# frame-relay lmi-n391dte

To set a full status polling interval, use the **frame-relay lmi-n391dte** interface configuration command. To restore the default interval value, assuming that a Local Management Interface (LMI) has been configured, use the **no** form of this command.

**frame-relay lmi-n391dte** *keep-exchanges*

**no frame-relay lmi-n391dte** *keep-exchanges*

## Syntax Description

| | |
|---|---|
| *keep-exchanges* | Number of keep exchanges to be done before requesting a full status message. Acceptable value is a positive integer in the range from 1 through 255. |

## Defaults

6 keep exchanges

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Usage Guidelines

Use this command when the interface is configured as data terminal equipment (DTE) or a Network-to-Network Interface (NNI) as a means of setting the full status message polling interval.

## Examples

In the following example, one out of every four status inquiries generated will request a full status response from the switch. The other three status inquiries will request keepalive exchanges only.

```
interface serial 0
 frame-relay intf-type DTE
 frame-relay lmi-n391dte 4
```

# frame-relay lmi-n392dce

To set the data communications equipment (DCE) and the Network-to-Network Interface (NNI) error threshold, use the **frame-relay lmi-n392dce** interface configuration command. To remove the current setting, use the **no** form of this command.

**frame-relay lmi-n392dce** *threshold*

**no frame-relay lmi-n392dce** *threshold*

## Syntax Description

| | |
|---|---|
| *threshold* | Error threshold value. Acceptable value is a positive integer in the range from 1 through 10. |

## Defaults

2 errors

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Usage Guidelines

In Cisco's implementation, N392 errors must occur within the number defined by the N393 event count in order for the link to be declared down. Therefore, the threshold value for this command must be less than the count value defined in the **frame-relay lmi-n393dce** command.

## Examples

The following example sets the LMI failure threshold to 3. The router acts as a Frame Relay DCE or NNI switch.

```
interface serial 0
 frame-relay intf-type DCE
 frame-relay lmi-n392dce 3
```

## Related Commands

| Command | Description |
|---|---|
| **frame-relay lmi-n393dce** | Sets the DCE and NNI monitored events count. |

# frame-relay lmi-n392dte

To set the error threshold on a data terminal equipment (DTE) or network-to-network interface (NNI) interface, use the **frame-relay lmi-n392dte** interface configuration command. To remove the current setting, use the **no** form of this command.

**frame-relay lmi-n392dte** *threshold*

**no frame-relay lmi-n392dte** *threshold*

## Syntax Description

| | |
|---|---|
| *threshold* | Error threshold value. Acceptable value is a positive integer in the range from 1 through 10. |

## Defaults

3 errors

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Examples

The following example sets the Loca Management Interface (LMI) failure threshold to 3. The router acts as a Frame Relay DTE or NNI switch.

```
interface serial 0
 frame-relay intf-type DTE
 frame-relay lmi-n392dte 3
```

# frame-relay lmi-n393dce

To set the data communications equipment (DCE) and Network-to-Network Interface (NNI) monitored events count, use the **frame-relay lmi-n393dce** interface configuration command. To remove the current setting, use the **no** form of this command.

**frame-relay lmi-n393dce** *events*

**no frame-relay lmi-n393dce** *events*

## Syntax Description

| | |
|---|---|
| *events* | Value of monitored events count. Acceptable value is a positive integer in the range from 1 through 10. |

## Defaults

2 events

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Usage Guidelines

This command and the **frame-relay lmi-n392dce** command define the condition that causes the link to be declared down. In Cisco's implementation, N392 errors must occur within the *events* argument count in order for the link to be declared down. Therefore, the *events* value defined in this command must be greater than the threshold value defined in the **frame-relay lmi-n392dce** command.

## Examples

The following example sets the Local Management Interface (LMI) monitored events count to 3. The router acts as a Frame Relay DCE or NNI switch.

```
interface serial 0
 frame-relay intf-type DCE
 frame-relay lmi-n393dce 3
```

## Related Commands

| Command | Description |
|---|---|
| **frame-relay lmi-n392dce** | Sets the DCE and the NNI error threshold. |

# frame-relay lmi-n393dte

To set the monitored event count on a data terminal equipment (DTE) or Network-to-Network Interface (NNI) interface, use the **frame-relay lmi-n393dte** interface configuration command. To remove the current setting, use the **no** form of this command.

**frame-relay lmi-n393dte** *events*

**no frame-relay lmi-n393dte** *events*

## Syntax Description

| | |
|---|---|
| *events* | Value of monitored events count. Acceptable value is a positive integer in the range from 1 through 10. |

## Defaults

4 events

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Examples

The following example sets the Local Management Interface (LMI) monitored events count to 3. The router acts as a Frame Relay DTE or NNI switch.

```
interface serial 0
 frame-relay intf-type DTE
 frame-relay lmi-n393dte 3
```

# frame-relay lmi-t392dce

To set the polling verification timer on a data communications equipment (DCE) or Network-to-Network Interface (NNI) interface, use the **frame-relay lmi-t392dce** interface configuration command. To remove the current setting, use the **no** form of this command.

**frame-relay lmi-t392dce** *seconds*

**no frame-relay lmi-t392dce** *seconds*

## Syntax Description

| | |
|---|---|
| *seconds* | Polling verification timer value from 5 to 30 seconds. |

## Defaults

15 seconds

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Usage Guidelines

The value for the timer must be greater than the DTE or NNI keepalive timer.

## Examples

The following example indicates a polling verification timer on a DCE or NNI interface set to 20 seconds:

```
interface serial 3
 frame-relay intf-type DCE
 frame-relay lmi-t392dce 20
```

## Related Commands

| Command | Description |
|---|---|
| keepalive (LMI) | Enables the LMI mechanism for serial lines using Frame Relay encapsulation. |

# frame-relay lmi-type

To select the Local Management Interface (LMI) type, use the **frame-relay lmi-type** interface configuration command. To return to the default LMI type, use the **no** form of this command.

**frame-relay lmi-type** {**ansi** | **cisco** | **q933a**}

**no frame-relay lmi-type** {**ansi** | **q933a**}

## Syntax Description

| | |
|---|---|
| **ansi** | Annex D defined by American National Standards Institute (ANSI) standard T1.617. |
| **cisco** | LMI type defined jointly by Cisco and three other companies. |
| **q933a** | ITU-T Q.933 Annex A. |

## Defaults

LMI autosense is active and determines the LMI type by communicating with the switch.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Usage Guidelines

Cisco's implementation of Frame Relay supports three LMI types: Cisco, ANSI Annex D, and ITU-T Q.933 Annex A.

The LMI type is set on a per-interface basis and is shown in the output of the **show interfaces** EXEC command.

If you want to deactivate LMI autosense, use this command and the **keepalive** command to configure the LMI. For more information about LMI autosense and configuring the LMI, refer to the chapter "Configuring Frame Relay" in the *Cisco IOS Wide-Area Networking Configuration Guide*.

## Examples

The following is an example of the commands you might enter to configure an interface for the ANSI Annex D LMI type:

```
interface Serial1
 encapsulation frame-relay
 frame-relay lmi-type ansi
 keepalive 15
```

# frame-relay local-dlci

To set the source data-link connection identifier (DLCI) for use when the Local Management Interface (LMI) is not supported, use the **frame-relay local-dlci** interface configuration command. To remove the DLCI number, use the **no** form of this command.

**frame-relay local-dlci** *number*

**no frame-relay local-dlci**

## Syntax Description

| | |
|---|---|
| *number* | Local (source) DLCI number to be used. |

## Defaults

No source DLCI is set.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Usage Guidelines

If LMI is supported and the multicast information element is present, the network server sets its local DLCI based on information provided via the LMI.

**Note** The **frame-relay local-dlci** command is provided mainly to allow testing of the Frame Relay encapsulation in a setting where two servers are connected back-to-back. This command is not required in a live Frame Relay network.

## Examples

The following example specifies 100 as the local DLCI:

```
interface serial 4
 frame-relay local-dlci 100
```

# frame-relay map

To define the mapping between a destination protocol address and the data-link connection identifier (DLCI) used to connect to the destination address, use the **frame-relay map** interface configuration command. To delete the map entry, use the **no** form of this command.

**frame-relay map** *protocol protocol-address dlci* [**broadcast**] [**ietf** | **cisco**] [**payload-compress** {**packet-by-packet** | **frf9 stac** [*hardware-options*] | **data-stream stac** [*hardware-options*]}]

**no frame-relay map** *protocol protocol-address*

## Syntax Description

| | |
|---|---|
| *protocol* | Supported protocol, bridging, or logical link control keywords: **appletalk**, **decnet**, **dlsw, ip**, **ipx**, **llc2**, **rsrb**, **vines,** and **xns**. |
| *protocol-address* | Destination protocol address. |
| *dlci* | DLCI number used to connect to the specified protocol address on the interface. |
| **broadcast** | (Optional) Forwards broadcasts to this address when multicast is not enabled (see the **frame-relay multicast-dlci** command for more information about multicasts). This keyword also simplifies the configuration of Open Shortest Path First (OSPF) (see the "Usage Guidelines" section for more detail). |
| **ietf** | (Optional) Internet Engineering Task Force (IETF) form of Frame Relay encapsulation. Used when the router or access server is connected to the equipment of another vendor across a Frame Relay network. |
| **cisco** | (Optional) Cisco encapsulation method. |
| **payload-compress** | (Optional) Enables payload compression. |
| **packet-by-packet** | (Optional) Packet-by-packet payload compression using the Stacker method. |
| **frf9 stac** | (Optional) FRF.9 compression using the Stacker method:<br>• If the router contains a compression service adapter (CSA), compression is performed in the CSA hardware (hardware compression).<br>• If the CSA is not available, compression is performed in the software installed on the VIP2 (distributed compression).<br>• If the second-generation Versatile Interface Processor (VIP2) is not available, compression is performed in the main processor of the router (software compression). |
| **data-stream stac** | (Optional) Data-stream compression using the Stacker method:<br>• If the router contains a CSA, compression is performed in the CSA hardware (hardware compression).<br>• If the CSA is not available, compression is performed in the main processor of the router (software compression). |

| | |
|---|---|
| *hardware-options* | Choose one of the following hardware options:<br>• (Optional) **distributed**. Specifies that compression is implemented in the software that is installed in a VIP2. If the VIP2 is not available, compression is performed in the main processor of the router (software compression). This option applies only to the Cisco 7500 series routers. This option is not supported with data-stream compression.<br>• (Optional) **software**. Specifies that compression is implemented in the Cisco IOS software installed in the main processor of the router.<br>• (Optional) **csa** *csa_number*. Specifies the CSA to use for a particular interface. This option applies only to Cisco 7200 series routers. |

## Defaults

No mapping is defined.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |
| 11.3 | The **payload-compress frf9 stac** keyword was added. |
| 12.1(5)T | The **payload-compress data-stream stac** keyword was added. |

## Usage Guidelines

Many DLCIs can be known by a router or access server and can send data to many different places, but they are all multiplexed over one physical link. The Frame Relay map defines the logical connection between a specific protocol and address pair and the correct DLCI.

The optional **ietf** and **cisco** keywords allow flexibility in the configuration. If no keywords are specified, the map inherits the attributes set with the **encapsulation frame-relay** command. You can also use the encapsulation options to specify that, for example, all interfaces use IETF encapsulation except one, which needs the original Cisco encapsulation method and can be configured through use of the **cisco** keyword with the **frame-relay map** command.

Data-stream compression is supported on interfaces and virtual circuits (VCs) using Cisco proprietary encapsulation. When the **data-stream stac** keyword is specified, Cisco encapsulation is automatically enabled. FRF.9 compression is supported on IETF-encapsulated VCs and interfaces. When the **frf9 stac** keyword is specified, IETF encapsulation is automatically enabled.

Packet-by-packet compression is Cisco-proprietary and will not interoperate with routers of other manufacturers.

You can disable payload compression by entering the **no frame-relay map payload** command and then entering the **frame-relay map** command again with one of the other encapsulation keywords (**ietf** or **cisco**).

Use the **frame-relay map** command to enable or disable payload compression on multipoint interfaces. Use the **frame-relay payload-compress** command to enable or disable payload compression on point-to-point interfaces.

We recommend that you shut down the interface before changing encapsulation types. Although shutting down the interface is not required, it ensures that the interface is reset for the new encapsulation.

The **broadcast** keyword provides two functions: it forwards broadcasts when multicasting is not enabled, and it simplifies the configuration of OSPF for nonbroadcast networks that will use Frame Relay.

The **broadcast** keyword might also be required for some routing protocols—for example, AppleTalk—that depend on regular routing table updates, especially when the router at the remote end is waiting for a routing update packet to arrive before adding the route.

By requiring selection of a designated router, OSPF treats a nonbroadcast, multiaccess network such as Frame Relay in much the same way as it treats a broadcast network. In previous releases, selection of a designated router required manual assignment in the OSPF configuration using the **neighbor interface** router command. When the **frame-relay map** command (with the **broadcast** keyword) and the **ip ospf network** command (with the **broadcast** keyword) are configured, there is no need to configure any neighbors manually. OSPF will now automatically run over the Frame Relay network as a broadcast network. (See the **ip ospf network** interface command for more detail.)

**Note** The OSPF broadcast mechanism assumes that IP class D addresses are never used for regular traffic over Frame Relay.

## Examples

### IP Address Mapping Example

The following example maps the destination IP address 172.16.123.1 to DLCI 100:

```
interface serial 0
 frame-relay map ip 172.16.123.1 100 broadcast
```

OSPF will use DLCI 100 to broadcast updates.

### FRF.9 Compression Example

The following example shows FRF.9 compression configuration using the **frame-relay map** command:

```
interface serial2/0/1
 ip address 172.16.1.4 255.255.255.0
 no ip route-cache
 encapsulation frame-relay ietf
 no keepalive
 shutdown
 frame-relay map ip 172.16.1.1 105 ietf payload-compress frf9 stac
```

### Data-Stream Compression Example

The following example shows data-stream compression configuration using the **frame-relay map** command:

```
interface serial0/0
 frame-relay map ip 10.0.0.1 100 payload-compress data-stream stac
```

## Related Commands

| Command | Description |
|---|---|
| **encapsulation frame-relay** | Enables Frame Relay encapsulation. |
| **frame-relay payload-compress** | Enables Stacker payload compression on a specified point-to-point interface or subinterface. |
| **ip ospf network** | Configures the OSPF network type to a type other than the default for a given medium. |

# frame-relay map bridge

To specify that broadcasts are to be forwarded during bridging, use the **frame-relay map bridge** interface configuration command. To delete the map entry, use the **no** form of this command.

**frame-relay map bridge** *dlci* [**broadcast**] [**ietf**]

**no frame-relay map bridge** *dlci*

## Syntax Description

| | |
|---|---|
| *dlci* | DLCI number to be used for bridging on the specified interface or subinterface. |
| **broadcast** | (Optional) Broadcasts are forwarded when multicast is not enabled. |
| **ietf** | (Optional) IETF form of Frame Relay encapsulation. Use when the router or access server is connected to another vendor's equipment across a Frame Relay network. |

## Defaults

No broadcasts are forwarded.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Examples

The following example uses DLCI 144 for bridging:

```
interface serial 0
 frame-relay map bridge 144 broadcast
```

The following example sets up separate point-to-point links over a subinterface and runs transparent bridging over it:

```
interface serial 0
 bridge-group 1
 encapsulation frame-relay
interface serial 0.1
 bridge-group 1
 frame-relay map bridge 42 broadcast
interface serial 0.2
 bridge-group 1
 frame-relay map bridge 64 broadcast
interface serial 0.3
 bridge-group 1
 frame-relay map bridge 73 broadcast
```

DLCI 42 is used as the link; refer to the section “Frame Relay Configuration Examples” in the *Cisco IOS Wide-Area Networking Configuration Guide* for more examples of subinterfaces.

# frame-relay map clns

To forward broadcasts when Connectionless Network Service (CLNS) is used for routing, use the **frame-relay map clns** interface configuration command. To delete the map entry, use the **no** form of this interface configuration command.

**frame-relay map clns** *dlci* [**broadcast**]

**no frame-relay map clns** *dlci*

## Syntax Description

| | |
|---|---|
| *dlci* | DLCI number to which CLNS broadcasts are forwarded on the specified interface. |
| **broadcast** | (Optional) Broadcasts are forwarded when multicast is not enabled. |

## Defaults

No broadcasts are forwarded.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Examples

The following example uses DLCI 125 for CLNS routing:

```
interface serial 0
 frame-relay map clns 125 broadcast
```

# frame-relay map ip tcp header-compression

To assign to an IP map header compression characteristics that differ from the compression characteristics of the interface with which the IP map is associated, use the **frame-relay map ip tcp header-compression** interface configuration command.

**frame-relay map ip** *ip-address dlci* [**broadcast**] **tcp header-compression** [**active** | **passive**] [**connections** *number*]

## Syntax Description

| | |
|---|---|
| *ip-address* | IP address of the destination or next hop. |
| *dlci* | Data-link connection identifier (DLCI) number. |
| **broadcast** | (Optional) Forwards broadcasts to the specified IP address. |
| **active** | (Optional) Compresses the header of every outgoing TCP/IP packet. |
| **passive** | (Optional) Compresses the header of an outgoing TCP/IP packet only if an incoming TCP/IP packet had a compressed header. |
| **connections** *number* | (Optional) Specifies the maximum number of TCP header compression connections. The range is from 3 to 256. |

## Defaults

The default maximum number of TCP header compression connections is 256.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |
| 12.1(2)T | This command was modified to enable the configuration of the maximum number of header compression connections. |

## Usage Guidelines

If you do not specify the number of TCP header compression connections, the map will inherit the current value from the interface.

IP maps inherit the compression characteristics of the associated interface unless this command is used to provide different characteristics. This command can also reconfigure an IP map that existed before TCP header compression was configured on the associated interface.

When IP maps at both ends of a connection inherit passive compression, the connection will never transfer compressed traffic because neither side will generate a packet that has a compressed header.

If you change the encapsulation characteristics of the interface to Internet Engineering Task Force (IETF) encapsulation, you lose the TCP header compression configuration of the associated IP map.

The **frame-relay map ip** *ip-address dlci* **tcp header-compression active** command can also be entered as **frame-relay map ip** *ip-address dlci* **active tcp header-compression**.

We recommend that you shut down the interface before changing encapsulation types. Although shutting down the interface is not required, it ensures that the interface is reset for the new encapsulation.

## Examples

The following example illustrates a command sequence for configuring an IP map associated with serial interface 1 to enable active TCP/IP header compression:

```
interface serial 1
 encapsulation frame-relay
 ip address 10.108.177.170 255.255.255.0
 frame-relay map ip 10.108.177.180 190 tcp header-compression active
```

## Related Commands

| Command | Description |
|---|---|
| **frame-relay ip tcp compression-connections** | Specifies the maximum number of TCP header compression connections that can exist on a Frame Relay interface. |
| **frame-relay ip tcp header-compression** | Enables TCP header compression for all Frame Relay maps on a physical interface. |
| **frame-relay map ip compress** | Enables both RTP and TCP header compression on a link. |
| **show frame-relay ip tcp header-compression** | Displays statistics and TCP/IP header compression information for the interface. |

# frame-relay mincir

To specify the minimum acceptable incoming or outgoing committed information rate (CIR) for a Frame Relay virtual circuit, use the **frame-relay mincir** map-class configuration command. To reset the minimum acceptable CIR to the default, use the **no** form of this command.

**frame-relay mincir** {**in** | **out**} *bps*

**no frame-relay mincir**

## Syntax Description

| | |
|---|---|
| **in** \| **out** | Incoming or outgoing. |
| *bps* | Committed information rate, in bits per second. |

## Defaults

56000 bps

## Command Modes

Map-class configuration

## Command History

| Release | Modification |
|---|---|
| 11.2 | This command was introduced. |

## Usage Guidelines

Rate values greater than 2048 must be entered with trailing zeros. For example, 2048000 and 5120000.

The network uses the **mincir** value when allocating resources for the SVC. If the **mincir** value cannot be supported, the call is cleared.

## Examples

The following example defines the peak and average traffic rate, the minimum CIR, and the idle timer for the fast_vcs map class and applies those values to DLCI 100, which is associated with that map class:

```
interface serial 0
 frame-relay interface-dlci 100
  class fast_vc

map-class frame-relay fast_vc
 frame-relay traffic-rate 56000 128000
 frame-relay idle-timer 30
 frame-relay mincir out 48000
```

## Related Commands

| Command | Description |
|---|---|
| **map-class frame-relay** | Specifies a map class to define QoS values for an SVC. |

# frame-relay multicast-dlci

To define the data-link connection identifier (DLCI) to be used for multicasts, use the **frame-relay multicast-dlci** interface configuration command. To remove the multicast group, use the **no** form of this command.

**frame-relay multicast-dlci** *number*

**no frame-relay multicast-dlci**

## Syntax Description

| | |
|---|---|
| *number* | Multicast DLCI. |

## Defaults

No DLCI is defined.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Usage Guidelines

Use this command when the multicast facility is not supported. Network transmissions (packets) sent to a multicast DLCI are delivered to all network servers defined as members of the multicast group.

**Note** The **frame-relay multicast-dlci** command is provided mainly to allow testing of the Frame Relay encapsulation in a setting where two servers are connected back-to-back. This command is not required in a live Frame Relay network.

## Examples

The following example specifies 1022 as the multicast DLCI:

```
interface serial 0
 frame-relay multicast-dlci 1022
```

# frame-relay payload-compress

To enable Stacker payload compression on a specified point-to-point interface or subinterface, use the **frame-relay payload-compress** interface configuration command. To disable payload compression on a specified point-to-point interface or subinterface, use the **no** form of this command.

**frame-relay payload-compress** {**packet-by-packet** | **frf9 stac** [*hardware-options*] | **data-stream stac** [*hardware-options*]}

**no frame-relay payload-compress** {**packet-by-packet** | **frf9 stac** | **data-stream stac**}

## Syntax Description

| | |
|---|---|
| **packet-by-packet** | Packet-by-packet payload compression using the Stacker method. |
| **frf9 stac** | Enables FRF.9 compression using the Stacker method.<br>• If the router contains a CSA[1], compression is performed in the CSA hardware (hardware compression).<br>• If the CSA is not available, compression is performed in the software installed on the VIP2[2] (distributed compression).<br>• If the VIP2 is not available, compression is performed in the main processor of the router (software compression). |
| *hardware-options* | Choose one of the following hardware options:<br>• (Optional) **distributed**. Specifies that compression is implemented in the software that is installed in a VIP2. If the VIP2 is not available, compression is performed in the main processor of the router (software compression). This option applies only to the Cisco 7500 series routers. This option is not supported with data-stream compression.<br>• (Optional) **software**. Specifies that compression is implemented in the Cisco IOS software installed in the main processor of the router.<br>• (Optional) **csa** *csa_number*. Specifies the CSA to use for a particular interface. This option applies only to Cisco 7200 series routers. |
| **data-stream stac** | Enables data-stream compression using the Stacker method.<br>• If the router contains a CSA, compression is performed in the CSA hardware (hardware compression).<br>• If the CSA is not available, compression is performed in the main processor of the router (software compression). |

1. CSA = compression service adapter
2. VIP2 = second-generation Versatile Interface Processor

## Defaults

Disabled

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 11.0 | This command was introduced. |
| 11.2 | The **packet-by-packet** keyword was added. |
| 11.3 | The **frf9 stac** keyword was added. |
| 12.1(5)T | The **data-stream stac** keyword was added. |

## Usage Guidelines

Use the **frame-relay payload-compress** command to enable or disable payload compression on a point-to-point interface or subinterface. Use the **frame-relay map** command to enable or disable payload compression on a multipoint interface or subinterface.

We recommend that you shut down the interface before changing encapsulation types. Although shutting down the interface is not required, it ensures that the interface is reset for the new encapsulation.

Data-stream hardware compression is supported on interfaces and virtual circuits (VCs) using Cisco proprietary encapsulation. When the **data-stream stac** keyword is specified, Cisco encapsulation is automatically enabled. FRF.9 compression is supported on VCs and interfaces that using Internet Engineering Task Force (IETF) encapsulation type. When the **frf9 stac** keyword is specified, IETF encapsulation is automatically enabled.

## Examples

### FRF.9 Compression Example

The following example configures FRF.9 compression for subinterfaces:

```
interface serial2/0/0
 no ip address
 no ip route-cache
 encapsulation frame-relay
 ip route-cache distributed
 no keepalive
 shutdown
!
interface serial2/0/0.500 point-to-point
 ip address 172.16.1.4 255.255.255.0
 no cdp enable
 frame-relay interface-dlci 500 ietf
 frame-relay payload-compress frf9 stac
```

### Data-Stream Compression Example

The following example shows the configuration of data-stream compression using the **frame-relay payload-compress** command:

```
interface serial1/0
 encapsulation frame-relay
 frame-relay traffic-shaping
!
interface serial1/0.1 point-to-point
 ip address 10.0.0.1 255.0.0.0
 frame-relay interface-dlci 100
 frame-relay payload-compress data-stream stac
```

## Related Commands

| Command | Description |
|---|---|
| **frame-relay map** | Defines mapping between a destination protocol address and the DLCI used to connect to the destination address. |

# frame-relay policing

To enable Frame Relay policing on all switched PVCs on the interface, use the **frame-relay policing** interface configuration command. To disable Frame Relay policing, use the **no** form of this command.

**frame-relay policing**

**no frame-relay policing**

## Syntax Description

This command has no arguments or keywords.

## Defaults

Frame Relay policing is not enabled on switched PVCs.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 12.1(2)T | This command was introduced. |

## Usage Guidelines

You must enable Frame Relay policing on the incoming interface before you can configure traffic-policing parameters.

You must enable Frame Relay switching, using the **frame-relay switching** global command, before the **frame-relay policing** command will be effective on switched PVCs.

## Examples

The following example shows the configuration of Frame Relay policing on serial interface 0:

```
interface serial0
 frame-relay policing
```

## Related Commands

| Command | Description |
|---|---|
| **frame-relay bc** | Specifies the incoming or outgoing Bc for a Frame Relay virtual circuit. |
| **frame-relay be** | Specifies the incoming or outgoing Be for a Frame Relay virtual circuit. |
| **frame-relay cir** | Specifies the incoming or outgoing CIR for a Frame Relay virtual circuit. |
| **frame-relay switching** | Enables PVC switching on a Frame Relay DCE or NNI. |
| **frame-relay tc** | Specifies the measurement interval for policing incoming traffic when the CIR is zero. |

# frame-relay priority-dlci-group

To prioritize multiple data-link connection identifiers (DLCIs) according to the type of Frame Relay traffic, use the **frame-relay priority-dlci-group** interface configuration command.

**frame-relay priority-dlci-group** *group-number high-dlci medium-dlci normal-dlci low-dlci*

## Syntax Description

| | |
|---|---|
| *group-number* | Specific group number. |
| *high-dlci* | DLCI that is to have highest priority level. |
| *medium-dlci* | DLCI that is to have medium priority level. |
| *normal-dlci* | DLCI that is to have normal priority level. |
| *low-dlci* | DLCI that is to have lowest priority level. |

## Defaults

Disabled

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 11.0 | This command was introduced. |

## Usage Guidelines

This command is applied at the interface or subinterface level. Levels in descending order are high, medium, normal, and low.

This command allows you to define different DLCIs for different categories of traffic based on traffic priorities. This command does not itself define priority queueing, but it can be used in conjunction with priority queueing.

A global priority list must be defined, and the associated DLCIs must already be applied to the configuration before you enable this command.

Associate the DLCIs to their prospective groups and define their priority levels. This command is used for multiple DLCIs, where the source and destination endpoints are the same (parallel paths). This command should not be used on a main interface, or point-to-point subinterface, where only a single DLCI is configured.

A DLCI can only be affiliated with a single priority-group; however, there can be multiple groups per interface or subinterface.

You must configure the *high-priority* and *medium-priority* DLCI values. If you do not explicitly associate a DLCI for the *normal-dlci* and *low-dlci* priority levels, the last DLCI specified in the command line is used as the value of the remaining arguments. For example, the following two commands are equivalent:

```
frame-relay priority-dlci-group 1 40 50
frame-relay priority-dlci-group 1 40 50 50 50
```

When you configure static map entries using **frame-relay map** commands or use Inverse Address Resolution Protocol (ARP), the high-level DLCI is the only DLCI that is mapped. In the example, DLCI 40 is defined as having the highest priority. Therefore, DLCI 40 is the only DLCI that should be included in the **frame-relay map** command. DLCI 50 should not be included in a **frame-relay map** command.

## Examples

The following example shows the **frame-relay priority-dlci-group** command configured on a main interface with a static Frame Relay map entry. Note that DLCI 40 is the high-priority DLCI as defined in the **frame-relay priority-dlci-group** command and the only DLCI included in the **frame-relay map** command.

```
interface serial 1
 ip address 172.21.177.1 255.255.255.0
 encapsulation frame-relay
 frame-relay priority-dlci-group 1 40
 frame-relay map ip 172.21.177.2 40 broadcast
```

The following example shows the **frame-relay priority-dlci-group** command configured on subinterfaces where multiple priority groups are defined. DLCI 40 is the high-priority DLCI in group 1, and DLCI 80 is the high-priority DLCI in group 2.

```
interface Serial3
 no ip address
 encapsulation frame-relay
!
interface Serial3.2 multipoint
 ip address 172.21.177.1 255.255.255.0
 frame-relay interface-dlci 40
 frame-relay priority-dlci-group 1 40

!
interface Serial3.3 multipoint
 ip address 131.108.177.180 255.255.255.0
 frame-relay priority-dlci-group 2 80 90 100 100
 frame-relay interface-dlci 80
!
interface Serial 4
 no ip address
 encapsulation frame-relay
!
interface serial4.1 multipoint
 ip address 172.16.1.1 255.255.255.0
 frame-relay priority-dlci-group 3 200 210 300 300
 frame-relay priority-dlci-group 4 400 410 410 410
 frame-relay interface-dlci 200
 frame-relay interface-dlci 400
```

## Related Commands

| Command | Description |
|---|---|
| **frame-relay map** | Defines mapping between a destination protocol address and the DLCI used to connect to the destination address. |

# frame-relay priority-group

To assign a priority queue to virtual circuits associated with a map class, use the **frame-relay priority-group** map-class configuration command. To remove the specified queueing from the virtual circuit and cause it to revert to the default first-come, first-served queueing, use the **no** form of this command.

**frame-relay priority-group** *list-number*

**no frame-relay priority-group** *list-number*

## Syntax Description

| | |
|---|---|
| *list-number* | Priority-list number to be associated with the specified map class. |

## Defaults

If this command is not entered, the default is first-come, first-served queueing.

## Command Modes

Map-class configuration

## Command History

| Release | Modification |
|---|---|
| 11.2 | This command was introduced. |

## Usage Guidelines

Definition of the priority queue takes place in the existing manner (through **priority-list** commands). Because only one form of queueing can be associated with a particular map class, subsequent definitions overwrite previous ones.

## Examples

The following example configures a map class for a specified DLCI, specifies a priority list for the map class, and then defines the priority list:

```
interface serial 0
 encapsulation frame-relay
 frame-relay interface-dlci 100
 class pri_vc

 map-class frame-relay pri_vc
 frame-relay priority-group 1

priority-list 1 protocol ip high
```

## Related Commands

| Command | Description |
|---|---|
| **class (virtual circuit)** | Associates a map class with a specified DLCI. |
| **frame-relay interface-dlci** | Assigns a DLCI to a specified Frame Relay subinterface on the router or access server. |
| **map-class frame-relay** | Specifies a map class to define QoS values for an SVC. |

# frame-relay pvc

To configure Frame Relay permanent virtual circuits (PVCs) for FRF.8 Frame Relay-ATM Service Interworking, use the **frame-relay pvc** interface configuration command. To remove the PVC, use the **no** form of the command.

**frame-relay pvc** *dlci* **service** {**transparent** | **translation**} [**clp-bit** {**0** | **1** | **map-de**}][**de-bit** {**0** | **1** | **map-clp**}][**efci-bit** {**0** | **1** | **map-fecn**}] **interface atm0** {*vpi*/*vci* | *vcd*}

**no frame-relay pvc** *dlci* **service** {**transparent** | **translation**} [**clp-bit** {**0** | **1** | **map-de**}][**de-bit** {**0** | **1** | **map-clp**}][**efci-bit** {**0** | **1** | **map-fecn**}] **interface atm0** {*vpi*/*vci* | *vcd*}

## Syntax Description

| | |
|---|---|
| *dlci* | A value ranging from 16 to 1007 for the PVC's data-link connection identifier (DLCI). Use this label when you associate a Frame Relay PVC with an ATM PVC. |
| **service** {**transparent** \| **translation**} | In the **transparent** mode of Service Interworking, encapsulations are sent unaltered. In **translatio**n mode, mapping and translation take place. There is no default. |
| **clp-bit** {**0** \| **1** \| **map-de**} | (Optional) Sets the mode of DE/CLP mapping in Frame Relay to the ATM direction. The default is **map-de**.<br>• **map-de**—Specifies Mode 1 (see section 4.2.1 of FRF.8)<br>• **0** or **1**—Specifies Mode 2 (see section 4.2.1 of FRF.8) |
| **de-bit** {**0** \| **1** \| **map-clp**} | (Optional) Sets the mode of DE/CLP mapping in the ATM-to-Frame Relay direction. The default is **map-clp**.<br>• **map-clp**—Specifies Mode 1 (see section 4.2.1 of FRF.8)<br>• **0** or **1**—Specifies Mode 2 (see section 4.2.1 of FRF.8) |
| **efci-bit** {**0** \| **1** \| **map-fecn**} | (Optional) Sets FECN and the ATM EFCI in the Frame Relay-to-ATM direction. **map-fecn** is the default.<br>• **0**—Sets a constant value rather than mapping.<br>• **1**—Sets a constant value rather than mapping.<br>• **map-fecn**—Adheres to Mode 1 and maps the FECN indicators to EFCI indicators. |
| **interface atm0** {*vpi*/*vci* \| *vcd*} | Maps the Frame Relay PVC to an ATM PVC specified by slot number (0 is the only option for ATM on the Cisco MC3810) and either one of the following labels:<br>• *vpi*/*vci*—The virtual path identifier-virtual channel identifier (VPI-VCI) pair for the ATM PVC<br>• *vcd*—The ATM virtual circuit descriptor (VCD) for the ATM PVC |

## Defaults

See the defaults listed in the "Syntax Description" section.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 12.0(7)T | This command was introduced. |

## Usage Guidelines

This command applies only to Frame Relay-ATM Service Interworking (FRF.8) on the Cisco MC3810. Use this command to create Frame Relay PVCs for association with ATM PVCs when you are configuring FRF.8 Frame Relay-ATM Service Interworking on the Cisco MC3810 multiservice access concentrator.

## Examples

The following example shows two Frame Relay PVCs configured on a serial interface of a Cisco MC3810:

```
frame-relay pvc 222 service translation clp-bit map-de de-bit map-clp efci-bit map-fecn
interface ATM0 222/222
frame-relay pvc 925 service transparent clp-bit map-de de-bit map-clp efci-bit map-fecn
interface ATM0 92/92
```

## Related Commands

| Command | Description |
|---|---|
| **pvc** | Creates an ATM PVC on a main interface or subinterface; assigns a name to an ATM PVC; specifies ILMI, QSAAL, or SMDS as the encapsulation type on an ATM PVC; or enters interface-ATM-VC configuration mode. |

# frame-relay qos-autosense

To enable Enhanced Local Management Interface on the Cisco router, use the **frame-relay qos-autosense** interface configuration command. To disable Enhanced Local Management Interface on the Cisco router, use the **no** form of this command.

**frame-relay qos-autosense**

**no frame-relay qos-autosense**

## Syntax Description

This command has no arguments or keywords.

## Defaults

Disabled

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 11.2 | This command was introduced. |

## Usage Guidelines

Enhanced Local Management Interface must be configured on both the Cisco router and the Cisco switch.

Traffic shaping is optional with Enhanced Local Management Interface. Configure traffic shaping on the interface if you want QoS information to be used by the router for traffic rate enforcement.

## Examples

This configuration example shows a Frame Relay interface enabled to receive Enhanced Local Management Interface messages from the Cisco switch that is also configured with Enhanced Local Management Interface enabled. Traffic shaping is also configured on the interface for traffic rate enforcement and dynamic rate throttling. This allows the router to adjust its output rate based on congestion information it receives from the switch.

```
interface serial0
  no ip address
  encapsulation frame-relay
  frame-relay lmi-type ansi
  frame-relay traffic-shaping
  frame-relay qos-autosense

interface serial0.1 point-to-point
  no ip address
  frame-relay interface-dlci 101
```

## Related Commands

| Command | Description |
|---|---|
| **encapsulation frame-relay** | Enables Frame Relay encapsulation. |
| **frame-relay adaptive-shaping** | Selects the type of backward notification you want to use. |
| **frame-relay traffic-shaping** | Enables both traffic shaping and per-VC queueing for all PVCs and SVCs on a Frame Relay interface. |
| **show frame-relay qos-autosense** | Displays the QoS values sensed from the switch. |

# frame-relay route

To specify the static route for permanent virtual circuit (PVC) switching, use the **frame-relay route** interface configuration command. To remove a static route, use the **no** form of this command.

**frame-relay route** *in-dlci* **interface** *out-interface-type out-interface-number out-dlci* [**voice-encap** *size*]

**no frame-relay route** *in-dlci* **interface** *out-interface-type out-interface-number out-dlci* [**voice-encap** *size*]

## Syntax Description

| | |
|---|---|
| *in-dlci* | DLCI on which the packet is received on the interface. |
| **interface** *out-interface-type out-interface-number* | Interface that the router or access server uses to transmit the packet. |
| *out-dlci* | DLCI that the router or access server uses to transmit the packet over the interface specified by the *out-interface* argument. |
| **voice encap** *size* | (Optional) (Supported on the Cisco MC3810 only.) Specifies that data segmentation will be used to support Voice over Frame Relay. Note that the voice encapsulation applies only to the input DLCI side. The valid range is from 8 to 1600. |

## Defaults

No static route is specified.

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Usage Guidelines

When used with voice, the **frame-relay route** command is applied on both interfaces. If the voice-encap option is specified on one interface, then the incoming frames on that interface are defragmented before being routed to the other interface. The outgoing frames on that interface are then fragmented after being routed from the other interface, and before transmission out the interface.

**Note** Static routes cannot be configured over tunnel interfaces on the Cisco 800 series, 1600 series, and 1700 series platforms. Static routes can only be configured over tunnel interfaces on platforms that have the Enterprise feature set.

## Examples

The following example configures a static route that allows packets in DLCI 100 and sends packets out over DLCI 200 on interface serial 2:

```
frame-relay route 100 interface Serial2 200
```

The following example illustrates the commands you enter for a complete configuration that includes two static routes for PVC switching between interface serial 1 and interface serial 2:

```
interface Serial1
 no ip address
 encapsulation frame-relay
 keepalive 15
 frame-relay lmi-type ansi
 frame-relay intf-type dce
 frame-relay route 100 interface Serial2 200
 frame-relay route 101 interface Serial2 201
 clockrate 2000000
```

# frame-relay svc

To enable Frame Relay switched virtual circuit (SVC) operation on the specified interface, use the **frame-relay svc** interface configuration command. To disable SVC operation on the specified interface, use the **no** form of this command.

**frame-relay svc**

**no frame-relay svc**

## Syntax Description

This command has no arguments or keywords.

## Defaults

Disabled

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 11.2 | This command was introduced. |

## Usage Guidelines

SVC operation can be enabled at the interface level only. Once it is enabled at the interface level, it is enabled on all subinterfaces on the interface. One signalling channel, DLCI 0, is set up for the interface, and all SVCs are controlled from the physical interface.

The first use of this command on the router starts all SVC-related processes on the router. If they are already up and running because SVCs are enabled on another interface, no additional action is taken. These processes are not removed once they are created.

## Examples

The following example enables Frame Relay SVC operation on serial interface 0 and starts SVC-related processes on the router:

```
interface serial 0
 ip address 172.68.3.5 255.255.255.0
 encapsulation frame-relay
 frame-relay lmi-type q933a
 frame-relay svc
```

## Related Commands

| Command | Description |
|---|---|
| **encapsulation frame-relay** | Enables Frame Relay encapsulation. |
| **frame-relay lmi-type** | Selects the LMI type. |
| **interface serial** | Specifies a serial interface created on a channelized E1 or channelized T1 controller (for ISDN PRI, CAS, or robbed bit signalling). |
| **ip address** | Sets a primary or secondary IP address for an interface. |

# frame-relay switching

To enable permanent virtual switching (PVC) switching on a Frame Relay DCE device or a Network-to-Network Interface (NNI), use the **frame-relay switching** global configuration command. To disable switching, use the **no** form of this command.

**frame-relay switching**

**no frame-relay switching**

## Syntax Description

This command has no arguments or keywords.

## Defaults

Disabled

## Command Modes

Global configuration

## Command History

| Release | Modification |
|---|---|
| 10.0 | This command was introduced. |

## Usage Guidelines

You must add this command to the configuration file before configuring the routes.

## Examples

The following example shows the simple command that is entered in the configuration file before the Frame Relay configuration commands to enable switching:

```
frame-relay switching
```

# frame-relay tc

To set the measurement interval for policing incoming traffic when the committed information rate (CIR) is zero, use the **frame-relay tc** map-class configuration command. To reset the measurement interval for policing, use the **no** form of this command.

**frame-relay tc** *milliseconds*

**no frame-relay tc** *milliseconds*

## Syntax Description

| | |
|---|---|
| *milliseconds* | Time interval from 10 ms to 10,000 ms, during which incoming traffic cannot exceed committed burst size (Bc) plus excess burst size (Be). |

## Defaults

1000 ms

## Command Modes

Map-class configuration

## Command History

| Release | Modification |
|---|---|
| 12.1(2)T | This command was introduced. |

## Usage Guidelines

You must enable Frame Relay policing on the incoming interface, using the **frame-relay policing** interface command, before you can configure traffic-policing parameters.

You must enable Frame Relay switching, using the **frame-relay switching** global command, before the **frame-relay tc** command will be effective on switched PVCs.

When the CIR is greater than 0, Tc is equal to Bc divided by the CIR.

## Examples

The following example shows how to configure a policing measurement interval of 800 milliseconds within a map class called “police”:

```
map-class frame-relay police
 frame-relay tc 800
```

## Related Commands

| Command | Description |
|---|---|
| **frame-relay bc** | Specifies the incoming or outgoing Bc for a Frame Relay virtual circuit. |
| **frame-relay be** | Specifies the incoming or outgoing Be for a Frame Relay virtual circuit. |
| **frame-relay cir** | Specifies the incoming or outgoing CIR for a Frame Relay virtual circuit. |
| **frame-relay policing** | Enables Frame Relay policing on all switched PVCs on an interface. |
| **frame-relay switching** | Enables PVC switching on a Frame Relay DCE or NNI. |

# frame-relay traffic-rate

To configure all the traffic-shaping characteristics of a virtual circuit (VC) in a single command, use the **frame-relay traffic-rate** command in map-class configuration mode. To remove the specified traffic shaping from the map class, use the **no** form of this command.

**frame-relay traffic-rate** *average* [*peak*]

**no frame-relay traffic-rate** *average* [*peak*]

## Syntax Description

| | |
|---|---|
| *average* | Average rate, in bits per second; equivalent to specifying the contracted committed information rate (CIR). |
| *peak* | (Optional) Peak rate, in bits per second; equivalent to CIR + Be/Tc = CIR (1 + Be/Bc) = CIR + EIR. If the *peak* value is not configured, the peak rate will default to the configured *average* value. |

## Defaults

If the peak rate is omitted, the default value used is the average rate configured.

## Command Modes

Map-class configuration

## Command History

| Release | Modification |
|---|---|
| 11.2 | This command was introduced. |

## Usage Guidelines

The configured *peak* and *average* rates are converted to the equivalent CIR, excess burst size (Be), and committed burst size (Bc) values for use by the VC. When the values are translated, the *average* rate is used as the CIR. This value is assumed to be for one second. The generated Bc value is 1/8 the CIR value with an interval of 125 milliseconds.

The Be value is derived from the *peak* rate by subtracting by the *average* rate. The value of the *peak* rate minus *average* rate is assumed to be for one second. The generated Be value is 1/8 the *peak* rate minus the *average* rate with an interval of 125 milliseconds. If the *peak* value is not configured, the peak rate will default to the configured *average* value, and the Be value will equal 0.

For example, entering the **frame-relay traffic-rate 64000 96000** command will result in a CIR of 64000 bps. Assuming 8 intervals of 125 milliseconds, the Bc is 64000/8 or 8000 bits. The Be value is calculated by subtracting 64000 from 96000, so the one-second value is 32000 bits. For each 125-millisecond interval, the Be value is 4000 bits.

Note that the **show frame-relay pvc** command displays Be and Bc values based on an interval of one second. Internally the values being used are based on an interval of 125 milliseconds. The configuration examples below include the **frame-relay traffic-rate** command and corresponding **show frame-relay pvc** command output.

The **frame-relay traffic-rate** command lets you configure all the traffic-shaping characteristics of a virtual circuit in a single command. Using it is simpler than the alternative of entering the three commands **frame-relay cir out**, **frame-relay be out** and **frame-relay bc out**, but offers slightly less flexibility.

## Examples

The following example associates a map class with specified data-link connection identifier (DLCI) and then sets a traffic rate for the map class (and thus for the DLCI):

```
interface serial 0
 frame-relay interface-dlci 100
  class fast_vc

map-class frame-relay fast_vc
 frame-relay traffic-rate 64000 96000
```

The following sample output for the **show frame-relay pvc** command is for the PVC configured in the preceding example. Note that the display shows values for Be and Bc that are based on an interval of one second. Internally the values being used are based on an interval of 125 milliseconds, which means that the actual Be value being used is 4000 bits and the actual Bc value being used is 8000 bits.

```
Router# show frame-relay pvc 100

PVC Statistics for interface Serial0 (Frame Relay DTE)

DLCI = 100, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial0.100

  input pkts 0             output pkts 2314         in bytes 0
  out bytes 748080         dropped pkts 0           in pkts dropped 0
  out pkts dropped 0                 out bytes dropped 0
  in FECN pkts 0           in BECN pkts 0           out FECN pkts 0
  out BECN pkts 0          in DE pkts 0             out DE pkts 0
  out bcast pkts 2308      out bcast bytes 747792
  pvc create time 1d16h, last time pvc status changed 1d16h
  cir 64000     bc 64000     be 32000     byte limit 5000   interval 125
  mincir 32000     byte increment 1000  Adaptive Shaping none
  pkts 12        bytes 3888      pkts delayed 0         bytes delayed 0
  shaping inactive
  traffic shaping drops 0
  Queueing strategy:fifo
  Output queue 0/40, 0 drop, 0 dequeued
```

## Related Commands

| Command | Description |
|---|---|
| **frame-relay bc** | Specifies the incoming or outgoing Bc for a Frame Relay VC. |
| **frame-relay be** | Sets the incoming or outgoing Be for a Frame Relay VC. |
| **frame-relay cir** | Specifies the incoming or outgoing CIR for a Frame Relay VC. |

# frame-relay traffic-shaping

To enable both traffic shaping and per-virtual circuit queueing for all permanent virtual circuits (PVCs) and switched virtual circuits (SVCs) on a Frame Relay interface, use the **frame-relay traffic-shaping** interface configuration command. To disable traffic shaping and per-virtual circuit queueing, use the **no** form of this command.

**frame-relay traffic-shaping**

**no frame-relay traffic-shaping**

## Syntax Description

This command has no arguments or keywords.

## Defaults

Disabled

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 11.2 | This command was introduced. |

## Usage Guidelines

For virtual circuits (VCs) for which no specific traffic-shaping or queueing parameters are specified, a set of default values are used. The default queueing is performed on a first-come, first-served basis.

The default committed information rate (CIR) of 56K will apply in the following situations:

- When traffic shaping is enabled (by using the **frame-relay traffic-shaping** command), but a map class is not assigned to the VC
- When traffic shaping is enabled (by using the **frame-relay traffic-shaping** command) and a map class is assigned to the VC, but traffic-shaping parameters have not been defined in the map class

Frame Relay traffic shaping is not effective for Layer 2 PVC switching using the **frame-relay route** command.

## Examples

The following example enables both traffic shaping and per-virtual circuit queueing:

```
frame-relay traffic-shaping
```

## Related Commands

| Command | Description |
|---|---|
| **frame-relay class** | Associates a map class with an interface or subinterface. |
| **frame-relay custom-queue-list** | Specifies a custom queue to be used for the VC queueing associated with a specified map class. |
| **frame-relay priority-group** | Assigns a priority queue to VCs associated with a map class, rather than the default first-come-first-served queueing. |

| Command | Description |
|---|---|
| **frame-relay traffic-rate** | Configures all the traffic shaping characteristics of a VC in a single command. |
| **map-class frame-relay** | Specifies a map class to define QoS values for an SVC. |

# frame-relay traps-maximum dlci-status-change

To change the maximum number of frDLCIStatusChange traps that Frame Relay generates at linkup or when receiving LMI Full Status messages, use the **frame-relay traps-maximum dlci-status-change** command in interface configuration mode. To disable any limit on the number of traps, use the **no** form of this command.

**frame-relay traps-maximum dlci-status-change** *traps*

**no frame-relay traps-maximum dlci-status-change**

## Syntax Description

| | |
|---|---|
| *traps* | Number of traps. The range is 0 to 1024. |

## Command Default

Enabled (and the maximum number of traps is equal to the maximum number of trap events specified for the SNMP server message queue).

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 11.1(33)CC | This command was introduced. |
| 11.1(33)CV | This command was integrated into Cisco IOS Release 11.1(33)CV. |
| 12.1(8) | This command was integrated into Cisco IOS Release 12.1(8). |

## Usage Guidelines

You should set the maximum number of traps based on the number of PVCs on the interface as well as on the SNMP server message queue length. A low number on an interface with many PVCs can be reached quickly, which can cause a large number of traps to be dropped. Also, you should set this number smaller than the SNMP server message queue length (which is specified by the **snmp-server queue-length** command, which has a default of 10 traps).

The traps counter for this command is reset when a keepalive message is exchanged on the Frame Relay interface.

**Note** Frame Relay frDLCIStatusChange traps are not generated when the line status or line protocol status of an interface changes to down.

This command does not restrict traps caused by individual circuit status changes.

## Examples

The following example sets a maximum of 256 traps on serial interface 3/3:

```
Router> enable
Password:
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface serial 3/3
Router(config-if)# encapsulation frame-relay
Router(config-if)# frame-relay traps-maximum 256
Router(config-if)# end
```

## Related Commands

| Command | Description |
|---|---|
| **snmp-server enable traps frame-relay** | Enables Frame Relay SNMP notifications. |
| **snmp-server host** | Specifies the recipient of an SNMP notification operation. |
| **snmp-server queue-length** | Establishes the message queue length for each trap host. |
| **snmp-server trap link** | Enables linkUp/linkDown SNMP traps, which are compliant with RFC 2233. |
| **snmp-server trap-source** | Specifies the interface (and hence the corresponding IP address) from which an SNMP trap should originate. |
| **snmp-server trap-timeout** | Defines how often to try resending trap messages on the retransmission queue. |

# interface fr-atm

To create a Frame Relay-ATM Interworking interface on the Cisco MC3810 and to enter Frame Relay-ATM Interworking configuration mode, use the **interface fr-atm** global configuration command. To delete the Frame Relay-ATM Interworking interface, use the **no** form of this command.

**interface fr-atm** *number*

**no interface fr-atm** *number*

## Syntax Description

| | |
|---|---|
| *number* | The Frame Relay-ATM Interworking interface number. Valid range is from 0 to 20. |

## Defaults

Frame Relay-ATM Interworking interface 20 is configured by default.

## Command Modes

Global configuration

## Command History

| Release | Modification |
|---|---|
| 11.3 MA | This command was introduced. |

## Usage Guidelines

This command applies to Frame Relay-ATM Interworking on the Cisco MC3810 only.

Use the **interface fr-atm** command to enter Frame Relay-ATM interworking interface configuration mode. When you issue this command for the first time, an interface number is created dynamically. You can configure up to 21 Frame Relay-ATM interworking interfaces.

**Note** The Cisco MC3810 provides only *network interworking* (FRF.5). The Cisco MC3810 can be used with *service interworking* (FRF.8), which is provided by the carrier's ATM network equipment.

## Examples

The following example configures Frame Relay-ATM Interworking interface number 20:

```
interface fr-atm 20
```

## Related Commands

| Command | Description |
|---|---|
| **fr-atm connect dlci** | Maps a Frame Relay DLCI to an ATM virtual circuit descriptor for FRF.5 Frame Relay-ATM internetworking. |

# keepalive (LMI)

To enable the Local Management Interface (LMI) mechanism for serial lines using Frame Relay encapsulation, use the **keepalive** interface configuration command. To disable this capability, use the **no** form of this command.

**keepalive** *number*

**no keepalive**

## Syntax Description

| | |
|---|---|
| *number* | Number of seconds that defines the keepalive interval. The interval must be set as a positive integer that is less than the interval set on the switch; see the **frame-relay lmi-t392dce** command description earlier in this chapter. |

## Defaults

10 seconds

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 11.2 | This command was introduced. |

## Usage Guidelines

The **keepalive** command enables the keepalive sequence, which is part of the LMI protocol.

**Note** When booting from a network server over Frame Relay, you might need to disable keepalives.

## Examples

The following example sets the keepalive timer on the server for a period that is two or three seconds faster (has a shorter interval) than the interval set on the keepalive timer of the Frame Relay switch. The difference in keepalive intervals ensures proper synchronization between the Cisco server and the Frame Relay switch.

```
interface serial 3
 keepalive 8
```

## Related Commands

| Command | Description |
|---|---|
| **frame-relay lmi-t392dce** | Sets the polling verification timer on a DCE or NNI interface. |