Dial-on-Demand Routing Commands

This section lists DDR commands, explains the command syntax, and provides usage guidelines. For information about configuring DDR and configuration examples, refer to the "Configuring Dial-on-Demand Routing" chapter in the *Router Products Configuration Guide*.

backup delay

Use the **backup delay** interface configuration command to define how much time should elapse before a secondary line status changes after a primary line status has changed. Use the **no backup delay** command to return to the default, which means as soon as the primary fails, the secondary is immediately brought up without delay.

> **backup delay** {*enable-delay* | **never**} {*disable-delay* | **never**}
> **no backup delay** {*enable-delay* | **never**} {*disable-delay* | **never**}

Syntax Description

enable-delay	Number of seconds that elapse after the primary line goes down before the router activates the secondary line.
disable-delay	Number of seconds that elapse after the primary line goes up before the router deactivates the secondary line.
never	Prevents the secondary line from being activated or deactivated.

Default

0 seconds

Command Mode

Interface configuration

Usage Guidelines

For environments in which there are spurious signal disruptions that may appear as intermittent lost carrier signals, it is recommended that some delay be enabled before activating and deactivating a secondary line.

Example

The following example sets a 10-second delay on deactivating the secondary line (interface serial 0); however, the line is activated immediately:

```
interface serial 0
backup delay 0 10
```

backup interface

Use the **backup interface** interface configuration command to configure the serial interface as a secondary or dial backup line. Use the **no backup interface** command with the appropriate serial port designation to turn this feature off.

backup interface *interface number*
no backup interface *interface number*

Syntax Description

interface	The type of interface. This is always **serial**.
number	Serial port to be set as the secondary line.

Default

None

Command Mode

Interface configuration

Usage Guidelines

The interface you define with this command can only backup one interface.

Example

The following example sets serial 1 as the backup line:

```
interface serial 0
backup interface serial 1
```

backup load

Use the **backup load** interface configuration command to set traffic load threshold for dial backup service. Use the **no backup** command to remove this setting.

backup delay {*enable-threshold* | **never**} {*disable-load* | **never**}
no backup delay {*enable-threshold* | **never**} {*disable-load* | **never**}

Syntax Description

enable-threshold	Percentage of the primary line's available bandwidth.
disable-load	Percentage of the primary line's available bandwidth.
never	Sets the secondary line to never be activated due to traffic load.

Default

None

Command Mode

Interface configuration

Usage Guidelines

When the transmitted or received load on the primary line is greater than the value assigned to the *enable-threshold* argument, the secondary line is enabled.

The secondary line is disabled when one of the following conditions occur:

- The transmitted load on the primary line plus the transmitted load on the secondary line is less than the value entered for the *disable-load* argument.

- The received load on the primary line plus the received load on the secondary line is less than the value entered for the *disable-load* argument.

If the **never** keyword is used instead of an enable-threshold value, the secondary line is never activated because of a traffic load. If the **never** keyword is used instead of a *disable load* argument, the secondary line is never activated because of traffic load.

Example

The following example sets the traffic load threshold to 60 percent of the primary line serial 0. When that load is exceeded, the secondary line is activated, and will not be deactivated until the combined load is less than 5 percent of the primary bandwidth.

```
interface serial 0
backup load 60 5
```

chat-script

Use the **chat-script** global configuration command to create a script that will place a call over a modem. Use the **no** form of the command to disable the specified chat script.

> **chat-script** *script-name expect-send*
> **no chat-script** *script-name expect-send*

Syntax Description

script-name	Name of the chat script.
expect-send	Content of the chat script.

Default

No chat scripts are configured by default.

Command Mode

Global configuration

Usage Guidelines

Chat scripts are used in dial-on-demand routing to give commands to dial a modem and commands to log on to remote systems. The defined script will be used to place a call over a modem.

Some characteristics of chat scripts are as follows:

- Chat scripts are case sensitive.

- You can have any number of ABORT sequences active at once.

- When a chat script starts, the default timeout is 5 seconds. Changes to the timeout persist until the next time you change them in the script.

- A string within " " characters is treated as a single entity.

It is recommended that one chat script (a "modem" chat script) be written for placing a call and another chat script (a "system" or "login" chat script) be written to log onto remote systems, where required.

Suggested Chat Script Naming Conventions

A suggested chat script naming convention is as follows:

> **vendor-type-modulation**

In other words, the syntax of the **chat-script** command becomes the following:

> **chat-script** *vendor-type-modulation expect send*

For example, if you have a Telebit t3000 modem that uses V.32bis modulation, you would name your chat script as follows:

> **telebit-t3000-v32bis**

For example, the chat-script command could become the following:

```
CS# chat-script telebit-t3000-v32bis ABORT ERROR ABORT BUSY ABORT "NO ANSWER" "" "AT H"
OK "AT DT \T" DIALING \c TIMEOUT 30 CONNECT \c
```

For example, you could have script names like the following

- telebit-tb-b103

- telebit-tb-v21

- telebit-tb-v22

- codex-326x-b103

- codex-326x-v21

- codex-326x-v22

- codex-326x-v22bis

- codex-326x-v32

- codex-326x-v32bis

- usr-courier-v22bis

- usr-courier-hst

- usr-courier-v32

- usr-courier-v32bis

Adhering to this naming convention allows you to use partial chat script names with regular expressions to specify a range of chat scripts that can be used. This is particularly useful for dialer rotary groups and is explained further in the next section.

Escape Sequences

Chat scripts are in the form *expect send*, where the send string following the hyphen is executed if the preceding expect string fails. Each send string is followed by a return unless it ends with \c. ^*x* gets translated into the appropriate control character, and *x* gets translated into x if *x* is not one of the special sequences listed in Table 1-1.

See the book entitled *Managing uucp and Usenet* by Tim O'Reilly and Grace Todino for more information about chat scripts.

The escape sequences used in chat scripts are listed in the following table.

Table 1-1   Chat Script Escape Sequences

Escape Sequence	Description
""	Expect a null string.
EOT	Send an end-of-transmission character.
BREAK	Cause a BREAK. This is sometimes simulated using line speed changes and null characters. May not work on all systems.
\c	Suppress newline at the end of the send string.
\d	Delay for 2 seconds.
\K	Insert a BREAK.
\n	Send a newline or linefeed character.
\p	Pause for 1/4 second
\r	Send a return.
\s	Send a space character.
\t	Send a table character
\\	Send a backslash (\) character.
\T	Replaced by phone number.
\q	Reserved, not yet used

Expect-Send Pairs

Sample supported *expect-send* pairs are described in the following table.

Table 1-2   Sample Supported Expect-Send Pairs

Expect and Send Pair	Function
ABORT *string*	Starts scanning for the string in the input and if it is seen this indicates that the chat script has failed.
TIMEOUT *time*	Sets the time to wait for input, in seconds. The default is five seconds.

As an example of how expect-send pairs function, if the modem reports BUSY when the number is busy, you can indicate that you want the attempt stopped at this point by including ABORT BUSY in your chat script.

Alternate Handlers

ABORT sink instead of ABORT ERROR means that the system will abort when it sees sink instead of when it sees ERROR.

Missed Characters

After the connection is established and Return is pressed, a second Return is often required before the prompt appears.

You might include the following as part of your chat script:

```
ssword:-/r-ssword
```

This means that after the connection is established you want "ssword" to be displayed. If it is not displayed, send a return again after the timeout passes.

Example

The following example shows the **chat-script** command being used to create a chat script named t3000:

```
CS# chat-script t3000 ABORT ERROR ABORT BUSY ABORT "NO ANSWER" "" "AT H" OK "AT DT \T"
DIALING \c TIMEOUT 30 CONNECT \c
```

Related Commands

dialer map
modem chat-script

dialer enable-timeout

Use the **dialer enable-timeout** interface configuration command to set the length of time an interface stays down after a call has completed or failed, before it is available to dial again. Use the **no dialer enable-timeout** command to reset the enable timeout value to the default.

> **dialer enable-timeout** *number-of-seconds*
> **no dialer enable-timeout**

Syntax Description

number-of-seconds	Number of seconds that the router waits before the next call can occur on the specific interface. Acceptable values are positive, nonzero integers.

Default

15 seconds

Command Mode

Interface configuration

Usage Guidelines

This command applies to inbound and outbound calls.

If your phone lines are busy or down, you might want to enforce a certain period of time before the system repeats an attempt to make a connection with a remote site. Configuring this timeout can prevent outgoing lines and switching equipment from being needlessly loaded down.

Example

The following example specifies a waiting period of 30 seconds on interface async 1:

```
interface async 1
dialer enable-timeout 30
```

dialer fast-idle

Use the **dialer fast-idle** interface configuration command to specify the amount of time that a line for which there is contention will stay idle before the line is disconnected and the competing call is placed. Use the **no dialer fast-idle** command to reset the timeout period to the default.

dialer fast-idle *number-of-seconds*
no dialer fast-idle

Syntax Description

number-of-seconds	Idle time, in seconds, that must occur on an interface before the line is disconnected. Acceptable values are positive, nonzero integers.

Default
20 seconds

Command Mode
Interface configuration

Usage Guidelines
The fast idle timer is activated if there is contention for a line. In other words, if a line is busy, a packet for a different next hop address is received, and the busy line is required to send the competing packet, the dialer fast idle timer is activated.

If the line becomes idle for configured length of time, the current call is disconnected immediately and the new call is placed.

If the line has not yet been idle as long as the fast idle timer, the packet is dropped because there is no way to get through to the destination. After the packet is dropped, the fast idle timer remains active and the current call is disconnected as soon as it has been idle for as long as the fast idle timeout.

If, in the meanwhile, there is another packet transmitted to the currently connected destination, and it is classified as interesting, the fast idle timer will be restarted.

This command applies to inbound and outbound calls.

Combining this command with the **dialer idle-timeout** command allows you to configure lines to stay up for a longer period of time when there is not contention, but to be reused more quickly when there are not enough lines for the current demand.

Example
The following example specifies a fast idle timeout of 35 seconds on interface async 1:

```
interface async 1
dialer fast-idle 35
```

Related Commands
dialer idle-timeout
dialer map

dialer-group

Use the **dialer-group** interface configuration command to control access. You must specify the number of a dialer access group to which a specific interface is assigned. Use the **no dialer-group** command to remove an interface from the specified dialer access group.

dialer-group *group-number*
no dialer-group

Syntax Description

group-number	Number of the dialer access group to which the specific interface belongs. This access group is defined using the **dialer-list** command. Acceptable values are nonzero, positive integers between 1 and 10.

Default

None

Command Mode

Interface configuration

Usage Guidelines

An interface can only be associated with a single dialer access group; multiple **dialer-group** assignment is not allowed. A second dialer access group assignment will override the first. A dialer access group is defined with the **dialer-group** command. The **dialer-list** command associates an access list with a dialer access group.

Example

The following example specifies dialer access group number 1.

If there is a **dialer-list** command associated with the dialer group 1, the destination address of the packet is evaluated against the access list specified in the associated **dialer-list** command. If it passes, a call is initiated (if no connection has already been established) or the idle timer is reset (if a call is currently connected).

```
interface async 1
dialer-group 1
```

Related Command

dialer-list

dialer idle-timeout

Use the **dialer idle-timeout** interface configuration command to specify the idle time before the line is disconnected. Use the **no dialer idle-timeout** command to reset the idle timeout to the default.

> **dialer idle-timeout** *number-of-seconds*
> **no dialer idle-timeout**

Syntax Description

number-of-seconds	Idle time, in seconds, that must occur on an interface before the line is disconnected. Acceptable values are positive, nonzero integers.

Default

120 seconds

Command Mode

Interface configuration

Usage Guidelines

This command is used on lines for which there is no contention. When contention occurs, the dialer fast-idle command is activated. For example, when a busy line is requested to send another packet to a different destination than it is currently connected to, line contention occurs and the **dialer fast-idle** command is activated.

This command applies to inbound and outbound calls. For example, if a receiving system needs to make outgoing calls, you might configure it with a short idle timeout.

Example

The following example specifies of an idle timeout of 3 minutes (180 seconds) on interface async 1:

```
interface async 1
dialer idle-timeout 180
```

Related Command

dialer fast-idle

dialer in-band

Use the **dialer in-band** interface configuration command to specify that DDR is to be supported. The **dialer in-band** command specifies that chat scripts will be used on the auxiliary port and V.25bis will be used on synchronous interfaces. Use the **no dialer in-band** command to disable dial-on-demand routing for the interface.

> **dialer in-band** [**no-parity** | **odd-parity**]
> **no dialer in-band**

Syntax Description

no-parity	No parity is applied to the dialer string that is sent out to the modem on synchronous interfaces.
odd-parity	Dialed number will have odd parity (7-bit ASCII characters with the eighth bit the parity bit) on synchronous interfaces.

Default

Disabled. By default, no parity is applied to the dialer string.

Command Mode

Interface configuration

Usage Guidelines

The parity keywords do not apply to asynchronous interfaces.

The parity setting applies to the dialer string that is sent out to the modem. If you do not specify a parity, or if you specify no parity, no parity is applied to the output number. If odd parity is configured, the dialed number will have odd parity (7-bit ASCII characters with the eighth bit, the parity bit.)

If an interface is only accepts calls and does not place calls, the **dialer in-band** interface configuration command is the only command needed to configure it. If an interface is configured in this manner, with no dialer rotary groups, the idle timer never disconnects the line. It is up to the remote end (the end that placed the call) to disconnect the line based on idle time.

Example

The following example specifies DDR for async 1:

```
interface async 1
dialer in-band
```

Related Commands

dialer map
dialer string

dialer-list list

Use the **dialer-list list** global configuration command to group access lists. This command applies access lists to dialer access groups to control automatic dialing using DDR with standard IP access lists. Use the **no dialer-list list** global configuration command to disable automatic dialing.

> **dialer-list** *dialer-group* **list** *list-number*
> **no dialer-list** *dialer-group* **list** *list-number*

Syntax Description

dialer-group   Specifies the number of a dialer access group identified in any **dialer-group** interface configuration command.

list-number   Specifies the access list number specified in any IP or Novell IPX access lists including Novell IPX extended, Service Access Point (SAP) access lists and bridging type. See Table 1-3 for the supported access list types and numbers.

Table 1-3   Supported Access List Types and Numbers

Access List Type	Access List Number Range
Standard IP	1-99
Extended IP	100-199
Transparent Bridging	200-299
Standard Novell IPX	800-899
Extended Novell IPX	900-999

Default

None

Command Mode

Global configuration

Usage Guidelines

This command applies access lists to dialer access groups defined with the **dialer-group** command. See the *Router Products Configuration Guide* for more information about configuring IP access lists.

Example

In the following example, dialing occurs when an interesting packet (one that matches access list specifications) needs to be output on an interface. Using the standard access list method, packets can be classified as interesting or uninteresting. To specify that IGRP TCP/IP routing protocol updates are not interesting (relative to DDR automatic dialing), the following access list would be defined:

```
access-list 101 deny igrp 0.0.0.0 255.255.255.255 255.255.255.255 0.0.0.0
```

To permit all other IP traffic, the preceding would be modified as follows:

```
access-list 101 permit ip 0.0.0.0 255.255.255.255 0.0.0.0 255.255.255.255
```

Then the following command would be used to place list 101 into dialer access group 1:

```
dialer-list 1 list 101
```

Related Command
dialer-group

dialer-list protocol

Use the **dialer-list protocol** global configuration command to control automatic dialing by a protocol name. Use the **no dialer-list** commands to disable automatic dialing.

dialer-list *dialer-group* **protocol** *protocol-name* {**permit** | **deny**}
no dialer-list *dialer-group* **protocol** *protocol-name* {**permit** | **deny**}

Syntax Description

dialer-group	Number of a dialer access group identified in any **dialer access group** interface configuration command.
protocol-name	One of the supported protocols as listed in Table 1-4.

Table 1-4   Supported Protocols for DDR Access Lists

Keyword	Protocol
ip	IP
ipx	Novell IPX

Default

None

Command Mode

Global configuration

Usage Guidelines

Using the **dialer-list protocol** command provides a coarse method of access control by permitting or denying an entire protocol. For more refined access control, use the **dialer-list list** command to specify an access list.

Related Commands

dialer-group
dialer-list list

dialer load-threshold

To configure bandwidth on demand by setting the maximum load before the dialer places another call to a destination, use the **dialer load-threshold** interface configuration command. To disable the setting, use the **no** form of the command.

dialer load-threshold *load*
no dialer load-threshold

Syntax Description

load	Interface load beyond which the dialer will initiate another call to the destination. This argument is a number between 1 and 255.

Default

No maximum load is predefined.

Command Mode

Interface configuration

Usage Guidelines

This command applies to dialer rotary groups only.

If a packet is transmitted on a dialer interface, there is a call established, and the transmit load on the interface exceeds the specified load threshold, the dialer will initiate another call to the destination. The dialer will make additional calls as necessary to expand bandwidth but will never interrupt an existing call to another destination.

The argument *load* is the calculated weighted average load value for the interface; 1 is unloaded, 255 is fully loaded. The load is calculated by the system dynamically, based on bandwidth. You must set the bandwidth for an interface in kilobits per second, using the **bandwidth** command.

The load calculation determines how much of the total bandwidth you are using, where 255 means that you are using one hundred percent of the bandwidth.

See the interface configuration chapter for a full description of the **bandwidth** command.

Example

In the following example, if the load to a particular destination on an interface in dialer rotary group 5 exceeds interface load 200, the dialer will initiate another call to the destination.

```
interface dialer 5
dialer load-threshold 200
```

dialer map modem-script system-script

Use the **dialer map modem-script system-script** interface configuration command to place a call to either of the following:

- A single site on an asynchronous line for which a modem script has not been assigned or a system script must be specified

- Multiple sites on a single line, multiple lines or a dialer rotary group

    dialer map *protocol next-hop-address* [**modem-script** *modem-regexp*] [**system-script**
         system-regexp] *dial-string*[:*isdn-subaddress*]
    no dialer map *protocol next-hop-address* [**modem-script** *modem-regexp*] [**system-script**
         system-regexp] *dial-string*[:*isdn-subaddress*]

Syntax Description

protocol	Name of the protocol.
next-hop-address	Protocol address used to match against addresses to which packets are destined.
modem-script	(Optional.) Modem script to be used for the connection (for asynchronous interfaces).
modem-regexp	(Optional.) Regular expression to which a modem script will be matched for asynchronous interfaces).
system-script	(Optional.) System script to be used for the connection (for asynchronous interfaces).
system-regexp	(Optional.) Regular expression to which a system script will be matched for asynchronous interfaces).
dial-string	Telephone number sent to the dialing device when it sees packets with the specified *next-hop-address* that matches the access lists defined.
:isdn-subaddress	(Optional.) Subaddress number used for ISDN multipoint connections.

Default

None

Command Mode

Interface configuration

Usage Guidelines

Specify chat scripts for a physical interface that is not part of a dialer rotary group if no chat script is specified for the line or an additional (system) chat script is required to log on to the remote system.

Configure a **dialer map** command for each remote destination for that interface.

You do not need to specify a system script under the following conditions:

- The modem script can be used to dial and log on to the remote system.

- You are calling a system that does not require a login script; that is, a system that answers and immediately goes into protocol mode.

If you adhered to the chat script naming convention described earlier in this chapter, use the form [**modem-script** *modulation-type*] in the **dialer map** command, as in as in ".*-v32bis." This allows you to specify the modulation type that is best for the system you are calling, and allows the modem type for the line to be specified by the **modem chat-script** command.

The expression "." is a wildcard that matches any character, and the expression "*" indicates that the preceding character can be duplicated multiple times. For more information about regular expressions, see Appendix C, "Regular Expressions."

If there is a **modem-script** specified in the **dialer map** interface configuration command and a modem script specified in the **modem chat-script** line configuration command, the first chat script that matches both will be used. If no script matches both, an error message is logged and the connection is not established. If there is no modem chat script specified for the line, the first chat script (that is, the one specified using the **chat-script** global configuration command) that matches the modem script regular expression will be used. If there is a system script specified in the **dialer map** interface configuration command, the first chat script to match the regular expression will be used.

The **modem-script** and **system-script** keywords and corresponding arguments are optional. They are ignored on synchronous interfaces.

If you have named your chat script according to the type of modem and modulation (for example, codex-v32 or telebit v32), your regular expression could be codex-.* in the **modem chat-script** line configuration command, and *-v32bis in the modem script specified in the **dialer map** command for a system that you wish to connect to using v32bis modulation.

The modem lines (specified by the argument *regexp* in the **modem chat-script** line configuration command) would be set to one of the following regular expressions to match patterns, depending on what kind of modem you have:

- codex-.*

- telebit-.*

- usr-.*

Example
The following example shows a dialing chat script and a login chat script. The
dialer in-band command enables DDR on asynchronous interface 10 and the **dialer map** command looks for the specified dialing and the login scripts, and then uses those scripts to dial 96837890.

```
chat-script dial ABORT ERROR "" "AT Z" OK "ATDT \T" TIMEOUT 30 CONNECT \c
chat-script login ABORT invalid TIMEOUT 15 name: billw word: wewpass ">"
                "slip default"
interface async 10
dialer in-band
dialer map ip 10.55.0.1 modem-script dial system-script login 96837890
```

Related Commands

chat-script
modem chat-script

dialer map modem-script system-script name

Use the **dialer map modem-script system-script name** interface configuration command to configure a serial interface to call multiple sites and to authenticate calls from multiple sites. Use the **no** form of this command to delete a particular dialer map entry.

dialer map *protocol next-hop-address* [**modem-script** *modem-regexp*] [**system-script** *system-regexp*] **name** *hostname dial-string*[:*isdn-subaddress*]

no dialer map *protocol next-hop-address* [**modem-script** *modem-regexp*] [**system-script** *system-regexp*] **name** *hostname dial-string*[:*isdn-subaddress*]

Syntax Description

protocol	Name of the protocol.
next-hop-address	Protocol address used to match against addresses to which packets are destined.
modem-script	(Optional.) Modem script to be used for the connection (for asynchronous interfaces).
modem-regexp	(Optional.) Regular expression to which a modem script will be matched for asynchronous interfaces).
system-script	(Optional.) System script to be used for the connection (for asynchronous interfaces).
system-regexp	(Optional.) Regular expression to which a system script will be matched for asynchronous interfaces).
name	(Optional.) Remote system with which the local router communicates.
hostname	(Optional.) Name of the remote device (usually the host name).
dial-string	Telephone number sent to the DCE dialing device when it sees packets with the specified *next-hop-address* that matches the access lists defined.
:isdn-subaddress	(Optional.) Subaddress number used for ISDN multipoint connections.

Default

None

Command Mode

Interface configuration

Usage Guidelines

With an interface configured for Challenge Handshake Authentication Protocol (CHAP) and the **name** *hostname* keyword and argument pair, the local device will authenticate the remote site using CHAP, which will transmit the remote site's host name to the central site. The central site will then use this name to authenticate the caller, and will use the next hop address to transmit packets to the remote site. Because there is no dialer string specified, the central site cannot call the remote router.

Specify chat scripts for a physical interface that is not part of a dialer rotary group if no chat script is specified for the line and/or an additional (system) chat script is required to log on to the remote system.

Configure a **dialer map** command for each remote destination for that interface.

You do not need to specify a system script under the following conditions:

- The modem script can be used to dial and log on to the remote system.

- You are calling a system that does not require a login script; that is, a system that answers and immediately goes into protocol mode.

If you adhered to the chat script naming convention described earlier in this chapter, use the form [**modem-script** *modulation-type*] in the **dialer map** command, as in as in ".*-v32bis." This allows you to specify the modulation type that is best for the system you are calling, and allows the modem type for the line to be specified by the **modem chat-script** command.

The expression "." is a wildcard that matches any character, and the expression "*" indicates that the preceding character can be duplicated multiple times. For more information about regular expressions, see Appendix C, "Regular Expressions."

If there is a **modem-script** specified in the **dialer map** interface configuration command and a modem script specified in the **modem chat-script** line configuration command, the first chat script that matches both will be used. If no script matches both, an error message is logged and the connection is not established. If there is no modem chat script specified for the line, the first chat script (the one specified in the **chat-script** global configuration command) that matches the modem script regular expression will be used. If there is a system script specified in the **dialer map** interface configuration command, the first chat script to match the regular expression will be used.

The **modem-script** and **system-script** keywords and arguments are optional. They are ignored on synchronous interfaces.

If you have named your chat script according to the type of modem and modulation (for example, codex-v32 or telebit v32), your regular expression could be codex-.* in the **modem chat-script** line configuration command, and *-v32bis in the **modem-script** option to the **dialer map** command for a system that you wish to connect to using v32bis modulation.

The modem lines (the argument *regexp* in the **modem chat-script** command) would be set to one of the following regular expressions to match patterns, depending on what kind of modem you have:

- codex-.*

- telebit-.*

- usr-.*

Example

In the following example, the remote site is calling the central site, and the central site is calling the remote site. The central router can use the name, ZZZ, to authenticate the remote router when they connect and also can use the dialer string 14155553434 to call the remote router if it is not currently connected.

```
interface async 1
dialer map ip 131.108.2.5 name ZZZ 14155553434
```

Related Commands

chat-script
dialer map
dialer map modem
modem chat-script
ppp authentication chap
username

dialer map name

Use the **dialer map name** interface configuration command to configure a dialer rotary group to receive and take advantage of caller identification using CHAP. Use the **no** form of this command to delete a particular dialer map entry.

dialer map *protocol next-hop-address* **name** *hostname*
no dialer map *protocol next-hop-address* **name** *hostname*

Syntax Description

protocol	Name of the protocol.
next-hop-address	Protocol address used to match against addresses to which packets are destined.
name	Remote system with which the local router communicates.
hostname	Name of the remote device (usually the host name).

Default

None

Command Mode

Interface configuration

Usage Guidelines

This form of the **dialer map** command is used in configurations in which remote sites are calling a central site, but the central site is not calling the remote site. With this command, the local device will authenticate the remote site using CHAP, which will transmit the remote site's host name to the central site. The central site will then use this name to authenticate the caller, and will use the next hop address to transmit packets to the remote site. Because there is no dialer string specified, the central site cannot call the remote router.

Example

In the following example, a remote site is calling a central site, but the central site is not calling the remote site. The local device will authenticate the site that is calling in using CHAP. CHAP will cause the remote site's name, YYY, to be transmitted to the site it is calling. The central site will then use this name to authenticate the remote site.

```
interface async 1
encapsulation ppp
ppp authentication chap
dialer map ip 131.108.2.5 name YYY
```

Related Commands

dialer map
dialer map modem
ppp authentication chap
username

dialer rotary-group

Use the **dialer rotary-group** interface configuration command to include an interface in a dialer rotary group.

> **dialer rotary-group** *number*

Syntax Description

number	Number of the dialer interface in whose rotary group you want this interface included. An integer that you select that indicates the dialer rotary group; defined by the **interface dialer** command. A number from 0 to 255.

Default

None

Command Mode

Interface configuration

Example

The following example places async interfaces1 and 2 into dialer rotary group 1, defined by the **interface dialer 1** command:

```
hostname central-site
! PPP encapsulation is enabled for interface dialer 1.
interface dialer 1
encapsulation ppp
dialer in-band
ip address 131.108.2.1 255.255.255.0
ip address 131.126.4.1 255.255.255.0 secondary

! The first dialer map command allows the central site and remote site YYY
! and to call each other and allows the central site to authenticate site YYY
! when it calls in. The second dialer map command, with no! dialer string,
! allows the central site to authenticate remote site ZZZ when it calls in, but
! the central site cannot call remote site ZZZ (no phone number).
dialer map ip 131.108.2.5 name YYY 14155553434
dialer map ip 131.126.4.5 name ZZZ

! The DTR pulse signals for three seconds on the interfaces in dialer
! group 1. This holds the DTR low so the modem can recognize that DTR has been
! dropped.
pulse-time 3

! Interfaces async 1 and async 2 are placed in dialer rotary group 1.
! All of the interface configuration commands (the encapsulation and dialer
! map commands shown earlier in this example) applied to interface
! dialer 1 apply to the physical interfaces assigned to the dialer group.
interface async 1
dialer rotary-group 1
interface async 2
dialer rotary-group 1
```

Related Command

interface dialer

dialer string

Use the **dialer string** interface configuration command to specify the string (telephone number) to be called for interfaces calling a single site. Use the **no dialer string** command to delete the dialer string specified for the interface.

> **dialer string** *dial-string*[:*isdn-subaddress*]
> **no dialer string**

Syntax Description

dial-string	String of characters to be sent to a DCE.
:*isdn-subaddress*	(Optional.) Subaddress number used for ISDN multipoint connections.

Default

None

Command Mode

Interface configuration

Usage Guidelines

To use this command on an asynchronous interface, a modem chat script must be defined for the associated line, by using the **modem chat-script** command. A script must be used to implement dialing.

Dialers configured as **in-band** pass the string to the external dialing device. Specify one **dialer string** command per interface.

To specify multiple strings, use the **dialer map** command. In general, you include a **dialer string** or **dialer map** command if you intend to use a specific interface to initiate a DDR call.

Note If a **dialer string** command is specified without a **dialer-group** command with access lists defined, dialing never will be initiated. If debug dialer is enabled, an error message will be displayed indicating that dialing never will occur.

The string of characters specified for the *dial-string* argument is the default number used under the following conditions:

- A **dialer map** command is not included in the interface configuration.
- The next-hop-address specified in a packet is not included in any of the **dialer map** interface configuration commands recorded—assuming that the destination address passes any access lists specified for DDR with the **dialer-list** command.

CCITT V.25bis Options

On synchronous interfaces, depending on the type of modem you are using, CCITT V.25bis options might be supported as *dial-string* parameters of the **dialer string** command. Supported options are listed in Table 1-5. The functions of the parameters are nation specific, and they may have different implementations in your country. These options apply only if you have enabled DDR with the **dialer in-band** command. Refer to the operation manual for your modem for a list of supported options.

Table 1-5   CCITT V.25bis Options

Option	Description
:	Wait tone.
<	Pause.
	Usage and duration of this parameter vary by country.
=	Separator 3.
	For national use.
>	Separator 4
	For national use.
P	Dialing to be continued in pulse mode.
	Optionally accepted parameter.
T	Tone (Dialing to be continued in Dual Tone Multifrequency, DTMF, mode).
	Optionally accepted parameter.
&	Flash. (The flash duration varies by country.)
	Optionally accepted parameter.

Example

The following example specifies a DDR telephone number to be tone dialed on interface async 1 using the **dialer string** command:

```
interface async 1
dialer string T14085553434
```

Related Commands

dialer-group
dialer in-band
dialer map
modem chat-script

dialer wait-for-carrier-time

Use the **dialer wait-for-carrier-time** interface configuration command to specify how long to wait for a carrier. On asynchronous interfaces this command sets the total time allowed for the chat script to run.Use the **no dialer wait-for-carrier-time** command to reset the carrier wait time value to the default.

dialer wait-for-carrier-time *number-of-seconds*
no dialer wait-for-carrier-time

Syntax Description

number-of-seconds   Number of seconds that the interface waits for the carrier to come up when a call is placed. Acceptable values are positive, nonzero integers.

Default

30 seconds

Command Mode

Interface configuration

Usage Guidelines

If a carrier signal is not detected in this amount of time, the interface is disabled until the enable timeout occurs (configured with the **dialer enable-timeout** command).

Example

The following example specifies a carrier wait time of 45 seconds on interface async 1:

```
interface async 1
dialer wait-for-carrier-timeout 45
```

Related Command

dialer enable-timeout

encapsulation ppp

Use the **encapsulation ppp** interface configuration command to configure Point-to-Point Protocol (PPP) encapsulation.

> **encapsulation ppp**

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

The Point-to-Point Protocol (PPP), described in RFCs 1331 and 1332, is designed to encapsulate Internet Protocol (IP) datagrams and other network layer protocol information over point-to-point links.

The current implementation of PPP supports no configuration options. The software sends no options, and any proposed options are rejected.

Of the possible upper-layer protocols, only IP is supported at this time. Thus, the only upper-level protocol that can be sent or received over a point-to-point link using PPP encapsulation is IP. Refer to RFC 1134 for definitions of the codes and protocol states.

PPP echo requests also can be used as keepalives, to minimize disruptions to the end users of your network. The **no keepalive** command can be used to disable echo requests.

Example

The following example enables PPP encapsulation on interface async 1:

```
interface async 1
encapsulation ppp
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

keepalive†
ppp authentication chap

interface dialer

Use the **interface dialer** global configuration command to define a dialer rotary group.

interface dialer *number*

Syntax Description

number	Number of the dialer rotary group. It can be number in the range 0 through 255.

Default

None

Command Mode

Global configuration

Usage Guidelines

Dialer rotary groups allow you to apply a single interface configuration to a set of physical interfaces. This allows a group of interfaces to be used as a pool of interfaces for calling many destinations.

Once the interface configuration is propagated to a set of interfaces, those interfaces can be used to place calls using the standard DDR criteria. When multiple destinations are configured, any of these interfaces can be used for outgoing calls.

Dialer rotary groups are useful in environments that require multiple calling destinations. Only the rotary group needs to be configured with all of the **dialer map** commands. The only configuration required for the interfaces is the **dialer rotary-group** command indicating that each interface is part of a dialer rotary group.

Although a dialer rotary group is configured as an interface, it is not a physical interface. Instead it represents a group of interfaces. Interface configuration commands entered after the **interface dialer** command will be applied to all physical interfaces assigned to specified rotary groups. Individual interfaces in a dialer rotary group do not have individual addresses. The dialer interface has an address, and that address is used by all interfaces in the dialer rotary group.

Example

The following example identifies interface dialer 1 as the dialer rotary group leader. Interface dialer 1 is not a physical interface, but represents a group of interfaces. The interface configuration commands that follow apply to all interfaces included in this group.

```
interface dialer 1
encapsulation ppp
authentication chap
dialer in-band
ip address 1.2.3.4
dialer map ip 1.2.2.5 name YYY 14155553434
dialer map ip 1.3.2.6 name ZZZ
```

modem chat-script

Use the **modem chat-script** command for asynchronous lines to set a regular expression for a script on a modem line.

    modem chat-script *regexp*

Syntax Description

regexp   Regular expression to be used to select a chat script. The chat script name will be matched to *regexp*.

Default

None

Command Mode

Line configuration

Usage Guidelines

Scripts are used to give commands to dial modems and commands to log onto remote systems. The regular expression is used to specify the name of the modem script that is to be executed. The first script that matches the argument *regexp* in this command and the dialer map command will be used. For more information about regular expressions, see Appendix C, "Regular Expressions."

If you adhered to the recommended naming convention for chat scripts, the modem lines (the argument *regexp* in the **modem chat-script** command) would be set to one of the following regular expressions to match patterns, depending on what kind of modem you have:

- codex-.*

- telebit-.*

- usr-.*

In the **dialer map** command, you could specify the modulation but leave the type of modem unspecified, as in ".*-v32bis."

Example

The following example shows line chat scripts being specified for lines connected to Telebit and U.S. Robotics modems:

```
! Some lines have telebit modems
line 1 6
modem chat-script telebit.*
! Some lines have US robotics modems
line 7 12
modem chat-script usr.*
```

Related Commands
chat-script
modem-script
system-script

ppp authentication chap

Use the **ppp authentication chap** interface configuration command to enable Challenge Handshake Authentication Protocol (CHAP) on a serial interface. Use the **no ppp authentication chap** command to disable this encapsulation.

ppp authentication chap
no ppp authentication chap

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

Once you have enabled CHAP, the local router requires authentication from remote devices. If the remote device does not support CHAP, no traffic will be passed to that device.

Example

The following example enables CHAP on interface serial 4:

```
interface async 4
ppp authentication chap
```

Related Command

encapsulation ppp

show dialer

Use th**e show dialer** EXEC command to obtain a general diagnostic display for serial interfaces configured for DDR.

show dialer [**interface** *interface unit*]

Syntax Description

interface   (Optional.) Information for the interface specified by the arguments *interface* and *unit* is to be displayed.

interface unit   (Optional.) Interface and unit identifiers.

Command Mode

EXEC

Sample Display

The following is sample output from the **show dialer** command.

```
speedy# show dialer int async 1
Async1 - dialer type = IN-BAND NO-PARITY
Idle timer (900 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Time until disconnect 838 secs
Current call connected 0:02:16
Connected to 8986

 Dial String     Successes    Failures    Last called   Last status
 8986                   0           0      never                       Default
 8986                   8           3      0:02:16       Successful
 speedy#
```

Table 1-6 describes significant fields shown in the display.

Table 1-6   Show Dialer Field Descriptions

Field	Description
Async 1	Name of an asynchronous interface.
dialer type = IN-BAND	Indicates that DDR is enabled.
Idle timer (600 secs)	Idle timeout specification (in seconds).
Fast idle timer (20 secs)	Fast idle timer specification (in seconds).
Wait for carrier (30 secs)	Wait for carrier timer specification (in seconds).
Re-enable (15 secs)	Enable timeout specification (in seconds).
Time until disconnected	Time until line is configured to disconnect.
Current call connected	Time at which the current call was connected.
Connected to	Dial string to which line is currently connected.
Dial string	Dial strings of logged calls (telephone numbers).
Successes	Successful connections (even if no data is passed).
Failures	Failed connections; call not successfully completed.
Last called	Time that last call occurred to specific dial string.
Last status	Status of last call to specific dial string (successful or failed).
Default	If the DDR facility is using the dial string specified with the **dialer string** command, the word Default is appended to the Last status entry.

If an interface is connected to a destination, a display is provided that indicates the idle time before the line is disconnected (decrements each second). Then the duration of the current connection is shown. The following shows an example of this display; it would appear after the third line in the **show dialer** display.

```
Time until disconnect 596 secs
Current call connected 0:00:25
```

After a call disconnects, the system displays the time remaining before being available to dial again. The following is an example of this display; it would appear after the third line in the **show dialer** display:

```
Time until interface enabled 8 secs
```

If the **show dialer** EXEC command is issued for an interface on which DDR is not enabled, the system displays an error message. The following is an example error message:

```
Async 1 - Dialing not enabled on this interface.
```

If an interface is configured for DDR, the **show interfaces** command now displays the following message:

```
Async1 is up, line protocol is up (spoofing)
Hardware is Async Serial
```

The *spoofing* indicates that the line really is not up, but the dialer is forcing the line to masquerade as "up" so that upper level protocols will continue to operate as expected.

username

Use the **username** command to specify the password to be used in Challenge Handshake Authentication Protocol (CHAP) caller identification.

username *name* **password** *secret*

Syntax Description

name	Host name, server name, user ID, or command name.
password	Possibly an encrypted password for this username.
secret	For CHAP authentication: specifies the secret for the local router or the remote device. The secret is encrypted when it is stored on the local router. This prevents the secret from being stolen. The secret can consist of any string of up to 11 printable ASCII characters. There is no limit to the number of username/password combinations that can be specified, allowing any number of remote devices to be authenticated.

Default

None

Command Mode

Global configuration

Usage Guidelines

Add a **name** entry for each remote system that the local router requires authentication from.

The **username** command is required as part of the configuration for (CHAP). For each remote system that the local router communicates with from which it requires authentication, you add a **username** entry.

Note   To enable the local router to respond to remote CHAP challenges, one **username** *name* entry must be the same as the **hostname** *name* entry that has already been assigned to your router.

If there is no secret specified and **debug serial-interface** is enabled, an error is displayed when a link is established and the CHAP challenge is not implemented. Debugging information on CHAP is available using the **debug serial-interface** and **debug serial-packet** commands. See the *Debug Command Reference* publication for more information.

Example

The following example configuration enables CHAP on interface serial 0. It also defines a password for the local server, Adam, and a remote server, Eve.

```
hostname Adam
interface serial 0
encapsulation ppp
ppp authentication chap
username Eve password theirsystem
```

When you look at your configuration file, the passwords will be encrypted and the display will look similar to the following:

```
hostname Adam
interface serial 0
encapsulation ppp
ppp authentication chap
username Eve password 7 121F0A18
```

Related Command

hostname