

# Managing Modems

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The Cisco IOS software provides commands that manage modems that reside inside access servers or routers in the form of modem cards. Cisco Systems does not consider external modems, which physically connect to an access server or router with an asynchronous cable or modem line, to be part of its modem management paradigm.

For a complete description of the commands in this chapter, refer to the “Modem Management Commands” chapter of the *Dial Solutions Command Reference*. To locate documentation of other commands that appear in this chapter, use the command reference master index or search online.

This chapter consists of the following sections:

- Business Scenarios that Benefit from Managing Modems
- Cisco’s Modem and Terminal Adapter Technology
- Manageable versus Nonmanageable Modems
- Verify Connection Speed Performance
- Automatically Run a Modem Diagnostics Test
- Display Local Disconnect Reasons
- Upgrade Modem Firmware for 56K, V.34, and V.110 Cards
- Control Modems
- Collect Modem Statistics
- Change Modem Configuration

## Business Scenarios that Benefit from Managing Modems

Figure 47 shows a typical large scale dial scenario for an Internet service provider. Modem management commands are useful for gathering call statistics and upgrading modem firmware for large modem pools.

**Figure 47 Typical Large-Scale Dial Scenario for an ISP**

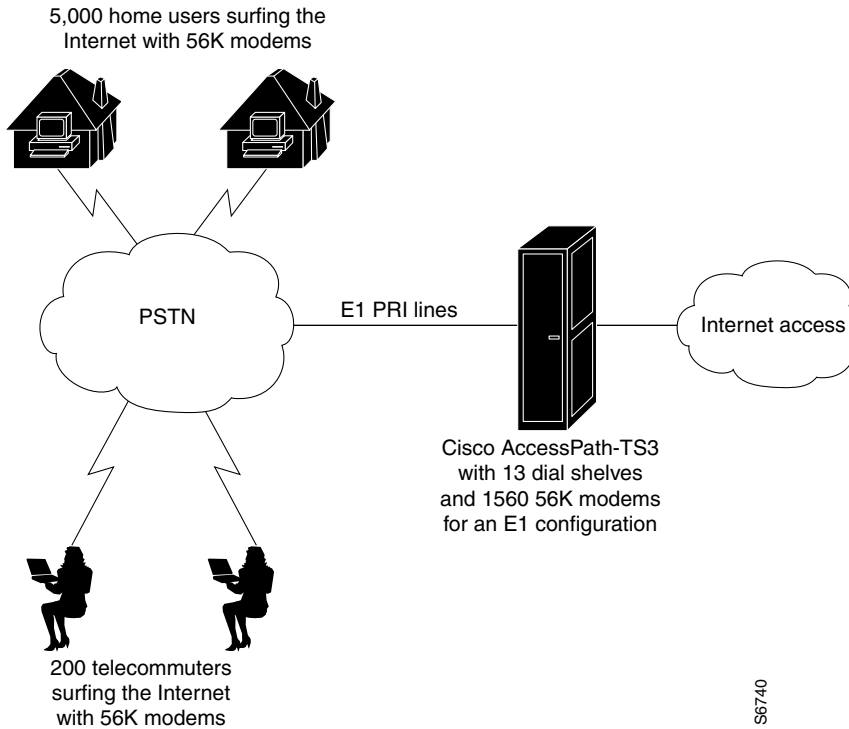
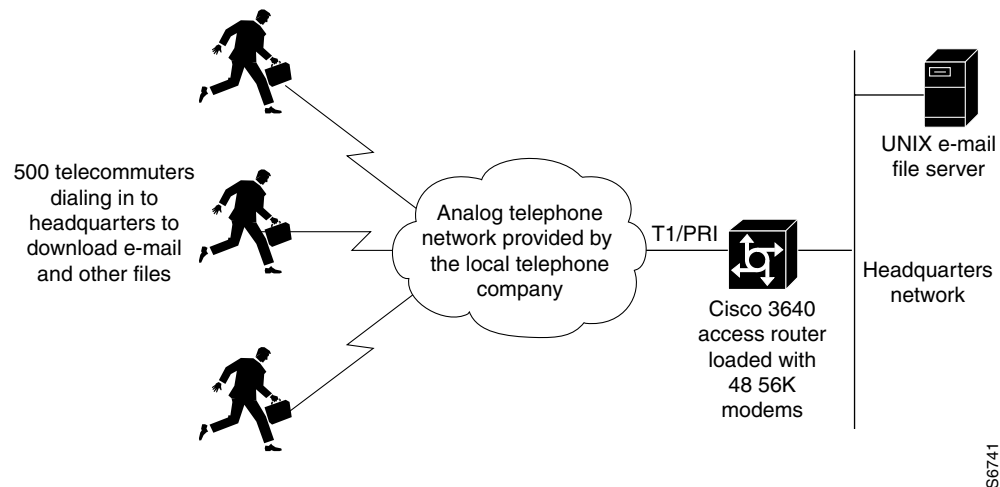


Figure 48 shows a typical dial scenario for an enterprise network.

**Figure 48 Typical Dial Scenario for an Enterprise Network**



## Cisco's Modem and Terminal Adapter Technology

Cisco Systems installs the following different types of modems and terminal adapter cards in some of its access devices:

- 56K Modems
- V.110 Terminal Adapters
- V.34 Modems

Table 9 shows which Cisco access devices provide hardware support for these dial technologies.

**Table 9 Available Modems and Terminal Adapters**

Type of Modem or Terminal Adapter	Cisco AS5200	Cisco AS5300	Cisco 3600 Series	Cisco AccessPath Integrated Access System
56K modem card	Yes	Yes	Yes	Yes
V.110 terminal adapter module	Yes	No	No	No
V.34 modem card	Yes	Yes	Yes	Yes

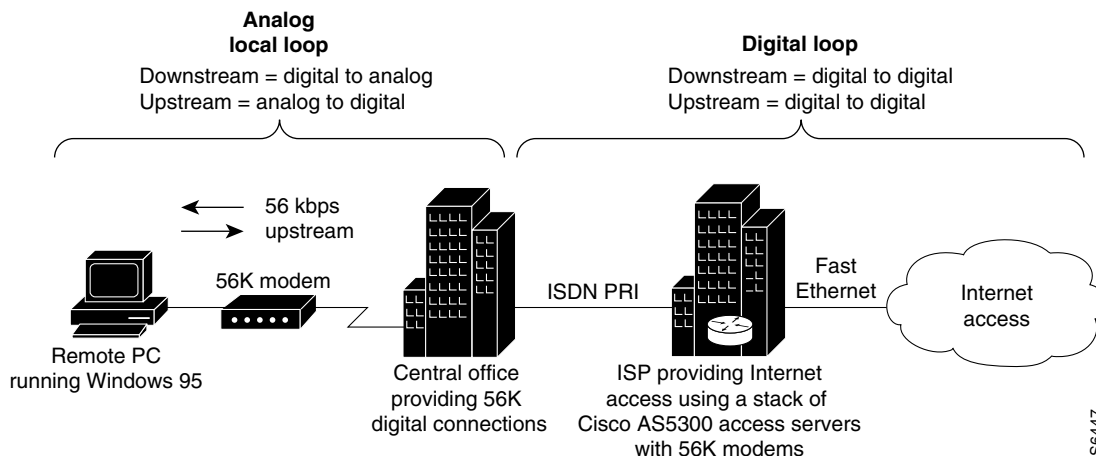
### 56K Modems

The 56K modems are used for making high-speed connections across digital networks. Ultimately, this means that files transmitted at up to 56 kbps arrive at the desktop nearly twice as fast as standard V.34 (28.8-kbps) connections. The wait for information is reduced by nearly 50 percent.

The 56K modems are ideal for serious Internet users who want to quickly dial-in to corporate LANs or download web pages containing sound, video, graphics, and other large files over digital networks using standard telephone lines.

Traditional modems assume that both ends of a modem conversation use an analog connection over the public switched telephone network. Data signals are converted from digital to analog and back again to digital, limiting transmission speeds to 33.6 kbps. The 56K modems, however, assume that one end of the modem conversation has a pure digital connection to the phone network and takes advantage of the high-speed digital connection. This is a new technique where the network is viewed as a digital transmission medium and the data is encoded for transmission over an end user's telephone line, which is also known as the local loop. The downstream data is digitally encoded instead of being modulated. Upstream analog-to-digital communication at the local loop can transmit up to 33.6 kbps. Downstream digital to analog communication at the local loop can transmit up to 56 kbps. To maximize channel bandwidth for 56 kbps connections, the Integrated Services Digital Network Primary Rate Interface (ISDN PRI) must be used. (See Figure 49.)

Figure 49 Remote PC Downloading Files over the Network at 56 kbps



Special digital signal processor (DSP) software is used in conjunction with 56K modem firmware to enable speeds up to 56 kbps. Both DSP and modem firmware are posted on the Cisco Connection Online (CCO) FTP server for upgrading purposes. Upgrade instructions are provided in the section "Upgrade Modem Firmware for 56K, V.34, and V.110 Cards" later in this chapter.

The following prerequisites apply to 56K modems:

- K56flex-compatible modems must be present at both ends of a digital connection in a digital network. K56 requires a client-side modem and a server-side modem. If not, this speed cannot be achieved. All modem connections will fall back to V.34 speeds.
- Only one analog loop can be in the end-to-end communications path.
- You cannot have any A-law to U-law conversions, which exist at some international gateways.

## V.110 Terminal Adapters

V.110 is a bit rate adaptation protocol defined by International Telecommunication Union (ITU). V.110 provides a standard method of encapsulating data over Global System for Mobile Telecommunications (GSM) and ISDN networks. A Cisco AS5200 loaded with V.110 terminal adapter modules provides corporate or Internet access to GSM mobile users.

The 12 port V.110 terminal adapter connects to the AS5200 TDM bus via the universal carrier card. There can be up to five V.110 modules in one Cisco AS5200, which is capable of terminating 60 V.110 sessions. Modem and V.110 terminal adapter port modules can coexist in the same Cisco AS5200. Based on ISDN Q.931 call bearer information, the Cisco IOS software routes calls to the appropriate port module for termination. For example, analog calls are terminated by the modem modules, GSM calls are serviced by the V.110 terminal adapter modules, and ISDN calls are sent to the PPP termination engine. This flexibility allows providing one telephone number to users for analog, GSM, and ISDN data calls.

Figure 50 shows a dial-in scenario for how V.110 technology can be used with Cisco AS5200 access servers:

Figure 50 V.110 Dial-In Scenario

## V.34 Modems

Recommendation V.34 is the name of the standard that defines how modems should operate at 28.8 kbps. The previous standard for high speed modem communication was V.32bis, which defined how modems should operate at 14.4 kbps.

## Manageable versus Nonmanageable Modems

Depending on which modem license you purchase with your access server or router, Cisco modems are either manageable or not manageable by the Cisco IOS software.

Manageable modems support the one out-of-band feature, which is used for gathering modem performance statistics and transmitting attention (AT) commands. Nonmanageable modems do not support the out-of-band feature nor the functionality associated with manageable modems. As you read through this chapter, note which commands apply to manageable versus nonmanageable modems.

Table 10 provides a summary of the Cisco IOS commands supported by manageable modems versus nonmanageable modems.

**Table 10 Commands for Manageable versus Nonmanageable Modems**

<b>Modem Commands</b>	<b>Supported by Manageable Modems</b>	<b>Supported by Nonmanageable Modems</b>
<b>clear modem</b>	Yes	Yes
<b>clear modem at-mode</b>	Yes	No

**Table 10** Commands for Manageable versus Nonmanageable Modems (Continued)

<b>Modem Commands</b>	<b>Supported by Manageable Modems</b>	<b>Supported by Nonmanageable Modems</b>
<code>clear modem counters</code>	Yes	No
<code>copy modem</code>	Yes	Yes
<code>modem at-mode</code>	Yes	No
<code>modem at-mode-permit</code>	Yes	No
<code>modem autotest</code>	Yes	Yes
<code>modem bad</code>	Yes	Yes
<code>modem buffer-size</code>	Yes	No
<code>modem busyout</code>	Yes	Yes
<code>modem hold-reset</code>	Yes	Yes
<code>modem poll time</code>	Yes	No
<code>modem recovery-time</code>	Yes	No
<code>modem shutdown</code>	Yes	Yes
<code>modem startup-test</code>	Yes	Yes
<code>modem status-poll</code>	Yes	No
<code>show modem</code>	Yes	Yes
<code>show modem at-mode</code>	Yes	No
<code>show modem call-stats</code>	Yes	No
<code>show modem connect-speeds</code>	Yes	No
<code>show modem cookie</code>	Yes	Yes
<code>show modem csm</code>	Yes	Yes
<code>show modem log</code>	Yes	Yes
<code>show modem summary</code>	Yes	No
<code>show modem test</code>	Yes	Yes
<code>show modem version</code>	Yes	Yes
<code>test modem back-to-back</code>	Yes	Yes

## Verify Connection Speed Performance

Making sure that your modems are connecting at the correct connection speeds is an important aspect of managing modems. To display modem connection speed statistics for a specific modem or range of modems, use the following EXEC commands:

<b>Step</b>	<b>Command</b>	<b>Purpose</b>
1	<code>show modem connect-speeds [max-speed [slot]]</code>	Displays connection speed statistics for all the modems.
2	<code>show modem [slot/port   group number]</code>	Displays a high-level performance report for all the modems or a single modem.

These commands also provide performance information to investigate possible bad or corrupt modems or T1/E1 lines. For example, suppose you have an access server that is fully populated with V.34 modems. If you notice that modem 1/0 is only getting V.34 connections 50% of the time, whereas all the other modems are getting V.34 connections 80% of the time, then modem 1/0 is probably malfunctioning or bad. If you are reading low connection speeds across all the modems, you may have a faulty channelized T1 or ISDN PRI line connection.

To display connection speed information for all modems running in your system, use the **show modem connect-speeds** *max-speed* EXEC command. Because most terminal screens are not wide enough to display the entire range of connection speeds at one time (for example, 75 to 56000 bps), the *max-speed* variable is used. This variable specifies the contents of a shifting baud-rate window, which provides you with a snap shot of the modem connection speeds for your system. Replace the *max-speed* argument with the maximum connect speed that you want to view. You can specify from 12000 to 56000 bps. If you are interested in viewing a snap shot of lower baud rates, specify a lower connection speed. If you are interested in viewing a snap shot of higher baud rates, specify a higher connection speed.

See the chapter “Modem Management Commands” in the *Dial Solutions Command Reference* for a complete description of each of the fields displayed in the following Microcom modem example:

```
router# show modem connect-speeds 33600

transmit connect speeds

Mdm   14400  16800  19200  21600  24000  26400  28800  31200  33600 TotCnt
* 0/0      0      0      0      0      0      0      4      4      1      9
* 0/1      2      0      0      0      0      0      3      3      1      9
  0/2      2      0      0      0      0      1      2      4      1     10
* 0/3      0      0      0      1      0      0      3      4      1      9
* 0/4      1      0      0      0      0      2      2      1      1      7
* 0/5      0      0      0      0      0      0      4      4      1      9
* 0/6      0      0      0      0      0      1      3      3      1      8
* 0/7      0      0      0      2      0      0      4      3      1     10
* 0/8      2      0      0      0      0      0      3      4      1     10
* 0/9      0      0      0      0      0      0      4      3      0      7
* 0/10     1      0      0      0      0      1      3      2      1      8
* 0/11     0      0      0      0      0      0      4      3      1      8
  0/12     1      0      0      0      0      0      4      2      1      8
* 0/13     0      0      0      0      0      0      4      2      1      7
* 0/14     1      0      0      0      0      1      2      2      1      7
* 0/15     0      0      0      0      0      0      4      2      1      7
* 0/16     0      0      0      1      0      0      3      2      1      7
* 0/17     1      0      0      0      0      0      4      2      1      8
* 0/18     1      0      0      0      0      0      3      3      1      8
* 0/19     0      0      0      0      0      0      5      3      1      9
* 0/20     0      0      0      0      0      0      4      2      1      7
* 0/21     1      0      0      0      0      0      4      2      0      7
* 0/22     0      0      0      0      0      0      7      9      1     17
* 0/23     0      0      0      0      0      2      2      3      1      8
* 2/0      0      0      0      1      0      0      3      3      1      8
* 2/1      0      0      0      0      0      0      5      2      1      8
* 2/2      0      0      0      1      0      0      4      1      1      7
* 2/3      1      0      0      0      0      0      4      2      1      8
* 2/4      0      0      0      0      0      0      5      2      1      8
* 2/5      0      0      0      0      0      0      4      3      1      8
* 2/6      0      0      0      0      0      0      3      2      1      6
* 2/7      1      0      0      0      0      1      3      2      0      7
* 2/8      1      0      0      0      0      0      3      2      1      7
* 2/9      0      0      0      0      0      1      3      2      1      7
* 2/10     2      0      0      0      0      2      1      0      1      6
* 2/11     0      0      0      1      0      1      3      5      1     11
* 2/12     0      0      0      0      0      0      5      2      1      8
```

## Verify Connection Speed Performance

* 2/13	1	0	0	0	0	0	5	0	1	7
* 2/14	1	0	0	0	0	0	3	3	1	8
* 2/15	1	0	0	0	0	1	2	3	1	8
* 2/16	0	0	0	0	0	0	4	3	1	8
* 2/17	0	0	0	0	0	0	5	11	0	16
* 2/18	0	0	0	1	0	1	1	2	1	6
* 2/19	0	0	0	0	0	0	2	3	1	6
* 2/20	1	0	0	0	0	2	3	9	1	16
* 2/21	1	0	0	0	0	0	4	1	1	7
* 2/22	0	0	0	1	0	0	2	3	1	7
* 2/23	0	0	0	0	0	1	3	3	1	8
Tot	23	0	0	9	0	18	165	141	44	400
Tot %	5	0	0	2	0	4	41	35	11	

### receive connect speeds

Mdm	14400	16800	19200	21600	24000	26400	28800	31200	33600	TotCnt
* 0/0	0	0	0	0	0	4	1	3	1	9
* 0/1	2	0	0	0	0	3	1	2	1	9
0/2	2	0	0	0	0	3	1	3	1	10
* 0/3	0	0	0	1	0	3	4	0	1	9
* 0/4	1	0	0	0	0	4	0	1	1	7
* 0/5	0	0	0	0	0	4	3	1	1	9
* 0/6	0	0	0	0	0	4	0	3	1	8
* 0/7	0	0	0	2	0	4	1	2	1	10
* 0/8	2	0	0	0	0	3	0	5	0	10
* 0/9	0	0	0	0	0	4	2	0	1	7
* 0/10	1	0	0	0	0	4	0	2	1	8
* 0/11	0	0	0	0	0	4	0	3	1	8
0/12	1	0	0	0	0	2	2	2	1	8
* 0/13	0	0	0	0	0	4	1	1	1	7
* 0/14	1	0	0	0	0	2	3	0	1	7
* 0/15	0	0	0	0	0	4	1	1	1	7
* 0/16	0	0	0	1	0	3	2	0	1	7
* 0/17	1	0	0	0	0	4	1	1	1	8
* 0/18	1	0	0	0	0	3	2	1	1	8
* 0/19	0	0	0	0	0	5	1	2	1	9
* 0/20	0	0	0	0	0	4	0	3	0	7
* 0/21	1	0	0	0	0	4	0	1	1	7
* 0/22	0	0	0	0	0	6	6	4	1	17
* 0/23	0	0	0	0	0	4	2	1	1	8
* 2/0	0	0	0	1	0	3	1	2	1	8
* 2/1	0	0	0	0	0	3	3	1	1	8
* 2/2	0	0	0	1	0	4	0	1	1	7
* 2/3	1	0	0	0	0	3	2	1	1	8
* 2/4	0	0	0	0	0	4	2	1	1	8
* 2/5	0	0	0	0	0	4	1	2	1	8
* 2/6	0	0	0	0	0	3	0	3	0	6
* 2/7	1	0	0	0	1	2	2	0	1	7
* 2/8	1	0	0	0	0	3	0	2	1	7
* 2/9	0	0	0	0	0	4	1	1	1	7
* 2/10	2	0	0	0	0	3	0	0	1	6
* 2/11	0	0	0	1	0	3	1	5	1	11
* 2/12	0	0	0	0	0	4	3	0	1	8
* 2/13	1	0	0	0	0	2	3	0	1	7
* 2/14	1	0	0	0	0	3	2	1	1	8
* 2/15	1	0	0	0	0	3	0	3	1	8
* 2/16	0	0	0	0	0	4	0	4	0	8
* 2/17	0	0	0	0	0	5	2	8	1	16
* 2/18	0	0	1	0	0	2	1	1	1	6
* 2/19	0	0	0	0	0	2	2	1	1	6
* 2/20	1	0	0	0	0	4	2	8	1	16

* 2/21	1	0	0	0	0	4	0	1	1	7
* 2/22	0	0	1	0	0	2	0	3	1	7
* 2/23	0	0	0	0	0	4	2	1	1	8
Tot	23	0	2	7	1	167	64	92	44	400
Tot %	5	0	0	1	0	41	16	23	11	

The following example shows the connection statistics for modem 1/2, which is a V.34 Microcom modem. See the chapter “Modem Management Commands” in the *Dial Solutions Command Reference* for a complete description of each of the displayed fields:

```
router# show modem 1/2
Mdm Typ      Status      Tx/Rx      G Duration TX  RX  RTS  CTS  DSR  DCD  DTR
1/2 V34      Idle      26400/28800 1 00:18:42          x   x   x           x
```

```
Modem 1/2, Microcom (Select), Async3, TTY3
Firmware (Boot) Rev: 3.1(30) (3.0(4))
DSP Controller (SPX) Rev: 1.1(0) (1.1(0))
Modem config: Incoming and Outgoing
Protocol: reliable/LAPM, Compression: V42bis
Management port config: Status polling and AT session
Management port status: Status polling and AT session
TX signals: -13 dBm, RX signals: -19 dBm
```

```
Last clearing of "show modem" counters never
122 incoming completes, 6 incoming failures
0 outgoing completes, 0 outgoing failures
0 failed dial attempts, 0 ring no answers, 0 busied outs
0 no dial tones, 0 dial timeouts, 0 watchdog timeouts
6 no carriers, 0 link failures, 2 resets, 0 recover oob
0 protocol timeouts, 0 protocol errors, 0 lost events
```

Transmit Speed Counters:

Connection Speeds	75	300	600	1200	2400	4800
# of connections	0	0	0	0	0	0
Connection Speeds	7200	9600	12000	14400	16800	19200
# of connections	0	0	1	1	2	3
Connection Speeds	21600	24000	26400	28800	31200	32000
# of connections	18	13	51	32	1	0
Connection Speeds	33600	34000	36000	38000	40000	42000
# of connections	0	0	0	0	0	0
Connection Speeds	44000	46000	48000	50000	52000	54000
# of connections	0	0	0	0	0	0
Connection Speeds	56000					
# of connections	0					

Receive Speed Counters:

Connection Speeds	75	300	600	1200	2400	4800
# of connections	0	0	0	0	0	0
Connection Speeds	7200	9600	12000	14400	16800	19200
# of connections	0	0	1	1	0	3
Connection Speeds	21600	24000	26400	28800	31200	32000
# of connections	2	16	60	39	0	0
Connection Speeds	33600	34000	36000	38000	40000	42000
# of connections	0	0	0	0	0	0
Connection Speeds	44000	46000	48000	50000	52000	54000
# of connections	0	0	0	0	0	0
Connection Speeds	56000					
# of connections	0					

## Automatically Run a Modem Diagnostics Test

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The next example shows example output for the **show modem** command. See the chapter “Modem Management Commands” in the *Dial Solutions Command Reference* for a complete description of each of the displayed fields:

```
router# show modem
```

Mdm	Usage	Inc calls		Out calls		Busied Out	Failed Dial	No Answer	Succ Pct.
		Succ	Fail	Succ	Fail				
* 1/0	37%	98	4	0	0	0	0	0	96%
1/1	38%	98	2	0	0	0	0	0	98%
1/2	35%	122	6	0	0	0	0	0	95%
1/3	37%	104	4	0	0	0	0	0	96%
* 1/4	39%	104	5	0	0	0	1	1	95%
* 1/5	37%	96	4	0	0	0	0	0	96%
* 1/6	37%	120	6	0	0	0	0	0	95%
1/7	34%	130	5	0	0	0	0	0	96%
1/8	39%	111	6	0	0	0	1	1	94%
1/9	37%	108	4	0	0	0	0	0	96%
* 1/10	39%	115	8	0	0	0	0	0	93%
* 1/11	37%	86	3	0	0	0	0	0	96%
* 1/12	38%	121	3	0	0	0	1	1	97%
1/13	35%	107	6	0	0	0	0	0	94%
* 1/14	37%	92	5	0	0	0	0	0	94%
1/15	41%	106	9	0	0	0	0	0	92%
1/16	35%	112	6	0	0	0	0	0	94%
1/17	39%	101	3	0	0	0	0	0	97%
1/18	40%	102	7	0	0	0	0	0	93%
1/19	37%	93	3	0	0	0	0	0	96%
1/20	42%	97	4	0	0	0	0	0	96%
1/21	38%	86	5	0	0	0	0	0	94%
* 1/22	40%	104	10	0	0	0	0	0	91%
1/23	41%	76	5	0	0	0	0	0	93%

## Automatically Run a Modem Diagnostics Test

You can automatically run a diagnostics test for on modems inside access servers, such as a Cisco AS5200 loaded with Microcom modems. Modems that fail the test are automatically busied out of service. To do this, issue the **modem autotest** global configuration command, which is described in the following sections:

- How the Modem Autotest Works
- Preliminary Usage Guidelines
- Setup the Modem Autotest
- Modem Autotest Example
- Manually Isolating a Back-to-Back Modem Test Example

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**Note** The modem autotest feature is not supported on the Cisco 3600 series routers populated with MICA digital modem cards. However, the Cisco 3600 series does support a limited power on startup test, which automatically removes inoperable modems from dial-up services.

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## How the Modem Autotest Works

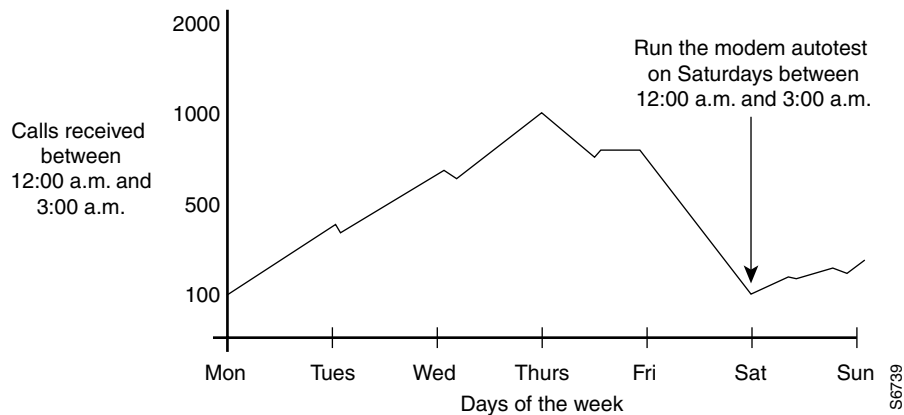
The access server or router performs the test by automatically conducting a series of back-to-back connections and data transfers between two internal modems. The data transfer consists of sending one packet that is 10-bytes large between two modems. All modem test connections occur inside the system. A modem involved in a back-to-back modem test is temporarily marked as busy, which means the modem will not accept a call while the test is running.

If all modems are currently active and the modem autotest is activated, the test will wait until at least two modems drop their calls and become available. The modem auto test moves on to test a second pair of modems as soon as two additional modems become available, and so on. To disable the modem autotest at any time, issue the **no modem autotest** command.

## Preliminary Usage Guidelines

We recommend that you set the modem autotest to run during off-peak hours. This provides maximum access to your remote users. For example, if you are an Internet service provider and your peak dial-in hours are between 5:00 p.m. and 12:00 p.m. on weekdays, configure the test to run automatically at 3:00 a.m. on Saturday mornings. Bad or inoperable modems detected by the test will automatically be busied out. See Figure 51.

**Figure 51 Sample Demand Curve for Dial Access**



There are specific syntax functions used for the **modem autotest time hh:mm [interval#]** command. The required **time hh:mm** parameter specifies the start time to initiate the test in hours and minutes (hh:mm; for example 1:00 a.m. is specified as 01:00). By default, the test runs once every 24 hours when enabled. The modem autotest feature synchronizes its timing with the access server's internal clock. The **interval#** parameter gives you the opportunity to specify which day and hour of the week you want the test to run. In place of the interval parameter specify the hour that you want to start the test, which can be between 1 and 168 hours ahead of the current time. For example, suppose that today is Friday and the current time on the access server is 3:00 p.m. If you want the test to run once every Saturday at 3:00 a.m., enter the **modem autotest time 03:00 168** command (03:00 = 3:00 a.m. in military time; 168 = 7 days).

Use the **show clock EXEC** command to determine the current time set on the access server.

Use the **show modem test EXEC** command to see the results of the modem autotest. This command displays which modems were tested and the results of the test. You can also use the **show modem EXEC** command to see which modems are marked bad by the **modem autotest** command. To disable the test at any time, issue the **no modem autotest** command.

### Setup the Modem Autotest

To set up the modem autotest, perform the following tasks beginning in EXEC mode:

Step	Command	Purpose
1	<b>show clock</b>	Take note of the current time set on the access server or router. The modem autotest synchronizes with this time. Be sure this clock matches the current actual time in your time zone.
2	<b>configure terminal</b>	Enter global configuration mode.
3	<b>modem autotest time</b> <i>hh:mm [interval]</i>	Specify the time you want the modem test to automatically begin. Express it in hours and minutes in military time. <sup>1</sup>
4	<b>modem autotest minimum</b> <i>number</i>	Set the minimum number of modems that will remain untested and available to accept calls during each test cycle. The default is six modems.
5	<b>modem autotest error</b> <i>threshold</i>	Specify a maximum consecutive modem error count that will trigger the modem autotest. You can configure the system to watch for between 3 and 50 errors before the modem autotest begins. To view the list of monitored errors, issue the <b>show modem call-stats</b> command.
6	<b>exit</b>	Return to EXEC mode.
7	<b>show modem test</b>	Display the results of the modem autotest after it has run.
8	<b>show modem</b>	Display the complete list of which modems are marked bad versus good. <sup>2</sup>

1. Do not forget to include the required colon (:) between the hours parameter (hh) and the minutes parameter (mm).

2. Inoperable or bad modems are marked with a "B" appearing before the slot/port.

### Modem Autotest Example

The following example shows how to set the modem autotest to run once per week on Tuesdays at 3:00 a.m. Additionally, the autotest will activate if the system detects a modem error count higher than 40 errors.

**Step 1** Use the **set clock EXEC** command to determine the current time set on the router or access server. In this example, the time and date set on the following router is 3:00 p.m, Monday, August 25, 1997.

```
router# show clock
*15:00:01.031 EST Aug 25 1997
```

**Step 2** Enter global configuration mode and set the modem autotest using the **modem autotest time** command. In this example, the access server is configured to run the modem autotest every Tuesday at 3:00 a.m.

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# modem autotest time 03:00 168
```

- Step 3** Configure the autotest to activate if the system detects a high modem error count. In this example, the autotest activates if the system detects a modem error count higher than 40 errors. To view the list of monitored errors, issue the **show modem call-stats EXEC** command.

```
router(config)# modem autotest error 40
router(config)# exit
router#
%SYS-5-CONFIG_I: Configured from console by console
router#
```

- Step 4** Display the results of the modem autotest after the test has run through a test cycle by issuing the **show modem test EXEC** command:

```
router# show modem test
Date Time           Modem  Test                Reason                State Result
5/15 07:25:17 AM  1/0   Back-To-Back        TIME INTERVAL        Idle  FAIL
5/15 07:25:17 AM  1/1   Back-To-Back        TIME INTERVAL        Idle  PASS
5/15 07:25:17 AM  1/2   Back-To-Back        TIME INTERVAL        Idle  PASS
5/15 07:25:17 AM  1/3   Back-To-Back        TIME INTERVAL        Idle  FAIL
5/15 07:25:17 AM  1/4   Back-To-Back        TIME INTERVAL        Idle  PASS
5/15 07:25:17 AM  1/5   Back-To-Back        TIME INTERVAL        Idle  PASS
5/15 07:25:17 AM  1/6   Back-To-Back        TIME INTERVAL        Idle  PASS
5/15 07:25:17 AM  1/7   Back-To-Back        TIME INTERVAL        Idle  PASS
5/15 07:25:17 AM  1/8   Back-To-Back        TIME INTERVAL        Idle  PASS
5/15 07:25:17 AM  1/9   Back-To-Back        TIME INTERVAL        Idle  PASS
...
```

Alternatively, you can view which modems were marked bad by the modem autotest by issuing the **show modem EXEC** command. Bad modems are marked by the letter B. In this example, modem 1/0 and 1/3 are marked bad, which takes them out of commission and makes them unable to participate in dial services.

```
router# show modem
%SYS-5-CONFIG_I: Configured from console by consolem
      Inc calls      Out calls  Busied   Failed   No       Succ
Mdm  Usage   Succ  Fail  Succ  Fail  Out     Dial  Answer  Pct.
B 1/0   0%      0    0    0    0    1      0    0      0%
  1/1   0%      0    0    0    0    3      0    0      0%
  1/2   0%      0    0    0    0    1      0    0      0%
B 1/3   0%      0    0    0    0    1      0    0      0%
  1/4   0%      0    0    0    0    1      0    0      0%
  1/5   0%      0    0    0    0    1      0    0      0%
  1/6   0%      0    0    0    0    1      0    0      0%
  1/7   0%      0    0    0    0    1      0    0      0%
  1/8   0%      0    0    0    0    1      0    0      0%
  1/9   0%      0    0    0    0    1      0    0      0%
  1/10  0%      0    0    0    0    1      0    0      0%
  1/11  0%      0    0    0    0    1      0    0      0%
  1/12  0%      0    0    0    0    1      0    0      0%
  1/13  0%      0    0    0    0    1      0    0      0%
  1/14  0%      0    0    0    0    1      0    0      0%
  1/15  0%      0    0    0    0    1      0    0      0%
  1/16  0%      0    0    0    0    1      0    0      0%
  1/17  0%      0    0    0    0    1      0    0      0%
  1/18  0%      0    0    0    0    0      0    0      0%
  1/19  0%      0    0    0    0    0      0    0      0%
  1/20  0%      0    0    0    0    0      0    0      0%
  1/21  0%      0    0    0    0    0      0    0      0%
  1/22  0%      0    0    0    0    0      0    0      0%
  1/23  0%      0    0    0    0    0      0    0      0%
```

## Manually Isolating a Back-to-Back Modem Test Example

You can also manually isolate an internal back-to-back connection and data transfer between two modems for focused troubleshooting purposes. For example, if mobile users cannot dial in to modem 2/5 (which is the sixth modem port on the modem board in the second chassis slot), attempt a back-to-back test with modem 2/5 and a modem known to be functioning, such as modem 2/6. To do this, issue the **test modem back-to-back slot/port slot/port**.

You might need to enable this command on several different combinations of modems to determine which one is not functioning properly. A pair of operable modems successfully connect and complete transmitting data in both directions. An operable modem and an inoperable modem do not successfully connect with each other.

**Step 1** Perform a back-to-back modem test between two normal functioning modems. This example shows a successful connection between modem 1/1 and modem 1/0, which verifies normal operating conditions between these two modems.

```
AS5200# test modem back-to-back 1/1 1/0
Repetitions (of 10-byte packets) [1]: 10
AS5200#
%MODEM-5-B2BCONNECT: Modems (1/1) and (1/0) connected in back-to-back test: CONN
ECT9600/REL-MNP
%MODEM-5-B2BMODEMS: Modems (1/0) and (1/1) completed back-to-back test: success/
packets = 20/20
```

After you enter the **test modem back-to-back** command, you must define the number of packets transmitted between modems at the *Repetitions* prompt. The ideal range of packets to transmit and receive is from 1 to 100. The default is 1 packet that is 10-bytes large. The response message (for example, “success/packets = 2/2”) tells you how many packets were successfully sent in *both* directions compared to the total number of packets attempted to be sent in both directions. Because the software reports the packet total in both directions, the reported numbers are *two times* the number you originally specify.

**Step 2** However, when modem 1/1 is tested against modem 1/3, the back-to-back modem test fails. Therefore, modem 1/3 is suspected or proven to be inoperable or bad.

```
router# test modem back-to-back 1/1 1/3
Repetitions (of 10-byte packets) [1]: 10
router#
%MODEM-5-BADMODEMS: Modems (1/3) and (1/1) failed back-to-back test: NOCARRIER
```

**Step 3** Next, you need to manually mark modem 1/3 as an inoperable or bad modem. To do this, you must first find out which line number corresponds with modem 1/3. By issuing the **show modem 1/3 EXEC** command, you can see that TTY line number 4 (shown as TTY4) is used for modem 1/3.

```
router# show modem 1/3
Mdm Typ Status Tx/Rx G Duration TX RX RTS CTS DSR DCD DTR
1/3 V34 Idle 28800/28800 0 00:00:00 x x x x x

Modem 1/3, Microcom MNP10 V34 Modem (Managed), TTY4
Firmware (Boot) Rev: 1.0(23) (1.0(5))
Modem config: Incoming and Outgoing
Protocol: reliable/MNP, Compression: V42bis
Management port config: Status polling and AT session
Management port status: Status polling and AT session
TX signals: -15 dBm, RX signals: -17 dBm

Last clearing of "show modem" counters never
0 incoming completes, 0 incoming failures
0 outgoing completes, 0 outgoing failures
```

```

0 failed dial attempts, 0 ring no answers, 1 busied outs
0 no dial tones, 0 dial timeouts, 0 watchdog timeouts
0 no carriers, 0 link failures, 0 resets, 0 recover oob
0 protocol timeouts, 0 protocol errors, 0 lost events

```

Transmit Speed Counters:

```

Connection Speeds      75      300      600      1200      2400      4800
# of connections       0        0        0        0        0        0
Connection Speeds     7200     9600    12000    14400    16800    19200
# of connections       0        0        0        0        0        0
Connection Speeds    21600    24000    26400    28800    31200    32000
# of connections       0        0        0        1        0        0
Connection Speeds    33600    34000    36000    38000    40000    42000
# of connections       0        0        0        0        0        0
Connection Speeds    44000    46000    48000    50000    52000    54000
# of connections       0        0        0        0        0        0
Connection Speeds     56000
# of connections       0

```

**Step 4** Enter line configuration mode and manually remove modem 1/3 from dial services by issuing the **modem bad** command on line 4:

```

router# configure terminal
router(config)# line 4
router(config-line)# modem bad
router(config-line)# exit
router(config)# exit
router#

```

**Step 5** You can now issue the **show modem EXEC** command or the **show modem slot/port** command to display the bad modem status.

Bad modems are marked with the letter *B* in the **show modem** command display output:

```

router# show modem
%SYS-5-CONFIG_I: Configured from console by consolem

```

Mdm	Usage	Inc calls		Out calls		Busied Out	Failed Dial	No Answer	Succ Pct.
		Succ	Fail	Succ	Fail				
1/0	0%	0	0	0	0	1	0	0	0%
1/1	0%	0	0	0	0	3	0	0	0%
1/2	0%	0	0	0	0	1	0	0	0%
B 1/3	0%	0	0	0	0	1	0	0	0%
1/4	0%	0	0	0	0	1	0	0	0%
1/5	0%	0	0	0	0	1	0	0	0%
1/6	0%	0	0	0	0	1	0	0	0%
1/7	0%	0	0	0	0	1	0	0	0%
1/8	0%	0	0	0	0	1	0	0	0%
1/9	0%	0	0	0	0	1	0	0	0%
1/10	0%	0	0	0	0	1	0	0	0%
1/11	0%	0	0	0	0	1	0	0	0%
1/12	0%	0	0	0	0	1	0	0	0%
1/13	0%	0	0	0	0	1	0	0	0%
1/14	0%	0	0	0	0	1	0	0	0%
1/15	0%	0	0	0	0	1	0	0	0%
1/16	0%	0	0	0	0	1	0	0	0%
1/17	0%	0	0	0	0	1	0	0	0%
1/18	0%	0	0	0	0	0	0	0	0%
1/19	0%	0	0	0	0	0	0	0	0%
1/20	0%	0	0	0	0	0	0	0	0%
1/21	0%	0	0	0	0	0	0	0	0%
1/22	0%	0	0	0	0	0	0	0	0%
1/23	0%	0	0	0	0	0	0	0	0%

## Display Local Disconnect Reasons

---

Bad modems are also marked as *Bad* in the Status column of the **show modem slot/port** command's display output:

```
router# show modem 1/3
Mdm Typ Status Tx/Rx G Duration TX RX RTS CTS DSR DCD DTR
1/3 V34 Bad 28800/28800 0 00:00:00 x x x x x
```

```
Modem 1/3, Microcom MNP10 V34 Modem (Managed), TTY4
Firmware (Boot) Rev: 1.0(23) (1.0(5))
Modem config: Incoming and Outgoing
Protocol: reliable/MNP, Compression: V42bis
Management port config: Status polling and AT session
Management port status: Status polling and AT session
TX signals: -15 dBm, RX signals: -17 dBm
```

```
Last clearing of "show modem" counters never
 0 incoming completes, 0 incoming failures
 0 outgoing completes, 0 outgoing failures
 0 failed dial attempts, 0 ring no answers, 1 busied outs
 0 no dial tones, 0 dial timeouts, 0 watchdog timeouts
 0 no carriers, 0 link failures, 0 resets, 0 recover oob
 0 protocol timeouts, 0 protocol errors, 0 lost events
```

Transmit Speed Counters:

Connection Speeds	75	300	600	1200	2400	4800
# of connections	0	0	0	0	0	0
Connection Speeds	7200	9600	12000	14400	16800	19200
# of connections	0	0	0	0	0	0
Connection Speeds	21600	24000	26400	28800	31200	32000
# of connections	0	0	0	1	0	0
Connection Speeds	33600	34000	36000	38000	40000	42000
# of connections	0	0	0	0	0	0
Connection Speeds	44000	46000	48000	50000	52000	54000
# of connections	0	0	0	0	0	0
Connection Speeds	56000					
# of connections	0					

## Display Local Disconnect Reasons

Use the **show modem call-stats [slot]** EXEC command to find out why a modem ended its connection or why a modem is not operating at peak performance.

Local disconnect reasons are listed across the top of the screen display (for example, wdogTimr, compress, retrain, inacTout, linkFail, moduFail, mnpProto, and lapmProt). In the body of the screen display, the number of times each modem disconnected is displayed (see the # column). For a particular disconnect reason, the % column indicates the percent that a modem was logged for the specified disconnect reason with respect to the entire modem pool for that given reason. For example, out of all the times the rmtLink error occurred on all the modems in the system, the rmtLink error occurred 10% of the time on modem 0/22.

Bad or malfunctioning modems are detected by an unusually high number of disconnect counters for a particular disconnect reason. For example, if modem 1/0 had an astronomically high number of compression errors compared to the remaining modems in system, modem 1/0 would probably be bad or inoperable.

To reset the counters displayed by the **show modem call-stats** command, issue the **clear modem counters** command.

**Note** For a complete description of each of the error display fields, see the chapter “Modem Management Commands” in the *Dial Solutions Command Reference*. Remote disconnect reasons are not described by this command.

The following example displays output for the **show modem call-stats** command. Due to the screen size limitation of most terminal screen displays, not all the possible disconnect reasons are displayed at one time. Only the top eight most frequently experienced disconnect reasons are displayed at one time.

```
router# show modem call-stats

dial-in/dial-out call statistics

      lostCarr  dtrDrop  rmtLink  wdogTimr  compress  retrain  inacTout  linkFail
Mdm   #    %    #    %    #    %    #    %    #    %    #    %    #    %    #    %
* 0/0   6    2    2    3    1    0    0    0    0    0    0    0    0    0    0
* 0/1   5    2    2    3    2    1    0    0    0    0    0    0    0    0    0
  0/2   5    2    2    3    4    3    0    0    0    0    0    0    0    0    0
* 0/3   5    2    2    3    2    1    0    0    0    0    0    0    0    0    0
* 0/4   5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 0/5   5    2    2    3    2    1    0    0    0    0    0    0    0    0    0
* 0/6   4    1    2    3    2    1    0    0    0    0    0    0    0    0    0
* 0/7   4    1    2    3    4    3    0    0    0    0    0    0    0    0    0
* 0/8   6    2    1    1    3    2    0    0    0    0    0    0    0    0    0
* 0/9   5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 0/10  5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
* 0/11  5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
  0/12  5    2    2    3    2    1    0    0    0    0    0    0    0    0    0
* 0/13  5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 0/14  5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 0/15  5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 0/16  5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 0/17  5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
* 0/18  5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
* 0/19  5    2    1    1    3    2    0    0    0    0    0    0    0    0    0
* 0/20  5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 0/21  5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 0/22  5    2    1    1    11   10    0    0    0    0    0    0    0    0    0
* 0/23  5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
* 2/0   4    1    2    3    2    1    0    0    0    0    0    0    0    0    0
* 2/1   5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
* 2/2   5    2    2    3    0    0    0    0    0    0    0    0    0    0    0
* 2/3   5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
* 2/4   5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
* 2/5   5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
* 2/6   4    1    1    1    1    0    0    0    0    0    0    0    0    0    0
* 2/7   5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 2/8   5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 2/9   4    1    1    1    2    1    0    0    0    0    0    0    0    0    0
* 2/10  5    2    1    1    0    0    0    0    0    0    0    0    0    0    0
* 2/11  5    2    1    1    5    4    0    0    0    0    0    0    0    0    0
* 2/12  5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
* 2/13  5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
* 2/14  5    2    1    1    2    1    0    0    0    0    0    0    0    0    0
* 2/15  4    1    1    1    3    2    0    0    0    0    0    0    0    0    0
* 2/16  4    1    1    1    3    2    0    0    0    0    0    0    0    0    0
* 2/17  5    2    2    3    9    8    0    0    0    0    0    0    0    0    0
* 2/18  4    1    1    1    1    0    0    0    0    0    0    0    0    0    0
* 2/19  3    1    1    1    2    1    0    0    0    0    0    0    0    0    0
* 2/20  7    3    1    1    8    7    0    0    0    0    0    0    0    0    0
* 2/21  5    2    1    1    1    0    0    0    0    0    0    0    0    0    0
```

## Display Local Disconnect Reasons

* 2/22	4	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0
* 2/23	5	2	1	1	2	1	0	0	0	0	0	0	0	0	0	0
Total	233		59		110		0		0		0		0		0	

### dial-out call statistics

Mdm	noCarr		noDitone		busy		abort		dialStrg		autoLgon		dialTout		rmtHgup	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
* 0/0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/7	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/11	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/14	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/15	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/16	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/17	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/18	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/19	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/22	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 0/23	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/1	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/7	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/8	7	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/9	4	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0
* 2/10	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/11	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/12	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/13	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/14	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/15	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/16	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/17	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/18	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/19	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/21	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/22	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* 2/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	84		0		0		0		0		0		0		0	

## Upgrade Modem Firmware for 56K, V.34, and V.110 Cards

New versions of modem firmware are regularly posted to the Cisco Connection Online (CCO) server for you to download to your system. However, you must be a CCO registered user to access these files. These new versions of firmware contain bug fixes or new modem features, which improves your system's overall modem performance.

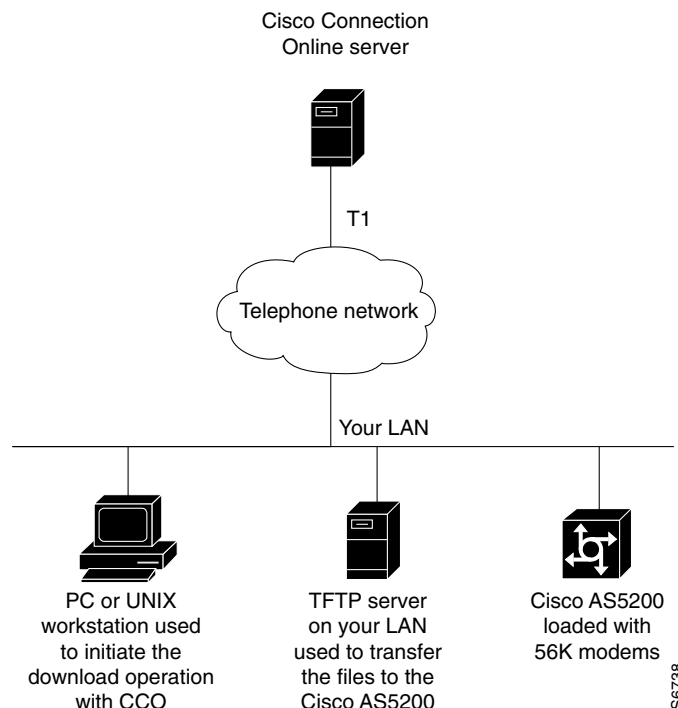
---

**Note** The modem download procedures described in this section do not apply to MICA digital modems. Only Micocom modem support is described.

---

The typical way to download firmware is shown in Figure 52. Use a PC or UNIX workstation to access CCO and download the new firmware to your desktop computer. After the firmware is downloaded, transfer it to a TFTP server somewhere on your LAN. You might be able to set up your workstation as a TFTP server. Next, log on to the access server or router to which you want to upgrade modem firmware and issue the Cisco IOS **copy** command to copy the file to the integrated modems.

**Figure 52** Downloading Modem Firmware from CCO to Your Modems



Perform the following two steps to download modem firmware from CCO to your integrated modems:

Step 1—Download the Modem Firmware from CCO to Your Workstation

Step 2—Copy the Firmware from a Local TFTP Server to the Access Server or Router

These steps are explained in detail in the next sections.

## Step 1—Download the Modem Firmware from CCO to Your Workstation

Choose a method to download these files from Cisco Systems:

- Download Method 1—Use an Internet Browser
- Download Method 2—Use a Traditional FTP Application

### Download Method 1—Use an Internet Browser

This section describes the procedure for logging onto Cisco System's Software Center and downloading new modem firmware to a workstation. You must log in as a Cisco registered user.

---

**Note** After the files are downloaded to your desktop computer, you must transfer them to a TFTP server on your network using an FTP application. The Cisco IOS software uses the **copy tftp** command to copy files from remote servers to access servers or routers. However, check to see if your workstation can be set up as TFTP server. If so, you do not need to transfer the files. Use your workstation as a server instead.

---

- Step 1** Launch an Internet browser.
- Step 2** Bring up Cisco Systems' Software Center home page at the following URL, which is subject to change without notice, and enter you CCO registered username and password at the prompt:
- `http://www.cisco.com/kobayashi/sw-center`
- Step 3** Find the firmware you want. Next, download it to your local workstation. For example, suppose you are looking for the latest Microcom firmware for the Cisco AS5200. Click the **Access Products** hot link. The Access Products window is displayed.
- Step 4** Click **Cisco AS5200 Series Software**.
- Step 5** Click **Download Microcom Modem Firmware** (for the type of modems installed in your access server or router).
- Step 6** Select the version of firmware you want to download.
- Step 7** Follow the remaining download instructions.
- Step 8** After the firmware is downloaded to your workstation, you must transfer the file to a TFTP server somewhere in your LAN using a terminal emulation software application.

## Download Method 2—Use a Traditional FTP Application

Take the following steps to download firmware files from Cisco's CCO FTP server using an FTP client application.

---

**Note** The directory path leading to the firmware files on cco.cisco.com is subject to change without notice. If you cannot access the files using an FTP application, try taking the URL route at <http://www.cisco.com/kobayashi/sw-center>.

---

### Step 1 Log in to Cisco Systems' CCO FTP server, which is called cco.cisco.com:

```
terminal> ftp cco.cisco.com
Connected to cio-sys.cisco.com.

Cisco Connection Online      |          |      Cisco Systems, Inc.
Email: cco-team@cisco.com   |||       |||      170 West Tasman Drive
Phone: +1.800.553.2447     .:||||:..:|||||.:. San Jose, CA 95134

NOTE: As of February 1, 1997 ftp.cisco.com will now point to this
service. Please be advised. To use the former ftp.cisco.com after
February 1, connect to ftpeng.cisco.com

You may login with:
+ Your CCO username and password, or
+ A special access code followed by your e-mail address, or
+ "anonymous" followed by your e-mail address for guest access.
```

```
cio-sys FTP server (CIOESD #103 Sun Dec 15 14:43:43 PST 1996) ready.
```

### Step 2 Enter your CCO registered username and password (for example, **harry** and **letmein**):

```
Name (cco.cisco.com:harry): harry
Password required for harry.
Password: letmein
#####
# Welcome to the Cisco Systems CCO FTP server.
# This server has a number of restrictions. If you are not familiar
# with these, please first get and read the /README or /README.TXT
# file.http://www.cisco.com/acs/info/cioesd.html for more info.
#####

**** NOTE: As of February 1, 1997, "cco.cisco.com", ****
**** "www.cisco.com" and "ftp.cisco.com" are now all ****
**** logical names for the same machine. ****
****
**** The old "ftp.cisco.com" is an entirely ****
**** different machine, which is now known as ****
**** "ftpeng.cisco.com" or "ftp-eng.cisco.com". ****
****
**** In general, "ftpeng.cisco.com" is used only for ****
**** distribution of Cisco Engineering-controlled ****
**** projects, such as beta programs, early field ****
**** trials, developing standards documents, etc. ****
****
**** Be sure to confirm you have connected to ****
**** the machine you need to interact with. ****
```

If you have any odd problems, try logging in with a minus sign (-) as the first character of your password. This will turn off a feature that may be confusing your ftp client program.

Please send any questions, comments, or problem reports about this server to [cco-team@cisco.com](mailto:cco-team@cisco.com).

**NOTE:**

To download files from CCO, you must be running a \*passive-mode\* capable FTP client.

To drop files on this system, you must `cd` to the `/drop` directory.

Mirrors of this server can be found at

```
+ ftp://www-europe.cisco.com European (Amsterdam)
+ ftp://www-fr.cisco.com      France (Paris)
+ ftp://www-au.cisco.com      Australia (Sydney)
+ ftp://www-jp.cisco.com      Japan (Tokyo)
+ ftp://www-kr.cisco.com      Korea (Seoul)
```

Please read the file `README`

it was last modified on Sat Feb 1 12:49:31 1997 - 163 days ago

ser harry logged in. Access restrictions apply.

Remote system type is UNIX.

Using binary mode to transfer files.

- Step 3** Specify the directory path that holds the modem firmware you want to download. Suppose you want 56K modem firmware for the Cisco AS5200, the directory path would be `/cisco/access/5200/56k`:

```
ftp> cd /cisco/access/5200/56k
Please read the file README
it was last modified on Tue May 27 10:07:38 1997 - 48 days ago
Please read the file README.txt
it was last modified on Tue May 27 10:07:38 1997 - 48 days ago
WD command successful.
```

- Step 4** View the contents of the directory with the `ls` command:

```
ftp> ls
Entering Passive Mode (192,31,7,130,218,128)
Opening ASCII mode data connection for /bin/ls.
total 2688
drwxr-s--T  2 ftpadmin ftpcio      512 Jun 30 18:11 .
drwxr-sr-t  19 ftpadmin ftpcio      512 Jun 23 10:26 ..
lrwxrwxrwx  1 root      3          10 Aug  6 1996 README -> README.txt
-rw-rw-r--  1 root      ftpcio     2304 May 27 10:07 README.txt
-r--r--r--  1 ftpadmin ftpint 96708 Jul 10 18:08 mcom-modem-dsp-3.1.30-1.1.0.bin
-r--r--r--  1 ftpadmin ftpint 280208 Jul 10 18:08 mcom-modem-fw-3.1.30-1.1.0.bin
Transfer complete.
```

- Step 5** Specify a binary image transfer:

```
ftp> binary
Type set to I.
```

- Step 6** Copy the modem firmware files from the server to your local environment with the `get` command.

The following example downloads the modem firmware file `mcom-modem-fw-3.1.30-1.1.0.bin`:

```
ftp> get mcom-modem-fw-3.1.30-1.1.0.bin
PORT command successful.
Opening BINARY mode data connection for mcom-modem-fw-3.1.30-1.1.0.bin (280208 bytes).
Transfer complete.
```

```
local: mcom-modem-fw-3.1.30-1.1.0.bin remote: mcom-modem-fw-3.1.30-1.1.0.bin
280208 bytes received in 0.63 seconds (4.4e+02 Kbytes/s)
```

**Step 7** Quit your terminal session:

```
ftp> quit
Goodbye.
```

**Step 8** Verify that you successfully transferred the files to your local directory:

```
server% ls -al
total 596
-r--r--r-- 1 96708 Jul 10 18:08 mcom-modem-dsp-3.1.30-1.1.0.bin
-r--r--r-- 1 280208 Jul 10 18:08 mcom-modem-fw-3.1.30-1.1.0.bin
server% pwd
/auto/tftpboot
```

If you haven't already done so, you must now transfer these files to a local TFTP or rcp server that your access server or router can access.

## Step 2—Copy the Firmware from a Local TFTP Server to the Access Server or Router

Depending on the type of modems installed in your system, the download instructions will vary. Refer to the instructions that best describe your scenario:

- 56K Firmware and DSP Upgrades
- V.34 Firmware Upgrades
- V.110 Firmware Upgrades

### 56K Firmware and DSP Upgrades

Perform the following steps to upgrade Microcom 56K modem firmware and DSP software. This section provides an example to upgrade the firmware on 56K modems loaded in a Cisco AS5200 access server.

---

**Note** This section describes the two file download method for Microcom modem cards. It does not describe how to download firmware for MICA modems nor the single file download method for Microcom modems (a single file downloaded from Cisco's CCO FTP server, which contains both modem firmware and DSP software). Refer to your product-specific documentation for information about single file 56K downloads and MICA downloads.

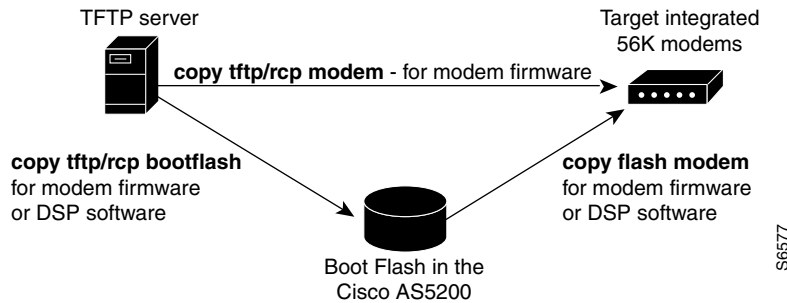
---

- Step 1—Create an Empty Boot Flash Memory Image File on Your TFTP Server
- Step 2—Back Up the Boot Flash Image and Disable Modem Autoconfigure
- Step 3—Upgrade to the Latest 56K Modem Firmware
- Step 4—Download the RAM-Based DSP Software to Boot Flash Memory
- Step 5—Copy the RAM-Based DSP Software from Boot Flash Memory to the 56K Modems

Before 56K modems were introduced, modem firmware was upgraded with a single firmware file stored in the modem's Flash memory. The file remained in the modem's Flash memory. However with 56K modems, the modem's Flash memory is not large enough to retain the necessary software to transmit at 56 kbps. Therefore the software is divided into two parts—56K modem firmware

and DSP software. The firmware resides in the modem’s Flash memory. The DSP software, which is the core intelligence of K56flex technology, runs from the access server’s RAM. Because the DSP software is not retained across reloads or power cycles, the image is stored in the access server’s boot Flash memory. (See Figure 53.)

**Figure 53 Supported Copy Commands**



**Step 1—Create an Empty Boot Flash Memory Image File on Your TFTP Server**

Before you back up your boot Flash image with the `copy bootflash tftp` command, you must create an empty destination file on your local TFTP server:

**Step 1** Log on to the Cisco AS5200 and find out the name of the boot image file in boot Flash memory with the `show bootflash` command:

```
router> enable
Password: letmein
router# show bootflash

Boot flash directory:
File Length Name/status
 1 6465584 c5200-is-1.112-6.4
[6465648 bytes used, 1922960 available, 8388608 total]
8192K bytes of processor board Boot flash (Read/Write)

router#
```

**Step 2** Go to your TFTP server and create an empty file using your boot image’s filename, then change its permissions to be world writable:

```
henry-sun:/tftpboot> touch c5200-is-1.112-6.4
henry-sun:/tftpboot> chmod 666 c5200-is-1.112-6.4
henry-sun:/tftpboot> ls -l c5200-is-1.112-6.4
-rw-rw-rw- 1 henry cisco 6465584 Jul 14 15:25 c5200-is-1.112-6.4
```

The placeholder or destination file is now created and prepared for the backup copy operation.

**Step 2—Back Up the Boot Flash Image and Disable Modem Autoconfigure**

For example, complete the following steps for a Cisco AS5200:

- Step 1** Back up your Boot Flash image to a local TFTP server on your network with the **copy bootflash tftp** command. This provides a recovery mechanism for you in case you accidentally erase or damage your Boot Flash image in one of the later steps.

```
router# copy bootflash tftp
```

- Step 2** Enter global configuration mode and disable the **modem autoconfigure** command on the TTY lines that correspond with the 56K modems. Ignore this step if this command is not enabled in your system configuration. In the following example, one 12-port 56K modem card is installed in slot 2:

```
router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)# line 13 24
router(config-line)# no modem autoconfigure
router(config-line)# exit
router(config)# exit
router#
%SYS-5-CONFIG_I: Configured from console by console
```

The boot image is now backed up and modem autoconfigure is disabled.

**Step 3—Upgrade to the Latest 56K Modem Firmware**

For example, complete the following steps for a Cisco AS5200:

- Step 1** Log in to the Cisco AS5200 and copy the new modem firmware file from your TFTP server directly to the installed 56K modems using the **copy tftp modem** Privileged EXEC command:

```
router# copy tftp modem
```

- Step 2** Specify the range of 56K modems that you want to upgrade. This example shows the range of modems to be 2/12 through 2/23:

```
Modem Numbers (<slot>/<port>[-<slot>/<port>] | group <number> | all)? 2/12-2/23
```

- Step 3** Specify the name or address of the TFTP server holding the new modem firmware. Press the **Return** key to accept the default name or IP address enclosed in the brackets []. Also specify the source path/filename of the firmware.

```
Address or name of remote host [255.255.255.255]? tftp-server
Source file name? mcom-modem-fw-3.1.30-1.1.0.bin
Accessing file 'mcom-modem-fw-3.1.30-1.1.0.bin' on tftp-server...
Loading mcom-modem-fw-3.1.30-1.1.0.bin from 172.16.1.129 (via Ethernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 280208/557056 bytes]

router#
*Mar  2 08:18:49.143: %MODEM-5-DL_START: Modem (2/12) started firmware download
*Mar  2 08:18:51.147: %MODEM-5-DL_START: Modem (2/13) started firmware download
*Mar  2 08:18:53.151: %MODEM-5-DL_START: Modem (2/14) started firmware download
*Mar  2 08:18:55.155: %MODEM-5-DL_START: Modem (2/15) started firmware download
*Mar  2 08:18:57.159: %MODEM-5-DL_START: Modem (2/16) started firmware download
*Mar  2 08:18:59.163: %MODEM-5-DL_START: Modem (2/17) started firmware download
*Mar  2 08:19:01.167: %MODEM-5-DL_START: Modem (2/18) started firmware download
*Mar  2 08:19:03.171: %MODEM-5-DL_START: Modem (2/19) started firmware download
*Mar  2 08:19:05.175: %MODEM-5-DL_START: Modem (2/20) started firmware download
*Mar  2 08:19:07.179: %MODEM-5-DL_START: Modem (2/21) started firmware download
```

```
*Mar 2 08:19:09.179: %MODEM-5-DL_START: Modem (2/22) started firmware download
*Mar 2 08:19:11.183: %MODEM-5-DL_START: Modem (2/23) started firmware download
*Mar 2 08:20:01.959: %MODEM-5-DL_GOOD: Modem (2/17) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:02.251: %MODEM-5-DL_GOOD: Modem (2/18) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:03.019: %MODEM-5-DL_GOOD: Modem (2/15) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:03.023: %MODEM-5-DL_GOOD: Modem (2/16) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:03.347: %MODEM-5-DL_GOOD: Modem (2/14) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:03.355: %MODEM-5-DL_GOOD: Modem (2/19) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:04.711: %MODEM-5-DL_GOOD: Modem (2/13) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:05.739: %MODEM-5-DL_GOOD: Modem (2/12) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:05.747: %MODEM-5-DL_GOOD: Modem (2/20) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:05.751: %MODEM-5-DL_GOOD: Modem (2/21) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:06.007: %MODEM-5-DL_GOOD: Modem (2/22) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:20:09.375: %MODEM-5-DL_GOOD: Modem (2/23) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
```

The 56K modems are now upgraded to the latest version of modem firmware. The procedure for copying the DSP software from a local file server to the access server's boot Flash memory is described next.

- Step 4—Download the RAM-Based DSP Software to Boot Flash Memory
- Step 5—Copy the RAM-Based DSP Software from Boot Flash Memory to the 56K Modems

These two steps are performed only once. Although the DSP software runs from RAM, the Cisco IOS software automatically copies the DSP code from boot Flash memory to the 56K modems each time the access server power cycles in the future. After you copy the DSP software to boot Flash memory for the first time, you should not have to perform these steps again.

### Step 4—Download the RAM-Based DSP Software to Boot Flash Memory

- Step 1** Copy the DSP software file from your TFTP server to the access server's boot Flash memory using the **copy tftp bootflash** command. The Cisco IOS software prompts you with a sequence of questions such as name/address of the TFTP server and the DSP filename to be copied. Answer all of the questions accordingly.

```
router# copy tftp bootflash

Boot flash directory:
File Length Name/status
1 2348148 as5200-boot-1.111-7.AA
[2348212 bytes used, 6040396 available, 8388608 total]
```

- Step 2** Specify the address or name of the server that currently holds the DSP software. You must also specify the source path/filename of the DSP software and the destination filename. The system software proposes a destination filename for you, which is enclosed in square brackets []. Press the **Return** key to accept the default destination name.

```
Address or name of remote host [255.255.255.255]? tftp-server
Source file name? mcom-modem-dsp-3.1.30-1.1.0.bin
Destination file name [mcom-modem-dsp-3.1.30-1.1.0.bin]?
```



## Upgrade Modem Firmware for 56K, V.34, and V.110 Cards

---

```
*Mar 2 08:22:18.563: %MODEM-5-DL_DSP_START: Modem (2/16) started DSP download
*Mar 2 08:22:20.567: %MODEM-5-DL_DSP_START: Modem (2/17) started DSP download
*Mar 2 08:22:22.567: %MODEM-5-DL_DSP_START: Modem (2/18) started DSP download
*Mar 2 08:22:24.567: %MODEM-5-DL_DSP_START: Modem (2/19) started DSP download
*Mar 2 08:22:26.567: %MODEM-5-DL_DSP_START: Modem (2/20) started DSP download
*Mar 2 08:22:28.571: %MODEM-5-DL_DSP_START: Modem (2/21) started DSP download
*Mar 2 08:22:30.575: %MODEM-5-DL_DSP_START: Modem (2/22) started DSP download
*Mar 2 08:22:32.579: %MODEM-5-DL_DSP_START: Modem (2/23) started DSP download
*Mar 2 08:22:56.795: %MODEM-5-DL_DSP_GOOD: Modem (2/13) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:22:57.055: %MODEM-5-DL_DSP_GOOD: Modem (2/12) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:22:57.311: %MODEM-5-DL_DSP_GOOD: Modem (2/14) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:22:57.315: %MODEM-5-DL_DSP_GOOD: Modem (2/15) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:22:57.575: %MODEM-5-DL_DSP_GOOD: Modem (2/17) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:22:57.835: %MODEM-5-DL_DSP_GOOD: Modem (2/18) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:22:58.091: %MODEM-5-DL_DSP_GOOD: Modem (2/16) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:22:58.351: %MODEM-5-DL_DSP_GOOD: Modem (2/19) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:22:58.355: %MODEM-5-DL_DSP_GOOD: Modem (2/20) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:23:00.059: %MODEM-5-DL_DSP_GOOD: Modem (2/21) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:23:04.119: %MODEM-5-DL_DSP_GOOD: Modem (2/22) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar 2 08:23:05.387: %MODEM-5-DL_DSP_GOOD: Modem (2/23) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
```

---

**Note** Now the 56K modems are equipped with the DSP software. The modems are configured to transmit at speeds up to 56 kbps. Each time the access server is power cycled, the system software automatically loads the 56K modems with the DSP software in boot Flash memory. If you erase the DSP software file from boot Flash memory, the 56K modems will revert to V.34 operation on the next power cycle.

---

**Step 4** Verify that the DSP software copied to the 56K modems with the **show modem version** command. In this example, modems 2/12 through 2/23 are loaded with the new DSP software:

```
router# show modem version
```

Mdm	Modem module Number	Firmware Rev	Boot Rev	DSP Rev
2/0	0	2.2(8)	1.0(5)	
2/1	0	2.2(8)	1.0(5)	
2/2	0	2.2(7)	1.0(5)	
2/3	0	2.2(7)	1.0(5)	
2/4	0	2.2(7)	1.0(5)	
2/5	0	2.2(7)	1.0(5)	
2/6	0	2.2(7)	1.0(5)	
2/7	0	2.2(7)	1.0(5)	
2/8	0	2.2(7)	1.0(5)	
2/9	0	2.2(7)	1.0(5)	
2/10	0	2.2(7)	1.0(5)	
2/11	0	2.2(7)	1.0(5)	

```

2/12    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/13    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/14    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/15    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/16    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/17    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/18    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/19    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/20    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/21    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/22    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)
2/23    1                3.1(30)   3.0(4)    1.1(0)/1.1(0)

```

Modem board HW version info:

Slot 2:

Carrier card:

hw version= 8, number\_of\_ports= 24, max\_modules= 2, max\_oob\_ports= 2

Modem Module 0:

number\_of\_modems= 12, option\_bits= 1,  
rev\_num= 03.00, vendor\_model\_number= 01,  
vendor\_banner= Microcom MNP10 V34 Modem

Modem Module 1:

number\_of\_modems= 12, option\_bits= 1,  
rev\_num= 03.00, vendor\_model\_number= 02,  
vendor\_banner= Microcom MNP10 K56 Modem

## V.34 Firmware Upgrades

The following example copies the Microcom modem firmware file called `mcom-modem-firmware.2.2.8.bin` from the TFTP server `Modem_Server` to all the V.34 Microcom modems installed in a Cisco AS5200 access server:

```

router# copy tftp modem
Modem Numbers (<slot>/<port>[-<slot>/<port>] | group <number> | all)? all

Address or name of remote host [UNKNOWN]? Modem_Server
Source file name? images/mcom-modem-firmware.2.2.8.bin
Accessing file 'images/mcom-modem-firmware.2.2.8.bin' on Modem_Server...
Loading images/mcom-modem-firmware.2.2.8.bin from 172.16.254.254 (via Ethernet0): !
[OK]

Loading images/mcom-modem-firmware.2.2.8.bin from 172.16.254.254 (via Ethernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 237503/278528 bytes]

router#
%MODEM-5-DL_START: Modem (2/0) started firmware download
%MODEM-5-DL_START: Modem (2/1) started firmware download
%MODEM-5-DL_START: Modem (2/2) started firmware download
%MODEM-5-DL_START: Modem (2/3) started firmware download
%MODEM-5-DL_START: Modem (2/4) started firmware download
%MODEM-5-DL_START: Modem (2/5) started firmware download
%MODEM-5-DL_START: Modem (2/6) started firmware download
%MODEM-5-DL_START: Modem (2/7) started firmware download
%MODEM-5-DL_START: Modem (2/8) started firmware download
%MODEM-5-DL_START: Modem (2/9) started firmware download
%MODEM-5-DL_START: Modem (2/10) started firmware download
%MODEM-5-DL_START: Modem (2/11) started firmware download
%MODEM-5-DL_START: Modem (2/12) started firmware download
%MODEM-5-DL_START: Modem (2/13) started firmware download
%MODEM-5-DL_START: Modem (2/14) started firmware download
%MODEM-5-DL_START: Modem (2/15) started firmware download

```

## Upgrade Modem Firmware for 56K, V.34, and V.110 Cards

---

```
%MODEM-5-DL_START: Modem (2/16) started firmware download
%MODEM-5-DL_START: Modem (2/17) started firmware download
%MODEM-5-DL_START: Modem (2/18) started firmware download
%MODEM-5-DL_START: Modem (2/19) started firmware download
%MODEM-5-DL_START: Modem (2/20) started firmware download
%MODEM-5-DL_START: Modem (2/21) started firmware download
%MODEM-5-DL_START: Modem (2/22) started firmware download
%MODEM-5-DL_START: Modem (2/23) started firmware download
%MODEM-5-DL_GOOD: Modem (2/2) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/10) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/4) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/6) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/7) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/12) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/11) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/13) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/1) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/14) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/19) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/22) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/5) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/8) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/9) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/17) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/0) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/3) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/21) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/16) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/15) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/18) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/20) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/23) completed firmware download:
MNPCclass10V.34/V.FCModemRev1.0.23/85.23/85
```

## V.110 Firmware Upgrades

The following example copies the modem firmware file v110-ta-firmware.2.8.7.bin from the local TFTP server Modem\_Server to all the V.34 terminal adapters installed in a Cisco AS5200 access server:

```

router# copy tftp modem
Modem Numbers (<slot>/<port>[<-<slot>/<port>] | group <number> | all)? all
Address or name of remote host [UNKNOWN]? Modem_Server
Source file name? images/v110-ta-firmware.2.8.7.bin
Accessing file 'images/v110-ta-firmware.2.8.7.bin' on Modem_Server...
Loading images/v110-ta-firmware.2.8.7.bin .from 172.16.254.254 (via Ethernet0): ! [OK]

Loading images/v110-ta-firmware.2.8.7.bin from 172.16.254.254 (via Ethernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 237503/278528 bytes]
router#
%MODEM-5-DL_START: Modem (2/0) started firmware download
%MODEM-5-DL_START: Modem (2/1) started firmware download
%MODEM-5-DL_START: Modem (2/2) started firmware download
%MODEM-5-DL_START: Modem (2/3) started firmware download
%MODEM-5-DL_START: Modem (2/4) started firmware download
%MODEM-5-DL_START: Modem (2/5) started firmware download
%MODEM-5-DL_START: Modem (2/6) started firmware download
%MODEM-5-DL_START: Modem (2/7) started firmware download
%MODEM-5-DL_START: Modem (2/8) started firmware download
%MODEM-5-DL_START: Modem (2/9) started firmware download
%MODEM-5-DL_START: Modem (2/10) started firmware download
%MODEM-5-DL_START: Modem (2/11) started firmware download
%MODEM-5-DL_START: Modem (2/12) started firmware download
%MODEM-5-DL_START: Modem (2/13) started firmware download
%MODEM-5-DL_START: Modem (2/14) started firmware download
%MODEM-5-DL_START: Modem (2/15) started firmware download
%MODEM-5-DL_START: Modem (2/16) started firmware download
%MODEM-5-DL_START: Modem (2/17) started firmware download
%MODEM-5-DL_START: Modem (2/18) started firmware download
%MODEM-5-DL_START: Modem (2/19) started firmware download
%MODEM-5-DL_START: Modem (2/20) started firmware download
%MODEM-5-DL_START: Modem (2/21) started firmware download
%MODEM-5-DL_START: Modem (2/22) started firmware download
%MODEM-5-DL_START: Modem (2/23) started firmware download
%MODEM-5-DL_GOOD: Modem (2/2) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/10) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/4) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/6) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/7) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/12) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/11) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/13) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/1) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/14) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/19) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/22) completed firmware download:
MNPClass10v110/V.FCModemRev1.0.23/85.23/85

```

```
%MODEM-5-DL_GOOD: Modem (2/5) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/8) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/9) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/17) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/0) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/3) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/21) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/16) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/15) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/18) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/20) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
%MODEM-5-DL_GOOD: Modem (2/23) completed firmware download:
MNPCClass10v110/V.FCModemRev1.0.23/85.23/85
```

## Control Modems

This section describes how to manually remove inoperable or bad modems from dial-up services.

You can perform the following optional tasks in line configuration mode:

Step	Command	Purpose
1	<b>modem bad</b>	Remove and idle modem from service and indicate it as suspected or proven to be inoperable.
2	<b>modem hold-reset</b>	Reset and isolate the modem hardware for extensive troubleshooting.
3	<b>modem busyout</b>	Gracefully disable a modem from dial services.
4	<b>modem shutdown</b>	Abruptly shut down a modem from dial service.
5	<b>modem recovery-time <i>minutes</i></b>	Set the maximum amount of time the call-switching module waits for a local modem to respond to a request before it is considered locked in a suspended state. The default is five minutes.

If you use the **modem bad** command to remove an idle modem from dial services and mark it as inoperable, the letter *B* is used to identify the modem as bad. You can see the letter *B* for modems that are marked bad by looking at the *Status* column in the **show modem slot/port** command's output. Additionally, look at the far left column in the **show modem** command's output. Use the **no modem bad** command to unmark a modem as *B* and restore it for dial-up connection services. If the letter *b* appears next to a modem number, it means the modem was removed from service with the **modem shutdown** command or the **modem busyout** command.

---

**Note** Only idle modems can be marked bad by the **modem bad** command. If you want to mark a modem bad that is actively supporting a call, first issued the **modem shutdown** command then issue the **modem bad** command.

---

Use the **modem hold-reset** command if you are experiencing extreme modem behavior (for example, if the modem is uncontrollably dialing in to the network). This command prevents the modem from establishing software relationships such as those created by the **test back-to-back modem** command and the **modem autotest** command. The modem is unusable while the **modem hold-reset** command is configured. The **modem hold-reset** command also resets a modem that is frozen in a suspended state. Disable the suspended modem with the **modem hold-reset** command, and then restart hardware initialization with the **no modem hold-reset** command.

The following example disables a suspended modem and resets its hardware initialization:

```
router# configure terminal
router(config)# line 4
router(config-line)# modem hold-reset
router(config-line)# no modem hold-reset
```

The following example gracefully disables the modem associated with line 1 from dialing and answering calls. The modem is disabled only after all active calls on the modem are dropped.

```
router# configure terminal
router(config)# line 1
router(config)# modem busyout
```

The following example abruptly shuts down the modem associated with line 2. All active calls on the modem are dropped immediately.

```
router# configure terminal
router(config)# line 2
router(config)# modem shutdown
```

In the following example, the modem using TTY line 3 is actively supporting a call. However, we want to mark the modem bad because it has poor connection performance. First abruptly shut down the modem and drop the call with the **modem shutdown** command then issue the **modem bad** command to take the modem out of service.

```
router# show modem
```

Mdm	Usage	Inc calls		Out calls		Busied Out	Failed Dial	No Answer	Succ Pct.
		Succ	Fail	Succ	Fail				
1/0	37%	98	4	0	0	0	0	0	96%
1/1	38%	98	2	0	0	0	0	0	98%
* 1/2	2%	3	99	0	0	0	0	0	1%

...

```
router# configure terminal
router(config)# line 3
router(config)# modem shutdown
router(config)# modem bad
router(config)# exit
router# show modem
```

Mdm	Usage	Inc calls		Out calls		Busied Out	Failed Dial	No Answer	Succ Pct.
		Succ	Fail	Succ	Fail				
1/0	37%	98	4	0	0	0	0	0	96%
1/1	38%	98	2	0	0	0	0	0	98%
B 1/2	2%	3	99	0	0	0	0	0	1%

## Collect Modem Statistics

There are many commands that enable you to display or poll various modem statistics. To show modem performance statistics, perform the following tasks in EXEC mode:

Step	Command	Purpose
1	<b>show modem</b> [ <i>slot/port</i>   <b>group number</b> ]	Show various performance statistics for a modem or group of modems.
2	<b>show modem csm</b> [ <i>slot/port</i>   <b>group number</b> ]	Show the call-switching module status for a modem or group of modems.
3	<b>show modem log</b> [ <i>slot/port</i>   <b>group number</b> ] <sup>1</sup>	Show the event log status for a modem or group of modems.
4	<b>show modem summary</b> <sup>1</sup>	Display the cumulative system statistics for all modems installed in the access server.
5	<b>show modem at-mode</b> <sup>1</sup>	Display all the active direct connect AT sessions for Microcom modems.

1. This command does not apply to nonmanageable modems.

Manageable Microcom modems have an out-of-band feature, which is used for polling modem statistics. To configure the system to poll for modem statistics, perform the tasks in the following task table. Unless otherwise specified, all tasks are performed in global configuration mode.

Step	Command	Purpose
1	<b>modem poll time</b> <i>seconds</i>	Specify the number of seconds between statistical modem polling for Microcom modems. The default is 12 seconds. The configuration range is 2 to 120 seconds.
2	<b>modem poll retry</b> <i>number</i>	Set maximum number of polling attempts to Microcom modems. The default is three polling attempts. The configuration range is from 0 to 10 attempts. <sup>1</sup>
3	<b>modem status-poll</b>	In line configuration mode, poll for a Microcom modem's status and statistics.
4	<b>modem buffer-size</b> <i>number</i>	Define the number of modem events that each modem is able to store. The default is 100 events for each modem. Use the <b>show modem log</b> command to view modem events.

1. If the number of attempts to retrieve modem status or statistics exceeds the number you define, the out-of-band feature is removed from operation. In this case, you must reset the modem hardware using the **clear modem** command.

## Show Modem Example

The following example shows example output for the **show modem** command:

```
router# show modem
      Inc calls      Out calls      Busied      Failed      No      Succ
      Mdm  Usage    Succ  Fail    Succ  Fail    Out    Dial    Answer  Pct.
* 1/0    17%     74   3     0    0     0     0     0     96%
* 1/1    15%     80   4     0    0     0     1     1     95%
* 1/2    15%     82   0     0    0     0     0     0    100%
      1/3    21%     62   1     0    0     0     0     0     98%
      1/4    21%     49   5     0    0     0     0     0     90%
* 1/5    18%     65   3     0    0     0     0     0     95%
* 1/6    19%     58   2     0    0     0     0     0     96%
* 1/7    17%     67   5     0    0     0     1     1     93%
* 1/8    20%     68   3     0    0     0     0     0     95%
      1/9    16%     67   2     0    0     0     0     0     97%
```

1/10	18%	56	2	0	0	0	1	1	96%
* 1/11	15%	76	3	0	0	0	0	0	96%
* 1/12	16%	62	1	0	0	0	0	0	98%
1/13	17%	51	4	0	0	0	0	0	92%
1/14	16%	51	5	0	0	0	0	0	91%
1/15	17%	65	0	0	0	0	0	0	100%
1/16	15%	73	3	0	0	0	0	0	96%
1/17	17%	67	2	0	0	0	0	0	97%
1/18	17%	61	2	0	0	0	0	0	96%
* 1/19	17%	74	2	0	0	0	0	0	97%
1/20	16%	65	1	0	0	0	0	0	98%
* 1/21	16%	58	3	0	0	0	0	0	95%
* 1/22	18%	56	4	0	0	0	0	0	93%
* 1/23	20%	60	4	0	0	0	0	0	93%

## Show Modem Summary Example

You can display a high level summary of the modems' performance with the **show modem summary** command:

```
router# show modem summary
          Incoming calls      Outgoing calls      Busied      Failed      No      Succ
Usage    Succ  Fail Avail      Succ  Fail Avail      Out      Dial  Ans  Pct.
  14%  2489   123   15         0     0   15         0         3    3   95%
```

## Show Modem Log Example

The following example shows the event log status for a manageable modem. It also identifies the time elapsed since each modem event was performed (for example, 01:02:41 means the modem event occurred 1 hour, 2 minutes, and 41 seconds ago):

```
router# show modem log 0/0
Modem 0/0 Events Log:
01:03:03: Startup Response: Microcom MNP10 K56 Modem (Select)
          Modem (boot) firmware = 3.1(16) (3.0(4))
          DSP Controller (SPX) rev = 204.173(0) (143.191(0))
01:03:03: Control Reply: 0xFF1F
01:03:03: RS232 event: RTS noDTR* CTS* DSR* noDCD* noRI noTST
01:03:03: RS232 event: RTS noDTR CTS DSR noDCD noRI noTST
01:03:03: Modem State event: Idle
01:03:03: End connection event: Retransmits for MNP block (TX/RX) = 0/0
          Duration = 0:00:00, Number of TX/RX char = 0/0
          Local Disc Reason = Lost Carrier
          Remote Disc Reason = Unknown
01:03:04: Phone number event:
01:02:51: DTR event: DTR On
01:02:51: RS232 event: RTS DTR* CTS DSR noDCD noRI noTST
00:39:52: Startup Response: Microcom MNP10 K56 Modem (Select)
          Modem (boot) firmware = 3.1(16) (3.0(4))
          DSP Controller (SPX) rev = 1.1(0) (1.1(0))
```

## Show Modem AT-Mode Example

The following example shows that modem 1/1 has one open AT directly connected session:

```
router# show modem at-mode
Active AT-MODE management sessions:
Modem      User's Terminal
1/1 0 cty 0
```

### Time Interval Example

The following example sets the time interval between polls to 10 seconds using the **modem poll time** configuration command:

```
router# configure terminal
router(config)# modem poll time 10
```

### Modem Polling Example

The following example enables modem status polling through the out-of-band feature, which is associated to line 1:

```
router# configure terminal
router(config)# line 1
router(config-line)# modem status-poll
```

### Polling Attempts Example

The following example configures the server to attempt to retrieve statistics from a local modem up to five times before discontinuing the polling effort:

```
router# configure terminal
router(config)# modem poll retry 5
```

## Change Modem Configuration

You can automatically change the running configuration for external modems (not embedded in modem cards) by issuing a single command. Additionally, you can change an integrated modem's running configuration by sending individual AT commands:

- Change Automatically for External Modems
- Change Manually by Sending AT Commands to Integrated Modems

### Change Automatically for External Modems

The Cisco IOS software can issue initialization strings automatically for most types of modems externally attached to an access server. A modem initialization string is a series of parameter settings that are sent to your modem to configure it to interact with the access server in a specified way. The Cisco IOS software defines seven initialization strings that have been found to properly initialize most modems so that the modems function properly with Cisco access servers. These initialization strings have the following names:

- Codex\_3260
- Usr\_courier
- Usr\_sportster
- Hayes\_optima
- Global\_village
- Viva
- Telebit\_t3000

---

**Note** Internal or integrated modems, such as those used by the Cisco AS5200 and Cisco AS5300, are preconfigured by Cisco Systems and do not need to be initialized.

---

If you do not know which of these modem strings is appropriate for your modems, issue the **modem autoconfigure discovery** line configuration command, as shown in the following example:

```
2511# configure terminal
2511(config)# line 1 16
2511(config-line)# modem autoconfigure discovery
2511(config-line)# Ctrl-Z
2511# copy running-config startup-config
```

The Cisco IOS software first tries the first of these strings to see if the modem initializes properly. If not, the Cisco IOS software cycles to the next string and repeats the process until the appropriate string is found. If none of the strings properly initializes the modem, you must manually configure the modem.

If you know that your modem can be configured using an initialization string from one of these scripts, you can issue the **modem autoconfigure type type** command, where *type* is one of the strings in the preceding list. If you list a specific modem type, initialization proceeds more quickly.

To display the list of modems for which the router has modem string entries, issue the **show modemcap** command. You can change a modem value that was returned from the **show modemcap EXEC** command. For example, you might want to add the factory default, **&F**, entry to the configuration file. To do this, enter the **modemcap edit modem-name attribute value** line configuration command. Configure one attribute of one modem at a time.

The following example shows how to enter line configuration mode and issue the **modem autoconfigure type type** command for a US Robotics Sportster modem.

```
2511(config-line)# modem autoconfigure type usr_sportster
```

For more information about the recommended strings for any type of modem, refer to the section “Sample Modem Strings” in the appendix “Configuring Modem Support and Chat Scripts” in the *Dial Solutions Command Reference*. If you have access to Cisco Connection Online (CCO), you can also access the following URL for more information (which is subject to change without notice):

<http://www.cisco.com/warp/customer/76/4.html>

## Change Manually by Sending AT Commands to Integrated Modems

Manageable Microcom modems have an out-of-band feature, which is used to poll modem statistics and transmit AT commands. The Cisco IOS software uses a direct connect session to transfer information through this out-of-band feature. To send AT commands to a Microcom modem, you must permit a direct connect session for a specified modem, open a direct connect session, send AT commands to a modem, and clear the directly connected session from the modem when you are finished.

---

**Note** This sections does not describe how to send AT commands to MICA digital modems. If your system uses MICA modems, refer to the publication *AT Command Set and Register Summary for MICA Six-Port Modules*.

---

Open a direct connect session by issuing the **modem at-mode slot/port** command in Privileged EXEC mode. From here, you can transmit AT commands directly from your terminal session window to the internal Microcom modems. Most incoming or outgoing calls on the modems are not interrupted when you open a direct connect session and transmit AT commands. However, some AT commands interrupt a call—for example, the **ATH** command, which hangs up a call. Open and close one direct connect session at a time. Beware that multiple open sessions slow down modem performance.

Refer to the AT command set that came with your router for a complete list of AT commands that you can transmit to the modems.

For Microcom modems, you can clear or terminate an active directly connected session in two ways:

- Press **Ctrl-C** after transmitting all AT commands as instructed by the system when you enter AT command mode.
- Enter a second Telnet session and enable the **clear modem at-mode slot/port** command in EXEC configuration mode. This method is used for closing a directly connected session that may have been mistakenly left open by the first Telnet session.

### Transmit AT Command Example

The following example opens a directly connected session on modem 1/1, enters AT command mode on modem 1/1, and transmits the **at%v** and **at\s** commands via the out-of-band feature on modem 1/1:

```
router# modem at-mode 1/1
You are now entering AT command mode on modem (slot 1 / port 1).
Please type CTRL-C to exit AT command mode.
at%v

MNP Class 10 V.34/V.FC Modem Rev 1.0/85

OK
at\s

IDLE          000:00:00
LAST DIAL

NET ADDR:      FFFFFFFF
MODEM HW: SA 2W United States
4 RTS 5 CTS 6 DSR - CD 20 DTR - RI
MODULATION     IDLE
MODEM BPS      28800  AT%G0
MODEM FLOW     OFF    AT\G0
MODEM MODE     AUT    AT\N3
V.23 OPR.     OFF    AT%F0
AUTO ANS.     ON     AT%S0=1
SERIAL BPS     115200 AT%U0
BPS ADJUST     OFF    AT\J0
SPT BPS ADJ.   0      AT\W0
ANSWER MESSGS ON     ATQ0
SERIAL FLOW    BHW    AT\Q3
PASS XON/XOFF OFF    AT\X0
PARITY         8N     AT
```

The manageable modem returns “OK” if the AT command you transmit is successfully enabled.

### Clear a Direct Connect Session from a Second Telnet Session Example

The following examples are for Microcom modems.

The following example shows how to execute the **modem at-mode** command from a Telnet session:

```
router# modem at-mode 1/1
```

The following example shows how to execute the **clear modem at-mode** command from a second Telnet session while the first Telnet session is connected to the modem:

```
router# clear modem at-mode 1/1  
clear "modem at-mode" for modem 1/1 [confirm] <press Return>  
router#
```

The following output is displayed in the first Telnet session after the modem is cleared by the second Telnet session:

```
Direct connect session cleared by vty0 (171.69.1.164)
```

