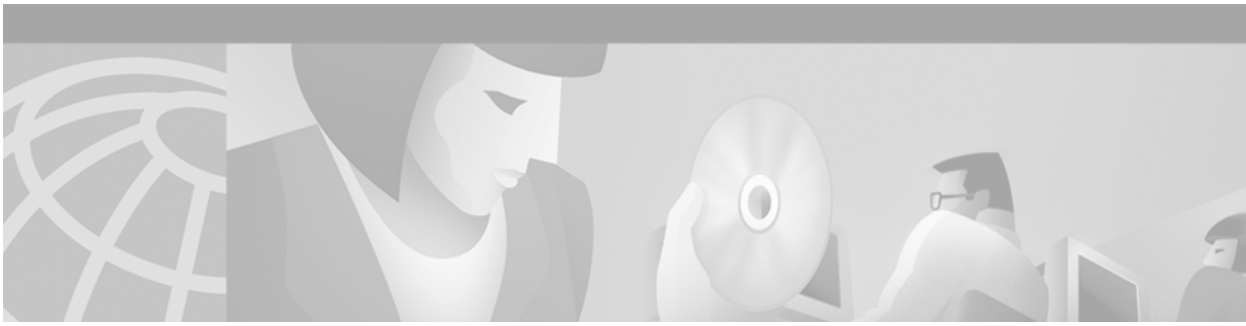


Frame Relay-to-ATM Network Interworking (FRF.5)

This feature module describes the Frame Relay-to-ATM Network Interworking (FRF.5) feature. It includes information on the benefits, supported platforms, related documents, and so on.

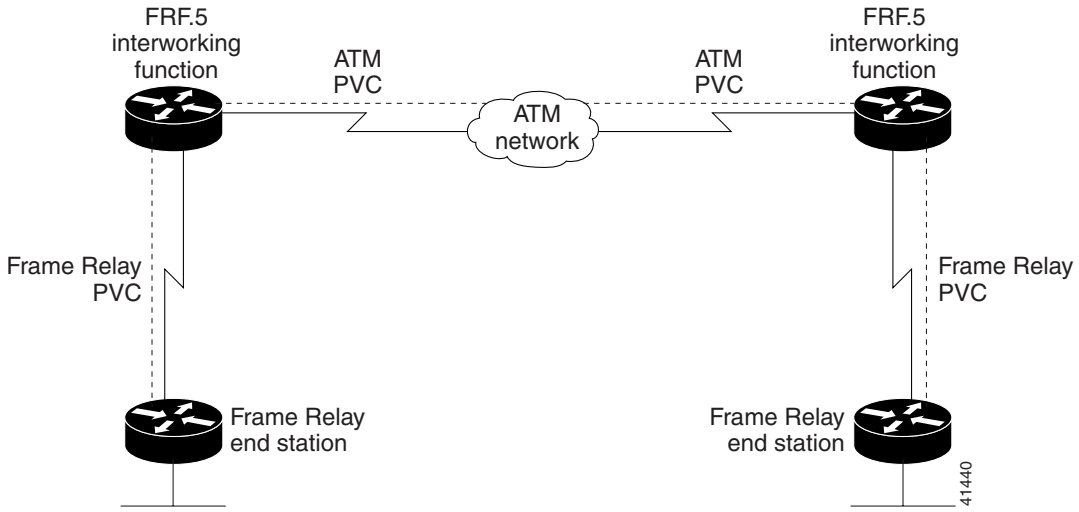
This feature module includes the following sections:

Feature Overview

To communicate over WANs, end-user stations and the network cloud typically must use the same type of transmission protocol. This limitation has prevented differing networks such as Frame Relay and ATM from being linked. However, the Frame Relay-to-ATM Network Interworking (FRF.5) feature allows Frame Relay and ATM networks to exchange data, despite differing network protocols. The functional requirements for linking Frame Relay and ATM networks are provided by the *Frame Relay/ATM PVC Network Interworking Implementation Agreement* specified in Frame Relay Forum (FRF) document number FRF.5.

FRF.5 provides network interworking functionality that allows Frame Relay end users to communicate over an intermediate ATM network that supports FRF.5. Multiprotocol encapsulation and other higher-layer procedures are transported transparently, just as they would be over leased lines. Figure 1 illustrates this concept.

Figure 1 Frame Relay-to-ATM Network Interworking (FRF.5)



FRF.5 describes network interworking requirements between Frame Relay Bearer Services and Broadband ISDN (BISDN) permanent virtual circuit (PVC) services.

Benefits

The Frame Relay-to-ATM Network Interworking (FRF.5) feature benefits Internet service providers that need to link Frame Relay and ATM networks, especially those networks with ATM backbones and Frame Relay end users.

Restrictions

Some network interworking functions defined by FRF.5 are not supported or are not implemented in Cisco IOS Release 12.1(2)T. See the "Supported Standards, MIBs, and RFCs" section for a summary of the FRF.5 standards and Cisco support for these standards in Release 12.1(2)T.

Supported Platforms

The Frame Relay-to-ATM Network Interworking (FRF.5) feature is supported on the following platforms and interfaces:

- Cisco MC3810: T1/E1 ATM interface
- Cisco 3600 series routers: OC-3 and inverse multiplexing over ATM (IMA) network modules
- Cisco 2600 series routers: OC-3 and IMA network modules
- Cisco 7200 series routers: all versions of the PA-A3 ATM port adapter

Note Cisco 7200 series routers do not currently support mapping of the ATM header bits (CLP and EFCI) into the Frame Relay header bits (SE and FECN), and vice versa.

Supported Standards, MIBs, and RFCs

Standards

This section compares the networking standards defined in Frame Relay Forum Document Number FRF.5: *Frame Relay/ATM PVC Network Interworking Implementation Agreement* with those defined for the Cisco Frame Relay-to-ATM Network Interworking (FRF.5) feature.

The following sections and subsections in this agreement are supported as follows:

- 4.1 Frame Formatting and Delimiting: Only the default (2 octet) address field is supported.
- 4.3 Connection Multiplexing: Mapping one-to-one connections between a Frame Relay data-link connection identifier (DLCI) and Frame Relay service specific convergence sublayer (SSCS) DLCI is done using the default DLCI value of 1022. Mapping many-to-one connections from Frame Relay DLCI to Frame Relay-SSCS DLCI and the other way around is user-configured (and it must be agreed upon between the two ATM end systems).
- 4.5.2.2 Frame Relay to B-ISDN Direction: Backward congestion indication is not supported.
- 5.1 Traffic Management: There is no direct mapping between Frame Relay and ATM traffic parameters; these parameters are configured independently.
- 5.2 PVC Management: PVC management is not supported.
- 5.3 Description of Upper Layer User Protocol Encapsulation Methods: This section applies only to terminal equipment and is not supported.
- 5.4.1 Operations for the Common Part of the AAL Type 5: The error counters mentioned in this section are reset at startup, and are counted until they are reset.

MIBs

None

For descriptions of supported MIBs and how to use MIBs, see the Cisco MIB web site on CCO at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

RFCs

None

Configuration Tasks

See the following sections for configuration tasks for the Frame Relay-to-ATM Network Interworking (FRF.5) feature. Each task in the list is identified as either optional or required.

- Configuring an FRF.5 One-to-One Network Interworking Connection (As Required)
- Configuring an FRF.5 Many-to-One Network Interworking Connection (As Required)

Configuring an FRF.5 One-to-One Network Interworking Connection

To configure FRF.5 encapsulation for a one-to-one connection between two Frame Relay end users over an intermediate ATM network, use the following commands beginning in global configuration command mode:

	Command	Purpose
Step 1	`Router(config)# interface serial`*number*	Configures the Frame Relay interface and enters interface configuration mode.
Step 2	`Router(config-if)# frame-relay interface-dlci` *dlci* `switched`	Configures a switched Frame Relay DLCI.
Step 3	`Router(config)# interface atm`*number*	Configures the ATM interface and enters interface configuration mode.
Step 4	`Router(config-if)# pvc` [*PVC-name*] *vpi*`/`*vci*	Creates the ATM PVC and virtual path identifier/virtual channel identifier (VPI/VCI). The VCI is a 16-bit field in the header of the ATM cell.
Step 5	`Router(config-if-atm-vc)# encapsulation aal5mux frame-relay`	Configures the ATM adaption layer (AAL) and encapsulation type for the ATM PVC.
Step 6	`Router(config)# connect` *connection-name FR-interface FR-DLCI ATM-interface ATM-PVC* `network-interworking`	Creates a connection to connect the Frame Relay DLCI to the ATM PVC and configures FRF.5 encapsulation.

Step 7	`Router(config-frf5)# clp-bit {0 | 1 | map-de}`
	or
	`Router(config-frf5)# de-bit map-clp`
		Sets the ATM cell loss priority (CLP) field in the ATM cell header.
		
		Sets discard eligible (DE) bit mapping from ATM to Frame Relay.

Step 8	`Router(config-frf5)# end`	Ends configuration mode and enters EXEC mode. Use the **exit** command to exit a submode and reenter global configuration command mode.

To disconnect the FRF.5 interworking connection, use the **shutdown** connect subcommand.

Configuring an FRF.5 Many-to-One Network Interworking Connection

To configure FRF.5 encapsulation for a many-to-one connection between two Frame Relay end users over an intermediate ATM network, use the following commands beginning in global configuration command mode:

	Command	Purpose
Step 1	`Router(config)# interface serial`*number*	Configures the Frame Relay interface and enters interface configuration mode.
Step 2	`Router(config-if)# frame-relay interface-dlci` *dlci* `switched`	Configures a switched Frame Relay DLCI.
Step 3	`Router(config)# vc-group` *group-name*	Assigns multiple Frame Relay DLCIs to a VC group.

	Command	Purpose
Step 4	`Router(config-vc-group)# FR-interface-name FR-DLCI [FR-SSCS-DLCI]`	Specifies the Frame Relay DLCIs in the VC group and maps them to the Frame Relay-SSCS DLCIs. If the optional Frame Relay-SSCS DLCI value is not specified, its value is the same as the Frame Relay DLCI.
Step 5	`Router(config)# interface atm`*number*	Configures the ATM interface and enters interface configuration mode.
Step 6	`Router(config-if)# pvc [`*PVC-name*`] `*vpi*`/`*vci*	Creates the ATM PVC and VPI/VCI. The VCI is a 16-bit field in the header of the ATM cell.
Step 7	`Router(config-if-atm-vc)# encapsulation aal5mux frame-relay`	Configures the AAL and encapsulation type for the ATM PVC.
Step 8	`Router(config)# connect` *connection-name* `vc-group` *group-name ATM-interface ATM-vpi/vci*	Creates a connection to connect the VC group to the ATM PVC.

Step 9	`Router(config-frf5)# clp-bit {0 | 1 | map-de}`
	
	or
	
	`Router(config-frf5)# de-bit map-clp`
		Sets the ATM CLP field in the ATM cell header.
		
		Sets DE bit mapping from ATM to Frame Relay.

Step 10	`Router(config-frf5)# end`	Ends configuration mode and enters EXEC mode. Use the **exit** command to exit a submode and reenter global configuration command mode.

To disconnect the FRF.5 interworking connection, use the **shutdown** connect subcommand.

Verifying Configuration

To verify correct configuration of the Frame Relay-to-ATM Network Interworking (FRF.5) feature, perform the following tasks:

Step 1 Enter the **show connect id** EXEC command to view information, including interworking parameters set, for the specified connection identifier:

```
C3640# 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
```

Step 2 Enter the **show connect port** EXEC command to view information about the connection on a specific interface:

```
C3640# show connect port atm3/0

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

Step 3 Enter the **show frame-relay pvc** EXEC command to view statistics about Frame Relay interfaces:

```
C3640# show frame-relay pvc

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

              Active     Inactive      Deleted       Static
  Local          0            0            0            0
  Switched       1            0            0            0
  Unused         0            0            0            0

DLCI = 18, DLCI USAGE = FRF.5, PVC STATUS = ACTIVE, INTERFACE =
Serial1/0

  input pkts 22             output pkts 21           in bytes 2140
  out bytes 2110            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 22
  pvc create time 02:02:49, last time pvc status changed 02:02:42
```

Step 4 Enter the **show atm pvc** EXEC command to view ATM PVCs and statistics:

```
C3640# show atm pvc

            VCD /                                          Peak  Avg/Min
Burst
Interface   Name       VPI   VCI  Type   Encaps   SC   Kbps   Kbps
Cells  Sts
3/0        10           1    32   PVC    FRATMSRV UBR
155000               UP
```

Monitoring and Maintaining Frame Relay-to-ATM Interworking

To display status of the virtual circuits and the Frame Relay-to-ATM interworking connections, use any of the following commands in EXEC mode:

Command	Purpose
Router# **show atm pvc** [**signalling** | **interface** | *vcd*]	Displays all ATM PVCs, switched virtual circuits (SVCs), and traffic information. Use the **signalling** keyword to display ATM interface signalling information for all interfaces. Use the **interface** keyword to display all PVCs and SVCs on the interface or subinterface. Use the *vcd* argument to specify the ATM VCD number (1–1023) about which to display information.
Router# **show connect** [**all** | *element* | *ID* | *name* | *port*]	Displays connection statistics. Use the optional **all** keyword to display statistics about all connections. Use the optional *element, ID*, *name*, or *port* arguments to display particular connection details.
Router# **show frame-relay pvc**	Displays statistics about Frame Relay interfaces.
Router# **show vc-group**	Displays the names of all VC groups.

Configuration Examples

This section provides the following configuration examples:

- FRF.5 One-to-One Connection Example
- FRF.5 Many-to-One Connection Example

FRF.5 One-to-One Connection Example

The following example shows how to configure an FRF.5 one-to-one connection:

```
   ;
   ; Configure a switched Frame Relay DLCI
   ;
interface serial0
    frame-relay interface-dlci 100 switched
   ;
   ; Configure ATM PVC with FRF.5 encapsulation
   ;
interface atm3/0
    pvc 0/32
        encapsulation aal5mux frame-relay
   ;
   ; Create a connection to connect Frame Relay DLCI 100 to ATM PVC 0/32
   ;
connect serial0 100 atm3/0 0/32 network-interworking
    clp-bit 1
    de-bit map-clp
```

FRF.5 Many-to-One Connection Example

The following example shows how to configure an FRF.5 many-to-one connection:

```
   ;
   ; Configure Frame Relay VC group
   ;
   ; The vc-group command assigns Frame Relay DLCI 16, 17, 18,
   ; and 19 to a VC group named 'friends'.
   ;
vc-group friends
    serial0 16 16
    serial0 17 17
    serial0 18 18
    serial0 19 19
   ;
   ; Configure ATM PVC with FRF.5 encapsulation
   ;
interface atm3/0
    pvc 0/32
        encapsulation aal5mux frame-relay
   ;
   ; Create a connection which connects VC group 'friends' to ATM PVC 0/32
   ; and configure FR DE field mapping to match ATM CLP field
   ;
connect vc-group friends atm3/0 0/32
    de-bit map-clp
```

Command Reference

This section documents the following new and modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.1 command reference publications.

- **clp-bit**
- **connect (FR-ATM)**
- **de-bit map-clp**
- **frame-relay interface-dlci switched (FR-ATM)**
- **show connect**
- **show vc-group**
- **shutdown**
- **vc-group**

clp-bit

To set the ATM cell loss priority (CLP) field in the ATM cell header, use the **clp-bit** connect submode command. To disable ATM CLP bit mapping, use the **no** form of this command.

clp-bit {**0** | **1** | **map-de**}

no clp-bit {**0** | **1** | **map-de**}

Syntax Description

0	The CLP field in the ATM cell header is always set to 0.
1	The CLP field in the ATM cell header is always set to 1.
map-de	The discard eligible (DE) field in the Frame Relay header is mapped to the CLP field in the ATM cell header.

Defaults

The default is set to **map-de**.

Command Modes

FRF.5 connect submode

Command History

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

Usage Guidelines

This command maps from Frame Relay to ATM.

Examples

The following example sets the CLP field in the ATM header to 1 for FRF.5:

```
C3640(config)# connect network-1 vc-group network-1 ATM3/0 1/35
C3640(config-frf5)# clp-bit 1
```

Related Commands

Command	Description
connect (FR-ATM)	Connects a Frame Relay DLCI or VC group to an ATM PVC.
de-bit map-clp	Sets the Frame Relay DE bit field in the Frame Relay cell header.

connect (FR-ATM)

To configure an FRF.5 one-to-one connection between two Frame Relay end users over an intermediate ATM network, or an FRF.5 many-to-one connection between two Frame Relay end users over an intermediate ATM network, use the **connect** global configuration command. To remove a connection, use the **no** form of this command.

connect *connection-name* {**vc-group** *group-name* | *FR-interface FR-DLCI*} *ATM-interface ATM-VPI/VCI* **network-interworking**

no connect *connection-name* {**vc-group** *group-name* | *FR-interface FR-DLCI*} *ATM-interface ATM-VPI/VCI* **network-interworking**

Syntax Description

connection-name	Specifies a connection name. Enter as a 15-byte maximum character string.
vc-group *group-name*	Specifies a VC group name for a many-to-one FRF.5 connection. Enter as an 11-byte maximum character string.
FR-interface	Specifies the Frame Relay interface type and number, for example, **serial1/0**.
FR-DLCI	Specifies the Frame Relay data-link connection identifier (DLCI) in the range 16 to 991.
ATM-interface	Specifies the ATM interface type and number, for example, **atm1/0**.
ATM-VPI/VCI	Specifies the ATM virtual path identifier/virtual channel identifier (VPI/VCI). If a VPI is not specified, the default VPI is 0.
network-interworking	Specifies FRF.5 network interworking. Not a valid keyword if the **vc-group** keyword is specified.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

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

Usage Guidelines

Use the **connect** command to connect a VC group to an ATM PVC or Frame Relay DLCI.

To disconnect the FRF.5 interworking connection, use the **shutdown** connect subcommand.

Examples

The following example shows how to create an FRF.5 one-to-one connection:

```
router(config)# interface serial0
router(config-if)# frame-relay interface-dlci 100 switched
router(config-if)# interface atm3/0
router(config-if)# pvc 0/32
router(config-if-atm-vc)# encapsulation aal5mux frame-relay
router(config)# connect serial0 100 atm3/0 0/32 network-interworking
router(config-frf5)# clp-bit 1
router(config-frf5)# de-bit map-clp
```

The following example shows how to create an FRF.5 many-to-one connection:

```
router(config)# interface serial0
router(config-if)# frame-relay interface-dlci 100 switched
router(config)# vc-group friends
router(config-vc-group)# serial0 16 16
router(config-vc-group)# serial0 17 17
router(config-vc-group)# serial0 18 18
router(config-vc-group)# serial0 19 19
router(config)# interface atm3/0
router(config-if)# pvc 0/32
router(config-if-atm-vc)# encapsulation aal5mux frame-relay
router(config)# connect vc-group friends atm3/0 0/32
router(config-frf5)# de-bit map-clp
```

Related Commands

Command	Description
encapsulation	Configures the AAL and encapsulation type for an ATM PVC, SVC, or VC class.
pvc	Creates an ATM PVC on a main interface or subinterface; enters interface-ATM-VC configuration mode.
vc-group	Assigns multiple Frame Relay DLCIs to a VC group.

de-bit map-clp

To set Frame Relay discard eligible (DE) bit mapping for FRF.5 network interworking, use the **de-bit map-clp** connect submode command. To disable or reset Frame Relay DE bit mapping, use the **no** form of this command.

de-bit map-clp

no de-bit map-clp

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

FRF.5 connect submode

Command History

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

Usage Guidelines

In the default state, the DE bit in the Frame Relay header is set to 1 when one or more ATM cells belonging to a frame has its cell loss priority (CLP) field set to 1, or when the DE field of the Frame Relay service specific convergence sublayer (FR-SSCS) protocol data unit (PDU) is set to 1.

When the **no de-bit map-clp** command is entered, the FR-SSCS PDU DE field is copied unchanged to the Q.922 core frame DE field, independent of CLP indications received at the ATM layer.

Examples

The following example creates a connection that connects the virtual circuit (VC) group named friends to ATM PVC 0/32 and configures FR DE field mapping to match the ATM CLP field:

```
router(config)# vc-group friends
router(config-vc-group)# serial0 16 16
router(config-vc-group)# serial0 17 17
router(config-vc-group)# serial0 18 18
router(config-vc-group)# serial0 19 19
router(config)# interface atm3/0
router(config-if)# pvc 0/32
router(config-if-atm-vc)# encapsulation aal5mux frame-relay
router(config)# connect vc-group friends atm3/0 0/32
router(config-frf5)# de-bit map-clp
```

Related Commands

Command	Description
clp-bit	Sets the ATM CLP field in the ATM cell header.
connect (FR-ATM)	Connects a Frame Relay DLCI or VC group to an ATM PVC.
vc-group	Assigns multiple Frame Relay DLCIs to a VC group.

frame-relay interface-dlci switched (FR-ATM)

To indicate that a Frame Relay data-link connection identifier (DLCI) is switched, use the **frame-relay interface-dlci switched** interface configuration command. To remove this assignment, use the **no** form of this command.

frame-relay interface-dlci *dlci* **switched**

no frame-relay interface-dlci *dlci* **switched**

Syntax Description

dlci	Specifies the Frame Relay DLCI number.

Defaults

No DLCI is assigned.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
12.1(2)T	The **switched** keyword was added for the Frame Relay-to-ATM Network Interworking (FRF.5) feature.

Usage Guidelines

This command creates an FRF.5 Frame Relay DLCI.

Examples

The following example configures serial interface 0 as a switched Frame Relay DLCI:

```
router(config)# interface serial0
router(config-if)# frame-relay interface-dlci 100 switched
router(config-fr-dlci)#
```

Related Commands

Command	Description
show frame-relay pvc	Displays statistics about Frame Relay interfaces.
show interface	Displays interface information.

show connect

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

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

Syntax Description

all	(Optional) Displays information about all Frame Relay-to-ATM Network Interworking (FRF.5) connections.
element	(Optional) Displays information about the specified connection element.
ID	(Optional) Displays information about the specified connection identifier.
name	(Optional) Displays information about the specified connection name.
port	(Optional) Displays information about all connections on an interface.

Defaults

Default state is **show connect all**.

Command Modes

EXEC

Command History

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

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:

```
C3640# 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
```

Table 1 describes the fields seen in these displays.

Table 1 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 (FR-ATM)	Connects a Frame Relay DLCI or VC group 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 vc-group	Displays the names of all VC groups.

show vc-group

To display the names of all virtual circuit (VC) groups, use the **show vc-group** EXEC command.

show vc-group [*group-name*]

Syntax Description

group-name	(Optional) Name defined by the **vc-group** command. If this argument is not specified, the names of all VC groups in the system are displayed.

Defaults

The names of all VC groups in the system are displayed.

Command Modes

EXEC

Command History

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

Examples

The following example shows the default display of the **show vc-group** EXEC command:

```
C3640# show vc-group
Name of All VC Groups:
======================
network-1
```

Related Commands

Command	Description
show atm pvc	Displays all ATM PVCs, SVCs, and traffic information.
show frame-relay pvc	Displays statistics about Frame Relay interfaces.
vc-group	Assigns multiple Frame Relay DLCIs to a VC group.

shutdown

To shut down a Frame Relay-to-ATM Network Interworking (FRF.5) connection, use the **shutdown** connect submode command. To disable disconnection, use the **no** form of this command.

shutdown

no shutdown

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

FRF.5 connect submode

Command History

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

Usage Guidelines

The FRF.5 connection must be manually shut down once the interworking connection is created by use of the **shutdown** connect subcommand.

Examples

The following example shows how to shut down an FRF.5 connection:

```
C3640(config)# connect network-2 interface serial0/1 16 atm3/0 0/32 network-interworking
. . .
C3640(config-frf5)# shutdown
```

Related Commands

Command	Description
connect (FR-ATM)	Connects a Frame Relay DLCI or VC group to an ATM PVC.

vc-group

To assign multiple Frame Relay data-link connection identifiers (DLCIs) to a virtual circuit (VC) group for Frame Relay-to-ATM Network Interworking (FRF.5), use the **vc-group** global configuration mode command. To disable the VC group assignments, use the **no** form of this command.

vc-group *group-name*

no vc-group *group-name*

This command requires the use of the following VC group subcommands to provide a map between Frame Relay DLCIs and Frame Relay-SSCS DLCIs:

VC Group Subcommands

FR-interface-name FR-DLCI [*FR-SSCS-DLCI*]

Syntax Description

group-name	A VC group name entered as an 11-character maximum string.

vc-group Subcommands Syntax Description

FR-interface-name	Frame Relay interface, for example, **serial0/0.**
FR-DLCI	Frame Relay DLCI number in the range 16 to 991.
FR-SSCS-DLCI	(Optional) Frame Relay SSCS DLCI number. Default is 1022.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

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

Usage Guidelines

This command specifies the Frame Relay DLCIs in the VC group and maps them to the Frame Relay-SSCS DLCIs. If the optional FR-SSCS DLCI value is not specified, its value is the same as the Frame Relay DLCI.

Examples

The following example shows how to configure an FRF.5 many-to-one connection. The **vc-group** command maps Frame Relay DLCI 16, 17, 18, and 19 to a VC group named friends:

```
Router(config)# vc-group friends
Router(config-vc-group)# serial0 16 16
Router(config-vc-group)# serial0 17 17
Router(config-vc-group)# serial0 18 18
Router(config-vc-group)# serial0 19 19
```

Related Commands

Command	Description
show vc-group	Displays the names of all VC groups.

Glossary

Asynchronous Transfer Mode—See ATM.

ATM—Asynchronous Transfer Mode. International standard for cell relay in which multiple service types (such as voice, video, or data) are conveyed in fixed-length (53-byte) cells. Fixed-length cells allow cell processing to occur in hardware, thereby reducing transit delays. ATM is designed to take advantage of high-speed transmission media such as E3, SONET, and T3.

data-link connection identifier—See DLCI.

DLCI—data-link connection identifier. Value that specifies a permanent virtual circuit or switched virtual circuit in a Frame Relay network. In the basic Frame Relay specification, DLCIs are locally significant (connected devices might use different values to specify the same connection).

Frame Relay—Industry-standard, switched data link layer protocol that handles multiple virtual circuits using High-Level Data Link Control encapsulation between connected devices.

IMA—inverse multiplexing over ATM. Standard protocol defined by the ATM Forum in 1997.

inverse multiplexing over ATM—See IMA.

OC-3—optical carrier signal level 3. One of a series of physical protocols defined for SONET optical signal transmissions.

optical carrier signal level 3—See OC-3.

permanent virtual circuit—See PVC.

PVC—permanent virtual circuit. Virtual circuit that is permanently established. PVCs save bandwidth associated with circuit establishment and tear down in situations where certain virtual circuits must exist all the time. In ATM terminology, called a permanent virtual connection.

service specific convergence sublayer—See SSCS.

SSCS—service specific convergence sublayer. One of the two sublayers of any ATM adaption layer (AAL). SSCS, which is service-dependent, offers assured data transmission.

SVC—switched virtual circuit. Virtual circuit that is dynamically established on demand and is torn down when transmission is complete. SVCs are used in situations where data transmission is sporadic. In ATM terminology, called a switched virtual connection.

switched virtual circuit—See SVC.