sequence-interval

To assign sequential numbers to class maps, use the **sequence-interval** command in QoS policy-map configuration mode. To remove the numbers, use the **no** form of this command.

sequence-interval *number*

no sequence-interval *number*

Syntax Description

number	The sequential interval. The range is 1 to 65535.

Command Default

Class maps are not assigned with sequential numbers.

Command Modes

QoS policy-map configuration (config-pmap)

Command History

Release	Modification
15.1(2)T	This command was introduced.

Usage Guidelines

Use this command to assigns sequential numbers to the class maps at a specific interval.

Examples

The following example sets the interval as 100 to assign sequence numbers to class maps:

```
Router(config)# policy-map type waas waas_global
Router(config-pmap)# sequence-interval 100
```

Related Commands

Command	Description
class	Associates a map class with a specified DLCI.
passthrough	Allows traffic without optimization.
policy-map type waas	Defines a WAAS Express policy map.
optimize	Applies WAAS optimization.

sequencing

To configure the direction in which sequencing is enabled for data packets in a Layer 2 pseudowire, use the **sequencing** command in pseudowire class configuration mode. To remove the sequencing configuration from the pseudowire class, use the **no** form of this command.

sequencing {**transmit** | **receive** | **both** | **resync** *number*}

no sequencing {**transmit** | **receive** | **both** | **resync** *number*}

Syntax Description

transmit	Updates the Sequence Number field in the headers of data packets sent over the pseudowire according to the data encapsulation method that is used.
receive	Keeps the value in the Sequence Number field in the headers of data packets received over the pseudowire. Out-of-order packets are dropped.
both	Enables both the **transmit** and **receive** options.
resync	Enables the reset of packet sequencing after the disposition router receives a specified number of out-of-order packets.
number	The number of out-of-order packets that cause a reset of packet sequencing. The range is 5 to 65535.

Command Default

Sequencing is disabled.

Command Modes

Pseudowire class configuration

Command History

Release	Modification
12.0(23)S	This command was introduced for Layer 2 Tunnel Protocol Version 3 (L2TPv3).
12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.
12.0(29)S	This command was updated to support Any Transport over MPLS (AToM).
12.0(30)S	The **resync** keyword was added.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(27)SBC	L2TPv3 support for this command was integrated into Cisco IOS Release 12.2(27)SBC.
12.2(28)SB	AToM support for this command was integrated into Cisco IOS Release 12.2(28)SB.

Usage Guidelines

When you enable sequencing using any of the available options, the sending of sequence numbers is automatically enabled and the remote provider edge (PE) peer is requested to send sequence numbers. Out-of-order packets received on the pseudowire are dropped only if you use the **sequencing receive** or **sequencing both** command.

If you enable sequencing for Layer 2 pseudowires on the Cisco 7500 series routers and you issue the **ip cef distributed** command, all traffic on the pseudowires is switched through the line cards.

It is useful to specify the **resync** keyword for situations when the disposition router receives many out-of-order packets. It allows the router to recover from situations where too many out-of-order packets are dropped.

Examples

The following example shows how to enable sequencing in data packets in Layer 2 pseudowires that were created from the pseudowire class named "ether-pw" so that the Sequence Number field is updated in tunneled packet headers for data packets that are both sent and received over the pseudowire:

```
Router(config)# pseudowire-class ether-pw
Router(config-pw)# encapsulation mpls
Router(config-pw)# sequencing both
```

The following example shows how to enable the disposition router to reset packet sequencing after it receives 1000 out-of-order packets:

```
Router(config)# pseudowire-class ether-pw
Router(config-pw)# encapsulation mpls
Router(config-pw)# sequencing both
Router(config-pw)# sequencing resync 1000
```

Related Commands

Command	Description
ip cef	Enables Cisco Express Forwarding on the Route Processor card.
pseudowire-class	Specifies the name of an L2TP pseudowire class and enters pseudowire class configuration mode.

service pad

To enable all packet assembler/disassembler (PAD) commands and connections between PAD devices and access servers, use the **service pad** command in global configuration mode. To disable this service, use the **no** form of this command.

service pad [**cmns**] [**from-xot**] [**to-xot**]

no service pad [**cmns**] [**from-xot**] [**to-xot**]

Syntax Description

cmns	(Optional) Specifies sending and receiving PAD calls over CMNS.
from-xot	(Optional) Accepts XOT to PAD connections.
to-xot	(Optional) Allows outgoing PAD calls over XOT.

Command Default

All PAD commands and associated connections are enabled. PAD services over XOT or CMNS are not enabled.

Command Modes

Global configuration

Command History

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

Usage Guidelines

The keywords **from-xot** and **to-xot** enable PAD calls to destinations that are not reachable over physical X.25 interfaces, but instead over TCP tunnels. This feature is known as PAD over XOT (X.25 over TCP).

Examples

If the **service pad** command is disabled, the **pad** EXEC command and all PAD related configurations, such as X.29, are unrecognized, as shown in the following example:

```
Router(config)# no service pad
Router(config)# x29 ?
% Unrecognized command
Router(config)# exit
Router# pad ?
% Unrecognized command
```

If the **service pad** command is enabled, the **pad** EXEC command and access to an X.29 configuration are granted as shown in the following example:

```
Router# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# service pad
Router(config)# x29 ?
access-list       Define an X.29 access list
inviteclear-time  Wait for response to X.29 Invite Clear message
profile           Create an X.3 profile
Router# pad ?
WORD   X121 address or name of a remote system
```

In the following example, PAD services over CMNS are enabled:

```
! Enable CMNS on a nonserial interface
interface ethernet0
 cmns enable
!
!Enable inbound and outbound PAD over CMNS service
service pad cmns
!
! Specify an X.25 route entry pointing to an interface's CMNS destination MAC address
x25 route ^2193330 interface Ethernet0 mac 00e0.b0e3.0d62

Router# show x25 vc

SVC 1,  State: D1,  Interface: Ethernet0
     Started 00:00:08, last input 00:00:08, output 00:00:08

     Line: 0   con 0    Location: console Host: 2193330
      connected to 2193330 PAD <--> CMNS Ethernet0 00e0.b0e3.0d62

     Window size input: 2, output: 2
     Packet size input: 128, output: 128
     PS: 2  PR: 3  ACK: 3  Remote PR: 2  RCNT: 0  RNR: no
     P/D state timeouts: 0  timer (secs): 0
     data bytes 54/19 packets 2/3 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0
```

Related Commands

Command	Description
cmns enable	Enables the CMNS on a nonserial interface.
show x25 vc	Displays information about active SVCs and PVCs.
x29 access-list	Limits access to the access server from certain X.25 hosts.
x29 profile	Creates a PAD profile script for use by the translate command.

service pad from-xot

To permit incoming X.25 over TCP (XOT) calls to be accepted as a packet assembler/disassembler (PAD) session, use the **service pad from-xot** command in global configuration mode. To disable this service, use the **no** form of this command.

service pad from-xot

no service pad from-xot

Syntax Description

This command has no arguments or keywords.

Defaults

Incoming XOT connections are ignored.

Command Modes

Global configuration

Command History

Release	Modification
11.2	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

If the **service pad from-xot** command is enabled, the calls received using the XOT service may be accepted for processing a PAD session.

Examples

The following example prevents incoming XOT calls from being accepted as a PAD session:

```
no service pad from-xot
```

Related Commands

Command	Description
x25 route	Creates an entry in the X.25 routing table (to be consulted for forwarding incoming calls and for placing outgoing PAD or protocol translation calls).
x29 access-list	Limits access to the access server from certain X.25 hosts.
x29 profile	Creates a PAD profile script for use by the translate command.

service pad to-xot

To permit outgoing PAD sessions to use routes to an XOT destination, use the **service pad to-xot** command in global configuration mode. To disable this service, use the **no** form of this command.

service pad to-xot

no service pad to-xot

Syntax Description

This command has no arguments or keywords.

Defaults

XOT routes pointing to XOT are not considered.

Command Modes

Global configuration

Command History

Release	Modification
11.2	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

If the **service pad to-xot** command is enabled, the configured routes to XOT destinations may be used when the router determines where to send a PAD Call, as shown in the following example:

```
service pad to-xot
```

Related Commands

Command	Description
x25 route	Creates an entry in the X.25 routing table (to be consulted for forwarding incoming calls and for placing outgoing PAD or protocol translation calls).
x29 access-list	Limits access to the access server from certain X.25 hosts.
x29 profile	Creates a PAD profile script for use by the translate command.

service translation

To enable upper layer user protocol encapsulation for Frame Relay-to-ATM Service Interworking (FRF.8) feature, which allows mapping between encapsulated ATM protocol data units (PDUs) and encapsulated Frame Relay PDUs, use the **service translation** command in FRF.8 connect configuration mode. To disable upper layer user protocol encapsulation, use the **no** form of this command.

service translation

no service translation

Syntax Description

This command has no arguments or keywords.

Defaults

The default state is **service translation**.

Command Modes

FRF.8 connect configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **no service translation** command disables mapping between encapsulated ATM PDUs and encapsulated Frame Relay PDUs.

Examples

The following example shows an FRF.8 configuration with service translation disabled:

```
Router# show running-config

Building configuration...

Current configuration:

connect service-1 Serial1/0 16 ATM3/0 1/32 service-interworking
 no service translation
 efci-bit map-fecn
```

The following example shows how to configure service translation on the connection named service-1:

```
Router(config)# connect service-1 serial1/0 16 ATM3/0 1/32 service-interworking
Router(config-frf8)# service translation
```

Related Commands

Command	Description
clp-bit	Sets the ATM CLP field in the ATM cell header.
connect (FRF.5)	Sets the Frame Relay DE bit field in the Frame Relay cell header.
de-bit map-clp	Sets the EFCI bit field in the ATM cell header.

set fr-fecn-becn

To enable forward explicit congestion notification (FECN) and backward explicit congestion notification (BECN) with Frame Relay over MPLS, use the **set fr-fecn-becn** command in policy map class configuration mode. To disable the configuration notification, use the **no** form of this command.

set fr-fecn-becn *percent*

no set fr-fecn-becn *percent*

Syntax Description

percent	Specifies how much (percentage) of the total queue size should be used before marking the FECN and BECN bits. The valid range of percentages is 0 to 99. Setting the threshold to 0 indicates that all traffic is marked with FECN and BECN bits.

Defaults

Frame Relay does not perform FECN and BECN marking.

Command Modes

Policy map class configuration

Command History

Release	Modification
12.0(26)S	This command was introduced.
12.2(27)SXA	This command was integrated into Cisco IOS Release 12.2(27)SXA.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

Usage Guidelines

This command works only with Frame Relay over MPLS.

If you configure FECN and BECN bit marking, you cannot configure bandwidth or priority.

Examples

The following example enables marking the FECN and BECN bits when 20 percent of the queue is used:

```
Router(config)# policy-map policy1
Router(config-pmap)# class class1
Router(config-pmap-c)# shape 80000
Router(config-pmap-c)# set fr-fecn-becn 20
```

Related Commands

Command	Description
threshold ecn	Sets the FECN and BECN marking at the interface level.

shape fr-voice-adapt

To enable Frame Relay voice-adaptive traffic shaping, use the **shape fr-voice-adapt** command in policy-map class configuration mode. To disable Frame Relay voice-adaptive traffic shaping, use the **no** form of this command.

shape fr-voice-adapt [**deactivation** *seconds*]

no shape fr-voice-adapt

Syntax Description

deactivation *seconds*	(Optional) Number of seconds that must elapse after the last voice packet is transmitted before the sending rate is increased to the committed information rate (CIR). The range is from 1 to 10000.

Defaults

Frame Relay voice-adaptive traffic shaping is not enabled.
Seconds: 30

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.2(15)T	This command was introduced.

Usage Guidelines

Frame Relay voice-adaptive traffic shaping enables a router to reduce the permanent virtual circuit (PVC) sending rate to the minimum CIR (minCIR) whenever packets (usually voice) are detected in the low latency queueing priority queue or H.323 call setup signaling packets are present. When there are no packets in priority queue and signaling packets are not present for a configured period of time, the router increases the PVC sending rate from minCIR to CIR to maximize throughput.

The **shape fr-voice-adapt** command can be configured only in the class-default class. If you configure the **shape fr-voice-adapt** command in another class, the associated Frame Relay map class will be rejected when you attach it to the interface.

Frame Relay voice-adaptive traffic shaping can be used with other types of adaptive traffic shaping. For example, when both voice-adaptive traffic shaping and adaptive shaping based on interface congestion are configured, the sending rate will change to minCIR if there are packets in the priority queue or the interface queue size exceeds the configured threshold.

Note Although the priority queue is generally used for voice traffic, Frame Relay voice-adaptive traffic shaping will respond to any packets (voice or data) in the priority queue.

In order to use Frame Relay voice-adaptive traffic shaping, you must have low latency queueing and traffic shaping configured using the Modular QoS CLI.

Examples

The following example shows the configuration of Frame Relay voice-adaptive traffic shaping and fragmentation. With this configuration, priority-queue packets or H.323 call setup signaling packets destined for PVC 100 will result in the reduction of the sending rate from CIR to minCIR and the activation of FRF.12 end-to-end fragmentation. If signaling packets and priority-queue packets are not detected for 50 seconds, the sending rate will increase to CIR and fragmentation will be turned off.

```
interface serial0
 encapsulation frame-relay
 frame-relay fragmentation voice-adaptive deactivation 50
 frame-relay fragment 80 end-to-end
 frame-relay interface-dlci 100
  class voice_adaptive_class
!
map-class frame-relay voice_adaptive_class
 frame-relay fair-queue
 service-policy output shape

class-map match-all voice
 match access-group 102
class-map match-all data
 match access-group 101

policy-map vats
 class voice
  priority 10
 class data
  bandwidth 10

policy-map shape
 class class-default
  shape average 60000
  shape adaptive 30000
  shape fr-voice-adapt deactivation 50
  service-policy vats
```

Related Commands

Command	Description
frame-relay fragmentation voice-adaptive	Enables voice-adaptive Frame Relay fragmentation.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.
show policy-map interface	Displays the packet statistics of all classes that are configured for all service policies either by interface or subinterface or by PVC.

show acircuit checkpoint

To display checkpointing information for each attachment circuit (AC), use the **show acircuit checkpoint** command in privileged EXEC mode.

show acircuit checkpoint

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(25)S	This command was introduced.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command is used for interface-based attachment circuits. For Frame Relay and ATM circuits, use the following commands to show redundancy information:

- **debug atm ha-error**
- **debug atm ha-events**
- **debug atm ha-state**
- **debug atm l2transport**
- **debug frame-relay redundancy**

Examples

The following **show acircuit checkpoint** command displays information about the ACs that have been check-pointed. The output varies, depending on whether the command output is for the active or standby Route Processor (RP).

On the active RP, the command displays the following output:

```
Router# show acircuit checkpoint

AC HA Checkpoint info:
Last Bulk Sync: 1 ACs
 AC    IW    XC    Id  VCId   Switch    Segment  St  Chkpt
----  ----  ----  ---  ----  --------  --------  --  -----
HDLC  LIKE  ATOM    3   100       1000      1000   0    N
VLAN  LIKE  ATOM    2  1002       2001      2001   3    Y
```

On the standby RP, the command displays the following output::

```
Router# show acircuit checkpoint

AC HA Checkpoint info:
 AC    IW    XC    Id  VCId   Switch    Segment  St  F-SLP
----  ----  ----  ---  ----  --------  --------  --  -----
HDLC  LIKE  ATOM    3   100         0         0   0   001
VLAN  LIKE  ATOM    2  1002      2001      2001   2   000
```

Table 21 describes the significant fields shown in the display.

Table 21 show acircuit checkpoint Field Descriptions

Field	Description
Last Bulk Sync	The number of ACs that were sent to the backup RP during the last bulk synchronization between the active and backup RPs.
AC	The type of attachment circuit.
IW	The type of interworking, either like-to-like (AToM) or any-to-any (Interworking).
XC	The type of cross-connect. Only AToM ACs are checkpointed.
ID	This field varies, depending on the type of attachment circuit. For Ethernet VLANs, the ID is the VLAN ID. For PPP and High-Level Data Link Control (HDLC), the ID is the AC circuit ID.
VCID	The configured virtual circuit ID.
Switch	An ID used to correlate the control plane and data plane contexts for this virtual circuit (VC). This is an internal value that is not for customer use.
Segment	An ID used to correlate the control plane and data plane contexts for this VC. This is an internal value that is not for customer use.
St	The state of the attachment circuit. This is an internal value that is not for customer use.
Chkpt	Whether the information about the AC was checkpointed.
F-SLP	Flags that provide more information about the state of the AC circuit. These values are not for customer use.

Related Commands

Command	Description
show mpls l2transport vc	Displays AToM status information.
show mpls l2transport vc checkpoint	Displays the status of the checkpointing process for both the active and standby RPs.

show ccm group

To display information about cluster control manager (CCM) groups on high availability (HA) Route Processor Stateful Switchover (RP-SSO) or Interchassis Stateful Switchover (IC-SSO) systems, use the **show ccm group** command in privileged EXEC mode.

show ccm group {**all** | **id** *group-id*}

Syntax Description

all	Displays information about all CCM groups (default, active, and inactive) configured on the router.
id	Displays the CCM group by group ID.
group-id	Valid existing CCM group ID.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(3)S	This command was introduced.

Usage Guidelines

Use the **show ccm group** command to display either all CCM redundancy groups with their group numbers or a specific CCM redundancy group, along with the number of CCM sessions in each group, the type of HA infrastructure, and the redundancy state of each group.

Examples

The following is sample output from the **show ccm group all** command:

```
Router# show ccm group all

CCM Default Group(RP-SSO) Details
---------------------------------

CCM Group ID              : 0
Infra Group ID            : Not Applicable
Infra Type                : Redundancy Facility (RF)
HA State                  : CCM HA Active
Redundancy State          : Collecting
Group Initialized/cleaned : Not Applicable


CCM Non-default Group(Inter-Box HA) Details
-------------------------------------------

 CCM Group 1 Details
------------------------

CCM Group ID              : 1
Infra Group ID            : 1
Infra Type                : Redundancy Group Facility (RGF)
HA State                  : CCM HA Active
Redundancy State          : Dynamic Sync
```

The following is sample output from the **show ccm group id** command:

```
Router# show ccm group id 1

CCM Group 1 Details
---------------------------------------

CCM Group ID              : 1
Infra Group ID            : 1
Infra Type                : Redundancy Group Facility (RGF)
HA State                  : CCM HA Active
Redundancy State          : Dynamic Sync
Group Initialized/cleaned : FASLE
```

Table 22 describes the significant fields shown in the display. Any data not described in the table is either self-explanatory or used for Cisco internal debugging.

Table 22 show ccm group Field Descriptions

Field	Description
CCM Group ID	Group ID of the CCM group. The default group ID is 0.
Infra Group ID	The corresponding redundancy infrastructure ID for this CCM group. This ID also matches the corresponding APS group ID.
Infra Type	The HA infrastructure type (Redundancy Facility [RF] or RGF)
HA State	The current HA state of the CCM group (active, standby, or HA absent)
Redundancy State	The current redundancy state of sessions that belong to the CCM group.

Related Commands

Command	Description
show ccm sessions	Displays CCM session information about HA RP-SSO and IC-SSO systems.

show ccm sessions

To display information about cluster control manager (CCM) sessions on Route Processor Stateful Switchover (RP-SSO) or Interchassis Stateful Switchover (IC-SSO) systems, use the **show ccm sessions** command in privileged EXEC mode.

show ccm sessions [**id** *group-id*]

Syntax Description

id	Displays the CCM session by group ID.
group-id	Valid existing CCM group ID.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(31)SB2	This command was introduced.
12.2(33)SRC	This command was integrated into Cisco IOS Release 12.2(33)SRC.
15.1(3)S	This command was modified. The **id** *group-id* keyword-argument pair was added.

Usage Guidelines

Use the **show ccm sessions** command to display information about CCM sessions on active and standby processors, and also to display information about subscriber redundancy sessions configured using the **subscriber redundancy** command.

Examples

The following is sample output from the **show ccm sessions** command on a Cisco 10000 series router active processor:

```
Router# show ccm sessions

Global CCM state:                               CCM HA Active - Dynamic Sync
Global ISSU state:                              Compatible, Clients Cap 0x0
    Number of sessions in state Down:               0
    Number of sessions in state Not Ready:          0
    Number of sessions in state Ready:              0
    Number of sessions in state Dyn Sync:           0

Timeout: Timer Type   Delay    Remaining Starts    CPU Limit CPU Last
        ------------ -------- --------- --------- --------- --------
        Rate         00:00:01 -         2         -         -
        Dynamic CPU  00:00:10 -         0         90        0
```

The following is sample output from the **show ccm sessions** command on a Cisco 10000 series router standby processor:

```
Router# show ccm sessions

Global CCM state:                       CCM HA Standby - Collecting
Global ISSU state:                      Compatible, Clients Cap 0xFFE
```

```
                                        Current     Bulk Sent   Bulk Rcvd
                                        ----------- ----------- -----------
Number of sessions in state Down:       0           0           0
Number of sessions in state Not Ready:  0           0           0
Number of sessions in state Ready:      0           0           0
Number of sessions in state Dyn Sync:   0           0           0

Timeout: Timer Type   Delay    Remaining Starts      CPU Limit CPU Last
         ------------ -------- --------- ----------- --------- --------
         Rate         00:00:01 -         0           -         -
         Dynamic CPU  00:00:10 -         0           90        0
         Bulk Time Li 00:08:00 -         0           -         -
         RF Notif Ext 00:00:20 -         0           -         -
```

The following is sample output from the **show ccm sessions** command on a Cisco 7600 series router active processor:

```
Router# show ccm sessions

Global CCM state:                               CCM HA Active - Dynamic Sync
Global ISSU state:                              Compatible, Clients Cap 0xFFFE

                                     Current     Bulk Sent   Bulk Rcvd
                                        ----------- ----------- -----------
Number of sessions in state Down:       0           0           0
Number of sessions in state Not Ready:  7424        0           0
Number of sessions in state Ready:      0           0           0
Number of sessions in state Dyn Sync:   20002       28001       0
Timeout: Timer Type   Delay    Remaining Starts      CPU Limit CPU Last
         ------------ -------- --------- ----------- --------- --------
Rate         00:00:01 -          924         -         -
         Dynamic CPU  00:00:10 -         0           90        2
         Bulk Time Li 00:08:00 -         0           -         -
         RF Notif Ext 00:00:20 -         18          -         -
```

The following is sample output from the **show ccm sessions** command on a Cisco 7600 series router standby processor:

```
Router# show ccm sessions

Global CCM state:                       CCM HA Standby - Collecting
Global ISSU state:                      Compatible, Clients Cap 0xFFE

                                        Current     Bulk Sent   Bulk Rcvd
                                        ----------- ----------- -----------
Number of sessions in state Down:       0           0           0
Number of sessions in state Not Ready:  8038        0           0
Number of sessions in state Ready:      20002       0           28001
Number of sessions in state Dyn Sync:   0           0           0
Timeout: Timer Type   Delay    Remaining Starts      CPU Limit CPU Last
         ------------ -------- --------- ----------- --------- --------
Rate         00:00:01 -          0          -         -
         Dynamic CPU  00:00:10 -         0           90        0
         Bulk Time Li 00:08:00 -         1           -         -
         RF Notif Ext 00:00:20 -         0           -         -
```

The following is sample output from the **show ccm sessions id** command on a Cisco 7600 series router:

```
Router# show ccm sessions id

Global CCM state:                       CCM HA Active - Dynamic Sync

                                        Current     Bulk Sent   Bulk Rcvd
                                        ----------- ----------- -----------
```

```
Number of sessions in state Down:        0           0           31
Number of sessions in state Not Ready:   9           10          11
Number of sessions in state Ready:       0           0           56
Number of sessions in state Dyn Sync:    66          62          0

Timeout: Timer Type   Delay    Remaining Starts      CPU Limit CPU Last
         ------------ -------- --------- ----------- --------- --------
         Rate         00:00:01 -         0           -         -
         Dynamic CPU  00:00:10 -         0           90        0
         Bulk Time Li 00:08:00 -         0           -         -
         RF Notif Ext 00:00:01 -         0           -         -
         RGF Bulk Tim 00:05:00 -         1           -         -
```

Table 22 describes the significant fields shown in the display. Any data not described in the table is either self-explanatory or used for Cisco internal debugging.

Table 23 show ccm sessions Field Descriptions

Field	Description
Global CCM state	Displays the processor's active or standby status and its CCM state. For example: CCM HA Active - Dynamic Sync means that this is the active processor, standby is in STANDBY_HOT state, and CCM is ready to synchronize sessions. CCM HA Active - Collecting means that this is the active processor and there is no standby processor. CCM can collect sessions but cannot synchronize them to a standby processor. CCM HA Active - Bulk Sync means that this is the active processor and a standby processor is booting up. CCM is doing a bulk synchronization of sessions. CCM HA Standby- Collecting means that this is the standby processor and is in STANDBY_HOT state. CCM is collecting sessions for synchronizing if a switchover happens.
Global ISSU state	Compatible, Clients Cap 0xFFFE0 indicates that CCM is compatible for in-service software upgrade (ISSU) clients, that is, ISSU-compatible Cisco IOS versions are running on both processors. It also means that CCM has the client capability for clients in the bitmask 0xFFFE.
Current	CCM sessions currently ready for synchronization.
Bulk Sent	CCM sessions sent during bulk synchronization.
Bulk Rcvd	CCM sessions received during bulk synchronization.
Number of sessions in state Down	Sessions in the down state.
Number of sessions in state Not Ready	Sessions in the not ready state.
Number of sessions in state Ready	Sessions in the ready state.
Number of sessions in state Dyn Sync	Sessions in the dynamic synchronization state.

Table 23 show ccm sessions Field Descriptions (continued)

Field	Description
Timeout	Displays statistics for the following timers: Rate—Monitors the number of sessions to be synchronized per configured time period. Dynamic CPU—Monitors the CPU limit, number of sessions, delay, and allowed calls configured for dynamic synchronization parameters. Bulk Time Li—Monitors the time limit configured for bulk synchronization. RF Notif Ext—Monitors redundancy facility (RF) active and standby state progressions and events. Use the **subscriber redundancy** command to modify parameters that these timers monitor.
Delay	Timer delay (in hh:mm:ss) for bulk and dynamic synchronization of subscriber sessions.
Remaining	Indicates the remaining time in seconds before the timer expires.
Starts	Indicates the number of times the timer started.
CPU Limit	CPU usage percentage, a configurable value; default is 90 percent.
CPU Last	Indicates the last time the CPU limit timer was running.

Related Commands

Command	Description
show ccm clients	Displays CCM client information.
show ccm queues	Displays CCM queue information.
subscriber redundancy	Configures subscriber session redundancy policies.

show connect (FR-ATM)

To display statistics and other information about Frame-Relay-to-ATM Network Interworking (FRF.5) and Frame Relay-to-ATM Service Interworking (FRF.8) connections, use the **show connect** command in privileged EXEC mode.

show connect [**all** | *element* | **id** *ID* | *name* | **port** *port*]

Syntax Description

all	(Optional) Displays information about all Frame Relay-to-ATM connections.
element	(Optional) Displays information about the specified connection element.
id *ID*	(Optional) Displays information about the specified connection identifier.
name	(Optional) Displays information about the specified connection name.
port *port*	(Optional) Displays information about all connections on an interface.

Defaults

Default state is **show connect all**.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(2)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

FRF.5: Examples

The following example displays information about all FRF.5 connections:

```
C3640# show connect all

ID   Name               Segment 1            Segment 2           State
=============================================================================
5    network-1         VC-Group network-1   ATM3/0 1/34          UP
```

The following example displays information about the specified FRF.5 connection identifier:

```
Router# show connect id 5

FR/ATM Network Interworking Connection: network-1
  Status    - UP
  Segment 1 - VC-Group network-1
  Segment 2 - ATM3/0 VPI 1 VCI 34
  Interworking Parameters -
    de-bit map-clp
    clp-bit map-de
```

FRF.8: Examples

The following example displays information about the specified FRF.8 connection identifier:

```
Router# show connect id 10

FR/ATM Service Interworking Connection: service-1
  Status    - UP
  Segment 1 - Serial1/0 DLCI 16
  Segment 2 - ATM3/0 VPI 1 VCI 32
Interworking Parameters -
    service translation
    efci-bit 0
    de-bit map-clp
    clp-bit map-de
```

The following example displays information about the FRF.8 connection on an interface:

```
Router# show connect port atm3/0

ID   Name               Segment 1            Segment 2           State
=========================================================================
10   service-1         Serial1/0 16         ATM3/0 1/32          UP
```

Table 24 describes the fields seen in these displays.

Table 24 show connect Field Descriptions

Display	Description
ID	Arbitrary connection identifier assigned by the operating system.
Name	Assigned connection name.
Segment 1 or 2	Frame Relay or ATM interworking segments.
State or Status	Status of the connection, UP, DOWN, or ADMIN DOWN.

Related Commands

Command	Description
connect (FRF.8)	Connects a Frame Relay DLCI to an ATM PVC.
show atm pvc	Displays all ATM PVCs, SVCs, and traffic information.
show frame-relay pvc	Displays statistics about Frame Relay interfaces.

show connection

TTo display the status of interworking connections, use the **show connection** command in privileged EXEC mode.

show connection [**all** | *element* | **id** *startid*-[*endid*]] | **name** *name* | **port** *port*]

Syntax Description

all	(Optional) Displays information about all interworking connections.
element	(Optional) Displays information about the specified connection element.
id	(Optional) Displays information about the specified connection identifier.
startid	Starting connection ID number.
endid	(Optional) Ending connection ID number.
name *name*	(Optional) Displays information about the specified connection name.
port *port*	(Optional) Displays information about all connections on an interface. (In Cisco IOS Release 12.0S, only ATM, serial, and Fast Ethernet are shown.)

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.1(2)T	This command was introduced as **show connect** (FR-ATM).
12.0(27)S	This command was integrated into Cisco IOS Release 12.0(27)S and updated to show all ATM, serial, and Fast Ethernet interworking connections.
12.4(2)T	The command output was modified to add Segment 1 and Segment 2 fields for Segment state and channel ID.
12.0(30)S	This command was integrated into Cisco IOS Release 12.0(30)S.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.4(8)	This command was integrated into Cisco IOS Release 12.4(8).
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4(11)T	This command was integrated into Cisco IOS Release 12.4(11)T.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
12.2(33)SB	This command was updated to display High-Level Data Link Control (HDLC) local switching connections.
Cisco IOS XE Release 2.5	This command was integrated into Cisco IOS XE Release 2.5.

Examples

The following example shows the local interworking connections on a router:

```
Router# show connection

ID    Name               Segment 1            Segment 2           State
======================================================================
1     conn1          ATM 1/0/0 AAL5 0/100   ATM 2/0/0 AAL5 0/100   UP
2     conn2          ATM 2/0/0 AAL5 0/300   Serial0/1 16           UP
3     conn3          ATM 2/0/0 AAL5 0/400   FA 0/0.1 10            UP
4     conn4          ATM 1/0/0 CELL 0/500   ATM 2/0/0 CELL 0/500   UP
5     conn5          ATM 1/0/0 CELL 100     ATM 2/0/0 CELL 100     UP
```

Table 25 describes the significant fields shown in the display.

Table 25 show connection Field Descriptions

Field	Description
ID	Arbitrary connection identifier assigned by the operating system.
Name	Name of the connection.
Segment 1 Segment 2	Information about the interworking segments: • Interface name and number. • Segment state, interface name and number, and channel ID. Segment state will displays nothing if the segment state is UP, "-" if the segment state is DOWN, and "***Card Removed***" if the segment state is DETACHED. • Type of encapsulation (if any) assigned to the interface. • Permanent virtual circuit (PVC) assigned to the ATM interface, data-link connection identifier (DLCI) assigned to the serial interface, or VLAN ID assigned to the Ethernet interface.
State	Status of the connection, which is one of the following: INVALID, UP, ADMIN UP, ADMIN DOWN, OPER DOWN, COMING UP, NOT VERIFIED, ERR.

Related Commands

Command	Description
connect (L2VPN local switching)	Connects two different or like interfaces on a router.
show atm pvc	Displays the status of ATM PVCs and SVCs.
show frame-relay pvc	Displays the status of Frame Relay interfaces.

show ethernet service evc

To display information about Ethernet virtual connections (EVCs), use the **show ethernet service evc** command in privileged EXEC mode.

show ethernet service evc [**detail** | **id** *evc-id* [**detail**] | **interface** *type number* [**detail**]]

Syntax Description

detail	(Optional) Displays detailed information about service instances or the specified service instance ID or interface.
id	(Optional) Displays EVC information for the specified service.
evc-id	(Optional) String from 1 to 100 characters that identifies the EVC.
interface	(Optional) Displays service instance information for the specified interface.
type	(Optional) Type of interface.
number	(Optional) Number of the interface.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(25)SEG	This command was introduced.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.

Usage Guidelines

This command is useful for system monitoring and troubleshooting.

Examples

Following is sample output from the **show ethernet service evc** command:

```
Router# show ethernet service evc

Identifier                      Type  Act-UNI-cnt Status
BLUE                            P-P       2       Active
PINK                            MP-MP     2       PartiallyActive
PURPLE                          P-P       2       Active
BROWN                           MP-MP     2       Active
GREEN                           P-P       3       Active
YELLOW                          MP-MP     2       PartiallyActive
BANANAS                         P-P       0       InActive
TEST2                           P-P       0       NotDefined
ORANGE                          P-P       2       Active
TEAL                            P-P       0       InActive
```

Table 26 describes the significant fields in the output.

Table 26 show ethernet service evc Field Descriptions

Field	Description
Identifier	EVC identifier.
Type	Type of connection, for example point-to-point (P-P) or multipoint-to-multipoint (MP-MP).
Act-UNI-cnt	Number of active user network interfaces (UNIs).
Status	Availability status of the EVC.

Related Commands

Command	Description
show ethernet instance	Displays information about Ethernet customer service instances.
show ethernet interface	Displays interface-only information about Ethernet customer service instances.

show ethernet service instance

To display information about Ethernet customer service instances, use the **show ethernet service instance** command in privileged EXEC mode.

show ethernet service instance [**detail** | **id** *id* | **interface** *type number* | **policy-map** | **stats**]

Syntax Description

detail	(Optional) Displays detailed information about service instances or the specified service instance ID or interface.
id	(Optional) Displays a specific service instance on an interface that does not map to a VLAN.
id	(Optional) Integer in the range of 1 to 4294967295 that identifies a service instance on an interface that does not map to a VLAN.
interface	(Optional) Displays service instance information for a configured interface.
type	(Optional) Type of interface.
number	(Optional) Number of the interface.
policy-map	(Optional) Displays the policy map for the service instance.
stats	(Optional) Displays service instance statistics.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(25)SEG	This command was introduced.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.

Usage Guidelines

This command is useful for system monitoring and troubleshooting.

Examples

Following is an example of output from the **show ethernet service instance** command:

```
Router# show ethernet service instance

Identifier Interface              CE-Vlans
222        FastEthernet0/1        untagged,1-4094
10         FastEthernet0/2
222        FastEthernet0/2        200
333        FastEthernet0/2        default
10         FastEthernet0/3        300
11         FastEthernet0/3
10         FastEthernet0/4        300
10         FastEthernet0/6        untagged,1-4094
10         FastEthernet0/7        untagged,1-4094
10         FastEthernet0/8        untagged,1-4094
10         FastEthernet0/9        untagged
20         FastEthernet0/9
222        FastEthernet0/11       300-350,900-999
333        FastEthernet0/11       100-200,1000,1999-4094
```

```
222         FastEthernet0/12      20
333         FastEthernet0/12      10
10          FastEthernet0/13      10
20          FastEthernet0/13      20
30          FastEthernet0/13      30
200         FastEthernet0/13      222
200         FastEthernet0/14      200,222
300         FastEthernet0/14      333
555         FastEthernet0/14      555
```

Table 27 describes the significant fields in the output.

Table 27 show ethernet service instance Field Descriptions

Field	Description
Identifier	Service instance identifier.
Interface	Interface type and number with which the service instance is associated.
CE-Vlans	Customer edge (CE) device VLAN ID.

Related Commands

Command	Description
show ethernet evc	Displays information about Ethernet customer service instances.
show ethernet interface	Displays interface-only information about Ethernet customer service instances.

show ethernet service interface

To display interface-only information about Ethernet customer service instances for all interfaces or for a specified interface, use the **show ethernet service interface** privileged EXEC mode.

show ethernet service interface [*type number*] [**detail**]

Syntax Description

type	(Optional) Type of interface.
number	(Optional) Number of the interface.
detail	(Optional) Displays detailed information about interfaces or a specified service instance ID or interface.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(25)SEG	This command was introduced.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.

Usage Guidelines

Expressions are case sensitive. For example, if you enter | **exclude output**, the lines that contain *output* are not displayed, but the lines that contain "Output" are displayed.

Examples

Following are examples of output from the **show ethernet service interface** command:

```
Router# show ethernet service interface gigabitethernet0/1

Interface          Identifier
GigabitEthernet0/1 PE2-G101

Router# show ethernet service interface detail

Interface: FastEthernet0/1
ID:
CE-VLANS:
EVC Map Type: Bundling-Multiplexing
Interface: FastEthernet0/2
ID:
CE-VLANS:
EVC Map Type: Bundling-Multiplexing
Interface: FastEthernet0/3
ID:
CE-VLANS:
EVC Map Type: Bundling-Multiplexing

<output truncated>

Interface: GigabitEthernet0/1
ID: PE2-G101
CE-VLANS: 10,20,30
```

```
EVC Map Type: Bundling-Multiplexing
Associated EVCs:
EVC-ID CE-VLAN
WHITE 30
RED 20
BLUE 10
Associated Service Instances:
Service-Instance-ID CE-VLAN
10 10
20 20
30 30
```

Table 28 describes the significant fields in the output.

Table 28 show ethernet service interface Field Descriptions

Field	Description
Interface	Interface type and number.
Identifier	EVC identifier.
ID	EVC identifier.
CE-VLANS	VLANs associated with the customer edge (CE) device.
EVC Map Type	UNI service type; for example, Bundling, Multiplexing, All-to-one Bundling.
Associated EVCs	EVCs associated with a device.
EVC-ID CE-VLAN	EVC identifier and associated VLAN.
Associated Service Instances	Service instances associated with a device.
Service-Instance-ID CE-VLAN	Service instance identifier and its associated CE VLAN.

Related Commands

Command	Description
service instance ethernet	Defines an Ethernet service instance and enters Ethernet service configuration mode.
show ethernet evc	Displays information about Ethernet customer service instances.
show ethernet interface	Displays interface-only information about Ethernet customer service instances.

show flow monitor type mace

To display the status and statistics for a flow monitor of type Measurement, Aggregation, and Correlation Engine (MACE), use the **show flow monitor type mace** command in privileged EXEC mode.

show flow monitor type mace [*name*]

Syntax Description

name	(Optional) Name of a specific MACE flow monitor that is configured using the **flow monitor type mace** command.

Command Default

If no flow monitor name is specified, the command displays the status and statistics of all the configured flow monitors of type MACE.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(4)M	This command was introduced.

Usage Guidelines

Use the **show flow monitor type** command to display the status and statistics for a flow monitor of type MACE. If no flow monitor name is specified, the command displays the status and statistics of all the configured flow monitors of type MACE.

Note You need to configure the **flow monitor type mace** command with a specific name to display the output for that flow monitor name using this command.

Examples

The following is sample output from the **show flow monitor type mace** command:

```
Router# show flow monitor type mace mace_monitor_1

Flow Monitor type mace mace_monitor_1:
Description: User defined
Flow Record: mace_record
Flow Exporter: mace_exporter
No. of Inactive Users: 1
No. of Active Users: 0
Cache Timeout Update: 2 seconds
```

Table 29 describes the significant fields shown in the display.

Table 29 show flow record type mace Field Descriptions

Field	Description
Description	Displays the description provided for a flow monitor.
Flow Record	Displays the flow record that is included in the flow monitor.
Flow Exporter	Displays the flow exporter that is included in the flow monitor.
No. of Inactive Users	Displays the number of times that a flow monitor is inactive.
No. of Active Users	Displays the number of times that a flow monitor is active as an action under a policy when the policy is applied under an interface.
Cache Timeout Update	Displays the frequency with which the cache timeout is updated.

Related Commands

Command	Description
cache (Flexible NetFlow)	Configures a flow cache parameter for a Flexible NetFlow flow monitor.
flow monitor type mace	Configures a flow monitor of type MACE.
flow record	Configures the status and statistics for a Flexible Netflow flow record.

show flow record type

To display the configuration for a flow record, use the **show flow record type** command in privileged EXEC mode.

show flow record type {**mace** [[**name**] *flow-record-name*] | **performance-monitor** [**name**] [**default-rtp** | **default-tcp** | *record-name*]}

Syntax Description

mace	Displays Measurement, Aggregation, and Correlation Engine (MACE) metrics for the flow record.
name	(Optional) Displays the configuration for a specific MACE flow record if it is used with the **mace** keyword. Displays the configuration for a specific performance monitor flow record if it is used with the **performance-monitor** keyword.
flow-record-name	(Optional) Name of the user-defined MACE flow record that was previously configured.
performance-monitor	Displays configuration for the flow record of type performance monitor.
default-rtp	(Optional) Displays the Video Monitoring (VM) default Real-time Transport Protocol (RTP) record.
default-tcp	(Optional) Displays the VM default TCP record.
record-name	(Optional) Name of the user-defined performance monitor that was previously configured.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(4)M	This command was introduced.

Usage Guidelines

Use the **show flow record type** command to display the status and statistics for various flow record types. If you chose to use the **name** keyword in the command, you must use either the **default-rtp** or **default-tcp** keywords, or use the *record-name* argument to complete the command.

Note You need to configure a flow record of type MACE using the **flow record type mace** command in order for the output of the **show flow record type mace** command to display information about the configured flow record.

Note You need to configure a flow record of type performance monitor using the **flow record type performance-monitor** command in order for the output of the **show flow record type performance-monitor** command to display information about the configured flow record.

Examples

The following is sample output from the **show flow record type mace** command:

```
Router# show flow record type mace mace1

flow record type mace mace1:
  Description:        User defined
  No. of users:       0
  Total field space:  164 bytes
  Fields:
    collect art all
```

The following is sample output from the **show flow record type performance-monitor** command:

```
Router# show flow record type performance-monitor p1

flow record type performance-monitor p1:
  Description:        User defined
  No. of users:       0
  Total field space:  4 bytes
  Fields:
    collect application media bytes rate
```

Table 30 describes the significant fields shown in the above examples.

Table 30 show flow record type Field Descriptions

Field	Description
Description	Provides a description for this flow record.
No. of users	Indicates how many times a particular flow record has been used under a flow monitor.
Total field space	Displays the size of the record in bytes.
Fields	Displays the names of the fields that are configured.

Related Commands

Command	Description
flow record	Configures the status and statistics for an Flexible NetFlow flow record.
flow record type mace	Configures a flow record for MACE.
flow record type performance monitor	Configures a flow record for performance monitor.

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** command in privileged EXEC mode.

show frame-relay end-to-end keepalive [*interface* [*dlci*] | *failures*]

Syntax Description

interface	(Optional) Interface to display.
dlci	(Optional) DLCI to display.
failures	(Optional) Displays the number of times keepalive has failed and the elapsed time since the last failure occurred.

Defaults

If no interface is specified, show all interfaces.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4T	This command was modified for Cisco IOS Release 12.4T.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

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

Examples

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

Displaying Statistics About Frame Relay End-to-End Keepalive: Example

```
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
```

Displaying Failure Statistics About Frame Relay End-to-End Keepalive: Example

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

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

Failures Since Started: 1,      Last Failure: 00:01:31
```

Table 31 describes the fields shown in the display.

Table 31 show frame-relay end-to-end keepalive Field Descriptions

Field	Description
DLCI	The DLCI number that identifies 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 31 show frame-relay end-to-end keepalive Field Descriptions (continued)

Field	Description
VC 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.
Send Sequence Number	The current sequence number being sent in the keepalive packets.
Receive Sequence Number	The last sequence number received in the incoming keepalive packets.
Configured Event Window	The value configured by frame-relay end-to-end keepalive event-window command.
Configured Error Threshold	The value configured by frame-relay end-to-end keepalive error-threshold command.
Total Observed Events	The total number of successful events counted.
Total Observed Errors	The total number of error events counted.
Monitored Events	The number of events in current event window.
Monitored Errors	The number of errors in current event window.
Successive Successes	The number of successive success events in the current event window.
End-to-end VC Status	The status of the end-to-end keepalive protocol. The status is either UP or DOWN.
Failures Since Started	The number of times the end-to-end keepalive protocol has failed, causing the DLCI to go into the EEK DOWN state, since the protocol started.
Last Failure	The elapsed time since the last failure.

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.
frame-relay end-to-end keepalive success-events	Modifies the keepalive success events value.

Command	Description
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.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

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 32 describes the fields shown in the display.

Table 32 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.

Table 32 show frame-relay fragment Field Descriptions (continued)

Field	Description
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).
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 iphc

To display Frame Relay IP Header Compression Implementation Agreement (FRF.20) negotiation parameters for each PVC, use the **show frame-relay iphc** command in user EXEC or privileged EXEC mode.

show frame-relay iphc [**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 data link connection identifiers (DLCI(s)) for which you wish to display fragmentation information.
dlci	(Optional) Specific Data-Link Connection Identifier (DLCI) for which you wish to display fragmentation information. Valid values are from 16 to 1022.

Command Modes

User EXEC (>)
Privileged EXEC (#)

Command History

Release	Modification
12.4(15)T	This command was introduced.
12.1(2)E	This command was integrated into Cisco IOS Release 12.1(2)E.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command was integrated into Cisco IOS Release 12.2SX.

Examples

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

```
Router# show frame-relay iphc

FRF.20 Statistics for Interface Serial2/0

DLCI 16 :
Parameters:        TCP space  16     non TCP space  16
F_MAX period  256  F_MAX time 5      MAX header     168

CP: State - req sent CP drops  0
Reqs txed   2        Req rxed  0      Acks txed   0      Acks rxed  0
```

Table 33 describes the significant fields shown in the display.

Table 33 show frame-relay iphc Field Descriptions

Field	Description
DLCI	The DLCI number that identifies the PVC.

Table 33 show frame-relay iphc Field Descriptions (continued)

Field	Description
Parameters	Indicates FRF negotiation parameters configured for PVCs.
CP: State	Indicates the status of control protocol frames.

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 Frame Relay Transmission Control Protocol (TCP)/IP header compression statistics, use the **show frame-relay ip tcp header-compression** command in user EXEC or privileged EXEC mode.

show frame-relay ip tcp header-compression [**interface** *type number*] [*dlci*]

Syntax Description

interface *type number*	(Optional) Specifies an interface for which information will be displayed. A space is optional between the type and number.
dlci	(Optional) Specifies a data-link connection identifier (DLCI) for which information will be displayed. Range is from 16 to 1022.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
10.3	This command was introduced.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T. The command was modified to support display of RTP header compression statistics for Frame Relay permanent virtual circuit (PVC) bundles.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC, and the *dlci* argument was added.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.4(9)T	The *dlci* argument was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

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
```

The following sample output from the **show frame-relay ip tcp header-compression** command shows statistics for a PVC bundle called “MP-3-static”:

```
Router# show frame-relay ip tcp header-compression interface Serial1/4

 vc-bundle MP-3-static      Link/Destination info:ip 10.1.1.1
  Interface Serial1/4:
    Rcvd:   14 total, 13 compressed, 0 errors
             0 dropped, 0 buffer copies, 0 buffer failures
    Sent:   15 total, 14 compressed,
             474 bytes saved, 119 bytes sent
             4.98 efficiency improvement factor
    Connect:256 rx slots, 256 tx slots,
             1 long searches, 1 misses 0 collisions, 0 negative cache hits
             93% hit ratio, five minute miss rate 0 misses/sec, 0 max
```

In the following example, the **show frame-relay ip tcp header-compression** command displays information about DLCI 21:

```
Router# show frame-relay ip tcp header-compression 21

DLCI 21         Link/Destination info: ip 10.1.2.1
  Interface POS2/0 DLCI 21 (compression on, VJ)
    Rcvd:    0 total, 0 compressed, 0 errors, 0 status msgs
             0 dropped, 0 buffer copies, 0 buffer failures
    Sent:    0 total, 0 compressed, 0 status msgs, 0 not predicted
             0 bytes saved, 0 bytes sent
    Connect: 256 rx slots, 256 tx slots,
             0 misses, 0 collisions, 0 negative cache hits, 256 free contexts

DLCI 21         Link/Destination info: ip 10.1.4.1
  Interface Serial3/0 DLCI 21 (compression on, VJ)
    Rcvd:    0 total, 0 compressed, 0 errors, 0 status msgs
             0 dropped, 0 buffer copies, 0 buffer failures
    Sent:    0 total, 0 compressed, 0 status msgs, 0 not predicted
             0 bytes saved, 0 bytes sent
    Connect: 256 rx slots, 256 tx slots,
             0 misses, 0 collisions, 0 negative cache hits, 256 free contexts
```

The following is sample output from the **show frame-relay ip tcp header-compression** command for a specific DLCI on a specific interface:

```
Router# show frame-relay ip tcp header-compression pos2/0 21

DLCI 21         Link/Destination info: ip 10.1.2.1
  Interface POS2/0 DLCI 21 (compression on, VJ)
    Rcvd:    0 total, 0 compressed, 0 errors, 0 status msgs
             0 dropped, 0 buffer copies, 0 buffer failures
    Sent:    0 total, 0 compressed, 0 status msgs, 0 not predicted
             0 bytes saved, 0 bytes sent
    Connect: 256 rx slots, 256 tx slots,
             0 misses, 0 collisions, 0 negative cache hits, 256 free contexts
```

Table 34 describes the fields shown in the display.

Table 34 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.

Table 34 show frame-relay ip tcp header-compression Field Descriptions (continued)

Field	Description
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 failures	Number of times that a new buffer was needed but was not obtained.
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** command in user EXEC or privileged EXEC mode.

show frame-relay lapf

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.2	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

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 35 describes significant fields in this output.

Table 35 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.

Table 35 show frame-relay lapf Field Descriptions (continued)

Field	Description
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.
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** command in user EXEC or privileged EXEC mode.

show frame-relay lmi [*type number*]

Syntax Description

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

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

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 36 describes significant fields shown in the output.

Table 36 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 current Frame Relay map entries and information about connections, use the **show frame-relay map** command in privileged EXEC mode.

show frame-relay map [**interface** *type number*] [*dlci*]

Syntax Description

interface *type number*	(Optional) Specifies an interface for which mapping information will be displayed. A space is optional between the interface type and number.
dlci	(Optional) Specifies a data-link connection identifier (DLCI) for which mapping information will be displayed. Range: 16 to 1022.

Command Default

Static and dynamic Frame Relay map entries and information about connections for all DLCIs on all interfaces are displayed.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.2(2)T	The display output for this command was modified to include the IPv6 address mappings of remote nodes to Frame Relay permanent virtual circuits (PVCs).
12.0(21)ST	This command was integrated into Cisco IOS Release 12.0(21)ST.
12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(13)T	The display output for this command was modified to include information about Frame Relay PVC bundle maps.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB, the **interface** keyword was added, and the *dlci* argument was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4(9)T	The **interface** keyword was added, and the *dlci* argument was added.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

This section contains the following examples:

- Display All Maps or Maps for Specific DLCIs on Specific Interfaces or Subinterfaces: Example, page 436
- Display Maps for PVC Bundles: Example, page 437
- Display Maps for IPv6 Addresses: Example, page 438

Display All Maps or Maps for Specific DLCIs on Specific Interfaces or Subinterfaces: Example

The sample output in these examples uses the following configuration:

```
interface POS2/0
 no ip address
 encapsulation frame-relay
 frame-relay map ip 10.1.1.1 20 tcp header-compression
 frame-relay map ip 10.1.2.1 21 tcp header-compression
 frame-relay map ip 10.1.3.1 22 tcp header-compression
 frame-relay map bridge 23
 frame-relay interface-dlci 25
 frame-relay interface-dlci 26
 bridge-group 1
interface POS2/0.1 point-to-point
 frame-relay interface-dlci 24 protocol ip 10.1.4.1

interface Serial3/0
 no ip address
 encapsulation frame-relay
 serial restart-delay 0
 frame-relay map ip 172.16.3.1 20
 frame-relay map ip 172.16.4.1 21 tcp header-compression active
 frame-relay map ip 172.16.1.1 100
 frame-relay map ip 172.16.2.1 101
interface Serial3/0.1 multipoint
 frame-relay map ip 192.168.11.11 24
 frame-relay map ip 192.168.11.22 105
```

The following example shows how to display all maps:

```
Router# show frame-relay map

POS2/0 (up): ip 10.1.1.1 dlci 20(0x14,0x440), static,
              CISCO, status deleted
              TCP/IP Header Compression (enabled), connections: 256
POS2/0 (up): ip 10.1.2.1 dlci 21(0x15,0x450), static,
              CISCO, status deleted
              TCP/IP Header Compression (enabled), connections: 256
POS2/0 (up): ip 10.1.3.1 dlci 22(0x16,0x460), static,
              CISCO, status deleted
              TCP/IP Header Compression (enabled), connections: 256
POS2/0 (up): bridge dlci 23(0x17,0x470), static,
              CISCO, status deleted
POS2/0.1 (down): point-to-point dlci, dlci 24(0x18,0x480), broadcast
          status deleted
Serial3/0 (downup): ip 172.16.3.1 dlci 20(0x14,0x440), static,
              CISCO, status deleted
Serial3/0 (downup): ip 172.16.4.1 dlci 21(0x15,0x450), static,
              CISCO, status deleted
              TCP/IP Header Compression (enabled), connections: 256
Serial3/0.1 (downup): ip 192.168.11.11 dlci 24(0x18,0x480), static,
              CISCO, status deleted
Serial3/0 (downup): ip 172.16.1.1 dlci 100(0x64,0x1840), static,
              CISCO, status deleted
Serial3/0 (downup): ip 172.16.2.1 dlci 101(0x65,0x1850), static,, CISCO,
              CISCO, status deleted
              ECRTP Header Compression (enabled, IETF), connections 16
              TCP/IP Header Compression (enabled, IETF), connections 16
Serial3/0.1 (downup): ip 192.168.11.22 dlci 105(0x69,0x1890), static,
              CISCO, status deleted
Serial4/0/1:0.1 (up): point-to-point dlci, dlci 102(0x66,0x1860), broadcast, CISCO
          status defined, active,
              RTP Header Compression (enabled), connections: 256
```

The following example shows how to display maps for a specific DLCI:

```
Router# show frame-relay map 20

POS2/0 (up): ip 10.1.1.1 dlci 20(0x14,0x440), static,
              CISCO, status deleted
              TCP/IP Header Compression (enabled), connections: 256
Serial3/0 (down): ip 172.16.3.1 dlci 20(0x14,0x440), static,
              CISCO, status deleted
```

The following example shows how to display maps for a specific interface:

```
Router# show frame-relay map interface pos2/0

POS2/0 (up): ip 10.1.1.1 dlci 20(0x14,0x440), static,
              CISCO, status deleted
              TCP/IP Header Compression (enabled), connections: 256
POS2/0 (up): ip 10.1.2.1 dlci 21(0x15,0x450), static,
              CISCO, status deleted
              TCP/IP Header Compression (enabled), connections: 256
POS2/0 (up): ip 10.1.3.1 dlci 22(0x16,0x460), static,
              CISCO, status deleted
              TCP/IP Header Compression (enabled), connections: 256
POS2/0 (up): bridge dlci 23(0x17,0x470), static,
              CISCO, status deleted
POS2/0.1 (down): point-to-point dlci, dlci 24(0x18,0x480), broadcast
          status deleted
```

The following example shows how to display maps for a specific DLCI on a specific interface:

```
Router# show frame-relay map interface pos2/0 20

POS2/0 (up): ip 10.1.1.1 dlci 20(0x14,0x440), static,
              CISCO, status deleted
              TCP/IP Header Compression (enabled), connections: 256
```

The following example shows how to display maps for a specific subinterface:

```
Router# show frame-relay map interface pos2/0.1

POS2/0.1 (down): point-to-point dlci, dlci 24(0x18,0x480), broadcast
          status deleted
```

The following example shows how to display maps for a specific DLCI on a specific subinterface:

```
Router# show frame-relay map interface pos2/0.1 24

POS2/0.1 (down): point-to-point dlci, dlci 24(0x18,0x480), broadcast
          status deleted
```

Display Maps for PVC Bundles: Example

The sample output in this example uses the following router configuration:

```
hostname router1
!
interface Serial2/0
 ip address 30.0.0.2 255.255.255.0
 encapsulation frame-relay
 frame-relay vc-bundle vcb1
  pvc 100 vcb1-classA
   precedence 1-7
   class vcb1-classA
  pvc 109 vcb1-others
   precedence other
   class others
```

```
 frame-relay intf-type dce
!
map-class frame-relay vcb1-classA
 frame-relay cir 128000
!
map-class frame-relay others
 frame-relay cir 64000

hostname router2
!
interface Serial3/3
 ip address 30.0.0.1 255.255.255.0
 encapsulation frame-relay
 frame-relay vc-bundle vcb1
  pvc 100 vcb1-classA
   precedence 1-7
   class vcb1-classA
  pvc 109 vcb1-others
   precedence other
   class others
!
map-class frame-relay vcb1-classA
 frame-relay cir 128000
!
map-class frame-relay others
 frame-relay cir 64000
```

The following sample output displays mapping information for two PVC bundles. The PVC bundle MAIN-1-static is configured with a static map. The map for PVC bundle MAIN-2-dynamic is created dynamically using Inverse Address Resolution Protocol (ARP).

```
Router# show frame-relay map

Serial1/4 (up): ip 10.1.1.1 vc-bundle MAIN-1-static, static,
          CISCO, status up
Serial1/4 (up): ip 10.1.1.2 vc-bundle MAIN-2-dynamic, dynamic,
          broadcast, status up
```

Display Maps for IPv6 Addresses: Example

The sample output in this example uses the following router configuration:

```
hostname router1
!
interface Serial2/0
 no ip address
 encapsulation frame-relay
!
interface Serial2/0.1 point-to-point
 ipv6 address 1::1/64
 frame-relay interface-dlci 101
!
interface Serial2/0.2 multipoint
 ipv6 address 2::1/64
 frame-relay map ipv6 2::2 201
 frame-relay interface-dlci 201
!

hostname router2
!
interface Serial3/3
 no ip address
 encapsulation frame-relay
 frame-relay intf-type dce
```

```
!
interface Serial3/3.1 point-to-point
 ipv6 address 1::2/64
 frame-relay interface-dlci 101
!
interface Serial3/3.2 multipoint
 ipv6 address 2::2/64
 frame-relay map ipv6 3::1 201
 frame-relay interface-dlci 201
!
```

The following sample output from the **show frame-relay map** command shows that the link-local and global IPv6 addresses (FE80::E0:F727:E400:A and 2001:0DB8:2222:1044::32; FE80::60:3E47:AC8:8 and 2001:0DB8:2222:1044::32) of two remote nodes are explicitly mapped to DLCI 17 and DLCI 19, respectively. Both DLCI 17 and DLCI 19 are terminated on interface serial 3 of this node; therefore, interface serial 3 of this node is a point-to-multipoint interface.

```
Router# show frame-relay map

Serial3 (up): ipv6 FE80::E0:F727:E400:A dlci 17(0x11,0x410), static,
              broadcast, CISCO, status defined, active
Serial3 (up): ipv6 2001:0DB8:2222:1044::32 dlci 19(0x13,0x430), static,
              CISCO, status defined, active

Serial3 (up): ipv6 2001:0DB8:2222:1044::32 dlci 17(0x11,0x410), static,
              CISCO, status defined, active
Serial3 (up): ipv6 FE80::60:3E47:AC8:8 dlci 19(0x13,0x430), static,
              broadcast, CISCO, status defined, active
```

Table 37 describes the significant fields shown in the displays.

Table 37 show frame-relay map Field Descriptions

Field	Description
POS2/0 (up)	Identifies a Frame Relay interface and its status (up or down).
ip 10.1.1.1	Destination IP address.
dlci 20(0x14,0x440)	DLCI that identifies the logical connection being used to reach this interface. This value is displayed in three ways: its decimal value (20), its hexadecimal value (0x14), and its value as it would appear on the wire (0x440).
vc-bundle	PVC bundle that serves as the logical connection being used to reach the interface.
static/dynamic	Indicates whether this is a static or dynamic entry.
broadcast	Indicates pseudobroadcasting.
CISCO	Indicates the encapsulation type for this map: either CISCO or IETF.

Table 37 show frame-relay map Field Descriptions (continued)

Field	Description
TCP/IP Header Compression (inherited), passive (inherited)	Indicates the header compression type (TCP/IP, Real-Time Transport Protocol (RTP), or Enhanced Compressed Real-Time Transport Protocol (ECRTP)) and whether the header compression characteristics were inherited from the interface or were explicitly configured for the IP map.
status defined, active	Indicates that the mapping between the destination address and the DLCI used to connect to the destination address is active.

Related Commands

Command	Description
show frame-relay pvc	Displays statistics about PVCs for Frame Relay interfaces.
show frame-relay vc-bundle	Displays attributes and other information about a Frame Relay PVC bundle.

show frame-relay multilink

To display configuration information and statistics about multilink Frame Relay bundles and bundle links, use the **show frame-relay multilink** command in user EXEC or privileged EXEC mode.

show frame-relay multilink [**mfr** *number* | **serial** *number*] [**dlci** {*dlci-number* | **lmi**}] [**detailed**]

Syntax Description

mfr *number*	(Optional) Displays information about a specific bundle interface.
serial *number*	(Optional) Displays information about a specific bundle link interface.
dlci	(Optional) Displays information about the data-link connection identifier (DLCI).
dlci-number	DLCI number. The range is from 16 to 1022.
lmi	Displays information about the Local Management Interface (LMI) DLCI.
detailed	(Optional) Displays more-detailed information, including counters for the control messages sent to and from the peer device and the status of the bundle links.

Command Default

Information for all bundles and bundle links is displayed.

Command Modes

User EXEC (>)
Privileged EXEC (#)

Command History

Release	Modification
12.0(17)S	This command was introduced.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.0(24)S	This command was implemented on Versatile Interface Processor (VIP)-enabled Cisco 7500 series routers.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.3(4)T	This command was implemented on VIP-enabled Cisco 7500 series routers.
12.0(30)S	This command was updated to display Multilink Frame Relay variable bandwidth class status.
12.4(2)T	This command was updated to display Multilink Frame Relay variable bandwidth class status.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command was integrated into the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
12.0(33)S	Support fsaor IPv6 was added. This command was implemented on the Cisco 12000 series routers.
Cisco IOS XE Release 3.4S	This command was integrated into Cisco IOS XE Release 3.4S.

Examples

All Bundles and Bundle Links: Example

The following is sample output from the **show frame-relay multilink** command (see Table 38 for descriptions of the fields). Because a specific bundle or bundle link is not specified, information for all bundles and bundle links is displayed:

```
Router# show frame-relay multilink

Bundle:MFR0, State = up, class = A, fragmentation disabled
 BID = MFR0
 Bundle links :
 Serial2/1:3, HW state :up, Protocol state :Idle, LID :Serial2/1:3
 Serial2/1:2, HW state :up, Protocol state :Idle, LID :Serial2/1:2
 Serial2/1:1, HW state :up, Protocol state :Idle, LID :Serial2/1:1
```

The following is sample output from the **show frame-relay multilink** command when a Frame Relay bundle is configured as bandwidth class C (threshold) (see Table 38 for descriptions of the fields):

```
Router# show frame-relay multilink

Bundle: MFR0, state down, class C (threshold 2), no fragmentation
 ID: bundle
 Serial5/1, state up/up, ID: bundle1
 Serial5/3, state up/add-sent, ID: bundle3
```

Bundle Link: Example

The following is sample output from the **show frame-relay multilink** command when it is entered with the **serial** *number* keyword and argument pair (see Table 38 for descriptions of the fields). The example displays information about the specified bundle link:

```
Router# show frame-relay multilink serial 3/2

 Bundle links :
 Serial3/2, HW state : down, Protocol state :Down_idle, LID :Serial3/2
 Bundle interface = MFR0,  BID = MFR0
```

Detailed Bundle Links: Examples

The following is sample output from the **show frame-relay multilink** command when it is entered with the **serial** *number* keyword and argument pair and **detailed** keyword (see Table 38 for descriptions of the fields). The example shows a bundle link in the "idle" state:

```
Router# show frame-relay multilink serial 3 detailed

 Bundle links:

  Serial3, HW state = up, link state = Idle, LID = Serial3
  Bundle interface = MFR0,  BID = MFR0
    Cause code = none, Ack timer = 4, Hello timer = 10,
    Max retry count = 2, Current count = 0,
    Peer LID = Serial5/3, RTT = 0 ms
    Statistics:
    Add_link sent = 0, Add_link rcv'd = 10,
    Add_link ack sent = 0, Add_link ack rcv'd = 0,
    Add_link rej sent = 10, Add_link rej rcv'd = 0,
    Remove_link sent = 0, Remove_link rcv'd = 0,
    Remove_link_ack sent = 0, Remove_link_ack rcv'd = 0,
    Hello sent = 0, Hello rcv'd = 0,
    Hello_ack sent = 0, Hello_ack rcv'd = 0,
    outgoing pak dropped = 0, incoming pak dropped = 0
```

The following is sample output from the **show frame-relay multilink** command when it is entered with the **serial** *number* keyword and argument pair and **detailed** keyword (see Table 38 for descriptions of the fields). The example shows a bundle link in the "up" state:

```
Router# show frame-relay multilink serial 3 detailed

 Bundle links:

  Serial3, HW state = up, link state = Up, LID = Serial3
  Bundle interface = MFR0,  BID = MFR0
    Cause code = none, Ack timer = 4, Hello timer = 10,
    Max retry count = 2, Current count = 0,
    Peer LID = Serial5/3, RTT = 4 ms
    Statistics:
    Add_link sent = 1, Add_link rcv'd = 20,
    Add_link ack sent = 1, Add_link ack rcv'd = 1,
    Add_link rej sent = 19, Add_link rej rcv'd = 0,
    Remove_link sent = 0, Remove_link rcv'd = 0,
    Remove_link_ack sent = 0, Remove_link_ack rcv'd = 0,
    Hello sent = 0, Hello rcv'd = 1,
    Hello_ack sent = 1, Hello_ack rcv'd = 0,
    outgoing pak dropped = 0, incoming pak dropped = 0
```

Table 38 describes significant fields shown in the displays.

Table 38 show frame-relay multilink Field Descriptions

Field	Description
Bundle	Bundle interface.
State	Operational state of the bundle interface.
class	The bandwidth class criterion used to activate or deactivate a Frame Relay bundle. • Class A (single link)—The bundle activates when any bundle link is up and deactivates when all bundle links are down (default). • Class B (all links)—The bundle activates when all bundle links are up and deactivates when any bundle link is down. • Class C (threshold)—The bundle activates when the minimum configured number of bundle links (the threshold) is up and deactivates when the minimum number of configured bundle links fails to meet the threshold.
BID	Bundle identification.
Bundle links	Bundle links for which information is displayed.
HW state	Operational state of the physical link.
Protocol state	Operational state of the bundle link line protocol.
link state	Operational state of the bundle link.
LID	Bundle link identification.
Bundle interface	Bundle interface with which the bundle link is associated.

Table 38 show frame-relay multilink Field Descriptions (continued)

Field	Description
Cause code	Can be one of the following values: • ack timer expiry—Add link synchronization process is exhausted. • bundle link idle—Peer's bundle link is idle. This usually occurs when the peer's bundle interface is shut down. • inconsistent bundle—Peer already has this bundle associated with another bundle. • loopback detected—Local bundle link's physical line is looped back. • none—ADD_LINK and ADD_LINK_ACK messages were properly exchanged, and no cause code was recorded. • other—Indicates one of the following: a link identifier (LID) mismatch, an ID from the peer that is too long, or a failure to allocate ID memory. • unexpected Add_link—ADD_LINK message is received when the bundle link is already in the "up" state. This code might appear when the line protocol is being set up, but will disappear once the connection is stabilized.
Ack timer	Number of seconds for which the bundle link waits for a hello acknowledgment before resending a hello message or resending an ADD_LINK message used for initial synchronization.
Hello timer	Interval at which a bundle link sends out hello messages.
Max retry count	Maximum number of times that a bundle link will resend a hello message before receiving an acknowledgment or resending an ADD_LINK message.
Current count	Number of retries that have been attempted.
Peer LID	Bundle link identification name of the peer end of the link.
RTT	Round-trip time (in milliseconds) as measured by using the Timestamp Information Element in the HELLO and HELLO_ACK messages.
Statistics	Displays statistics for each bundle link.
Add_link sent	Number of Add_link messages sent. Add_link messages notify the peer endpoint that the local endpoint is ready to process frames.
Add_link rcv'd	Number of Add_link messages received.
Add_link ack sent	Number of Add_link acknowledgments sent. Add_link acknowledgments notify the peer endpoint that an Add_link message was received.
Add_link ack rcv'd	Number of Add_link acknowledgments received.
Add_link rej sent	Number of Add_link_reject messages sent.
Add_link rej rcv'd	Number of Add_link_reject messages received.

Table 38 show frame-relay multilink Field Descriptions (continued)

Field	Description
Remove_link sent	Number of Remove_link messages sent. Remove_link messages notify the peer that on the local end, a bundle link is being removed from the bundle.
Remove_link rcv'd	Number of Remove_link messages received.
Remove_link_ack sent	Number of Remove_link acknowledgments sent. Remove_link acknowledgments notify the peer that a Remove_link message has been received.
Remove_link_ack rcv'd	Number of Remove_link acknowledgments received.
Hello sent	Number of hello messages sent. Hello messages notify the peer endpoint that the local endpoint remains in the "up" state.
Hello rcv'd	Number of hello messages received.
Hello_ack sent	Number of hello acknowledgments sent. Hello acknowledgments notify the peer that hello messages have been received.
Hello_ack rcv'd	Number of hello acknowledgments received.
outgoing pak dropped	Number of outgoing packets dropped.
incoming pak dropped	Number of incoming packets dropped.

Related Commands

Command	Description
debug frame-relay multilink	Displays debug messages for multilink Frame Relay bundles and bundle links.

show frame-relay pvc

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

show frame-relay pvc [[**interface** *interface*] [*dlci*] [**64-bit**] | **summary** [**all**]]

Syntax Description

interface	(Optional) 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.
64-bit	(Optional) Displays 64-bit counter statistics.
summary	(Optional) Displays a summary of all PVCs on the system.
all	(Optional) Displays a summary of all PVCs on each interface.

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 PVC interface priority queueing. • 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 network-to-network PVCs.

Release	Modification
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.
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(4)T	The **64-bit** keyword was added.
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.
12.2(13)T	This command was modified to support display of Frame Relay PVC bundle information.
12.2(15)T	This command was modified to support display of Frame Relay voice-adaptive fragmentation information.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC, and the **summary** and **all** keywords were added.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB, and support was added for hierarchical queueing framework (HQF).
12.4(9)T	The **summary** and **all** keywords were added, and support was added for hierarchical queueing framework (HQF).
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

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.

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.

To display a summary of all PVCs on the system, use the **show frame-relay pvc** command with the **summary** keyword. To display a summary of all PVCs per interface, use the **summary all** keywords.

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.

You can change the period of time over which a set of data is used for computing load statistics. If you decrease the load interval, the average statistics are computed over a shorter period of time and are more responsive to bursts of traffic. To change the length of time for which a set of data is used to compute load statistics for a PVC, use the **load-interval** command in Frame-Relay DLCI configuration mode.

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 points to exit points in the network.

Examples

The various 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. This section contains the following examples:

Summary of Frame Relay PVCs: Example

The following example shows sample output of the **show frame-relay pvc** command with the **summary** keyword. The **summary** keyword displays all PVCs on the system.

```
Router# show frame-relay pvc summary

Frame-Relay VC Summary

              Active      Inactive      Deleted       Static
  Local          0            12            0            0
  Switched       0             0            0            0
  Unused         0             0            0            0
```

The following example shows sample output for the **show frame-relay pvc** command with the **summary** and **all** keywords. The **summary** and **all** keywords display all PVCs per interface.

```
Router# show frame-relay pvc summary all

VC Summary for interface Serial3/0 (Frame Relay DTE)

              Active      Inactive      Deleted       Static
  Local          0             7            0            0
```

```
  Switched       0            0            0            0
  Unused         0            0            0            0

VC Summary for interface Serial3/1 (Frame Relay DTE)

              Active     Inactive      Deleted       Static
  Local          0            5            0            0
  Switched       0            0            0            0
  Unused         0            0            0            0
```

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
```

Frame Relay Voice-Adaptive Fragmentation: Example

The following sample output indicates that Frame Relay voice-adaptive fragmentation is active on DLCI 202 and there are 29 seconds left on the deactivation timer. If no voice packets are detected in the next 29 seconds, Frame Relay voice-adaptive fragmentation will become inactive.

```
Router# show frame-relay pvc 202

PVC Statistics for interface Serial3/1 (Frame Relay DTE)

DLCI = 202, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial3/1.2

  input pkts 0             output pkts 479          in bytes 0
  out bytes 51226          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 0         out bcast bytes 0
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 5000 bits/sec, 5 packets/sec
  pvc create time 00:23:36, last time pvc status changed 00:23:31
  fragment type end-to-end fragment size 80 adaptive active, time left 29 secs
```

Frame Relay PVC Bundle: Example

The following sample output indicates that PVC 202 is a member of VC bundle MAIN-1-static:

```
Router# show frame-relay pvc 202

PVC Statistics for interface Serial1/4 (Frame Relay DTE)

DLCI = 202, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial1/4

  input pkts 0             output pkts 45           in bytes 0
```

```
  out bytes 45000          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
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 2000 bits/sec, 2 packets/sec
  pvc create time 00:01:25, last time pvc status changed 00:01:11
  VC-Bundle MAIN-1-static
```

Frame Relay 64-Bit Counter: Example

The following sample output displays the Frame Relay 64-bit counters:

```
Router# show frame-relay pvc 35 64-bit

DLCI = 35, INTERFACE = Serial0/0
  input pkts 0                       output pkts 0
  in bytes 0                         out bytes 0
```

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 Network-to-Network Interface (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 64000 bps 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 type employed is proprietary to Cisco.

A sample configuration for this situation 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 situation 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.

Multipoint Subinterfaces Transporting Data: Example

The following is sample output from the **show frame-relay pvc** command for multipoint subinterfaces carrying data only. The output displays both the subinterface number and the DLCI. This display is the same whether the PVC is configured for static or dynamic addressing. Note that neither fragmentation nor voice is configured on this PVC.

```
Router# show frame-relay pvc

DLCI = 300, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial0.103
input pkts 10  output pkts 7  in bytes 6222
out bytes 6034  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
outbcast pkts 0  outbcast bytes 0
pvc create time 0:13:11  last time pvc status changed 0:11:46
DLCI = 400, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial0.104
input pkts 20  output pkts 8  in bytes 5624
out bytes 5222  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
outbcast pkts 0  outbcast bytes 0
pvc create time 0:03:57  last time pvc status changed 0:03:48
```

PVC Shaping When HQF is Enabled: Example

The following is sample output from the **show frame-relay pvc** command for a PVC when HQF is enabled:

```
Router# show frame-relay pvc 16

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

DLCI = 16, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial4/1

  input pkts 1             output pkts 1            in bytes 34
  out bytes 34             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 1         out bcast bytes 34
  pvc create time 00:09:07, last time pvc status changed 00:09:07
  shaping inactive
```

PVC Transporting Voice and Data: Example

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 39 describes the significant fields shown in the displays.

Table 39 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.
PVC STATUS	Status of the PVC: ACTIVE, INACTIVE, or DELETED.
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 • Packets 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.
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.

Table 39 show frame-relay pvc Field Descriptions (continued)

Field	Description
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.
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.

Table 39 show frame-relay pvc Field Descriptions (continued)

Field	Description
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.
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.

Table 39 show frame-relay pvc Field Descriptions (continued)

Field	Description
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.
Output queue 48/100 0 drop 300 dequeued	State of the per-VC queue. • Number of packets enqueued/size of the queue • Number of packets dropped • 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.

Table 39 show frame-relay pvc Field Descriptions (continued)

Field	Description
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.
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 map	Displays the current Frame Relay map entries and information about the connections
show frame-relay vc-bundle	Displays attributes and other information about a Frame Relay PVC bundle.

show frame-relay qos-autosense

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

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

Privileged 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.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

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 40 describes the significant fields in the output display.

Table 40 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** command in privileged EXEC mode.

show frame-relay route

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

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 41 describes significant fields shown in the output.

Table 41 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** command in user EXEC or privileged EXEC mode.

show frame-relay svc maplist *name*

Syntax Description

name	Name of the map list.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
11.2	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

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

```
map-list fish local-addr X121 87654321 dest-addr X121 12345678
 ip 172.21.177.26 class fish ietf
 ipx 123.0000.0c07.d530 class fish ietf
!
map-class frame-relay fish
 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 fish

Map List : fish
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 42 describes significant fields in the output.

Table 42 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.

Table 42 show frame-relay svc maplist Field Descriptions (continued)

Field	Description
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.
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** command in privileged EXEC mode.

show frame-relay traffic

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

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
```

show frame-relay vc-bundle

To display attributes and other information about a Frame Relay permanent virtual circuit (PVC) bundle, use the **show frame-relay vc-bundle** command in privileged EXEC mode.

show frame-relay vc-bundle *vc-bundle-name* [**detail**]

Syntax Description

vc-bundle-name	Name of this Frame Relay PVC bundle.
detail	(Optional) Displays output packet count information in addition to the other bundle member attributes for each PVC in the bundle specified by *vc-bundle-name*.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(13)T	This command was introduced.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

Usage Guidelines

Use this command to display packet service levels, bumping attributes, and other information about a specific Frame Relay PVC bundle. To view packet counts for each PVC in the bundle in addition to the other attributes, use the **detail** keyword.

Examples

Displaying General Information: Example

The following example shows the Frame Relay PVC bundle named "MP-4-dynamic" with PVC protection applied. Note that in this PVC bundle, data-link connection identifier (DLCI) 400 is configured to explicitly bump traffic to the PVC that handles DSCP level 40, which is DLCI 404. All the other DLCIs are configured for implicit bumping. In addition, all the DLCIs are configured to accept bumped traffic.

The asterisk (*) before PVC 4a indicates that this PVC was configured with the **precedence other** command, which means the PVC will handle all levels that are not explicitly configured on other PVCs.

In this example all PVCs are up so, the values in the "Active level" fields match the values in the "Config level" fields. If a PVC goes down and its traffic is bumped, the "Active level" field value for the PVC that went down is cleared. The "Active level" field values for the PVC that the traffic bumped to will be updated to include the levels of the PVC that went down.

The first three PVCs in the following example make up a protected group. All three of these PVCs must go down before the bundle will go down. The last two PVCs are protected PVCs: if either of these PVCs goes down, the bundle will go down.

```
Router# show frame-relay vc-bundle MP-4-dynamic

MP-4-dynamic on Serial1/4.1 - Status: UP Match-type: DSCP

Name    DLCI    Config. Active     Bumping     PG/     CIR     Status
                level   level      to/accept   PV      kbps
```

```
*4a     400     0-9     0-9         40/Yes      pg              up
4b      401     10-19   10-19       9/Yes       pg              up
4c      402     20-29   20-29       19/Yes      pg              up
4d      403     30-39   30-39       29/Yes      -               up
4e      404     40-49   40-49       39/Yes      -               up
4f      405     50-59   50-59       49/Yes      -               up
4g      406     60-62   60-62       59/Yes      pv              up
4h      407     63      63          62/Yes      pv              up

Packets sent out on vc-bundle MP-4-dynamic : 0:
Router#
```

Bumping: Example

The following example shows that although some DLCIs are down, the bumping rules and the remaining DLCIs keep the bundle up and running for all traffic types.

Note that DLCI 304 is handling the traffic being bumped from the three DLCIs that are down. The "Active level" field indicates the levels that the PVC is actually handling, not just which levels are configured.

```
Router# show frame-relay vc-bundle MP-3-static

MP-3-static on Serial1/4.1 - Status: UP Match-type: DSCP

Name    DLCI    Config. Active      Bumping     PG/     CIR     Status
                level   level       to/accept   PV      kbps
3a      300     0-9     0-9         -/Yes       -               up
3b      301     10-19   10-19       9/Yes       -               up
3c      302     20-29   20-29       19/Yes      -               up
3d      303     30-39               40/Yes      -               deleted
3e      304     40-49   30-59,63    39/Yes      -               up
3f      305     50-59               49/Yes      -               deleted
3g      306     60-62   60-62       59/No       -               up
3h      307     63                  62/Yes      -               deleted

Packets sent out on vc-bundle MP-3-static : 335
Router#
```

Traffic-Shaping: Example

The following example shows output for a PVC bundle configured with traffic shaping. The same rules of class inheritance apply to PVC-bundle members as to regular PVCs.

```
Router# show frame-relay vc-bundle 26k

26k on Serial1/4.1 - Status:UP  Match-type:PRECEDENCE

Name    DLCI  Config.         Active          Bumping     PG/ CIR   Status
              level           level           to/ accept  PV  kbps

        521   0,2,4           0,2,4           -/Yes       -   20    up
        522   1,3,5-6         1,3,5-6         0/Yes       -   26    up
        523   7               7               6/Yes       -   20    up

Packets sent out on vc-bundle 26k :0
Router#
```

Detail: Example

The following example shows the detail output of a PVC bundle. Note in this example that because all packet service levels are not handled, and because the PVCs are currently down, this bundle can never come up.

```
Router# show frame-relay vc-bundle x41 detail

x41 on Serial1/1 - Status: DOWN Match-type: DSCP

Name    DLCI    Config. Active     Bumping     PG/     CIR     Status
                level   level      to/accept   PV      kbps

        410     50-62              49/Yes      -               down
        411     30,32,34,36,3..    29/Yes      -               down

Packets sent out on vc-bundle x41 : 0

Active configuration and statistics for each member PVC
DLCI    Output pkts    Active level
410     0              50-62
411     0              30,32,34,36,38-40
Router#
```

Table 43 describes the significant fields shown in the **show frame-relay vc-bundle** displays.

Table 43 show frame-relay vc-bundle Field Descriptions

Field	Description
Status:	PVC bundle status. Possible values are UP, DOWN, and INITIAL (no PVCs associated with the bundle).
Name	The user-defined, alphanumeric name of the PVC.
DLCI	The ID number of the PVC bundle member.
Config. level	The packet service levels configured for the PVC.
Active level	The packet service levels actually handled by the PVC. This may include packet service levels for bumped traffic accepted by the PVC.
Bumping to/accept	The packet service level that the PVC will bump to if it goes down/whether or not the PVC will accept bumped traffic from another PVC.
PG/PV	Indicates whether the PVC is a member of a protected group or is an individually protected PVC. A dash in this field indicates that the PVC is not protected.
CIR kbps	Committed information rate for the PVC, in kilobits per second.
Status	Indicates whether the PVC is up, down, or deleted.
Output pkts	Number of packets sent out on the PVC.

Related Commands

Command	Description
show frame-relay map	Displays the current Frame Relay map entries and information about the connections.
show frame-relay pvc	Displays statistics about PVCs for Frame Relay interfaces.

show l2cac

To display dynamic Layer 2 Call Admission Control (L2CAC) information for an asynchronous transfer mode (ATM) interface, use the **show l2cac** command in user EXEC or privileged EXEC mode.

show l2cac atm *interface-number* {**aggregate-svc** | **vcd** *vcd-number*}

Syntax Description

atm	Specifies an ATM interface.
interface-number	Interface or subinterface number. For more information about the numbering syntax for your networking device, use the question mark (?) online help function.
aggregate-svc	Aggregates switched virtual circuits (SVCs).
vcd	Specifies the virtual circuit descriptor (VCD) about which the L2CAC information must be displaced.
vcd-number	VCD number. The range is from 1 to 65535.

Command Modes

User EXEC (>)
Privileged EXEC (#)

Command History

Release	Modification
12.2(13)T	This command was introduced.

Examples

The following is sample output from the **show l2cac** command for aggregated SVCs on ATM interface 2/0:

```
Router# show l2cac atm2/0 aggregate-svc

*Jun 11 04:01:44.247: l2_cac_show_cmd. Begin
*Jun 11 04:01:44.247: l2_cac_show_cmd: l2 cac control block not found, with the vcd = 0
*Jun 11 04:01:44.247: l2_cac_show_cmd. End
```

The following is sample output from the **show l2cac** command for VCD 1 on ATM interface 2/0:

```
Router# show l2cac atm2/0 vcd 1

vcci number = 1.
*Jun 11 04:02:16.487: l2_cac_show_cmd. Begin
*Jun 11 04:02:16.487: l2_cac_show_cmd: l2 cac control block not found, with the vcd = 1
*Jun 11 04:02:16.487: l2_cac_show_cmd. End
```

Table 44 describes the significant fields shown in the displays.

Table 44 show l2cac Field Descriptions

Field	Description
Begin	Indicates the beginning of the output.
l2 cac control block not found, with the vcd = 0	Displays the status of the L2CAC and the VCD number.
End	Indicates the end of the output.
vcci number	Displays the Virtual Circuit Connection Identifier (VCCI) number.

Related Commands

Command	Description
codec aal2-profile atmf	Configures the ATMF profile for VoAAL2.

show l2tun

To display general information about Layer 2 tunnels and sessions, use the **show l2tun** command in privileged EXEC mode.

show l2tun

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0(23)S	This command was introduced.
12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(27)SBC	Support for this command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines

The **show l2tun** command displays general information about all active Layer 2 tunnels and sessions. Use the **show l2tun tunnel** command or the **show l2tun session** command to display more detailed information about Layer 2 tunnels or sessions.

Examples

The following example shows the display of information about all currently active Layer 2 tunnels and sessions:

```
Router# show l2tun

L2TP Tunnel and Session Information Total tunnels 1 sessions 1

LocID RemID Remote Name   State  Remote Address  Port  Sessions L2TP Class/
                                                          VPDN Group
45795 43092 PE1           est    10.1.1.1         0     1        generic

LocID      RemID      TunID      Username, Intf/      State  Last Chg Uniq ID
                                 Vcid, Circuit
42410      0          45795      123456789, Fa4/1/1   idle   00:00:24 1
```

Table 45 describes the significant fields shown in the display.

Table 45 show l2tun tunnel all Field Descriptions

Field	Description
Total tunnels	Total number of tunnels established on the router.
sessions	Total number of sessions established on the router.
LocID	Local ID of the tunnel.

Table 45 show l2tun tunnel all Field Descriptions (continued)

Field	Description
RemID	Remote ID of the tunnel.
Remote Name	Hostname of the remote tunnel endpoint.
State	State of the tunnel.
Remote Address	IP address of the remote tunnel endpoint.
Port	Port number used by the remote tunnel endpoint.
Sessions	Number of sessions established in the tunnel.
L2TPclass	Name of the L2TP class the tunnel parameters are derived from.
VPDN group	Name of the virtual private dial-up network (VPDN) group the tunnel belongs to.
LocID	Local ID of the session.
RemID	Remote ID of the session.
TunID	Tunnel ID of the tunnel the session is in.
Username, Intf/Vcid, Circuit	The sessions username, interface, virtual circuit identifier (VCID), and circuit.
Last Chg	Time since the last change in the tunnel state, in hh:mm:ss.
Uniq ID	The tunnel session ID.

Related Commands

Command	Description
clear l2tun tunnel counters	Clears L2TP control channel authentication counters.
show l2tun session	Displays the current state of Layer 2 sessions and displays protocol information about L2TP control channels.
show l2tun tunnel	Displays the current state of a Layer 2 tunnel and displays information about currently configured tunnels.

show l2tun counters tunnel l2tp

To display global or per-tunnel control message statistics for Layer 2 Tunnel Protocol (L2TP) tunnels, use the **show l2tun counters tunnel l2tp** command in privileged EXEC mode.

show l2tun counters tunnel l2tp [**all** | **authentication** | **id** *local-id*]

Syntax Description

all	(Optional) Displays control message statistics for all L2TP tunnels that have per-tunnel statistics enabled.
authentication	(Optional) Displays global information about L2TP control channel authentication attribute-value (AV) pairs.
id *local-id*	(Optional) Displays control message statistics for the L2TP tunnel with the specified local ID.

Command Default

Global control message statistics are always enabled.
Per-tunnel control message statistics are disabled by default.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(28)SB	This command was introduced.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB, and EXP ACK and CiscoACK were added to the command output.

Usage Guidelines

Use the **show l2tun counters tunnel l2tp** command to display global L2TP control message statistics.

Use the **show l2tun counters tunnel l2tp authentication** command to display global L2TP authentication control message statistics.

The **show l2tun counters tunnel l2tp** command can display per-tunnel statistics, but per-tunnel statistics must first be enabled. Per-tunnel statistics are controlled on a tunnel by tunnel basis using the **monitor l2tun counters tunnel l2tp** command.

Use the **show l2tun counters tunnel l2tp id** *local-id* command to display per-tunnel statistics for a specific tunnel.

Use the **show l2tun counters tunnel l2tp all** command to display control message statistics for all tunnels that have per-tunnel statistics enabled.

Examples

The following example displays global L2TP control message counter information. In this example, the `Number of unknown control messages received:` displays only if the unknown message count is nonzero.

```
Router# show l2tun counters tunnel l2tp

Global L2TP tunnel control message statistics:
 Number of unknown control messages received: 10

                  XMIT       RE-XMIT         RCVD         DROP
              ==========   ==========   ==========   ==========
Total               32           25           22           15
ZLB                  0            0            0            0
SCCRQ                6           10            0            0
SCCRP                0            0            1            0
SCCCN                1            0            0            0
StopCCN              5            5            0            0
Hello                0            0            0            0
OCRQ                 0            0            0            0
OCRP                 0            0            0            0
OCCN                 0            0            0            0
ICRQ                 2            0            0            0
ICRP                 0            0            2            0
ICCN                 2            0            0            0
CDN                  0            0            0            0
WEN                  0            0            0            0
SLI                  2            0            4            0
EXP ACK              0            0            0            0
SRRQ                 0            0            0            0
SRRP                 0            0            0            0
CiscoACK             4            0            5            5
```

Table 46 describes the significant fields shown in the display.

Table 46 show l2tun counters tunnel l2tp Field Descriptions

Field	Description
XMIT	The number of control messages that have been sent.
RE-XMIT	The number of control messages that have been sent.
RCVD	The number of control messages that have been received.
DROP	The number of control messages that have been dropped.
ZLB	The number of Zero Length Body (ZLB) messages.
SCCRQ	The number of Start-Control-Connection-Request (SCCRQ) messages.
SCCRP	The number of Start-Control-Connection-Reply (SCCRP) messages.
SCCCN	The number of Start-Control-Connection-Connected (SCCCN) messages.
StopCCN	The number of Stop-Control-Connection-Notification (StopCCN) messages.
Hello	The number of hello messages.
OCRQ	The number of Outgoing-Call-Request (OCRQ) messages.
OCRP	The number of Outgoing-Call-Reply (OCRP) messages.
OCCN	The number of Outgoing-Call-Connected (OCCN) messages.
ICRQ	The number of Incoming-Call-Request (ICRQ) messages.
ICRP	The number of Incoming-Call-Reply (ICRP) messages.

Table 46 show l2tun counters tunnel l2tp Field Descriptions (continued)

Field	Description
ICCN	The number of Incoming-Call-Connected (ICCN) messages.
CDN	The number of Call-Disconnect-Notify (CDN) messages.
WEN	The number of WAN-Error-Notify (WEN) messages.
SLI	The number of Set-Link-Info (SLI) messages.
EXP ACK	The number of Explicit-Acknowledgment (ACK) messages.
SRRQ	The number of Service Relay Request Message (SRRQ) messages.
SRRP	The number of Service Relay Reply Message (SRRP) messages.
CiscoACK	The number of Cisco Explicit-Acknowledgment (ACK) messages.

The following example shows the display of all possible L2TP control channel authentication AV pair statistics. AV pair statistic fields are displayed only if they are nonzero. For the purposes of this example, all possible output fields are displayed in the sample output.

```
Router# show l2tun counters tunnel l2tp authentication

 L2TPv3 Tunnel Authentication Statistics:
   Nonce AVP Statistics:
     Ignored                                0
     Missing                                0
   All Digests Statistics:
     Unexpected                             0
     Unexpected ZLB                         0
   Primary Digest AVP Statistics:
     Validate fail                          0
     Hash invalid                           0
     Length invalid                         0
     Missing                                0
     Ignored                                0
     Passed                                 0
     Failed                                 0
   Secondary Digest AVP Statistics:
     Validate fail                          0
     Hash invalid                           0
     Length invalid                         0
     Missing                                0
     Ignored                                0
     Passed                                 0
     Failed                                 0
   Integrity Check Statistics:
     Validate fail                          0
     Length invalid                         0
     Passed                                 0
     Failed                                 0
   Local Secret Statistics:
     Missing                                0
   Challenge AVP Statistics:
     Generate response fail                 0
     Ignored                                0
   Challenge/Response AVP Statistics:
     Generate response fail                 0
     Missing                                0
     Ignored                                0
     Passed                                 0
     Failed                                 0
```

```
Overall Statistics:
  Passed                                0
  Skipped                               0
  Ignored                               0
  Failed                                0
```

Table 47 describes the significant fields shown in the display.

Table 47 show l2tun counters tunnel l2tp authentication Field Descriptions

Field	Description
Nonce AVP Statistics	Counters for the nonce AV pair.
Ignored	Number of AV pair messages that were ignored.
Missing	Number of AV pair messages that were missing.
All Digests Statistics	Statistics for all configured digest passwords.
Unexpected	Digest information was received but the router is not configured for it.
Unexpected ZLB	A ZLB message was received while control message authentication is enabled. ZLB messages are permitted only when control message authentication is disabled.
Primary Digest AVP Statistics	Statistics for AV pair messages exchanged using the primary L2TP Version 3 (L2TPv3) control message digest password.
Validate fail	Number of AV pair messages that failed to validate.
Hash invalid	Number of AV pair messages with an invalid hash.
Length invalid	Number of AV pair messages with an invalid length.
Passed	Number of AV pair messages successfully exchanged.
Failed	Number of AV pair messages that have failed to authenticate.
Secondary Digest AVP Statistics	Statistics for AV pair messages exchanged using the secondary L2TPv3 control message digest password.
Integrity Check Statistics	Statistics for AV pair messages exchanged when integrity checking is enabled.
Local Secret Statistics	Statistics for AV pair messages related to the local secret.
Challenge AVP Statistics	Statistics for AV pair messages related to Challenge Handshake Authentication Protocol (CHAP) style authentication challenges.
Generate response fail	Number of AV pair messages that did not generate a response.
Challenge/Response AVP Statistics	Statistics for AV pair messages exchanged when CHAP-style authentication is configured.
Overall Statistics	Summary of the statistics for all authentication AV pair messages.
Skipped	The number of AV pair messages that authentication was not performed on.

The following example displays L2TP control message statistics for all L2TP tunnels with per-tunnel statistics enabled:

```
Router# show l2tun counters tunnel l2tp all

Summary listing of per-tunnel statistics:

   LocID  RemID  Remote IP       Total      Total      Total      Total
                                 XMIT       RE-XMIT    RCVD       DROP
   15587  39984  10.0.1.1        40         0          40         0
   17981  42598  10.0.0.1        34         0          34         0
   22380  14031  10.0.0.0        38         0          38         0
   31567  56228  10.0.1.0        32         0          32         0
   38360  30275  10.1.1.1        30         0          30         0
   42759  1708   10.1.0.1        36         0          36         0

Number of tunnels with per-tunnel stats: 6
```

Table 48 describes the significant fields shown in the display.

Table 48 show l2tun counters tunnel l2tp all Field Descriptions

Field	Description
LocID	The local tunnel ID.
RemID	The remote tunnel ID.
Remote IP	The IP address of the remote peer.
Total XMIT	Total number of control messages sent.
Total RE-XMIT	Total number of control messages sent.
Total RCVD	Total number of control messages received.
Total Drop	Total number of control messages dropped.

The following example enables per-tunnel L2TP control message statistics for the L2TP tunnel with the local ID 38360:

```
Router# monitor l2tun counters tunnel l2tp id 38360 start
Router#
```

The following example displays L2TP control message statistics for the L2TP tunnel with the local ID 38360:

```
Router# show l2tun counters tunnel l2tp id 38360

L2TP tunnel control message statistics:
   Tunnel LocID: 38360  RemID: 30275
   Remote Address: 10.1.1.1

                  XMIT       RE-XMIT         RCVD          DROP
               ==========   ==========   ==========   ==========
Total                32           25           22           15
ZLB                   0            0            0            0
SCCRQ                 6           10            0            0
SCCRP                 0            0            1            0
SCCCN                 1            0            0            0
StopCCN               5            5            0            0
Hello                 0            0            0            0
OCRQ                  0            0            0            0
OCRP                  0            0            0            0
OCCN                  0            0            0            0
```

```
ICRQ                2           0           0           0
ICRP                0           0           2           0
ICCN                2           0           0           0
CDN                 0           0           0           0
WEN                 0           0           0           0
SLI                 2           0           4           0
EXP ACK             0           0           0           0
SRRQ                0           0           0           0
SRRP                0           0           0           0
CiscoACK            4           0           5           5
```

Related Commands

Command	Description
clear l2tun counters	Clears L2TP session counters.
clear l2tun counters tunnel l2tp	Clears global or per-tunnel control message statistics for L2TP tunnels.
monitor l2tun counters tunnel l2tp	Enables or disables the collection of per-tunnel control message statistics for L2TP tunnels.
show l2tun tunnel	Displays the current state of L2TP tunnels and information about configured tunnels.

show l2tun session

To display the current state of Layer 2 sessions and protocol information about Layer 2 Tunnel Protocol (L2TP) control channels, use the **show l2tun session** command in privileged EXEC mode.

show l2tun session [**l2tp** | **pptp**] [**all** [*filter*] | **brief** [*filter*] [**hostname**] | **circuit** [*filter*] [**hostname**] | **interworking** [*filter*] [**hostname**] | **packets** [*filter*] | **sequence** [*filter*] | **state** [*filter*]]

Syntax Descriptions

l2tp	(Optional) Displays information about L2TP.
pptp	(Optional) Displays information about Point-to-Point Tunneling Protocol.
all	(Optional) Displays information about all current L2TP sessions on the router.
filter	(Optional) One of the filter parameters defined in Table 49.
brief	(Optional) Displays information about all current L2TP sessions, including the peer ID address and circuit status of the L2TP sessions.
hostname	(Optional) Specifies that the peer hostname will be displayed in the output.
circuit	(Optional) Displays information about all current L2TP sessions, including circuit status (up or down).
interworking	(Optional) Displays information about Layer 2 Virtual Private Network (L2VPN) interworking.
packets	(Optional) Displays information about the packet counters (in and out) associated with current L2TP sessions.
sequence	(Optional) Displays sequencing information about each L2TP session, including the number of out-of-order and returned packets.
state	(Optional) Displays information about all current L2TP sessions and their protocol state, including remote Virtual Connection Identifiers (VCIDs).

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.0(23)S	This command was introduced.
12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.0(31)S	The **hostname** keyword was added.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4(11)T	This command was integrated into Cisco IOS Release 12.4(11)T.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
12.4(22)T	This command was modified.The **pptp** and **tunnel** keywords were added.

Usage Guidelines

Use the **show l2tun session** command to display information about current L2TP sessions on the router.

Table 49 defines the filter parameters available to refine the output of the **show l2tun session** command.

Table 49 Filter Parameters for the show l2tun session Command

Syntax	Description
ip-addr *ip-address* [**vcid** *number*]	Filters the output to display information about only those L2TP sessions associated with the IP address of the peer router. The 32-bit VCID shared between the peer router and the local router at each end of the control channel can be optionally specified. • *ip-address*—IP address of the peer router. • *number*—VCID number.
vcid *number*	Filters the output to display information about only those L2TP sessions associated with the VCID shared between the peer router and the local router at each end of the control channel. • *number*—VCID number.
username *username*	Filters the output to display information for only those sessions associated with the specified username. • *username*—Username.
tunnel {**id** *local-tunnel local-session* | **remote-name** *remote-tunnel local-tunnel-name*}	Displays the sessions in a tunnel. • **id**—Tunnel ID for established tunnels. • *local-tunnel*—Local tunnel ID. • *local-session*—Local session ID. • **remote-name**—Remote tunel name. • *remote-tunnel*—Remote tunnel name. • *local-tunnel*—Local tunnel name.

Examples

The following example shows how to display detailed information about all current L2TP sessions:

```
Router# show l2tun session all

Session Information Total tunnels 0 sessions 1

Session id 42438 is down, tunnel id n/a
  Remote session id is 0, remote tunnel id n/a
Session Layer 2 circuit, type is Ethernet, name is FastEthernet4/1/1
  Session vcid is 123456789
  Circuit state is DOWN
    Local circuit state is DOWN
    Remote circuit state is DOWN
Call serial number is 1463700128
Remote tunnel name is PE1
  Internet address is 10.1.1.1
Local tunnel name is PE1
  Internet address is 10.1.1.2
IP protocol 115
  Session is L2TP signalled
  Session state is idle, time since change 00:00:26
    0 Packets sent, 0 received
    0 Bytes sent, 0 received
  Last clearing of "show vpdn" counters never
```

```
    Receive packets dropped:
      out-of-order:            0
      total:                   0
    Send packets dropped:
      exceeded session MTU:    0
      total:                   0
  DF bit off, ToS reflect disabled, ToS value 0, TTL value 255
  No session cookie information available
  UDP checksums are disabled
  L2-L2 switching enabled
  No FS cached header information available
  Sequencing is off
  Unique ID is 1
```

The following example shows how to display information only about the L2TP session set up on a peer router with an IP address of 192.0.2.0 and a VCID of 300:

```
Router# show l2tun session all ip-addr 192.0.2.0 vcid 300

L2TP Session
Session id 32518 is up, tunnel id n/a
Call serial number is 2074900020
Remote tunnel name is tun1
  Internet address is 192.0.2.0
Session is L2TP signalled
  Session state is established, time since change 03:06:39
    9932 Packets sent, 9932 received
    1171954 Bytes sent, 1171918 received
  Session vcid is 300
  Session Layer 2 circuit, type is Ethernet Vlan, name is FastEthernet0/1/0.3:3
  Circuit state is UP
    Remote session id is 18819, remote tunnel id n/a
  Set DF bit to 0
  Session cookie information:
    local cookie, size 4 bytes, value CF DC 5B F3
    remote cookie, size 4 bytes, value FE 33 56 C4
  SSS switching enabled
  Sequencing is on
    Ns 9932, Nr 10001, 0 out of order packets discarded
```

Table 50 describes the significant fields shown in the displays.

Table 50 show l2tun session Field Descriptions

Field	Description
Total tunnels	Total number of L2TP tunnels established on the router.
sessions	Number of L2TP sessions established on the router.
Session id	Session ID for established sessions.
is	Session state.
tunnel id	Tunnel ID for established tunnels.
Remote session id	Session ID for the remote session.
tunnel id	Tunnel ID for the remote tunnel.
Session Layer 2 circuit, type is, name is	Type and name of the interface used for the Layer 2 circuit.
Session vcid is	VCID of the session.

Table 50 show l2tun session Field Descriptions (continued)

Field	Description
Circuit state is	State of the Layer 2 circuit.
Local circuit state is	State of the local circuit.
Remote circuit state is	State of the remote circuit.
Call serial number is	Call serial number.
Remote tunnel name is	Name of the remote tunnel.
Internet address is	IP address of the remote tunnel.
Local tunnel name is	Name of the local tunnel.
Internet address is	IP address of the local tunnel.
IP protocol	The IP protocol used.
Session is	Signaling type for the session.
Session state is	Session state for the session.
time since change	Time since the session state last changed, in the format hh:mm:ss.
Packets sent, received	Number of packets sent and received since the session was established.
Bytes sent, received	Number of bytes sent and received since the session was established.
Last clearing of "show vpdn" counters	Time elapsed since the last clearing of the counters displayed with the **show vpdn** command. Time will be displayed in one of the following formats: • hh:mm:ss—Hours, minutes, and seconds. • dd:hh—Days and hours. • WwDd—Weeks and days, where W is the number of weeks and D is the number of days. • YyWw—Years and weeks, where Y is the number of years and W is the number of weeks. • never—The timer has not been started.
Receive packets dropped:	Number of received packets that were dropped since the session was established. • out-of-order—Total number of received packets that were dropped because they were out of order. • total—Total number of received packets that were dropped.
Send packets dropped:	Number of sent packets that were dropped since the session was established. • exceeded session MTU—Total number of sent packets that were dropped because the session maximum transmission unit (MTU) was exceeded. • total—Total number of sent packets that were dropped.
DF bit	Status of the Don't Fragment (DF) bit option. The DF bit can be on or off.
ToS reflect	Status of the type of service (ToS) reflect option. ToS reflection can be enabled or disabled.
ToS value	Value of the ToS byte in the L2TP header.
TTL value	Value of the time-to-live (TTL) byte in the L2TP header.

Table 50 show l2tun session Field Descriptions (continued)

Field	Description
local cookie	Size (in bytes) and value of the local cookie.
remote cookie	Size (in bytes) and value of the remote cookie.
UDP checksums are	Status of the User Datagram Protocol (UDP) checksum configuration.
switching	Status of switching.
No FS cached header information available	Fast Switching (FS) cached header information. If an FS header is configured, the encapsulation size and hexadecimal contents of the FS header will be displayed. The FS header is valid only for IP virtual private dialup network (VPDN) traffic from a tunnel server to a network access server (NAS).
Sequencing is	Status of sequencing. Sequencing can be on or off.
Ns	Sequence number for sending.
Nr	Sequence number for receiving.
Unique ID is	Global user ID correlator.

The following example shows how to display information about the circuit status of L2TP sessions on a router:

```
Router# show l2tun session circuit

Session Information Total tunnels 3 sessions 3

LocID      TunID      Peer-address    Type Stat Username, Intf/
                                              Vcid, Circuit
32517      n/a         172.16.184.142  VLAN UP   100, Fa0/1/0.1:1
32519      n/a         172.16.184.142  VLAN UP   200, Fa0/1/0.2:2
32518      n/a         172.16.184.142  VLAN UP   300, Fa0/1/0.3:3
```

The following example shows how to display information about the circuit status of L2TP sessions and the hostnames of remote peers:

```
Router# show l2tun session circuit hostname

Session Information Total tunnels 3 sessions 3

LocID      TunID      Peer-hostname Type Stat Username, Intf/
                                              Vcid, Circuit
32517      n/a         <unknown>       VLAN UP   100, Fa0/1/0.1:1
32519      n/a         router32        VLAN UP   200, Fa0/1/0.2:2
32518      n/a         access3         VLAN UP   300, Fa0/1/0.3:3
```

Table 51 describes the significant fields shown in the displays.

Table 51 show l2tun session circuit Field Descriptions

Field	Description
LocID	Local session ID.
TunID	Tunnel ID.
Peer-address	IP address of the peer.
Peer-hostname	Hostname of the peer.
Type	Session type.

Table 51 show l2tun session circuit Field Descriptions (continued)

Field	Description
Stat	Session status.
Username, Intf/Vcid, Circuit	Username, interface name/VCID, and circuit number of the session.

Related Commands

Command	Description
show l2tun	Displays general information about Layer 2 tunnels and sessions.
show l2tun tunnel	Displays the current state of Layer 2 tunnels and information about configured tunnels.

show l2tun tunnel

To display the current state of Layer 2 Tunneling Protocol (L2TP) tunnels and information about configured tunnels, including local and remote hostnames, aggregate packet counts, and control channel information, use the **show l2tun tunnel** command in privileged EXEC mode.

show l2tun tunnel [**l2tp** | **pptp**] [**all** [*filter*] | **packets** [*filter*] | **state** [*filter*] | **summary** [*filter*] | **transport** [*filter*] | **authentication**]

Syntax Description

l2tp	(Optional) Displays information about L2TP.
pptp	(Optional) Displays information about Point-to-Point Tunneling Protocol.
all	(Optional) Displays information about all current L2TP sessions configured on the router.
filter	(Optional) One of the filter parameters defined in Table 52.
packets	(Optional) Displays aggregate packet counts for all negotiated L2TP sessions.
state	(Optional) Displays information about the current state of L2TP sessions, including the local and remote hostnames for each control channel.
summary	(Optional) Displays a summary of L2TP sessions on the router and their current state, including the number of virtual private dialup network (VPDN) sessions associated with each control channel.
transport	(Optional) Displays information about the L2TP control channels used in each session and the local and remote IP addresses at each end of the control channel.
authentication	(Optional) Displays global information about L2TP control channel authentication attribute-value pairs (AV pairs).

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.0(23)S	This command was introduced.
12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.0(30)S	This command was enhanced to display information about pseudowire control channel authentication passwords.
12.0(31)S	The **authentication** keyword was added and the output of the **show l2tun tunnel all** command was enhanced to display per-tunnel authentication failure counters.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.
12.2(28)SB	The **authentication** keyword was removed. The statistics previously displayed by the **show l2tun tunnel authentication** command are now displayed by the **show l2tun counters tunnel l2tp authentication** command.

Release	Modification
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4(11)T	This command was integrated into Cisco IOS Release 12.4(11)T.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.

Usage Guidelines

Use the **show l2tun tunnel** command to display information about configured L2TP sessions on the router.

Table 52 defines the filter parameters available to refine the output of the **show l2tun tunnel** command.

Table 52 Filter Parameters for the show l2tun tunnel Command

Syntax	Description
id *local-id*	Filters the output to display information for only the tunnel with the specified local ID. • *local-id*—The local tunnel ID number. Valid values range from 1 to 65535.
local-name *local-name remote-name*	Filters the output to display information for only the tunnel associated with the specified names. • *local-name*—The local tunnel name. • *remote-name*—The remote tunnel name.
remote-name *remote-name local-name*	Filters the output to display information for only the tunnel associated with the specified names. • *remote-name*—The remote tunnel name. • *local-name*—The local tunnel name.

Examples

The following example shows how to display detailed information about all L2TP tunnels:

```
Router# show l2tun tunnel all

Tunnel Information Total tunnels 1 sessions 1

Tunnel id 26515 is up, remote id is 41814, 1 active sessions
  Tunnel state is established, time since change 03:11:50
  Tunnel transport is IP (115)
  Remote tunnel name is tun1
    Internet Address 172.0.0.0, port 0
  Local tunnel name is Router
    Internet Address 172.0.0.1, port 0
  Tunnel domain is
  VPDN group for tunnel is
  L2TP class for tunnel is
  0 packets sent, 0 received
  0 bytes sent, 0 received
  Control Ns 11507, Nr 11506
  Local RWS 2048 (default), Remote RWS 800
  Tunnel PMTU checking disabled
```

```
Retransmission time 1, max 1 seconds
Unsent queuesize 0, max 0
Resend queuesize 1, max 1
Total resends 0, ZLB ACKs sent 11505
Total peer authentication failures 8
Current nosession queue check 0 of 5
Retransmit time distribution: 0 0 0 0 0 0 0 0 0 0
Sessions disconnected due to lack of resources 0
```

Table 53 describes the significant fields shown in the displays.

Table 53 show l2tun tunnel all Field Descriptions

Field	Description
Total tunnels	Total number of L2TP tunnels currently established on the router.
sessions	Number of L2TP sessions currently established on the router.
Tunnel id is up	Tunnel ID and tunnel status.
remote id is	Remote ID.
active sessions	Number of active sessions.
Tunnel state is	State of the tunnel.
time since change	Time since the tunnel state last changed, in the format hh:mm:ss.
Tunnel transport is	Tunnel transport protocol.
Remote tunnel name is	Name of the remote tunnel endpoint.
Internet Address	IP address of the remote tunnel endpoint.
port	Port number used by the remote tunnel endpoint.
Local tunnel name is	Name of the local tunnel endpoint.
Internet Address	IP address of the local tunnel endpoint.
port	Port number used by the local tunnel endpoint.
Tunnel domain is	Domain information for the tunnel.
VPDN group for tunnel is	Name of the VPDN group associated with the tunnel.
L2TP class for tunnel is	Name of the L2TP class associated with the tunnel.
packets sent, received	Number of packets sent and received since the tunnel was established.
bytes sent, received	Number of bytes sent and received since the tunnel was established.
Control Ns, Nr	Sequence number for control packets sent and received.
Local RWS	Local receiving window size, in packets.
Remote RWS	Remote receiving window size, in packets.
Tunnel PMTU checking	Status of the tunnel path maximum transmission unit (MTU) checking option. It may be enabled or disabled.
Retransmission time, max	Current time, in seconds, required to resend a packet and maximum time, in seconds, that was required to resend a packet since tunnel establishment.
Unsent queuesize, max	Current size of the unsent queue and maximum size of the unsent queue since tunnel establishment.

Table 53 show l2tun tunnel all Field Descriptions (continued)

Field	Description
Resend queuesize, max	Current size of the resend queue and maximum size of the resend queue since tunnel establishment.
Total resends	Total number of packets re-sent since tunnel establishment.
ZLB ACKs sent	Number of zero length body acknowledgment messages sent.
Total peer authentication failures	The total number of times peer authentication has failed.
Current nosession queue check	Number of tunnel timeout periods since the last session ended. Up to five tunnel timeouts are used if there are outstanding control packets on the unsent or resend queue. Otherwise, the tunnel is dropped after one tunnel timeout.
Retransmit time distribution	Histogram showing the number of retransmissions at 0, 1, 2,..., 8 seconds, respectively.
Sessions disconnected due to lack of resources	Number of sessions disconnected because of a lack of available resources.
secrets configured	The number of pseudowire control channel authentication passwords that are configured for the tunnel. One or two passwords may be configured.

The following example shows how to filter information to display L2TP control channel details only for the sessions configured with the local name Router and the remote name tun1:

```
Router# show l2tun tunnel transport local-name Router tun1

Tunnel Information Total tunnels 3 sessions 3

LocID Type Prot  Local Address   Port  Remote Address  Port
26515 IP   115   172.16.184.116  0     172.16.184.142  0
30866 IP   115   172.16.184.116  0     172.16.184.142  0
35217 IP   115   172.16.184.116  0     172.16.184.142  0
```

Table 54 describes the significant fields shown in the display.

Table 54 show l2tun tunnel transport Field Descriptions

Field	Description
Total tunnels	Total number of tunnels established.
sessions	Number of sessions established.
LocID	Local session ID.
Type	Session type.
Prot	Protocol type used by the tunnel.
Local Address	IP address of the local tunnel endpoint.
Port	Port used by the local tunnel endpoint.
Remote Address	IP address of the remote tunnel endpoint.
Port	Port used by the remote tunnel endpoint.

The following example shows how to display information about the current state of L2TP tunnels with the local and remote hostnames of each session:

```
Router# show l2tun tunnel state

LocID  RemID   Local Name Remote Name  State  Last-Chg
26515  41814   Router      tun1         est     03:13:15
30866  6809    Router      tun1         est     03:13:15
35217  37340   Router      tun1         est     03:13:15
```

Table 55 describes the significant fields shown in the display.

Table 55 show l2tun tunnel state Field Descriptions

Field	Description
LocID	Local session ID.
RemID	Remote session ID.
Local Name	Name of the local tunnel endpoint.
Remote Name	Name of the remote tunnel endpoint.
State	Current state of the tunnel.
Last-Chg	Time since the state of the tunnel last changed, in the format hh:mm:ss.

The following example shows the display of all possible L2TP control channel authentication AV pair statistics. AV pair statistic fields are displayed only if they are nonzero. For the purposes of this example, all possible output fields are displayed in the sample output.

This example is valid for Cisco IOS Release 12.0(31)S and later releases or Cisco IOS Release 12.2(27)SBC. To display authentication statistics in Cisco IOS Release 12.2(28)SB or a later release, use the **monitor l2tun counters tunnel l2tp** and **show l2tun counters tunnel l2tp** commands instead.

```
Router# show l2tun tunnel authentication

 L2TPv3 Tunnel Authentication Statistics:
   Nonce AVP Statistics:
     Ignored                                0
     Missing                                0
   All Digests Statistics:
     Unexpected                             0
     Unexpected ZLB                         0
   Primary Digest AVP Statistics:
     Validate fail                          0
     Hash invalid                           0
     Length invalid                         0
     Missing                                0
     Ignored                                0
     Passed                                 0
     Failed                                 0
   Secondary Digest AVP Statistics:
     Validate fail                          0
     Hash invalid                           0
     Length invalid                         0
     Missing                                0
     Ignored                                0
     Passed                                 0
     Failed                                 0
   Integrity Check Statistics:
     Validate fail                          0
```

```
    Length invalid                          0
    Passed                                  0
    Failed                                  0
  Local Secret Statistics:
    Missing                                 0
  Challenge AVP Statistics:
    Generate response fail                  0
    Ignored                                 0
  Challenge/Response AVP Statistics:
    Generate response fail                  0
    Missing                                 0
    Ignored                                 0
    Passed                                  0
    Failed                                  0
  Overall Statistics:
    Passed                                  0
    Skipped                                 0
    Ignored                                 0
    Failed                                  0
```

Table 56 describes the significant fields shown in the display.

Table 56 show l2tun tunnel authentication Field Descriptions

Field	Description
Nonce AVP Statistics	Counters for the nonce AV pair.
Ignored	Number of AV pair messages that were ignored.
Missing	Number of AV pair messages that were missing.
All Digests Statistics	Statistics for all configured digest passwords.
Unexpected	Digest information was received, but the router is not configured for it.
Unexpected ZLB	A ZLB message was received while control message authentication was enabled. ZLB messages are permitted only when control message authentication is disabled.
Primary Digest AVP Statistics	Statistics for AV pair messages that were exchanged using the primary L2TP Version 3 (L2TPv3) control message digest password.
Validate fail	Number of AV pair messages that failed to validate.
Hash invalid	Number of AV pair messages with an invalid hash.
Length invalid	Number of AV pair messages with an invalid length.
Passed	Number of AV pair messages that were successfully exchanged.
Failed	Number of AV pair messages that failed to authenticate.
Secondary Digest AVP Statistics	Statistics for AV pair messages that were exchanged using the secondary L2TPv3 control message digest password.
Integrity Check Statistics	Statistics for AV pair messages that were exchanged when integrity checking was enabled.
Local Secret Statistics	Statistics for AV pair that were messages related to the local secret.
Challenge AVP Statistics	Statistics for AV pair messages that were related to Challenge Handshake Authentication Protocol (CHAP), style authentication challenges.
Generate response fail	Number of AV pair messages that did not generate a response.

Table 56 show l2tun tunnel authentication Field Descriptions (continued)

Field	Description
Challenge/Response AVP Statistics	Statistics for AV pair messages exchanged when CHAP-style authentication is configured.
Overall Statistics	Summary of the statistics for all authentication AV pair messages.
Skipped	The number of AV pair messages that were not authenticated.

Related Commands

Command	Description
clear l2tun counters tunnel l2tp	Clears global or per-tunnel control message statistics for L2TP tunnels.
clear l2tun tunnel counters	Clears L2TP control channel authentication counters.
monitor l2tun counters tunnel l2tp	Enables or disables the collection of per-tunnel control message statistics for L2TP tunnels.
show l2tun	Displays general information about Layer 2 tunnels and sessions.
show l2tun session	Displays the current state of Layer 2 sessions and protocol information about L2TP control channels.
show l2tun counters tunnel l2tp	Displays global or per-tunnel control message statistics for L2TP tunnels, or toggles the recording of per-tunnel statistics for a specific tunnel.

show l4f

To display the flow database for Layer 4 Forwarding (L4F), use the **show l4f** command in privileged EXEC mode.

show l4f {**clients** | **flows** [**brief** | **detail** | **summary**] | **statistics**}

Syntax Description

clients	Shows information about L4F clients.
flows	Shows information about L4F flows.
brief	(Optional) Shows brief information about L4F flows.
detail	(Optional) Shows detailed information about L4F flows.
summary	(Optional) Shows summary information about L4F flows.
statistics	Shows statistical information about L4F.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(2)T	This command was introduced.

Usage Guidelines

Use this command to examine the flow database for L4F. New statistics for L4F are available through this command. The per-flow statistics help to correlate the information with existing per-TCB statistics.

Examples

The following example displays the output of the **show l4f statistics** command. The fields in the table are self explanatory.

```
Router# show l4f statistics

L4F Global Statistics               Process     Interrupt

Client register                           4             0
Client deregister                         4             0
Client lookup failure                     8             0
Policy check accepted                     0             0
Policy check rejected                     0             0
Flows created                             0             0
Flow creation failed                      0             0
Flows destroyed                           0             0
Flows forced to bypass                    0             0
Flow lookup failed                        0             0
Flow cleanup scans                      501             0
Flows delayed for reinjection             0             0
Packet interception FORWARD               0             0
Packet interception PROXIED               0             0
Packet interception BYPASS                0             0
Packet interception ABORT                 0             0
Packet interception DROP                  0             0
Packet interception CONSUME               0             0
```

```
Packet interception PUNT                0              0
Packet interception UNKNOWN             0              0
Packet interception forced punt         0              0
Spoofing to proxying failures           0              0
Spoofing to proxying success            0              0
Spoofing to proxying timeouts           0              0
Read notify called                      0              0
Read notify aborted                     0              0
Read notify punt                        0              0
Read notify ok                          0              0
Read buffer                             0              0
Read packet                             0              0
Write notify called                     0              0
Write notify aborted                    0              0
Write notify punt                       0              0
Write notify ok                         0              0
Write buffer                            0              0
Write packet                            0              0
Close notify called                     0              0
Shutdown called                         0              0
Close called                            0              0
Abort called                            0              0
Spoofing mode packets                   0              0
Proxying mode packets                   0              0
Packet reinject state alloc fail        0              0
Packet buffer alloc failed              0              0
Packet reinjection                      0              0
Packet reinjection punts                0              0
Packet reinjection errors               0              0
Packet reinjection other                0              0
Packets delayed for reinjection         0              0
Packets drained from delay q            0              0
Packets freed from delay q              0              0
```

Related Commands

Command	Description
debug l4f	Enables troubleshooting for L4F flows.

show line x121-address

To display all the line and rotary group addresses that are in a router, use the **show line x121-address** command in user EXEC or privileged EXEC mode.

show line x121-address

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC
Privileged EXEC

Command History

Release	Modification
12.3(11)YN	This command was introduced.
12.4(4)T	This command was integrated into Cisco IOS Release 12.4(4)T.

Usage Guidelines

You use this command to see whether any X.121 address has been assigned, and if so, to which line or rotary group it has been assigned.

Examples

The following example shows the lines and groups that have X.121 addresses. It also shows that address 1111 will be used as the calling address by calls originating from lines within Rotary Group 2.

```
Router# show line x121-address

   X121-Addresses     Line   Rotary
   34567              97      -
   12345              98      -
   23456              -       1
   1111               -       2 (calling-address)
```

Table 57 show line x121-address Field Descriptions

Field	Description
X121-Addresses	X.121 address assigned to the TTY line or rotary group identified to the right in the same row.
Line	The TTY line's absolute number.
Rotary	The rotary group's ID number. The words "calling address" also appear in this column when the group's X.121 address has been assigned to be the source address for all calls originating with members of that group.

Related Commands

Command	Description
show line	Displays status of configured lines.

show mace metrics

To display all Measurement, Aggregation, and Correlation Engine (MACE) metrics that were collected at the last export timeout, use the **show mace metrics** command in privileged EXEC mode.

show mace metrics [**summary** | [**name**] *monitor-name* [**art** | **waas**] | *source-ip* [*destination-ip* [*port* [*protocol*]]] [**art** | **waas**]]

Syntax Description

summary	(Optional) Displays the MACE metrics summary.
name	(Optional) Specifies the name of a flow monitor.
monitor-name	(Optional) Name of a flow monitor of type MACE that was previously configured.
art	(Optional) Displays the Application Response Time (ART) metrics.
waas	(Optional) Displays the Wide Area Application Services (WAAS) metrics.
source-ip	(Optional) Source IP address used by the exported packets. You can specify a valid source IP address, or you can use the **any** keyword. If you use the **any** keyword, the command displays information about all the source IP addresses.
destination-ip	(Optional) IP address of the destination host. You can specify a valid destination IP address or use the **any** keyword. If you use the **any** keyword, the command displays information about all the destination IP addresses.
port	(Optional) Destination port to which the exported packets are sent. The range is from 1 to 65535. You can specify a valid port address, or you can use the **any** keyword. If you use the **any** keyword, the command displays information about all the ports.
protocol	(Optional) Transport layer protocol used by the exported packets. The range is from 1 to 256. You can specify a valid protocol, or you can use the **any** keyword. If you use the **any** keyword, the command displays information about all the protocols.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(4)M	This command was introduced.

Usage Guidelines

Use the **show mace metrics** command to display MACE metrics that are collected at the last export timeout. No metrics are displayed before the first export timeout. If you do not specify any source IP address, destination IP address, port, protocol, or flow-monitor, and instead use the **any** keyword, all MACE metrics for all flows are displayed.

Examples

The following examples are sample output from the **show mace metrics** command:

```
Router# show mace metrics summary
```

```
Segment          Client Pkts             Server Pkts             Flows Exported
0                 0                       0                       0
1                 618                     771                     155
2                 906                     890                     155
4                 0                       0                       0
8                 0                       0                       0
16                182                     181                     46
```

Table 58 describes the significant fields shown in the display.

Table 58 show mace metrics summary Field Descriptions

Field	Description
Segment	WAAS Segment ID.
Client Pkts	Number of packets that are sent by the client.
Server Pkts	Number of packets that are sent by the server.
Flows Exported	Number of flows that are exported in the previous interval.

```
Router# show mace metrics

Key fields:    | Client           | Server          | Dst. Port  | Protocol | Segment ID
MACE Metrics:  | DSCP        AppId      cByte       cPkts       sByte       sPkts
ART Metrics:   | sumRT       sumAD       sumNT       sumCNT      sumSNT      sumTD
                 sumTT       numT        sPkts       sByte       cPkts       cByte
                 newSS       numR
WAAS Metrics:  | optMode    InBytes     OutBytes    LZByteIn    LZByteOut   DREByteIn
                 DREByteOut
Rec. 1    :    | 1.1.1.2          | 3.3.3.2          | 80          | 6        |  1
MACE Metrics:  | 0            0           88           4            72          2
ART Metrics:   | 0          0          0          0          0          0          0
                 0          2          0          4          0          0          0
WAAS Metrics:  | 7          0          0          0          0          0          0
Rec. 2    :    | 1.1.1.2          | 3.3.3.2          | 80          | 6        |  2
MACE Metrics:  | 0            0           152          6            72          2
ART Metrics:   | 0          0          0          0          0          0          0
                 0          2          0          6          0          0          0
WAAS Metrics:  | 7            0           0           0            0           0           0
```

Table 59 describes the significant fields shown in the display.

Table 59 show mace metrics Field Descriptions

Field	Description
Client	Client address.
Server	Server address.
Dst. Port	Destination server port.
Segment ID	WAAS segment ID.
DSCP	Differentiated Services Code Point (DSCP) value in the Type of Service (TOS) field.
AppId	Network-Based Application Recognition (NBAR) application ID.

Table 59 show mace metrics Field Descriptions (continued)

Field	Description
cByte	Client bytes.
cPkts	Client packets.
sByte	Server bytes.
sPkts	Server packets
sumRT	Response time sum.
sumAD	Application delay sum.
sumNT	Network time sum.
sumCNT	Client network time sum.
sumSNT	Server network time sum.
sumTD	Total delay sum.
sumTT	Transaction time sum.
numT	Number of transactions.
newSS	Number of sessions.
numR	Number of responses.
optMode	WAAS optimization mode.
InBytes	WAAS input bytes.
OutBytes	WAAS output bytes.
LZByteIn	WAAS Lempel-Ziv (LZ) input bytes.
LZByteOut	WAAS LZ output bytes.
DREByteIn	WAAS Data Redundancy Elimination (DRE) input bytes.
DREByteOut	WAAS DRE output bytes.

Related Commands

Command	Description
flow monitor type mace	Configures a Flexible NetFlow flow monitor of type MACE.
mace enable	Applies the global MACE policy on an interface.
mace monitor waas	Enables MACE on WAAS.

show mpls l2transport checkpoint

To display checkpointing information about Any Transport over MPLS (AToM) virtual circuits (VCs), use the **show mpls l2transport checkpoint** command in privileged EXEC mode.

show mpls l2transport checkpoint

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(25)S	This command was introduced.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

The output of the commands varies, depending on whether the output reflects the active or standby Route Processor (RP).

On the active RP, the command displays the following output:

```
Router# show mpls l2transport checkpoint

AToM Checkpoint info for active RP
Checkpointing is allowed
Bulk-sync checkpointed state for 1 VC
```

On the standby RP, the command displays the following output:

```
Router# show mpls l2transport checkpoint

AToM HA Checkpoint info for standby RP
1 checkpoint information block in use
```

In general, the output on the active RP shows that checkpointing information was sent to the backup RP. The output on the backup RP shows that checkpointing information was received from the active RP.

Related Commands

Command	Description
show mpls l2transport vc	Displays information about the checkpointed data when checkpointing is enabled.

show platform software frame-relay

To display the statistics about frame relay permanent virtual circuits (PVCs), use the **show platform software frame-relay** command in the privileged EXEC mode.

show platform software frame-relay *slot* **pvc [interface** <*interface*> **| dlci** <*number*>**]**

Syntax Description

slot	(Optional) Embedded Service Processor or Route Processor slot. Valid options are: • F0—Embedded-Service-Processor slot 0 • F1—Embedded-Service-Processor slot 1 • FP—Embedded-Service-Processor • R0—Route-Processor slot 0 • R1—Route-Processor slot 1 • RP—Route-Processor
interface	(Optional) Indicates the specific interface for which PVC information will be displayed.
dlci	(Optional) Indicates the specific DLCI number used on the interface. Statistics pertaining to the specified PVC are displayed when a DLCI is specified. The valid value range is 16 to 1022.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
Cisco IOS XE Release 2.1	This command was introduced.

Examples

The following is a sample output from the **show paltform software frame-relay rp active pvc** command displaying the forwarding manager frame relay PVC information:

```
router#show platform software frame-relay rp active pvc

Forwarding Manager Frame Relay PVC Information

Interface       DLCI        ID       QFP ID    Bandwidth  Fragm...
Serial0/1...     61      0x1020012      0          0          0
MFR1.1          100      0x1020013      0          0          0
```

show platform software mfr

To display statistics about multilink frame relay information, use the **show platform software mfr** command in the privileged EXEC mode.

show platform software mfr *slot* {**active** [*counter* | *index*] | **standby**}

Syntax Description

slot	(Optional) Embedded Service Processor or Route Processor slot. Valid options are: • F0—Embedded-Service-Processor slot 0 • F1—Embedded-Service-Processor slot 1 • FP—Embedded-Service-Processor • R0—Route-Processor slot 0 • R1—Route-Processor slot 1 • RP—Route-Processor
active	Displays the active instance of the MFR.
counter	(Optional) MFR messaging counter information.
index	(Optional) MFR FP information pertaining to a specific index. The valid value range is 0 to 1000000.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
Cisco IOS XE Release 3.4S	This command was introduced.

Examples

The following is a sample output from the **show paltform software mfr fp active counters** command displaying the forwarding manager MFR message counters:

```
router#show platform software mfr fp active counter
Forwarding Manager MFR Message Counters

MFR Bundle additions         : 2
MFR Bundle deletions         : 0
MFR Bundle modifications     : 0
MFR Bundle errors            : 0
MFR Deferred Bundles         : 0
MFR Member Link additions    : 0
MFR Member Link deletions    : 0
MFR Member Link modifications: 0
MFR Member Link errors       : 0
MFR Deferred Links           : 0
```

show policy-map type mace

To display policy-map statistics for the Measurement, Aggregation, and Correlation Engine (MACE), use the **show policy-map type mace** command in privileged EXEC mode.

show policy-map type mace [*mace-name* [**class** *name*] | **apn** *number* | **interface** [*type number* [**vc** [*vpi/*]*vci* | **vp** *vpi* [*subinterface*]] [**input** [**class** *name*] | **output** [**class** *name*]] | **session** [**uid** [*session-id*]] [**input** [**class** *name*] | **output** [**class** *name*]]]

Syntax Description

mace-name	(Optional) Name of the policy map.
class *name*	(Optional) Displays quality of service (QoS) policy actions for an individual class map.
apn	(Optional) Displays Access Point Name (APN)-related policy information.
number	Number of the APN index. The range is from 1 to 65535.
interface	(Optional) Displays the interface on which the QoS policy is configured.
type number	(Optional) Interface type and number. For more information, use the question mark (?) online help function.
vc	(Optional) Displays the virtual circuit (VC) service policy.
vp	(Optional) Displays the virtual path (VP) service policy.
vpi/	(Optional) Virtual path identifier (VPI) of the VP. The range is 0 to 255.
vci	Virtual channel identifier (VCI) of the VC associated with this VP. The range is 1 to 65535.
subinterface	(Optional) Subinterface, where applicable. The accepted values for this field are: • cef-exception— Cisco Express Forwarding (CEF)-exception subinterface. • host—Host subinterface. • transit—Transit subinterface.
input	(Optional) Displays the input policy of the session.
output	(Optional) Displays the output policy of the session.
session	(Optional) Displays the QoS policy session.
uid	(Optional) Displays the session information based on the Subscriber Service Switch (SSS) unique ID.
session-id	(Optional) Unique ID of the session. The range is from 1 to 65535.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(4)M	This command was introduced.

Examples

The following is sample output from the **show policy-map type mace** command:

```
Router# show policy-map type mace mace_global

interface Ethernet1/0

Service-policy mace input: mace_global

Class-map: c1 (match-any)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: tcp any
0 packets, 0 bytes
5 minute rate 0 bps

Class-map: c2 (match-any)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: tcp any
0 packets, 0 bytes
5 minute rate 0 bps

Class-map: c3 (match-any)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: tcp any
0 packets, 0 bytes
5 minute rate 0 bps

Class-map: class-default (match-any)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: any
```

Table 60 describes the significant fields shown in the display.

Table 60 show policy-map type mace Field Descriptions

Field	Description
Service-policy	Displays the service policy that is configured as a traffic shaping policy within a policy map.
Class-map	Displays a class map configuration that is created to be used for matching packets to a specified class.

Related Commands

Command	Description
policy-map type mace	Configures a MACE policy map and enters policy-map configuration mode.
show policy-map	Displays the configuration of all classes for a specified service policy map or all classes for all existing policy maps.

show rgf groups

To display information about redundancy group facility (RGF) groups on Multirouter Automatic Protection Switching (MR-APS)-enabled routers that support stateful Multilink PPP (MLPPP) sessions, use the **show rgf group** command in privileged EXEC mode.

show rgf groups [*group-id*]

Syntax Description

group-id	Valid existing RGF group ID.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(3)S	This command was introduced.

Usage Guidelines

Use the **show rgf groups** command to display information about all RGF groups with Interchassis Redundancy Manager (ICRM) and Automatic Protection Switching (APS) group associations.

Examples

The following is sample output from the **show rgf groups** command:

```
Router# show rgf groups

Total RGF groups: 1
------------------------------------------------------------
STANDBY RGF GROUP

 RGF Group ID     : 1
 RGF Peer Group ID: 1
 ICRM Group ID    : 100
 APS Group ID     : 1

RGF State information:
 My State Present  : Standby-hot
         Previous  : Standby-bulk
 Peer State Present: Active-fast
           Previous: Standby-cold

Misc:
 Communication state Up
 aps_bulk:  0
 aps_stby:  0
 peer_stby: 0
 -> Driven Peer to [peer Standby Bulk] Progression
 -> We sent Bulk Sync start Progression to Active
  RGF GET BUF:   114       RGF RET BUF   114
```

Table 22 describes the significant fields shown in the display. Any data not described in the table is either self-explanatory or used for Cisco internal debugging.

Table 61 show rgf groups Field Descriptions

Field	Description
RGF Group ID	The local RGF group ID.
RGF Peer Group ID	The remote RGF group ID associated with the local RGF group.
ICRM Group ID	The ICRM group associated with this RGF group.
APS Group ID	The APS group associated with this RGF group.
RGF State information	Redundancy state of the RGF group.
My State Present	Current redundancy state of the local RGF group.
Previous	Previous redundancy state of the local RGF group.
Peer State Present	Current redundancy state of the remote group.
Previous	Previous redundancy state of the remote group.
Communication state	Communication status of the RGF group with its peer.
RGF GET BUF	RGF allocated buffers.
RGF RET BUF	RGF freed buffers.

Related Commands

Command	Description
show rgf history	Displays information about all redundancy events logged for a particular RGF.
show rgf statistics	Displays statistics of redundancy progression events.

show rgf history

To display information about all redundancy events logged for a particular redundancy group facility (RGF) group on Multirouter Automatic Protection Switching (MR-APS)-enabled routers that support stateful Multilink PPP (MLPPP) sessions, use the **show rgf history** command in privileged EXEC mode.

show rgf history *group-id*

Syntax Description

group-id	ID of the RGF group.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(3)S	This command was introduced.

Examples

The following is sample output from the **show rgf history** command:

```
Router# show rgf history 1

00:00:35  MS > RGF Group  Created, Set to Init state
00:00:35  E > Event Go-Init, MS = Init, peer MS = None
00:00:35  P > Prog Type = Init(0), Client Resp = RGF Sent
00:00:35  P > Prog Type = Init(0), Client Resp = RGF Done
00:00:35  S > MS = Init, PS = None, peer MS = None, peer PS = None
00:01:54  MS > Got go Standby cold from APS. Waiting for Peer
00:11:43  E > Event Go-Active-fast, MS = Active-fast, peer MS = Init
00:11:43  P > Prog Type = Active Fast(1), Client Resp = RGF Sent
00:11:43  P > Prog Type = Active Fast(1), Client Resp = RGF Done
00:11:43  S > MS = Active-fast, PS = Init, peer MS = Init, peer PS = None
00:11:43  P > Prog Type = peer Standby Cold(5), Client Resp = RGF Sent
00:11:43  P > Prog Type = peer Standby Cold(5), Client Resp = RGF Done
01:16:57  MS > Got go Standby cold from APS. Waiting for Peer
01:16:57  P > Prog Type = Standby cold(2), Client Resp = RGF Sent
01:16:57  P > Prog Type = Standby cold(2), Client Resp = RGF Done
01:16:57  S > MS = Standby-cold, PS = Active-fast, peer MS = Active-fast, peer PS =
Standby-cold
01:17:29  P > Prog Type = peer Standby Bulk(6), Client Resp = RGF Sent
01:17:29  P > Prog Type = peer Standby Bulk(6), Client Resp = RGF Done
01:17:29  S > MS = Standby-bulk, PS = Standby-cold, peer MS = Active-fast, peer PS =
Standby-cold
01:22:29  E > Event Go-Standby-hot, MS = Standby-hot, peer MS = Active-fast
01:22:29  P > Prog Type = Standby hot(4), Client Resp = RGF Sent
01:22:29  P > Prog Type = Standby hot(4), Client Resp = RGF Done
```

Table 22 describes the significant fields shown in the display. Any data not described in the table is either self-explanatory or used for Cisco internal debugging.

Table 62 show rgf history Field Descriptions

Field	Description
MS	Miscellaneous String
E	Finite State Machine (FSM) Event
P	Progression Event
S	State Change

Related Commands

Command	Description
show rgf groups	Displays information about RGF groups on high availability RP-SSO and IC-SSO systems.
show rgf statistics	Displays statistics of redundancy progression events.

show rgf statistics

To display statistics of redundancy progression events of redundancy group facility (RGF) groups configured on Multirouter Automatic Protection Switching (MR-APS)-enabled routers that support stateful Multilink PPP (MLPPP) sessions, use the **show rgf statistics** command in privileged EXEC mode.

show rgf statistics

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(3)S	This command was introduced.

Examples

The following is sample output from the **show rgf statistics** command. Per group statistics is currently not available. The fields in the display are self-explanatory.

```
Router# show rgf statistics

RGF  Events                TOTAL        SINCE CLEARED
Go-Init                      1              1
Go-Active-fast               1              1
Go-Standby-cold              0              0
Go-Standby-bulk              2              2
Go-Standby-hot               1              1
Got-delete                   0              0
```

Related Commands

Command	Description
show rgf groups	Displays information about RGF groups on high availability RP-SSO and IC-SSO systems.
show rgf history	Displays information about all redundancy events logged for a particular RGF.