map-class frame-relay

To specify a map class to define quality of service (QoS) values for a switched virtual circuit (SVC), use the **map-class frame-relay** global configuration command.

map-class frame-relay *map-class-name*

Syntax Description

map-class-name	Name of this map class.

Defaults

Disabled

Command Modes

Global configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

After you specify the named map class, you can specify the QoS parameters—such as incoming and outgoing committed information rate (CIR), committed burst rate, excess burst rate, and the idle timer—for the map class.

To specify the protocol-and-address combination to which the QoS parameters are to be applied, associate this map class with the static maps under a map list.

Examples

The following example specifies a map class called “hawaii” and defines three QoS parameters for it. The “hawaii” map class is associated with a protocol-and-address static map defined under the **map-list** command.

```
map-list bermuda source-addr E164 123456 dest-addr E164 654321
 ip 10.108.177.100 class hawaii
 appletalk 1000.2 class hawaii

map-class frame-relay hawaii
 frame-relay cir in 2000000
 frame-relay cir out 56000
 frame-relay be out 9000
```

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 idle-timer	Specifies the idle timeout interval for an SVC.

map-group

To associate a map list with a specific interface, use the **map-group** interface configuration command.

map-group *group-name*

Syntax Description

group-name	Name used in a **map-list** command.

Defaults

Disabled. No map group name is defined.

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

A map-group association with an interface is required for switched virtual circuit (SVC) operation. In addition, a map list must be configured.

The **map-group** command applies to the interface or subinterface on which it is configured. The associated E.164 or X.121 address is defined by the **map-list** command, and the associated protocol addresses are defined by using the **class** command under the **map-list** command.

Examples

The following example configures a physical interface, applies a map group to the physical interface, and then defines the map group:

```
interface serial 0
 ip address 172.10.8.6
 encapsulation frame-relay
 map-group bermuda
 frame-relay lmi-type q933a
 frame-relay svc

map-list bermuda source-addr E164 123456 dest-addr E164 654321
 ip 131.108.177.100 class hawaii
 appletalk 1000.2 class rainbow
```

Related Commands

Command	Description
class (map-list)	Associates a map class with a protocol-and-address combination.
map-list	Specifies a map group and link it to a local E.164 or X.121 source address and a remote E.164 or X.121 destination address for Frame Relay SVCs.

map-list

To specify a map group and link it to a local E.164 or X.121 source address and a remote E.164 or X.121 destination address for Frame Relay switched virtual circuits (SVCs), use the **map-list** global configuration command. To delete a previous map-group link, use the **no** form of this command.

map-list *map-group-name* **source-addr** {**e164** | **x121**} *source-address* **dest-addr** {**e164** | **x121**} *destination-address*

no map-list *map-group-name* **source-addr** {**e164** | **x121**} *source-address* **dest-addr** {**e164** | **x121**} *destination-address*

Syntax Description

map-group-name	Name of the map group. This map group must be associated with a physical interface.
source-addr {**e164** | **x121**}	Type of source address.
source-address	Address of the type specified (E.164 or X.121).
dest-addr {**e164** | **x121**}	Type of destination address.
destination-address	Address of the type specified (E.164 or X.121).

Defaults

Disabled

Command Modes

Global configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use the **map-class** command and its subcommands to define quality of service (QoS) parameters—such as incoming and outgoing committed information rate (CIR), committed burst rate, excess burst rate, and the idle timer—for the static maps defined under a map list.

Each SVC needs to use a source and destination number, in much the same way that a public telephone network needs to use source and destination numbers. These numbers allow the network to route calls from a specific source to a specific destination. This specification is done through map lists.

Depending on switch configuration, addressing can take either of two forms: E.164 or X.121.

An X.121 address number is 14 digits long and has the following form:

```
Z CC P NNNNNNNNNN
```

Table 27 describes the codes in an X.121 address number form.

Table 27 X.121 Address Numbers

Code	Meaning	Value
Z	Zone code	3 for North America
C	Country code	10–16 for the United States
P	Public data network (PDN) code	Provided by the PDN
N	10-digit number	Set by the network for the specific destination

An E.164 number has a variable length; the maximum length is 15 digits. An E.164 number has the fields shown in Figure 2 and described in Table 28.

Figure 2 E.164 Address Format

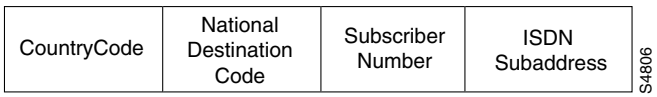

Table 28 E.164 Address Field Descriptions

Field	Description
Country code	Can be 1, 2, or 3 digits long. Some current values are the following: • Code 1—United States of America • Code 44—United Kingdom • Code 61—Australia
National destination code + subscriber number	Referred to as the National ISDN number; the maximum length is 12, 13, or 14 digits, based on the country code.
ISDN subaddress	Identifies one of many devices at the termination point. An ISDN subaddress is similar to an extension on a PBX.

Examples

In the following SVC example, if IP or AppleTalk triggers the call, the SVC is set up with the QoS parameters defined within the class “hawaii”. An SVC triggered by either protocol results in two SVC maps, one for IP and one for AppleTalk. Two maps are set up because these protocol-and-address combinations are heading for the same destination, as defined by the **dest-addr** keyword and the values following it in the **map-list** command.

```
map-list bermuda source-addr E164 123456 dest-addr E164 654321
 ip 131.108.177.100 class hawaii
 appletalk 1000.2 class hawaii
```

Related Commands

Command	Description
class (map-list)	Associates a map class with a protocol-and-address combination.
map-class frame-relay	Specifies a map class to define QoS values for an SVC.

show frame-relay end-to-end keepalive

To display statistics about Frame Relay end-to-end keepalive, use the **show frame-relay end-to-end keepalive** EXEC command.

show frame-relay end-to-end keepalive [*interface* [*DLCI*]]

Syntax Description

interface	(Optional) Interface to display.
DLCI	(Optional) DLCI to display.

Defaults

If no interface is specified, show all interfaces.

Command Modes

EXEC

Command History

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

Usage Guidelines

Use this command to display the keepalive status of an interface.

Examples

The following example shows output from the **show frame-relay end-to-end keepalive** command:

```
Router# show frame-relay end-to-end keepalive interface s1

End-to-end Keepalive Statistics for Interface Serial1 (Frame Relay DTE)
DLCI = 100, DLCI USAGE = LOCAL, VC STATUS = STATIC (EEK UP)

SEND SIDE STATISTICS
Send Sequence Number: 86,       Receive Sequence Number: 87
Configured Event Window: 3,     Configured Error Threshold: 2
Total Observed Events: 90,      Total Observed Errors: 34
Monitored Events: 3,            Monitored Errors: 0
Successive Successes: 3,        End-to-end VC Status: UP

RECEIVE SIDE STATISTICS
Send Sequence Number: 88,       Receive Sequence Number: 87
Configured Event Window: 3,     Configured Error Threshold: 2
Total Observed Events: 90,      Total Observed Errors: 33
Monitored Events: 3,            Monitored Errors: 0
Successive Successes: 3,        End-to-end VC Status: UP
```

Related Commands

Command	Description
frame-relay end-to-end keepalive error-threshold	Modifies the keepalive error threshold value.
frame-relay end-to-end keepalive event-window	Modifies the keepalive event window value.
frame-relay end-to-end keepalive mode	Enables Frame Relay end-to-end keepalives.

Command	Description
frame-relay end-to-end keepalive success-events	Modifies the keepalive success events value.
frame-relay end-to-end keepalive timer	Modifies the keepalive timer.
map-class frame-relay	Specifies a map class to define QoS values for an SVC.

show frame-relay fragment

To display information about the Frame Relay fragmentation, use the **show frame-relay fragment** command in privileged EXEC mode.

show frame-relay fragment [**interface** *interface* [*DLCI*]]

Syntax Description

interface	(Optional) Indicates a specific interface for which Frame Relay fragmentation information will be displayed.
interface	(Optional) Interface number containing the DLCI(s) for which you wish to display fragmentation information.
DLCI	(Optional) Specific DLCI for which you wish to display fragmentation information.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0(4)T	This command was introduced.
12.1(2)E	Support was added for Cisco 7500 series routers with Versatile Interface Processors.
12.1(5)T	Support was added for Cisco 7500 series routers with Versatile Interface Processors running 12.1(5)T.

Usage Guidelines

When no parameters are specified with this command, the output displays a summary of each data-link connection identifier (DLCI) configured for fragmentation. The information displayed includes the fragmentation type, the configured fragment size, and the number of fragments transmitted, received, and dropped.

When a specific interface and DLCI are specified, additional details are displayed.

Examples

The following is sample output for the **show frame-relay fragment** command without any parameters specified:

```
Router# show frame-relay fragment

interface         dlci  frag-type    frag-size  in-frag    out-frag   dropped-frag
Serial0           108   VoFR-cisco   100        1261       1298       0
Serial0           109   VoFR         100        0          243        0
Serial0           110   end-to-end   100        0          0          0
```

The following is sample output for the **show frame-relay fragment** command when an interface and DLCI are specified:

```
Router# show frame-relay fragment interface Serial1/0 16

  fragment-size 45                  fragment type end-to-end
  in fragmented pkts 0              out fragmented pkts 0
```

```
in fragmented bytes 0              out fragmented bytes 0
in un-fragmented pkts 0            out un-fragmented pkts 0
in un-fragmented bytes 0           out un-fragmented bytes 0
in assembled pkts 0                out pre-fragmented pkts 0
in assembled bytes 0               out pre-fragmented bytes
in dropped reassembling pkts 0     out dropped fragmenting pkts 0
in timeouts 0
in out-of-sequence fragments 0
in fragments with unexpected B bit set 0
out interleaved packets 0
```

Table 29 describes the fields shown in the display.

Table 29 show frame-relay fragment Field Descriptions

Field	Description
interface	Subinterface containing the DLCI for which the fragmentation information pertains.
dlci	Data-link connection identifier for which the displayed fragmentation information applies.
frag-type	Type of fragmentation configured on the designated DLCI. Supported types are end-to-end, VoFR, and VoFR-cisco.
frag-size	Configured fragment size in bytes.
in-frag	Total number of fragments received by the designated DLCI.
out-frag	Total number of fragments sent by the designated DLCI.
dropped-frag	Total number of fragments dropped by the designated DLCI.
in/out fragmented pkts	Total number of frames received/sent by this DLCI that have a fragmentation header.
in/out fragmented bytes	Total number of bytes, including those in the Frame Relay headers, that have been received/sent by this DLCI.
in/out un-fragmented pkts	Number of frames received/sent by this DLCI that do not require reassembly, and therefore do not contain the FRF.12 header. These counters can be incremented only when the end-to-end fragmentation type is set.
in/out un-fragmented bytes	Number of bytes received/sent by this DLCI that do not require reassembly, and therefore do not contain the FRF.12 header. These counters can be incremented only when the end-to-end fragmentation type is set.
in assembled pkts	Total number of fully reassembled frames received by this DLCI, including the frames received without a Frame Relay fragmentation header (in unfragmented packets). This counter corresponds to the frames viewed by the upper-layer protocols.
out pre-fragmented pkts	Total number of fully reassembled frames transmitted by this DLCI, including the frames transmitted without a Frame Relay fragmentation header (out un-fragmented pkts).

Table 29 show frame-relay fragment Field Descriptions (continued)

Field	Description
in assembled bytes	Number of bytes in the fully reassembled frames received by this DLCI, including the frames received without a Frame Relay fragmentation header (in un-fragmented bytes). This counter corresponds to the total number of bytes viewed by the upper-layer protocols.
out pre-fragmented bytes	Number of bytes in the fully reassembled frames transmitted by this DLCI, including the frames sent without a Frame Relay fragmentation header (out un-fragmented bytes). This counter corresponds to the total number of bytes viewed by the upper-layer protocols.
in dropped reassembling pkts	Number of fragments received by this DLCI that are dropped for reasons such as running out of memory, receiving segments out of sequence, receiving an unexpected frame with a B bit set, or timing out on a reassembling frame.
out dropped fragmenting pkts	Number of fragments that are dropped by this DLCI during transmission because of running out of memory.
in timeouts	Number of reassembly timeouts that have occurred on incoming frames to this DLCI. (A frame that does not fully reassemble within two minutes is dropped, and the timeout counter is incremented.)
in out-of-sequence fragments	Number of fragments received by this DLCI that have an unexpected sequence number.
in fragments with unexpected B bit set	Number of fragments received by this DLCI that have an unexpected B bit set. When this occurs, all fragments being reassembled are dropped and a new frame is begun with this fragment.
out interleaved packets	Number of packets leaving this DLCI that have been interleaved between segments.

Related Commands

Command	Description
frame-relay fragment	Enables fragmentation of Frame Relay frames for a Frame Relay map class.
show frame-relay pvc	Displays statistics about PVCs for Frame Relay interfaces.
show frame-relay vofr	Displays details about FRF.11 subchannels being used on Voice over Frame Relay DLCIs.
show interfaces serial	Displays information about a serial interface.
show traffic-shape queue	Displays information about the elements queued at a particular time at the VC level.

show frame-relay ip tcp header-compression

To display statistics and TCP/IP header compression information for the interface, use the **show frame-relay ip tcp header-compression** EXEC command.

show frame-relay ip tcp header-compression

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
10.3	This command was introduced.

Examples

The following is sample output from the **show frame-relay ip tcp header-compression** command:

```
Router# show frame-relay ip tcp header-compression

DLCI 200          Link/Destination info: ip 10.108.177.200
Interface Serial0:
Rcvd:     40 total, 36 compressed, 0 errors
          0 dropped, 0 buffer copies, 0 buffer failures
Sent:     0 total, 0 compressed
          0 bytes saved, 0 bytes sent
Connect:  16 rx slots, 16 tx slots, 0 long searches, 0 misses, 0% hit ratio
          Five minute miss rate 0 misses/sec, 0 max misses/sec
```

Table 30 describes the fields shown in the display.

Table 30 show frame-relay ip tcp header-compression Field Descriptions

Field	Description
Rcvd:	Table of details concerning received packets.
total	Sum of compressed and uncompressed packets received.
compressed	Number of compressed packets received.
errors	Number of errors caused by errors in the header fields (version, total length, or IP checksum).
dropped	Number of packets discarded. Seen only after line errors.
buffer copies	Number of times that a new buffer was needed to put the uncompressed packet in.
buffer failures	Number of times that a new buffer was needed but was not obtained.

Table 30 show frame-relay ip tcp header-compression Field Descriptions (continued)

Field	Description
Sent:	Table of details concerning sent packets.
total	Sum of compressed and uncompressed packets sent.
compressed	Number of compressed packets sent.
bytes saved	Number of bytes reduced because of the compression.
bytes sent	Actual number of bytes transmitted.
Connect:	Table of details about the connections.
rx slots, tx slots	Number of states allowed over one TCP connection. A state is recognized by a source address, a destination address, and an IP header length.
long searches	Number of times that the connection ID in the incoming packet was not the same as the previous one that was processed.
misses	Number of times that a matching entry was not found within the connection table and a new entry had to be entered.
hit ratio	Percentage of times that a matching entry was found in the compression tables and the header was compressed.
Five minute miss rate	Miss rate computed over the most recent 5 minutes and the maximum per-second miss rate during that period.

show frame-relay lapf

To display information about the status of the internals of Frame Relay Layer 2 (LAPF) if switched virtual circuits (SVCs) are configured, use the **show frame-relay lapf** EXEC command.

show frame-relay lapf

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
11.2	This command was introduced.

Examples

The following is sample output from the **show frame-relay lapf** command.

```
Router# show frame-relay lapf

Interface = Serial1 (up),  LAPF state = TEI_ASSIGNED (down)
SVC disabled, link down cause = LMI down,  #link-reset = 0
T200 = 1.5 sec.,  T203 = 30 sec.,  N200 = 3,  k = 7,  N201 = 260
I xmt = 0, I rcv = 0, I reXmt = 0, I queued = 0
I xmt dropped = 0,  I rcv dropped = 0,  Rcv pak dropped = 0
RR xmt = 0,  RR rcv = 0,  RNR xmt = 0,  RNR rcv = 0
REJ xmt = 0,  REJ rcv = 0,  FRMR xmt = 0,  FRMR rcv = 0
DM xmt = 0,  DM rcv = 0,  DISC xmt = 0,  DISC rcv = 0
SABME xmt = 0,  SABME rcv = 0,  UA xmt = 0,  UA rcv = 0
V(S) = 0,  V(A) = 0,  V(R) = 0,  N(S) = 0,  N(R) = 0
Xmt FRMR at Frame Reject
```

Table 31 describes significant fields in this output.

Table 31 show frame-relay lapf Field Descriptions

Field	Description
Interface	Identifies the interface and indicates the line status (up, down, administratively down).
LAPF state	A LAPF state of MULTIPLE FRAME ESTABLISHED or RIMER_RECOVERY indicates that Layer 2 is functional. Others, including TEI_ASSIGNED, AWAITING_ESTABLISHMENT, and AWAITING_RELEASE, indicate that Layer 2 is not functional.
SVC disabled	Indicates whether SVCs are enabled or disabled.
link down cause	Indicates the reason that the link is down. For example, N200 error, memory out, peer disconnect, LMI down, line down, and SVC disabled. Many other causes are described in the Q.922 specification.
#link-reset	Number of times the Layer 2 link has been reset.
T200, T203, N200, k, N201	Values of Layer 2 parameters.

Table 31 show frame-relay lapf Field Descriptions (continued)

Field	Description
I xmt, I rcv, I reXmt, I queued	Number of I frames sent, received, retransmitted, and queued for transmission, respectively.
I xmt dropped	Number of sent I frames that were dropped.
I rcv dropped	Number of I frames received over DLCI 0 that were dropped.
Rcv pak dropped	Number of received packets that were dropped.
RR xmt, RR rcv	Number of RR frames sent; number of RR frames received.
RNR xmt, RNR rcv	Number of RNR frames sent; number of RNR frames received.
REJ xmt, REJ rcv	Number of REJ frames sent; number of REJ frames received.
FRMR xmt, FRMR rcv	Number of FRMR frames sent; number of FRMR frames received.
DM xmt, DM rcv	Number of DM frames sent; number of DM frames received.
DISC xmt, DISC rcv	Number of DISC frames sent; number of DISC frames received.
SABME xmt, SABME rcv	Number of SABME frames sent; number of SABME frames received.
UA xmt, UA rcv	Number of UA frames sent; number of UA frames received.
V(S) 0, V(A) 0, V(R) 0, N(S) 0, N(R) 0	Layer 2 sequence numbers.
Xmt FRMR at Frame Reject	Indicates whether the FRMR frame is sent at Frame Reject.

show frame-relay lmi

To display statistics about the Local Management Interface (LMI), use the **show frame-relay lmi** EXEC command.

show frame-relay lmi [*type number*]

Syntax Description

type	(Optional) Interface type; it must be serial.
number	(Optional) Interface number.

Command Modes

EXEC

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Enter the command without arguments to obtain statistics about all Frame Relay interfaces.

Examples

The following is sample output from the **show frame-relay lmi** command when the interface is a data terminal equipment (DTE) device:

```
Router# show frame-relay lmi

LMI Statistics for interface Serial1 (Frame Relay DTE) LMI TYPE = ANSI
  Invalid Unnumbered info 0             Invalid Prot Disc 0
  Invalid dummy Call Ref 0              Invalid Msg Type 0
  Invalid Status Message 0              Invalid Lock Shift 0
  Invalid Information ID 0              Invalid Report IE Len 0
  Invalid Report Request 0              Invalid Keep IE Len 0
  Num Status Enq. Sent 9                Num Status msgs Rcvd 0
  Num Update Status Rcvd 0              Num Status Timeouts 9
```

The following is sample output from the **show frame-relay lmi** command when the interface is a Network-to-Network Interface (NNI):

```
Router# show frame-relay lmi

LMI Statistics for interface Serial3 (Frame Relay NNI) LMI TYPE = CISCO
  Invalid Unnumbered info 0             Invalid Prot Disc 0
  Invalid dummy Call Ref 0              Invalid Msg Type 0
  Invalid Status Message 0              Invalid Lock Shift 0
  Invalid Information ID 0              Invalid Report IE Len 0
  Invalid Report Request 0              Invalid Keep IE Len 0
  Num Status Enq. Rcvd 11               Num Status msgs Sent 11
  Num Update Status Rcvd 0              Num St Enq. Timeouts 0
  Num Status Enq. Sent 10               Num Status msgs Rcvd 10
  Num Update Status Sent 0              Num Status Timeouts 0
```

Table 32 describes significant fields shown in the output.

Table 32 show frame-relay lmi Field Descriptions

Field	Description
LMI Statistics	Signalling or LMI specification: CISCO, ANSI, or ITU-T.
Invalid Unnumbered info	Number of received LMI messages with invalid unnumbered information field.
Invalid Prot Disc	Number of received LMI messages with invalid protocol discriminator.
Invalid dummy Call Ref	Number of received LMI messages with invalid dummy call references.
Invalid Msg Type	Number of received LMI messages with invalid message type.
Invalid Status Message	Number of received LMI messages with invalid status message.
Invalid Lock Shift	Number of received LMI messages with invalid lock shift type.
Invalid Information ID	Number of received LMI messages with invalid information identifier.
Invalid Report IE Len	Number of received LMI messages with invalid Report IE Length.
Invalid Report Request	Number of received LMI messages with invalid Report Request.
Invalid Keep IE Len	Number of received LMI messages with invalid Keep IE Length.
Num Status Enq. Sent	Number of LMI status inquiry messages sent.
Num Status Msgs Rcvd	Number of LMI status messages received.
Num Update Status Rcvd	Number of LMI asynchronous update status messages received.
Num Status Timeouts	Number of times the status message was not received within the keepalive time value.
Num Status Enq. Rcvd	Number of LMI status enquiry messages received.
Num Status Msgs Sent	Number of LMI status messages sent.
Num Status Enq. Timeouts	Number of times the status enquiry message was not received within the T392 DCE timer value.
Num Update Status Sent	Number of LMI asynchronous update status messages sent.

show frame-relay map

To display the current map entries and information about the connections, use the **show frame-relay map** EXEC command.

show frame-relay map

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following is sample output from the **show frame-relay map** command:

```
Router# show frame-relay map

Serial 1 (administratively down): ip 10.108.177.177
dlci 177 (0xB1,0x2C10), static,
broadcast,
CISCO
TCP/IP Header Compression (inherited), passive (inherited)
```

Table 33 describes significant fields shown in the display.

Table 33 show frame-relay map Field Descriptions

Field	Description
Serial 1 (administratively down)	Identifies a Frame Relay interface and its status (up or down).
ip 131.108.177.177	Destination IP address.
dlci 177 (0xB1,0x2C10)	DLCI that identifies the logical connection being used to reach this interface. This value is displayed in three ways: its decimal value (177), its hexadecimal value (0xB1), and its value as it would appear on the wire (0x2C10).
static	Indicates whether this is a static or dynamic entry.
CISCO	Indicates the encapsulation type for this map; either CISCO or IETF.
TCP/IP Header Compression (inherited), passive (inherited)	Indicates whether the TCP/IP header compression characteristics were inherited from the interface or were explicitly configured for the IP map.

Related Commands

Command	Description
show frame-relay pvc	Displays statistics about PVCs for Frame Relay interfaces.

show frame-relay pvc

To display statistics about permanent virtual circuits (PVCs) for Frame Relay interfaces, use the **show frame-relay pvc** privileged EXEC command.

show frame-relay pvc [**interface** *interface*] [*dlci*]

Syntax Description

interface	(Optional) Indicates a specific interface for which PVC information will be displayed.
interface	(Optional) Interface number containing the data-link connection identifiers (DLCIs) for which you wish to display PVC information.
dlci	(Optional) A specific DLCI number used on the interface. Statistics for the specified PVC are displayed when a DLCI is also specified.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.0(1)T	This command was modified to display statistics about virtual access interfaces used for PPP connections over Frame Relay.
12.0(3)XG	This command was modified to include the fragmentation type and size associated with a particular PVC when fragmentation is enabled on the PVC.
12.0(4)T	This command was modified to include the fragmentation type and size associated with a particular PVC when fragmentation is enabled on the PVC.
12.0(5)T	This command was modified to include information on the special voice queue that is created using the **queue** keyword of the **frame-relay voice bandwidth** command.
12.1(2)T	This command was modified to display the following information: • Details about the policy map attached to a specific PVC. • The priority configured for PVCs within Frame Relay PIPQ. • Details about Frame Relay traffic shaping and policing on switched PVCs.
12.0(12)S	This command was modified to display reasons for packet drops and complete status information for switched NNI PVCs.
12.1(5)T	This command was modified to display the following information: • The number of packets in the post-hardware-compression queue. • The reasons for packet drops and complete status information for switched NNI PVCs.
12.0(17)S	This command was modified to display the number of outgoing packets dropped and the number of outgoing bytes dropped because of QoS policy.

Release	Modification
12.2 T	This command was modified to show that when payload compression is configured for a PVC, the throughput rate reported by the PVC is equal to the rate reported by the interface.
12.2(11)T	This command was modified to display the number of outgoing packets dropped and the number of outgoing bytes dropped because of QoS policy.

Usage Guidelines

Use this command to monitor the PPP link control protocol (LCP) state as being open with an "up" state, or closed with a "down" state.

When "vofr" or "vofr cisco" has been configured on the PVC, and a voice bandwidth has been allocated to the class associated with this PVC, configured voice bandwidth and used voice bandwidth are also displayed.

Statistics Reporting

To obtain statistics about PVCs on all Frame Relay interfaces, use this command with no arguments. When you use the show frame-relay pvc command with no arguments or with the *interface* argument, a table will display that shows the number of PVCs in the various states.

To obtain statistics about a PVC that include policy-map configuration or the priority configured for that PVC, use this command with the *dlci* argument.

Per-VC counters are not incremented at all when either autonomous or silicon switching engine (SSE) switching is configured; therefore, PVC values will be inaccurate if either switching method is used.

Traffic Shaping

Congestion control mechanisms are currently not supported on terminated PVCs nor on PVCs over ISDN. Where congestion control mechanisms are supported, the switch passes forward explicit congestion notification (FECN) bits, backward explicit congestion notification (BECN) bits, and discard eligible (DE) bits unchanged from entry to exit points in the network.

Examples

The displays in this section show sample output for a variety of PVCs. Some of the PVCs carry data only; some carry a combination of voice and data.

Frame Relay Generic Configuration Example

The following sample output shows a generic Frame Relay configuration on DLCI 100:

```
Router# show frame-relay pvc 100

PVC Statistics for interface Serial4/0/1:0 (Frame Relay DTE)

DLCI = 100, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE (EEK UP), INTERFACE = Serial4/0/1:0.1

  input pkts 4360          output pkts 4361         in bytes 146364
  out bytes 130252         dropped pkts 3735        in pkts dropped 0
  out pkts dropped 3735             out bytes dropped 1919790
  late-dropped out pkts 3735        late-dropped out bytes 1919790
  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 337       out bcast bytes 102084
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
  pvc create time 05:34:06, last time pvc status changed 05:33:38
```

Multiple Frame Relay PVCs Example

The following is sample output for the **show frame-relay pvc** command with no arguments. Statistics for all of the PVCs on all of the interfaces are displayed.

```
PVC Statistics for interface Serial2/1 (Frame Relay DTE)

               Active     Inactive      Deleted       Static
   Local        115           0            0            0
   Switched       0           0            0            0
   Unused         0           0            0            0

 DLCI = 100, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial2/1

   input pkts 12             output pkts 7             in bytes 4406
   out bytes 1366            dropped pkts 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 7           out bcast bytes 1366
   pvc create time 1d04h, last time pvc status changed 00:30:32
  --More--
```

Frame Relay Fragmentation and Hardware Compression Example

The following is sample output for the **show frame-relay pvc** command for a PVC configured with Cisco-proprietary fragmentation and hardware compression:

```
Router# show frame-relay pvc 110

PVC Statistics for interface Serial0/0 (Frame Relay DTE)

DLCI = 110, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial0/0

  input pkts 409            output pkts 409           in bytes 3752
  out bytes 4560            dropped pkts 1            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 0           out bcast bytes 0
  pvc create time 3d00h, last time pvc status changed 2d22h
  Service type VoFR-cisco
   Voice Queueing Stats: 0/100/0 (size/max/dropped)
  Post h/w compression queue: 0
  Current fair queue configuration:
   Discard     Dynamic      Reserved
   threshold   queue count  queue count
   64          16           2
  Output queue size 0/max total 600/drops 0
  configured voice bandwidth 16000, used voice bandwidth 0
  fragment type VoFR-cisco          fragment size 100
  cir 64000     bc   640       be 0          limit 80     interval 10
  mincir 32000     byte increment 80    BECN response no
  frags 428       bytes 4810      frags delayed 24        bytes delayed 770
  shaping inactive
  traffic shaping drops 0
  ip rtp priority parameters 16000 32000 20000
```

Switched PVC Example

The following is sample output from the **show frame-relay pvc** command for a switched Frame Relay PVC. This output displays detailed information about NNI status and why packets were dropped from switched PVCs.

```
Router# show frame-relay pvc

 PVC Statistics for interface Serial2/2 (Frame Relay NNI)
```

```
DLCI = 16, DLCI USAGE = SWITCHED, PVC STATUS = INACTIVE, INTERFACE = Serial2/2
LOCAL PVC STATUS = INACTIVE, NNI PVC STATUS = INACTIVE

  input pkts 0             output pkts 0            in bytes 0
  out bytes 0              dropped pkts 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 0         out bcast bytes 0
  switched pkts0
  Detailed packet drop counters:
  no out intf 0            out intf down 0          no out PVC 0
  in PVC down 0            out PVC down 0           pkt too big 0
  shaping Q full 0         pkt above DE 0           policing drop 0
  pvc create time 00:00:07, last time pvc status changed 00:00:07
```

Frame Relay Congestion Management on a Switched PVC Example

The following is sample output from the **show frame-relay pvc** command that shows the statistics for a switched PVC on which Frame Relay congestion management is configured:

```
Router# show frame-relay pvc 200

PVC Statistics for interface Serial3/0 (Frame Relay DTE)

DLCI = 200, DLCI USAGE = SWITCHED, PVC STATUS = ACTIVE, INTERFACE = Serial3/0

  input pkts 341           output pkts 390          in bytes 341000
  out bytes 390000         dropped pkts 0           in FECN pkts 0
  in BECN pkts 0           out FECN pkts 0          out BECN pkts 0
  in DE pkts 0             out DE pkts 390
  out bcast pkts 0          out bcast bytes 0            Num Pkts Switched 341

  pvc create time 00:10:35, last time pvc status changed 00:10:06
  Congestion DE threshold 50
  shaping active
  cir 56000     bc 7000      be 0         byte limit 875    interval 125
  mincir 28000     byte increment 875   BECN response no
  pkts 346       bytes 346000    pkts delayed 339       bytes delayed 339000
  traffic shaping drops 0
  Queueing strategy:fifo
  Output queue 48/100, 0 drop, 339 dequeued
```

Frame Relay Policing on a Switched PVC Example

The following is sample output from the **show frame-relay pvc** command that shows the statistics for a switched PVC on which Frame Relay policing is configured:

```
Router# show frame-relay pvc 100

PVC Statistics for interface Serial1/0 (Frame Relay DCE)

DLCI = 100, DLCI USAGE = SWITCHED, PVC STATUS = ACTIVE, INTERFACE = Serial1/0

  input pkts 1260          output pkts 0            in bytes 1260000
  out bytes 0              dropped pkts 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 0          out bcast bytes 0            Num Pkts Switched 1260

  pvc create time 00:03:57, last time pvc status changed 00:03:19
  policing enabled, 180 pkts marked DE
  policing Bc  6000        policing Be  6000        policing Tc  125 (msec)
```

```
  in Bc pkts   1080        in Be pkts   180         in xs pkts   0
  in Bc bytes  1080000     in Be bytes  180000      in xs bytes  0
```

Frame Relay PVC Priority Queueing Example

The following is sample output for a PVC that has been assigned high priority:

```
Router# show frame-relay pvc 100

PVC Statistics for interface Serial0 (Frame Relay DTE)

DLCI = 100, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial0

  input pkts 0             output pkts 0            in bytes 0
  out bytes 0              dropped pkts 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 0          out bcast bytes 0
  pvc create time 00:00:59, last time pvc status changed 00:00:33
  priority high
```

Low Latency Queueing for Frame Relay Example

The following is sample output from the **show frame-relay pvc** command for a PVC shaped to a 64K committed information rate (CIR) with fragmentation. A policy map is attached to the PVC and is configured with a priority class for voice, two data classes for IP precedence traffic, and a default class for best-effort traffic. Weighted Random Early Detection (WRED) is used as the drop policy on one of the data classes.

```
Router# show frame-relay pvc 100

PVC Statistics for interface Serial1/0 (Frame Relay DTE)

DLCI = 100, DLCI USAGE = LOCAL, PVC STATUS = INACTIVE, INTERFACE = Serial1/0.1

  input pkts 0             output pkts 0            in bytes 0
  out bytes 0              dropped pkts 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 0          out bcast bytes 0
  pvc create time 00:00:42, last time pvc status changed 00:00:42
  service policy mypolicy
 Class voice
  Weighted Fair Queueing
      Strict Priority
      Output Queue: Conversation 72
        Bandwidth 16 (kbps) Packets Matched 0
        (pkts discards/bytes discards) 0/0
 Class immediate-data
  Weighted Fair Queueing
      Output Queue: Conversation 73
        Bandwidth 60 (%) Packets Matched 0
        (pkts discards/bytes discards/tail drops) 0/0/0
        mean queue depth: 0
        drops: class  random   tail     min-th   max-th   mark-prob
               0      0        0        64       128      1/10
               1      0        0        71       128      1/10
               2      0        0        78       128      1/10
               3      0        0        85       128      1/10
               4      0        0        92       128      1/10
               5      0        0        99       128      1/10
               6      0        0        106      128      1/10
               7      0        0        113      128      1/10
               rsvp   0        0        120      128      1/10
```

```
 Class priority-data
  Weighted Fair Queueing
      Output Queue: Conversation 74
        Bandwidth 40 (%) Packets Matched 0 Max Threshold 64 (packets)
        (pkts discards/bytes discards/tail drops) 0/0/0
 Class class-default
  Weighted Fair Queueing
      Flow Based Fair Queueing
      Maximum Number of Hashed Queues 64  Max Threshold 20 (packets)
  Output queue size 0/max total 600/drops 0
  fragment type end-to-end         fragment size 50
  cir 64000     bc   640       be 0         limit 80     interval 10
  mincir 64000     byte increment 80    BECN response no
  frags 0         bytes 0         frags delayed 0         bytes delayed 0
  shaping inactive
  traffic shaping drops 0
```

PPP over Frame Relay Example

The following is sample output from the **show frame-relay pvc** command that shows the PVC statistics for serial interface 5 (slot 1 and DLCI 55 are up) during a PPP session over Frame Relay:

```
Router# show frame-relay pvc 55

PVC Statistics for interface Serial5/1 (Frame Relay DTE)
DLCI = 55, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial5/1.1
     input pkts 9             output pkts 16           in bytes 154
     out bytes 338            dropped pkts 6           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 0         out bcast bytes 0
     pvc create time 00:35:11, last time pvc status changed 00:00:22
     Bound to Virtual-Access1 (up, cloned from Virtual-Template5)
```

Voice over Frame Relay Example

The following is sample output from the **show frame-relay pvc** command for a PVC carrying Voice over Frame Relay (VoFR) traffic configured via the **vofr cisco** command. The **frame-relay voice bandwidth** command has been configured on the class associated with this PVC, as has fragmentation. The fragmentation employed is proprietary to Cisco.

A sample configuration for this scenario is shown first, followed by the output for the **show frame-relay pvc** command.

```
interface serial 0
 encapsulation frame-relay
 frame-relay traffic-shaping
 frame-relay interface-dlci 108
  vofr cisco
  class vofr-class
map-class frame-relay vofr-class
 frame-relay fragment 100
 frame-relay fair-queue
 frame-relay cir 64000
 frame-relay voice bandwidth 25000
```

```
Router# show frame-relay pvc 108

PVC Statistics for interface Serial0 (Frame Relay DTE)
DLCI = 108, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial0
  input pkts 1260          output pkts 1271         in bytes 95671
  out bytes 98604          dropped pkts 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 1271       out bcast bytes 98604
  pvc create time 09:43:17, last time pvc status changed 09:43:17
  Service type VoFR-cisco
  configured voice bandwidth 25000, used voice bandwidth 0
  voice reserved queues 24, 25
  fragment type VoFR-cisco         fragment size 100
  cir 64000     bc 64000     be 0         limit 1000   interval 125
  mincir 32000     byte increment 1000  BECN response no
  pkts 2592      bytes 205140    pkts delayed 1296      bytes delayed 102570
  shaping inactive
  shaping drops 0
  Current fair queue configuration:
   Discard     Dynamic      Reserved
   threshold   queue count  queue count
    64          16           2
  Output queue size 0/max total 600/drops 0
```

FRF.12 Fragmentation Example

The following is sample output from the **show frame-relay pvc** command for an application employing pure FRF.12 fragmentation. A sample configuration for this scenario is shown first, followed by the output for the **show frame-relay pvc** command.

```
interface serial 0
 encapsulation frame-relay
 frame-relay traffic-shaping
 frame-relay interface-dlci 110
  class frag
map-class frame-relay frag
 frame-relay fragment 100
 frame-relay fair-queue
 frame-relay cir 64000

Router# show frame-relay pvc 110

PVC Statistics for interface Serial0 (Frame Relay DTE)
DLCI = 110, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial0
  input pkts 0             output pkts 243          in bytes 0
  out bytes 7290           dropped pkts 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 243        out bcast bytes 7290
  pvc create time 04:03:17, last time pvc status changed 04:03:18
  fragment type end-to-end         fragment size 100
  cir 64000     bc 64000     be 0         limit 1000   interval 125
  mincir 32000     byte increment 1000  BECN response no
  pkts 486       bytes 14580     pkts delayed 243       bytes delayed 7290
  shaping inactive
  shaping drops 0
  Current fair queue configuration:
   Discard     Dynamic      Reserved
   threshold   queue count  queue count
   64          16           2
  Output queue size 0/max total 600/drops 0
```

Note that when voice is not configured, voice bandwidth output is not displayed.

PVC Transporting Voice and Data

The following is sample output from the **show frame-relay pvc** command for a PVC carrying voice and data traffic, with a special queue specifically for voice traffic created using the **frame-relay voice bandwidth** command **queue** keyword:

```
Router# show frame-relay pvc interface serial 1 45

 PVC Statistics for interface Serial1 (Frame Relay DTE)

 DLCI = 45, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial1

   input pkts 85            output pkts 289          in bytes 1730
   out bytes 6580           dropped pkts 11          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 0          out bcast bytes 0
   pvc create time 00:02:09, last time pvc status changed 00:02:09
   Service type VoFR
   configured voice bandwidth 25000, used voice bandwidth 22000
   fragment type VoFR         fragment size 100
   cir 20000     bc   1000      be 0         limit 125    interval 50
   mincir 20000     byte increment 125   BECN response no
   fragments 290       bytes 6613      fragments delayed 1         bytes delayed 33
   shaping inactive
   traffic shaping drops 0
    Voice Queueing Stats: 0/100/0 (size/max/dropped)
   ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
   Current fair queue configuration:
    Discard     Dynamic      Reserved
    threshold   queue count  queue count
    64          16           2
   Output queue size 0/max total 600/drops 0
```

Table 34 describes the significant fields shown in the display.

Table 34 show frame-relay pvc Field Descriptions

Field	Description
DLCI	One of the DLCI numbers for the PVC.
DLCI USAGE	Lists SWITCHED when the router or access server is used as a switch, or LOCAL when the router or access server is used as a DTE device.

Table 34 show frame-relay pvc Field Descriptions (continued)

Field	Description
PVC STATUS	Status of the PVC. The DCE device reports the status, and the DTE device receives the status. When you disable the Local Management Interface (LMI) mechanism on the interface (by using the **no keepalive** command), the PVC status is STATIC. Otherwise, the PVC status is exchanged using the LMI protocol: • STATIC—LMI is disabled on the interface. • ACTIVE— The PVC is operational and can transmit packets. • INACTIVE—The PVC is configured, but down. • DELETED—The PVC is not present (DTE device only), which means that no status is received from the LMI protocol. If the **frame-relay end-to-end keepalive** command is used, the end-to-end keepalive (EEK) status is reported in addition to the LMI status. For example: • ACTIVE (EEK UP) —The PVC is operational according to LMI and end-to-end keepalives. • ACTIVE (EEK DOWN)—The PVC is operational according to LMI, but end-to-end keepalive has failed.
INTERFACE	Specific subinterface associated with this DLCI.
LOCAL PVC STATUS[1]	Status of PVC configured locally on the NNI interface.
NNI PVC STATUS[1]	Status of PVC learned over the NNI link.
input pkts	Number of packets received on this PVC.
output pkts	Number of packets sent on this PVC.
in bytes	Number of bytes received on this PVC.
out bytes	Number of bytes sent on this PVC.
dropped pkts	Number of incoming and outgoing packets dropped by the router at the Frame Relay level.
in pkts dropped	Number of incoming packets dropped. Incoming packets may be dropped for a number of reasons, including the following: • inactive PVC • policing • pkts received above DE discard level • dropped fragments • memory allocation failures • configuration problems
out pkts dropped	Number of outgoing packets dropped, including shaping drops and late drops.
out bytes dropped	Number of outgoing bytes dropped.
late-dropped out pkts	Number of outgoing packets dropped because of QoS policy (such as with VC queuing or Frame Relay traffic shaping). This field is not displayed when the value is zero.

Table 34 show frame-relay pvc Field Descriptions (continued)

Field	Description
late-dropped out bytes	Number of outgoing bytes dropped because of QoS policy (such with as VC queuing or Frame Relay traffic shaping). This field is not displayed when the value is zero.
in FECN pkts	Number of packets received with the FECN bit set.
in BECN pkts	Number of packets received with the BECN bit set.
out FECN pkts	Number of packets sent with the FECN bit set.
out BECN pkts	Number of packets sent with the BECN bit set.
in DE pkts	Number of DE packets received.
out DE pkts	Number of DE packets sent.
out bcast pkts	Number of output broadcast packets.
out bcast bytes	Number of output broadcast bytes.
switched pkts	Number of switched packets.
no out intf[2]	Number of packets dropped because there is no output interface.
out intf down[2]	Number of packets dropped because the output interface is down.
no out PVC[2]	Number of packets dropped because the outgoing PVC is not configured.
in PVC down[2]	Number of packets dropped because the incoming PVC is inactive.
out PVC down[2]	Number of packets dropped because the outgoing PVC is inactive.
pkt too big[2]	Number of packets dropped because the packet size is greater than media MTU[3].
shaping Q full[2]	Number of packets dropped because the Frame Relay traffic-shaping queue is full.
pkt above DE[2]	Number of packets dropped because they are above the DE level when Frame Relay congestion management is enabled.
policing drop[2]	Number of packets dropped because of Frame Relay traffic policing.
pvc create time	Time at which the PVC was created.
last time pvc status changed	Time at which the PVC changed status.
VC-Bundle	PVC bundle of which the PVC is a member.
priority	Priority assigned to the PVC.
pkts marked DE	Number of packets marked DE because they exceeded the Bc.
policing Bc	Committed burst size.
policing Be	Excess burst size.
policing Tc	Measurement interval for counting Bc and Be.
in Bc pkts	Number of packets received within the committed burst.
in Be pkts	Number of packets received within the excess burst.
in xs pkts	Number of packets dropped because they exceeded the combined burst.
in Bc bytes	Number of bytes received within the committed burst.
in Be bytes	Number of bytes received within the excess burst.

Table 34 show frame-relay pvc Field Descriptions (continued)

Field	Description
in xs bytes	Number of bytes dropped because they exceeded the combined burst.
Congestion DE threshold	PVC queue percentage at which packets with the DE bit are dropped.
Congestion ECN threshold	PVC queue percentage at which packets are set with the BECN and FECN bits.
Service type	Type of service performed by this PVC. Can be VoFR or VoFR-cisco.
Post h/w compression queue	Number of packets in the post-hardware-compression queue when hardware compression and Frame Relay fragmentation are configured.
configured voice bandwidth	Amount of bandwidth in bits per second (bps) reserved for voice traffic on this PVC.
used voice bandwidth	Amount of bandwidth in bps currently being used for voice traffic.
service policy	Name of the output service policy applied to the VC.
Class	Class of traffic being displayed. Output is displayed for each configured class in the policy.
Output Queue	The WFQ[4] conversation to which this class of traffic is allocated.
Bandwidth	Bandwidth in kbps or percentage configured for this class.
Packets Matched	Number of packets that matched this class.
Max Threshold	Maximum queue size for this class when WRED is not used.
pkts discards	Number of packets discarded for this class.
bytes discards	Number of bytes discarded for this class.
tail drops	Number of packets discarded for this class because the queue was full.
mean queue depth	Average queue depth, based on the actual queue depth on the interface and the exponential weighting constant. It is a moving average. The minimum and maximum thresholds are compared against this value to determine drop decisions.
drops:	WRED parameters.
class	IP precedence value.
random	Number of packets randomly dropped when the mean queue depth is between the minimum threshold value and the maximum threshold value for the specified IP precedence value.
tail	Number of packets dropped when the mean queue depth is greater than the maximum threshold value for the specified IP precedence value.
min-th	Minimum WRED threshold in number of packets.
max-th	Maximum WRED threshold in number of packets.
mark-prob	Fraction of packets dropped when the average queue depth is at the maximum threshold.
Maximum Number of Hashed Queues	(Applies to class default only) Number of queues available for unclassified flows.

Table 34 show frame-relay pvc Field Descriptions (continued)

Field	Description
fragment type	Type of fragmentation configured for this PVC. Possible types are as follows: • end-to-end—Fragmented packets contain the standard FRF.12 header • VoFR—Fragmented packets contain the FRF.11 Annex C header • VoFR-cisco—Fragmented packets contain the Cisco proprietary header
fragment size	Size of the fragment payload in bytes.
adaptive active/inactive	Indicates whether Frame Relay voice-adaptive fragmentation is active or inactive.
time left	Number of seconds left on the Frame Relay voice-adaptive fragmentation deactivation timer. When this timer expires, Frame Relay fragmentation turns off.
cir	Current CIR in bps.
bc	Current committed burst (Bc) size, in bits.
be	Current excess burst (Be) size, in bits.
limit	Maximum number of bytes sent per internal interval (excess plus sustained).
interval	Interval being used internally (may be smaller than the interval derived from Bc/CIR; this happens when the router determines that traffic flow will be more stable with a smaller configured interval).
mincir	Minimum CIR for the PVC.
byte increment	Number of bytes that will be sustained per internal interval.
BECN response	Indication that Frame Relay has BECN adaptation configured.
pkts	Number of packets associated with this PVC that have gone through the traffic-shaping system.
frags	Total number of fragments (and unfragmented packets that are too small to be fragmented) shaped on this VC.
bytes	Number of bytes associated with this PVC that have gone through the traffic-shaping system.
pkts delayed	Number of packets associated with this PVC that have been delayed by the traffic-shaping system.
frags delayed	Number of fragments (and unfragmented packets that are too small to be fragmented) delayed in the shaping queue before being sent.
bytes delayed	Number of bytes associated with this PVC that have been delayed by the traffic-shaping system.
shaping	Indication that shaping will be active for all PVCs that are fragmenting data; otherwise, shaping will be active if the traffic being sent exceeds the CIR for this circuit.
shaping drops	Number of packets dropped by the traffic-shaping process.
Queueing strategy	Per-VC queueing strategy.

Table 34 show frame-relay pvc Field Descriptions (continued)

Field	Description
Output queue	State of the per-VC queue.
48/100	• Number of packets enqueued/size of the queue
0 drop	• Number of packets dropped
300 dequeued	• Number of packets dequeued
Voice Queueing Stats	Statistics showing the size of packets, the maximum number of packets, and the number of packets dropped in the special voice queue created using the **frame-relay voice bandwidth** command **queue** keyword.
Discard threshold	Maximum number of packets that can be stored in each packet queue. Additional packets received after a queue is full will be discarded.
Dynamic queue count	Number of packet queues reserved for best-effort traffic.
Reserved queue count	Number of packet queues reserved for voice traffic.
Output queue size	Size in bytes of each output queue.
max total	Maximum number of packets of all types that can be queued in all queues.
drops	Number of frames dropped by all output queues.

1. The LOCAL PVC STATUS and NNI PVC STATUS fields are displayed only for PVCs configured on Frame Relay NNI interface types. These fields are not displayed if the PVC is configured on DCE or DTE interface types.
2. The detailed packet drop fields are displayed for switched Frame Relay PVCs only. These fields are not displayed for terminated PVCs.
3. MTU = maximum transmission unit
4. WFQ = weighted fair queueing

Related Commands

Command	Description
frame-relay accounting adjust	Enables byte count adjustment at the PVC level so that the number of bytes sent and received at the PVC corresponds to the actual number of bytes sent and received on the physical interface.
frame-relay interface-queue priority	Enables FR PIPQ on a Frame Relay interface and assigns priority to a PVC within a Frame Relay map class.
frame-relay pvc	Configures Frame Relay PVCs for FRF.8 Frame Relay-ATM Service Interworking.
service-policy	Attaches a policy map to an input interface or VC, or an output interface or VC, to be used as the service policy for that interface or VC.
show dial-peer voice	Displays configuration information and call statistics for dial peers.
show frame-relay fragment	Displays Frame Relay fragmentation details.
show frame-relay vofr	Displays details about FRF.11 subchannels being used on VoFR DLCIs.
show interfaces serial	Displays information about a serial interface.
show policy-map interface	Displays the configuration of classes configured for service policies on the specified interface or PVC.
show traffic-shape queue	Displays information about the elements queued at a particular time at the VC (DLCI) level.

show frame-relay qos-autosense

To display the quality of service (QoS) values sensed from the switch, use the **show frame-relay qos-autosense** EXEC command.

show frame-relay qos-autosense [**interface** *number*]

Syntax Description

interface *number*	(Optional) Indicates the number of the physical interface for which you want to display QoS information.

Command Modes

EXEC

Command History

Release	Modification
11.2	This command was introduced.
12.1(3)T	This command was modified to display information about Enhanced Local Management Interface (ELMI) address registration.

Examples

The following is sample output from the **show frame-relay qos-autosense** command when ELMI and ELMI address registration are enabled.

```
Router# show frame-relay qos-autosense

ELMI information for interface Serial1
   IP Address used for Address Registration:9.2.7.9 My Ifindex:4
   ELMI AR status : Enabled.
   Connected to switch:hgw1 Platform:2611 Vendor:cisco
   Sw side ELMI AR status: Enabled
   IP Address used by switch for address registration :9.2.6.9 Ifindex:5
   ELMI AR status : Enabled.
               (Time elapsed since last update 00:00:40)
```

The following is sample output from the **show frame-relay qos-autosense** command when ELMI and traffic shaping are enabled:

```
Router# show frame-relay qos-autosense

ELMI information for interface Serial1
 Connected to switch:FRSM-4T1   Platform:AXIS   Vendor:cisco
              (Time elapsed since last update 00:00:30)

 DLCI = 100
 OUT:    CIR  64000       BC 50000        BE 25000        FMIF 4497
 IN:     CIR  32000       BC 25000        BE 12500        FMIF 4497
 Priority 0     (Time elapsed since last update 00:00:12)

 DLCI = 200
 OUT:    CIR 128000       BC 50000        BE 5100         FMIF 4497
 IN:     CIR Unknown      BC Unknown      BE Unknown      FMIF 4497
 Priority 0     (Time elapsed since last update 00:00:13)
```

Table 35 describes the significant fields in the output display.

Table 35 show frame-relay qos-autosense Field Descriptions

Field	Description
IP Address used for Address Registration	Management IP address of the data terminal equipment (DTE) interface.
My ifIndex	ifIndex of the DTE interface on which ELMI is running.
ELMI AR status	Indicates whether ELMI is enabled or disabled on the interface.
Connected to switch	Name of neighboring switch.
Platform	Platform information about neighboring switch.
Vendor	Vendor information about neighboring switch.
Sw side ELMI AR status	Indicates whether ELMI is enabled or disabled on the neighboring switch.
IP Address used by switch for address registration	IP address of DCE. If ELMI is not supported or is disabled, this value will be 0.0.0.0.
ifIndex	ifIndex of DCE.
DLCI	Value that indicates which PVC statistics are being reported.
Out:	Values reporting settings configured for the outgoing Committed Information Rate, Burst Size, Excess Burst Size, and FMIF.
In:	Values reporting settings configured for the incoming Committed Information Rate, Burst Size, Excess Burst Size, and FMIF.
Priority	Value indicating priority level (currently not used).

Related Commands

Command	Description
frame-relay qos-autosense	Enables ELMI on the Cisco router.
show frame-relay pvc	Displays statistics about PVCs for Frame Relay interfaces.

show frame-relay route

To display all configured Frame Relay routes, along with their status, use the **show frame-relay route** EXEC command.

show frame-relay route

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following is sample output from the **show frame-relay route** command:

```
Router# show frame-relay route

    Input Intf      Input Dlci      Output Intf     Output Dlci  Status
    Serial1         100             Serial2         200          active
    Serial1         101             Serial2         201          active
    Serial1         102             Serial2         202          active
    Serial1         103             Serial3         203          inactive
    Serial2         200             Serial1         100          active
    Serial2         201             Serial1         101          active
    Serial2         202             Serial1         102          active
    Serial3         203             Serial1         103          inactive
```

Table 36 describes significant fields shown in the output.

Table 36 show frame-relay route Field Descriptions

Field	Description
Input Intf	Input interface and unit.
Input Dlci	Input DLCI number.
Output Intf	Output interface and unit.
Output Dlci	Output DLCI number.
Status	Status of the connection: active or inactive.

show frame-relay svc maplist

To display all the switched virtual circuits (SVCs) under a specified map list, use the **show frame-relay svc maplist** EXEC command.

show frame-relay svc maplist *name*

Syntax Description

name	Name of the map list.

Command Modes

EXEC

Command History

Release	Modification
11.2	This command was introduced.

Examples

The following example shows, first, the configuration of the shank map list and, second, the corresponding output of the **show frame-relay svc maplist** command. The following lines show the configuration:

```
map-list shank local-addr X121 87654321 dest-addr X121 12345678
 ip 172.21.177.26 class shank ietf
 ipx 123.0000.0c07.d530 class shank ietf
!
map-class frame-relay shank
 frame-relay incir 192000
 frame-relay min-incir 19200
 frame-relay outcir 192000
 frame-relay min-outcir 19200
 frame-relay incbr(bytes) 15000
 frame-relay outcbr(bytes) 15000
```

The following lines show the output of the **show frame-relay svc maplist** command for the preceding configuration:

```
Router# show frame-relay svc maplist shank

Map List : shank
Local Address : 87654321            Type: X121
Destination Address: 12345678       Type: X121

Protocol : ip 172.21.177.26
Protocol : ipx 123.0000.0c07.d530
Encapsulation : IETF
Call Reference : 1              DLCI : 501

Configured Frame Mode Information Field Size :
Incoming : 1500         Outgoing : 1500
Frame Mode Information Field Size :
Incoming : 1500         Outgoing : 1500
Configured Committed Information Rate (CIR) :
Incoming : 192 * (10**3)                Outgoing : 192 * (10**3)
Committed Information Rate (CIR) :
Incoming : 192 * (10**3)                Outgoing : 192 * (10**3)
```

```
Configured Minimum Acceptable CIR :
Incoming : 192 * (10**2)                Outgoing : 192 * (10**2)
Minimum Acceptable CIR :
Incoming : 0 * (10**0)          Outgoing : 0 * (10**0)
Configured Committed Burst Rate (bytes) :
Incoming : 15000                Outgoing : 15000
Committed Burst Rate (bytes) :
Incoming : 15000                Outgoing : 15000
Configured Excess Burst Rate (bytes) :
Incoming : 16000                Outgoing : 1200
Excess Burst Rate (bytes) :
Incoming : 16000                Outgoing : 1200
```

Table 37 describes significant fields in the output.

Table 37 show frame-relay svc maplist Field Descriptions

Field	Description
Map List	Name of the configured map-list.
Local Address...Type	Configured source address type (E.164 or X.121) for the call.
Destination Address...Type	Configured destination address type (E.164 or X.121) for the call.
Protocol : ip ... Protocol: ipx ...	Destination protocol addresses configured for the map-list.
Encapsulation	Configured encapsulation type (CISCO or IETF) for the specified destination protocol address.
Call Reference	Call identifier.
DLCI: 501	Number assigned by the switch as the DLCI for the call.
Configured Frame Mode Information Field Size: Incoming: Outgoing: Frame Mode Information Field Size: Incoming: 1500 Outgoing: 1500	Lines that contrast the configured and actual frame mode information field size settings used for the calls.
Configured Committed Information Rate (CIR): Incoming: 192 * (10**3) Outgoing: 192 * (10**3) Committed Information Rate (CIR): Incoming: 192 * (10**3) Outgoing: 192 * (10**3)	Lines that contrast the configured and actual committed information rate (CIR) settings used for the calls.
Configured Minimum Acceptable CIR: Incoming: 192 * (10**2) Outgoing: 192 * (10**2) Minimum Acceptable CIR: Incoming: 0 * (10**0) Outgoing: 0 * (10**0)	Lines that contrast the configured and actual minimum acceptable CIR settings used for the calls.

Table 37 show frame-relay svc maplist Field Descriptions (continued)

Field	Description
Configured Committed Burst Rate (bytes): Incoming: 15000 Outgoing: 15000 Committed Burst Rate (bytes): Incoming: 15000 Outgoing: 15000	Lines that contrast the configured and actual committed burst rate (bytes) settings used for the calls.
Configured Excess Burst Rate (bytes): Incoming: 16000 Outgoing: 1200 Excess Burst Rate (bytes): Incoming: 16000 Outgoing: 1200	Lines that contrast the configured and actual excess burst rate (bytes) settings used for the calls.

Related Commands

Command	Description
class (map-list)	Associates a map class with a protocol-and-address combination.
frame-relay bc	Specifies the incoming or outgoing Bc for a Frame Relay VC.
frame-relay cir	Specifies the incoming or outgoing CIR for a Frame Relay VC.
frame-relay mincir	Specifies the minimum acceptable incoming or outgoing CIR for a Frame Relay VC.
map-class frame-relay	Specifies a map class to define QoS values for an SVC.
map-list	Specifies a map group and link it to a local E.164 or X.121 source address and a remote E.164 or X.121 destination address for Frame Relay SVCs.

show frame-relay traffic

To display the global Frame Relay statistics since the last reload, use the **show frame-relay traffic** EXEC command.

show frame-relay traffic

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following is sample output from the **show frame-relay traffic** command:

```
Router# show frame-relay traffic

Frame Relay statistics:
ARP requests sent 14, ARP replies sent 0
ARP request recvd 0, ARP replies recvd 10
```

threshold de

To configure the threshold at which discard eligible (DE)-marked packets will be discarded from switched permanent virtual circuits (PVCs) on the output interface, use the **threshold de** Frame Relay congestion management configuration command. To remove the threshold configuration, use the **no** form of this command.

threshold de *percentage*

no threshold de *percentage*

Syntax Description

percentage	Threshold at which DE-marked packets will be discarded, specified as a percentage of maximum queue size.

Defaults

100%

Command Modes

Frame Relay congestion management configuration

Command History

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

Usage Guidelines

You must enable Frame Relay congestion management on the interface before congestion management parameters will be effective. To enable Frame Relay congestion management and to enter Frame Relay congestion management configuration mode, use the **frame-relay congestion-management** interface command.

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

Examples

The following example shows how to configure a DE threshold of 40% on serial interface 1.

```
interface serial1
 encapsulation frame-relay
 frame-relay congestion-management
  threshold de 40
```

Related Commands

Command	Description
frame-relay congestion-management	Enables Frame Relay congestion management functions on all switched PVCs on an interface, and enters congestion management configuration mode.
frame-relay congestion threshold de	Configures the threshold at which DE-marked packets will be discarded from the traffic-shaping queue of a switched PVC.

Command	Description
frame-relay congestion threshold ecn	Configures the threshold at which ECN bits will be set on packets in the traffic-shaping queue of a switched PVC.
frame-relay switching	Enables PVC switching on a Frame Relay DCE or NNI.
threshold ecn	Configures the threshold at which ECN bits will be set on packets in switched PVCs on the output interface.

threshold ecn

To configure the threshold at which ECN bits will be set on packets in switched PVCs on the output interface, use the **threshold ecn** Frame Relay congestion management configuration command. To remove the threshold configuration, use the **no** form of this command.

threshold ecn {**bc** | **be**} *percentage*

no threshold ecn {**bc** | **be**} *percentage*

Syntax Description

bc	Specifies threshold for committed traffic.
be	Specifies threshold for excess traffic.
percentage	Threshold at which ECN bits will be set on packets, specified as a percentage of maximum queue size.

Defaults

100%

Command Modes

Frame Relay congestion management

Command History

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

Usage Guidelines

You must enable Frame Relay congestion management on the interface before congestion management parameters will be effective. To enable Frame Relay congestion management and to enter Frame Relay congestion management configuration mode, use the **frame-relay congestion-management** interface command.

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

You can configure separate queue thresholds for committed and excess traffic.

Configure the Be ECN threshold so that it is greater than or equal to zero and less than or equal to the Bc ECN threshold. Configure the Bc ECN threshold so that it is less than or equal to 100.

Examples

The following example shows how to configure a Be threshold of 0 and a Bc threshold of 20% on serial interface 1.

```
interface serial1
 encapsulation frame-relay
 frame-relay congestion-management
  threshold ecn be 0
  threshold ecn bc 20
```

Related Commands

Command	Description
frame-relay congestion-management	Enables Frame Relay congestion management functions on all switched PVCs on an interface, and enters congestion management configuration mode.
frame-relay congestion threshold de	Configures the threshold at which DE-marked packets will be discarded from the traffic-shaping queue of a switched PVC.
frame-relay congestion threshold ecn	Configures the threshold at which ECN bits will be set on packets in the traffic-shaping queue of a switched PVC.
frame-relay switching	Enables PVC switching on a Frame Relay DCE or NNI.
threshold de	Configures the threshold at which DE-marked packets will be discarded from switched PVCs on the output interface.