

Dial-on-Demand Routing Commands

This chapter lists dial backup and dial-on-demand routing (DDR) commands, explains command syntax, and provides usage guidelines.

Dial backup provides protection against WAN downtime by allowing you to configure a backup serial line circuit-switched connection.

DDR provides network connections across the Public Switched Telephone Network (PSTN). Traditionally, networks have been interconnected using dedicated lines for WAN connections. With DDR, you can use modems to establish low-volume, periodic network connections over public circuit-switched networks.

For information about configuring DDR and configuration examples, refer to the “Configuring Dial-on-Demand Routing” chapter in the *Access and Communication Servers 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

<i>enable-delay</i>	Number of seconds that elapse after the primary line goes down before the communication server activates the secondary line.
<i>disable-delay</i>	Number of seconds that elapse after the primary line goes up before the communication server 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 might 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 (serial interface 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 *type number*
no backup interface *type number*

Syntax Description

type Interface type. This is always **serial**.
number Interface number.

Default
Disabled

Command Mode
Interface configuration

Usage Guidelines

The interface you define with this command can only back up one interface.

Example

The following example sets serial interface 1 as the backup line:

```
interface async 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 load {enable-threshold | never} {disable-load | never}
no backup load {enable-threshold | never} {disable-load | never}
```

Syntax Description

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

Default

No traffic load threshold is set for dial backup.

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 for serial interface 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 this command to disable the specified chat script.

```
chat-script script-name expect-send...
no chat-script script-name
```

Syntax Description

<i>script-name</i>	Name of the chat script
<i>expect-send...</i>	Content of the chat script

Default

No chat scripts are configured.

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 onto 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 quotation marks (“ ”) 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:

```
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 7-1.

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 Table 7-1.

Table 7-1 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 two seconds.
\K	Insert a BREAK.

Escape Sequence	Description
\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 tab 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 Table 7-2.

Table 7-2 Sample Supported Expect-Send Pairs

Expect and Send Pair	Function
ABORT <i>string</i>	Starts scanning for the string in the input and if it is seen this indicates that the chat script has failed.
TIMEOUT <i>time</i>	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 entered, a second RETURN is often required before the prompt appears.

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

```
ssword:~/r-sswrod
```

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 period.

Example

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

```
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
script dialer

dialer dtr

To enable DDR on an interface and specify that the serial line is connected by non-V.25bis modems using EIA signaling only (the data terminal ready [DTR] signal), use the **dialer dtr** interface configuration command. To disable dial-on-demand routing for the interface, use the **no** form of this command.

dialer dtr
no dialer dtr

Syntax Description

This command has no keywords or arguments.

Default

This command has no default values.

Command Mode

Interface configuration

Usage Guidelines

A serial interface configured for DTR dialing can place calls only; it cannot accept them.

When an interface is configured for DTR dialing, the remote interface can be configured for in-band dialing or not configured for anything but encapsulation, depending on the desired behavior. If the remote interface is expected to terminate a call when no traffic is transmitted for some time, it must be configured for in-band dialing (along with access lists and a dummy dialer string). If the remote interface is purely passive, no configuration is necessary.

Hunt group leaders cannot be configured for DTR dialing.

The **dialer map** and **dialer string** commands have no effect on DTR dialers.

Example

The following example enables DDR and specifies DTR dialing on an interface:

```
dialer dtr
```

Related Commands

dialer in-band
dialer map
dialer string

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 *seconds*
no dialer enable-timeout

Syntax Description

seconds Number of seconds that the communication server 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 async interface 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 *seconds*
no dialer fast-idle

Syntax Description

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 the 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 async interface 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

No dialer access group is specified.

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 *seconds*
no dialer idle-timeout

Syntax Description

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 async interface 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 asynchronous interfaces 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 (Optional) No parity is applied to the dialer string that is sent out to the modem on synchronous interfaces.

odd-parity (Optional) Dialed number will have odd parity (7-bit ASCII characters with the eighth bit the parity bit) on synchronous interfaces.

Default

Disabled. 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 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 interface 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** *access-list-number*
no dialer-list *dialer-group* **list** *access-list-number*

Syntax Description

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

access-list-number Specifies the access list number specified in any IP or Novell IPX access lists, including Novell IPX extended and service access point (SAP) access lists. See Table 7-3 for the supported access list types and numbers.

Table 7-3 Supported Access List Types and Numbers

Access List Type	Access List Number Range
Standard IP	1-99
Extended IP	100-199
Standard Novell IPX	800-899
Extended Novell IPX	900-999
Novell SAP	1000-1099

Default

Disabled

Command Mode

Global configuration

Usage Guidelines

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

Examples

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

To define a DDR dialer list to control dialing by protocol or by a combination of protocol and access list, use the **dialer-list protocol** global configuration command. To delete a dialer list, use the **no** form of this command.

```
dialer-list dialer-group protocol protocol-name {permit | deny | list access-list-number}
no dialer-list dialer-group [protocol protocol-name [list access-list-number]]
```

Syntax Description

<i>dialer-group</i>	Number of a dialer access group identified in any dialer-group interface configuration command.
<i>protocol-name</i>	One of the following protocol keywords: appletalk , ip , or ipx .
permit	(Optional) Permits access to an entire protocol.
deny	(Optional) Denies access to an entire protocol.
list	Specifies that an access list will be used for defining a granularity finer than an entire protocol.
<i>access-list-number</i>	Access list number. Access list numbers include any IP or Novell IPX standard or extended access lists, Novell IPX extended and Service Access Point (SAP) access lists. See the “Dialer-List Supported Access List Types and Numbers” table in the “Usage Guidelines” section for the supported access list types and numbers.

Default

No dialer lists are defined.

Command Mode

Global configuration

Usage Guidelines

The various **no** forms of this command have the following effects:

- The **no dialer-list 1** command deletes all lists configured with list 1, regardless of the keyword previously used (**permit**, **deny**, **protocol**, or **list**).
- The **no dialer-list 1 protocol protocol-name** command deletes all lists configured with list 1 and protocol *protocol-name*.
- The **no dialer-list 1 protocol protocol-name list access-list-number** command deletes the specified list.

The **dialer-list protocol** form of this command permits or denies access to an entire protocol. The **dialer-list protocol list** form of this command provides a finer permission granularity and also supports protocols that were not previously supported.

The **dialer-list protocol list** form of this command applies protocol access lists to dialer access groups to control dialing using DDR. The dialer access groups are defined with the **dialer-group** command. See the *Access and Communication Servers Configuration Guide* for more information about configuring access lists for protocols.

Although the **dialer-list list** command is still supported for IP, IPX, and AppleTalk, the new **dialer-list protocol list** form of this command should be used for all protocols.

Table 7-4 lists the access list types and numbers that the **dialer-list protocol list** command supports.

Table 7-4 Dialer-List Supported Access List Types and Numbers

Access List Type	Access List Number Range (decimal)
AppleTalk	600-699
IP (standard)	1-99
IP (extended)	100-199
Novell IPX (standard)	800-899
Novell IPX (extended)	900-999

Examples

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 example 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 protocol ip list 101
```

Then the following command would be used to place list 301 into dialer access group 1:

```
dialer-list 1 protocol decnet list 301
```

In the following example, an IP access lists is defined. The IP access lists define IGRP packets as uninteresting, but permits other IP packets to trigger calls.

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

Then the following two commands place the IP access list into dialer access group 1:

```
dialer-list 1 protocol ip list 101
```

Related Commands

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

access-list †
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 this command.

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

Syntax Description

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

Default

Disabled

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
```

Related Commands

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

bandwidth †
dialer rotary-group
interface dialer

dialer map

To configure a serial interface to call one or multiple sites, use a form of the **dialer map** interface configuration command. All options are shown in the first form of the command.

To configure a serial interface to place a call to multiple sites and to authenticate calls from multiple sites, use the second form of the **dialer map** command.

To configure an asynchronous interface to place a call to a single site for which a modem script has not been assigned or a system script must be specified, or to multiple sites on a single line, multiple lines, or a dialer rotary group, use the third form of the **dialer map** command.

To delete a particular dialer map entry, use a **no** form of this command.

```
dialer map protocol next-hop-address [name hostname] [broadcast]  
    [modem-script modem-regexp] [system-script system-regexp] [dial-string]  
no dialer map protocol next-hop-address [name hostname] [broadcast]  
    [modem-script modem-regexp] [system-script system-regexp] [dial-string]  
  
dialer map protocol next-hop-address [name hostname] [broadcast] [dial-string]  
no dialer map protocol next-hop-address [name hostname] [broadcast] [dial-string]  
  
dialer map protocol next-hop-address [name hostname] [broadcast] [modem-script  
    modem-regexp] [system-script system-regexp] [dial-string]  
no dialer map protocol next-hop-address [name hostname] [broadcast] [modem-script  
    modem-regexp] [system-script system-regexp] [dial-string]
```

Syntax Description

<i>protocol</i>	Protocol keyword. See Table 7-5 for a list of supported protocols and their keywords.
<i>next-hop-address</i>	Protocol address used to match the addresses to which packets are destined.
name	(Optional) The remote system with which the local access or communication server communicates.
<i>hostname</i>	(Optional) Case-sensitive name or ID of the remote device (usually the host name).
broadcast	Broadcasts should be forwarded to this protocol address.
modem-script	(Optional) The modem script used for the connection (for asynchronous interfaces).
<i>modem-regexp</i>	(Optional) Regular expression to which a modem script will be matched (for asynchronous interfaces).
system-script	(Optional) The system script used for the connection (for asynchronous interfaces).

<i>system-regexp</i>	(Optional) Regular expression to which a system script will be matched (for asynchronous interfaces).
<i>dial-string</i>	Telephone number sent to the dialing device when it sees packets with the specified <i>next-hop-address</i> that matches the access lists defined. The dial string must be the last item in the command line.

Default

No dialer map is configured. No scripts are defined for placing calls.

Command Mode

Interface configuration

Usage Guidelines

Table 7-5 lists the protocols supported by the **dialer map** command.

Table 7-5 Dialer Map Command Supported Protocols

Keyword	Protocol
appletalk	AppleTalk
ip	IP
ipx	Novell IPX

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 communication server.

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 if 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 adhere to the chat script naming convention suggested in this publication, use the form [**modem-script** **modulation-type*] in the **dialer map** command, for example, “.*-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 **scrip dialer** 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 B, “Regular Expressions.”

If there is a **modem-script** specified in both the **dialer map** interface configuration command and in the **script dialer** line configuration command, the first chat script that matches both will be used. If there is no script that 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 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.

For example, on a system that you wish to connect to using v32bis modulation, you could name 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 **script dialer** line configuration command, and *-v32bis in the modem script specified in the **dialer map** command.

The modem lines (specified by the argument *regex* in the **script dialer** line configuration command) are set to one of the following regular expressions to match patterns, depending on the type of modem you have:

- codex-.*
- telebit-.*
- usr-.*

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

Examples

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
```

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 it connects and also can use the dialer string 1415553434 to call the remote access or communication server if it is not currently connected.

```
interface async 1
dialer map ip 131.108.2.5 name ZZZ 1415553434
```


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

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

chat-script

ppp authentication chap †

ppp authentication pap †

username †

dialer map snapshot

To define a dialer map for Cisco's snapshot routing protocol on a client router connected to a DDR interface, use the **dialer map snapshot** interface configuration command. To delete one or more previously defined snapshot routing dialer maps, use the **no** form of this command.

```
dialer map snapshot sequence-number dial-string  
no dialer map snapshot [sequence-number]
```

Syntax Description

sequence-number An number in the range from 1 to 254, inclusive, that uniquely identifies a dialer map.

dial-string Telephone number of the remote host.

Default

No snapshot routing dialer map is defined.

Command Mode

Interface configuration

Usage Guidelines

Use the **no dialer map snapshot** form of this command to remove all previously defined snapshot dialer maps on the client router; use the **no dialer map snapshot** *sequence-number* form of this command to delete a specified dialer map.

Example

The following examples define snapshot dialer maps on a client router:

```
dialer map snapshot 12 4151231234  
dialer map snapshot 13 4151231245
```

The following example removes one of the previously defined snapshot routing dialer maps on the client router:

```
no dialer map snapshot 13
```

Related Commands

```
dialer rotary-group  
interface dialer  
snapshot client
```

dialer priority

To set the priority of an interface in a dialer rotary group, use the **dialer priority** interface configuration command. Use the **no** form of this command to revert to the default setting.

dialer priority *number*
no dialer priority

Syntax Description

number Specifies the priority of an interface in a dialer rotary group; the lowest number indicates the highest priority. A number from 0 to 255. The default is 0.

Default

0

Command Mode

Interface configuration

Usage Guidelines

The value 0 indicates the lowest priority and 255 indicates the highest priority. The **dialer priority** command controls which interfaces within a dialer rotary group will be used first. Higher priority interfaces (configured with higher *number* value) are used first. This command is only meaningful for interfaces that are part of dialer rotary groups.

The **priority** command gives the administrator the ability to tell the dialer rotary group which free interface (and by extension which modem) to use first. This command applies to outgoing calls only.

Examples

In the following example, async interface 3 will be used after interfaces with higher priority and before interfaces with lower priority.

```
interface async 3
dialer priority 5
```

For example, a 500-CS has a selection of 14400 modems on it. Some of them are perceived to be better performers than others. You also have two 4800-bps, three 1200-bps, and one 300-bps modem. They are all on interfaces that are in a dialer rotary group. You do not want the 500-CS to make the call on the 300-baud modem if any of the faster modems are free. You want the 500-CS to use the highest-performance modems first, and the slowest modems last.

Related Commands

dialer rotary-group
interface dialer

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

No dialer rotary groups are defined.

Command Mode

Interface configuration

Example

The following example places async interfaces 1 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*
no dialer string

Syntax Description

dial-string String of characters to be sent to a DCE

Default

No dialer strings are defined by default.

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 **script dialer** 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.

ITU-T V.25bis Options

On synchronous interfaces, depending on the type of modem you are using, ITU-T V.25bis options might be supported as *dial-string* parameters of the **dialer string** command. Supported options are listed in Table 7-6. 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.

Note The ITU-T carries out the functions of the former Consultative Committee for International Telegraph and Telephone (CCITT).

Table 7-6 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 async interface 1 using the **dialer string** command:

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

Related Commands

dialer-group
dialer in-band
dialer map
script dialer

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

Syntax Description

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. The default is 30 seconds.

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 async interface 1:

```
interface async 1
dialer wait-for-carrier-time 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) and IPX 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 async interface 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

No dialer rotary groups are defined.

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. Dialer interface 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 1415553434
 dialer map ip 1.3.2.6 name ZZZ
```

script dialer

To specify a default modem chat script, use the **script dialer** line configuration command. Use the **no** form of this command to disable this feature.

```
script dialer regexp  
no script dialer
```

Syntax Description

regexp Specifies the set of modem scripts that might be executed. If multiple modem scripts have been defined, the system searches alphabetically. The first script that matches the argument *chat-script-name* will be used. For example, if two scripts are defined, one with the name *usr-1* and the other with the name *usr-kailas*, *usr-1* will be executed.

Default

No chat script is defined.

Command Mode

Line configuration

Usage Guidelines

This command is used by DDR modules to provide modem dialing commands and commands to log in to remote systems.

The argument *regexp* 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 appendix “Regular Expressions” later in this publication.

If you adhered to the recommended naming convention for chat scripts, the modem lines (the argument *regexp* in the **script dialer** 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-.**
- *xyz-.**

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 US Robotics modems:

```
! Some lines have telebit modems  
line 1 6
```

```
dialer script telebit.*  
! Some lines have US robotics modems  
line 7 12  
dialer script usr.*
```

Related Commands

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

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

show dialer

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

```
show dialer [interface type number]
```

Syntax Description

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

type (Optional) Interface type.

number (Optional) Interface number.

Command Mode

EXEC

Sample Display

The following is a sample output from the **show dialer** command for an asynchronous interface:

```
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 7-7 describes significant fields shown in the display.

Table 7-7 Show Dialer Field Descriptions

Field	Description
Async 1	Name of an asynchronous interface.
dialer type = IN-BAND	Indicates that DDR is enabled.
Idle timer (900 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).
Dial string	Dial strings (telephone numbers) of logged calls.
Time until disconnect	Time until line is configured to disconnect.
Current call connected	Time at which the current call was connected.

Field	Description
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.

When the **show dialer EXEC** command is issued for a synchronous serial interface configured for DTR dialing, output similar to the following is displayed:

```
Serial 0 - dialer type = DTR SYNC
Idle timer (120 secs), Fst idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)

Dial String  Successes  Failures  Last called  Last status
----          1           0         1:04:47    Success     DTR dialer
8986          0           0         never       Default
```

Table 7-8 describes new fields shown in the display.

Table 7-8 Show Dialer Field Descriptions for DTR Dialers

Field	Description
DTR SYNC	Indicates that DDR is enabled and that DTR dialing is enabled on this synchronous interface.
Last status: Success	Indicates that the last call was successful and that DTR dialing was used.
DTR dialer	Phrase appended to the Last status entry to indicate that this is a DTR dialer.

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** 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 displays the following message:

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

The word *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. (Spoofing is a state added to allow DDR to work. Basically, the interface “dials on demand” in response to packets being routed to it. No packets are routed to down interfaces, so the router interface must pretend to be up [spoo] so packets will be routed to it when it’s not connected. It’s the normal idle state on a dial-on-demand interface.)

Field	Description
Current queue:	Indicates which period snapshot routing is currently in. It can be one of the following: <ul style="list-style-type: none">• active—Routing updates are being exchanged.• client quiet—The client router is in a quiet period and routing updates are not being exchanged.• server quiet—The server router is in a quiet period, awaiting an update from the client router before awakening, and routing updates are not being exchanged.• post active—Routing updates are not being exchanged. If the server router receives an update from the client router, it processes it but does not begin an active period. This allows time for resynchronization of active periods between the client and server routers.• no queue—This is a temporary holding queue for new snapshot routing interfaces and for interfaces being deleted.
remaining active time time until next activation	Time remaining in the current period.
Updates received this cycle	Protocols from which routing updates have been received in the current active period. This line is displayed only if the router is in an active period.

snapshot client

To configure a client router (or communication server with routing capabilities) for snapshot routing, use the **snapshot client** interface configuration command. To disable a client router, use the **no** form of this command:

```
snapshot client active-time quiet-time [suppress-statechange-updates] [dialer]  
no snapshot client active-time quiet-time [suppress-statechange-updates] [dialer]
```

Syntax Description

<i>active-time</i>	Amount of time, in minutes, that routing updates are regularly exchanged between the client and server routers. This can be an integer in the range 5 to 100. There is no default value. A typical value would be 5 minutes.
<i>quiet-time</i>	Amount of time, in minutes, that routing entries are frozen and remain unchanged between active periods. Routes are not aged during the quiet period, so they remain in the routing table as if they were static entries. The argument <i>quiet-time</i> can be a value from 8 to 100000. There is no default value. The minimum quiet time is generally the active time plus 3.
suppress-statechange-updates	(Optional) Disables the exchange of routing updates each time the line protocol goes from “down” to “up” or from “dialer spoofing” to “fully up.”
dialer	(Optional) Allows the client router to dial up the remote router in the absence of regular traffic.

Default

Snapshot routing is disabled.

The *active-time* and *quiet-time* arguments have no default values.

Command Mode

Interface configuration

Usage Guidelines

The value of the *active-time* argument must be the same for the client and server routers.

Example

The following example configures a client router for snapshot routing:

```
interface dialer 1  
  snapshot client 5 600 suppress-statechange-updates dialer
```

Related Commands

clear snapshot quiet-time

dialer map

show snapshot

snapshot server

snapshot server

To configure a server router (or communication server with routing functionality) for snapshot routing, use the **snapshot server** interface configuration command. To disable a server router, use the **no** form of this command.

```
snapshot server active-time [dialer]  
no snapshot server active-time [dialer]
```

Syntax Description

<i>active-time</i>	Amount of time, in minutes, that routing updates are regularly exchanged between the client and server routers. This can be an integer in the range 5 to 100. There is no default value. A typical value would be 5 minutes.
dialer	(Optional) Allows the client router to dial up the remote router in the absence of regular traffic.

Default

Snapshot routing is disabled.

The *active-time* argument has no default value.

Command Mode

Interface configuration

Usage Guidelines

The value of the *active-time* argument must be the same for the client and server routers.

Example

The following example configures a server router for snapshot routing:

```
interface dialer 1  
  snapshot server 5
```

Related Commands

```
show snapshot  
snapshot client
```

username

Use the **username** global configuration command to specify the password to be used in CHAP caller identification.

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

Syntax Description

<i>name</i>	Host name, server name, user ID, or command name.
password	Possibly an encrypted password for this username.
<i>password</i>	Specifies the password for the local communication server or the remote device. The password is encrypted when it is stored on the local communication server. This prevents the password from being stolen. The password can consist of any string of up to eleven 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

No password is defined for CHAP caller identification.

Command Mode

Global configuration

Usage Guidelines

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

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

Note To enable the local communication server 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 communication server.

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.

Example

The following example configuration enables CHAP on serial interface 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
```