



Cisco Modem User Interface

Feature History

Release	Modification
12.2(4)T	This feature was introduced.

This document describes the Asynchronous Line Monitoring feature feature in Cisco IOS Release 12.2(4)T. It includes the following sections:

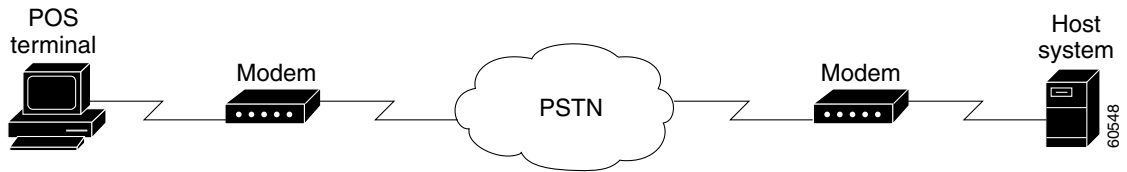
- [Feature Overview, page 1](#)
- [Supported Platforms, page 3](#)
- [Supported Standards, MIBs, and RFCs, page 3](#)
- [Configuration Tasks, page 4](#)
- [Monitoring and Maintaining the Asynchronous Line Monitoring feature, page 9](#)
- [Configuration Examples, page 9](#)
- [Command Reference, page 12](#)
- [Glossary, page 13](#)

Feature Overview

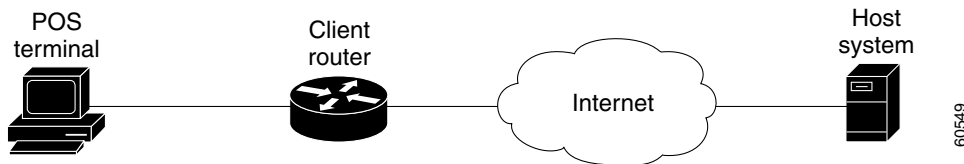
The Asynchronous Line Monitoring feature feature enables Cisco routers to behave like a modem and be configured using standard Hayes modem commands.

[Figure 1](#) shows a legacy data transfer configuration using X.25, modems, and telephone lines.



Figure 1 Legacy Data Transfer Equipment

With the Asynchronous Line Monitoring feature, a point of sale (POS) terminal, such as those used by gasoline service stations to charge customers for merchandise and services, can use high-speed Internet connections rather than slow-speed telephone connections to transfer data (see [Figure 2](#)).

Figure 2 Data Transfers Using the Asynchronous Line Monitoring feature

The user interface to the higher speed connection will not change when the Asynchronous Line Monitoring feature is used; the user interface will still appear as if the connection on the POS terminal is through a modem and a telephone line.

Although there are a wide variety of proprietary extensions to the Hayes modem commands, the Asynchronous Line Monitoring feature supports only a subset of the commands. This basic functionality is enhanced with Cisco-specific modem register settings, Telnet connection capability, and dial-related Cisco IOS commands.

**Note**

Typically, parity and databits commands have no effect on modem lines without UART. However, since modem lines such as WIC-1AM and WIC-2AM are implemented though UART and use an internal UART, the parity and databits commands can be used to set async parity framing. The following commands may be used on WIC-AM modem cards (although changing the DTE speed and stopbits on these lines have no effect): parity, databits, stopbits, flowcontrol, speed, rxspeed, txspeed.

Benefits

The Asynchronous Line Monitoring feature allows Cisco routers to replace modems, and thereby update a slow telephone call-modem negotiation process with a high-speed Internet connection. Together, these features provide the following benefits:

- Reduced costs, because modems are no longer necessary.
- Increased connection speeds, because Internet connections are faster than modem connections.

Restrictions

The following Hayes modem features are not supported by the Asynchronous Line Monitoring feature:

- Modem autobaud detection
- Modem answer capability
- Modem fax features
- Synchronous traffic
- The Hayes modem escape sequence (,+++)

Supported Platforms

- Cisco 1700 series
- Cisco 2600 series
- Cisco 3600 series

Platform Support Through Feature Navigator

Cisco IOS software is packaged in feature sets that support specific platforms. To get updated information regarding platform support for this feature, access Feature Navigator. Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Feature Navigator is a web-based tool that enables you to quickly determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image.

To access Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions at <http://www.cisco.com/register>.

Feature Navigator is updated when major Cisco IOS software releases and technology releases occur. As of May 2001, Feature Navigator supports M, T, E, S, and ST releases. You can access Feature Navigator at the following URL:

<http://www.cisco.com/go/fn>

Supported Standards, MIBs, and RFCs

Standards

None

MIBs

None

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>

RFCs

None

Configuration Tasks

See the following sections for the configuration tasks for the Asynchronous Line Monitoring feature feature. Each task in the list is identified as either required or optional:

- [Configuring the Telephone Number for the Asynchronous Line Monitoring feature Connection](#) (required)
- [Configuring a Line for the Asynchronous Line Monitoring feature](#) (required)
- [Entering Asynchronous Line Monitoring feature Mode from EXEC Mode](#) (optional)
- [Configuring Banners for the Hayes Information Mode Command](#) (optional)

Configuring the Telephone Number for the Asynchronous Line Monitoring feature Connection

To configure the telephone number for the Asynchronous Line Monitoring feature feature, you must map the telephone number to the IP host where the connection will be made. To do so, use the following command in global configuration mode:

Command	Purpose
Router(config)# ip host tmodem-telephone-number address	Maps a modem telephone number to an IP host address for use in Asynchronous Line Monitoring feature mode.

Configuring a Line for the Asynchronous Line Monitoring feature

To configure a line for the Asynchronous Line Monitoring feature feature, use the following commands beginning in global configuration mode. (Notice that the **modemui EXEC** command is entered as part of the **autocommand** command.)

	Command	Purpose
Step 1	Router(config)# line aux 0	Selects the line to configure for the Asynchronous Line Monitoring feature feature and enters line configuration mode.
Step 2	Router(config-line)# stopbits bits	Sets the number of stop bits sent per byte.
Step 3	Router(config-line)# speed rate	Sets the asynchronous line bit rate.
Step 4	Router(config-line)# flowcontrol type	Sets line flow control.
Step 5	Router(config-line)# modem dialin delay	(Optional) Delays assertion of the data terminal ready (DTR) signal until a connection is established.
Step 6	Router(config-line)# autocommand modemui [<i>modem-commands</i>]	(Optional) Automatically executes the modemui EXEC command when a user connects to the line. See Table 1 for the modem commands that are entered with the modemui command.

**Note**

Typically, parity and databits commands have no effect on modem lines without UART. However, since modem lines such as WIC-1AM and WIC-2AM are implemented through UART and use an internal UART, the parity and databits commands can be used to set async parity framing. The following commands may be used on WIC-AM modem cards although changing the DTE speed and stopbits on these lines have no effect: parity, databits, stopbits, flowcontrol, speed, rxspeed, and txspeed.

Example configurations in the section “[Configuration Examples](#)” list additional commands that might also be entered for line configuration.

Entering Asynchronous Line Monitoring feature Mode from EXEC Mode

To enter the Cisco modem user interface from EXEC mode, use the following command in EXEC mode:

Command	Purpose
Router# modemui [<i>modem-commands</i>]	Enters Cisco modem user interface mode and establishes an environment where you can enter the Hayes modem commands listed in Table 1 .

You can also add EXEC commands to the Cisco IOS **autocommand** line configuration command. This type of configuration allows the **modemui** EXEC command to be automatically executed; see the section “[Configuring a Line for the Asynchronous Line Monitoring feature](#)” for the relevant task.

Configuring Banners for the Hayes Information Mode Command

To configure banners that are displayed in response to the Hayes information mode command, use the following command in global configuration mode:

Command	Purpose
Router(config)# modemui-version <i>delimiter banner-text delimiter</i>	Sets the the display for the Hayes information mode command (ATI <i>n</i>).

[Table 1](#) lists and describes the Hayes-compatible modem commands, including **ATI***n*.

Table 1 Cisco-Supported Hayes Modem Commands

Hayes Modem Commands	Description
AT	Attention command. Enters modem command execution mode. You can add any of the command settings listed in this table to the AT command.
DTstring DPstring	<p>Dials outbound tone (T) or pulse (P) call. The string following the T or P character is used as an argument to the Cisco IOS connect EXEC command.</p> <p>Before dialing, you must set up an appropriate IP host using the Cisco IOS ip host global configuration command. For example:</p> <pre>ip host t555-1212 4023 10.0.0.51</pre> <p>Valid characters for <i>string</i> are the same as the characters that are used in a host name for the Cisco IOS connect command, as follows:</p> <ul style="list-style-type: none"> • The numbers 0 through 9 • Uppercase letters A through Z • Lowercase letters a through z • The . (period), - (hyphen), and _ (underscore) characters <p>No other characters (such as # or *) are accepted in the dial string, and unsupported characters are stripped before dialing occurs.</p>
En	<p>Echo mode. Values for <i>n</i> follow:</p> <ul style="list-style-type: none"> • 0 turns off command echo. • 1 turns on command echo (default).
Hn	Hangup mode. A value of 0 or 1 closes the connection.
In	Information mode. The information displayed is set in a banner configured with the Cisco IOS MODEMUI-VERSION global configuration command; see the section “ Configuring Banners for the Hayes Information Mode Command .” Acceptable values for <i>n</i> are the numbers 0 through 6.
On	Online mode. A value of 0 or 1 resumes the connection.
Qn	<p>Quiet mode. Values for <i>n</i> follow:</p> <ul style="list-style-type: none"> • 0 displays modem result codes (default). • 1 inhibits modem result codes display (quiet mode).
Sn=v	<p>Set selected register (S-register).</p> <p>Note The standard Hayes modem S-register settings S0 through S53 are accepted by Cisco IOS software, but do not have any effect.</p> <p>Choose one of the following S-registers for <i>n</i>:</p> <ul style="list-style-type: none"> • S201—Command mode parity sniffing. <p>If the value (<i>v</i>) for S201 is 0 (default), parity for both the command and data portions of a call are controlled by the Cisco IOS parity and databits line configuration commands.</p> <p>If the value (<i>v</i>) for S201 is 1, mark or space parity for the command session will be taken from the Hayes AT part of the command, while the data portion will be 8-bit transparent.</p>

Table 1 Cisco-Supported Hayes Modem Commands (continued)

Hayes Modem Commands	Description
	<ul style="list-style-type: none"> • S202—Output mask. This setting allows mark parity to be unconditionally implemented for the command characters. The default value for S202 is 0 (no parity). The value 128 causes command characters to be sent with mark parity. • S203—Connect delay. Allows a delay to be added to the time between when the ATD command is executed and when the call success or failure code is displayed. This delay is sometimes required because a Telnet connection is established more quickly than placing a telephone call. The value for S203 can be a number from 0 to 255. The actual value applied to the connect delay is 10 percent of the number entered for <i>v</i>. For example, a value of 300 sets a connect delay of 30 seconds. The default value is 0. • S204—Connect code. Allows the result code for a successful connection to be specified. The default is code 1 for the unextended mode, but you can configure one of the following numbers to display a selected line speed. For example, connection code 10 selects CONNECT 2400. By allowing the code to be expressed explicitly, you can allow for a “CONNECT 2400” response message to be displayed, regardless of the actual line speed. The default for <i>v</i> is 0, or choose one of the following connection codes: <ul style="list-style-type: none"> - 9—CONNECT 1200 - 10—CONNECT 2400 - 11—CONNECT 4800 - 12—CONNECT 9600 - 13—CONNECT 14400 - 14—CONNECT 19200 - 15—CONNECT 38400 - 16—CONNECT 57600
Sn?	S-register query. The value for <i>n</i> is the number of the S-register to query (S201 through S204, see the preceding list).
Vn	Result code format. Values for <i>n</i> follow: <ul style="list-style-type: none"> • 0 displays a short result report. • 1 displays a long result report (default).
Xn	Extended result codes. The value for <i>n</i> is any nonzero number, which appends /NONE to the connect message. Also see the preceding description for S-register S204, for changing the reported connection speed.
Z Z99	Reset to default configuration. Choose one of the following reset options: <ul style="list-style-type: none"> • ATZ returns the Cisco modem user interface to its default state and re-executes the initialization string provided in the modemui command. • ATZ99 returns to the standard Cisco IOS software user interface (EXEC) mode.

Verifying Asynchronous Line Monitoring feature Mode

To verify correct operation of the Asynchronous Line Monitoring feature feature, perform the following steps in EXEC mode:

-
- Step 1** Enter the **modemui** command to enter Cisco modem user interface mode:
- ```
Router# modemui
```
- Step 2** Enter the **AT** command to start interactive Cisco modem user interface mode operation. The system replies with “OK” when you successfully enter the mode:
- ```
AT
OK
```
- Step 3** Enter the modem telephone number with the **ATDT** dial command. A successful connection displays the “CONNECT” message followed by the login prompt from the remote terminal:
- ```
ATDT4085551212
CONNECT
User Access Verification
Username:
```
- Step 4** Enter the Cisco IOS escape sequence (by default this sequence is Ctrl^, X) to leave the connection and return to the Cisco modem user interface mode.
- Step 5** Return to Cisco IOS EXEC mode by entering the **ATZ99** command. The Cisco IOS EXEC prompt reappears:
- ```
ATZ99

Router#
```
-

Verifying the Asynchronous Line Monitoring feature Telephone-to-IP-Address Map

To verify correct mapping between the modem telephone number and the IP host, enter the **show host** command in EXEC mode to display the telephone number associated with the IP host. This command also displays default domain name, the style of name lookup service, a list of name server hosts, and the cached list of host names and addresses.

```
Router# show host

Default domain is not set
Name/address lookup uses domain service
Name servers are 255.255.255.255

Codes: u - unknown, e - expired, * - OK, ? - revalidate
       t - temporary, p - permanent

   Host                Age  Type  Address(es)
  *p p4085554567        0   IP    1.2.1.6
  *p t4085551234        0   IP    1.2.1.5
```


Under the Host field, a “p” indicates a pulse-dialed modem telephone number, and a “t” indicates a tone-dialed modem telephone number. The IP address mapped to the telephone number appears under the “Address(es)” field.

Troubleshooting Tips

To troubleshoot operation of the Asynchronous Line Monitoring feature feature, use the **debug modem** privileged EXEC command to start modem and EXEC debugging mode.

Monitoring and Maintaining the Asynchronous Line Monitoring feature

To monitor and maintain the Asynchronous Line Monitoring feature feature, use the following commands in EXEC mode, as needed:

Command	Purpose
Router# show host	Displays the default domain name, the style of name lookup service, a list of name server hosts, and the cached list of host names and addresses.
Router# show tcp	Displays the status of TCP connections, and lists the telephone number mapped to the IP host.
Router# show users	Displays information about the active lines on the router.

Configuration Examples

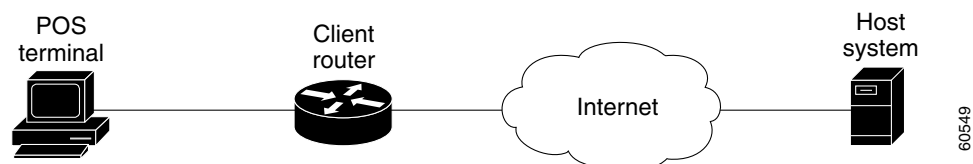
This section provides the following configuration examples:

- [Automatic Connection Configuration Example](#)
- [Asynchronous Tunnel Termination Configuration Example](#)
- [Banner Setup and Display Example](#)

Automatic Connection Configuration Example

The following example shows how to configure the Asynchronous Line Monitoring feature shown in [Figure 3](#).

Figure 3 *Asynchronous Line Monitoring feature Configuration*



Both the client and host router must have the Asynchronous Line Monitoring feature loaded for the configurations to work. Configuration settings on the routers provide an environment that spoofs or emulates the Hayes modem interface, yet allows connection to the host using a high-speed Internet connection instead of the slow-speed telephone connections shown in [Figure 1](#). The configuration in this example includes a 2-second delay between when the dial number command is executed and when the call success or failure code is displayed (see the **autocommand modemui ats203=20** command in the following “Client Router Configuration” output).

Client Router Configuration

```
ip host t4155551234 192.168.33.15
!
line 35
 login authentication modem
 modem dialin delay
 stopbits 1
 speed 2400
 flowcontrol hardware
 transport input none
 autocommand modemui ats203=20
```

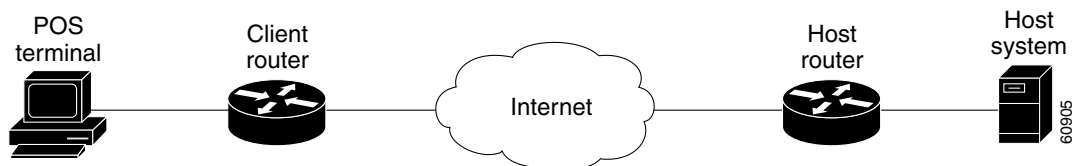
Host Router Configuration

```
aaa new-model
aaa authentication login modem none
!
ip host t4085551234 1.2.1.5
!
interface async 129
 ip address 1.2.1.5 255.255.255.0
 encapsulation ppp
 async dynamic address
 async dynamic routing
 async mode dedicated
 pulse-time 3
```

Asynchronous Tunnel Termination Configuration Example

The following example shows a configuration where a destination host router terminates an asynchronous tunnel from the client router. The connection to the final destination is also an asynchronous connection (see [Figure 4](#)).

Figure 4 Asynchronous Tunnel Configuration



Note that in this configuration the host router does *not* use the **modemui EXEC** command.

Client Router Configuration

```
!
ip host t4155551234 4017 121.12.33.15
```

```

!
line 35
  login authentication modem
  modem dialin delay
  stopbits 1
  speed 2400
  flowcontrol hardware
  transport input none
  autocommand ats203=20

```

Host Router Configuration

```

!
line 17
  login authentication asynctunnels
  modem host
  transport input all
  stopbits 1
  speed 2400
  flowcontrol hardware
  no exec

```

Banner Setup and Display Example

The following example configures the Asynchronous Line Monitoring feature banner to display the modem model and code revision in response to the **ATI6** modem command:

```
modemui-version / Telebit T3000 Modem, Version 1.5 /
```

To display the banner, perform the following steps:

-
- Step 1** From EXEC mode, enter the **modemui** command to enter Cisco modem user interface mode:
- ```
Router# modemui
```
- Step 2** Display the modem model and code revision by entering the **ATI6** command:
- ```
ATI6
Telebit T3000, Version 1.5
```
- Step 3** Enter the modem telephone number with the Hayes **ATDT** dial command. A successful connection displays the “CONNECT” message followed by the login prompt from the remote terminal:
- ```
ATDT4085551212
CONNECT
User Access Verification
Username:
```
- Step 4** To leave the connection and return to Cisco modem user interface mode, either enter the Cisco IOS escape sequence (by default this sequence is Ctrl^, X), or log out of an active terminal session.
- Step 5** Return to Cisco IOS EXEC mode by entering the **ATZ99** command. The Cisco IOS EXEC prompt reappears:
- ```
ATZ99
Router#
```
-

Command Reference

The following commands are introduced or modified in the feature or features documented in this module. For information about these commands, see the *Cisco IOS Dial Technologies Command Reference* at http://www.cisco.com/en/US/docs/ios/dial/command/reference/dia_book.html. For information about all Cisco IOS commands, go to the Command Lookup Tool at <http://tools.cisco.com/Support/CLILookup> or to the *Cisco IOS Master Commands List*.

New Commands

- **modemui**
- **modemui-version**

Modified Commands

- **ip host**
- **modem dialin**
- **show hosts**

Glossary

AT commands—The basic **AT**, or attention, command starts interaction with a Hayes or Hayes-compatible modem. Additional Hayes modem commands and arguments can be added to the basic **AT** command to set modem characteristics. For example, the **ATE0** command turns off command echoing.

Hayes-compatible modem—Any modem that recognizes Hayes modem commands. Hayes Microcomputer Products has developed a language called the AT command set for controlling modems that has become a de facto modem industry standard.

point of sale—See POS.

point of service—See POS.

POS—point of service or point of sale. A terminal such as those used by gasoline service stations to charge customers for merchandise and services. A POS is a PC with an internal modem and software

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: www.cisco.com/go/trademarks. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.

© 2001-2008 Cisco Systems, Inc. All rights reserved.

