

# Troubleshooting

---

This chapter describes what to do if you experience a problem with your router. Assuming that you do not know what the problem is, this chapter leads you through the following troubleshooting checklist:

- Verify that your router boots properly.
- Troubleshoot the physical connections:
  - Ethernet
  - Serial
- Troubleshoot Ethernet line problems.
- Troubleshoot serial line problems:
  - Clocking problems
  - Synchronous leased line problems
  - Asynchronous dial-up problems
  - Frame Relay problems
  - X.25 problems

Some of the solutions to problems that you might uncover require that you use debug commands. The chapter also contains information you need to know about these commands.

Before troubleshooting a software problem, you must connect a terminal or PC to the router light-blue Console port. (For information on making this connection, see the *Cisco 805 Router Hardware Installation Guide*.) With a connected terminal or PC, you can read status messages from the router and enter commands to troubleshoot a problem.

## Verifying that Router Boots Properly

---

As an alternative, you can remotely access the interface (Ethernet or serial) by using Telnet. The Telnet option assumes that the interface is up and running.

## Verifying that Router Boots Properly

After you power on the Cisco 805 router, the router performs a series of power-on self-tests (POSTs) to verify hardware and software operations. The following is sample output that results from a proper boot sequence:

```
TinyROM version 1.2(1)
Compiled Fri Jul 9 10:32:58 1999
Copyright (c) 1999 by cisco Systems, Inc.
All rights reserved.
POST..... OK. 8MB DRAM, 4MB Flash.

Booting up..,
...
Cisco Internetwork Operating System Software
...
Press RETURN to get started!
```

If after the router boots, you cannot access the command line interface (CLI) and you get output that does not resemble the sample output, contact your Cisco reseller.

## Troubleshooting Physical Connections

This section describes how to troubleshoot your Ethernet and serial connections.

### Ethernet Connection

Table 6-1 describes how to troubleshoot your Ethernet connection.

**Table 6-1 Problems with Ethernet Connection**

What to Look for	Problems	Solutions
Is the LINK LED on the router back panel blinking or off? If blinking or off, then go on to the Problems column. If on, then go on the "Serial Connection" section.	No connection to Ethernet device, which can be caused by one of the following: <ul style="list-style-type: none"> <li>A cable-related problem: <ul style="list-style-type: none"> <li>Improperly connected cable.</li> <li>Damaged cable.</li> </ul> </li> </ul>	Perform the following tasks in the following order: <p><b>Step 1</b> To make sure you have cabled the device correctly, refer to the installation chapter in the <i>Cisco 805 Router Hardware Installation Guide</i>.</p> <p><b>Step 2</b> Make sure the connectors at both ends of the cable are securely seated.</p> <p><b>Step 3</b> Make sure the cable is not physically damaged. If it is, order another cable from Cisco or replace it with a similar cable.</p>
	<ul style="list-style-type: none"> <li>Improperly set router HUB/NO HUB button or hub equivalent of HUB/NO HUB button.</li> </ul>	To make sure you have set button(s) correctly, refer to the installation chapter in the <i>Cisco 805 Router Hardware Installation Guide</i> .
	<ul style="list-style-type: none"> <li>Improperly functioning network interface card (NIC) on server, PC, or workstation.</li> </ul>	<ul style="list-style-type: none"> <li>Run the NIC diagnostic supplied by the vendor to make sure it is functioning properly. If it is not, replace it.</li> <li>If the problem continues after these checks, call your Cisco reseller.</li> </ul>

### Serial Connection

Table 6-2 describes how to troubleshoot your serial connection.

**Table 6-2 Problems with Serial Connection**

What to Look for	Problems	Solutions
Is the CD LED on the router front panel off for a long time? If off, then go on to the Problems column. If on, then go on to the “Troubleshooting Ethernet Line Problems” section.	No connection to serial device, which can be caused by one of the following: <ul style="list-style-type: none"><li>• Wrong cable.</li></ul>	To make sure you are using the correct cable, refer to Appendix A, “Selecting a Serial Cable” in the <i>Cisco 805 Router Hardware Installation Guide</i> .
	<ul style="list-style-type: none"><li>• Improperly connected cable.</li></ul>	<ul style="list-style-type: none"><li>• To make sure that you have cabled properly, refer to the installation chapter in the <i>Cisco 805 Router Hardware Installation Guide</i>.</li><li>• Make sure the connectors at both ends of the cable are securely seated.</li></ul>
	<ul style="list-style-type: none"><li>• Improperly functioning modem or channel service unit/data service unit (CSU/DSU).</li></ul>	Refer to the documentation that accompanies your modem or CSU/DSU.
	<ul style="list-style-type: none"><li>• CSU/DSU configuration has been lost or changed.</li></ul>	Check CSU/DSU configuration. If necessary, reconfigure CSU/DSU so that its settings match original provisioning parameters provided by your WAN service provider.
	<ul style="list-style-type: none"><li>• Router improperly configured as a data terminal equipment (DTE) or data communications equipment (DCE).</li></ul>	By default, the router is configured as a DTE. Check the setting of the <b>clock rate</b> command to determine if it is set properly. If a clock rate speed is not specified, the router is configured as a DTE. If a clock rate speed is specified, the router is configured as a DCE.

**Table 6-2 Problems with Serial Connection (continued)**

What to Look for	Problems	Solutions
	<ul style="list-style-type: none"> <li>Serial interface has been shut down.</li> </ul>	<ul style="list-style-type: none"> <li>Enter the <b>no shutdown</b> command in serial interface configuration mode to bring the serial interface up.</li> </ul>
	<ul style="list-style-type: none"> <li>Problem with serial line or WAN service.</li> </ul>	<ul style="list-style-type: none"> <li>Contact your serial line or WAN service provider to determine if there is a problem.</li> </ul>

## Troubleshooting Ethernet Line Problems

Use the following steps to troubleshoot problems with your Ethernet line:

- Step 1** Enter the **show interfaces ethernet 0** privileged EXEC command.
- Step 2** Check the output for the following:
- Make sure that the interface is up.
  - Make sure that the interface has an IP address (Internet address) assigned.
  - Make sure that the IP address and subnet mask assigned to the interface match your IP addressing scheme.
- Step 3** Refer to Table 6-3 if one of the following applies:
- The Ethernet interface is administratively down.
  - The Ethernet interface does not have an IP address.
  - The IP address and subnet mask assigned to the Ethernet interface do not match your IP addressing scheme.

**Table 6-3 Ethernet Line Problems**

Problems	Solutions
Interface is administratively down.	Enter the <b>no shutdown</b> command in Ethernet interface configuration mode to bring the Ethernet interface up.
Interface does not have an IP address.	Assign an IP address and subnet mask to the interface by entering the <b>ip address ip-address mask</b> command in Ethernet interface configuration mode.

## Troubleshooting Serial Line Problems

---

**Table 6-3 Ethernet Line Problems (continued)**

Problems	Solutions
IP address and subnet mask assigned to interface do not match your IP addressing scheme.	Assign the correct IP address and subnet mask to the interface by entering the <b>ip address</b> <i>ip-address mask</i> command in Ethernet interface configuration mode.

## Troubleshooting Serial Line Problems

This section describes how to troubleshoot problems in the following areas:

- Synchronous CSU/DSU clocking
- Synchronous leased lines
- Asynchronous dial-up lines
- Frame Relay
- X.25

## Synchronous CSU/DSU Clocking Problems

Clocking conflicts in serial connections can lead to either chronic loss of connection service or to degraded performance. This section describes how to detect and solve clocking problems with synchronous CSU/DSUs.

### Detecting Problems

Use the following steps to detect clocking conflicts on your serial interface:

- Step 1** Enter the **show interfaces serial 0** privileged EXEC command on the routers at both ends of the link.
- Step 2** Examine the output for cyclic redundancy check (CRC) or framing errors and aborts.

If the number of CRC or framing errors exceeds an approximate range of 0.5 to 2.0 percent of traffic on the serial interface, clocking problems are likely to exist somewhere in the WAN.

## Synchronous CSU/DSU Clocking Problems

---

**Step 3** Isolate the source of the clocking conflicts by performing a series of ping tests and loopback tests (both local and remote).

For information on how to perform ping and loopback tests, refer to the “Performing Ping Tests” and “Performing Loopback Tests” sections later in this chapter.

**Step 4** Reenter the **show interfaces serial 0** privileged EXEC command on the routers at both ends of the link. Determine if CRC and framing errors are increasing and if so, where they are accumulating.

If input errors are accumulating on both ends of the connection, clocking of the CSU is the likely problem. If input errors are accumulating on one end of the connection, clocking of the DSU or cabling are the likely problems. If aborts are occurring on one end of the connection, the other end could be sending bad information or there could be a problem with the serial line. For information on how to solve these problems, refer to Table 6-4.

**Table 6-4 Synchronous CSU/DSU Clocking Problems**

Problems	Solutions
Incorrect CSU configuration.	Perform the following tasks in the following order: <b>Step 1</b> Determine if the CSUs at both ends of the serial line agree on the clock source (local or line). <b>Step 2</b> If the CSUs do not agree, configure them so that they do (usually the line is the source). <b>Step 3</b> Check the line build out (LBO) setting on the CSU to ensure that the impedance matches that of the physical line. For information on configuring your CSU, refer to your CSU documentation.

## Troubleshooting Serial Line Problems

---

**Table 6-4 Synchronous CSU/DSU Clocking Problems (continued)**

Problems	Solutions
Incorrect DSU configuration.	<p>Perform the following steps in the following order:</p> <p><b>Step 1</b> Determine if the DSUs at both ends of the serial line have serial clock transmit external (SCTE) mode enabled.</p> <p><b>Step 2</b> If SCTE is not enabled on both ends of the connection, enable it.</p> <p><b>Step 3</b> For any interface that is connected to a line of 128 kbps or faster, SCTE <i>must</i> be enabled.</p> <p><b>Step 4</b> Make sure that ones density is maintained, which requires that the DSU use the same framing and coding schemes (for example, Extended Superframe Format [ESF] and Binary 8-Zero Substitution [B8ZS]) used by the leased line or other carrier service.</p> <p><b>Step 5</b> Check with your leased line provider for information on their framing and coding schemes.</p> <p><b>Step 6</b> If your carrier service uses Alternate Mark Inversion (AMI) coding, either invert the transmit clock on both sides of the link or run the DSU in bit-stuff mode. For information on configuring your DSU, refer to your DSU documentation.</p>
Cable to router out of specification.	<p>For information on the appropriate cable needed to connect a serial device to a Cisco 805 router, refer to Appendix A, "Selecting a Serial Cable" in the <i>Cisco 805 Router Hardware Installation Guide</i>. For information on the appropriate cable needed to connect a serial device to the other router, refer to your router documentation.</p>

## Performing Ping Tests

Use the following steps to perform ping tests:

- Step 1** Put the CSU or DSU into local loopback mode.
- Step 2** Use the **ping** privileged EXEC command to send different data patterns and packet sizes.

Figure 6-1 and Figure 6-2 illustrate two useful ping tests, an all-zeros 1500-byte ping and an all-ones 1500-byte ping, respectively.

Figure 6-1 All-Zeros 1500-Byte Ping Test

```
yowzers#ping
Protocol [ip]:
Target IP address: 192.169.51.22
Repeat count [5]: 100
1500-byte packet size — Datagram size [100]: 1500
Timeout in seconds [2]:
Extended commands [n]: y
Source address: 192.169.51.14
Type of service [0]:
Set DF bit in IP header? [no]:
Validate reply data? [no]:
All-zeros ping — Data pattern [0xABCD]: 0x0000
Loose, Strict, Record, Timestamp, Verbose[none]:
Sweep range of sizes [n]:
Type escape sequence to abort.
Sending 100, 1500-byte ICMP Echos to 192.169.51.22, timeout is 2 seconds:
Packet has data pattern 0x0000
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 100 percent (100/100), round-trip min/avg/max = 4/6/8 ms
yowzers#
```

24857

**Figure 6-2 All-Ones 1500-Byte Ping Test**

```

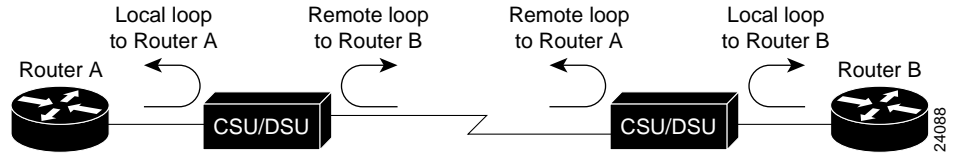
zounds#ping
Protocol [ip]:
Target IP address: 192.169.51.22
Repeat count [5]: 100
1500-byte packet size — Datagram size [100]: 1500
Timeout in seconds [2]:
Extended commands [n]: y
Source address: 192.169.51.14
Type of service [0]:
Set DF bit in IP header? [no]:
Validate reply data? [no]:
All-ones ping — Data pattern [0xABCD]: 0xffff
Loose, Strict, Record, Timestamp, Verbose[none]:
Sweep range of sizes [n]:
Type escape sequence to abort.
Sending 100, 1500-byte ICMP Echos to 192.169.51.22, timeout is 2 seconds:
Packet has data pattern 0xFFFF
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 100 percent (100/100), round-trip min/avg/max = 4/6/8 ms
zounds#
    
```

24858

Performing Loopback Tests

These loopback tests do not apply to Frame Relay or X.25 networks. Figure 6-3 shows the basic topology of the CSU/DSU local and remote loopback tests.

**Figure 6-3 CSU/DSU Local and Remote Loopback Tests**



24086

## Local Loopback Tests

Use the following steps to perform local loopback tests:

- Step 1** Place the CSU/DSU in local loop mode (refer to your CSU/DSU documentation).
- In local loop mode, the use of the line clock (from the T1 service) is terminated, and the DSU is forced to use the local clock.
- Step 2** Enter the **show interfaces serial 0** privileged EXEC command to determine if the line status changes from “line protocol is down” to “line protocol is up (looped),” or if it remains down.
- If the line protocol comes up when the CSU or DSU is in local loopback mode, a problem could be occurring on the remote end of the serial connection. If the status line does not change state, there is a possible problem in the router, connecting cable, or CSU/DSU.
- If the problem appears to be local, enter the **debug serial interface** privileged EXEC command and go on to the next step.
- Step 3** Take the CSU/DSU out of local loop mode.
- When the line protocol is down, the **debug serial interface** command output will indicate that keepalive counters are not incrementing.
- Step 4** Place the CSU/DSU in local loop mode again.
- This action should cause the keepalive packets to begin to increment. Specifically, the values for *mineseen* and *yourseen* keepalives will increment every 10 seconds. This information will appear in the **debug serial interface** output.
- If the keepalives do not increment, there may be a timing problem on the interface card or on the network.
- Step 5** Check the local router and CSU/DSU hardware, and any attached cables.
- Make certain the cables are within the recommended lengths (no more than 50 feet [15.24 meters], or 25 feet [7.62 meters] for a T1 link). Make certain the cables are attached to the proper ports. Swap faulty equipment as necessary.

### Remote Loopback Tests

Use the following steps to perform remote loopback tests:

- Step 1** Put the remote CSU or DSU into remote loopback mode (refer to the your CSU/DSU documentation).
- Step 2** Enter the **show interfaces serial 0** privileged EXEC command to determine if the line protocol remains up with the status line indicating “Serial *x* is up, line protocol is up (looped),” or if it goes down with the status line indicating “line protocol is down.”

If the line protocol remains up (looped), the problem is probably at the remote end of the serial connection (between the remote CSU/DSU and the remote router). Perform both local and remote tests at the remote end to isolate the problem source.

If the line status changes to “line protocol is down” when remote loopback mode is activated, make certain that ones density is being properly maintained. The CSU/DSU must be configured to use the same framing and coding schemes used by the leased-line or other carrier service (for example, ESF and B8ZS).

### Synchronous Leased Line Problems

Use the following steps to troubleshoot problems with your synchronous leased line:

- Step 1** From privileged EXEC command mode, enter the **show interfaces serial 0** command.

If you see the line `Serial0 is up, line protocol is up`, the serial line is functioning properly. You do not need to take further action.

- Step 2** If you see one of the following messages, refer to Table 6-5:

- `Serial 0 is down, line protocol is down.`
- `Serial 0 is up, line protocol is down.`
- `Serial 0 is up, line protocol is up (looped).`
- `Serial 0 is administratively down, line protocol is up.`

**Table 6-5 Leased Line Problems**

Line State	Problems	Solutions
Serial 0 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"><li>• Faulty or incorrect cabling of the router.</li><li>• Local router hardware failure.</li><li>• Local CSU/DSU hardware failure.</li><li>• WAN service provider problem, such as the line is down or not connected to the CSU/DSU.</li></ul>	<p>Following are some steps you can take to isolate the problem:</p> <ul style="list-style-type: none"><li>• Refer to the <i>Cisco 805 Router Hardware Installation Guide</i> to confirm that you are using the correct serial cable to connect the CSU/DSU and that you connected the CSU/DSU correctly.</li><li>• Connect the leased line to another port, if possible. If the connection comes up, there is a hardware failure. Contact your Cisco reseller.</li><li>• Check the LEDs on the CSU/DSU for CD activity.</li><li>• Contact your WAN service provider.</li></ul>

## Troubleshooting Serial Line Problems

---

**Table 6-5** Leased Line Problems (continued)

Line State	Problems	Solutions
Serial 0 is up, line protocol is down.	<p>Possible causes for this line state are:</p> <ul style="list-style-type: none"><li>• Router hardware failure.</li><li>• Local or remote CSU/DSU hardware failure.</li><li>• Local or remote router misconfigured.</li><li>• The serial clock transmit external is not set on the CSU/DSU.</li><li>• The remote router is not sending keepalive packets.</li><li>• Problem with the leased line.</li></ul>	<p>Following are some steps you can take to isolate the problem:</p> <ul style="list-style-type: none"><li>• Refer to the <i>Cisco 805 Router Hardware Installation Guide</i> to confirm that you are using the correct serial cable to connect the CSU/DSU and that you connected the CSU/DSU correctly.</li><li>• Connect the leased line to another port, if possible. If the connection comes up, there is a hardware failure. Contact your Cisco reseller.</li><li>• Check the LEDs on the CSU/DSU for CD activity.</li><li>• Perform CSU/DSU loopback tests. During local loopback, enter the <b>show interfaces serial 0</b> command. If the line protocol is shown as up, there might be a problem with the WAN service provider, or the remote router is down.</li><li>• Contact your WAN service provider.</li></ul>

Table 6-5 Leased Line Problems (continued)

Line State	Problems	Solutions
Serial 0 is up, line protocol is up (looped).	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>Following are some steps you can take to isolate the problem:</p> <ul style="list-style-type: none"> <li>• Use the <b>write terminal</b> privileged EXEC command to display any instances of the loopback command. If the router has been configured with the loopback command, enter the <b>no loopback</b> command to remove the loop.</li> <li>• Check to see if the CSU/DSU is configured in manual loopback mode. If it is, disable manual loopback.</li> <li>• Reset the CSU/DSU.</li> <li>• If you are unable to isolate the problem, contact your WAN service provider for help with troubleshooting.</li> </ul>
Serial 0 is administratively down, line protocol is up.	<p>The possible causes for this state are:</p> <ul style="list-style-type: none"> <li>• The serial interface has been disabled with the <b>shutdown</b> command.</li> <li>• Different interfaces on the router are using the same IP address.</li> </ul>	<p>Following are some steps you can take to isolate the problem:</p> <ul style="list-style-type: none"> <li>• Use the <b>show configuration</b> privileged EXEC command to display the serial port configuration. If “shutdown” is displayed after “interface Serial0,” use the <b>no shutdown</b> command in serial interface configuration mode to enable the interface.</li> <li>• Use the <b>show interface</b> privileged EXEC command to display the IP addresses for all router interfaces. Take the appropriate action to assign a unique IP address to each router interface. (If you set up your network per the sample networks in this guide, refer to that particular sample network for information on how to assign a unique IP address to the router interfaces.)</li> </ul>

### Asynchronous Dial-up Problems

This section describes how to use the **show line 1** command to troubleshoot problems with the connection between your modem and router. It also describes the following symptoms, problems, and solutions:

- No Connectivity between Modem and Router
- Modem Does Not Dial
- Modem Does Not Answer
- Modem Hangs Up Shortly after Connecting
- Dial-up Client Receives No EXEC Prompt
- Dial-up Session Sees Garbage
- Dial-up Session Ends Up in Existing Session
- Modem Cannot Send or Receive Data
- Modem Cannot Send or Receive IP Data
- Modem Cannot Send or Receive IPX Data
- Modem Does Not Disconnect Properly
- Link Goes Deactivates Soon
- Link Does Not Deactivate or Stays Activated Too Long
- Poor Performance

### Troubleshooting Problems with Modem and Router Connection

Use the following steps to troubleshoot problems with the connection between your modem and router:

**Step 1** From privileged EXEC command mode, enter the **show line 1** command.

Check the Modem state field in the output. If the modem state is Idle and CTS noDSR DTR RTS, the connection between your modem and router is functioning properly.

**Step 2** If you see one of the following modem states, refer to Table 6-6:

- Ready –
- Ready not CTS noDSR DTR RTS
- Ready CTS DSR DTR RTS
- Ready CTS\* DSR\* DTR RTS

**Table 6-6 Problems with Modem and Router Connection**

Modem State	Problems
Ready –	<ul style="list-style-type: none"> <li>• Modem control is not configured on the router. Enter the <b>modem inout</b> command in serial interface configuration mode.</li> <li>• A session exists on the line. Enter the <b>show users</b> privileged EXEC command and the <b>clear line 0</b> privileged EXEC command to stop the session if desired.</li> <li>• Data set ready (DSR) is high. There are two possible reasons for this:               <ul style="list-style-type: none"> <li>— Cabling problems—If your modem connector uses DB-25 pin 6 and has no pin 8, you must move the pin from 6 to 8 or get the appropriate connector.</li> <li>— Modem configured for data carrier detect (DCD) always high—The modem should be reconfigured to have DCD high only on carrier detect (CD), which is usually done with the <b>&amp;C1</b> modem command. Check your modem documentation for the exact syntax for your modem.</li> </ul> <p>If your software does not support modem control, you must configure the router line to which the modem is connected with the <b>no exec</b> command in asynchronous line configuration mode. Clear the line with the <b>clear line</b> privileged EXEC command, initiate a reverse Telnet session with the modem, and reconfigure the modem so that DCD is high only on CD. End the Telnet session by entering <b>disconnect</b> and reconfigure the router line with the <b>exec</b> command in asynchronous line configuration mode.</p> </li> </ul>

## Troubleshooting Serial Line Problems

---

**Table 6-6** Problems with Modem and Router Connection (continued)

Modem State	Problems
Ready noCTS noDSR DTR RTS	<ul style="list-style-type: none"><li>• The modem is turned off.</li><li>• The modem is not properly connected to the router. Refer to the <i>Cisco 805 Router Hardware Installation Guide</i> for information on how to select the serial cable and how to connect the modem.</li><li>• The modem is not configured for hardware flow control. Disable hardware flow control on the router by entering the <b>no flowcontrol hardware</b> command in asynchronous line configuration mode. Enable hardware flow control on the modem via a reverse Telnet session. (Consult your modem documentation.) Reenable hardware flow control on the router by entering the <b>flowcontrol hardware</b> command in asynchronous line configuration mode.</li></ul>
Ready CTS DSR DTR RTS	<ul style="list-style-type: none"><li>• Incorrect cabling. Refer to the <i>Cisco 805 Router Hardware Installation Guide</i> for information on how to select the serial cable.</li><li>• The modem is configured for DCD always high. Reconfigure the modem so that DCD is only high on CD, which is usually done with the <b>&amp;C1</b> modem command. Check your modem documentation for the exact syntax for your modem.  Configure the router line to which the modem is connected by entering the <b>no exec</b> command in asynchronous line configuration mode. Clear the line with the <b>clear line</b> privileged EXEC command, initiate a reverse Telnet session with the modem, and reconfigure the modem so that DCD is high only on CD. End the Telnet session by entering <b>disconnect</b>. Reconfigure the router line with the <b>exec</b> command in asynchronous line configuration mode.</li></ul>
Ready CTS* DSR* DTR RTS <sup>1</sup>	If this string appears in the Modem state field, modem control is probably not enabled on the router. Enter the <b>modem inout</b> command in asynchronous line configuration mode to enable modem control on the line.

<sup>1</sup> An asterisk (\*) next to a signal indicates one of two things: the signal has changed within the last few seconds, or the signal is not being used by the modem control method selected.

### No Connectivity between Modem and Router

**Symptom:** The connection between a modem and a Cisco router does not work. Attempts to initiate a reverse Telnet session to the modem have no result, or the user receives a “Connection Refused by Foreign Host” message.

**Note** More specific symptoms for dial-up connection problems are covered later in this section.

---

Table 6-7 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-7 No Connectivity between Modem and Router**

<b>Problems</b>	<b>Solutions</b>
Incorrect cabling	Check the cabling between the modem and the router. Refer to the <i>Cisco 805 Router Hardware Installation Guide</i> for information on how to select the serial cable and how to connect the modem.
Hardware problem	<ul style="list-style-type: none"> <li>• Check the cabling between the modem and the router. Refer to the <i>Cisco 805 Router Hardware Installation Guide</i> for information on how to select the serial cable and how to connect the modem.</li> <li>• Check all hardware for damage, including cabling (broken wires), adapters (loose pins), ports, and modem.</li> </ul>
Modem control is not enabled on the router	<ul style="list-style-type: none"> <li>• Use the <b>show line 1</b> privileged EXEC command on the router. The output should show <code>inout</code> or <code>RIisCD</code> in the Modem column, which indicates that modem control is enabled on the line of the router.</li> <li>• If necessary, configure modem control by using the <b>modem inout</b> command in asynchronous line configuration mode.</li> </ul>

### Modem Does Not Dial

**Symptom:** Dial-up sessions cannot be established because the modem does not dial properly.

Table 6-8 outlines the problems that might cause this symptom and describes solutions to those problems.

## Troubleshooting Serial Line Problems

---

**Table 6-8 Modem Does Not Dial**

<b>Problems</b>	<b>Solutions</b>
Incorrect cabling	Check the cabling between the modem and the router. Refer to the <i>Cisco 805 Router Hardware Installation Guide</i> for information on how to select the serial cable and how to connect the modem.
Modem hardware problem	Check the modem's physical connection. Make sure the modem is on and is connected securely to the correct port. Make sure the transmit and receive indicator lights flash when the chat script is running.
No interesting packets defined	<ul style="list-style-type: none"><li>• Use the <b>show running-config</b> privileged EXEC command to view the router configuration. Check the <b>dialer-list</b> command entries to see which access lists, if any, are being used to define interesting traffic.</li><li>• Make sure that the access lists referenced by the <b>dialer-list</b> commands specify all traffic that should bring the link up (interesting traffic).</li><li>• If necessary, modify the <b>access list</b> commands so that they define the proper traffic as interesting.</li></ul>
Missing chat script	<ul style="list-style-type: none"><li>• Use the <b>debug chat</b> privileged EXEC command to check if there is a chat script running.</li><li>• If there is no chat script running, use the <b>start-chat</b> privileged EXEC command or another appropriate command to start the chat script on the line.</li></ul> <p>For detailed information about creating and configuring chat scripts, refer to the <i>Dial Solutions Configuration Guide</i>.</p>
Bad chat script	<ul style="list-style-type: none"><li>• Establish a reverse Telnet session to the modem, and step through each step of the chat script.</li><li>• Verify that the command response to each chat script step is correct.</li><li>• Fix any inconsistencies you find in the chat script.</li></ul> <p>For detailed information about creating and configuring chat scripts, refer to the <i>Dial Solutions Configuration Guide</i>.</p>

## Modem Does Not Answer

**Symptom:** When attempting to open a dial-up connection to a modem, the modem does not answer the call.

Table 6-9 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-9 Modem Does Not Answer**

Problems	Solutions
Incorrect cabling	Check the cabling between the modem and the router. Refer to the <i>Cisco 805 Router Hardware Installation Guide</i> for information on how to select the serial cable and how to connect the modem.
Modem control not enabled on router	<ul style="list-style-type: none"> <li>Observe the remote modem to see if it is receiving a data terminal ready (DTR) signal from the router. Most modems have a DTR indicator light. Check the modem documentation to interpret the indicator lights.</li> <li>If the DTR indicator light is on, the modem is seeing a DTR signal from the router. You can also enter the <b>show line 1</b> privileged EXEC command to check for DTR. If the Modem state shows the string noDTR, then the router is configured to hold DTR low and the modem is not seeing a DTR signal.</li> <li>Configure modem control by entering either the <b>modem inout</b> or the <b>modem ri-is-cd</b> command in the asynchronous line configuration mode.</li> </ul>
Remote modem not set to auto-answer	<ul style="list-style-type: none"> <li>Check the remote modem to see if it is set to auto-answer. Usually, an AA indicator light will be on when auto-answer is set.</li> <li>Set the remote modem to auto-answer if it is not already set. To find out how to verify and change the modem's settings, refer to your modem documentation.</li> </ul>
Wrong telephone line attached to remote modem	<ul style="list-style-type: none"> <li>Make sure you are using the correct telephone line. Replace the remote modem with a telephone and call again. If the phone rings, you are using the correct telephone line.</li> <li>Contact the telephone company to make sure that the line is good.</li> </ul>
Remote modem not attached to a router	<ul style="list-style-type: none"> <li>Make sure the remote modem is attached to a router or other device that is asserting DTR.</li> <li>Most modems have an LED indicator for DTR. Check to make sure this indicator comes on.</li> </ul>

## Troubleshooting Serial Line Problems

---

### Modem Hangs Up Shortly after Connecting

**Symptom:** A dial-up connection is successful but the modem hangs up after 30 to 90 seconds.

Table 6-10 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-10**      **Modem Hang Up Shortly after Connecting**

<b>Problems</b>	<b>Solutions</b>
Modem speed setting is not locked	<ul style="list-style-type: none"><li>• Enter the <b>show line 1</b> privileged EXEC command on the router. The output for the serial port should indicate the currently configured transmit (Tx) and receive (Rx) speeds.</li><li>• If the line is not configured to the correct speed, use the <b>speed</b> command in asynchronous line configuration mode to set the speed on the router line. Set the value to the highest speed in common between the modem and the router port. If for some reason you cannot use flow control, limit the line speed to 9600 bps. Faster speeds are likely to result in lost data.</li><li>• Use the <b>show line 1</b> command again, and confirm that the line speed is set to the desired value.</li><li>• When you are certain that the router line is configured for the desired speed, initiate a reverse Telnet session to the modem on that line.</li><li>• Use a modem command string that includes the lock DTE speed command for your modem. See your modem documentation for exact configuration command syntax.  The lock DTE speed command, which might also be referred to as <i>port rate adjust</i> or <i>buffered mode</i>, is often related to the way in which the modem handles error correction. This command varies widely between modems.  Locking the modem speed ensures that the modem always communicates with the Cisco router at the speed configured on the Cisco serial port. If this command is not used, the modem will revert to the speed of the data link (the telephone line) instead of communicating at the speed configured on the router.</li></ul>

---

**Table 6-10 Modem Hang Up Shortly after Connecting (continued)**

Problems	Solutions
Modem control is not enabled on the router	<ul style="list-style-type: none"> <li>Use the <b>show line 1</b> privileged EXEC command on the router. The output for the port should show <code>inout</code> or <code>RIISCD</code> in the Modem column, which indicates that modem control is enabled on the line of the router.</li> <li>If necessary, configure modem control by using the <b>modem inout</b> command in asynchronous line configuration mode.</li> </ul>
PPP authentication fails	<ul style="list-style-type: none"> <li>Use the <b>debug ppp chap</b> privileged EXEC command to see if PPP authentication was successful. Check the output for the phrase <code>Passed authentication with remote</code>. If you see this output, authentication was successful.</li> <li>If PPP authentication was not successful, verify the username and password configured on the router. The username and password you enter must be identical to those configured on the router. Usernames and passwords are case-sensitive.</li> </ul>
Local router not waiting long enough to connect	<ul style="list-style-type: none"> <li>Enter the <b>show dialer</b> privileged EXEC command to see the configured dialer timeout. A timeout value of less than 120 seconds will not be long enough.</li> <li>Configure the local router to wait longer for the connection by entering the <b>dialer wait-for-carrier-time</b> command in the serial interface configuration mode. Make sure you specify at least a 120-second timeout.</li> </ul>
Chat script problem	<ul style="list-style-type: none"> <li>Enter the <b>debug chat</b> privileged EXEC command. If you see the output “Success” at the end of the chat script, the chat script completed successfully.</li> <li>Make the timeout in the chat script longer at the point where it fails.</li> <li>If the problem persists, verify that the command response to each chat script step is correct. Open a reverse Telnet session to the modem and step through the chat script.</li> <li>Fix any inconsistencies you find in the chat script.</li> </ul> <p>For detailed information about creating and configuring chat scripts, refer to the <i>Dial Solutions Configuration Guide</i>.</p>

### Dial-up Client Receives No EXEC Prompt

**Symptom:** A remote dial-up client opens a session and appears to be connected, but the user does not receive an EXEC prompt (for example, a `Username>` or `Router>` prompt).

Table 6-11 outlines the problems that might cause this symptom and describes solutions to those problems.

## Troubleshooting Serial Line Problems

---

**Table 6-11**      **Dial-up Client Receives No EXEC Prompt**

<b>Problems</b>	<b>Solutions</b>
Autoselect is enabled on the line	Try to access privileged EXEC mode by entering a carriage return.
Line is configured with the <b>no exec</b> command	<ul style="list-style-type: none"><li>• Use the <b>show line 1</b> privileged EXEC command to view the status of the appropriate line. Check the Capabilities field to see if it says EXEC suppressed. If this is the case, the <b>no exec</b> line configuration command is enabled.</li><li>• Configure the <b>exec</b> command in asynchronous line configuration mode to allow EXEC sessions to be initiated.</li></ul>
Flow control is not enabled, is enabled only on one device (either DTE or DCE), or is misconfigured	<ul style="list-style-type: none"><li>• Enter the <b>show line 0</b> privileged EXEC command, and look for the following in the Capabilities field: <pre>Capabilities: Hardware Flowcontrol In, Hardware Flowcontrol Out...</pre><p>If there is no mention of hardware flow control in this field, hardware flow control is not enabled on the line.</p></li><li>• Configure hardware flow control on the line using the <b>flowcontrol hardware</b> command in asynchronous line configuration mode. If for some reason you cannot use flow control, limit the line speed to 9600 bps. Faster speeds are likely to result in lost data.</li><li>• After enabling hardware flow control on the router line, initiate a reverse Telnet session to the modem via that line.</li><li>• Use a modem command string that includes the RTS/CTS Flow command for your modem. This command ensures that the modem is using the same method of flow control (that is, hardware flow control) as the Cisco router. See your modem documentation for exact configuration command syntax.</li></ul>

**Table 6-11** Dial-up Client Receives No EXEC Prompt (continued)

Problems	Solutions
Modem speed setting is not locked	<ul style="list-style-type: none"> <li>• Enter the <b>show line 1</b> privileged EXEC command on the router. The output for the serial port should indicate the currently configured transmit (Tx) and receive (Rx) speeds.</li> <li>• If the line is not configured to the correct speed, use the <b>speed</b> command in asynchronous line configuration mode to set the speed on the router line. Set the value to the highest speed in common between the modem and the router port. If for some reason you cannot use flow control, limit the line speed to 9600 bps. Faster speeds are likely to result in lost data.</li> <li>• Use the <b>show line 1</b> command again, and confirm that the line speed is set to the desired value.</li> <li>• When you are certain that the router line is configured for the desired speed, initiate a reverse Telnet session to the modem on that line.</li> <li>• Use a modem command string that includes the lock DTE speed command for your modem. See your modem documentation for exact configuration command syntax.</li> </ul> <p>The lock DTE speed command, which might also be referred to as <i>port rate adjust</i> or <i>buffered mode</i>, is often related to the way in which the modem handles error correction. This command varies widely between modems.</p> <p>Locking the modem speed ensures that the modem always communicates with the Cisco router at the speed configured on the Cisco serial port. If this command is not used, the modem will revert to the speed of the data link (the telephone line) instead of communicating at the speed configured on the router.</p>

### Dial-up Session Sees Garbage

**Symptom:** Attempts to establish remote dial-up sessions over a modem to a Cisco router return garbage and ultimately result in no connection to the remote site. Users might see a `Connection Closed by Foreign Host` message.

Table 6-12 outlines the problems that might cause this symptom and describes solutions to those problems.

## Troubleshooting Serial Line Problems

---

**Table 6-12**      **Dial-up Session Sees Garbage**

<b>Problems</b>	<b>Solutions</b>
Modem speed setting is not locked	<ul style="list-style-type: none"><li>• Enter the <b>show line 1</b> privileged EXEC command on the router. The output for the serial port should indicate the currently configured transmit (Tx) and receive (Rx) speeds.</li><li>• If the line is not configured to the correct speed, use the <b>speed</b> command in asynchronous line configuration mode to set the speed on the router line. Set the value to the highest speed in common between the modem and the router port. If for some reason you cannot use flow control, limit the line speed to 9600 bps. Faster speeds are likely to result in lost data.</li><li>• Use the <b>show line 1</b> command again, and confirm that the line speed is set to the desired value.</li><li>• When you are certain that the router line is configured for the desired speed, initiate a reverse Telnet session to the modem on that line.</li><li>• Use a modem command string that includes the lock DTE speed command for your modem. See your modem documentation for exact configuration command syntax.  The lock DTE speed command, which might also be referred to as <i>port rate adjust</i> or <i>buffered mode</i>, is often related to the way in which the modem handles error correction. This command varies widely between modems.  Locking the modem speed ensures that the modem always communicates with the Cisco router at the speed configured on the Cisco serial port. If this command is not used, the modem will revert to the speed of the data link (the telephone line) instead of communicating at the speed configured on the router.</li></ul>

### Dial-up Session Ends Up in Existing Session

**Symptom:** Remote dial-up session ends up in an already existing session initiated by another user. That is, instead of getting a login prompt, a dial-up user sees a session established by another user (which might be a UNIX command prompt, a text editor session, and so forth).

Table 6-13 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-13** Dial-up Session Ends Up in Existing Session

Problems	Solutions
Incorrect cabling	Check the cabling between the modem and the router. Refer to the <i>Cisco 805 Router Hardware Installation Guide</i> for information on how to select the serial cable and how to connect the modem.
Modem control is not enabled on the router	<ul style="list-style-type: none"> <li>Enter the <b>show line 1</b> privileged EXEC command on the router. The output for the serial port should show <code>inout</code> or <code>RIisCD</code> in the Modem column, which indicates that modem control is enabled on the router line.</li> <li>Configure modem control by entering either the <b>modem inout</b> or the <b>modem ri-is-cd</b> command in the asynchronous line configuration mode.</li> </ul>
Modem configured for DCD is always high	<ul style="list-style-type: none"> <li>The modem should be reconfigured to have DCD high only on CD, which is usually configured with the <b>&amp;C1</b> modem command string. Check your modem documentation for the exact syntax for your modem.</li> <li>You might have to configure the router line to which the modem is connected with the <b>no exec</b> command in asynchronous line configuration mode. Clear the line with the <b>clear line</b> privileged EXEC command, initiate a reverse Telnet session with the modem, and reconfigure the modem so that DCD is high only on CD.</li> <li>End the Telnet session by entering <b>disconnect</b> and reconfigure the router line with the <b>exec</b> line configuration command.</li> </ul>

### Modem Cannot Send or Receive Data

**Symptom:** After a dial-up connection is established, a modem cannot send or receive data of any kind.

Table 6-14 outlines the problems that might cause this symptom and describes solutions to those problems.

## Troubleshooting Serial Line Problems

---

**Table 6-14**      **Modem Cannot Send or Receive Data**

<b>Problems</b>	<b>Solutions</b>
Modem speed setting is not locked	<ul style="list-style-type: none"><li>• Enter the <b>show line 1</b> privileged EXEC command on the router. The output for the serial port should indicate the currently configured transmit (Tx) and receive (Rx) speeds.</li><li>• If the line is not configured to the correct speed, use the <b>speed</b> command in asynchronous line configuration mode to set the speed on the router line. Set the value to the highest speed in common between the modem and the router port. If for some reason you cannot use flow control, limit the line speed to 9600 bps. Faster speeds are likely to result in lost data.</li><li>• Use the <b>show line 1</b> command again, and confirm that the line speed is set to the desired value.</li><li>• When you are certain that the router line is configured for the desired speed, initiate a reverse Telnet session to the modem on that line.</li><li>• Use a modem command string that includes the lock DTE speed command for your modem. See your modem documentation for exact configuration command syntax.  The lock DTE speed command, which might also be referred to as <i>port rate adjust</i> or <i>buffered mode</i>, is often related to the way in which the modem handles error correction. This command varies widely between modems.  Locking the modem speed ensures that the modem always communicates with the Cisco router at the speed configured on the Cisco serial port. If this command is not used, the modem will revert to the speed of the data link (the telephone line) instead of communicating at the speed configured on the router.</li></ul>

**Table 6-14 Modem Cannot Send or Receive Data (continued)**

Problems	Solutions
Hardware flow control not configured on local or remote modem or router	<ul style="list-style-type: none"> <li>• Enter the <b>show line 0</b> privileged EXEC command, and look for the following in the Capabilities field:  Capabilities: Hardware Flowcontrol In, Hardware Flowcontrol Out...</li> <li>If there is no mention of hardware flow control in this field, hardware flow control is not enabled on the line.</li> <li>• Configure hardware flow control on the line using the <b>flowcontrol hardware</b> command in asynchronous line configuration mode. If for some reason you cannot use flow control, limit the line speed to 9600 bps. Faster speeds are likely to result in lost data.</li> <li>• After enabling hardware flow control on the router line, initiate a reverse Telnet session to the modem via that line.</li> <li>• Use a modem command string that includes the RTS/CTS Flow command for your modem. This command ensures that the modem is using the same method of flow control (that is, hardware flow control) as the Cisco router. See your modem documentation for exact configuration command syntax.</li> </ul>
Problem with dialing modem	Make sure that the dialing modem is operational and is securely connected to the correct port. See if another modem works when connected to the same port.

### Modem Cannot Send or Receive IP Data

**Symptom:** After a dial-up connection is established, a modem cannot send or receive IP data.

**Note** For general problems associated with a modem that cannot send or receive data, refer to the section “Modem Cannot Send or Receive Data” earlier in this chapter.

Table 6-15 outlines the problems that might cause this symptom and describes solutions to those problems.

## Troubleshooting Serial Line Problems

---

**Table 6-15 Modem Cannot Send or Receive IP Data**

Problems	Solutions
IP routing not enabled on local or remote router	Make sure that IP routing is enabled on the local and remote routers. For information on enabling IP routing, refer to either Chapter 3, “Configuring Remote Office to Corporate Office Networks” or Chapter 4, “Configuring Small Office to ISP Networks.”
No default gateway specified on PC	<ul style="list-style-type: none"><li>• Enter the <b>show slip</b> privileged EXEC command. Make sure that the specified IP address is the same as the default gateway specification on the PC.</li><li>• Check the specified default gateway address on the PC. If the IP address is not correct, specify the correct address. For instructions on verifying and changing the default gateway address on the workstation, refer to the vendor documentation.</li></ul>
Hardware flow control not configured on local or remote modem or router	<ul style="list-style-type: none"><li>• Enter the <b>show line 0</b> privileged EXEC command, and look for the following in the Capabilities field: <pre>Capabilities: Hardware Flowcontrol In, Hardware Flowcontrol Out...</pre><p>If there is no mention of hardware flow control in this field, hardware flow control is not enabled on the line.</p></li><li>• Configure hardware flow control on the line using the <b>flowcontrol hardware</b> command in asynchronous line configuration mode. If for some reason you cannot use flow control, limit the line speed to 9600 bps. Faster speeds are likely to result in lost data.</li><li>• After enabling hardware flow control on the router line, initiate a reverse Telnet session to the modem via that line.</li><li>• Use a modem command string that includes the RTS/CTS Flow command for your modem. This command ensures that the modem is using the same method of flow control (that is, hardware flow control) as the Cisco router. See your modem documentation for exact configuration command syntax.</li></ul>
Static routes not configured	<ul style="list-style-type: none"><li>• Use the <b>show ip route</b> privileged EXEC command to see if there is a static route to the remote network in the routing table.</li><li>• If there is not a static route to the remote network, configure one using the <b>ip route</b> command. The static route should point to the remote network.</li></ul>

**Table 6-15 Modem Cannot Send or Receive IP Data (continued)**

<b>Problems</b>	<b>Solutions</b>
Domain Name System (DNS) server not specified on router or workstation	<ul style="list-style-type: none"><li>• Check to see if the workstation and router both have DNS information specified. On the router, use the <b>show running-config</b> privileged EXEC command to see if DNS is configured. For information on verifying the workstation configuration, refer to the vendor documentation.</li><li>• If the router and workstation are not configured to use DNS, use the <b>ip domain-lookup</b>, <b>ip domain-name</b>, and <b>ip name-server</b> commands to configure the router.  Configure a DNS server address in the TCP/IP software on the PC. For more information, refer to the vendor documentation.</li></ul>

### Modem Cannot Send or Receive IPX Data

**Symptom:** After a dial-up connection is established, a modem cannot send or receive Novell IPX data.

---

**Note** For general problems associated with a modem that cannot send or receive data, refer to the section “Modem Cannot Send or Receive Data” earlier in this chapter.

---

## Troubleshooting Serial Line Problems

---

Table 6-16 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-16 Modem Cannot Send or Receive IPX Data**

Problems	Solutions
IPX not enabled on the router	Make sure that IPX routing is enabled on the router. For information on configuring IPX routing, refer to Chapter 3, “Configuring Remote Office to Corporate Office Networks.”
Incorrect Ethernet encapsulation	<ul style="list-style-type: none"><li>• Enter the <b>show ipx servers</b> privileged EXEC command on your router. If the router is not in the listing, the Ethernet encapsulation might be incorrect.</li><li>• Configure the correct Ethernet encapsulation by using the <b>ipx network network encapsulation encapsulation-type</b> command in Ethernet interface configuration mode. The encapsulation must be the same as that for your server.</li></ul>

## Modem Does Not Disconnect Properly

**Symptom:** Modem does not disconnect properly. Connections to the modem do not terminate when the **quit** command is entered.

Table 6-17 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-17 Modem Does Not Disconnect Properly**

Problems	Solutions
Modem is not sensing DTR	Enter the Hangup DTR modem command string. This command tells the modem to drop carrier when the DTR signal is no longer being received. For the exact syntax of this command, see the your modem documentation.
Modem control is not enabled on the router	<ul style="list-style-type: none"><li>• Use the <b>show line 1</b> privileged EXEC command on the router. The output should show <b>inout</b> or <b>RIISCD</b> in the Modem column, which indicates that modem control is enabled on the line of the router.</li><li>• If necessary, configure modem control by using the <b>modem inout</b> command in asynchronous line configuration mode.</li></ul>

### Link Goes Deactivates Soon

**Symptom:** After a dial-up connection is established, the link deactivates too quickly.

Table 6-18 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-18**      **Link Deactivates Too Soon**

<b>Problems</b>	<b>Solutions</b>
Dialer timeout is too short	<ul style="list-style-type: none"><li>• Use the <b>show running-config</b> privileged EXEC command to view the router configuration. Check the value configured with the <b>dialer idle-timeout</b> command.</li><li>• Increase the timeout value using the <b>dialer idle-timeout seconds</b> command. The default is 120 seconds.</li></ul>
Dialer lists are too restrictive	<ul style="list-style-type: none"><li>• Use the <b>show running-config</b> privileged EXEC command to view the router configuration. Check the access lists, if any, referenced by <b>dialer list</b> commands.</li><li>• Make sure the access lists describe all the traffic that should keep the link active. Reconfigure the access lists to include additional traffic if necessary.</li></ul>

## Troubleshooting Serial Line Problems

---

### Link Does Not Deactivate or Stays Activated Too Long

**Symptom:** After a dial-up connection is established, the link activates indefinitely or stays activated too long in an idle state.

Table 6-19 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-19**      **Link Does Not Deactivate or Stays Activated Too Long**

<b>Problems</b>	<b>Solutions</b>
Dialer lists not restrictive enough	<ul style="list-style-type: none"><li>• Use the <b>show running-config</b> privileged EXEC command to view the router configuration. Check the access lists, if any, referenced by <b>dialer list</b> commands.</li><li>• Make sure the access lists do not describe traffic that should not keep the link active. Reconfigure the access lists if necessary.</li></ul>
Modems misconfigured	Make sure the local and remote modems are properly configured. In particular, both modems should be configured to disconnect on loss of DTR (Hangup DTR). For the exact syntax of this command, see your modem documentation.

## Poor Performance

**Symptom:** After a dial-up connection is established, performance over the link is slow or unreliable, often due to a high rate of data loss.

Table 6-20 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-20**      **Poor Performance**

<b>Problems</b>	<b>Solutions</b>
Error correction is not configured on the modem	Make certain the modem is configured for error correction. For the exact syntax of the command, see your modem documentation.
Flow control is not enabled, is enabled only on one device (either DTE or DCE), or is misconfigured	<ul style="list-style-type: none"> <li>Enter the <b>show line 0</b> privileged EXEC command, and look for the following in the Capabilities field:  <pre>Capabilities: Hardware Flowcontrol In, Hardware Flowcontrol Out...</pre> <p>If there is no mention of hardware flow control in this field, hardware flow control is not enabled on the line.</p> </li> <li>Configure hardware flow control on the line using the <b>flowcontrol hardware</b> command in asynchronous line configuration mode. If for some reason you cannot use flow control, limit the line speed to 9600 bps. Faster speeds are likely to result in lost data.</li> <li>After enabling hardware flow control on the router line, initiate a reverse Telnet session to the modem via that line.</li> <li>Use a modem command string that includes the RTS/CTS Flow command for your modem. This command ensures that the modem is using the same method of flow control (that is, hardware flow control) as the Cisco router. See your modem documentation for exact configuration command syntax.</li> </ul>
Congestion or line noise	<ul style="list-style-type: none"> <li>If the network is congested, dial-up connections can freeze for a few seconds. The only solution is to reduce congestion on the network by increasing bandwidth or redesigning the network.</li> <li>Line noise can also freeze up a dial-up connection. For information on how to account for line noise for your modem, refer to the vendor documentation.</li> </ul>

### Frame Relay Problems

This section describes how to troubleshoot the following Frame Relay symptoms:

- Frame Relay Link is Down
- Cannot Ping Remote Router
- Cannot Ping End to End

#### Frame Relay Link is Down

**Symptom:** Connections over a Frame Relay link fail.

Table 6-21 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-21**      **Frame Relay Link is Down**

<b>Problems</b>	<b>Solutions</b>
Cabling, hardware, or carrier problem	<p>Perform these steps on the local and remote routers.</p> <ul style="list-style-type: none"><li>• Use the <b>show interfaces serial 0</b> command to see if the interface and line protocol are up.</li><li>• If the interface and line protocol are down, refer to the <i>Cisco 805 Router Hardware Installation Guide</i> to confirm that you are using the correct serial cable to connect the CSU/DSU and that you connected the CSU/DSU correctly. Make sure cables are securely attached.</li><li>• If the cable is correct, try moving it to a different port. If that port works, then the first port is defective. Replace the router.</li><li>• If the cable does not work on the second port, replace the cable. If it still does not work, there might be a problem with the DCE. Contact your carrier about the problem.</li></ul>

**Table 6-21**      **Frame Relay Link is Down (continued)**

<b>Problems</b>	<b>Solutions</b>
LMI type mismatch	<ul style="list-style-type: none"> <li>• Use the <b>show interfaces serial 0</b> command to check the state of the interface.</li> <li>• If the output shows the interface is up but the line protocol is down, enter the <b>show frame-relay lmi</b> privileged EXEC command to see which LMI type is configured on the Frame Relay interface.</li> <li>• Make sure that the LMI type is the same for all devices in the path from source to destination. Enter the <b>frame-relay lmi-type {ansi   cisco   q933a}</b> command in serial interface configuration mode to change the LMI type on the router.</li> </ul>
Keepalives not being sent	<ul style="list-style-type: none"> <li>• Enter the <b>show interfaces serial 0</b> command to find out if keepalives are configured. If you see a line that says “keepalives not set,” keepalives are not configured.</li> <li>• Use the <b>keepalive seconds</b> command in serial interface configuration mode to configure keepalives. The default value for this command is 10 seconds.</li> </ul>
Encapsulation mismatch	<ul style="list-style-type: none"> <li>• When connecting Cisco devices with non-Cisco devices, you must use IETF encapsulation on both devices. Check the encapsulation type on the Cisco device by using the <b>show frame-relay map</b> privileged EXEC command.</li> <li>• If the Cisco device is not using IETF encapsulation, use the <b>encapsulation frame-relay ietf</b> command in serial interface configuration mode to configure IETF encapsulation on the Cisco Frame Relay interface. For information on viewing or changing the configuration of the non-Cisco device, refer to the vendor documentation.</li> </ul>

## Troubleshooting Serial Line Problems

---

**Table 6-21**      **Frame Relay Link is Down (continued)**

<b>Problems</b>	<b>Solutions</b>
DLCI inactive or deleted	<ul style="list-style-type: none"><li>• Enter the <b>show frame-relay pvc</b> privileged EXEC command to view the status of the interface PVC.</li><li>• If the output shows that the PVC is inactive or deleted, there is a problem along the path to the remote router. Check the remote router or contact your carrier to check the status of the PVC.</li></ul>
DLCI assigned to wrong subinterface	<ul style="list-style-type: none"><li>• Use the <b>show frame-relay pvc</b> privileged EXEC command to check the assigned DLCIs. Make sure that the correct DLCIs are assigned to the correct subinterface.</li><li>• If the DLCIs appear to be correct, shut down the main interface by entering the <b>shutdown</b> command in serial interface configuration mode, then bring the interface back up entering the <b>no shutdown</b> command.</li></ul>

### Cannot Ping Remote Router

**Symptom:** Attempts to ping the remote router across a Frame Relay connection fail.

Table 6-22 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-22**      **Cannot Ping Remote Router**

<b>Problems</b>	<b>Solutions</b>
Encapsulation mismatch	<ul style="list-style-type: none"><li>• When connecting Cisco devices with non-Cisco devices, you must use IETF encapsulation on both devices. Check the encapsulation type on the Cisco device by using the <b>show frame-relay map</b> privileged EXEC command.</li><li>• If the Cisco device is not using IETF encapsulation, use the <b>encapsulation frame-relay ietf</b> command in serial interface configuration mode to configure IETF encapsulation on the Cisco Frame Relay interface. For information on viewing or changing the configuration of the non-Cisco device, refer to the vendor documentation.</li></ul>

**Table 6-22**      **Cannot Ping Remote Router (continued)**

Problems	Solutions
DLCI inactive or deleted	<ul style="list-style-type: none"> <li>• Enter the <b>show frame-relay pvc</b> privileged EXEC command to view the status of the interface PVC.</li> <li>• If the output shows that the PVC is inactive or deleted, there is a problem along the path to the remote router. Check the remote router or contact your carrier to check the status of the PVC.</li> </ul>
DLCI assigned to wrong subinterface	<ul style="list-style-type: none"> <li>• Use the <b>show frame-relay pvc</b> privileged EXEC command to check the assigned DLCIs. Make sure that the correct DLCIs are assigned to the correct subinterface.</li> <li>• If the DLCIs appear to be correct, shut down the main interface by entering the <b>shutdown</b> command in serial interface configuration mode, then bring the interface back up entering the <b>no shutdown</b> command.</li> </ul>
Misconfigured access list	<ul style="list-style-type: none"> <li>• Enter the <b>show access-list</b> privileged EXEC command to see if there are access lists configured on the router.</li> <li>• If there are access lists configured, test connectivity by disabling access lists by entering the <b>no access-group</b> command in global configuration mode. Check to see if connectivity is restored.</li> <li>• If connections work, reenabling access lists one at a time, checking connections after enabling each access list.</li> <li>• If enabling an access list blocks connections, make sure that the access list does not deny necessary traffic. Make sure to configure explicit <b>permit</b> statements for any traffic you want to pass.</li> <li>• Continue testing access lists until all access lists are restored and connections still work.</li> </ul>

## Troubleshooting Serial Line Problems

---

**Table 6-22** Cannot Ping Remote Router (continued)

Problems	Solutions
<b>frame-relay map</b> command missing	<ul style="list-style-type: none"><li>• Enter the <b>show frame-relay map</b> privileged EXEC command to see if an address map is configured for the DLCI.</li><li>• If you do not see an address map for the DLCI, enter the <b>clear frame-relay-inarp</b> privileged EXEC command and then enter the <b>show frame-relay map</b> command again to see if there is now a map to DLCI.</li><li>• If there is no map to the DLCI, add a static address map by entering the <b>frame-relay map</b> command in serial interface configuration mode.<sup>1</sup> For complete information on configuring Frame Relay address maps, refer to the <i>Cisco IOS Wide-Area Networking Configuration Guide</i> publication.</li><li>• Make sure that the DLCIs and next-hop addresses specified in <b>frame-relay map</b> commands are correct. The specified protocol address should be in the same network as your local Frame Relay interface.</li></ul>
No <b>broadcast</b> keyword in <b>frame-relay map</b> statements	<ul style="list-style-type: none"><li>• Enter the <b>show running-config</b> privileged EXEC command on the local and remote routers to view the router configuration. Check <b>frame-relay map</b> command entries to see if the <b>broadcast</b> keyword is specified.</li><li>• If the keyword is not specified, add the <b>broadcast</b> keyword to all <b>frame-relay map</b> commands. By default, the <b>broadcast</b> keyword is added to dynamic maps learned via Inverse ARP.</li></ul>

<sup>1</sup> You can eliminate the need for static Frame Relay address maps by using Inverse ARP instead. Use the **frame-relay interface-dlci dlcid broadcast** interface configuration command to configure an interface to use Inverse ARP. For more information about the use of this command, refer to the *Cisco IOS Wide-Area Networking Configuration Guide* and *Wide-Area Networking Command Reference*.

### Cannot Ping End to End

**Symptom:** Attempts to **ping** devices on a remote network across a Frame Relay connection fail.

Table 6-23 outlines the problems that might cause this symptom and describes solutions to those problems.

**Table 6-23**      **Cannot Ping End to End**

Problems	Solutions
Split horizon problem	In a partially meshed Frame Relay environment, you must configure subinterfaces to avoid problems with split horizon. For detailed information on configuring subinterfaces, refer to the <i>Wide-Area Networking Configuration Guide</i> and <i>Wide-Area Networking Command Reference</i> .
No default gateway on workstation	<ul style="list-style-type: none"> <li>• From a local workstation or server, try to <b>ping</b> the remote workstation or server. Make several attempts to ping the remote device if the first ping is unsuccessful.</li> <li>• If all your attempts fail, check to see if the local workstation or server can <b>ping</b> the Frame Relay interface of the local router.</li> <li>• If you are unable to <b>ping</b> the Frame Relay interface of the local router, check the local workstation or server to see if it is configured with a default gateway specification.</li> <li>• If there is no default gateway specified, configure the device with a default gateway. The default gateway should be the address of the LAN interface of the local router. For information on viewing or changing the default gateway of the workstation or server, refer to the vendor documentation.</li> </ul>

## X.25 Problems

This section describes how to troubleshoot the following X.25 symptoms:

- No Connections over X.25 Link
- Excess Serial Errors on X.25 Link

### No Connections over X.25 Link

**Symptom:** Connections over an X.25 link fail.

Table 6-24 outlines the problems that might cause this symptom and describes solutions to those problems.

## Troubleshooting Serial Line Problems

---

**Table 6-24**      **No Connections over X.25 Link**

<b>Problems</b>	<b>Solutions</b>
Incorrect cabling or bad router hardware	<ul style="list-style-type: none"><li>• Check all cabling and hardware for damage or wear. Replace cabling or hardware as required. For more information on the Cisco 805 router and serial cables, refer to the <i>Cisco 805 Router Hardware Installation Guide</i>.</li><li>• Enter the <b>show interfaces serial 0</b> privileged EXEC command to determine the status of the interface.</li><li>• If the interface is down, refer to the “Serial Connection” section earlier in this chapter. If the interface is up but the line protocol is down, check the (Link Access Procedure, Balanced) LAPB state in the output of the <b>show interfaces serial 0</b> command.</li><li>• If the LAPB state is not CONNECT, use the <b>debug lapb</b> privileged EXEC command (or attach a serial analyzer) to look for set asynchronous balance mode requests (SABMs) being sent, and for UA packets being sent in reply to SABMs. If UAs are not being sent, one of the other possible problems described in this table is the likely cause.</li><li>• If the <b>show interfaces serial 0</b> command indicates that the interface and line protocol are up but no connections can be made, there is probably a router or switch misconfiguration. Refer to the other possible problems outlined in this table.</li></ul>
Link is down	Enter the <b>show interfaces serial 0</b> privileged EXEC command to determine if the link is down. If the link is down, refer to the “Serial Connection” section earlier in this chapter.
Misconfigured protocol parameters	<ul style="list-style-type: none"><li>• Enable the <b>debug lapb</b> privileged EXEC command and look for SABMs being sent. If no SABMs are being sent, disable the <b>debug lapb</b> command and enable the <b>debug x25 events</b> privileged EXEC command.</li><li>• Look for RESTART messages (for PVCs) or CLEAR REQUESTS with non-zero cause codes (for SVCs). To interpret X.25 cause and diagnostic codes provided in the <b>debug x25 events</b> output, refer to the <i>Debug Command Reference</i> document.</li><li>• Verify that all critical LAPB parameters (modulo, T1, N1, N2, and k) and the critical X.25 parameters (modulo, X.121 addresses, SVC ranges, PVC definitions, and default window and packet sizes) match the parameters required by the X.25 service provider.</li></ul>

**Table 6-24** No Connections over X.25 Link (continued)

Problems	Solutions
Misconfigured <b>x25 map</b> command	<ul style="list-style-type: none"> <li>• Use the <b>show running-config</b> privileged EXEC command to view the router configuration. Look for <b>x25 map</b> command entries under the serial interface.</li> <li>• Make sure that <b>x25 map</b> commands specify the correct address mappings.</li> <li>• If dynamic routing is being used in the network, verify that the <b>broadcast</b> keyword is included in the <b>x25 map</b> command.</li> <li>• Make sure that all router X.25 configuration options match the settings of attached switches. Reconfigure the router or the switch as necessary.</li> <li>• Enable the <b>debug x25 events</b> privileged EXEC command and look for <b>RESTART</b> messages (for PVCs) or <b>CLEAR REQUESTS</b> with non-zero cause codes (for SVCs). To interpret X.25 cause and diagnostic codes provided in the <b>debug x25 events</b> output, refer to the <i>Debug Command Reference</i> document.</li> </ul>

### Excess Serial Errors on X.25 Link

**Symptom:** The output of the **show interfaces serial 0** privileged EXEC command shows rejects (REJs), receiver not ready events (RNRs), protocol frame errors (FRMRs), restarts (RESTARTs), or disconnects (DISCs) in excess of 0.5 percent of information frames (IFRAMEs).

**Note** If any of these fields are increasing and represent more than 0.5 percent of the number of IFRAMEs, there is probably a problem somewhere in the X.25 network. There should always be at least one SABM. However, if there are more than 10, the packet switch probably is not responding.

Table 6-25 outlines the problem that might cause this symptom and describes solutions to this problem.

## Using Debug Commands

---

**Table 6-25**      **No Connections over X.25 Link**

Problems	Solutions
Incorrect cabling or bad router hardware	<ul style="list-style-type: none"><li>• Check all cabling and hardware for damage or wear. Replace cabling or hardware as required. For more information on the Cisco 805 router and serial cables, refer to the <i>Cisco 805 Router Hardware Installation Guide</i>.</li><li>• Enter the <b>show interfaces serial 0</b> privileged EXEC command to determine the status of the interface.</li><li>• If the interface is down, refer to the “Serial Connection” section earlier in this chapter. If the interface is up but the line protocol is down, check the LAPB (Link Access Procedure, Balanced) state in the output of the <b>show interfaces serial 0</b> command.</li><li>• If the LAPB state is not CONNECT, use the <b>debug lapb</b> privileged EXEC command (or attach a serial analyzer) to look for set asynchronous balance mode requests (SABMs) being sent, and for UA packets being sent in reply to SABMs. If UAs are not being sent, one of the other possible problems described in this table is the likely cause.</li><li>• If the <b>show interfaces serial 0</b> command indicates that the interface and line protocol are up but no connections can be made, there is probably a router or switch misconfiguration. Refer to the other possible problems outlined in this table.</li></ul>

## Using Debug Commands

You can use the debug commands to troubleshoot any configuration problems on your network. Debug commands provide extensive, informative displays to help you interpret any problems.

The following list contains important information about debug commands.



**Caution** Debugging is assigned a high priority in your router CPU process, and it can render your router unusable. For this reason, use debug commands only to troubleshoot specific problems. The best time to use debug commands is during periods of low network traffic and few users to decrease the likelihood that the debug command processing overhead affects network users.

- You can find additional information and documentation about the debug commands in the *Debug Command Reference* document on the Documentation CD-ROM that came with your router.
- To turn off any debugging, enter the **undebug all** command.
- If you want to use a debug command during a Telnet session with your router, you must first enter the **terminal monitor** command.

## Using Debug Commands

---