dialer string

To specify the string (telephone number) to be called for interfaces calling a single site, use the **dialer string** command in interface configuration mode. To delete the dialer string specified for the interface, use the **no** form of this command.

dialer string *dial-string*[**:***isdn-subaddress*]

no dialer string

Syntax Description

dial-string	String of characters to be sent to a DCE device.
:*isdn-subaddress*	(Optional) ISDN subaddress.

Command Default

No strings are predefined.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

To use this command on an asynchronous interface, you must define a modem chat script 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 dial-on-demand routing (DDR) call.

Note If a **dialer string** command is specified without a **dialer-group** command with access lists defined, dialing is never initiated. If the **debug dialer** command is enabled, an error message is 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.25*bis* Options

On synchronous interfaces, depending on the type of modem you are using, International Telecommunication Union Telecommunication (ITU-T) Standardization Sector V.25*bis* options might be supported as *dial-string* parameters of the **dialer string** command. Supported options are listed in Table 4. 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 4 ITU-T 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.

Examples

The following example specifies a dial-on-demand routing (DDR) telephone number to be tone-dialed on interface async 1 using the **dialer string** command:

```
interface async 1
 dialer string T14085550134
```

Related Commands

Command	Description
dialer-group	Controls access by configuring an interface to belong to a specific dialing group.
dialer in-band	Specifies that DDR is to be supported.
dialer-list protocol (Dial)	Defines a DDR dialer list to control dialing by protocol or by a combination of a protocol and a previously defined access list.
dialer map	Configures a serial interface or ISDN interface to call one or multiple sites or to receive calls from multiple sites.
script dialer	Specifies a default modem chat script.

dialer string (dialer profiles)

To specify the string (telephone number) to be used when placing a call from an interface, use the **dialer string** command in interface configuration mode. To delete the telephone number specified for the interface, use the **no** form of this command.

dialer string *dial-string* [**class** *class-name*]

no dialer string

Syntax Description

dial-string	Telephone number to be sent to a DCE device.
class *class-name*	(Optional) Dialer map class associated with this telephone number.

Command Default

No telephone numbers and class names are predefined.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

When you use dialer profiles for DDR, use the **dialer string class** form of this command to define a map class for a specific dialer profile.

Dialer profiles make it unnecessary to use dialer maps to configure DDR.

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

Examples

The following example specifies that the dial string 4155550134 be used in calls to destinations defined by the map class myclass:

```
dialer string 4155550134 class myclass
```

Related Commands

Command	Description
dialer-group	Controls access by configuring an interface to belong to a specific dialing group.
dialer wait-for-carrier-time (map-class)	Specifies the length of time to wait for a carrier when dialing out to the dial string associated with a specified map class.
interface dialer	Defines a dialer rotary group.

dialer string (legacy DDR)

To specify the destination string (telephone number) to be called for interfaces calling a single site, use the **dialer string** command in interface configuration mode. To delete the dialer string specified for the interface, use the **no** form of this command.

dialer string *dial-string*[**:***isdn-subaddress*]

no dialer string

Syntax Description

dial-string	String of characters to be sent to a DCE device.
:*isdn-subaddress*	(Optional) ISDN subaddress preceded by a colon.

Command Default

No strings are predefined.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

To use this command on an asynchronous interface, you must define a modem chat script 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.

In general, you include a **dialer string** command if you intend to use a specific interface to initiate a dial-on-demand routing (DDR) call.

Note If a **dialer string** command is specified without a **dialer-group** command with access lists defined, dialing is never initiated. If the **debug dialer** command is enabled, an error message is 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** command in interface configuration modes recorded—assuming that the destination address passes any access lists specified for DDR with the **dialer-list** command.

ITU-T V.25*bis* Options

On synchronous interfaces, depending on the type of modem you are using, International Telecommunication Union Telecommunication (ITU-T) Standardization Sector V.25*bis* options might be supported as *dial-string* parameters of the **dialer string** command. Supported options are listed in Table 4. 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).

Examples

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

```
interface async 1
dialer string T14085550134
```

Related Commands

Command	Description
dialer-group	Controls access by configuring an interface to belong to a specific dialing group.
dialer in-band	Specifies that DDR is to be supported.
dialer-list protocol (Dial)	Defines a DDR dialer list to control dialing by protocol or by a combination of a protocol and a previously defined access list.
dialer map	Configures a serial interface or ISDN interface to call one or multiple sites or to receive calls from multiple sites.
script dialer	Specifies a default modem chat script.

dialer string trunkgroup

To specify a dial-out telephone number and dial-out trunk group name for a static configuration on a network access server (NAS), use the **dialer string trunkgoup** command in interface configuration mode. To delete the static, dial-out trunk group configuration, use the **no** form of this command.

dialer string *dial-string* **trunkgroup** *trunkgroup-label*

no dialer string *dial-string* **trunkgroup** *trunkgroup-label*

Syntax Description

dial-string	String of characters to be dialed.
trunkgroup-label	A predefined dial-out trunk group name.

Command Default

No trunk groups are defined.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(11)T	This command was introduced.

Usage Guidelines

A **dialer string** command, in general, enables a specific interface for initiating a dial-on-demand routing (DDR) call.

The **dialer string trunkgroup** command enables use of a dial-out trunk group, which directs an outbound synchronous or asynchronous call to be initiated by DDR on a specific channel of an ISDN circuit. The channel (also called a digital service 0 or DS0 link), is a member of a defined dial-out trunk group. Individual DS0s from various signaling circuits can be aggregated into a dial-out trunk group.

The dial-out trunk group configured by the **dialer string trunkgroup** command must be part of a static configuration on an NAS. See the "Related Commands" section for commands that allow other nonstatic configurations of dial-out trunk groups.

Examples

The following example enables use of dial-out trunk group TG1 on dialer interface 0 as part of a static NAS configuration:

```
interface dialer 0
dialer string 5550112 trunkgroup TG1
```

Related Commands

Command	Description
cas-custom	Customizes signaling parameters for a particular E1 or T1 channel group on a channelized line.
ds0-group	Defines E1 channels for the CAS method by which the router connects to the PSTN.

Command	Description
pri-group timeslots	Specifies an ISDN PRI group on a channelized T1 or E1 controller.
show trunk group	Displays one or more trunk groups.
trunk-group timeslots	Directs an outbound synchronous or asynchronous call initiated by DDR to use specific DS0 channels of an ISDN circuit.

dialer voice-call

To configure the dialer map class for a Network Specific Facilities (NSF) dialing plan to support outgoing voice calls, use the **dialer voice-call** command in map-class dialer configuration mode.

dialer voice-call

Syntax Description

This command has no arguments or keywords.

Command Default

Disabled

Command Modes

Map-class dialer configuration

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following partial example defines a dialer map class to support the SDN dialing plan and to support outgoing voice calls. For a more complete example using all the related commands, see the **map-class dialer** command.

```
map-class dialer sdnplan
  dialer voice-call
  dialer outgoing sdn
```

Related Commands

Command	Description
dialer map	Configures a serial interface or ISDN interface to call one or multiple sites or to receive calls from multiple sites.
dialer outgoing	Configures the dialer map class for a NSF dialing plan to support outgoing calls.
map-class dialer	Defines a class of shared configuration parameters associated with the dialer map command for outgoing calls from an ISDN interface and for PPP callback.

dialer vpdn

To enable a dialer profile or dial-on-demand routing (DDR) dialer to use Layer 2 Tunnel Protocol (L2TP) dialout, use the **dialer vpdn** command in interface configuration mode. To disable L2TP dialout on a dialer profile or DDR dialer, use the **no** form of this command.

dialer vpdn

no dialer vpdn

Syntax Description

This command has no arguments or keywords.

Command Default

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)T	This command was introduced.

Usage Guidelines

The **dialer vpdn** command must be configured on the LNSs dialer interface to enable L2TP dialout. This command enables the dialer to place a VPDN call.

Examples

The following example shows how to configure the dialer interface and VPDN group on an LNS for L2TP dialout:

```
interface Dialer2
 ip address 172.16.2.3 255.255.255.128
 encapsulation ppp
 dialer remote-name myname
 dialer string 5550134
 dialer vpdn
 dialer pool 1
 dialer-group 1
 ppp authentication chap

vpdn-group 1
 request-dialout
  protocol l2tp
  pool-member 1
 initiate-to ip 172.21.9.4
```

Related Commands

Command	Description
dialer aaa	Allows a dialer to access the AAA server for dialing information.
request-dialout	Enables an LNS to request VPDN dial-out calls by using L2TP.

dialer wait-for-carrier-time (interface)

To specify the length of time the interface waits for a carrier, use the **dialer wait-for-carrier-time** command in interface configuration mode. To reset the carrier wait time value to the default, use the **no** form of this command.

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.

Command Default

30 seconds

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

On asynchronous interfaces, the **dialer wait-for-carrier-time** command sets the total time allowed for the chat script to run.

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).

Do not use this command for BRI and leased-line interfaces.

Examples

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

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

Related Commands

Command	Description
dialer enable-timeout	Sets the length of time an interface stays down after a call has completed or failed and before the interface is available to dial again.

dialer wait-for-carrier-time (map-class)

To specify the length of time to wait for a carrier when dialing out to the dial string associated with a specified map class, use the **dialer wait-for-carrier-time** command in map-class dialer configuration mode. To reset the carrier wait time value to the default, use the **no** form of this command.

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.

Command Default

30 seconds

Command Modes

Map-class dialer configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

You can define different dialer map classes with different wait-for-carrier times to suit the different types of lines and interfaces. For example, you must define a longer wait time for a map class used by serial interfaces than for one used by ISDN interfaces.

Do not use this command for BRI and leased-line interfaces.

Examples

The following example specifies a carrier wait time of 20 seconds for the class “Eng” on interface Dialer2:

```
interface Dialer2
 ip address 10.2.2.2 255.255.255.0
 encapsulation ppp
 dialer remote-name Mediumuser
 dialer string 5264540 class Eng
 dialer wait-for-carrier-time 20
 dialer load-threshold 50 either
 dialer pool 1
 dialer-group 2
```

dialer wait-for-line-protocol

To set a maximum time the dialer will wait for a line protocol after establishing a physical connection before considering the call unsuccessful, use the **dialer wait-for-line-protocol** command in interface configuration mode. To disable this function, use the **no** form of this command.

dialer wait-for-line-protocol *wait-time*

no dialer wait-for-line-protocol

Syntax Description

wait-time	Time, in seconds, that the dialer will wait for the line protocol to come up after the physical layer connection has been established. The time can range from 1 to 2147483 seconds.

Command Default

Timer is disabled.

Command Modes

Interface configuration

Command History

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

Usage Guidelines

This command is supported only with encapsulation PPP.

By default the Cisco IOS software considers a dial-out attempt successful if a connection is established to the physical layer (Layer 1 of the Open System Interconnection reference model). The **dialer wait-for-line-protocol** command can be used to configure a router to wait a specific amount of time for a line protocol to come up once a physical layer connection has been established. If the call is dropped before the timer has elapsed, the call will be considered a failure. Redial will be triggered if the redial options have been configured with the **dialer redial** interface configuration command. The dialer failure statistics for the physical interface will be updated, which may influence the selection of a physical dialer for the next dial attempt. The physical dialer selection algorithm may be customized using the **dialer rotor** interface configuration command.

Note This command is not useful in conjunction with Cisco High-Level Data Link Control (HDLC) encapsulation. Cisco HDLC encapsulation is the default line protocol and will always come up regardless of line conditions.

Examples

The following example configures the dialer to wait 10 seconds for a line protocol after making a physical connection:

```
dialer wait-for-line-protocol 10
```

Related Commands

Command	Description
debug dialer events	Displays debugging information about the packets received on a dialer interface.
dialer redial	Configures the number of redial attempts to be made, the interval between redial attempts, and the amount of time the interface will be disabled if all redial attempts fail.
dialer rotor	Specifies the method for identifying the outbound line to be used for ISDN or asynchronous DDR calls.

dialer watch-disable

Note Effective with Cisco IOS Release 12.3(11)T, this command is replaced by the **dialer watch-list delay** command. See the **dialer watch-list delay** command page for more information.

To set a delay time to the backup interface, use the **dialer watch-disable** command in interface configuration mode. To disable this feature, use the **no** form of this command.

dialer watch-disable *timeout*

no dialer watch-disable

Syntax Description

timeout	The timeout value in seconds.

Command Default

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
11.3	This command was introduced.
12.3(11)T	This command was replaced by the **dialer watch-list delay** command.

Usage Guidelines

This command is used to add a delay time to the backup interface. The delay time delays the time it takes for the backup interface to disconnect after the primary interface recovers.

Examples

The following example forces a 6-second delay to the backup interface once the primary interface recovers:

```
interface bri0
 ip address 10.1.1.2 255.255.255.0
 encapsulation ppp
 dialer map ip 10.3.1.1 255.255.255.0 name mymap 5550134
 dialer-group 1
 dialer watch-group 1
 dialer watch-disable 6
```

Related Commands

Command	Description
show dialer dnis	Displays general diagnostic information for ISDN BRI interfaces configured for DDR.

dialer watch-group

To enable dial-on-demand routing (DDR) backup on an interface using Dialer Watch, configure the interface using the **dialer watch-group** command in interface configuration mode. To disable this feature, use the **no** form of this command.

dialer watch-group *group-number*

no dialer watch-group *group-number*

Syntax Description

group-number	Group number assigned that will point to a globally defined list of IP addresses to watch. The valid range is 1 to 255.

Command Default

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
11.3T	This command was introduced.

Usage Guidelines

Use the **dialer watch-group** command on the secondary interface you want to enable DDR backup.

The dialer watch group number points to a globally defined list (the **dialer watch-list** command) that contains the IP addresses to be watched. If you use the **dialer watch-group** command you must also use the **dialer watch-list** command.

You must configure the standard commands required to enable the router to perform DDR in addition to the Dialer Watch commands. Refer to the *Cisco IOS Dial Technologies Configuration Guide* and the *Cisco IOS Dial Technologies Command Reference* for additional information.

The **dialer watch-group** and **dialer watch-list** commands can be added in any order.

Examples

The following example configures BRI interface 0 as the backup interface:

```
interface bri0
 ip address 10.1.1.2 255.255.255.0
 encapsulation ppp
 dialer watch-group 1
```

Related Commands

Command	Description
dialer watch-list	Adds the list of IP addresses to be monitored for Dialer Watch.

dialer watch-list

To specify a list of watched routes of IPv4 or IPv6 addresses, to specify IPv4 or IPv6 address and VPN routing and forwarding (VRF) instance pairs to be monitored by dialer watch, or to configure the router to dial the backup link if the primary link fails during the initial startup, use the **dialer watch-list** command in global configuration mode. To disable the list of watched routes or to disable the dialer watch to monitor IPv4 or IPv6 addresses and VFR pairs, use the **no** form of this command.

dialer watch-list *group-number* {[**ip** *ip-address ip-address-mask* | **ipv6** *ipv6-address ipv6-address-mask*] **[vrf** *vrf-name*] | **delay route-check initial** *seconds*}

no dialer watch-list *group-number* {[**ip** *ip-address ip-address-mask* | **ipv6** *ipv6-address ipv6-address-mask*] **[vrf** *vrf-name*] | **delay route-check initial** *seconds*}

Syntax Description

group-number	Group number assigned to the list. The range is 1 to 255. The value of this argument must match the group number set with the **dialer watch-group** command.
ip *ip-address address-mask*	(Optional) Specifies the IP address or the IP address range and the IP address mask to be applied to the list.
ipv6 *ipv6-address* i*pv6-address-mask*	(Optional) Specifies the IPv6 address or the IPv6 address range and the IPv6 address mask to be applied to the list.
vrf *vrf-name*	(Optional) Specifies a watched route using the VRF instance table named in the *vrf-name* argument.
delay route-check initial *seconds*	Specifies the time, in seconds, after which the router ensures that the primary route is up when the initial startup is complete. The range is from 1 to 2147483.

Command Default

The specified list of IPv4 or IPv6 addresses, the IPv4 or IPv6 address and the VRF instance pairs are not monitored. The router is not configured to dial the backup link when the primary link fails during the initial startup.

Command Modes

Global configuration (config)

Command History

Release	Modification
11.3	This command was introduced.
12.1(3)T	This command was modified. The **delay route-check initial** *seconds* keyword-argument pair was introduced.
12.3(7)T	This command was modified. The **vrf** *vrf-name* keyword-argument was introduced.
15.2(3)T	This command was modified. The **ipv6** *ipv6-address ipv6-address-mask* keyword-argument pair was introduced.

Usage Guidelines

Use the **dialer watch-list** command to specify a list of all IP addresses or networks that you want to monitor. The software does not limit the number of IP addresses or IPv6 addresses that can be added to a watch group.

Use the **dialer watch-list** command with the **dialer watch-group** command to monitor the IP or IPv6 addresses and VRF pairs. The *group-number* value specified using the **dialer watch-list** command must match the group number set in the **dialer watch-group** command in interface configuration mode. For example, if you use **dialer watch-group 1**, you must use **dialer watch-list 1**.

The **dialer watch-list** and **dialer watch-group** commands can be used in any order.

Address matching is exact; therefore, you must apply the specific IP or IPv6 address and mask range for the networks that you want to monitor. Use the **show ip route** and **show ipv6 route** commands to verify that the IPv4 and IPv6 routes you are watching exist in the routing table.

The route configured for the **dialer watch-list** command must exactly match the route in the routing table. This matching includes verifying that the network and the masks are identical.

You must configure the standard commands required to enable the router to perform dial-on-demand routing (DDR) in addition to configuring the dialer watch commands. See the *Dial Technologies Configuration Guide* and the *Dial Technologies Command Reference* for additional information.

Enabling the **delay route-check initial** keywords enables the router to check whether the primary route is up after the initial startup of the router is complete and the timer has expired. If this command is not configured, the dialer watch mechanism is triggered only when the primary route is removed from the routing table. If the primary link fails to come up during initial startup of the router, the route is never added to the routing table and hence cannot be watched. Therefore, use of the **delay route-check initial** keywords enables the dialer watch to dial the backup link in the event of a primary link failure during the initial startup of the router.

Use the **vrf** *vrf-name* keyword and argument to configure the corresponding VRF table to be used to detect when the watched route for the VRF has gone down. A VRF is a per-VPN routing information repository that defines the VPN membership of a customer site attached to a network access server. A VRF consists of an IP routing table, a derived Cisco Express Forwarding (formerly known as CEF) table, a set of interfaces that use the forwarding table, and a set of rules and routing protocol parameters that control the information that is included in the routing table. A separate set of routing and Cisco Express Forwarding tables is maintained for each VPN customer.

Note that the VRF might have overlapping address space, as explained below:

- At the provider edge (PE) router, each customer edge (CE) router will have a corresponding VRF associated with it.
- If two CE routers use the same address space, the corresponding VRFs at the PE router will have the overlapping address space.
- When using the **vrf** *vrf-name* keyword and argument, configure the watched route as an IPv4 or an IPv6 address-VRF name pair, where the IP address is the watched IP address and the VRF name is the routing and forwarding instance to which the IP address belongs.

Configuring the dialer watch with only the IP address does not ensure that the correct CE route will be dialed when a watched route goes down. Configuring the dialer watch with an IP address and VRF name pair ensures that the VRF table corresponding to the routing and forwarding instance to which the IP address belongs is found and the correct CE is dialed.

You can define a watch route that watches the same IP address, but belongs to a different VRF, in a single watch list.

Examples

The following example shows how to specify a pair of watched routes in a legacy dialer configuration. In this configuration, watch lists 1 and 2 are watching the same IP address, but belong to different VRFs.

```
Device(config)# interface BRI3/0
Device(config-if)# ip address 10.0.2.2 255.255.255.0
Device(config-if)# encapsulation ppp
Device(config-if)# dialer map ip 10.1.2.0 vrf v1 3xxxxxx
Device(config-if)# dialer map ip 10.1.2.0 vrf v2 4xxxxxx
Device(config-if)# dialer-group 1
Device(config-if)# dialer watch-group 1
Device(config-if)# dialer watch-group 2
Device(config-if)# isdn switch-type ntt
Device(config-if)# ppp authentication chap
Device(config-if)# exit
Device(config)# dialer watch-list 1 ip 10.2.1.0 255.255.255.0 vrf v1
Device(config)# dialer watch-list 2 ip 10.2.1.0 255.255.255.0 vrf v2
```

The following example shows how to specify a pair of watched routes in a dialer rotary group configuration. In this configuration, watch lists 1 and 2 watch the same IP address, but belong to different VRFs.

```
Device(config)# interface BRI3/0
Device(config-if)# no ip address
Device(config-if)# encapsulation ppp
Device(config-if)# dialer rotary-group 1
Device(config-if)# isdn switch-type ntt
Device(config-if)# ppp authentication chap
Device(config-if)# exit
Device(config)# interface Dialer1
Device(config-if)# ip address 10.0.2.2 255.255.255.0
Device(config-if)# encapsulation ppp
Device(config-if)# dialer remote-name c3640-B
Device(config-if)# dialer map ip 10.1.2.0 vrf v1 3xxxxxx
Device(config-if)# dialer map ip 10.1.2.0 vrf v2 4xxxxxx
Device(config-if)# dialer watch-group 1
Device(config-if)# dialer watch-group 2
Device(config-if)# dialer-group 1
Device(config-if)# ppp authentication chap
Device(config-if)# exit
Device(config)# dialer watch-list 1 ip 10.2.1.0 255.255.255.0 vrf v1
Device(config)# dialer watch-list 2 ip 10.2.1.0 255.255.255.0 vrf v2
```

The following example shows how to specify a pair of watched routes in a dialer profile configuration. In this configuration, watch lists 1 and 2 watch the same IP address, but belong to different VRFs.

```
Device(config)# interface BRI3/0
Device(config-if)# no ip address
Device(config-if)# encapsulation ppp
Device(config-if)# dialer pool-member 1
Device(config-if)# isdn switch-type ntt
Device(config-if)# ppp authentication chap
Device(config-if)# exit
Device(config)# interface Dialer1
Device(config-if)# ip vrf forwarding v1
Device(config-if)# ip address 10.0.2.2 255.255.255.0
Device(config-if)# encapsulation ppp
Device(config-if)# dialer pool 1
Device(config-if)# dialer remote-name c3640-B
Device(config-if)# dialer watch-disable 30
Device(config-if)# dialer string 03xxxxxxx1
Device(config-if)# dialer caller 03xxxxxxx1 callback
Device(config-if)# dialer watch-group 1
Device(config-if)# dialer-group 1
```

```
Device(config-if)# ppp authentication chap
Device(config-if)# exit
Device(config)# interface Dialer2
Device(config-if)# ip vrf forwarding v2
Device(config-if)# ip address 10.0.2.2 255.255.255.0
Device(config-if)# encapsulation ppp
Device(config-if)# dialer pool 1
Device(config-if)# dialer remote-name c3640-B
Device(config-if)# dialer string 04xxxxxxx1
Device(config-if)# dialer caller 04xxxxxxx1 callback
Device(config-if)# dialer watch-group 2
Device(config-if)# dialer-group 1
Device(config-if)# ppp authentication chap
Device(config-if)# exit
Device(config)# dialer watch-list 1 ip 10.2.1.0 255.255.255.0 vrf v1
Device(config)# dialer watch-list 2 ip 10.2.1.0 255.255.255.0 vrf v2
```

The following example shows how to list IP addresses to be watched and form a group of networks to be monitored:

```
Device(config)# dialer watch-list 1 ip 10.1.1.0 255.255.255.0
Device(config)# dialer watch-list 1 ip 10.31.1.0 255.255.255.0
Device(config)# dialer watch-list 1 ip 10.12.1.0 255.255.255.0
```

The following example shows how to list IPv6 addresses to be watched and form a group of IPv6 networks to be monitored:

```
Device(config)# dialer watch-list 2 ipv6 2001:DB8:0:ABCD::4 FFFF:FFFF::
Device(config)# dialer watch-list 2 ipv6 2001:DB8:0:ABCE::5 FFFF:FFFF::
Device(config)# dialer watch-list 2 ipv6 2001:DB8:0:ABCF::6 FFFF:FFFF::
```

The following command output shows how to ensure that a device checks that the primary route is up after initial startup of the device is complete:

```
! Create backup link and enable process switching
interface BRI0/0
 ip address 10.13.1.1 255.255.255.0
 encapsulation ppp
 no ip route-cache
.
.
! Enable dialer watch on this backup interface.
! Watch the route specified with the dialer watch-list 1 command.
! Apply interesting traffic defined in dialer list 1.
! Apply crypto map on backup interface.
dialer watch-group 1
 dialer-group 1
isdn switch-type basic-ts013
 no peer neighbor-route
 no cdp enable
 ppp authentication chap
 crypto map cisco
.
.
! Access control list (ACL) 101 is the IPSec traffic used in match address.
! ACL 110 is for the dialer list to mark all IP traffic uninteresting.
! The dialer watch will trigger the ISDN backup when the route is lost.
access-list 101 permit ip host 10.11.11.11 host 10.11.22.22
access-list 110 deny ip any any
dialer watch-list 1 ip 192.168.0.222 255.255.255.255
! These commands define the routes to be watched
! and check whether the primary route is up after the initial startup of the
! router is complete.
! The exact route (including subnet mask) must exist in the routing table.
```

```
! The dialer watch-group 1 command applies this list to the backup interface.
dialer watch-list 1 delay route-check initial 10
dialer-list 1 protocol ip list 110
! Interesting traffic is defined by ACL 110.
! The ACL is applied to BRI0/0 using dialer group 1.
```

Related Commands

Command	Description
dialer watch-group	Enables DDR backup on an interface using the dialer watch feature.
show ip route	Displays all static IP routes or the routes installed using the AAA route download function.
show ipv6 route	Displays the IPv6 routing information for all the active routing tables.

dialer watch-list delay

To configure the router to delay before connecting or disconnecting a secondary link for a route monitored by Dialer Watch, use the **dialer watch-list delay** command in global configuration mode. To disable these delays, use the **no** form of this command.

dialer watch-list *group-number* **delay** {**connect** *connect-time* | **disconnect** *disconnect-time*}

no dialer watch-list *group-number* **delay** {**connect** *connect-time* | **disconnect** *disconnect-time*}

Syntax Description

group-number	Group number assigned to the list. Valid group numbers are from 1 to 255.
connect	Specifies that the router will delay dialing the secondary link when the primary link becomes unavailable.
connect-time	Time, in seconds, after which the router rechecks for availability of the primary link. If the primary link is still unavailable, the secondary link is then dialed. Valid times range from 1 to 2147483.
disconnect	Specifies that the disconnect timer is started when the secondary link is up and after the idle timeout period has expired, and only when software has determined that the primary route has come up.
disconnect-time	Time, in seconds. Valid times range from 1 to 2147483.

Command Default

No delay is configured.

Command Modes

Global configuration

Command History

Release	Modification
12.2(8)T	This command was introduced.

Usage Guidelines

Use this command to configure a delay before connecting or disconnecting a secondary link for a route monitored by Dialer Watch. This command will not work unless dial-on-demand routing (DDR) is configured and Dialer Watch has been enabled.

Examples

The following example configures the router to wait 10 seconds before verifying that the primary link is still down and dialing a secondary link:

```
dialer watch-list 1 ip 10.1.1.0 255.255.255.0
dialer watch-list 1 delay connect 10
```

The following example configures the router to wait 10 seconds to disconnect a secondary link once the primary link has been reestablished:

```
dialer watch-list 1 ip 10.1.1.0 255.255.255.0
dialer watch-list 1 delay disconnect 10
```

Related Commands

Command	Description
dialer watch-group	Enables DDR backup on an interface using Dialer Watch.
dialer watch-list	Adds the list of IP addresses to be monitored for Dialer Watch.

dialer-group

To control access by configuring an interface to belong to a specific dialing group, use the **dialer-group** command in interface configuration mode. To remove an interface from the specified dialer access group, use the **no** form of this command.

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 with the **dialer-list** command. Acceptable values are nonzero, positive integers between 1 and 10.

Command Default

No access is predefined.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

An interface can be associated with a single dialer access group only; 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.

Packets that match the dialer group specified trigger a connection request.

Examples

The following example specifies dialer access group number 1.

The destination address of the packet is evaluated against the access list specified in the associated **dialer-list** command. If it passes, either 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
access-list 101 deny igrp 0.0.0.0 255.255.255.255 255.255.255.255 0.0.0.0
access-list 101 permit ip 0.0.0.0 255.255.255.255 0.0.0.0 255.255.255.255
dialer-list 1 protocol ip list 101
```

Related Commands

Command	Description
dialer-list protocol (Dial)	Defines a DDR dialer list to control dialing by protocol or by a combination of protocol and an access list.

dialer-group (template)

To control access by configuring a virtual access interface to belong to a specific dialing group, use the **dialer-group** command in template configuration mode. To remove an interface from the specified dialer access group, use the **no** form of this command.

dialer-group *dialer-list-number*

no dialer-group

Syntax Description

dialer-list-number	Number of the dialer access group to which the specific interface belongs. This access group is defined with the **dialer-list** command. Acceptable values are positive numbers from 1 to 128.

Command Default

No access is predefined.

Command Modes

Template configuration

Command History

Release	Modification
12.2(4)T	This command was introduced for Resource Pool Manager (RPM) template configuration.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T and support was added for the Cisco AS5300, Cisco AS5400, and Cisco AS5800.

Usage Guidelines

An interface can be associated with only 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** template configuration command. The **dialer-list** command associates an access list with a dialer access group. For Cisco IOS Release 12.2(4)T, the number of dialer groups that can be configured was increased from 10 to 128.

Packets that match the dialer group specified trigger a connection request.

Examples

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

```
template template1
 dialer-group 1
```

Related Commands

Command	Description
dialer-list protocol	Defines a dialer list to control dialing by protocol or by a combination of protocol and an access list.

dialer-list protocol (Dial)

To define a dial-on-demand routing (DDR) dialer list for dialing by protocol or by a combination of a protocol and a previously defined access list, use the **dialer-list protocol** command in global configuration mode. 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* | *access-group*}

no dialer-list *dialer-group* [**protocol** *protocol-name* [**list** *access-list-number* | *access-group*]]

Syntax Description

dialer-group	Number of a dialer access group identified in any **dialer-group** interface or template configuration command. Up to 128 dialer groups can be configured.
protocol-name	One of the following protocol keywords: **appletalk**, **bridge**, **clns**, **clns_es**, **clns_is**, **decnet**, **decnet_router-L1**, **decnet_router-L2**, **decnet_node**, **ip**, **ipx**, or **ipv6**.
permit	Permits access to an entire protocol.
deny	Denies access to an entire protocol.
list	Specifies that an access list will be used for defining a granularity finer than an entire protocol.
access-list-number	Access list numbers specified in any DECnet, IP, or Novell IPX standard or extended access lists, including Novell IPX extended service access point (SAP) access lists and bridging types. See Table 5 for the supported access list types and numbers.
access-group	Filter list name used in the **clns filter-set** and **clns access-group** commands.

Command Default

No dialer lists are defined.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.
10.3	The **list** keyword and the *access-list-number* and *access-group* arguments were added.
12.2(2)T	The **ipv6** protocol keyword was added.
12.2(4)T	The number of dialer groups that can be configured was increased to 128.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T and support was added for the Cisco AS5300, Cisco AS5400, and Cisco AS5800.
12.2(13)T	The **igrp**, **vines**, and **xns** arguments were removed because the Interior Gateway Routing Protocol (IGRP), Banyan Systems Virtual Integrated Network Service (VINES), and the Xerox Network System (XNS) are no longer available in Cisco IOS software.

Usage Guidelines

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

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

The **dialer-list protocol** command permits or denies access to an entire protocol.

The **dialer-list protocol** command with the optional **list** keyword provides finer permission granularity and also supports protocols that were not previously supported. This command also applies protocol access lists to dialer access groups to control dialing using DDR. The dialer access groups are defined with the **dialer-group** command.

Table 5 lists the access list types and numbers that the **dialer-list protocol** command supports. The table does not include International Organization for Standardization Connectionless Network Service (ISO CLNS) because that protocol uses filter names instead of predefined access list numbers.

Table 5 dialer-list protocol Command Supported Access List Types and Numbers

Access List Type	Access List Number Range (Decimal)
AppleTalk	600–699
DECnet	300–399
IP (standard)	1–99
IP (extended)	100–199
Novell IPX (standard)	800–899
Novell IPX (extended)	900–999
Transparent Bridging	200–299

Examples

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. The following example classifies all other IP packets as interesting and permits them to initiate calls:

```
access-list 101 permit ip 10.0.0.0 255.255.255.255 10.0.0.0 255.255.255.255
```

Then the following command places list 101 into dialer access group 1:

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

In the following example, DECnet access lists allow any DECnet packets with source area 10 and destination area 20 to trigger calls:

```
access-list 301 permit 10.0 0.1023 10.0 0.1023
access-list 301 permit 10.0 0.1023 20.0 0.1023
```

Then the following command places access list 301 into dialer access group 1:

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

In the following example, a CLNS filter is defined and then the filter is placed in dialer access group 1:

```
clns filter-set ddrline permit 47.0004.0001....
!
dialer-list 1 protocol clns list ddrline
```

The following example configures an IPv6 access list named list2 and places the access list in dialer access group 1:

```
ipv6 access-list list2 deny fec0:0:0:2::/64 any
ipv6 access-list list2 permit any any
!
dialer-list 1 protocol ipv6 list list2
```

Related Commands

Command	Description
access-list	Configures the access list mechanism for filtering frames by protocol type or vendor code.
clns filter-set	Builds a list of CLNS address templates with associated permit and deny conditions for use in CLNS filter expressions.
dialer-group (template)	Controls access by configuring a virtual template interface to belong to a specific dialing group.
ipv6 access-list	Defines an IPv6 access list and sets deny or permit conditions for the defined access list.

dial-peer cor custom

To specify that named class of restrictions (COR) apply to dial peers, use the **dial-peer cor custom** command in global configuration mode.

dial-peer cor custom

Syntax Description

This command has no arguments or keywords.

Command Default

No default behavior or keywords.

Command Modes

Global configuration

Command History

Release	Modification
12.1(3)T	This command was introduced.

Usage Guidelines

You must use the **dial-peer cor custom** command and the **name** command to define the names of capabilities before you can specify COR rules and apply them to specific dial peers.

Examples of possible names might include the following: call1900, call527, call9, and call911.

Note You can define a maximum of 64 COR names.

Examples

The following example defines two COR names:

```
dial-peer cor custom
 name group32
 name CatchAll
```

Related Commands

Command	Description
name (dial peer cor custom)	Provides a name for a custom COR.

dial-peer cor list

To define a class of restrictions (COR) list name, use the **dial-peer cor list** command in global configuration mode. To remove a previously defined COR list name, use the **no** form of this command.

dial-peer cor list *list-name*

no dial-peer cor list *list-name*

Syntax Description

list-name	List name that is applied to incoming or outgoing calls to specific numbers or exchanges.

Command Default

No default behavior or keywords.

Command Modes

Global configuration

Command History

Release	Modification
12.1(3)T	This command was introduced.

Usage Guidelines

A COR list defines a capability set that is used in the COR checking between incoming and outgoing dial peers.

Examples

The following example adds two members to the COR list named list1:

```
dial-peer cor list list1
 member 900block
 member 800_call
```

Related Commands

Command	Description
dial-peer cor custom	Specifies that named COR apply to dial peers.
member (dial peer cor list)	Adds a member to a dial peer COR list.
name (dial peer cor custom)	Provides a name for a custom COR.

dial-shelf split backplane-ds0

To connect two router shelves to a dial shelf, use the **dial-shelf split backplane-ds0** command in global configuration mode. To remove the connection, use the **no** form of this command.

dial-shelf split backplane-ds0 {*predefined-option* | **userdefined** *option*}

no dial-shelf split backplane-ds0

Syntax Description

predefined-option	Predefined backplane DS0 pairs. See Table 6 for a list of these options.
userdefined *option*	Number of backplane DS0 interfaces used by the router shelf that you define, in the range 128 to 2048.

Command Default

Option pair 6

Command Modes

Global configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

The options for this command come in pairs and vary according to the desired configuration. You will need to log in to each router shelf and separately configure the routers for the intended load. In most circumstances, it is recommended that the predefined options remain selected. These options are designed to be matched pairs, as seen in Table 6. You can select the **userdefined** keyword and define your own split, if needed. Table 6 lists the predefined options.

Table 6 dial-shelf split backplane ds-0 Predefined Options

	Router Shelf 1			Router Shelf 2			Total Calls
Option Pair	Option	Maximum Calls	Unused T1	Option	Maximum Calls	Unused T1	
1	`2ct3cas`	1344	—	`1ct3cas`	672	—	2016
2	`part2ct1ct3cas`	1152	4	`part1ct1ct3cas`	888	3	2040
3	`2ct3isdn`	1288	—	`part1ct1ct3isdn_b`	644	7	1932
4	`part2ct1ct3isdn`	1150	2	`part1ct1ct3isdn`	897	1	2047
5[1]	`3ce1`	960	—	`3ce1`	960	—	1920
6	Default (no option entered)	1/2 of current input	—	Default (no option entered)	1/2 of current input	—	—
7	`no dial-shelf backplane-ds0`	1024	—	`no dial-shelf backplane-ds0`	1024	—	2048

1. This option is used to revert to the default for an environment that uses six E1 lines.

The **dial-shelf split slot** command must be defined for the **dial-shelf split backplane-ds0** command to be active.

Even if your system is already using a split dial shelf configuration, configuring one router shelf to handle two T3 trunks and the other router to handle the third trunk requires you to take the entire access server out of service. Busyout all connections before attempting to reconfigure. The configuration must be changed to set up one pool of TDM resources that can be used by either DMM cards or UPC and a second pool of two streams that contains TDM resources that can be used only by UPCs.

You may have more trunk capacity than 2048 calls. It is your decision how to provision the trunks so the backplane capacity is not exceeded. If more calls come in than backplane DS0 capacity for that half of the split, the call will be rejected and an error message printed for each call. This cannot be detected while a new configuration is being built because the router cannot tell which T1 trunks are provisioned and which are not. The user may want some trunks in hot standby.

The DMM, HMM, and VoIP cards can use only 1792 DS0 of the available 2048 backplane DS0. The UPC and trunk cards can use the full 2048 backplane DS0.

The **show tdm splitbackplane** command shows the resources in two groups, the first 1792 accessible to all cards, and the remaining 256 accessible only to UPC and trunk cards.

Examples

The following example shows how to configure two router shelves. Refer to Table 6 to interpret the options specified.

Configure router shelf 1 to run two CT3 interfaces with channel-associated signaling (CAS) and the ability to answer 1344 calls:

```
dial-shelf split backplane-ds0 2ct3cas
```

Configure router shelf 2 to run one CT3 interface with CAS on the second router shelf and the ability to answer 672 calls:

```
dial-shelf split backplane-ds0 1ct3cas
```

The total calls configured for the system are 2036 (1344 plus 672).

Related Commands

Command	Description
dial-shelf split slots	Configures split dial shelves.
show tdm splitbackplane	Displays modem and PRI channel assignments with streams and channels on the modem side as assigned to the unit and channels on the PRI side of the TDM assignment.

dial-shelf split slots

To configure split dial shelves, use the **dial-shelf split slots** command in global configuration mode. To change the router shelf to normal mode, if a router is in split mode and the other router shelf has already relinquished control of all dial shelf slots or is switched off, use the **no** form of this command.

dial-shelf split slots *slot-numbers*

no dial-shelf split slots

Syntax Description

slot-numbers	List of the dial shelf slot numbers that the router owns in the range 0 to 11, separated by spaces. Slot ownership for each of the two router shelves is configured individually using the **dial-shelf split slots** command.

Command Default

No default behavior or keywords.

Command Modes

Global configuration

Command History

Release	Modification
11.3(8)AA	This command was introduced.

Usage Guidelines

You allocate the slots in the dial shelf between the two router shelves to achieve the desired configuration. The two router shelves are both configured to run in split mode by means of the **dial-shelf split slots** command. While a router is in split mode, additional slots can be added to the set that the router owns by re-entering the **dial-shelf split slots** command listing the new slots. The effect of entering two or more **dial-shelf split slots** commands with different slot numbers is cumulative.

Slots must be explicitly removed from the list of router-owned slots with the **dial-shelf split slots remove** command.

A single router can also be configured in split mode, but with no slots owned, by using the **dial-shelf split slots none** command.

When you configure a Cisco AS5800 system to operate in split mode, it is the same as having two Cisco AS5800 systems with each having a separate set of feature boards assigned to its router; they just happen to be sharing a single dial shelf. Modem pooling, for example, is the same as if you had two separate Cisco AS5800 systems. Router shelf 1 has a modem pool that consists of all the modem cards that reside in slots owned by router shelf 1. The same situation applies to router shelf 2.

Examples

The following example would configure the router shelf to own slots 0 through 2 and 6 through 8.

```
dial-shelf split slots 0 1 2 6 7 8
```

In this example, the other router shelf could be configured to own the other slots: 3, 4, 5, 9, 10, and 11.

Related Commands

Command	Description
dial-shelf split backplane-ds0	Connects two router shelves to a dial shelf.
dial-shelf split slots none	Configures the router in dial shelf split mode but with no slots owned.
dial-shelf split slots remove	Removes slots configured in split mode.

dial-shelf split slots none

To configure the router in dial shelf split mode but with no slots owned, use the **dial-shelf split slots none** command in global configuration mode.

dial-shelf split slots none

Syntax Description

This command has no arguments or keywords.

Command Default

No default behavior or keywords.

Command Modes

Global configuration

Command History

Release	Modification
11.3(8)AA	This command was introduced.

Usage Guidelines

The **dial-shelf split slots none** command is useful for configuring a single router in split mode, but with no slots owned.

Examples

The following example changes dial shelf slot ownership. The router will no longer have ownership of any dial shelf slots.

```
dial-shelf split slots none
```

Related Commands

Command	Description
dial-shelf split slots remove	Removes slots configured in split mode.

dial-shelf split slots remove

To remove slots configured in split mode, use the **dial-shelf split slots remove** command in global configuration mode.

dial-shelf split slots remove *slot-numbers*

Syntax Description

slot-numbers	List of the dial shelf slot numbers to be removed ,separated by spaces, in the range 0 to 11.

Command Default

No default behavior or keywords.

Command Modes

Global configuration

Command History

Release	Modification
11.3(8)AA	This command was introduced.

Usage Guidelines

To move a slot from the control of one router shelf to the others, the router releasing the slot should be modified first by entering the **dial-shelf split slots remove** command, specifying the slot numbers to be released. The released slots can then be added to the slot set of the other router by re-entering the **dial-shelf split slots** command including the new slot numbers.

The router shelf that is losing the slot frees any resources and clears any state associated with the card in the slot it is relinquishing. The dial shelf controller (DSC) reconfigures its hub to ignore traffic from that slot, and if there is a card in the slot it will be reset. This ensures that the card frees up any TDM resource it might be using and allows it to restart under control of the router shelf that is subsequently configured to own the slot.

Examples

The following example removes dial shelf slot 8 from the list of owned dial shelf slots:

```
dial-shelf split slots remove 8
```

The effect of multiple commands is cumulative.

Related Commands

Command	Description
dial-shelf split slots none	Configures the router in dial shelf split mode but with no slots owned.

dial-tdm-clock

To configure the clock source and priority of the clock source used by the time-division multiplexing (TDM) bus on the dial shelf of the Cisco AS5800, use the **dial-tdm-clock** command in global configuration mode. To return the clock source and priority to the default values, use the **no** form of this command.

dial-tdm-clock priority *number* {**external** {**e1** | **t1**} [**120ohm**] | **freerun** | **trunk-slot** *slot* **port** *port*} [**line** {**0** | **1**}]

no dial-tdm-clock priority *number* {**external** {**e1** | **t1**} [**120ohm**] | **freerun** | **trunk-slot** *slot* **port** *port*} [**line** {**0** | **1**}]

Syntax Description

priority *number*	Specifies the priority of the clock source. The range is from 1 to 50. Priority 1 is the highest priority, and 50 is the lowest.
external	Specifies the priority of an external clock source. The external clock source is connected to the front panel of the Dial Shelf Controller (DSC) card.
{**e1** | **t1**} [**120ohm**]	Specifies priority of the E1 (2.048 MHz) or T1 (1.54 MHz) external clock source. The default value of the external coaxial cable impedance is 75 ohm. Specify the **120ohm** option if a 120 ohm coaxial cable is connected.
freerun	Specifies the priority of the local oscillator clock source.
trunk-slot *slot*	Specifies the priority of the trunk card to provide the clock source. The slot number is from 0 to 5 (these are the only slots capable of providing clock sources).
port *port*	Specifies the controller number on the trunk used to provide the clock source. The port number is from 0 to 28. The T1 and E1 trunk cards each have 12 ports. The T3 trunk card has 28 ports.
line {**0** | **1**}	(Optional) Specifies the optical port. If the physical optical port is 0, the **line** value is also 0.

Command Default

If no clock sources are specified, the software selects the first available good clock source on a trunk port.

Command Modes

Global configuration

Command History

Release	Modification
11.3(2)AA	This command was introduced.
12.2(15)T	The **line** keyword was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The TDM bus in the backplane on the dial shelf must be synchronized to the T1/E1 clocks on the trunk cards. The DSC card on the dial shelf provides hardware logic to accept multiple clock sources as input and use one of them as the primary source to generate a stable, PPL synchronized output clock. The input clock can be any of the following sources:

- Trunk port in slots 0 through 5 (up to 12 can be selected (two per slot)
- An external T1 or E1 clock source fed directly through a connector on the DSC card
- A free running clock from an oscillator in the clocking hardware on the DSC card

The clock commands are listed in the configuration file with the highest priority listed first.

If the current primary clock source is good, specifying another clock source of higher priority does not cause the clock source to switch to the higher priority clock source. The new higher priority clock source is used as a backup clock source. This prevents switching of the clock source as you enter multiple **dial-tdm-clock priority** configuration commands in random order. Also, it is important not to disturb the existing clock source as long as it is good. To force the new higher priority clock source to take over from a currently good primary clock source, configure the new clock source and use the **no dial-tdm-clock priority** command to remove the current primary clock source.

To display the current primary and backup clocks along with their priorities, use the **show dial-shelf clocks** EXEC command.

Examples

In the following example, an external clock source is set at priority 1 and the trunk card in slot 4, port 1 is set at priority 5:

```
Router(config)# dial-tdm-clock priority 1 external t1
Router(config)# dial-tdm-clock priority 5 trunk-slot 4 port 1
Router(config)# exit
```

Related Commands

Command	Description
show dial-shelf	Displays information about the dial shelf, including clocking information.

disconnect

To disconnect a line, use the **disconnect** command in EXEC mode.

disconnect [*connection*]

Syntax Description

connection	(Optional) Number of the line or name of the active network connection to be disconnected.

Command Modes

EXEC

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Do not disconnect a line to end a session. Instead, log off the host, so that the Cisco IOS software can clear the connection. Then end the session. If you cannot log out of an active session, disconnect the line.

Examples

In the following example, the user disconnects from the device Remote to return to the router:

```
Remote% disconnect
 Connection closed by remote host
```

Related Commands

Command	Description
login (EXEC)	Enables or changes a login user name.

dnis group

To include a group of Dialed Number Identification Service (DNIS) numbers in a customer profile, use the **dnis group** command in customer profile configuration mode. To remove a DNIS group from a customer profile, use the **no** form of this command.

dnis group {**default** | **name** *dnis-group-name*}

no dnis group {**default** | **name** *dnis-group-name*}

Syntax Description

default	Allows a specified customer profile to accept all DNIS numbers coming into the access server. For example, a stray DNIS number not listed in any customer profile passes through this default DNIS group. Most customer profiles do not have this option configured.
name	Assigns a name to a DNIS group.
dnis-group-name	DNIS group name. It can have up to 23 characters.

Command Default

No DNIS groups are associated with a customer profile.

Command Modes

Customer profile configuration

Command History

Release	Modification
12.0(4)XI	This command was introduced.

Usage Guidelines

Use the **dnis group** customer profile configuration command to include a group of DNIS numbers in a customer profile or discriminator.

Examples

The following example includes the DNIS group called customer1dnis in the customer1 customer profile:

```
resource-pool profile customer customer1
 dnis group name customer1dnis
```

Related Commands

Command	Description
dialer dnis group	Creates a DNIS group.
resource-pool profile customer	Creates a customer profile.

ds0 busyout (channel)

To busyout one or more digital signal level 0s (DS0s), use the **ds0 busyout** command in controller configuration mode. To cancel busyout on a DS0, use the **no** form of this command.

ds0 busyout *ds0*

no ds0 busyout *ds0*

Syntax Description

ds0	DS0 number listed as a single channel, or listed as a channel range with the starting channel number and the ending channel number seperated by a hyphen. The range of numbers can be from 1 to 24 for T1. For example, from 1 to 10, or from 10 to 24.

Command Default

Disabled

Command Modes

Controller configuration

Command History

Release	Modification
11.3(2)AA	This command was introduced, and supported T1 and T3 only.
12.0	This command was integrated into Cisco IOS Release 12.0, and supported the E1and DMM HMM (Double Modem Module [12] Hex Modem Module [6]).

Usage Guidelines

Use the **ds0 busyout** command when you to busyout a one or more DS0s (channels). If there is an active call, the software waits until the call terminates by a disconnection; then the DS0 is busied out. First you must specify the T1 line (port) containing the 24 DS0s, using the **controller T1** command.

To busyout all DS0s on a trunk card or all modems on a modem card, use the **busyout** privileged EXEC command.

To display the busyout information, use the **show busyout** privileged EXEC command.

Note The **ds0 busyout** command only applies to **cas-group** command configurations for channel-associated signaling. This command has no effect on **pri-group** command configurations.

Examples

In this example, the controller T1 is configured with cas-group (channel-associated signaling). The following example removes DS0s 1 through 10 from dialup services. These DS0s are assigned to the T1 port (line) in shelf 6, slot 0, port 0:

```
controller t1 6/0/0
 ds0 busyout 1-10
 exit
```

Related Commands

Command	Description
busyout	Informs the central-office switch that a channel is out of service.
modem busyout	Disables a modem from dialing or answering calls whereby the disabling action is not executed until the active modem returns to an idle state.
modem busyout-threshold	Maintains a balance between the number of DS0s and modems.
modem shutdown	Abruptly shuts down an active or idle modem installed in an access server or router.
show busyout	Displays the busyout status for a card on the dial shelf.
show dial-shelf	Displays information about the dial shelf, including clocking information.

ds0 busyout-threshold

To define a threshold to maintain a balance between the number of DS0s and modems, use the **ds0 busyout-threshold** command in global configuration mode. To remove the threshold, use the **no** form of this command.

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ds0 busyout-threshold *threshold-number*

no ds0 busyout-threshold *threshold-number*

Note This command is the same as the **modem busyout-threshold** command for the Cisco AS5350 and AS5400 access servers.

Syntax Description

threshold-number	Number of modems that are free when the router should enforce the stipulation that the number of free DS0 lines is less than or equal to the number of modems.

Command Default

No threshold is defined.

Command Modes

Global configuration

Command History

Release	Modification
11.3(2)AA	This command was introduced as **modem busyout-threshold**.
12.2	This command was changed to **ds0 busyout-threshold** for the Cisco AS5300 and AS5800 access servers.

Usage Guidelines

The **ds0 busyout-threshold** command functionality is also often termed **autobusyout**. This command applies to all DS0 lines coming into the router and counts all free modems in all pools.

The **ds0 busyout-threshold** command periodically checks to see if the number of free modems is less that the user specified threshold and if it is it ensures the number of free DS0 channels is less than or equal to the number of modems.

This command should only be used where excess calls to one router are forwarded by the exchange to an additional router on the same exchange group number.

Since the **ds0 busyout-threshold** command checks only periodically, the threshold should be greater than the number of calls the user expects to receive in 1 minute plus a safety margin. For example, if the user receives an average of 10 calls per minute, then a threshold of 20 would be advised. Very small thresholds should be avoided since they do not allow sufficient time for the exchange to respond to out-of-service notifications from the router, and callers may receive busy signals when free modems are all used.

Caution The number of DS0 lines in normal operating conditions should be approximately equal to the number of modems (for example, within 30). If it is not, this will cause a lot of messaging traffic to the exchange and may cause active calls to be dropped. This is not a concern for short periods, that is, when modem cards are replaced.

On T3 controllers, any contained T1 controllers that are not in use should be undeclared to remove them from the **autobusyout** list.

Examples

The following example shows how you might configure the **ds0 busyout-threshold** command:

```
ds0 busyout-threshold 30
```

Related Commands

Command	Description
busyout	Informs the central-office switch that a channel is out-of-service.
ds0 busyout (channel)	Forces a DS0 time slot on a controller into the busyout state.
modem busyout	Disables a modem from dialing or answering calls whereby the disabling action is not executed until the active modem returns to an idle state.
modem shutdown	Abruptly shuts down an active or idle modem installed in an access server or router.

ds0-group (controller e1)

To define E1 channels for compressed voice calls and the channel-associated signaling (CAS) method by which the router connects to the PBX or PSTN, enter the **ds0-group** command in controller configuration mode. To remove the group and signaling setting, use the **no** form of this command.

ds0-group *channel* **timeslots** *range* **type** *signal*

no ds0-group *channel* **timeslots** *range* **type** *signal*

Syntax Description

channel	Specifies a single channel group number. Replace the *channel* variable with a number from 0 through 30.
timeslots *range*	Specifies a time-slot range, which can be from 1 through 31. You can specify a time-slot range (for example, 1-31), individual time-slots separated by commas (for example 1, 3, 5), or a combination of the two (for example 1-14, 15, 17-31). The sixteenth time slot is reserved for out-of-band signaling.
type *signal*	Specifies the type of channel-associated signaling. Configure the signal type that your central office uses. Replace the *signal* argument with one of the following signal types: • **r2-analog** [**r2-compelled** [**ani**] | **r2-non-compelled** [**ani**] | **r2-semi-compelled** [**ani**]] • **r2-digital** [**r2-compelled** [**ani**] | **r2-non-compelled** [**ani**] | **r2-semi-compelled** [**ani**]] • **r2-pulse** [**r2-compelled** [**ani**] | **r2-non-compelled** [**ani**] | **r2-semi-compelled** [**ani**]] The following descriptions are provided for the previous three R2 syntax bullets: • **r2-analog**—Specifies R2 ITU Q411 analog line signaling, which reflects the on/off switching of a tone in frequency-division multiplexing circuits (before TDM circuits were created). The tone is used for line signaling. • **r2-digital**—Specifies R2 ITU Q421 digital line signaling, which is the most common signaling configuration. The A and B bits are used for line signaling. • **r2-pulse**—Specifies R2 ITU supplement 7 pulse line signaling, which is a transmitted pulse that indicates a change in the line state. • **r2-compelled** [**ani**]—Specifies R2 compelled register signaling. You can also specify provisioning the ANI address option. • **r2-non-compelled** [**ani**]—Specifies R2 noncompelled register signaling. • **r2-semi-compelled** [**ani**]—Specifies R2 semicompelled register signaling.

Command Default

No channel-associated signaling is configured on the controller. All R2 signaling types have DNIS turned on by default.

Command Modes

Controller configuration

Command History

Release	Modification
11.3MA	The command was introduced as the **voice-group** command on the Cisco MC3810 concentrator.
12.0(5)XK	The command was implemented on the Cisco 2600 and Cisco 3600 series with a different name and some keyword modifications.
12.0(7)T	The command was implemented on the Cisco 2600 and Cisco 3600 series with a different name and some keyword modifications.
12.1(2)XH	The command was modified for E1 R2 signaling.
12.1(3)T	The command was modified for E1 R2 signaling.
12.2	The command was modified to exclude **sas** keywords**.** The Single Attachment Station (SAS) CAS options of **sas-loop-start** and **sas-ground-start** are not supported as a type of signaling for the DS0 group.

Usage Guidelines

Use this command to configure support for incoming and outgoing call signals (such as on-hook and off-hook) on each E1 controller.

If you specify the time-slot range 1-31, the system software automatically uses the sixteenth time slot to transmit the channel-associated signaling.

The signaling you configure on the access server must match the signaling used by the central office. For example, if the central office switch is forwarding R2 analog signaling to a Cisco 2600 or 3600 series router, the E1 controller on the router must also be configured for R2 analog signaling (**r2-analog**).

All R2 signaling options have DNIS support turned on by default. If you enable the **ani** option, the collection of DNIS information is still performed. Specifying the **ani** option does not disable DNIS. DNIS is the number being called. ANI is the caller's number. For example, if you are configuring router A to call router B, the DNIS number is router B and the ANI number is router A. ANI is very similar to Caller ID.

To customize the R2 signaling parameters, refer to the **cas-custom** controller configuration command. When you enable the **ds0-group** command, the **cas-custom** command is automatically set up to be polled for configuration information. However, unless you enable or turn on specific features with the **ds0-custom** command, the cas-custom feature has an empty set of signaling parameters.

DNIS is automatically collected for modem pools and R2 tone signaling. You do not need to specify the collection of DNIS information with the **ds0-group** command. However, if you are using non-R2 tone signaling, the system must be manually configured to collect DNIS information. For non-R2 CAS signaling, DNIS collection is done only for E&M-fgb.

Examples

In most cases, you will configure the same channel-associated signaling on each E1 controller. The following examples configure signaling and customized parameters on controller E1 2 using the **ds0-group** and **cas-custom** controller configuration commands.

The actual channel-associated signaling is configured on the sixteenth time slot, which is the reason why this time slot does not come up in the following output.

```
Router(config)# controller e1 2
Router(config-controller)# ds0-group 1 timeslots 1-31 type r2-digital r2-compelled ani
```

```
Router(config-controller)#

%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 1 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 2 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 3 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 4 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 5 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 6 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 7 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 8 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 9 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 10 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 11 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 12 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 13 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 14 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 15 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 17 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 18 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 19 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 20 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 21 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 22 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 23 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 24 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 25 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 26 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 27 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 28 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 29 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 30 is up
%DSX0-5-RBSLINEUP: RBS of controller 0 timeslot 31 is up
```

The following example shows all the supported E1 signaling types on a Cisco 2600 or 3600 series router.

```
Router(config-controller)# ds0-group 1 timeslots 1-31 type ?

 e&m-fgb              E & M Type II FGB
 e&m-fgd              E & M Type II FGD
 e&m-immediate-start  E & M Immediate Start
 fxs-ground-start     FXS Ground Start
 fxs-loop-start       FXS Loop Start
 p7                   P7 Switch
 r2-analog            R2 ITU Q411
 r2-digital           R2 ITU Q421
 r2-pulse             R2 ITU Supplement 7
 sas-ground-start     SAS Ground Start
 sas-loop-start       SAS Loop Start
```

Note Cisco IOS Releases later than 12.2 do not support the Single Attachment Station (SAS) CAS options of **sas-loop-start** and **sas-ground-start**.

```
Router(config-controller)# cas-group 1 timeslots 1-31 type r2-analog ?

 r2-compelled       R2 Compelled Register Signalling
 r2-non-compelled   R2 Non Compelled Register Signalling
 r2-semi-compelled  R2 Semi Compelled Register Signalling
 <cr>
```

R2 signaling parameters can be customized with the **cas-custom** controller configuration command:

```
Router(config-controller)# cas-custom 1
Router(config-ctrl-cas)# ?
```

```
CAS custom commands:
 caller-digits  Digits to be collected before requesting CallerID
 category       Category signal
 country        Country Name
 default        Set a command to its defaults
 exit           Exit from cas custom mode
 invert-abcd    invert the ABCD bits before tx and after rx
 metering       R2 network is sending metering signal
 nc-congestion  Non Compelled Congestion signal
 no             Negate a command or set its defaults
```

encap-sequence

To assign an encapsulation sequence number to a priority class in a multiclass multilink PPP bundle, use the **encap-sequence** command in policy-map class configuration mode. To reset the default value, use the **no** form of this command.

encap-sequence [*sequence-id* | **none**]

no encap-sequence *sequence-id*

Syntax Description

sequence-id	Assigns a unique encapsulation sequence number to priority class in a multiclass multilink PPP bundle. Valid range is from 0 to 3.
none	Specifies that a certain priority class is classified as or is assigned the highest priority, and packets are not encapsulated with a sequence number for multiclass multilink PPP.

Command Default

Sequence numbers are not assigned to priority classes.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.2(31)SB2	This command was introduced and implemented on the Cisco 10000 series router for the PRE2.

Usage Guidelines

The **encap-sequence** command allows you to assign sequence numbers to priority classes in a policy map for multiclass multilink PPP encapsulation. This command is only supported on the PRE2.

A class with a multiclass multilink PPP sequence number must have an associated queue action such as bandwidth and shape. The sequence number assigned to each priority class must be unique.

The default sequence number for class-default is 0 and it is not configurable.

If you do not assign a sequence number to a priority class, the priority queue packets use PPP encapsulation. Interleaving is allowed for priority traffic regardless of the encapsulated sequence number configuration.

Examples

The following example shows that class voice has the highest priority and that packets are not encapsulated with a sequence number for multiclass multilink PPP.

```
Router(config)# policy-map prec1
Router(config-pmap)# class voice
Router(config-pmap-c)# priority
Router(config-pmap-c)# police 128
Router(config-pmap-c)# encap-sequence none
Router(config-pmap-c)# exit
Router(config-pmap)# class video
```

```
Router(config-pmap-c)# bandwidth 1000
Router(config-pmap-c)# police 1000
Router(config-pmap-c)# encap-sequence 1
Router(config-pmap-c)# exit
Router(config-pmap)# class game
Router(config-pmap-c)# bandwidth 1000
Router(config-pmap-c)# encap-sequence 2
Router(config-pmap-c)# exit
Router(config-pmap)# class class-default
```

Related Commands

Command	Description
show ppp multilink	Displays information for multilink PPP bundles.

encapsulation cpp

Note Effective with Cisco IOS Release 12.3(4)T, the **encapsulation cpp** command is no longer available in Cisco IOS software.

To enable encapsulation for communication with routers or bridges using the Combinet Proprietary Protocol (CPP), use the **encapsulation cpp** command in interface configuration mode. To disable CPP encapsulation, use the **no** form of this command.

encapsulation cpp

no encapsulation cpp

Syntax Description

This command has no arguments or keywords.

Command Default

CPP encapsulation disabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.
12.3(4)T	This command was removed and is no longer available in Cisco IOS software.

Usage Guidelines

Use this command to communicate over an ISDN interface with Cisco 700 and 800 series (formerly Combinet) routers that do not support PPP but do support CPP.

Most Cisco routers support PPP. Cisco routers can communicate over ISDN with these devices by using PPP encapsulation, which supports both routing and fast switching.

The Cisco 700 and 800 series routers support only IP, IPX, and bridging. For AppleTalk, these Cisco routers automatically perform half-bridging.

This command is supported on ISDN BRIs and PRIs only.

Examples

The following example configures BRI interface 0 to communicate with a router or bridge that does not support PPP:

```
interface bri 0
 encapsulation cpp
 cpp callback accept
 cpp authentication
```

The following example configures PRI serial interface 1/1:23 to communicate with a router or bridge that does not support PPP:

```
controller t1 1/1
 framing esf
 linecode b8zs
 pri-group timeslots 1-23
 isdn switchtype primary-4ess
!
interface Serial1/1:23
 encapsulation cpp
 cpp callback accept
 cpp authentication
```

Related Commands

Command	Description
cpp authentication	Enables negotiation of authentication with a router or bridge that supports the CPP and that is calling in to this router.
cpp callback accept	Enables the router to accept callback from a router or bridge that supports the CPP.

failover group-number

To configure shelf redundancy for Cisco AS5800 universal access servers, use the **failover group-number** command in redundancy configuration mode. To disable redundancy, use the **no** form of this command.

failover group-number *group-code*

no failover group-number *group-code*

Syntax Description

group-code	The failover group code. An integer that identifies a redundant pair of router shelves. Each member of the pair must be configured with the same group code. When failover mode is enabled, this group code is sent in place of the router MAC address.

Command Default

Redundancy is not enabled.

Command Modes

Redundancy configuration

Command History

Release	Modification
12.1(5)XV1	This command was introduced.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T.

Usage Guidelines

This command must be configured on both router shelves. The *group-code* argument is used by the system controller and must be the same for both router shelves forming the redundant pair.

For successful failover to occur, both router-shelf configurations must be synchronized. Configure each router shelf separately, as active and backup respectively, with the same configuration except for the IP address on egress interfaces.

Note Test the backup router shelf configuration before deployment in a production environment.

Examples

The following example assigns the configured router shelf to the redundancy pair designated as 25. These commands must be issued on both router shelves in the redundant router-shelf pair:

```
Router(config)# redundancy
Router(config-red)# failover group-number 25
```

Related Commands

Command	Purpose
redundancy	Enters redundancy mode for further configuration.
show redundancy	Displays current or historical status and related information and displays shelf-redundancy status.

firmware filename

To use a different DSL firmware other than the embedded one, use the **firmware filename** command in controller configuration mode. To revert back to the embedded firmware, use the **no** form of this command.

firmware filename flash:*firmware-filename*

no firmware filename

Syntax Description

firmware-filename	Filename for the binary firmware file to be upgraded.
flash:	Compact flash.

Defaults

The default uses the embedded firmware.

Command Modes

Configuration controller mode.

Command History

Release	Modification
15.0(1)M1	This command was introduced.

Usage Guidelines

The specified firmware will be used after **shutdown** and **no shutdown** of the controller.

Examples

The following example shows how to upgrade the firmware file.

```
Router(config)#controller vdsl 0/2/0
Router(config-controller)#firmware filename flash:myvdsl.bin
```

Related Commands

Command	Description
debug vdsl daemon	Debugs the VDSL firmware download state, DSL line training progress, and VDSL interface status

firmware location

To download firmware into the modems, use the **firmware location** command in Service Processing Element (SPE) configuration mode. To revert the router to the system embedded image default, use the **no** form of this command.

firmware location [*IFS*]*filename*

no firmware location

Syntax Description

IFS:	(Optional) IOS file specification (IFS), which can be any valid IFS on any local file system. Examples of legal specifications include: • **bootflash:**—Loads the firmware from a separate Flash memory device. • **flash:**—Loads the firmware from the Flash NVRAM located within the router. • **system:/**—Loads the firmware from a built-in file within the Cisco IOS image. The optional forward slash (**/**) and system path must be entered with this specification. Use the **dir all-filesystems** EXEC command to display legal IFSs.
filename	The firmware filename. When *filename* is entered without an IFS specification, this name defaults to the file in Flash memory.

Command Default

Downloads SPE firmware in Flash memory.

Command Modes

SPE configuration

Command History

Release	Modification
12.0(4)XI1	This command was introduced on the Cisco AS5200, Cisco AS5300, and Cisco AS5800.
12.0(6)T	This command was integrated into Cisco IOS Release 12.0(6)T.
12.0(7)T	This command was implemented on the Cisco AS5300 and Cisco AS5800 for MICA technologies modems.
12.1(1)XD	This command was implemented on the Cisco AS5400 for the NextPort dial feature card (DFC).
12.1(3)T	This command was implemented on the Cisco AS5400 for the NextPort DFC and on the Cisco AS5800 for the universal port card (UPC).
12.1(5)XM1	This command was implemented on the Cisco AS5350.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T.

Usage Guidelines

Use the **firmware location** SPE configuration command to download firmware into your modems. This command specifies the location of the firmware file *and* downloads the firmware in the range of SPEs specified, depending on the states configured by the **firmware upgrade** command. Use the **firmware location** command with the **firmware upgrade** command. The entire SPE is affected by the **firmware location** command.

The latest SPE firmware image can usually be retrieved from Cisco.com. You must first copy the SPE image from a TFTP server to Flash memory using the **copy tftp flash** command.

The **firmware location** command is a configuration command and must be saved into the system configuration using the **write memory** command; otherwise, at the next reboot downloading of the specified firmware will not occur.

The **firmware location** command was first supported in Cisco IOS Release 12.0(4)XI1. For earlier images, use the **copy** command. For the Cisco IOS Release 12.0(4)XI1 images, the **copy flash modem** command is disabled for MICA technologies modems and newer versions of the 56-kbps Microcom modems. The older V.34 Microcom modems still use the **copy** command for downloading in Cisco IOS Release 12.0(4)XI1 images.

Note This command should be used when traffic is low because the **firmware location** download will not begin until the modems have no active calls. Otherwise, use the **firmware upgrade** command to customize the scheduling of modem downloads for your needs.

You cannot use the **firmware location** command on SPEs that are in the Bad state.

Examples

The following example shows how to display all legal IFSs:

```
Router# dir all-filesystems

Directory of nvram:/

  121  -rw-        1543              <no date>  startup-config
  122  ----           5              <no date>  private-config

126968 bytes total (125368 bytes free)

Directory of system:/

    6  dr-x           0              <no date>  memory
    1  -rw-        2929              <no date>  running-config
    2  dr-x           0              <no date>  ucode
   17  dr-x           0              <no date>  vfiles

No space information available

Directory of flash:/

    1  -rw-    12575032              <no date>  c5300-js-mz.122-11.T

16777216 bytes total (4202120 bytes free)

Directory of bootflash:/

    1  -rw-     1155864              <no date>  c5300-boot-mz.113-10.T.bin
    2  -rw-      381540              <no date>  mica-modem-pw.2.6.2.0.bin
    3  -rw-      384056              <no date>  pw2621.ios
8388608 bytes total (5682340 bytes free)
```

```
Directory of lex:/

No files in directory

No space information available
```

The following example shows how to enter the SPE configuration mode, set the range of SPEs, specify the firmware file location in Flash memory, download the file to the SPEs, and display a status report using the **show spe** EXEC command:

```
Router# configure terminal
Router(config)# spe 7/0 7/17
Router(config-spe)# firmware location flash:np-6-75
Router(config-spe)# firmware upgrade busyout
Started downloading firmware flash:np-6-75.spe
Router(config-spe)# exit
Router# show spe 7
.
.
.
                     SPE          SPE     SPE  SPE   Port         Call
SPE#    Port #       State        Busyout Shut Crash State        Type
7/00    0000-0005    ACTIVE             1    0     0 BBBBBB       _______
7/01    0006-0011    DOWNLOAD           1    0     0 bbbbbb       _______
7/02    0012-0017    DOWNLOAD           1    0     0 bbbbbb       _______
7/03    0018-0023    DOWNLOAD           1    0     0 bbbbbb       _______
.
.
.
```

The following configuration example specifies a firmware file located in Flash memory:

```
spe 1/0 1/8
 firmware location np-spe-upw-1.0.1.2.bin
```

The following configuration example shows how to download firmware that is not bundled with the Cisco IOS image:

```
spe 1/2 1/4
 firmware location flash:portware.2620.ios
```

The following configuration example shows how to download firmware that is bundled with the Cisco IOS image:

```
spe 2/9 2/9
 firmware location system:/ucode/microcom_firmware
```

Related Commands

Command	Description
clear port	Resets the NextPort port and clears any active call.
clear spe	Reboots all specified SPEs.
copy	Copies any file from a source to a destination.
copy tftp flash	Copies the SPE image from a TFTP server to the Flash memory.
firmware upgrade	Specifies the method in which the SPE will be downloaded.
show spe version	Displays the firmware version on an SPE.
spe download maintenance	Performs download maintenance on SPEs that are marked for recovery.
spe recovery	Sets an SPE port for recovery.

firmware upgrade

To modify the way in which the service processing element (SPE) will be downloaded, use the **firmware upgrade** command in SPE configuration mode. To revert to the default SPE firmware upgrade option, busyout, use the **no** form of this command.

firmware upgrade {**busyout** | **recovery** | **reboot**}

no firmware upgrade

Cisco AS5350, Cisco AS5400, and Cisco AS5800

firmware upgrade [**busyout** | **download-maintenance** | **reboot**]

Syntax Description

busyout	Upgrades when all calls are terminated on the SPE.
recovery	Upgrades during download maintenance time.
reboot	Upgrades at the next reboot.
download-maintenance	Upgrades during download maintenance time.

Command Default

An upgrade occurs when all calls are terminated on the SPE (**busyout**).
For the Cisco AS5350, Cisco AS5400, and Cisco AS5800 there is no default.

Command Modes

SPE configuration

Command History

Release	Modification
12.0(4)XI1	This command was introduced on the Cisco AS5200, Cisco AS5300, and Cisco AS5800.
12.0(6)T	This command was integrated into Cisco IOS Release 12.0(6)T.
12.0(7)T	This command was implemented on the Cisco AS5300 and Cisco AS5800 for MICA technologies modems.
12.1(1)XD	This command was implemented on the Cisco AS5400 for the NextPort dial feature card (DFC).
12.1(3)T	This command was implemented on the Cisco AS5400 for the NextPort DFC and Cisco AS5800 for the universal port card (UPC).
12.1(5)XM1	This command was implemented on the Cisco AS5350.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T.

Usage Guidelines

Three methods of upgrade are available: busyout, reboot, and download-maintenance or recovery.

The **reboot** keyword requests the Cisco access servers to upgrade SPE firmware at the next reboot.

The **busyout** keyword upgrades SPE firmware after waiting for all calls to be terminated on an SPE.

The **download-maintenance** or **recovery** keyword requests SPE firmware download during maintenance time.

Use this command in conjunction with the **firmware location** command and the **spe download maintenance** command.

The SPE **firmware location** command is designed to integrate all continuous ranges of SPEs containing the same firmware location. However, the **firmware upgrade** command does not affect the ranges of SPEs. As such, all SPEs within the ranges of SPEs must have the same firmware upgrade mode or the router uses the default upgrade mode to busyout state. If you want to upgrade a single SPE within an existing range of SPEs with a different upgrade mode than is currently configured, you must first change the upgrade mode for the entire range of SPEs and then change the firmware location for the specific SPE being upgraded. Furthermore, each time you merge ranges of SPEs due to configuration changes, verify that the configuration of the SPE firmware upgrade remains effective to what is desired.

Examples

The following example sets the SPEs and specifies the firmware upgrade to take place once all calls are terminated on the SPE:

```
Router(config)# spe 1/03
Router(config-spe)# firmware location np-spe-upw-1.0.1.2.bin
Router(config-spe)# firmware upgrade busyout
```

If the **busyout upgrade** command is specified, or if no upgrade mode is specified, the SPE modems are set into a "pending download" state when you use the **firmware location** command on the specified SPE. The pending download state prevents any modem in that state to be allocated for new calls until the state is cleared. Modems with active calls remain active for their call durations, but enter the pending download state when they terminate. This pending download state can be cleared only when the SPE is finally downloaded. When all modems within the SPE are in the pending download state and no active calls remain on the SPE, the SPE is reloaded. The **busyout** option is the fastest way to upgrade modems on an active router but can severely impact the capacity of the router during the upgrade. The following example sets the default option for the firmware upgrade process:

```
Router(config-spe)# firmware upgrade busyout
```

If reboot upgrade is specified, the SPE modems are not reloaded to the new firmware location until the router is rebooted. The reboot upgrade option is useful for routers that need to have their SPE upgraded and that also will be rebooted for maintenance. When the new firmware is configured, the configuration takes effect after the reboot takes place. The following example sets the firmware upgrade reboot:

```
Router(config-spe)# firmware upgrade reboot
```

If recovery upgrade is specified, the SPE modems are reloaded based on the modem recovery algorithm. Only when no active calls exist on the SPE does the firmware download take place. Furthermore, at the time configured with the **modem recovery maintenance** command, the modem recovery maintenance process attempts, in a controller fashion, to reload the modems by busying out the modems for a window duration of time to make the download take place. Refer to the modem recovery documentation for more information. The recovery upgrade option upgrades modems on an active router with the least impact. Capacity is kept at a maximum. However, this option may take a few days for all modems to be reloaded to the new firmware location. The following example sets the system for a firmware upgrade recovery:

```
Router(config-spe)# firmware upgrade recovery
```

For the Cisco AS5350, Cisco AS5400, or Cisco AS5800, use the following syntax to set the system for a firmware upgrade recovery:

```
Router(config-spe)# firmware upgrade download-maintenance
```

Related Commands

Command	Description
firmware location	Downloads firmware into the modems from this file location.
modem recovery maintenance	Specifies the scheduled modem maintenance recovery behavior.
show spe version	Displays the firmware version on an SPE.
spe download maintenance	Performs download maintenance on SPEs that are marked for recovery.
spe recovery	Sets an SPE port for recovery.

flowcontrol

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

flowcontrol {**none** | **software** [**lock**] [**in** | **out**] | **hardware** [**in** | **out**]}

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

Syntax Description

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

Command Default

Flow control is disabled.

Command Modes

Line configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.

Usage Guidelines

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

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

Examples

The following example sets hardware flow control on line 7:

```
line 7
 flowcontrol hardware
```

Related Commands

Command	Description
start-character	Sets the flow control start character.
stop-character	Sets the flow control stop character.

group-range

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

group-range *low-end-of-interfacerange high-end-of-interfacerange*

no group-range *interface*

Syntax Description

low-end-of-interfacerange	Beginning interface number to be made a member of the group interface.
high-end-of-interfacerange	Ending interface number to be made a member of the group interface.
interface	Interface number to be removed from the group interface.

Command Default

No interfaces are designated as members of a group.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

Using the **group-range** command, you create a group of asynchronous interfaces that are associated with a group asynchronous interface on the same device. This group interface is configured by using the **interface group-async** command. This one-to-many structure allows you to configure all associated member interfaces by entering one command on the group interface, rather than entering this command on each interface. You can customize the configuration on a specific interface by using the **member** command. Interface numbers can be removed from the interface group using the **no group-range** command.

Examples

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

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

Related Commands

Command	Description
interface group-async	Creates a group interface that will serve as master, to which asynchronous interfaces can be associated as members.
member	Alters the configuration of an asynchronous interface that is a member of a group.