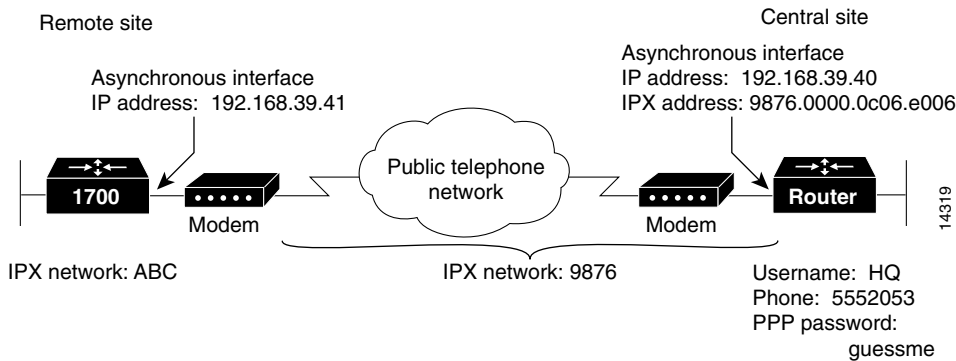
In this configuration, a modem is attached to the router serial port. The modem dials into the central-site router over a standard telephone line, which is an asynchronous connection. The Cisco router is dialing into a central-site router.

These are the major tasks in configuring your router for an asynchronous dial-up connection:

- [Configuring Global Parameters](#)
- [Configuring Security](#)
- [Configuring the Fast Ethernet Interface](#)
- [Configuring the Asynchronous Interface](#)
- [Configuring When the Router Dials](#)
- [Configuring Command-Line Access to the Router](#)

Figure 8-1 shows the configuration example used in this section.

Figure 8-1 Configuration Example—Asynchronous Dial-Up Connection



Configuring Global Parameters

Follow these steps to configure global parameters.

	Command	Task
Step 1	<code>configure terminal</code>	Enter configuration mode.
Step 2	<code>service timestamps debug datetime msec</code>	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	<code>service timestamps log datetime msec</code>	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.

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	Command	Task
Step 4	ipx routing <i>0060.834f.66dd</i>	Enable Internetwork Packet Exchange (IPX) routing and configure the router with an IPX address.
Step 5	chat-script <i>dialout "atdt" timeout 60 connectc</i>	Create a script that causes the modem connected to the router to place a call to the central site.

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 file names. For PPP authentication, the host name entered with this command must match the username of the central-site router.
Step 3	username <i>HQ password</i> <i><guessme></i>	Specify the password used during caller identification and Challenge Handshake Authorization Protocol (CHAP) and Password Authorization Protocol (PAP) authentication. For CHAP and PAP authentication, the username entered with this command must match the host name 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>172.16.25.42 255.255.255.224</i>	Configure this interface with an IP address and a subnet mask.
Step 3	ipx network <i>ABC</i>	Configure an IPX network address for this interface.
Step 4	no shutdown	Enable the interface and the configuration changes that you have just made on the interface.
Step 5	exit	Exit configuration mode for the interface.

Configuring the Asynchronous Interface

Follow these steps to configure the asynchronous interface, which connects your router to the central-site router over the wide-area network.

	Command	Task
Step 1	interface Serial0	Enter configuration mode for the serial interface.
Step 2	physical-layer async	Specify the mode of this slow-speed serial interface as asynchronous.
Step 3	async mode dedicated	Configure the asynchronous line for data traffic, rather than for EXEC command line sessions.
Step 4	ip address <i>192.168.39.41 255.255.255.0</i>	Configure this interface with an IP address and a subnet mask.
Step 5	ipx network <i>9876</i>	Enable IPX routing on this interface.

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	Command	Task
Step 6	dialer in-band	Specify that dial-on-demand routing (DDR) is supported on this interface.
Step 7	ipx route 1234 9876.0000.0c06.ecc6	Configure a static route to the central-site device.
Step 8	snapshot client 5 60	<p>Enable snapshot routing. Because your router is dialing into a central-site router, it is considered the client router.</p> <p>The first number is the amount of “active time” (in minutes) during which routing updates are exchanged between your router and the central-site router.</p> <p>The second number is the amount of “quiet time” (in minutes) during which routing entries are frozen and remain unchanged.</p>
Step 9	dialer-group 1	Assign the dialer interface to a dialer group.
Step 10	encapsulation ppp	Set the encapsulation method on this interface to PPP.
Step 11	ppp authentication chap pap callin	Enable CHAP or PAP authentication on this interface. CHAP authentication is attempted first.
Step 12	no shutdown	Enable the interface and the configuration changes that you have just made on the interface.
Step 13	exit	Exit configuration mode for this interface.
Step 14	line 1	Enter configuration mode for the serial0 interface.
Step 15	speed 19200	Configure the baud rate for the asynchronous line.
Step 16	parity n	Configure parity on the asynchronous line.
Step 17	datab 8	Configure data bits on the asynchronous line.

	Command	Task
Step 18	stopb /	Configure stop bits on the asynchronous line.
Step 19	exit	Exit line configuration mode.

Verifying Your Configuration

You can verify your configuration to this point by

- [Confirming Connectivity to the Central-Site Router](#)
- [Confirming the Serial Interface Status](#)
- [Confirming the Asynchronous Line Configuration](#)

Confirming Connectivity to the Central-Site Router

Follow these steps to verify connectivity to the central-site router:

- Step 1** From the privileged EXEC command mode, enter the **ping** command, followed by the IP address of the central-site router. You should see command output similar to the following.



Note The modem might need time to synchronize with the central-site modem. You might have to enter the **ping** command several times before you get a response.

```
Router# ping 192.168.37.40

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.37.40, timeout is 2
seconds:
!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 40/43/48 ms
Router#
*Mar 1 03:37:46.526: %LINK-3-UPDOWN: Interface BRI0:1, changed state
to up
*Mar 1 03:37:46.923: %LINEPROTO-5-UPDOWN: Line protocol on Interface
BRI0:1, changed state to up
*Mar 1 03:37:46.939: %LINK-3-UPDOWN: Interface Virtual-Access1,
changed state to up
*Mar 1 03:37:47.923: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Virtual-Access1, changed state to up
*Mar 1 03:35:57.217: %ISDN-6-CONNECT: Interface BRI0:1 is now
connected to 5552053 HQ
```

- Step 2** Note the percentage in the “Success rate” line. A success rate of 60 percent or greater means that your router is successfully transferring data to the central-site router.

Step 3 To continue configuration, reenter global configuration mode.

Confirming the Serial Interface Status

Follow these steps to confirm the status of the serial interface:

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

```
Router# show interface serial0
Serial0 is up, line protocol is up
  Hardware is PQUICC Serial in async mode (TTY1)
  Internet address is 12.0.0.2/8
  MTU 1500 bytes, BW 19 Kbit, DLY 100000 usec, rely 255/255, load
1/255
  Encapsulation PPP, loopback not set, keepalive not set
  DTR is pulsed for 5 seconds on reset
  LCP Open
  Listen: CDPCP
  Open: IPCP
  Last input 00:00:01, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/10/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/256 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    20 packets input, 1605 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    4 input errors, 0 CRC, 4 frame, 0 overrun, 0 ignored, 0 abort
    23 packets output, 2403 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
```

Step 2 Confirm that the “LCP Open” line appears in the command output.

Step 3 To continue configuration, reenter global configuration mode.

Confirming the Asynchronous Line Configuration

Follow these steps to confirm the configuration of the asynchronous line:

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

```
Router# show line 1
Tty Typ Tx/Rx A Modem Roty AccO AccI Uses Noise
Overruns
A 1 TTY 19200/19200 - - - - - 2 4
0/0

Line 1, Location: "", Type: ""
Length: 24 lines, Width: 80 columns
Baud rate (TX/RX) is 19200/19200, no parity, 1 stopbits, 8 databits
Status: Ready, Active, Async Interface Active, HW PPP Support Active
Capabilities: Line is permanent async interface
Modem state: Ready
Line is running PPP for address 192.168.39.40
0 output packets queued, 0 input packets.
 Async Escape map is 00000000000000001010000000000000
Modem hardware state: CTS DSR DTR RTS
Special Chars: Escape Hold Stop Start Disconnect Activation
                ^x none - - none
```

- Step 2** Confirm that the “Line 1” message appears in the command output. The asynchronous line settings should be the same as those that you configured in the [“Configuring the Asynchronous Interface”](#) section on page 8-5. The IP address in the “Line is running” message should be the IP address of the WAN interface of the central-site router.

Configuring When the Router Dials

Follow these steps to configure how and when the router dials the central-site router.

	Command	Task
Step 1	interface Serial0	Enter configuration mode for the serial interface.
Step 2	dialer map snapshot 1 name HQ	Define a dialer map for snapshot routing.
Step 3	dialer map ip 192.168.39.40 name HQ modem-script dialout 5552053	Configure a dialer map to send IP data over the modem line to the central-site router.
Step 4	dialer map ipx 9876.0000.0c06.ecc6 modem-script dialout 5552053	Configure a dialer map to send IPX data over the modem line to the central-site router.
Step 5	ipx sap 4 HQ server AA 1234.0000.0000.0001 2	Configure a route to IPX services, such as servers and printers, on the central-site network.
Step 6	exit	Exit configuration mode for this interface.

Configuring Command-Line Access to the Router

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

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

Asynchronous Dial-In Pool

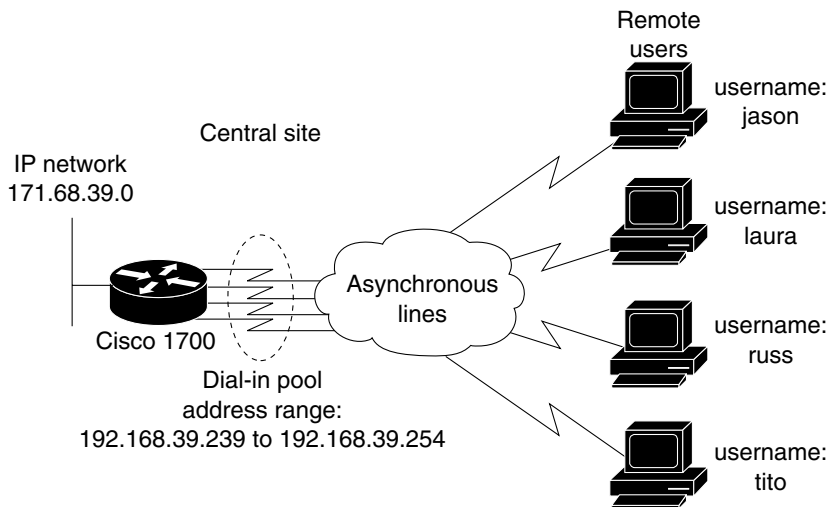
This section describes how to configure a Cisco router with multiple asynchronous interfaces for dial-in connections. In this example, the Cisco router functions as the central-site router that accepts connections from remote users.

These are the major task in configuring an asynchronous dial-in pool:

- [Configuring Global Parameters](#)
- [Configuring Security](#)
- [Configuring the Fast Ethernet Interface](#)
- [Configuring the Asynchronous Interfaces](#)
- [Configuring Command-Line Access to the Router](#)

Figure 8-2 shows the configuration example used in this section.

Figure 8-2 Configuration Example—Asynchronous Dial-In Pool



This configuration example includes multiple interfaces of the same type being configured with the same commands. When you enter commands for one of the multiple interfaces, you must enter interface configuration mode for the correct interface. [Table 8-1](#) shows how the interfaces are numbered in this configuration example.

Table 8-1 Serial Interface Numbering

Line	Interface Name and Number
1	Serial0
2	Serial1
3	Serial2
4	Serial3
5 (AUX port)	Async5

Configuring Global Parameters

Follow these steps to configure 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.

Configuring Security

Follow these steps to configure the router with security measures.

	Command	Task
Step 1	service password-encryption	Configure the router to encrypt passwords.
Step 2	enable password <i><user></i>	Specify a password to prevent unauthorized access to the router.
Step 3	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.
Step 4	username <i>jason</i> password <i><foot></i> username <i>laura</i> password <i><letmein></i> username <i>russ</i> password <i><openup></i> username <i>tito</i> password <i><iamhere></i>	Specify the password used during caller identification and CHAP and PAP authentication. For CHAP and PAP authentication, the host name of every remote router that dials into the router must be entered with this command, along with the password used to authenticate the router.

Configuring the Fast Ethernet Interface

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

	Command	Task
Step 1	interface fastethernet0	Enter configuration mode for the Fast Ethernet interface.
Step 2	ip address <i>192.168.39.1 255.255.255.0</i>	Configure this interface with an IP address and a subnet mask.

	Command	Task
Step 3	no shutdown	Enable the interface and the configuration changes that you have just made on the interface.
Step 4	exit	Exit configuration mode for the interface.

Configuring the Asynchronous Interfaces

Follow these steps to configure how the four asynchronous interfaces will receive calls from remote routers. The procedure below tells how to configure one interface (Serial0); however, you can use the same commands to configure any of the serial interfaces, as well as the AUX interface (Async5).

	Command	Task
Step 1	interface serial0	Enter configuration mode for the asynchronous serial interface.
Step 2	ip unnumbered fastethernet0	Configure the asynchronous interfaces to use the IP address of the FastEthernet interface.
Step 3	encapsulation ppp	Configure the asynchronous interfaces for PPP encapsulation.
Step 4	async mode interactive	Configure the asynchronous interfaces for interactive mode, which enables slip and ppp EXEC commands.
Step 5	peer default ip address pool <i>dialin</i>	Configure the remote routers to use the IP address configured with the ip local pool command.
Step 6	no cdp enable	Disable Cisco Discovery Protocol (CDP) on the asynchronous interfaces.
Step 7	ppp authentication chap	Configure the asynchronous interfaces to authenticate the remote routers with CHAP.
Step 8	no shutdown	Enable this interface and the configuration changes you have made.
Step 9	exit	Exit configuration mode for this interface.

	Command	Task
Step 10	ip local pool <i>dialin 192.168.39.239 192.168.39.254</i>	Configure a local pool of IP addressees that are used when a remote router connects to the one of the asynchronous interfaces. The command defines the range of IP address that can be used, with the lowest IP address followed by the highest IP address. If you do not include the highest IP address, the pool contains only the lowest IP address defined in the command.
Step 11	line 1	Enter configuration mode for the serial0 interface.
Step 12	speed <i>19200</i>	Configure the baud rate for the asynchronous line.
Step 13	parity <i>n</i>	Configure parity on the asynchronous line.
Step 14	datab <i>8</i>	Configure data bits on the asynchronous line.
Step 15	stopb <i>1</i>	Configure stop bits on the asynchronous line.
Step 16	exit	Exit line 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	line console <i>0</i>	Specify the console terminal line.
Step 2	exec-timeout <i>5</i>	Set the interval that the EXEC command interpreter waits until user input is detected.
Step 3	line vty <i>0 4</i>	Specify a virtual terminal for remote console access
Step 4	password <i><lineaccess></i>	Specify a password on the line.

	Command	Task
Step 5	login	Enable password checking at terminal session login.
Step 6	end	Exit configuration mode.

Troubleshooting Asynchronous Problems

If you are having problems or if the output that you received during the verification steps is very different from that shown in the command output examples, you can troubleshoot your router, using the Cisco IOS debug commands. The debug commands provide extensive command output that is not included in this document.



Caution

If you are not familiar with Cisco IOS debug commands, you should read the “[Using Debug Commands](#)” section in the “[Introduction to Router Configuration](#)” chapter before attempting any debugging.

The following debug commands are helpful in troubleshooting asynchronous configurations. Follow these commands with the **ping** command to display debug output:

- **debug modem**
- **debug chat-script**
- **debug dialer**
- **debug ppp negotiation**

