



Modem Support and Asynchronous Commands

The configuration commands described in this chapter are used to configure modems and modem lines on access servers and routers.

Note Some commands previously documented in this chapter have been replaced by new commands. Although these commands continue to perform their normal functions in the current release, support for these commands will cease in future releases.

For line configuration information and examples, refer to the “Configuring Modem Support and other Asynchronous Features” chapter in the *Dial Solutions Configuration Guide*.

async-bootp

To support the extended BOOTP request specified in RFC 1084, and to specify information that will be sent in response to BOOTP requests, use the **async-bootp** global configuration command. To clear the list, use the **no** form of this command.

```

async-bootp tag [:hostname] data
no async-bootp tag [:hostname] data
    
```

Syntax Description

<i>tag</i>	Item being requested; expressed as filename, integer, or IP dotted decimal address. See Table 3 for possible values.
<i>:hostname</i>	(Optional) This entry applies only to the specified host. The argument can be either an IP address or a logical host name.
<i>data</i>	List of IP addresses entered in dotted decimal notation or as logical host names, a number, or a quoted string.

Table 1 Supported Extended BOOTP Requests

Keyword and Argument Pair	Use
bootfile	Server boot file from which to download the boot program. Use the optional <i>:hostname</i> and <i>data</i> arguments to specify the host or hosts.
subnet-mask <i>mask</i>	Dotted decimal address specifying the network and local subnetwork mask (as defined by RFC 950).
time-offset <i>offset</i>	A signed 32-bit integer specifying the time offset of the local subnetwork in seconds from Coordinated Universal Time.
gateway <i>address</i>	Dotted decimal address specifying the IP addresses of gateways for this subnetwork. A preferred gateway should be listed first.
time-server <i>address</i>	Dotted decimal address specifying the IP address of time servers (as defined by RFC 868).
ien116-server <i>address</i>	Dotted decimal address specifying the IP address of name servers (as defined by IEN 116).
nbns-server <i>address</i>	Dotted decimal address specifying the IP address of Windows NT servers.
dns-server <i>address</i>	Dotted decimal address specifying the IP address of Domain Name Servers (as defined by RFC 1034).
log-server <i>address</i>	Dotted decimal address specifying the IP address of an MIT-LCS UDP log server.
quote-server <i>address</i>	Dotted decimal address specifying the IP address of Quote of the Day servers (as defined in RFC 865).
lpr-server <i>address</i>	Dotted decimal address specifying the IP address of Berkeley UNIX Version 4 BSD servers.
impress-server <i>address</i>	Dotted decimal address specifying the IP address of Impress network image servers.
rlp-server <i>address</i>	Dotted decimal address specifying the IP address of Resource Location Protocol (RLP) servers (as defined in RFC 887).

Table 1 Supported Extended BOOTP Requests (continued)

Keyword and Argument Pair	Use
hostname <i>name</i>	Name of the client (which might or might not be domain qualified, depending upon the site).
bootfile-size <i>value</i>	Two-octet value specifying the number of 512 octet (byte) blocks in the default boot file.

Default

If no extended BOOTP commands are entered, the software generates a gateway and subnet mask appropriate for the local network.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

Each of the *tag* keyword-argument pairs is a field that can be filled in and sent in response to BOOTP requests from clients.

BOOTP supports the extended BOOTP requests specified in RFC 1084 and works for both SLIP and PPP encapsulation.

Use the **show async bootp EXEC** command to list the configured parameters. BOOTP works for both SLIP and PPP.

Examples

The following example specifies different boot files: one for a PC and one for a Macintosh. With this configuration, a BOOTP request from the host on 192.168.31.1 results in a reply listing the boot filename as pcboot. A BOOTP request from the host named mac results in a reply listing the boot filename as macboot.

```
async-bootp bootfile :192.168.31.1 "pcboot"
async-bootp bootfile :mac "macboot"
```

The following example specifies a subnet mask of 255.255.0.0:

```
async-bootp subnet-mask 255.255.0.0
```

The following example specifies a negative time offset of the local subnetwork of -3600 seconds:

```
async-bootp time-offset -3600
```

The following example specifies the IP address of a time server:

```
async-bootp time-server 192.168.31.1
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

service old-slip-prompts

async default ip address

The **peer default ip address** command replaces the **async default ip address** command.

Refer to the description of the **peer default ip address** command in the “Media Independent PPP and Multilink PPP Commands” chapter of this book for more information.

async default routing

To enable the router to pass routing updates to other routers over the AUX port configured as an asynchronous interface, use the **async default routing** interface configuration command. To disable dynamic addressing, use the **no** form of this command.

async default routing
no async default routing

Syntax Description

This command has no keywords or arguments.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Use the **async default routing** command to define the default behavior for router-to-router communication over connections to the AUX port configured as an asynchronous interface. This command is commonly used to enable two routers to communicate over an async dial backup link.

To require a remote user to manually configure routing over connections to the AUX port configured as an asynchronous interface, use the **async dynamic routing** command.

Example

The following example enables routing over asynchronous interface 0:

```
interface async 0
  async default routing
```

Related Command

async dynamic routing

async dynamic address

To specify dynamic asynchronous addressing, use the **async dynamic address** interface configuration command. To disable dynamic addressing, use the **no** form of this command.

async dynamic address
no async dynamic address

Syntax Description

This command has no arguments or keywords.

Default

Dynamic addressing is disabled.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

You can control whether addressing is dynamic (the user specifies the address at the EXEC level when making the connection), or whether default addressing is used (the address is forced by the system). If you specify dynamic addressing, the router must be in interactive mode and the user will enter the address at the EXEC level.

It is common to configure an asynchronous interface to have a default address and to allow dynamic addressing. With this configuration, the choice between the default address or a dynamic addressing is made by the user when they enter the **slip** or **ppp** EXEC command. If the user enters an address, it is used, and if the user enters the **default** keyword, the default address is used.

Example

The following example shows dynamic addressing assigned to async interface 6.

```
interface ethernet 0
 ip address 10.0.0.1 255.0.0.0
interface async 6
 async dynamic address
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

peer default ip address

async dynamic routing

To enable manually configured routing on an asynchronous interface, use the **async dynamic routing** interface configuration command. Use the **no** form of this command to disable routing protocols; static routing is still used.

async dynamic routing
no async dynamic routing

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

The **async dynamic routing** command is commonly used to manually bring up PPP from an EXEC session.

Example

The following example shows how to enable manually configured routing on asynchronous interface 1. The **ip tcp header-compression passive** command enables Van Jacobson TCP header compression and prevents transmission of compressed packets until a compressed packet arrives from the asynchronous link.

```
interface async 1
  async dynamic routing
  async dynamic address
  async default ip address 1.1.1.2
  ip tcp header-compression passive
```

A remote user who establishes a PPP or SLIP connection to this asynchronous interface can enable routing by using the **/routing** switch or the **ppp/routing** command.

However, if you want to establish routing by default on connections to an asynchronous interface, use the **async default routing** command when you configure the interface.

Related Commands

async default routing
async dynamic address
ip tcp header-compression

autocommand

To configure the Cisco IOS software to automatically execute a command when a user connects to a particular line, use the **autocommand** line configuration command. Use the **no** form of this command to disable the automatic execution.

autocommand *command*
no autocommand *command*

Syntax Description

<i>command</i>	Any appropriate EXEC command, including the host name and any switches that occur with the EXEC command.
----------------	--

Default

No commands are configured to automatically execute.

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command enables you to automatically execute an EXEC command when a user connects to a line.

Example

The following example forces an automatic connection to a host named *host21* (which could be an IP address):

```
line vty 4
  autocommand connect host21
```

autohangup

To configure automatic line disconnect, use the **autohangup** line configuration command. This command causes the EXEC to issue the **exit** command when the last connection closes. Use the **no** form of this command to disable automatic line disconnect.

autohangup
no autohangup

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command is useful for UNIX UUCP applications that automatically disconnect lines because UUCP scripts cannot issue the **exit** command to hang up the telephone.

Example

The following example enables automatic line disconnect on lines 5 through 10:

```
line 5 10
 autohangup
```

clear line

To return a terminal line to idle state, use the **clear line** EXEC command.

clear line *line-number*

Syntax Description

line-number Absolute line number.

Command Mode

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Use this command to log out of a specific session running on another line. If the line uses a modem, the modem will be disconnected.

Example

The following example resets line 3 to idle state:

```
clear line 3
```

exec

To allow an EXEC process on a line, use the **exec** line configuration command. Use the **no** form of this command to turn off the EXEC process for the specified line.

exec
no exec

Syntax Description

This command has no arguments or keywords.

Default

The EXEC processes start is activated automatically on all lines.

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

When you want to allow an outgoing connection *only* for a line, use the **no exec** command. When a user tries to Telnet to a line with the **no exec** command configured, the user will get no response when pressing the Return key at the login screen.

Example

The following example turns off the EXEC on line 7. You might want to do this on the auxiliary port if the attached device (for example, the control port of a rack of modems) sends unsolicited data. If this happens, an EXEC process starts, which makes the line unavailable.

```
line 7
no exec
```

exec-timeout

To set the interval that the EXEC command interpreter waits until user input is detected, use the **exec-timeout** line configuration command. Use the **no** form of this command to remove the timeout definition.

exec-timeout *minutes* [*seconds*]
no exec-timeout

Syntax Description

<i>minutes</i>	Integer that specifies the number of minutes.
<i>seconds</i>	(Optional) Additional time intervals in seconds. An interval of zero specifies no timeouts.

Default

10 minutes

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

If no input is detected, the EXEC facility resumes the current connection, or if no connections exist, it returns the terminal to the idle state and disconnects the incoming session. It is the same as entering **exec-timeout 0**.

Examples

The following example sets a time interval of 2 minutes, 30 seconds:

```
line console
exec-timeout 2 30
```

The following example sets a time interval of 10 seconds:

```
line console
exec-timeout 0 10
```

flowcontrol

To set the method of data flow control between the terminal or other serial device and the router, use the **flowcontrol** line configuration command. Use the **no** form of this command to disable flow control.

```
flowcontrol { none | software [lock] [in | out] | hardware [in | out]}  
no flowcontrol { none | software [in | out] | hardware [in | out]}
```

Syntax Description

none	Turns off flow control.
software	Sets software flow control. An optional keyword specifies the direction: in causes the Cisco IOS software to listen to flow control from the attached device, and out causes the software to send flow control information to the attached device. If you do not specify a direction, both are assumed.
lock	(Optional) Used to make it impossible to turn off flow control from the remote host when the connected device <i>needs</i> software flow control. This option applies to connections using the Telnet or rlogin protocols.
hardware	Sets hardware flow control. An optional keyword specifies the direction: in causes the software to listen to flow control from the attached device, and out causes the software to send flow control information to the attached device. If you do not specify a direction, both are assumed. For more information about hardware flow control, see the hardware manual that was shipped with your router.

Default

No flow control

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

When software flow control is set, the default stop and start characters are Ctrl-S and Ctrl-Q (XOFF and XON). You can change them with the **stop-character** and **start-character** commands.

If a remote Telnet device requires software flow control, the remote system should not be able to turn it off. Using the **lock** option makes it possible to refuse “dangerous” Telnet negotiations if they are inappropriate.

Example

The following example sets hardware flow control on line 7:

```
line 7
  flowcontrol hardware
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

start-character

stop-character

terminal flowcontrol

group-range

To create a list of member asynchronous interfaces (associated with a group interface), use the **group-range** interface configuration command. Use the **no** form of the command to remove an interface from the member list.

```
group-range low-end-of-range high-end-of-range  
no group-range interface
```

Syntax Description

<i>low-end-of-range</i>	Beginning interface number to be made a member of the group interface.
<i>high-end-of-range</i>	Ending interface number to be made a member of the group interface.

Default

No interfaces are designated as members of a group.

Command Mode

Interface configuration

Usage Guidelines

Using the **group-range** command, you create a group of asynchronous interfaces that are associated with a group asynchronous interface on the same device. This group interface is configured by using the **interface group-async** command. This one-to-many structure allows you to configure all associated member interfaces by entering one command on the group interface, rather than entering this command on each interface. You can customize the configuration on a specific interface by using the **member** command.

Examples

The following example defines interfaces 2, 3, 4, 5, 6, and 7 as members of asynchronous group interface 0:

```
interface group-async 0  
  group range 2 7
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

interface group-async
member

hold-queue

To limit the size of the IP output queue, use the **hold-queue** interface configuration command. To return the output queue to the default size, use the **no** form of this command.

hold-queue *packets*
no hold-queue

Syntax Description

packets Maximum number of packets. The range of values is 0 to 65535.

Default

10 packets (default for asynchronous interfaces only)

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0. The **no hold-queue** command first appeared in Cisco IOS Release 11.1.

The default of 10 packets allows the Cisco IOS software to queue a number of back-to-back routing updates. This is the default for asynchronous interfaces only; other media types have different defaults.

The hold queue stores packets received from the network that are waiting to be sent to the client. It is recommended that the queue size not exceed ten packets on asynchronous interfaces. For most other interfaces, queue length should not exceed 100.

Example

The following example changes the packet queue length of a line to five packets:

```
interface async 2
  async default ip address 172.31.7.5
  hold-queue 5
```

ip access-group

To configure an access list to be used for packets transmitted to and from the asynchronous host, use the **ip access-group** interface configuration command. To disable control over packets transmitted to or from an asynchronous host, use the **no** form of this command.

```
ip access-group access-list-number { in | out }
no ip access-group access-list-number
```

Syntax Description

<i>access-list-number</i>	Assigned IP access list number.
in	Defines access control on packets transmitted <i>from</i> the asynchronous host.
out	Defines access control on packets being sent <i>to</i> the asynchronous host.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

With this command in effect, the IP destination address of each packet is run through the access list for acceptability and dropped or passed.

Example

The following example assumes that users are restricted to certain servers designated as SLIP or PPP servers, but that normal terminal users can access anything on the local network:

```
! access list for normal connections
access-list 1 permit 172.16.0.0 0.0.255.255
!
! access list for SLIP packets.
access-list 2 permit 172.16.42.55
access-list 2 permit 172.16.111.1
access-list 2 permit 172.16.55.99
!
! Specify the access list
interface async 6
  async dynamic address
  ip access-group 1 out
  ip access-group 2 in
```

ip mtu

To specify the size of the largest Internet packet, use the **ip mtu** interface configuration command. To return to the default MTU size of 1500 bytes, use the **no** form of this command.

ip mtu *bytes*
no ip mtu

Syntax Description

bytes Maximum number of bytes. The range of values is 64 to 1000000.

Default

1500 bytes

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Example

The following example sets the packet MTU size to 200 bytes:

```
interface async 5
  async default ip address 172.31.7.5
  ip mtu 200
```

line

To identify a specific line for configuration and start the line configuration command collection mode, use the **line** global configuration command.

```
line [aux | console | tty | vtty] line-number [ending-line-number]
```

Syntax Description

aux	(Optional) Auxiliary EIA/TIA-232 DTE port. Must be addressed as relative line 0. The auxiliary port can be used for modem support and asynchronous connections.
console	(Optional) Console terminal line. The console port is DCE.
tty	(Optional) Standard asynchronous line.
vtty	(Optional) Virtual terminal for remote console access.
<i>line-number</i>	The relative number of the terminal line (or the first line in a contiguous group) that you want to configure when the line type is specified. Numbering begins with zero.
<i>ending-line-number</i>	(Optional) The relative number of the last line in a contiguous group that you want to configure. If you omit the keyword, then <i>line-number</i> and <i>ending-line-number</i> are absolute rather than relative line numbers.

Default

There is no default line.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

You can address a single line or a consecutive range of lines with the **line** command. A line number is necessary, though, and you will receive an error message if you forget to include it.

Entering the **line** command with the optional line type (**AUX**, **CON**, **TTY**, or **VTY**) designates the line number as a relative line number. For example, to configure line parameters for line 7 (a TTY line), you could enter the following:

```
Router(config)# line tty 7
```

You also can enter the **line** command without specifying a line type. In this case, the line number is treated as an absolute line number. For example, to configure line parameters for line 5, which can be of any type, you could enter the following:

```
Router(config)# line 5
```

Absolute line numbers increment consecutively and can be difficult to manage on large systems. Relative line numbers are a shorthand notation used in configuration. Internally, the Cisco IOS software uses absolute line numbers. You cannot use relative line numbers everywhere, but you can use absolute line numbers everywhere.

The absolute line number of the auxiliary port is 1. The relative line number of the auxiliary port is 0. See the **modem** line configuration command to set up modem support on the auxiliary port.

The software keeps a table of absolute and relative line numbers that you can display with the EXEC command **show users all**. A sample display follows:

```
Router> show users all
  Line      User      Host(s)                Idle   Location
  0 con 0
  1 tty 1
  2 tty 2
  3 tty 3          DREGGS                1:07   Katy x1111
  4 tty 4
  5 tty 5
  6 tty 6
  7 tty 7          DREGGS                14    Marie x1112
 10 tty 10
. . .
135 tty 135
136 tty 136
137 tty 137
140 tty 140
141 aux 0
142 vty 0   Denise   idle                  DENISE-MAC.CISCO.COM
143 vty 1   Michael idle                  0 DREGGS.CISCO.COM
144 vty 2
145 vty 3
146 vty 4
147 vty 5
```

The absolute line numbers are listed at the far left, followed by the line type, and then the relative line number. Relative line numbers always begin numbering at zero and define the type of line. Addressing the second virtual terminal line as line VTY 1, for example, is easier than remembering it as line 143—its absolute line number.

The line types are ranked as follows in the line table:

- 1 Console 0 (con 0)
- 2 Standard asynchronous line (TTY)
- 3 Auxiliary port (aux)
- 4 Virtual terminal line (VTY)
- 5 Printer

The terminal from which you locally configure the router is attached to the console port. To configure line parameters for the console port, enter the following:

```
Router(config)# line con 0
```

The console relative line number must be 0.

Virtual terminal lines are used to allow remote access to the router. A virtual terminal line is not associated with either the auxiliary or console port. The router has five virtual terminal lines by default. However, you can create additional virtual terminal lines as described in the section “Create Additional Virtual Terminal Lines” in the “Configuring Protocol Translation and Virtual Asynchronous Devices” chapter of the *Dial Solutions Configuration Guide*.

Configuring the console port or virtual terminal lines allows you to perform such tasks as setting communication parameters, specifying autobaud connections, and configuring terminal operating parameters for the terminal you are using.

Examples

The following example starts configuration for virtual terminal lines 0 to 4:

```
line vty 0 4
```

In the following example, the user creates and configures the maximum 100 virtual terminal lines with the **no login** command:

```
line vty 0 99
no login
```

In the following example, the user eliminates virtual terminal line number 5 and all higher-numbered virtual terminal lines. Only virtual terminal lines 0 to 4 will remain.

```
no line vty 5
```

In the following example, the user configures console line 0, auxiliary line 0, and virtual terminal lines 0 to 4:

```
line vty 0 4
login
line con 0
password baskerville
line aux 0
password Mypassword
no exec
access-class 1 in
speed 19200
line vty 0
exec-timeout 0 0
password Mypassword
line vty 1
exec-timeout 0 0
password Mypassword
line vty 2
exec-timeout 0 0
password Mypassword
line vty 3
password Mypassword
line vty 4
password Mypassword
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

show line

show users all

member

To alter the configuration of an asynchronous interface that is a member of a group, use the **member** interface configuration command. Use the **no** form of the command to restore defaults set at the group master interface.

member *number interface-command*
no member *number interface-command*

Syntax Description

<i>number</i>	Number of the asynchronous interface to be altered.
<i>interface-command</i>	One or more of the following commands entered for this specific interface: <ul style="list-style-type: none">• peer default ip address• description

Default

No individual configurations are set for member interfaces.

Command Mode

Interface configuration

Usage Guidelines

You can customize a member interface by using the **member** command. (Interfaces are designated as members of a group by using the **interface group-async** and **group-range** commands.) To restore the defaults set at the group master interface, use the **no** form of this command.

Examples

The following example defines interface 3 with a description of line 3, which is attached to a Hayes Optima modem:

```
interface group-async 0
  member 3 description line #3 Hayes Optima
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

group-range
interface group-async

modem call-record

To activate the logging of a summary of modem events upon the termination of a call, use the **modem call-record** command in global configuration mode. Use the **no** form of this command to deactivate modem event logging of calls.

modem call-record terse
no modem call-record

Syntax Description

terse Specifies that only significant data is logged to the Modem Call Record (MCR).

Default

Logging of modem events is off.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.3(6) AA.

The modem management subsystem provides event logs for each modem at each major event during usage of the modems. The volume of event logs being generated make the monitoring of modem calls for debugging purposes difficult. MCR log, activated using the **modem call-record** command, will log a summary of a modem call to syslog upon termination of the call. If a call fails to establish a connection, the call will be summarized in a Modem Call Failed Record.

The MCR is written to the syslog and can be displayed using the **terminal monitor** or **show logging** command, or by examining files on a syslog server.

The **modem call-record** command is supported on routers with integrated MICA technologies and Microcom modems.

The information provided in the MCR log and the Modem Call Failed Record log varies depending on the type of modem being used. The following table describes the significant fields in the display for MICA and Microcom modems.

Table 2 modem call-record Field Descriptions

Field	Description
Interface slot	Interface slot of device assigned for call.
Interface controller unit	Interface controller unit of device assigned for call.
Interface channel	Interface channel of device assigned for call.
Modem type	Modem type used for call.
Modem slot/port	Physical location for modem handling the call.

Table 2 modem call-record Field Descriptions (continued)

Field	Description
Call id	Unique Call Identifier assigned to the modem call by the call switching module.
Userid	User ID of caller.
IP address	IP address assigned for caller.
Calling number	Modem calling number.
Called number	Modem called number.
Connected standard	Standard used for connection. Possible values are Bell103, Bell212, K56Flex 1.1, V.17, V.21, V.22, V.22bis, V.23, V.27, V.29, V.32, V.32bis, V.32terbo, V.34, V.34+, and V.90.
Connect protocol	Protocol user for connection. Possible values are ARA1.0, ARA2.0, ASYNC Mode, FAX Mode, LAP-M, MNP, SS7/COT, and SYNC Mode.
Compression	Compression method used for connection. Possible values are MNP5 data, none, V.42bis both, V.42bis RX, and V.42bis TX.
Initial RX bit rate	Actual bit rate from the remote Digital Signal Processor (DSP) to the local DSP at connect.
Initial TX bit rate	Actual bit rate from the local DSP to the remote DSP at connect.
Final RX bit rate	Actual bit rate from the remote DSP to the local DSP at disconnect.
Final TX bit rate	Actual bit rate from the local DSP to the remote DSP at disconnect.
RBS pattern ¹	Actual Robbed Bit Signaling (RBS) pattern observed by the modem. The six LSBs of the returned value indicate the periodic RBS pattern where a one denotes a pulse code modulation sample with a robbed-bit. (Only reported for K56Flex).
Digital pad ¹	Amount of digital padding (attenuation) in downlink, in decibels. (Only reported for V.90 and K56Flex.)
Total retrains ¹	Count of total retrains and speed shifts.
Signal quality value ¹	This value ranges from 0 to 7, where 0 is the worst. The units are arbitrary, approximating $\text{abs}(\log_{10}(\text{SNR}))$.
SNR	Signal-to-noise ratio, ranging from 0 to 70 in dB steps.
Characters received	Count of total characters received for SYNC/ASYNC connection.
Characters transmitted	Count of total characters sent for SYNC/ASYNC connection.
Characters received BAD ¹	Total number of parity errored characters received (for ASYNC connections).
Error correction frames received OK	Count of error-free Error Correction frames received. Incorrect or duplicate frames are not included.
Error correction frames transmitted	Count of unique Error Correction frames sent. Re-sent frames are not included.
Error correction frames received BAD/ABORTED ¹	Total error correction retransmissions requested by this modem during the course of the link.
Call timer	Duration of call, in seconds.

Table 2 modem call-record Field Descriptions (continued)

Field	Description
Final state	State of modem call before it terminated.
Disconnect reason	Reason for call being disconnected. Each modem type handles parameter differently.

!These fields are displayed only for MICA modems.

Example

The following example shows the activation of MCR logging:

```
modem call-record terse
```

The following is the MCR of a successful call on a MICA modem:

```
*Aug 15 01:34:08.775: %CALLRECORD-3-MICA_TERSE_CALL_REC:
DS0 slot/contr/channel=1/0/22 modem=mica slot/port=1/2 call_id=0x3
userid=jdoe ip=124.34.45.120
calling=#4085551212 called=#4085552222
std=V.34+ prot=LAP-M comp=None
init-rx/tx b-rate=31200/33600 finl-rx/tx b-rate=33600/33600
rbs=0 d-pad=None retr=2 sq=2 snr=28
rx/tx chars=1067/0 bad=0 rx/tx ec=0/0 bad=0
time=139 finl-state=Steady
disc=0xA220
Type (=5 ): Rx (line to host) data flushing, not OK
Class (=2 ): EC condition, locally detected
Reason (=32): received DISC frame -- normal LAPM termination
```

The following is the MCR of a failed call on a MICA modem:

```
*Aug 15 16:47:54.527: %CALLRECORD-3-MICA_TERSE_CALL_FAILED_REC:
DS0 slot/contr/channel=1/0/22 modem=mica slot/port=1/2 call_id=0x3
calling=4085551212# called=#4085552222
time=2 finl-state=Link
disc=0x7F06
Type (=3 ): Condition occurred during call setup
Class (=31): Requested by host
Reason (=6 ): network indicated disconnect
```

The following is the MCR of a successful call on a Microcom modem:

```
01:17:30: %CALLRECORD-3-MCOM_TERSE_CALL_REC:
DS0 slot/contr/channel=0/0/22 modem=microcom_server slot/port=0/2 call_id=0x3
userid=sque ip=124.34.46.111
calling=#4085551111 called=#4085552222
std=V34 prot=Normal comp=None
Init-RX/TX b-rate=33600/31200 Finl-RX/TX b-rate=33600/33600
SNR=47
RX/TX chars=0/0 RX/TX EC=0/0
time=73 Disc(local)=0x9 DTR Drop Disc(remote)=0x0 Unknown
```

The following is the MCR of a failed call on a Microcom modem:

```
Microcom Terse Modem Call Failed Record Log:
19:28:55: %CALLRECORD-3-MCOM_TERSE_CALL_FAILED_REC:
DS0 slot/contr/channel=0/0/0 modem=microcom_server slot/port=0/2 call_id=0xA003
calling=4085551111# called=#4085552222
time=0 finl-state=Dialing/Answering
disc(local)=0x9 DTR Drop disc(remote)=0x0 Unknown
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

show logging
terminal monitor

modem callin

To support dial-in modems that use the data terminal ready (DTR) signal to control the off-hook status of the modem, use the **modem callin** line configuration command. Use the **no** form of this command to disable this feature.

modem callin
no modem callin

Syntax Description

This command has no arguments or keywords.

Default

No modem control

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

In response to RING, the router raises the DTR signal, which indicates to the modem that it should answer the call. At the end of the session, the Cisco IOS software lowers DTR, which disconnects the modem. This command is useful for older modems that do not support auto answer.

This command uses CTS, whereas newer modem commands in the Cisco IOS software use DSR.

Only use the **modem callin** command on the ASM terminal server, where hardware flow control is not possible. If you have a more recent device (such as a Cisco 2509 through 2512, Cisco 2520 through 2523, a Cisco AS5100, Cisco 3600 series, or Cisco AS5200), use the **modem dialin** command instead.

Example

The following example configures lines 10 through 16 for dial-in modems that can run at speeds from 300 to 19,200 bps:

```
line 10 16
modem callin
autobaud
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

modem answer-timeout
modem inout

modem callout

To configure a line for reverse connections, use the **modem callout** line configuration command. Use the **no** form of this command to disable this feature.

modem callout
no modem callout

Syntax Description

This command has no arguments or keywords.

Default

No modem control

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command supports ports connected to computers that would normally be connected to modems. It causes the access server to act somewhat like a modem.

This command uses CTS and should be used only on access servers that do not support hardware flow control. If you have an access server that is newer than the ASM terminal server (such as a Cisco 2509 through 2512, Cisco 2520 through 2523, a Cisco AS5100, Cisco 3600 series, or a Cisco AS5200), use the **modem host** command instead. The **modem callout** command uses CTS, whereas the **modem host** command uses DSR/DCD. If CTS is used for modem control instead of DSR/DCD, it prevents CTS from being used by hardware flow control.

Example

The following example configures lines 17 through 32 in reverse connection mode to a large terminal switch. By using Telnet to connect to a TCP port on this host, the user gets the next free line in the rotary group.

```
line 17 32
 rotary 1
 modem callout
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

modem inout
:rotary

modem cts-required

The **modem printer** command replaces the **modem cts-required** command. Refer to the description of the **modem printer** command for more information.

modem dialin

To configure a line to enable a modem attached to the router to accept incoming calls only, use the **modem dialin** line configuration command. Use the **no** form of this command to disable this feature.

modem dialin
no modem dialin

Syntax Description

This command has no arguments or keywords.

Default

Do not permit incoming calls to the modem.

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

This command supports modems that can automatically handle telephone line activity, such as answering the telephone after a certain number of rings.

Example

The following example configures a line for a high-speed modem:

```
line 5
modem dialin
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

dialer
modem inout
parity

modem dtr-active

To configure a line to leave data terminal ready (DTR) signals low, unless the line has an active incoming connection or an EXEC process, use the **modem dtr-active** line configuration command. Use the **no** form of this command to disable this feature.

modem dtr-active
no modem dtr-active

Syntax Description

This command has no arguments or keywords.

Default

No modem control

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command does not use the Carrier Detect (CD) signal.

This command can be useful if the line is connected to an external device (for example, a time-sharing system) that must know whether a line is in active use. The **modem dtr-active** command is similar to the **no modem** line configuration command.

Example

The following example configures a line for low DTR:

```
line 5
  modem dtr-active
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

modem cts-required

modem host

To configure a line for reverse connections where hardware flow control is also required, use the **modem host** line configuration command. Use the **no** form of this command to disable the line modem control for reverse connections.

modem host
no modem host

Syntax Description

This command has no arguments or keywords.

Default

No modem control

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

This command supports ports connected to computers that would normally be connected to modems. This command causes the access server to act like a modem.

The **modem host** command is identical in operation to the **modem callout** command except that DSR/DCD is used for modem control instead of CTS. This frees CTS for use by hardware flow control.

Example

The following example configures a line to send a DSR/CD active signal to the modem for data switches and hosts:

```
line 5
  modem host
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

modem callout
modem printer

modem inout

To configure a line for both incoming and outgoing calls, use the **modem inout** line configuration command. Use the **no** form of this command to disable the line.

```
modem inout  
no modem inout
```

Syntax Description

This command has no arguments or keywords.

Default

No modem control

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command uses DSR and RING signals for carrier detection.

The Cisco IOS software does not support any dialing protocols; therefore, the host system software or the user must provide any special dialing commands when using the modem for outgoing calls.

Example

The following example configures a line for both incoming and outgoing calls:

```
line 5  
  modem inout
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

```
dialer  
parity
```

modem printer

To configure a line to require a data set ready (DSR) signal, use the **modem printer** line configuration command. Use the **no** form of this command to use CTS instead of DSR.

modem printer
no modem printer

Syntax Description

This command has no arguments or keywords.

Default

No modem control

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

This command uses RING/DCD (Data Carrier Detect) /DSR as the modem control signal instead of CTS. This leaves CTS free for use in hardware flow control. You can configure hardware flow control concurrently with the **modem printer** command.

While the **modem dialin** command supports modems concurrently with hardware flow control, the other auxiliary modem control options for printers, such as **modem cts-required**, use CTS instead of DSR/CD, as the CD signal.

Example

The following example configures a line to send a DSR signal to the modem:

```
line 5
modem printer
```

modem ri-is-cd

The **modem dialin** command replaces the **modem ri-is-cd** command. Refer to the description of the **modem dialin** command for more information.

netbios nbf

To enable the NetBIOS Frames Protocol (NBF) on an interface, use the **netbios nbf** interface configuration command. To disable NetBIOS Frames Protocol support on an interface, use the **no** form of this command.

netbios nbf
no netbios nbf

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

Example

The following example enables NetBIOS Frames Protocol on asynchronous interface 1 (connected to remote access client using a NetBEUI application) and Ethernet interface 0 (connected to the remote router):

```
interface async 1
  netbios nbf
interface ethernet 0
  netbios nbf
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

netbios name-cache
show netbios cache
show nbf sessions

physical-layer

To specify the mode of a slow-speed serial interface on a router as either synchronous or asynchronous, use the **physical-layer** interface configuration command. Use the **no** form of this command to return the interface to its default mode, which is synchronous.

```
physical-layer {sync | async}  
no physical-layer
```

Syntax Description

sync	Place the interface in synchronous mode.
async	Place the interface in asynchronous mode.

Default

Synchronous mode

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

This command applies only to low-speed serial interfaces available on Cisco 2520 through Cisco 2523 routers.

If you specify the **no physical-layer** command, you return the interface to its default mode (synchronous).

In synchronous mode, low-speed serial interfaces support all interface configuration commands available for high-speed serial interfaces, except the following two commands:

- **sdhc cts-delay**
- **sdhc rts-timeout**

When placed in asynchronous mode, low-speed serial interfaces support all commands available for standard asynchronous interfaces.

When you enter this command, it does not appear in the output of **more system:running-config** and **more nvram:startup-config** commands, because the command is a physical layer command.

Example

The following example changes a low-speed serial interface from synchronous to asynchronous mode:

```
interface serial 2  
  physical-layer async
```

:rotary

To define a group of lines consisting of one or more lines, use the **rotary** line configuration command. Use the **no** form of this command to remove a line or group of lines from a rotary group.

rotary *group*
no rotary

Syntax Description

group Integer between 1 and 100 that you choose to identify the rotary group.

Default

No group of lines is defined.

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Typically, rotary groups are used on devices with multiple modem connections to allow connections to the next free line in a hunt group.

Connections to a rotary group can take advantage of the following features:

- **Clear To Send (CTS)**—If a line in a rotary group is configured to require CTS, the Cisco IOS software skips that line if CTS from the attached device is low. This feature enables the software to avoid inactive host ports automatically. To enable this feature, use the **modem bad** line configuration command.
- **EIA/TIA-232 handshaking**—Rotary groups are often associated with large terminal switches that require an EIA/TIA-232 handshake before forming a connection. In this case, use the **modem callout** line configuration command to configure the lines in the group. If the EIA/TIA-232 handshake fails on a line, the Cisco IOS software steps to the next free line in the rotary group and restarts the negotiation.
- **Access control**—You can use access lists for groups of virtual terminal lines.
- **Session timeout**—Use the **session-timeout** line configuration command to set an interval for a line so that if no activity occurs on a remotely initiated connection for that interval the Cisco IOS software closes the connection. The software assumes that the host has crashed or is otherwise inaccessible.

The remote host must specify a particular TCP port on the router to connect to a rotary group with connections to an individual line. The available services are the same, but the TCP port numbers are different. Table 4 lists the services and port numbers for both rotary groups and individual lines.

Table 3 Services and Port Numbers for Rotary Groups and Lines

Services Provided	Base TCP Port for Rotaries	Base TCP Port for Individual Lines
Telnet protocol	3000	2000
Raw TCP protocol (no Telnet protocol)	5000	4000
Telnet protocol, binary mode	7000	6000
XRemote protocol	10000	9000

For example, if Telnet protocols are required, the remote host connects to the TCP port numbered 3000 (decimal) plus the rotary group number. If the rotary group identifier is 13, the corresponding TCP port is 3013.

If a raw TCP stream is required, the port is 5000 (decimal) plus the rotary group number. If rotary group 5 includes a raw TCP (printer) line, the user connects to port 5005 and is connected to one of the raw printers in the group.

If Telnet binary mode is required, the port is 7000 (decimal) plus the rotary group number.

Example

The following example establishes a rotary group consisting of virtual terminal lines 2 through 4 and defines a password on those lines. By using Telnet to connect to TCP port 3001, the user gets the next free line in the rotary group. The user does not have to remember the range of line numbers associated with the password.

```
line vty 2 4
  rotary 1
  password letmein
login
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

dialer
modem bad
modem callout
session-timeout

script activation

To specify that a chat script start on a physical terminal line any time the line is activated, use the **script activation** line configuration command. Use the **no** form of this command to disable this feature.

script activation *regex*
no script activation

Syntax Description

<i>regex</i>	Regular expression that specifies the set of modem scripts that might be executed. The first script name that matches the argument <i>regex</i> will be used.
--------------	---

Default

Not assigned to terminal lines

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command provides an asynchronous handshake to a user or device that activates the line. It can be activated by several events, such as a user issuing a carriage return on a vacant line, by a modem on the line sensing an incoming carrier, or an asynchronous device (such as another router) sending data. Each time an EXEC session is started on a line, the system checks to see if a **script activation** command is configured on the line. If so, and the argument *regex* (a regular expression) matches an existing chat script name, the matched script is run on the line. For more information about regular expressions, refer to the “Regular Expressions” appendix in this publication.

The **script activation** command can mimic a login handshake of another system. For example, a system that dials into a line on a router and expects an IBM mainframe login handshake can be satisfied with an appropriate activation script.

This command also can send strings to asynchronous devices that are connecting or dialing into a router.

The **script activation** command functions only on physical terminal (TTY) lines. It does not function on virtual terminal (VTY) lines.

Example

The following example specifies that the chat script with a name that includes *telebit* will be activated whenever line 4 is activated:

```
line 4
  script activation telebit
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

chat-script
dialer map modem-script system-script
dialer map modem-script system-script name
script activation
script connection
script dialer
script reset
script startup
start-chat

script connection

To specify that a chat script will start on a physical terminal line any time a remote network connection is made to a line, use the **script connection** line configuration command. Use the **no** form of this command to disable this feature.

script connection *regexp*
no script connection

Syntax Description

regexp Specifies the set of modem scripts that might be executed. The first script name that matches the argument *regexp* will be used.

Default

Not assigned to terminal lines

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command provides modem dialing commands and commands for logging onto remote systems. The **script connection** command functions only on physical terminal (TTY) lines. It does not function on virtual terminal (VTY) lines.

This command can be used to initialize an asynchronous device sitting on a line to which a reverse network connection is made.

For information about regular expressions, refer to the “Regular Expressions” appendix in this publication.

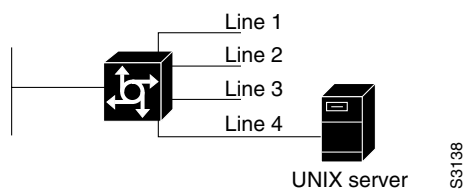
Example

The following example specifies that the chat script with a name that includes *inband* will be activated whenever a remote connection to line 4 is established. The router can send a login string and password to the UNIX server when a network tunneling connection comes into line 4:

```
line 4
 script connection inband
```

Using this example and the topology in Figure 2, the access server or router can send a login string and password to the UNIX server when a network tunneling connection comes into line 4.

Figure 2 Network Tunneling Connection on an Asynchronous Line



Related Commands

You can use the master indexes or search online to find documentation of related commands.

chat-script
dialer map modem-script system-script
dialer map modem-script system-script name
script activation
script dialer
script reset
script startup
start-chat

script reset

To specify that a chat script will start on a physical terminal line any time the specified line is reset, use the **script reset** line configuration command. Use the **no** form of this command to disable this feature.

```
script reset regex  
no script reset
```

Syntax Description

regex Specifies the set of modem scripts that might be executed. The first script name that matches the argument *regex* will be used.

Default

Not assigned to terminal lines.

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Chat scripts provide modem dialing commands and commands for logging onto remote systems. Use this command to reset a modem attached to a line every time a call is dropped.

The **script reset** command functions only on physical terminal (TTY) lines. It does not function on virtual terminal (VTY) lines.

For information about regular expressions, refer to the “Regular Expressions” appendix in this publication.

Examples

The following example specifies that any chat script name with the word *linebackup* in it will be activated any time line 7 is reset:

```
line 7  
script reset linebackup
```

The following example resets a modem sitting on a line each time a call is dropped:

```
chat-script drop-line ""+++"" " " ATH OK "ATS0=1" OK "ATS9=21"  
line 4  
script reset drop-line
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

```
chat-script  
dialer map modem-script system-script  
dialer map modem-script system-script name
```

script activation
script connection
script dialer
script startup
start-chat

script startup

To specify that a chat script will start on a physical terminal line any time the router is powered up, use the **script startup** line configuration command. Use the **no** form of this command to disable this feature.

script startup *regex*
no script startup

Syntax Description

regex Specifies the set of modem scripts that might be executed. The first script that matches the argument *regex* will be used.

Default

Not assigned to terminal lines

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Use this command to initialize asynchronous devices connected to a line when the router is started up or reloaded. You can also use it to start up a banner other than the default banner on lines. The **script startup** command functions only on physical terminal (TTY) lines. It does not function on virtual terminal (VTY) lines.

For information about regular expressions, refer to the “Regular Expressions” appendix in this publication.

Example

The following example specifies that a chat script with the word *linestart* in its name will be activated whenever line 5 is started up:

```
line 5
  script startup linestart
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

chat-script
dialer map modem-script system-script
dialer map modem-script system-script name
script activation
script connection
script dialer
script reset
start-chat

show async bootp

To display the parameters that have been configured for extended BOOTP requests, use the **show async bootp** privileged EXEC command.

```
show async bootp
```

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Sample Display

The following is sample output from the **show async bootp** command.

```
sloth# show async bootp

The following extended data will be sent in BOOTP responses:

bootfile (for address 192.168.31.1) "pcboot"
bootfile (for address 172.16.1.110) "dirtboot"
subnet-mask 255.255.0.0
time-offset -3600
time-server 192.168.31.1
```

Table 5 describes significant fields shown in the display.

Table 4 Show Async BOOTP Field Descriptions

Field	Description
bootfile... "pcboot"	Indicates that the boot file for address 192.168.31.1 is named pcboot.
subnet-mask 255.255.0.0	Specifies the subnet mask.
time-offset -3600	Indicates that the local time is one hour (3600 seconds) earlier than Coordinated Universal Time (UTC).
time-server 192.168.31.1	Indicates the address of the time server for the network.

show async status

To display the status of activity on all lines configured for asynchronous support, use the **show async status** privileged EXEC command.

show async status

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

The display resulting from this command shows all asynchronous sessions, whether they are using SLIP or PPP encapsulation.

Sample Display

The following is sample output from the **show async status** command:

```
router# show async status

Async protocol statistics:
  Rcvd: 5448 packets, 7682760 bytes
        1 format errors, 0 checksum errors, 0 overrun, 0 no buffer
  Sent: 5455 packets, 7682676 bytes, 0 dropped

  Tty          Local          Remote Qd InPack OutPac Inerr  Drops  MTU  Qsz
  *  3         192.168.7.84      None  0   5448   5455    1     0 1500  10
```

Table 6 describes significant fields shown in the display.

Table 5 Show Async Status Field Descriptions

Field	Description
Rcvd	Statistics on packets received.
5448 packets	Packets received.
7682760 bytes	Total number of bytes.
1 format errors	Spurious characters received when a packet start delimiter is expected.
0 checksum errors	Count of checksum errors.
0 overrun	Number of giants received.
0 no buffer	Number of packets received when no buffer was available.
Sent	Statistics on packets sent.
5455 packets	Packets sent.
7682676 bytes	Total number of bytes.

Table 5 Show Async Status Field Descriptions (continued)

Field	Description
0 dropped	Number of packets dropped.
Tty	Line number.
*	Line currently in use.
Local	Local IP address on the link.
Remote	Remote IP address on the link; "Dynamic" indicates that a remote address is allowed but has not been specified; "None" indicates that no remote address is assigned or being used.
Qd	Number of packets on hold queue (Qsz is the maximum).
InPack	Number of packets received.
OutPac	Number of packets sent.
Inerr	Number of total input errors; sum of format errors, checksum errors, overruns and no buffers.
Drops	Number of packets received that would not fit on the hold queue.
MTU	Current maximum transmission unit size.
Qsz	Current output hold queue size.

show line

To display a terminal line's parameters, use the **show line** EXEC command.

```
show line [line-number]
```

Syntax Description

<i>line-number</i>	(Optional) Absolute line number of the line for which you want to list parameters.
aux	(Optional) Auxiliary line.
console	(Optional) Primary terminal line.
summary	(Optional) Line status summary.

Command Mode

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0. The **summary** keyword was added in Cisco IOS Release 11.3(1)T. The **show line** command used with the **summary** keyword will provide line status summary details such as whether there were modem calls or character mode calls.

Table 6 describes the possible line status characters that can be shown in output from the **show line summary** command.

Table 6 Line Status Character Descriptions

Line Status Character	Description
?	Line has never been used.
-	Lines has been used but is currently idle.
.	Line does not exist.
A	Line in use by a packet mode user such as asynchronous PPP, Serial Line Internet Protocol (SLIP), ARAP or ASTUN.
D	Line in use by a digit mode user such as V.110 or V.120.
F	Line in use by a TCP fast-stream user.
M	Line in use by modem management.
U	Line in use by character mode user, such as an EXEC user making an outbound packet connection using Telnet, rlogin, local-area transport (LAT), packet assembler/disassembler (PAD), or normal (nonfast-stream) TCP clear.
V	Line in use by a voice mode user.

Sample Display

The following sample output from the **show line** command shows that line 17 is a virtual terminal line with a transmit and receive rate of 9600 bps. Also shown is the modem state, terminal screen width and length, and so on.

```

router# show line 17

Tty Typ      Tx/Rx      A Modem  Roty  AccO  AccI  Uses    Noise  Overruns
A 17 VTY     9600/9600  -   -    -    -    -      1      0      0/0

Line 17, Location: "", Type: ""
Length: 24 lines, Width: 80 columns
Baud rate (TX/RX) is 9600/9600
Status: Ready, Connected, Active, No Exit Banner, Async interface active
Capabilities: Line usable as async interface
Modem state: Ready
Special Chars: Escape  Hold  Stop  Start  Disconnect  Activation
                ^^x   none  -    -      none
Timeouts:      Idle EXEC  Idle Session  Modem Answer  Session  Dispatch
                never      never          none          not set
Session limit is not set.
Time since activation: never
Editing is enabled.
History is enabled, history size is 10.
Full user help is disabled
Allowed transports are lat telnet rlogin mop. Preferred is lat.
No output characters are padded
No special data dispatching characters

Line is running SLIP routing for address 1.0.0.2.
0 output packets queued, 0 input packets.
Group codes:    0

```

Table 7 describes the fields in the **show line** output.

Table 7 Show Line Field Descriptions

Field	Description
Tty	Line number. In this case, 17.
Typ	Type of line. In this case, a virtual terminal line (VTY), which is active, in asynchronous mode denoted by the preceding 'A.' Other possible values are: <ul style="list-style-type: none"> • CTY—console • AUX—auxiliary port • TTY—asynchronous terminal port • lpt—parallel printer
Tx/Rx	Transmit rate/receive rate of the line.
A	Indicates whether autobaud has been configured for the line. A value of F indicates that autobaud has been configured; a hyphen indicates that it has not been configured.
Modem	Types of modem signals that have been configured for the line. Possible values include <ul style="list-style-type: none"> • callin • callout • cts-req • DTR-Act • inout • RIisCD
Roty	Rotary group configured for the line.
AccO, AccI	Output or Input access list number configured for the line.
Uses	Number of connections established to or from the line since the system was restarted.
Noise	Number of times noise has been detected on the line since the system restarted.
Overruns	Hardware (UART) overruns and/or software buffer overflows, both defined as the number of overruns or overflows that have occurred on the specified line since the system was restarted. Hardware overruns are buffer overruns; the UART chip has received bits from the software faster than it can process them. A software overflow occurs when the software has received bits from the hardware faster than it can process them.
Line	Current line.
Location	Location of the current line.
Type	Type of line, as specified by the line global configuration command.
Length	Length of the terminal or screen display.
Width	Width of the terminal or screen display.
Baud rate (TX/RX)	Transmit rate/receive rate of the line.
Status	State of the line: Ready or not, connected or disconnected, active or inactive, exit banner or no exit banner, async interface active or inactive.
Capabilities	Current terminal capabilities. In this case, the line is usable as an asynchronous interface.

Table 7 Show Line Field Descriptions (continued)

Field	Description
Modem state	Modem control state. This field should always read READY.
Special Chars	Current settings of special characters that were input by the user (or taken by default) from the following global configuration commands: <ul style="list-style-type: none"> • escape-character • hold-character • stop-character • start-character • disconnect-character • activation-character
Timeouts	Current settings that were input by the user (or taken by default) from the following global configuration commands: <ul style="list-style-type: none"> • exec-timeout • session-timeout • dispatch-timeout • modem answer-timeout
Session limit	Maximum number of sessions.
Time since activation	Last time start_process was run.
Editing	Whether or not command line editing is enabled.
History	Current history length, set by the user (or taken by default) from the history configuration command.
Full user help	Whether or not full user help has been set by the user with the terminal full-help command or by the administrator with the full-help line configuration command.
Allowed transports are...	Current set transport method, set by the user (or taken by default) from the transport preferred line configuration command.
characters are padded	Current set padding, set by the user (or taken by default) from the padding line configuration command.
data dispatching characters	Current dispatch character set by the user (or taken by default) from the dispatch-character line configuration command.
Line	Definition of the specified line's protocol and address.
output, input packets	Number of output and input packets queued on this line.
Group codes	AT group codes.

show modemcap

To display the values set for the current modem, use the **show modemcap** command. This display lists the modems for which the router has entries. To display the attributes associated with a specific modem, use the **show modemcap *modem-name*** command.

```
show modemcap [modem-name]
```

Syntax Description

modem-name (Optional) The name of the modem (such as Codex_3260).

Default

The list of modems for which the router has entries.

Command Mode

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

When a modem name is supplied, this command displays the available modem values. Table 8 identifies the list of attributes and their description:

Table 8 Modem Attributes

Modem Attribute	Description
Factory defaults (FD)	Returns the modem to factory default configuration. This is commonly "&F"
Autoanswer (AA)	Sets the modem to answer the phone if DTR is high, preferably on the first ring. This is commonly "S0=1"
Carrier detect (CD)	Instructs the modem to raise CD signal when a carrier is detected. Cisco configures modems into auto-answer mode by default. Oddly this is not the default for most modems, which just raise CD and leave it high. This is commonly "&C1." In auto-answer mode, the modem waits until it detects a ring, then responds to the incoming call and negotiates an end-to-end connection with the other modem. At this point, the modem receiving the call informs the router that it has a call ready to be processed; this notification is performed by raising the signal on RS-232 pin 8 (the Data Carrier Detect signal) to high.
Drop with DTR (DTR)	Drops the connection if DTR signal drops. There is frequently an option to reset the configuration while doing this. However, this option should <i>not</i> be used. The connection should only drop. The correct value for this is commonly "&D2."
Set hardware flow control (HFL)	Uses RTS/CTS (out-of-band) flow control.
Set software flow control (SFL)	Uses XON/XOFF (in-band) flow control.

Table 8 Modem Attributes (continued)

Modem Attribute	Description
Lock to maximum DTE speed (SPD)	Instructs the modem to lock the speed at which it communicates to the router to a single rate, preferably the highest. This attribute is important and is often hard to find in manuals. SPD is often linked to the hardware flow control variable. Look for phrases like “bps rate adjust” and “bit rate adjust.” Some modems set the speed to a value that depends on an S-register; other modems simply lock to the speed that was used when the last AT command was issued. Locking to the speed that was last used is handled automatically. To enable the S-register to set the speed, you must include the proper S-register value for the fastest possible DTE speed.
Best error control (BER)	Instructs the modem to negotiate its best error control with remote modems. For ARAP users, this is MNP5/LAPB, but not MNP4.
Best compression (BCP)	Instructs the modem to negotiate its best compression with remote modems.
No error control (NER)	Instructs the modem to negotiate no error control with remote modems. This will be used when placing outgoing (callback) ARAP calls.
No compression (NCP)	Instructs the modem to negotiate no compression with remote modems. This is used when placing outgoing (callback) ARAP calls.
No echo (NEC)	Requests the modem <i>not</i> to echo characters. This is commonly “E0.”
No response codes (NRS)	Requests the modem <i>not</i> to send a response when you issue a command. This is commonly “Q1.”
Set Caller ID (CID)	Requests that Caller ID information be returned when dialin occurs. Currently not used.
Miscellaneous strings (MSC)	Sends any extra commands that are needed for the modem to work (possibly with specific platforms).
Template entry (TPL)	This is the name of another modem type. It is referenced as the value of any of the previously listed attributes if they are not set on the current modem type.

As an alternative to repeatedly entering the same data, use templates as a way to join modemcap entries. For example, consider the following modemcap entries:

```
modemcap entry gv_basics:FD=&F:AA=S0=1:CD=&C1:DTR=&D2:NEC=E0:NRS=Q1
modemcap entry global_village:HFL=&K3\X1:BCP=%C1:NCP=%C0:TPL=gv_basics
modemcap entry gv_teleport:NCP=%C0:TPL=gv_basics
```

To look up the factory default for a global_village modem, perform the following steps:

- Step 1** Look at the global_village modemcap entry for the factory default (FD).
- Step 2** If you fail to find FD in global_village, look at the global_village modemcap entry for a template (TPL).
- Step 3** Find a TPL called “gv_basics.”
- Step 4** Look in the gv_basics modemcap entry for the FD.
- Step 5** Find FD=&F in the gv_basics modemcap entry.
- Step 6** Use &F as the FD for the global_village.

show modemcap

Sample Display

The following example shows the modem values in a Codex_3260:

```
show modemcap Codex_3260
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

modemcap edit

modemcap entry

show nbf cache

Use the **show nbf cache** user level EXEC command to display NetBIOS name cache contents.

show nbf cache

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

Sample Display

The following is sample output from the **show nbf cache** command:

```
router> show nbf cache
HW Addr      Name      How      Idle      NetBIOS Packet Savings
1000.5a89.449a  IKBA      E0        6         0
0000.0000.0000  NANOO     async1    21        0
```

Table 9 describes significant fields shown in the display.

Table 9 Show NBF Cache Field Descriptions

Field	Description
HW Addr	MAC address mapped to the NetBIOS name in this entry.
Name	NetBIOS name mapped to the MAC address in this entry.
How	Interface through which this information was learned.
Idle	Period of time (in seconds) since this entry was last accessed. A hyphen in this column indicates a static entry in the NetBIOS name cache.
NetBIOS Packet Savings	Number of packets to which local replies were made (thus preventing transmission of these packets over the network).

Related Commands

You can use the master indexes or search online to find documentation of related commands.

netbios access-list
netbios input-access-filter
netbios name-cache
netbios nbf
netbios output-access-filter
show nbf sessions

show nbf sessions

Use the **show nbf sessions** user level EXEC command to view NetBEUI connection information.

show nbf sessions

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

Sample Display

The following is sample output from the **show nbf sessions** command:

```
router> show nbf sessions

Async6 NetBIOS Session Table:
Srcnum  Destnum  Dest-Interface  DestMAC
8        6          Ethernet0 00aa.005b.c17b

NetBIOS Global Session Table:
Srcnum  Destnum  Dest-Interface  DestMAC  Src-Interface  SrcMac(I)

6        8          Async7 0000.0000.0000  Ethernet0 00aa.005b.c17b(95)
ADD_[GROUP]NAME_QUERY queue size=0
STATUS_QUERY queue size=0
STATUS_RESPONSE queue size=0
NAME_QUERY queue size=0
NAME_RECOGNIZED queue size=0
SESSION_INITIALIZE queue size=0
SESSION_INITIALIZE (pending) queue size=0
```

Table 10 describes significant fields shown in the display.

Table 10 Show NBF Sessions Field Descriptions

Field	Description
Interface NetBIOS Session Table:	Summarizes Async/ISDN interface NetBIOS connection information.
Srcnum, Destnum	Source and destination connection numbers.
Dest-Interface, DestMAC	Destination interface and MAC address.
Global NetBIOS Session Table:	Summarizes LAN NetBIOS connection information.
Dest-Interface DestMAC	Destination interface (<i>Async7</i> in this case) and MAC address (<i>0000.0000.0000</i> in this case).
Src-Interface SrcMac	Source interface (<i>Ethernet0</i> in this case) and MAC address (<i>00aa.005b.c17b(95)</i> in this case).

Table 10 Show NBF Sessions Field Descriptions (continued)

Field	Description
NetBIOS Datagram Queue Summary:	Summarizes NetBIOS pending datagram queues.
ADD_[GROUP]NAME_QUERY	Add Group Name Query packets.
STATUS_QUERY	Status Query packets.
STATUS_RESPONSE	Status Response packets.
NAME_QUERY	Name Query packets.
NAME_RECOGNIZED	Name Recognized packets.
SESSION_INITIALIZE (pending)	NetBIOS session Initialize packets.

Related Commands

You can use the master indexes or search online to find documentation of related commands.

netbios access-list
netbios input-access-filter
netbios output-access-filter
netbios name-cache
netbios nbf
show nbf cache

show users

To display information about the active lines on the router, use the **show users** user EXEC command.

show users [all]

Syntax Description

all (Optional) Specifies that all lines be displayed, regardless of whether anyone is using them.

Command Mode

User EXEC

Usage Guidelines

This command first appeared in a release prior to Cisco IOS Release 10.0.

This command displays the line number, connection name, idle time, and terminal location.

Sample Displays

The following is sample output from the **show users** command:

```
router# show users
      Line      User      Host(s)      Idle Location
      0 con 0
*   2 vty 0      rose      idle        0 BASHFUL.CISCO.COM
```

The following is sample output from the **show users all** command:

```
router# show users all
      Line      User      Host(s)      Idle Location
*   0 vty 0      rose      idle        0 BASHFUL.CISCO.COM
      1 vty 1
      2 con 0
      3 aux 0
      4 vty 2
```

The asterisk (*) indicates the current terminal session.

Table 11 describes significant fields shown in the displays.

Table 11 Show Users Field Descriptions

Field	Description
Line	Contains three subfields. <ul style="list-style-type: none">• The first subfield (0 in the sample output) is the absolute line number.• The second subfield (VTY) indicates the type of line. Possible values follow: con—Console aux—Auxiliary port tty—Asynchronous terminal port vty—Virtual terminal• The third subfield (0 in the * sample output) indicates the relative line number within the type.
User	User using the line. If no user is listed in this field, no one is using the line.
Host(s)	Host to which the user is connected (outgoing connection). A value of idle means that there is no outgoing connection to a host.
Idle	Interval (in minutes) since the user has entered something.
Location	Either the hard-wired location for the line or, if there is an incoming connection, the host from which incoming connection came.

Related Commands

You can use the master indexes or search online to find documentation of related commands.

line
show line

start-character

To set the flow control start character, use the **start-character** line configuration command. Use the **no** form of this command to remove the character.

start-character *ascii-number*
no start-character

Syntax Description

ascii-number Decimal representation of the start character.

Default

Decimal 17

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command defines the character that signals the start of data transmission when software flow control is in effect. See the “ASCII Character Set” appendix in the *Configuration Fundamentals Command Reference* for a list of ASCII characters.

Example

The following example changes the start character to Ctrl-B, which is decimal 2:

```
line 2
 start-character 2
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

flowcontrol
stop-character
terminal start-character

start-chat

To specify that a chat script start on a specified line at any point, use the **start-chat** privileged EXEC command. Use the **no** form of this command to stop the chat script.

```
start-chat regex [line-number [dialer-string]]  
no start-chat
```

Syntax Description

<i>regex</i>	Specifies the name of a regular expression or modem script to be executed. If there is more than one script with a name that matches the argument <i>regex</i> , the first script found will be used.
<i>line-number</i>	(Optional) Indicates the line number on which to execute the chat script. If you do not specify a line number, the current line number is chosen. If the specified line is busy, the script is not executed and an error message appears. If the dialer-string argument is specified, line-number must be entered; it is not optional if you specify a dialer string. This command functions only on physical terminal (TTY) lines. It does not function on virtual terminal (VTY) lines.
<i>dialer-string</i>	(Optional) String of characters (often a telephone number) to be sent to a DCE. If you enter a dialer string, you must also specify line-number, or the chat script <i>regex</i> will not start.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command provides modem dialing commands for a chat script that you want to apply immediately to a line. If you do not specify a line, the script runs on the current line. If the specified line is already in use, the script is not activated and an error message appears.

The argument *regex* is used to specify the name of the modem script that is to be executed. The first script that matches the argument in this command and the **dialer map** command will be used. For more information about regular expressions, refer to the “Regular Expressions” appendix in this publication.

This command functions only on physical terminal (TTY) lines. It does not function on virtual terminal (VTY) lines.

Example

The following example forces a dialout on line 8 using the script *telebit*:

```
start-chat telebit line 8
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

chat-script
dialer map modem-script system-script
dialer map modem-script system-script name
script activation
script connection
script dialer
script reset
script startup

stop-character

To set the flow control stop character, use the **stop-character** line configuration command. Use the **no** form of this command to remove the character.

```
stop-character ascii-number  
no stop-character
```

Syntax Description

ascii-number Decimal representation of the stop character.

Default

Decimal 19

Command Mode

Line configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command defines the character that signals the end of data transmission when software flow control is in effect. See the “ASCII Character Set” appendix in the *Configuration Fundamentals Command Reference* for a list of ASCII characters.

Example

The following example changes the stop character to Ctrl-E, which is decimal 5:

```
line 3  
  stop-character 5
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

```
flowcontrol  
start-character  
terminal stop-character
```

