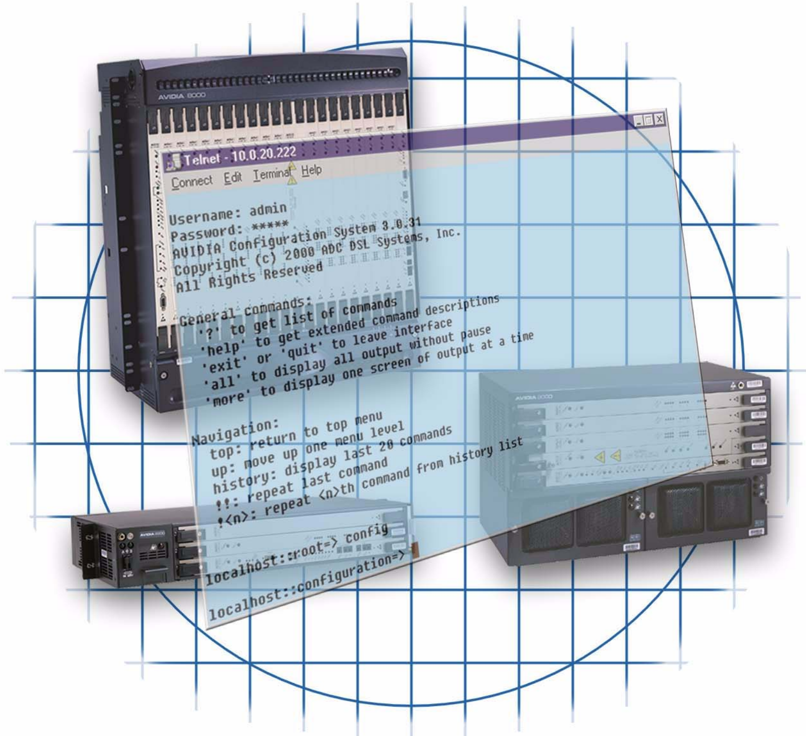
Avidia System Configuration User Manual

SwitchWare Version 3.0.78



Copyright

Trademark Information

Disclaimer of Liability

ABOUT THIS GUIDE

This *Avidia Configuration User Manual* provides information about how to set up and manage system-level configuration for an ADC ® Avidia® system using the SwitchWare™ command-line interface. The system level configuration includes:

- setting up line and alarm profiles, then configuring the ports for Avidia subscriber cards
- setting up line and alarm profiles, then configuring the ports for Avidia network cards
- setting up subtending
- setting up Inverse Multiplexing for ATM (IMA)
- setting up ATM connections (traffic and policing), including redundancy
- setting up ATM dynamic and static routing
- setting up Frame Relay interworking (FRF.5 or FRF.8) for IDSL transmission
- setting up bridging and routing services

This guide is part of a documentation set for Avidia SwitchWare. Other documents in the set include:

Document Title	ADC Part Number	Description
Avidia Getting Started Guide	1234960	Provides information about how to use the SwitchWare command-line interface to fully configure and manage an Avidia system. This guide also provides steps to assign an IP address to the Avidia system, and placing it on a management network, that must be completed before you can begin configuring services.
Avidia System Administrator Guide	1235000	Enables a system administrator to set up security for system users, as well as configure system parameters for an Avidia system.
Avidia System Fault Management User Manual	1235006	Describes how to access statistical and fault information about an Avidia system. It also provides information on setting up for datapath loopbacks tests or running ATM loopback tests.
Avidia System Technology and Applications Overview	1235008	Provides an overview of Avidia technology and describes how to implement Avidia applications using the SwitchWare or StarGazer interfaces.
Glossary	1183214	Defines Avidia terminology.

INTENDED PURPOSE

This documentation set is intended for use by someone responsible for configuring and maintaining Avidia systems. A basic understanding of voice and data communications, including xDSL and ATM technologies, is necessary.

Also, the Avidia system must be completely installed and operational to complete configuration. Refer to the appropriate documentation for each Avidia system (AV8000, AV6000, AV3000, or AV2200) for installation and startup instructions.

DOCUMENT CONVENTIONS

The following conventions are used in the Avidia SwitchWare documentation.

This convention:	Indicates:
Bold Courier	A command to be typed exactly as shown.
Unbolded Courier	Onscreen messages or prompts.
Italic	The format in which you type the information specified in the procedure.
<Angle brackets>	A parameter for which you need to provide an appropriate value.
[Square brackets]	An optional parameter.
[<Angle brackets within square brackets>]	An optional parameter that, should you opt to include it, requires you to provide an appropriate value.
(**Multiple|Values**)	Select one of the values for that parameter. These parameters are in parenthesis separated by a vertical line. However, parentheses may also contain parameters for which you need to provide a value. For example, (**all|**<port>) indicates that you can type all to view all ports or type a port number to view only a specific port.
[**-admin** (**up|down**)]	Some optional parameters contain both a command and a parameter for which you need to select from a finite set of values. For example, [**-admin** (**up|down**)] requires you to type **-admin up** or **-admin down**, should you choose to include the parameter. Optional parameters follow the required parameters in the command line, and can be included in any order.

See the *Avidia Getting Started Guide* for more information on using the command-line interface.

Command Path Navigation

For each command that provides configuration or management of an Avidia system, a path is provided in the applicable section of the user document to help locate that command in the command-line interface structure. The path will be displayed in a box, as shown below, prior to the description of the command.

```
::root=> configuration snmp community
```

In the example above, the command is issued at the root level of the command-line interface and results in navigating to the path for community. The result is shown below:

::community=>

Avidia Management Tools and Protocols

Avidia systems use the following management tools and protocols, which enable you to perform management tasks such as system configuration and performance monitoring:

- SNMP (Simple Network Management Protocol)
- TFTP (Trivial File Transfer Protocol)
- FTP (File Transfer Protocol)
- Telnet (for remote access to the command-line interface)
- MIBs (Management Information Base)
- Traps

TABLE OF CONTENTS

ACCESSING AND SELECTING AVIDIA SYSTEM CONFIGURATION

1

This document provides instructions and a recommended progression for configuring an Avidia system using the SwitchWare command-line interface. An Avidia system comprises a chassis, cards, and operational software. A suite of Avidia chassis are offered for deployment in a central office, a service provider environment, or remote deployment. A wide selection of network and subscriber cards are offered, to complete the Avidia system.

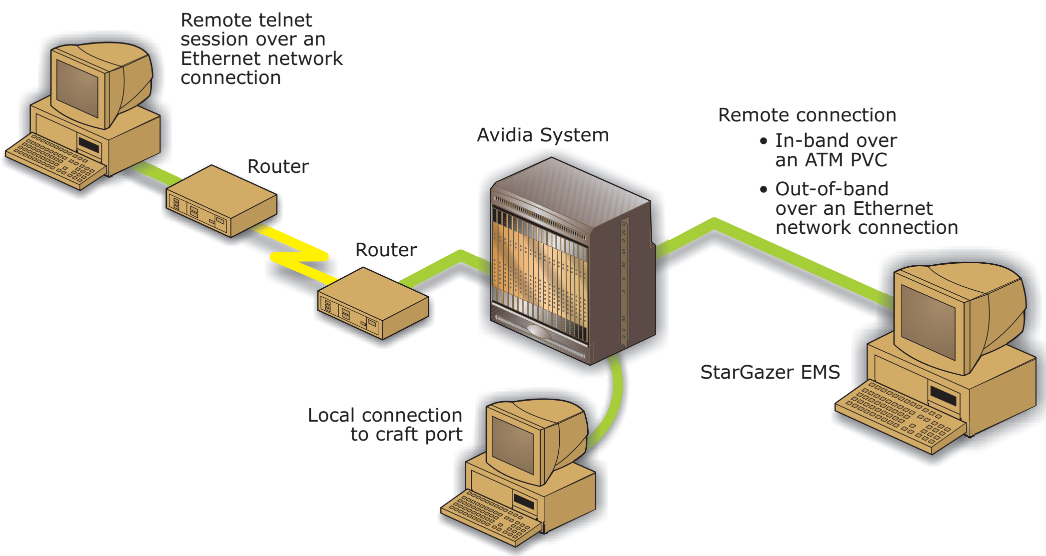
There are also sections providing instruction for accessing and logging on an Avidia system as well as indicating a general order that you can follow to configure an Avidia system.

ACCESSING AN AVIDIA SYSTEM FOR CONFIGURATION

The operational software for an Avidia system is SwitchWare, which resides on the Avidia management card and system cards. The SwitchWare software is accessed through a command-line interface to configure and manage an Avidia system.

The command-line interface can be accessed on an Avidia system locally through a serial interface to the craft port on the management card or through a telnet session as shown below. The command-line interface modifies and views the Avidia Management Information Base (MIB) objects to implement system configuration and management. See the *Avidia System Administration Guide* for more information on how the Avidia SwitchWare software is structured and for recommendations on software file backup and maintenance procedures.

Additionally, Avidia systems can also be configured and managed through an Element Management System (EMS) such as StarGazer. The EMS uses SNMP to modify and view the Avidia MIB objects. Refer to the StarGazer user documentation for information on setting up and using StarGazer.



LOGGING ON THE COMMAND-LINE INTERFACE

In addition to logging on an Avidia system locally through the management card craft port, the following number of remote users can log on through a telnet session:

- up to four additional remote users to an Avidia system using an AV220 FAMC
- one additional remote user to an Avidia system using an AV210 AMC

The following example shows how to access the SwitchWare command-line interface using a telnet session from a remote system. Specify either the management card default IP address or a new IP address you previously set up (see either the *Avidia System Administrator Guide* or the *Avidia Getting Started Guide* for information on changing the IP address):

```
C:\users\default>telnet 192.168.0.1
```

When you successfully log on the Avidia system SwitchWare command-line interface, the information shown below is displayed. Log on with the default username (**admin**) and default password (**dslam**) or with the user account information assigned to you (see the *Avidia System Administrator Guide* for information on how to set up new accounts). The CLI Session indicates the logon session to which you have connected.

```
Username: admin
Password: *****
CLI Session 1

AVIDIA Configuration System 3.0.78
Copyright (c) 2002 ADC DSL Systems, Inc.
All Rights Reserved

General commands:
  '?' to get list of commands
  'help' to get extended command descriptions
  'exit' or 'quit' to leave interface
  'all' to display all output without pause
  'more' to display one screen of output at a time

Navigation:
  top: return to top menu
  up: move up one menu level
  history: display last 20 commands
  !!: repeat last command
  !<n>: repeat <n>th command from history list

::root=>
```

Also, the command-line interface Inactivity Timer automatically logs the current user off if the keyboard remains inactive for five minutes. To change the length of the Inactivity Timer, see the *Avidia System Administrator Guide* for “Setting the Timeout Option.” The timeout is unique to each session (serial port or telnet).

Logging Off the Command-Line Interface

To log off the command-line interface, enter **exit** or **quit** at any prompt. Also, a user is automatically logged off the command-line interface if there is no keyboard input for a specified time period as defined by the Inactivity Timer (default is five minutes). See the *Avidia System Administrator Guide* to change the Inactivity Timeout setting.

Setting Up Service on an Avidia System

- ❑ When initially setting up an Avidia system (AV8000, AV6000, or AV3000), connect to the craft port on the management card to set the IP address and subnet for Ethernet access. After completing this, you can set up system parameters and service through the command-line interface or through the StarGazer EMS. See the *Avidia Getting Started Guide* for procedures on initially setting up an Avidia system.

  For setting up service on a remote AV2200 system, see Chapter 4, “Configuring Subtended Systems” on page 107.

- ❑ Configure administrative tasks and system parameters using the *Avidia System Administrator Guide.* Examples of administrative configuration are:

  - setting up system boot parameters, and determining your housekeeping process for the Avidia SwitchWare software
  - managing Avidia system security by setting up users with security levels and passwords
  - setting system times, polling interval, names, contacts, and more
  - setting up trap generation status and trap receivers
  - setting up system clocking

- ❑ Configure subscriber services for ADSL, G.shdsl, SDSL cell, SDSL frame, or IDSL cards by setting up the physical ports for the subscriber cards, including:

  - line profiles
  - alarm profiles
  - handshaking (ADSL only)
  - port configuration
  - subscriber names (SDSL frame and IDSL only)

Refer to the following paragraphs for configuration unique to the SDSL frame or IDSL card. Setting up service for these frame-based technologies requires a slightly different process than setting up service for cell-based technologies.

For SDSL frame, do the following:

- Set up the line profile, alarm profile, and the port for the SDSL frame card.
- Provision service for the SDSL frame card. Configure the ports (includes selecting the SDSL frame line profile and SDSL frame alarm profile for each port).
- Create a VCC from the network card to the SDSL frame card.
- Configure a session to set the service and encapsulation types for the VCC. The available encapsulation types depend upon the service type you select and both encapsulation and service type must match the modem encapsulation type.

For IDSL frame, do the following:

- Create one or more IDSL line profiles.
- Create one or more IDSL alarm profiles.
- Configure service for the IDSL frame card ports, including selecting the IDSL card transmit clock source.
- Select either VCC or Frame Relay to match the modem. For example, if you are using a WebRamp 450i modem configured with Ramp1483 service type, configure an VCC using ramp1483 encapsulation type. If the WebRamp 450i modem is configured for Frame Relay, you need to set up Frame Relay service.

❑ Configure network services for OC3, DS3 1-port- or 4-port, DS1/DSX-1, or E1 cards by setting up the physical ports for the network cards. When setting up service for a DS1 or E1 card in a remote AV2200 system, set up a subtending management relationship. The configuration includes:

- subtending (for a DS1 or E1 card in a remote AV2200 system)
- line profiles
- alarm profiles
- port configuration
- port redundancy (when applicable)

In a remote AV2200 chassis, the DS1 or E1 card provides management functions as well as network uplinks (eight ports). You must first set up a subtending management connection between the AV2200 system and another Avidia system before you can complete other configuration. For information on configuring a management subtending connection, see Chapter 4, “Configuring Subtended Systems” on page 107. Once the system is subtended, you can use inband management for configuration.

- ❑ Configure IMA. If you set up IMA on the management card in an AV2200 chassis, carefully review the IMA configuration section for special set up requirements when implementing a subtending management connection.
- ❑ Configure ATM traffic profiles and other traffic parameters.
- ❑ Configure ATM system parameters that include setting up the ATM address, enabling system capabilities that will be used with IISP or PNNI such as routing and signalling, and more.
- ❑ When applicable, configure ATM static routing using IISP or dynamic routing using PNNI.

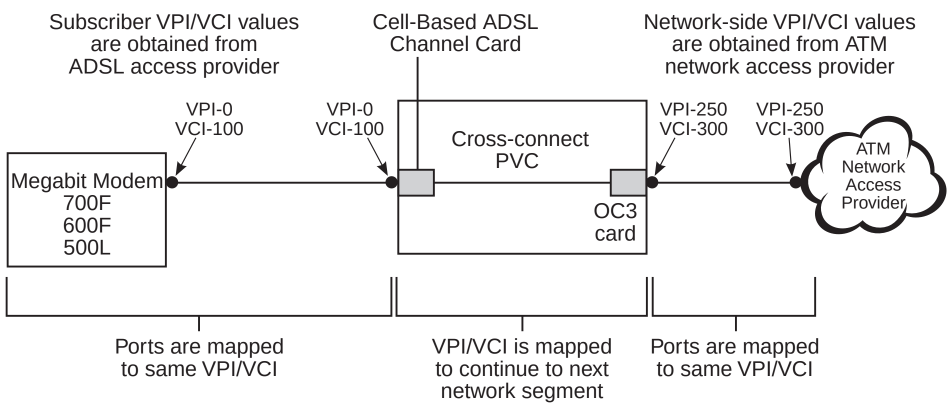
  For more information about the process of setting up a PNNI network for dynamic ATM routing, see the *Avidia System Technology and Applications Overview*.

- ❑ Configure permanent connections (PVPCs or PVCCs), including connection redundancy for backup, or configure SPVCs for IISP or PNNI routing, and assign traffic profiles.

  Before configuring ATM connections, ensure that the following was set up:

  - xDSL and network card service for the ports to be configured
  - ATM traffic profiles (for ADSL, set up both upstream and downstream traffic)

  Map the ATM virtual circuits to be configured, including the VPIs and VCIs to be assigned, verifying the values with the preceding tables. The following illustration shows an example of a configured PVC, including the specific VPI and VCI values associated with each segment of the connection.



- ❑ Configure Bridging/Routing sessions over PVCs for both IP/Ethernet uplink services and for inband management.
- ❑ Perform monitoring and diagnostics as required after you have set up your system.

CONFIGURING SUBSCRIBER SERVICES 2

This chapter describes how to configure xDSL services. Go to the following sections for more information.

SETTING UP ADSL SERVICE

To fully configure an ADSL port and set up service, complete the following in the order shown:

- ❑ Set up the ADSL line profile (see “Adding ADSL Line Profiles” on page 8).
- ❑ Set up the ADSL alarm profile (see “Adding ADSL Alarm Profiles” on page 12).
- ❑ Set up the handshaking mode for the ADSL port to comply with either ANSI or ITU standards (see “Configuring ADSL Handshaking” on page 16).
- ❑ Set up the ADSL port (see “Configuring the ADSL Port” on page 19).

Configuring ADSL Line Profiles

ADSL line profiles contain a preconfigured set of parameters, including the transmit rate, rate adaptation mode, target margin, and interleave delay. ADSL port configuration requires you to apply an ADSL line profile to the line, therefore you must configure the ADSL line profile before configuring the ADSL port. A default profile exists with an index of 1. You cannot delete the default profile.

Adding ADSL Line Profiles

```
::root=> configuration adsl profile line
```

From the `::line=>` prompt, enter the new command in one of the following formats to create a new ADSL line profile. The profile is automatically assigned the next available index number in the ADSL line profile table.

new fixed <margin> <upstream delay> <downstream delay>
<maximum upstream rate> <maximum downstream rate>

new adaptive <margin> <upstream delay> <downstream delay>
<maximum upstream rate> <maximum downstream rate>
<minimum upstream rate> <minimum downstream rate>

Parameters

(**fixed|adaptive**)

The form of transmit rate adaptation:

- **fixed**—The loop must be able to come up at the specified maximum upstream and downstream rate, or it does not come up at all.
- **adaptive**—The loop will come up at the highest achievable rate that is greater than the specified minimum upstream rate and less than the maximum upstream rate. This adaptation occurs at startup only.

`<margin>`

The upstream target signal-to-noise margin in decibels that the modem must achieve with a BER of 10^{-7} or better to successfully complete initialization. The margin value is typically 6 db. A lower margin may result in a higher data rate, but increases noise on the line.

`<upstream delay>`

The upstream interleave delay, in milliseconds. This specifies the delay between consecutive data bits. Larger delays improve noise immunity but reduce transmission speeds. A delay of 16 milliseconds is ideal for maximum noise immunity. However, a delay of 4 to 6 milliseconds is recommended for maximum transmission speed.

`<downstream delay>`

The downstream interleave delay, in milliseconds. This specifies the delay between consecutive data bits. Larger delays improve noise immunity but reduce transmission speeds. A delay of 16 milliseconds is ideal for maximum noise immunity. However, a delay of 4 to 6 milliseconds is recommended for maximum transmission speed.

`<maximum upstream rate>`

The maximum upstream transmit rate, in kbps. Enter a number from 64 to 928 kbps, in increments of 32 kbps. This is the highest transmission rate to which the modem can adapt for all lines to which the profile is applied. Upstream direction is from the modem to the ADSL card.

`<maximum downstream rate>`

The maximum downstream transmit rate, in kbps. Enter a number from 64 to 7552 kbps, in increments of 32 kbps. This is the highest transmission rate to which the modem can adapt for all lines to which the profile is applied. Downstream direction is from the ADSL card to the modem.

`<minimum upstream rate>`

(Use with **adaptive** only.) The minimum upstream transmit rate, in kbps. Enter a number from 64 to 928 kbps, in increments of 32 kbps. This is the lowest transmission rate to which the modem can adapt for all lines to which the profile is applied.

`<minimum downstream rate>`

(Use with **adaptive** only.) The minimum downstream transmit rate, in kbps. Enter a number from 64 to 7552 kbps, in increments of 32 kbps. This is the lowest transmission rate to which the modem can adapt for all lines to which the profile is applied.

Examples

```
::line=> new fixed 4 6 4 928 7552
::line=> new adaptive 4 6 4 928 7552 64 64
```

Displaying ADSL Line Profiles

```
::root=> configuration adsl profile line
```

From the `::line=>` prompt, enter the show command in one of the following formats.

```
show
show [<index>]
```

Parameter

`[<index>]`

The ADSL line profile table index number of the profile you want to display. Omitting this parameter displays the entire ADSL line profile table.

Examples

```
::line=> show
::line=> show 2
```

The following example illustrates both adsl profile line show commands.

```
::line=> show

                     UpStream                          DownStream
 Index  Mode        Mgn  MinTx  MaxTx  Delay     Mgn  MinRx  MaxRx  Delay
 -----  --------    ---  -----  -----  -----     ---  -----  -----  -----
     1  adaptive    4.0     64    928      4     4.0     64   7552      4
     2  fixed       0.0    N/A    928      8     1.0    N/A   7552      8
     3  fixed       0.0    N/A    928      4     4.0    N/A   7552      4

::line=> show 2

                     UpStream                          DownStream
 Index  Mode        Mgn  MinTx  MaxTx  Delay     Mgn  MinRx  MaxRx  Delay
 -----  --------    ---  -----  -----  -----     ---  -----  -----  -----
     2  fixed       0.0    N/A    928      8     1.0    N/A   7552      8

::line=>
```

Deleting ADSL Line Profiles

`::root=> configuration adsl profile line`

1. From the `::line=>` prompt, enter **`show`** to display the ADSL line profile table.
2. Note the index number of the ADSL line profile you want to delete.

You cannot delete profiles that are assigned to ports.

3. Enter the delete command in the following format.

   `delete` `<index>`

Parameter

`<index>`

The index number of the ADSL line profile you want to delete.

Example

`::line=>` **`delete 2`**

Configuring ADSL Alarm Profiles

ADSL alarm profiles determine the conditions that generate SNMP traps. When the configured thresholds are met or exceeded, the SNMP agent sends a trap to the configured trap receiver(s). Only one trap is sent for each 15-minute data collection period. ADSL port configuration requires assigning an alarm profile, therefore you must configure the alarm profile prior to configuring the ADSL port. A default profile exists with an index of 1. You cannot delete the default profile.

Adding ADSL Alarm Profiles

```
::root=> configuration adsl profile alarm
```

From the `::alarm=>` prompt, enter the new command in the following format to create a new ADSL alarm profile. The profile is automatically assigned the next available index number in the ADSL alarm profile table.

new `<ulof> <ulos> <ues> <dlof> <dlos> <des>`

Parameters

`<ulof>`

Upstream loss of frame threshold. This threshold determines the acceptable number of seconds in a 15-minute data collection period during which the frames lose sync on the ADSL interface. In a normal environment with sufficient margin, a typical loss of frame threshold value is 10. A value of `0` disables the alarm.

`<ulos>`

Upstream loss of signal threshold. The loss of signal threshold determines the acceptable number of seconds in a 15-minute ADSL performance data collection period during which the line power falls below the target margin threshold. In a normal environment with sufficient margin, a typical loss of signal threshold value is 10. A value of `0` disables the alarm.

`<ues>`

Upstream errored seconds threshold. This threshold is the acceptable number of seconds in a 15-minute data collection period during which errors occur on the ADSL interface that prevent the payload from being corrected. In a normal environment with sufficient margin, a typical errored seconds threshold value is 10. A value of `0` disables the alarm.

`<dlof>`

Downstream loss of frame threshold. This threshold determines the acceptable number of seconds in a 15-minute data collection period during which the frames lose sync on the ADSL interface. In a normal environment with sufficient margin, a typical loss of frame threshold value is 10. A value of `0` disables the alarm.

`<dlos>`

Downstream loss of signal threshold. The loss of signal threshold determines the acceptable number of seconds in a 15-minute ADSL performance data collection period during which the line power falls below the target margin threshold. In a normal environment with sufficient margin, a typical loss of signal threshold value is 10. A value of `0` disables the alarm.

`<des>`

Downstream errored seconds threshold. This threshold is the acceptable number of seconds in a 15-minute data collection period during which errors occur on the ADSL interface that prevent the payload from being corrected. In a normal environment with sufficient margin, a typical errored seconds threshold value is 10. A value of `0` disables the alarm.

Example

```
::alarm=> new 10 10 10 10 10 10
```

Displaying ADSL Alarm Profiles

`::root=> configuration adsl profile alarm`

From the `::alarm=>` prompt, enter the show command in one of the following formats.

show

show [<index>]

Parameter

[<index>]

The ADSL alarm profile table index number of the profile you want to display. Omitting this parameter displays the entire ADSL alarm profile table.

Examples

::alarm=> **show**

::alarm=> **show 2**

The following example illustrates both show alarm commands.

```
::alarm=> show

               UpStream                                  DownStream
 Index        LOFs       LOSs        ESs         LOFs        LOSs        ESs
     1           0          0          0            0           0          0
     2           1          0          0            0           0          0

::alarm=> show 2

               UpStream                                  DownStream
 Index        LOFs       LOSs        ESs         LOFs        LOSs        ESs
     2           1          0          0            0           0          0

::alarm=>
```

Deleting ADSL Alarm Profiles

::root=> configuration adsl profile alarm

1 From the ::alarm=> prompt, enter **show** to display the configured ADSL alarm profiles.

2 Note the index number of the profile you want to delete.

You cannot delete profiles that are assigned to ports.

3 Enter the delete command in the following format.

delete <index>

Parameter

<index>

The index number of the alarm profile you want to delete.

Example

::alarm=> **delete 3**

Configuring ADSL Handshaking

The ADSL handshaking and line code parameters provide compatibility with a wide range of modems. The selected handshaking protocol determines the line code options available.

- If handshaking is set to t1.413, the line code is automatically set to t1.413.
- If handshaking is set to g.hs, you can set the line code to either g.lite or g.dmt using the force command.

Setting Handshaking Parameters

```
::root=> configuration adsl handshake
```

From the `::handshake=>` prompt, enter the set command in the following format.

set `<port>` (**g.hs**|**t1.413**) [**-force** (**g.lite**|**g.dmt**)]

Parameters

(**g.hs**|**t1.413**)

The handshaking mode for the port. Select either g.hs (ITU standard) or t1.413 (ANSI standard). When selecting t1.413 handshaking mode, do not select a line code in the [**-force** (**g.lite**|**g.dmt**)] parameter.

[**-force** (**g.lite**|**g.dmt**)]

The line code setting for the port. When g.hs is the handshake mode, you can select either g.lite or g.dmt for the line code. G.dmt is full-rate ADSL, providing a transmission rate up to 7.552 Mbps. G.lite is a reduced rate, using approximately half of the DMT channels with a reduced transmitter power level. If you do not use the force command, the default line code is both G.dmt and G.lite. The port will use either G.dmt or G.lite after detecting what the modem connected to the port is using for line coding.

Example

```
::handshake=> set 5.1 g.hs -force g.lite
```

Displaying Handshaking Parameters

`::root=> configuration adsl handshake`

From the `::handshake=>` prompt, enter the show command in one of the following formats.

`show`

`show` `[<port>]`

Parameter

`[<port>]`

The port for which you want to display the handshaking parameters (format *slot.port*). Omitting this parameter displays the parameters for all configured ADSL channels.

Examples

`::handshake=>` **`show`**

`::handshake=>` **`show 9.2`**

The following example illustrates both handshake show commands.

```
::handshake=> show
 Port        Protocol        Standard
 9.1        T1.413             T1.413
 9.2        T1.413             T1.413
 9.3        T1.413             T1.413
 9.4        T1.413             T1.413
 9.5        T1.413             T1.413
 9.6        T1.413             T1.413
 9.7        T1.413             T1.413
 9.8        T1.413             T1.413
 9.9        T1.413             T1.413
 9.10       T1.413             T1.413
 9.11       T1.413             T1.413
 9.12       T1.413             T1.413
 9.13       T1.413             T1.413
 9.14       T1.413             T1.413
 9.15       T1.413             T1.413
 9.16       T1.413             T1.413
 9.17       T1.413             T1.413
 9.18       T1.413             T1.413
 9.19       T1.413             T1.413
 9.20       T1.413             T1.413
 9.21       T1.413             T1.413

Press ’Return’ or ’Enter’ to continue or ’q’ to quit ....

::handshake=> show 9.2
 Port        Protocol        Standard
 9.2        T1.413             T1.413

::handshake=>
```

Configuring the ADSL Port

Apply the line and alarm profiles that you previously set up when you configure service on an ADSL port.

Adding ADSL Port Configurations

```
::root=> configuration adsl
```

Each ADSL port is automatically assigned a default configuration of 1, the default profile index number for each adsl profile type. This procedure describes how to set up the port configuration for the appropriate service.

1 Select the appropriate line profile by doing the following.

- **a** From the `::adsl=>` prompt, enter the following command to display the `::line=>` prompt.

  `profile line`

- **b** Enter **`show`** to display the configured line profiles.
- **c** Note the index number of the line profile you want to assign to the port.

2 Select the appropriate alarm profile by doing the following.

- **a** From the `::adsl=>` prompt, enter the following command to display the `::alarm=>` prompt.

  `profile alarm`

- **b** Enter **`show`** to display the configured alarm profiles.
- **c** Note the index number of the alarm profile you want to assign to the channel.

3 From the `::adsl=>` prompt, enter the set command in the following format.

`set` `<port> <lpindex> <apindex> (`**`up|down`**`)`

Parameters

`<port>`

The subscriber slot and port number, in the format *slot.port*, for the ADSL card port you will configure.

`<lpindex>`

The line index number from Step 1 on page 19 you want to assign to this channel.

`<apindex>`

The alarm index number from Step 2 on page 19 you want to assign to this channel.

(**up**|**down**)

The administrative status of the line. **Up** activates the port. **Down** deactivates the port.

Example

```
::adsl=> set 4.2 3 6 up
```

Displaying ADSL Port Configurations

```
::root=> configuration adsl
```

From the `::adsl=>` prompt, enter the show command in one of the following formats.

show

show [<port>]

Parameter

[<port>]

The port for which you want to display the configuration (format *slot.port*). Omitting this parameter displays the configurations for all configured ADSL channels.

Examples

`::adsl=>` **`show`**

`::adsl=>` **`show 9.2`**

The following example illustrates both show adsl commands. In addition to displaying the configured parameters, it also displays the line coding and line type.

```
::adsl=> show

                                                 Line      Alarm       Admin
 Port    Coding   Type                           Profile   Profile    Status
 -----   ------   ------------------------      -------   -------    -------
 9.1     DMT      interleaved                         1         1         up
 9.2     DMT      interleaved                         1         1         up
 9.3     DMT      interleaved                         1         1         up
 9.4     DMT      interleaved                         1         1         up
 9.5     DMT      interleaved                         1         1         up
 9.6     DMT      interleaved                         1         1         up
 9.7     DMT      interleaved                         1         1         up
 9.8     DMT      interleaved                         1         1         up
 9.9     DMT      interleaved                         1         1         up
 9.10    DMT      interleaved                         1         1         up
 9.11    DMT      interleaved                         1         1         up
 9.12    DMT      interleaved                         1         1         up
 9.13    DMT      interleaved                         1         1         up
 9.14    DMT      interleaved                         1         1         up
 9.15    DMT      interleaved                         1         1         up
 9.16    DMT      interleaved                         1         1         up
 9.17    DMT      interleaved                         1         1         up
 9.18    DMT      interleaved                         1         1         up
 9.19    DMT      interleaved                         1         1         up

Press 'Return' or 'Enter' to continue or 'q' to quit .... q

::adsl=> show 9.2
                                                 Line      Alarm       Admin
 Port    Coding   Type                           Profile   Profile    Status
 -----   ------   ------------------------      -------   -------    -------
 9.2     DMT      interleaved                         1         1       down

::adsl=>
```

Setting Up G.shdsl Service

To fully configure a G.shdsl port and set up service, complete the following in the order shown:

- ❑ Set up the G.shdsl line profile (see “Adding G.shdsl Line Profiles” on page 22).
- ❑ Set up the G.shdsl alarm profile (see “Adding G.shdsl Alarm Profiles” on page 26).
- ❑ Set up the G.shdsl port (see “Configuring the G.shdsl Port” on page 30).

Configuring G.shdsl Line Profiles

G.shdsl line profiles contain a preconfigured set of parameters, including the profile name, minimum and maximum transmission rates, and the Annex to which the transmission complies. G.shdsl port configuration requires you to apply a G.shdsl line profile to the line. Configure the G.shdsl line profile before configuring the G.shdsl port. A default profile exists with a profile name of DEFVAL. You cannot delete the default profile.

Adding G.shdsl Line Profiles

```
::root=> configuration gshdsl profile line
```

From the `::line=>` prompt, enter the new command in the following format to create a new G.shdsl line profile.

new `<profilename>  <min_rate>  <max_rate>  <mode>`

Parameters

`<profilename>`

The literal name and identifier for this profile to make it easily distinguished from other profiles you set up. The default profile name is DEFVAL and cannot be deleted. Use any combination of alphanumeric characters, with a maximum of 32. You can also use an underscore to join two words as one name (for example, basic_rate). The profile name is case-sensitive.

When the minimum line rate equals the maximum line rate, the line rate is considered fixed rate. When the minimum line rate is less than the maximum line rate, the line rate is considered rate-adaptive.

`<min_rate>`

The minimum transmission rate, in kbps, for DSL synchronization between the G.shdsl card in a chassis and a G.shdsl modem. The valid range supported by the G.shdsl card is from 192 to 2,304 kbps, in increments of 64 kbps. The specified rate must also be supported by the remote modem. See the remote modem documentation to verify supported data rates.

`<max_rate>`

The maximum transmission rate, in kbps, for DSL synchronization between the G.shdsl card in a chassis and a G.shdsl modem. The valid range supported by the G.shdsl card is from 192 to 2,304 kbps, in increments of 64 kbps. The specified rate must also be supported by the remote modem. See the remote modem documentation to verify supported data rates.

`<mode>`

The Annex specifications and conditions to which the G.shdsl transmission will comply. The choices include:

- Enter 1 for Annex A. Use Annex A for G.shdsl systems operating under conditions typically found within North American networks.
- Enter 2 for Annex B. Use Annex B for G.shdsl systems operating under conditions typically found within European networks.

Example

```
::line=> new basic_rate 512 2048 2
```

Displaying G.shdsl Line Profiles

::root=> configuration gshdsl profile line

From the `::line=>` prompt, enter the show command in one of the following formats.

- **show**
- **show** [<profilename>]

Parameter

[<profilename>]

The name of G.shdsl profile you want to display. Omit this parameter to display the entire G.shdsl line profile table (all configured line profiles).

Examples

::line=> **show**

::line=> **show basic_rate**

The following example illustrates both show line profile commands.

```
::line=> show

                    Profile_Name   Min_Rate   Max_Rate   Mode
 -------------------------------   --------   --------   ----
                          DEFVAL        192       2304      2
                      basic_rate        384       2048      1

::line=> show basic_rate

                    Profile_Name   Min_Rate   Max_Rate   Mode
 -------------------------------   --------   --------   ----
                      basic_rate        384       2048      1

::line=>
```

Deleting G.shdsl Line Profiles

```
::root=> configuration gshdsl profile line
```

1. From the `::line=>` prompt, enter **`show`** to display the G.shdsl line profile table.
2. Note the profile name of the G.shdsl line profile you want to delete.

You cannot delete profiles that are assigned to ports.

3. Enter the delete command in the following format.

   delete <profilename>

Parameter

<profilename>

The profile name of the G.shdsl line profile you want to delete. This parameter is case sensitive.

Example

::line=> **delete basic_rate**

Configuring G.shdsl Alarm Profiles

G.shdsl alarm profiles determine the conditions that generate SNMP traps and Bellcore alarms. When the configured thresholds are met or exceeded, the SNMP agent sends a trap to the configured trap receiver(s) and generates the appropriate alarm. Only one trap is sent for each 15-minute data collection period. You must configure the alarm profile prior to configuring the G.shdsl port. A default profile exists with an index of 1. You cannot delete the default profile.

Adding G.shdsl Alarm Profiles

```
::root=> configuration gshdsl profile alarm
```

To create a new G.shdsl alarm profile, from the `::alarm=>` prompt, enter the new command in the following format (the profile is automatically assigned the next available index number in the G.shdsl alarm profile table):

```
new <profilename> <threshAttn> <threshSNR> <threshES>
<threshCRC> <threshLOSWS> <threshUAS>
```

Parameters

`<profilename>`

The case sensitive literal name and identifier for this alarm profile to make it easily distinguished from other alarm profiles you set up. The default alarm profile name is DEFVAL and cannot be deleted. Use any combination of up to 32 alphanumeric characters. You can use an underscore to join two words as one name (for example, std_alarm).

`<threshAttn>`

The threshold value for loop attenuation (loss of signal volume) margin. You can set the value from 0 to 25 db. A value of `0` disables this alarm and does not issue a trap. When the line attenuation reaches or exceeds the threshold value during a 15 minute interval, then a trap is reported to configured trap receivers and the appropriate alarm is generated.

`<threshSNR>`

The threshold value for signal to noise ratio (SNR) margin. You can set the value from 0 to 25 db. A value of `0` disables this alarm and does not issue a trap.When the line SNR value falls below the threshold value during a 15 minute interval, then a trap is reported to configured trap receivers and the appropriate alarm is generated.

SNR is the ratio of the received signal power to the received noise power. Margin is the amount of degradation in SNR that the system can tolerate under the current conditions and still achieve 10^{-7} BER.

`<threshES>`

The threshold value specifying how many errored seconds can occur on the G.shdsl line during a 15-minute interval. The value range is 0 to 900. A value of `0` disables this alarm and does not issue a trap. When the errored seconds count reaches or exceeds the threshold value within a 15 minute interval, then a trap is reported to configured trap receivers.

An errored second is generated when one or more block errors (CRC anomalies) are detected during the threshold interval, and one or more LOSW defects are detected.

`<threshCRC>`

The threshold value within which cyclic redundancy check (CRC) anomalies can occur on the G.shdsl line. The value range is 0 to 900 seconds. A value of `0` disables this alarm and does not issue a trap. When this count reaches or exceeds the threshold value within a 15 minute interval, then a trap is reported to configured trap receivers.

CRC anomalies indicate that errored data blocks occurred within the specified time frame.

`<threshLOSWS>`

The threshold value within which loss of synchronization word seconds is detected. The value range is 0 to 900 seconds. A value of `0` disables this alarm and does not issue a trap. When this count reaches or exceeds the threshold value within a 15 minute interval, then a trap is reported to configured trap receivers.

LOSWS indicates that sync words that identify frames were not detected.

`<threshUAS>`

The threshold value for unavailable seconds. When this count reaches or exceeds the threshold value within a 15 minute interval, then a trap is reported to configured trap receivers. The value range is 0 to 900 seconds. A value of `0` disables this alarm and does not issue a trap.

Unavailable seconds indicates that the signal was unavailable during the specified time.

Example

```
::alarm=> new std_alarm 4 4 60 100 100 100 100
```

Displaying G.shdsl Alarm Profiles

::root=> configuration gshdsl profile alarm

From the `::alarm=>` prompt, enter the show command in one of the following formats.

show

show [<profilename>]

Parameter

[<profilename>]

The name of the G.shdsl alarm profile you want to display. Omitting this parameter displays the entire G.shdsl alarm profile table.

Examples

::alarm=> **show**

::alarm=> **show std_alarm**

The following example illustrates both show alarm commands.

```
::alarm=> show

                    Profile_Name  Attn   SNR    ES   SES   CRC  LOSW   UAS
 -------------------------------- ----- ----- ----- ----- ----- ----- -----
                          DEFVAL     0     0     0     0     0     0     0
                       std_alarm     4     4   100   100   100   100   100

::alarm=> show std_alarm

                    Profile_Name  Attn   SNR    ES   SES   CRC  LOSW   UAS
 -------------------------------- ----- ----- ----- ----- ----- ----- -----
                       std_alarm     4     4   100   100   100   100   100

::alarm=>
```

Deleting G.shdsl Alarm Profiles

```
::root=> configuration gshdsl profile alarm
```

1. From the ::alarm=> prompt, enter **show** to display the configured G.shdsl alarm profiles.
2. Note the profile name of the profile you want to delete.

You cannot delete profiles that are assigned to ports.

3. Enter the delete command in the following format.

   delete <profilename>

Parameter

<profilename>

The profile name of the alarm profile you want to delete. This parameter is case sensitive.

Example

::alarm=> **delete std_alarm**

Configuring the G.shdsl Port

When you configure service on a G.shdsl port, apply the line and alarm profiles that you previously set up.

Adding G.shdsl Port Configurations

```
::root=> configuration gshdsl
```

Each G.shdsl port is automatically assigned a default configuration using the default profile index number for each G.shdsl profile type (line and alarm) which is DEFVAL. This procedure describes how to set up the port configuration for the appropriate service.

1 Select the appropriate line profile by doing the following.

- **a** From the `::gshdsl=>` prompt, enter the following command.

  `profile line`

- **b** Enter **`show`** to display the configured line profiles.
- **c** Note the profile name of the line profile you want to assign to the port.

2 Select the appropriate alarm profile by doing the following.

- **a** From the `::gshdsl=>` prompt, enter the following command.

  `profile alarm`

- **b** Enter **`show`** to display the configured alarm profiles.
- **c** Note the profile name of the alarm profile you want to assign to the port.

3 From the `::gshdsl=>` prompt, enter the set command in the following format.

```
set <slot.port> <lpindex> <apindex> <up|down>
[-scramble (enable|disable)]
```

Parameters

`<slot.port>`

The channel slot and port number.

`<lpindex>`

The line profile name from Step 1 on page 30 that you want to assign to this port.

`<apindex>`

The alarm profile name from Step 2 on page 30 that you want to assign to this port.

<**up|down**>

The administrative status of the line. **Up** activates the port. **Down** deactivates the port.

[-**scramble** (**enable|disable**)]

The optional parameter to enable or disable ATM TC layer scrambling for this port.

An ATM cell has two parts: header and payload. Cell scrambling scrambles the payload so that it does not resemble the header. In the event that an ATM network looses sync, it will attempt to synchronize on what it sees as the cell header. In some cases, the cell payload can resemble the cell header, so the network attempts to synchronize on the cell payload rather than the cell header. Scrambling the cell payload precludes it from looking like a cell header. Choose to enable or disable cell scrambling based on whether or not the ATM equipment in the network supports cell scrambling.

Example

```
::gshdsl=> set 6.12 basic_rate basic_alarms up -scramble enable
```

Displaying G.shdsl Port Configurations

::root=> configuration gshdsl

From the `::gshdsl=>` prompt, enter the show command in one of the following formats.

show

show [<slot.port>]

Parameter

[<slot.port>]

The slot and port number for the card which you want to display the configuration. Omitting this parameter displays the configurations for all configured G.shdsl profiles.

Examples

::gshdsl=> **show**

::gshdsl=> **show 4.2**

The following example illustrates both show G.shdsl commands.

```
::gshdsl=> show

Slot.       Line      Alarm      Admin    TCLayer
 Port     Profile    Profile     Status   Scramble
 ----- ---------- ---------- ---------- ----------
 4.1       DEFVAL     DEFVAL         up     enable
 4.2       DEFVAL     DEFVAL         up     enable
 4.3       DEFVAL     DEFVAL         up     enable
 4.4       DEFVAL     DEFVAL         up    disable
 4.5       DEFVAL     DEFVAL       down    disable
 4.6       DEFVAL     DEFVAL       down    disable
 4.7       DEFVAL     DEFVAL       down     enable
 4.8       DEFVAL     DEFVAL       down    disable
 4.9       DEFVAL     DEFVAL       down    disable
 4.10      DEFVAL     DEFVAL       down     enable
 4.11      DEFVAL     DEFVAL       down     enable
 4.12      DEFVAL     DEFVAL       down     enable
 4.13      DEFVAL     DEFVAL         up     enable
 4.14      DEFVAL     DEFVAL         up     enable
 4.15      DEFVAL     DEFVAL         up     enable
 4.16      DEFVAL     DEFVAL         up     enable
 4.17      DEFVAL     DEFVAL       down     enable
 4.18      DEFVAL     DEFVAL       down     enable

Press ’Return’ or ’Enter’ to continue or ’q’ to quit ....
::gshdsl=> show 4.2

 Slot.       Line      Alarm      Admin    TCLayer
 Port     Profile    Profile     Status   Scramble
 ----- ---------- ---------- ---------- ----------
 4.2       DEFVAL     DEFVAL         up     enable

::gshdsl=>
```

Setting Up SDSL Cell Service

To fully configure an SDSL cell port and set up service, complete the following in the order shown:

- ❑ Set up the SDSL cell line profile (see “Configuring SDSL Cell Line Profiles” on page 34).
- ❑ Set up the SDSL cell alarm profile (see “Configuring SDSL Cell Alarm Profiles” on page 38).
- ❑ Set up the SDSL cell port (see “Configuring SDSL Cell Ports” on page 42).

Configuring SDSL Cell Line Profiles

SDSL cell line profiles contain a preconfigured set of parameters, including the rate adaptation mode and the transmit rate. SDSL cell port configuration requires you to apply an SDSL cell line profile to the line, therefore you must configure the SDSL cell line profile before configuring the SDSL cell port. A default profile exists with an index of 1. You cannot delete the default profile.

Adding SDSL Cell Line Profiles

```
::root=> configuration sdsl cell profile line
```

Currently, Fixed Rate is the only supported rate adaptation mode, therefore all SDSL cell line profiles are automatically configured for Fixed Rate.

From the `::line=>` prompt, enter the new command in the following format.

new <rate>

Parameters

<rate>

The transmit rate in kbps. The valid range supported by the SDSL cell card is from 64 to 2,048, in increments of 64. However, the specified rate must be supported by the remote modem. See the remote modem documentation to verify the supported data rates.

Example

```
::line=> new 768
```

Displaying SDSL Cell Line Profiles

`::root=> configuration sdsl cell profile line`

From the `::line=>` prompt, enter the show command in one of the following formats.

`show`

`show` `[<index>]`

Parameter

`[<index>]`

The SDSL cell line profile table index number of the profile you want to display. Omitting this parameter displays the entire SDSL cell line profile table.

Examples

`::line=>` **`show`**

`::line=>` **`show 1`**

The following example illustrates both show line commands.

```
::line=> show

Index    Rate_Mode     Rate
1        fixed(4)      1536
2        fixed(4)       768

::line=> show 1

Index    Rate_Mode     Rate
1        fixed(4)      1536

::line=>
```

Deleting SDSL Cell Line Profiles

::root=> configuration sdsl cell profile line

You cannot delete profiles that are assigned to ports.

1. From the ::line=> prompt, enter **show** to display the SDSL cell line profile table.
2. Note the index number of the SDSL cell line profile you want to delete.
3. Enter the delete command in the following format.

   delete <index>

Parameter

<index>

The index number of the SDSL cell line profile you want to delete.

Example

::line=> **delete 2**

Configuring SDSL Cell Alarm Profiles

SDSL cell alarm profiles determine the conditions that generate SNMP traps. When the configured thresholds are met or exceeded, the SNMP agent sends a trap to the configured trap receiver(s). Only one trap is sent for each 15-minute data collection period. SDSL cell port configuration requires assigning an alarm profile, therefore you must configure the alarm profile prior to configuring the SDSL cell port. A default profile exists with an index of 1. You cannot delete the default profile. Setting the threshold value to zero disables the trap.

Adding SDSL Cell Alarm Profiles

```
::root=> configuration sdsl cell profile alarm
```

From the `::alarm=>` prompt, enter the new command in the following format to create a new SDSL cell alarm profile. The profile is automatically assigned the next available index number in the SDSL cell alarm profile table.

```
new  <threshLOSS> <threshLOCD> <threshSLOCD> <threshSNR>
```

Parameters

`<threshLOSS>`

The loss of signal seconds threshold. When the number of loss of signal seconds in the current 15-minute data collection interval exceeds the specified threshold, the loss of signal seconds alarm is activated. Loss of signal seconds are seconds during which the SDSL cell line is incapable of transmitting or receiving data and all data is lost.

`<threshLOCD>`

The loss of cell delineation threshold. When the number of loss of cell delineation seconds in the current 15-minute data collection interval exceeds the specified threshold, the loss of cell delineation alarm is activated. Loss of cell delineation seconds are seconds in which some cells transmitted during that second were lost.

`<threshSLOCD>`

The severe loss of cell delineation threshold. When the number of severe loss of cell delineation seconds in the current 15-minute data collection interval exceeds the specified threshold, the severe loss of cell delineation alarm is activated. During a severe loss of cell delineation second most of the cells transmitted during that second are lost.

`<threshSNR>`

The signal-to-noise ratio threshold. When the signal-to-noise ratio margin drops below the specified threshold in the current 15-minute collection interval, the signal-to-noise ratio alarm is activated. SNR margin is a measure of signal quality indicating how much margin can be dropped before the number of bit errors exceeds the ratio of $1x10^{-7}$ errored bits per bits transmitted.

Example

```
::alarm=> new 15 15 10 10
```

Displaying SDSL Cell Alarm Profiles

`::root=> configuration sdsl cell profile alarm`

From the `::alarm=>` prompt, enter the show command in one of the following formats.

`show`

`show` `[<index>]`

Parameter

`[<index>]`

The SDSL cell alarm profile table index number of the profile you want to display. Omitting this parameter displays the entire SDSL cell alarm profile table.

Examples

`::alarm=>` **`show`**

`::alarm=>` **`show 1`**

The following example illustrates both show alarm commands.

```
::alarm=> show
Index  ThrLOSS    ThrLOCD  ThrSLOCD  ThrSNR
1      15          15       10        10
2      15          15       10        10


::alarm=> show 1
Index  ThrLOSS    ThrLOCD  ThrSLOCD  ThrSNR
1      15          15       10        10

::alarm=>
```

Deleting SDSL Cell Alarm Profiles

`::root=> configuration sdsl cell profile alarm`

You cannot delete profiles that are assigned to ports.

1 From the `::alarm=>` prompt, enter **`show`** to display the configured SDSL cell alarm profiles.

2 Note the index number of the profile you want to delete.

3 Enter the delete command in the following format.

delete <index>

Parameter

<index>

The index number of the alarm profile you want to delete.

Example

::alarm=> **delete 3**

Configuring SDSL Cell Ports

When you configure service on an SDSL cell port, apply the line and alarm profiles that you previously set up.

Adding SDSL Cell Port Configurations

```
::root=> configuration sdsl cell
```

Each SDSL cell port is automatically assigned a default configuration. The default profile index number for each SDSL cell profile type is 1. This procedure describes how to modify the configuration to reflect the service.

1 Select the appropriate line profile by doing the following.

a From the `::cell=>` prompt, enter the following command.

```
profile line
```

b Enter show to display the configured line profiles.

c Note the index number of the line profile you want to assign to the channel.

2 Select the appropriate alarm profile by doing the following.

a From the `::cell=>` prompt, enter the following command to display the `::alarm=>` prompt.

```
profile alarm
```

b Enter show to display the configured alarm profiles.

c Note the index number of the alarm profile you want to assign to the channel.

3 Enter the set command in the following format.

```
set <slot.port> <lpindex> <apindex>
<up|down>[-scramble (enable|disable)]
```

Parameters

`<port>`

The channel slot and port number (format *slot.port*).

`<lpindex>`

The line index number from Step 1 on page 42 you want to assign to this channel.

`<apindex>`

The alarm index number Step 2 on page 42 you want to assign to this channel.

<**up|down**>

The administrative status of the line: **Up** activates the port. **Down** deactivates the port.

[**-scramble** (**enable|disable**)]

Enables or disables cell scrambling. Cell scrambling, used in Avidia, is not an ATM defined format for SDSL, but is implemented by many vendors. An ATM cell has two parts: header and payload. Cell scrambling scrambles the payload so that it does not resemble the header. In the event that an ATM network looses sync, it will attempt to synchronize on what it sees as the cell header. In some cases, the cell payload can resemble the cell header, so the network attempts to synchronize on the cell payload rather than the cell header. Scrambling the cell payload precludes it from looking like a cell header. Choose to enable or disable cell scrambling based on whether or not the ATM equipment in the network supports cell scrambling.

Examples

```
::cell=> set 4.2 3 6 up
::cell=> set 4.2 3 6 up -scramble disable
```

Displaying SDSL Cell Port Configurations

::root=> configuration sdsl cell

From the `::cell=>` prompt, enter the show command in one of the following formats.

show

show [<slot.port>]

Parameter

[<slot.port>]

The port for which you want to display the configuration (format slot.port). Omitting this parameter displays the configurations for all configured SDSL cell channels.

Examples

::cell=> **show**

::cell=> **show 4.1**

The following example illustrates both show SDSL cell commands.

```
::cell=> show


 -           Line      Alarm      Admin    TCLayer
 Port     Profile    Profile     Status   Scramble
 ----- ---------- ---------- ---------- ----------
 4.1        1         1            up       enable
 4.2        3         7          down       enable
 4.3        8         2            up      disable

::cell=> show 4.1

Port   Line     Alarm    Admin
       Profile  Profile  Status
4.1     1        1        up

::cell=>
```

SETTING UP SDSL FRAME SERVICE

To fully configure an SDSL frame port and set up service, complete the following in the order shown:

- ❑ Set up the SDSL frame line profile (see “Configuring SDSL Frame Line Profiles” on page 45).
- ❑ Set up the SDSL frame alarm profile (see “Configuring SDSL Frame Alarm Profiles” on page 49).
- ❑ Set up the SDSL frame port (see “Configuring SDSL Frame Ports” on page 53).

Configuring SDSL Frame Line Profiles

SDSL frame line profiles contain a preconfigured set of parameters, including the rate adaptation mode and the transmit rate. SDSL frame port configuration requires you to apply an SDSL frame line profile to the line. Therefore you must configure the SDSL frame line profile before configuring the SDSL frame port. A default profile exists with an index of 1. You cannot delete the default profile.

Adding SDSL Frame Line Profiles

```
::root=> configuration sdsl frame profile line
```

Currently, Fixed Rate is the only supported rate adaptation mode, therefore all SDSL frame line profiles are automatically configured for Fixed Rate.

From the `::line=>` prompt, enter the new command in the following format to create a new SDSL frame line profile.

new `<rate>`

Parameters

`<rate>`

The transmit rate in kbps. The valid range supported by the SDSL frame card is from 64 to 2,048, in increments of 64. However, the specified rate must be supported by the remote modem. See the remote modem documentation to verify the supported data rates.

Example

`::line=>` **new 768**

Displaying SDSL Frame Line Profiles

::root=> configuration sdsl frame profile line

From the `::line=>` prompt, enter the show command in one of the following formats.

show

show [<index>]

Parameter

[<index>]

The SDSL frame line profile table index number of the profile you want to display. Omitting this parameter displays the entire SDSL line profile table.

Examples

::line=> **show**

::line=> **show 1**

The following example illustrates both show line commands.

```
::line=> show

Index    Rate_Mode     Rate
1        Fixed Rate    1536
2        Fixed Rate     768

::line=> show 1

Index    Rate_Mode     Rate
1        Fixed Rate    1536

::line=>
```

Deleting SDSL Frame Line Profiles

```
::root=> configuration sdsl frame profile line
```

You cannot delete profiles that are assigned to ports.

1. From the `::line=>` prompt, enter **`show`** to display the SDSL frame line profile table.
2. Note the index number of the SDSL frame line profile you want to delete.
3. Enter the delete command in the following format.

```
delete <index>
```

Parameter

```
<index>
```

The index number of the SDSL frame line profile you want to delete.

Example

```
::line=> delete 2
```

Configuring SDSL Frame Alarm Profiles

SDSL frame alarm profiles determine the conditions that generate SNMP traps. When the configured thresholds are met or exceeded, the SNMP agent sends a trap to the configured trap receiver(s). Only one trap is sent for each 15-minute data collection period. SDSL frame port configuration requires assigning an alarm profile, therefore you must configure the alarm profile prior to configuring the SDSL frame port. A default profile exists with an index of 1. You cannot delete the default profile.

Adding SDSL Frame Alarm Profiles

```
::root=> configuration sdsl frame profile alarm
```

From the `::alarm=>` prompt, enter the new command in the following format to create a new SDSL frame alarm profile. The profile is automatically assigned the next available index number in the SDSL frame alarm profile table.

new `<loswmode> <mgn> <mgnmode> <es> <esmode> <uas> <uasmode>`

Parameters

`<loswmode>`

Loss of sync word alarm setting. A loss of sync word alarm occurs when one of the SDSL frame loops is out of sync. Enter **enable** or **disable**.

`<mgn>`

The margin threshold value, in decibels. When the margin falls below the specified threshold, the margin alarm is activated. A typical margin threshold value is 6.

`<mgnmode>`

The margin alarm setting. Enter **enable** or **disable**.

`<es>`

The errored seconds threshold. When the number of errored seconds in the current 15-minute data collection interval exceeds the specified threshold, the errored seconds alarm is activated. Errored seconds are seconds during which errors occur that prevent the payload from being corrected. A typical errored second threshold value is 17.

`<esmode>`

The errored seconds alarm setting. Enter **`enable`** or **`disable`**.

`<uas>`

The unavailable seconds threshold. When the number of unavailable seconds in the current 15-minute data collection interval exceeds the specified threshold, the UAS alarm is activated. Unavailable seconds are seconds during which the SDSL frame loop is not synchronized. A typical unavailable seconds threshold value is 60.

`<uasmode>`

The unavailable seconds alarm setting. Enter **`enable`** or **`disable`**.

Example

```
::alarm=> new enable 6 enable 17 enable 60 enable
```

Displaying SDSL Frame Alarm Profiles

`::root=> configuration sdsl frame profile alarm`

From the `::alarm=>` prompt, enter the show command in one of the following formats.

`show`

`show` `[<index>]`

Parameter

`[<index>]`

The SDSL frame alarm profile table index number of the profile you want to display. Omitting this parameter displays the entire SDSL frame alarm profile table.

Examples

`::alarm=>` **`show`**

`::alarm=>` **`show 1`**

The following example illustrates both show alarm commands.

```
::alarm=> show
Index  LOSW    Mgn  Mgn_Mode  ES  ES_Mode  UAS  UAS_Mode
1      enable  6    enable    17  enable   60   enable
2      disable 6    enable    17  disable  60   enable

::alarm=> show 1
Index  LOSW    Mgn  Mgn_Mode  ES  ES_Mode  UAS  UAS_Mode
1      enable  6    enable    17  enable   60   enable

::alarm=>
```

Deleting SDSL Frame Alarm Profiles

::root=> configuration sdsl frame profile alarm

You cannot delete profiles that are assigned to ports.

1. From the `::alarm=>` prompt, enter **`show`** to display the configured SDSL frame alarm profiles.
2. Note the index number of the profile you want to delete.
3. Enter the delete command in the following format.

   `delete` `<index>`

Parameter

`<index>`

The index number of the alarm profile you want to delete.

Example

`::alarm=>` **`delete 3`**

Configuring SDSL Frame Ports

Apply the line and alarm profiles that you previously set up when you configure service on an SDSL frame port.

Adding SDSL Frame Port Configurations

```
::root=> configuration sdsl frame
```

Each SDSL frame port is automatically assigned a default configuration. The default profile index number for each SDSL frame profile type is 1. This procedure describes how to modify the configuration to reflect the service.

1 Select the appropriate line profile by doing the following.

- **a** From the `::frame=>` prompt, enter the following command to display the `::line=>` prompt.

  `profile line`

- **b** Enter **`show`** to display the configured line profiles.
- **c** Note the index number of the line profile you want to assign to the channel.

2 Select the appropriate alarm profile by doing the following.

- **a** From the `::frame=>` prompt, enter the following command to display the `::alarm=>` prompt.

  `profile alarm`

- **b** Enter **`show`** to display the configured alarm profiles.
- **c** Note the index number of the alarm profile you want to assign to the channel.

3 Enter the set command in the following format.

```
set <port> <lpindex> <apindex> (up|down)
```

Parameters

`<port>`

The channel slot and port number (format *slot.port*).

`<lpindex>`

The line index number from Step 1 on page 53 you want to assign to this channel.

`<apindex>`

The alarm index number from Step 2 on page 53 you want to assign to this channel.

`(`**`up|down`**`)`

The administrative status of the line. **`Up`** activates the port. **`Down`** deactivates the port.

Example

```
::frame=> set 4.2 3 6 up
```

Displaying SDSL Frame Port Configurations

`::root=> configuration sdsl frame`

From the `::frame=>` prompt, enter the show command in one of the following formats.

`show`

`show` `[<port>]`

Parameter

`[<port>]`

The port for which you want to display the configuration (format *slot.port*). Omitting this parameter displays the configurations for all configured SDSL frame channels.

Examples

`::frame=>` **`show`**

`::frame=>` **`show 4.1`**

The following example illustrates both show sdsl commands.

```
::frame=> show
                Line          Alarm           Admin
Port            Profile       Profile         Status

4.1             1             1               up
4.2             2             4               down

::frame=> show 4.1
                Line          Alarm           Admin
Port            Profile       Profile         Status

4.1             1             1               up

::frame=>
```

SETTING UP IDSL SERVICE

To fully configure an IDSL port and set up service, complete the following in the order shown:

- ❑ Set up the IDSL line profile (see “Configuring IDSL Line Profiles” on page 56).
- ❑ Set up the IDSL alarm profile (see “Configuring IDSL Alarm Profiles” on page 60).
- ❑ Set up the IDSL port (see “Configuring IDSL Ports” on page 64).

Configuring IDSL Line Profiles

IDSL line profiles contain a preconfigured set of parameters, including the transmit rate, performance monitoring mode, and SES (severely errored second) threshold. IDSL port configuration requires you to apply an IDSL line profile to the line, therefore you must configure the IDSL line profile before configuring an IDSL port. A default profile exists with an index of 1. You cannot delete the default profile.

Adding IDSL Line Profiles

```
::root=> configuration idsl profile line
```

From the `::line=>` prompt, enter the new command in the following format to create a new IDSL line profile. The profile is automatically assigned the next available index number in the IDSL alarm profile table.

new `<rate> <PM Mode> <SES threshold>`

Parameters

`<rate>`

The data transfer rate on the IDSL line in kbps. The valid choices are 64, 128, or 144, with 144 as the default.

`<PM Mode>`

The performance monitoring mode, which determines how IDSL current performance data and diagnostic data are collected.

- **path**—Statistics are reported for each segment of the connection path (loop) cumulatively. In the customer direction, node 0 (Avidia system) reports statistics for the first segment, node 1 reports statistics for the first and second segments, etc. In the network direction, node 0 (Avidia system) reports statistics for all the segments, node 1 reports statistics for all but the first segment, and so on.
- **seg** (segmented)—Statistics are reported for each segment of the connection path (loop). In both the customer and network directions, node 0 (Avidia system) reports statistics for the first segment, node 1 reports statistics for the second segment, and so on.

`<SES threshold>`

The number of block errors required for defining a severely errored second. The range is 1 to 15, with 3 as the default. A block error is generated any time there is a CRC violation detected on an IDSL superframe.

Example

```
::line=> new 128 path 4
```

Displaying IDSL Line Profiles

```
::root=> configuration idsl profile line
```

From the `::line=>` prompt, enter the show command in one of the following formats.

show

show [<index>]

Parameter

[<index>]

The IDSL line profile table index number of the profile you want to display. Omitting this parameter displays the entire IDSL line profile table.

Examples

::line=> **show**

::line=> **show 1**

The following example illustrates both show line commands.

```
::line=> show

             PM         Rate              SES
Index        Mode      (kbps)           Threshold
    1   Segmented       144                3
    2        Path       144                3
    3        Path       128                3

::line=> show 1

             PM         Rate              SES
Index        Mode      (kbps)           Threshold
    1   Segmented       144                3

::line=>
```

Information	Description
Index	The index number of the line profile.
PM Mode	The performance monitoring mode, which determines how IDSL current performance data and diagnostic data are collected (Path or Segmented).
Rate (kbps)	The data transfer rate on the IDSL line (64, 128, or 144).
SES Threshold	The number of block errors required for defining a severely errored second.

Deleting IDSL Line Profiles

```
::root=> configuration idsl profile line
```

You cannot delete profiles that are assigned to ports. You cannot delete the default profile.

1. From the `::line=>` prompt, enter **`show`** to display the IDSL line profile table.
2. Note the index number of the IDSL line profile you want to delete.
3. Enter the delete command in the following format.

   `delete` `<index>`

Parameter

`<index>`

The index number of the IDSL line profile you want to delete.

Example

`::line=>` **`delete 2`**

Configuring IDSL Alarm Profiles

IDSL alarm profiles determine the conditions that generate SNMP traps. When the configured thresholds are met or exceeded, the SNMP agent sends a trap to the configured trap receiver(s). IDSL port configuration requires you to apply an IDSL alarm profile to the line, therefore you must configure the IDSL alarm profile before configuring an IDSL port. A default profile exists with an index of 1. You cannot delete the default profile.

Adding IDSL Alarm Profiles

```
::root=> configuration idsl profile alarm
```

From the `::alarm=>` prompt, enter the new command in the following format to create a new IDSL alarm profile.

new `<ES hourly> <SES hourly> <ES daily> <SES daily>`

Parameters

`<ES hourly>`

The number of errored seconds that must be met or exceeded on the IDSL line within an hour for a trap to occur. The range is 0 (disable) to 255, with 40 as the default.

An errored second generates when one or more block errors (CRC violations) are detected during a 1-second interval.

`<SES hourly>`

The number of severely errored seconds that must be met or exceeded on the IDSL line within an hour for a trap to occur. The range is 0 (disable) to 127, with 10 as the default.

A severely errored second generates when the number of block errors (CRC violations) defined by the SES threshold parameter are detected during a 1-second interval (see “Adding IDSL Line Profiles” on page 57).

`<ES daily>`

The number of errored seconds that must be met or exceeded on the IDSL line within a day for a trap to occur. The range is 0 (disable) to 4095, with 100 as the default.

An errored second generates when one or more block errors (CRC violations) are detected during a 1-second interval.

`<SES daily>`

The number of severely errored seconds that must be met or exceeded on the IDSL line within a day for a trap to occur. The range is 0 (disable) to 2047, with 25 as the default.

A severely errored second generates when the number of block errors (CRC violations) defined by the SES threshold parameter (see “Adding IDSL Line Profiles” on page 57) are detected during a 1-second interval.

Example

```
::alarm=> new 50 10 125 25
```

Displaying IDSL Alarm Profiles

```
::root=> configuration idsl profile alarm
```

From the `::alarm=>` prompt, enter the show command in one of the following formats.

show

show [<index>]

Parameter

[<index>]

The IDSL alarm profile table index number of the profile you want to display. Omitting this parameter displays the entire IDSL alarm profile table.

Examples

```
::alarm=> show
::alarm=> show 1
```

The following example illustrates both show alarm commands.

```
::alarm=> show

             Hourly       Hourly        Daily        Daily
Index          ES          SES           ES          SES
    1          40           10          100           25
    2          40           15          100           30
    3          50           10          125           25

::alarm=> show 1

             Hourly       Hourly        Daily        Daily
Index          ES          SES           ES          SES
    1          40           10          100           25

::alarm=>
```

Information	Description
Index	The index number of the alarm profile.
Hourly ES	The number of errored seconds that must be met or exceeded on the IDSL line within an hour for a trap to occur. The range is 0 (disable) to 255.
Hourly SES	The number of severely errored seconds that must be met or exceeded on the IDSL line within an hour for a trap to occur. The range is 0 (disable) to 127.
Daily ES	The daily ES threshold is the number of errored seconds that must be met or exceeded on the IDSL line within a day for a trap to occur. The range is 0 (disable) to 4095.
Daily SES	The number of severely errored seconds that must be met or exceeded on the IDSL line within a day for a trap to occur. The range is 0 (disable) to 2047.

Deleting IDSL Alarm Profiles

::root=> configuration idsl profile alarm

You cannot delete profiles that are assigned to ports. You cannot delete the default profile.

1. From the ::alarm=> prompt, enter **show** to display the configured IDSL alarm profiles.
2. Note the index number of the profile you want to delete.
3. Enter the delete command in the following format.

   delete <index>

Parameter

<index>

The index number of the alarm profile you want to delete.

Example

::alarm=> **delete 3**

Configuring IDSL Ports

Apply the line and alarm profiles that you previously set up when you configure service on an IDSL port.

Enter the following command to display the `::idsl=>` prompt.

`configuration idsl`

Modifying IDSL Port Configurations

```
::root=> configuration idsl
```

Each IDSL port is automatically assigned a default configuration. The default profile index number for each IDSL profile is 1. This procedure describes how to modify the configuration to reflect the service.

1 Select the appropriate line profile by doing the following.

- **a** From the `::idsl=>` prompt, enter the following command to display the `::line=>` prompt.

  `profile line`

- **b** Enter **`show`** to display the configured line profiles.
- **c** Note the index number of the line profile you want to assign to the channel.

2 Select the appropriate alarm profile by doing the following.

- **a** From the `::idsl=>` prompt, enter the following command to display the `::alarm=>` prompt.

  `profile alarm`

- **b** Enter **`show`** to display the configured alarm profiles.
- **c** Note the index number of the alarm profile you want to assign to the channel.

3 Enter the set command in the following format.

```
set <port> <lpindex> <apindex> (up|down) [<-id circuit id>]
```

Parameters

`<port>`

The channel slot and port number (format *slot.port*).

`<lpindex>`

The line index number from Step 1 on page 64 you want to assign to this channel.

`<apindex>`

The alarm index number from Step 2 on page 64 you want to assign to this channel.

(**up**|**down**)

The administrative status of the line. **Up** activates the port. **Down** deactivates the port.

`[-id <circuit id>]`

A text string of up to 255 characters that serves as a unique identifier for the IDSL circuit.

Example

```
::idsl=> set 4.2 3 6 up -id “idsl circuit #7”
```

Displaying IDSL Port Configurations

::root=> configuration idsl

From the `::idsl=>` prompt, enter the show command in one of the following formats.

show

show [<port>]

Parameter

[<port>]

The port for which you want to display the configuration (format *slot.port*). Omitting this parameter displays the configurations for all configured IDSL channels.

Examples

::idsl=> **show**

::idsl=> **show 4.1**

The following example illustrates both show idsl commands.

```
::idsl=> show
                Line          Alarm           Admin      Circuit
Port            Profile       Profile         Status        Id

4.1             1             1               up
4.2             2             4               down

::idsl=> show 4.1
                Line          Alarm           Admin
Port            Profile       Profile         Status

4.1             1             1               up

::idsl=>
```

Information	Description
Port	The slot number and port number for which IDSL port configurations are displayed.
Line Profile	The index number of the line profile assigned to this port.
Alarm Profile	The index number of the alarm profile assigned to this port.
Admin Status	The administrative status of the line (up or down).

CONFIGURING XDSL SUBSCRIBER NAMES

A subscriber name can be assigned to each IDSL (only ports not used for Frame Relay services) or SDSL frame port to easily identify it.

Configure IDSL or SDSL frame subscriber names from the `::service=>` prompt. From the `::root=>` prompt, enter the **service** command to display the `::service=>` prompt.

Adding New xDSL Subscriber Names

```
::root=> configuration atm frame service
```

From the `::service=>` prompt, enter the new command in the following format.

```
new <port> (<name>|"<name with spaces>")
[-service tls|ppp|ramp1483]
```

Parameter

`<port>`

The IDSL or SDSL frame card slot and port numbers for which you want to assign a subscriber name. Use the format *slot.port*.

`(<name>|"<name with spaces>")`

<name>

The `name` text string can contain any characters and can be any length. However, if you include quotation marks in the `name` text string, the quotation marks must be preceded by a backward slash (\). You can use multiple words separated by an underscore.

<name with spaces>

The `name with spaces` text string can contain any characters and be any length. You can use multiple words separated by spaces. If you include quotation marks in the `name with spaces` text string, the quotation marks must be preceded by a backward slash (\).

[**-service tls|ppp|ramp1483**]

The type of service configured for the session.

- **tls** (transparent lan services)—support tunneling for frame-based services
- **ppp**—supports PPP sessions from modems
- **ramp1483**—supports sessions for an IDSL (frame-based) RAMP modem that is attached to an IDSL card and is running RAMP 1483 bridging proprietary service type

Examples

::service=> **new 4.1 Company_A**

::service=> **new 4.1 "Company A"**

Adding a Range of New xDSL Subscriber Names

::root=> configuration atm frame service

The range command provides the ability for you to name every port on one IDSL or SDSL frame card at once. The name for each port is the same name that you specify in the name parameter. From the ::service=> prompt, enter the range command in the following format.

range <#serv> <port> (<name>|"<name with spaces>")
[**-service tls|ppp|ramp1483**]

Parameter

<#serv>

Specify a number of ports on one IDSL or SDSL frame card that you want to name. The number can be from 1 to 24 (maximum of 24 ports per card).

<port>

The IDSL or SDSL frame card slot and port numbers for which you want to assign a subscriber name. Use the format *slot.port*.

`(<name>|"<name with spaces>")`

<name>

The `name` text string that you will apply to the range of ports specified in the first parameter. The name text string can contain any characters and can be any length. However, if you include quotation marks in the `name` text string, the quotation marks must be preceded by a backward slash (\). You can use multiple words separated by an underscore.

<name with spaces>

The `name with spaces` text string can contain any characters and be any length. You can use multiple words separated by spaces. If you include quotation marks in the `name with spaces` text string, the quotation marks must be preceded by a backward slash (\).

`[`**`-service tls|ppp|ramp1483`**`]`

The type of service configured for the session.

- **`tls`** (transparent lan services)—support tunneling for frame-based services
- **`ppp`**—supports PPP sessions from modems
- **`ramp1483`**—supports sessions for an IDSL (frame-based) RAMP modem that is attached to an IDSL card and is running RAMP 1483 bridging proprietary service type

Examples

`::service=>` **`range 24 4.1 Company_A`**

`::service=>` **`range 24 4.1 "Company A"`**

Deleting Subscriber Names

```
::root=> configuration atm frame service
```

From the `::service=>` prompt, enter the delete command in the following format.

`delete` `<port>`

Parameter

`<port>`

The port for which you want to delete a subscriber name (format *slot.port*).

Example

`::service=>` **`delete 4.1`**

Displaying Subscriber Names

```
::root=> configuration atm frame service
```

From the `::service=>` prompt, enter the show command in the following format.

show [<port>]

Parameter

<port>

The port for which you want to display a subscriber name (format *slot.port*). Omitting this parameter displays the configured subscriber names for all SDSL frame or IDSL (not configured for Frame Relay) ports.

Example

::service=> **show**

::service=> **show 4.1**

The following example illustrates both show service commands.

```
::service=> show
Port     Subscriber_Name    Service_Type

4.1      Company A          TLS
4.2      Company B          TLS

::service=> show 4.1
4.1      Company A          TLS

::service=>
```

CONFIGURING NETWORK SERVICES 3

This chapter describes how to set up network card services. Go to the following sections for more information.

CONFIGURING OC3/STM-1

The following sections provide configuration for OC3/STM-1 services. You must first configure the ports for either SONET or SDH interface type, then configure the physical ports for service. Also, you can set up the ports for Automatic Protection Switching (APS).

Configuring Physical Interface Service

```
::root=> configuration optics
```

- You must configure each OC3 card port (has two ports) to reflect whether the physical interface is SONET or SDH.
- You must set the interface type for each port separately. This is necessary if you are implementing APS where the redundant port must have the same interface type as the primary port.

From the `::optics=>` prompt, enter the set command in the following format.

set `<port>` (**sonet|sdh**)

Parameters

`<port>`

The line card slot and port you want to configure. Use the *slot.port* format, where port is either 1 or 2.

(**sonet|sdh**)

The type of physical interface.

- **sonet**—the North American standard for transmitting data over optical fiber.
- **sdh**—the standard for transmitting data over optical fiber outside of North America.

Example

```
::optics=> set 12.1 sonet
::optics=> set 12.2 sonet
```

Displaying the OC3 Interface Type

```
::root=> configuration optics
```

From the `::optics=>` prompt, enter **`show`**. A screen similar to the following displays.

```
::optics=> show

Port         Type
12.1        sonet
12.2        sonet

::optics=>
```

The OC3 Configuration Table displays the following information.

Information	Description
Port	The line card slot and port 1 or 2).
Type	The type of physical interface. • sonet—the North American standard for transmitting data over optical fiber. • sdh—the standard for transmitting data over optical fiber outside of North America.

Configuring OC3/STM-1 Service

Configuring OC3 Ports

```
::root=> configuration oc3
```

From the `::oc3=>` prompt, enter the set command in the following format.

set <port> [**-loopback** (**none|local|line**)]
[**-scrambling** (**enable|disable**)] [**-clock** (**loop|local**)]

Parameters

`<port>`

The port you want to configure (format *slot.port*, where port is either 1 or 2).

[**-loopback** (**none|local|line**)]

The type of loopback to start, if any. See the *Avidia System Fault Management User Manual* for more information on using loopback mode.

- **none**—no loopback is initiated.
- **local**—the signal is looped back within the card at the transceiver.
- **line**—the signal is received at the line interface and is looped back through the transmitter. The near-end interface transmits the loopback to the far-end device. You can activate this test either from the near-end or far-end. A line loopback tests the complete signal for the port, including channels that are blocked by the user.

[**-scrambling** (**enable|disable**)]

Enables or disables cell scrambling. Cell scrambling is not an ATM defined format for OC3, but is implemented by many vendors. An ATM cell has two parts: header and payload. Cell scrambling scrambles the payload so that it does not resemble the header. In the event that an ATM network looses sync, it will attempt to synchronize on what it sees as the cell header. In some cases, the cell payload can resemble the cell header, so the network attempts to synchronize on the cell payload rather than the cell header. Scrambling the cell payload precludes it from looking like a cell header. Choose to enable or disable cell scrambling based on whether or not the ATM equipment in the network supports cell scrambling.

[-clock (loop|local)]

The type of clocking. Select either:

- `loop` timing derives timing from the loop
- `local` timing uses the local oscillator.

Example

::optics=> **set 12.1 -scrambling enable -clock local**

Displaying the OC3 Interface Type

::root=> configuration oc3

From the `::oc3=>` prompt, enter **show**. Information similar to the following displays.

```
::optics=> show

*****     THE OC3 CONFIGURATION TABLE FOR PORT 12.1     ****
            Loopback Configuration:       None
                  Cell Scrambling :       Enabled
                      Clock Source:       localTiming(2)
              Actual Clock Source:       lcoalTiming(2)


*****     THE OC3 CONFIGURATION TABLE FOR PORT 12.2     ****
            Loopback Configuration:       None
                  Cell Scrambling :       Enabled
                      Clock Source:       localTiming(2)
              Actual Clock Source:       lcoalTiming(2)

::optics=>
```

The OC3 Configuration Table displays the following information.

Information	Description
Loopback Configuration	The type of loopback currently in use, if any. • None—no loopback is initiated. • Local—the signal is looped back within the card at the transceiver. • Line—the signal is received at the line interface and is looped back through the transmitter. The near-end interface transmits the loopback to the far-end device. You can activate this test either from the near-end or far-end. A line loopback tests the complete signal for the port, including channels that are blocked by the user. See the *Avidia System Fault Management User Manual* for more information on using loopback mode.
Cell Scrambling	Whether cell scrambling is enabled or disabled. Cell scrambling is not an ATM defined format for OC3, but is implemented by many vendors. An ATM cell has two parts: header and payload. Cell scrambling scrambles the payload so that it does not resemble the header. In the event that an ATM network looses sync, it will attempt to synchronize on what it sees as the cell header. In some cases, the cell payload can resemble the cell header, so the network attempts to synchronize on the cell payload rather than the cell header. Scrambling the cell payload precludes it from looking like a cell header. Choose to enable or disable cell scrambling based on whether or not the ATM equipment in the network supports cell scrambling.
Clock Source	The configured clocking source. • loopTiming (1) derives timing from the loop. • localTiming (2) uses the local clocking source.
Actual Clock Source	The clocking source currently in use. If the port is currently in loopback mode, then the clocking for the port will be derived from the source specified in the loopback configuration. Otherwise, the Actual Clock Source will be the same as the Clock Source. • loopTiming (1) derives timing from the loop. • localTiming (2) uses the local clocking source.

Configuring APS

Avidia systems use APS to switch ATM traffic from the main SONET/SDH channel (the working channel) to a secondary SONET/SDH channel (the protection channel) when a failure occurs. This redundancy enables service to continue despite failures on the working SONET/SDH channel. See the *System Technology and Applications Overview* for an explanation of how APS works.

Configuring APS

```
::root=> configuration aps
```

From the `::aps=>` prompt enter the set command in the following format.

`set` `<slot> [`**`-enable`**` (`**`on`**`|`**`off`**`)] [`**`-mode`**` (`**`autonorev`**`|`**`norev`**`|`**`rev`**`)]`
`[`**`-wtr`**` <secs>] [`**`-trapenable`**` (`**`on`**`|`**`off`**`)]`

Parameters

`<slot>`

The slot number containing the OC3 card for which you want to configure APS.

`[`**`-enable`**` (`**`on`**`|`**`off`**`)]`

Enables or disables APS. Type **`-enable on`** to enable APS. Enter **`-enable off`** to disable APS.

`[`**`-mode`**` (`**`autonorev`**`|`**`norev`**`|`**`rev`**`)]`

Sets the APS mode.

- **`autonorev`** (non revertive auto switch)—once traffic has switched to the protection channel it will automatically switch back to the working channel when the system detects an error on the protection channel and the failure on the working channel has been cleared.
- **`norev`** (non revertive manual)—once traffic has switched to the protection channel it will not automatically switch back to the working channel when the failure on that channel has been cleared (this is the default).
- **`rev`** (revertive)—once traffic has switched to the protection channel, it will automatically switch back to the working channel when the failure on the working channel has been cleared for a user-specified amount of time.

[**-wtr** <secs>]

Omit this parameter if you selected **autonorev** or **norev** as the APS mode. When the APS is set to **rev**, the Wait To Revert (WTR) timer specifies the number of seconds that you want the system to wait before switching traffic from the protection channel back to the working channel after a failure on the main channel has been cleared. The range is 300 to 720 seconds. The default is 300 seconds.

[**-trapenable** (**on**|**off**)]

Determines whether or not the management card sends traps when the port automatically switches to the backup. Enter **-trapenable on** to enable APS trap generation. Enter **-trapenable off** to disable APS trap generation.

Example

```
::aps=> set 2 -enable on -mode rev -wtr 300 -trapenable on
```

Issuing Manual APS Commands

```
::root=> configuration aps
```

Once APS is enabled, you can issue manual commands to override the configured APS operation. After issuing a manual APS command, you must issue a clear command to resume the configured APS operation. From the `::aps=>` prompt enter the following command.

command <slot> <(**prot2workready|prot2work|work2prot|**
lockout|clear)>

Parameters

<slot>

The slot number containing the OC3 card for which you want to issue a manual APS command.

<(**prot2workready|prot2work|work2prot|lockout|clear**>

The command you want to issue.

- **prot2workready**—switches traffic to the working channel if there are not other conditions (such as the configured Wait To Revert Time or a failure condition) that prohibit switching to that channel.
- **prot2work**—switches the traffic to the working channel. After this command is used, it must be cleared using the clear command.
- **work2prot**—switches the traffic to the protection channel. After this command is used, it must be cleared using the clear command.
- **lockout**—disables APS. After this command is used, it must be cleared using the clear command.
- **clear**—clears any of the previous APS commands and resumes the configured APS operation.

Example

```
::aps=> command 12 prot2work
```

Displaying APS Configuration

::root=> configuration aps

To verify your APS configuration, from the `::aps=>` prompt, enter the **show** command as follows.

show [<slot>]

Parameter

[<slot>]

The slot number for which you want to display the APS configuration. Omitting this parameter displays the APS configuration for all slots.

Examples

::aps=> **show**

::aps=> **show 12**

Information similar to the following displays.

```
::aps=> show
 Slot     Enable                 Mode        WTR    Command     TrapEn
   11    Disable         nonRevertive        300       none    Disable
   18    Disable         nonRevertive        300       none    Disable
NOTE: APS must be enabled before setting APS parameters.
             Commands must be cleared before normal APS operation resumes.

::aps=> show 12
 Slot     Enable                 Mode        WTR    Command     TrapEn
NOTE: APS must be enabled before setting APS parameters.
             Commands must be cleared before normal APS operation resumes.

::aps=>
```

The APS Configuration Table displays the following information.

Information	Description
Slot	The slot for which the APS configuration is displayed.
Enable	Whether APS is enabled or disabled for the slot.
Mode	The configured APS mode. • nonRevertiveAuto (2)—once traffic has switched to the protection channel it will automatically switch back to the working channel when the system detects an error on the protection channel and the failure on the working channel has been cleared. • nonRevertive (1)—once traffic has switched to the protection channel it will not automatically switch back to the working channel when the failure on that channel has been cleared (this is the default). • revertive (3)—once traffic has switched to the protection channel, it will automatically switch back to the working channel when the failure on the working channel has been cleared for a user-specified amount of time.
WTR	When the APS is set to rev, this parameter specifies the number of seconds the system waits before switching traffic from the protection channel back to the working channel after a failure on the main channel has been cleared. The range is 300 to 720 seconds. The default is 300 seconds.
Command	Which, if any, manual APS commands are in effect. • none—no APS commands are in effect • lockout—disables APS • work2prot—switches the traffic to the protection channel. After this command is used, it must be cleared using the clear command. • prot2work—switches the traffic to the working channel. After this command is used, it must be cleared using the clear command.
TrapEn	Determines whether or not the management card sends traps when the port automatically switches to the backup. enable(1)—the management card sends traps disable(2)—the management card does not send traps

CONFIGURING DS1 SERVICE

This section contains instructions for configuring service for DS1 cards installed in an AV8000, AV6000, AV3000, or AV2200.

In an AV2200 system, you can configure the DS1 card in one of two ways:

- locally through the craft port
- remotely over a subtending management connection

To remotely configure a DS1 card installed in an AV2200, you must first subtend the AV2200 to another Avidia system using the command-line interface. (For more information about how to set up subtending see the *Avidia System Technology and Applications Overview* and for more information on using the subtend command see Chapter 4, “Configuring Subtended Systems” on page 107.) Then, through inband management, configure DS1 service on the DS1 card.

If you will configure an IMA group on this DS1 card, see “Configuring IMA Groups” on page 121.

Configuring DS1 Ports

```
::root=> configuration ds1
```

From the `::ds1=>` prompt, enter the set command in the following format.

```
set <port> [-type (esf|d4) [-coding (b8zs|ami)]
[-clock (loop|local)] [-lbo index] [-trap (enabled|disabled)]
[-admin (up|down)]
[-id (<circuit identifier>|"<circuit identifier with space>")]
[-loopback (none|local|line|payload|remote)]
[-scrambling (enable|disable)
```

Parameters

`<port>`

The channel slot and port number that you want to configure (format *slot.port*).

`[-type (esf|d4)]`

The type of DS1 line. Select either:

- **`esf`**—Extended SuperFrame for DS1 (T1.107).
- **`d4`**—a AT&T D4 format for DS1.

`[-coding (b8zs|ami)]`

The type of coding on the line. Select either:

- **`b8zs`** (Binary 8 Zero Substitution) line coding provides a minimum ones density on a bipolar T1 circuit.
- **`ami`** (Alternate Mark Inversion) is a bipolar line coding.

`[-clock (loop|local)]`

The source from which the DS1 port derives timing. Select either:

- **`loop`** derives timing from the device on the other end of the loop.
- **`local`** derives timing from the Avidia system (local oscillator).

`[-lbo index]`

The line build out, in decibels or feet/meters. Determine the value for `<index>`, based on the length of the line (for DSX1) or equalization (for DS1), as follows:

Index	Line Build Out/Equalization	Line Type
0	0 dB	DS1
1	-7.5 dB	DS1
2	-15 dB	DS1
3	-22.5 dB	DS1
4	0 to 133 feet (0 to 40 meters)	DSX1
5	133 to 266 feet (40 to 81 meters)	DSX1
6	266 to 399 feet (81 to 121 meters)	DSX1
7	399 to 533 feet (121 to 162 meters)	DSX1
8	533 to 655 feet (162 to 200 meters)	DSX1

[-trap (enabled|disabled)]

Enables or disables DS1 trap generation. Enabling trap generation causes the management card to send a trap when the line status changes for the DS1 port. Enter **-trap enabled** or **-trap disabled**.

[-admin (up|down)]

Specifies the administrative status of the line. Select **up** to activate the line. Select **down** to deactivate it.

[**-id** <circuit identifier>|"<circuit identifier with space>"]

A name (text string) that identifies the circuit.

`<circuit identifier>`

The `circuit identifier` text string can contain any characters and can be any length. However, if you include quotation marks in the `name` text string, the quotation marks must be preceded by a backward slash (\). You can use multiple words separated by an underscore. For example, you could name the circuit `Circuit_100`.

`“<circuit identifier with spaces>”`

The `circuit identifier with spaces` text string can contain any characters and be any length. You can use multiple words separated by spaces. If you include quotation marks in the `circuit identifier with spaces` text string, the quotation marks must be preceded by a backward slash (\). For example, you could name the circuit `Circuit 100`.

[-loopback (none|local|line|payload|remote)]

The type of loopback to start, if any. See the *Avidia System Fault Management User Manual* for more information on using loopback mode.

- **none**—no loopback is initiated.
- **local**—the signal is looped back within the card at the transceiver.
- **line**—the signal is received at the line interface and is looped back through the transmitter. The near-end interface transmits the loopback to the far-end device. You can activate this test either from the near-end or far-end. A line loopback tests the complete signal for the port, including channels that are blocked by the user.
- **payload**—the DS1 card loops the payload (192 bits) through the receive section (including the framer) and to the transmit section, returning the payload and the newly generated ESF framing. For this loopback, the framing for the DS1 port must be set to esf.
- **remote**—the signal is sent to the far end, where it is looped back. This loopback tests the entire data path to the far end.

[**-scrambling** (**enable|disable**)]

Enables or disables cell scrambling. Cell scrambling, used in Avidia, is not an ATM defined format for DS1, but is implemented by many vendors. An ATM cell has two parts: header and payload. Cell scrambling scrambles the payload so that it does not resemble the header. In the event that an ATM network looses sync, it will attempt to synchronize on what it sees as the cell header. In some cases, the cell payload can resemble the cell header, so the network attempts to synchronize on the cell payload rather than the cell header. Scrambling the cell payload precludes it from looking like a cell header. Choose to enable or disable cell scrambling based on whether or not the ATM equipment in the network supports cell scrambling.

Example

```
::ds1=> set 2.1 -type esf -coding ami -clock local -lbo 1 -trap
enabled -admin up -id company_a -scrambling enable
```

```
::ds1=> set 2.1 -type esf -coding ami -clock local -lbo 1 -trap
enabled -admin up -id “company a” -scrambling enable
```

Displaying DS1 Port Configurations

`::root=> configuration ds1`

From the `::ds1=>` prompt, enter the show command in the following format.

`show` `[<port>]`

Parameter

`[<port>]`

The slot and port number for which you want to display the configuration (format *slot.port*). Omitting this parameter displays the configurations for all configured DS1/T1 channels.

Examples

`::ds1=>` **`show 4.1`**

`::ds1=>` **`show`**

The following example illustrates the show ds1 command.

```
::ds1=> show 4.1

*****     THE DS1 CONFIGURATION TABLE FOR PORT 4.1     *****
                Circuit Identifier:
                  LBO/Equalization:       0 dB
                         Line Code:       B8ZS
                           Framing:       ESF
        Configured Tx Clock Source:       Local Timing
            Actual Tx Clock Source:       Local Timing
                      Elapsed Time:       667
                   Valid Intervals:       92
                 Invalid Intervals:       0
                       Line Status:       NoAlarm
           Line Status Last Change:       Tue, Sep 15 2001 11:03:43
                         Send Code:       Sending looped or normal data
              Facilities Data Link:       FdlNone
                  Loop Back Status:       None
                      Admin Status:       Up
    Line Status Change Trap Enable:       Enabled
                   Cell Scrambling:       Enabled

::ds1=>
```

The DS1 Configuration Table displays the following information.

Information	Descriptions
Circuit Identifier	A text string that identifies the circuit.
LBO/Equalization	For a DSX1 line, the length of the line, in feet. For a DS1 line, the line equalization, in dB.
Line Code	The type of coding on the line (B8ZS or AMI). • B8ZS (Binary 8 Zero Substitution) line coding provides a minimum ones density on a bipolar T1 circuit. • AMI (Alternate Mark Inversion) is a bipolar line coding.
Framing	The type of DS1 line (Extended Superframe or AT&T D4). • esf is Extended SuperFrame for DS1 (T1.107). • d4 is an AT&T D4 format for DS1.
Configured Tx Clock Source	The configured timing source. • Loop Timing derives timing from the device on the other end of the loop. • Local Timing derives timing from the Avidia system.
Actual Tx Clock Source	The clocking source currently in use. If the port is currently in loopback mode or the port is assigned to an IMA group, then the clocking for the port is derived from the source specified in the loopback configuration or IMA group. Otherwise, the Configured Tx Clock Source is the same as the Actual Tx Clock Source. • Loop Timing derives timing from the device on the other end of the loop. • Local Timing derives timing from the Avidia system.
Elapsed Time	The number of seconds that have elapsed since the current 15-minute data collection period began.
Valid Intervals	The number of 15-minute data collection intervals for which data is collected. The Avidia system supports 96 intervals, or 24 hours, of data collection.
Invalid Intervals	The Avidia system does not have invalid intervals, therefore 0 displays.
Last Line Status Change	The time at which the line entered its current status (see the Line Status description above for a definition of line status).
Send Code	The type of data currently being transmitted. Currently, the only data type supported is Sending Looped or Normal Data.
Facilities Data Link	This parameter is not currently supported, therefore FdlNone displays. Facilities Data Link is a protocol that enables communication with the remote device when in ESF mode.

<table>
<tr><th>Information</th><th>Descriptions</th></tr>
<tr><td>Loop Back Status</td><td>The type of loopback in effect, if any.
• None—no loopback is currently running.
• Local—the signal is looped back within the card at the transceiver.
• Line—the signal is received at the line interface and is looped back through the transmitter. The near-end interface transmits the loopback to the far-end device. You can activate this test either from the near-end or far-end. A line loopback tests the complete signal for the port, including channels that are blocked by the user.
• Payload—the DS1 card loops the payload (192 bits) through the receive section (including the framer) and to the transmit section, returning the payload and the newly generated ESF framing. For this loopback, the framing for the DS1 port must be set to esf.
• Remote—the signal is sent to the far end, where it is looped back. This loopback tests the entire data path to the far end.
See the Avidia System Fault Management User Manual for more information on using loopback mode.</td></tr>
<tr><td>Admin Status</td><td>The configured administrative status of the line, either Up or Down.</td></tr>
<tr><td>Line Status Change Trap Enable</td><td>Indicates whether DS1 trap generation is enabled or disabled. Enabling trap generation causes the management card to send a trap when the line status changes for the DS1 port.</td></tr>
<tr><td>Cell Scrambling</td><td>Indicates whether cell scrambling is enabled or disabled. Cell scrambling, used in Avidia, is not an ATM defined format for DS1, but is implemented by many vendors. An ATM cell has two parts: header and payload. Cell scrambling scrambles the payload so that it does not resemble the header. In the event that an ATM network looses sync, it will attempt to synchronize on what it sees as the cell header. In some cases, the cell payload can resemble the cell header, so the network attempts to synchronize on the cell payload rather than the cell header. Scrambling the cell payload precludes it from looking like a cell header. Choose to enable or disable cell scrambling based on whether or not the ATM equipment in the network supports cell scrambling.</td></tr>
</table>

CONFIGURING E1 SERVICE

This section contains instructions for configuring service for E1 cards installed in an AV8000, AV6000, AV3000, or AV2200 (that you configure locally through the craft port).

In an AV2200 system, you can configure the E1 card in one of two ways:

- locally through the craft port
- remotely over a subtending management connection

To configure an E1 card installed in a remote AV2200, you must first subtend the AV2200 to another Avidia system. (See the *Avidia System Technology and Applications Overview* for more information about how to set up subtending and see Chapter 4, "Configuring Subtended Systems" on page 107 for more information on using the subtend command.) Then, through inband management, use the command-line interface to configure E1 service on the E1 card.

If you will be configuring an IMA group on this E1 card, see "Setting Up an IMA Group" on page 121 before configuring E1 service.

Configuring E1 Ports

```
::root=> configuration e1
```

From the `::e1=>` prompt, enter the set command in the following format.

```
set <port> [-type (e1crcmf|e1crc|e1mf|e1)] [-clock (loop|local)]
[-trap (enabled|disabled)] [-admin up|down)] [-id
<circuit identifier>|"<circuit identifier with space>"]
[-loopback (none|local|line)] [-scrambling (enable|disable)]
```

Parameters

<port>

The channel slot and port number you want to configure (format *slot.port*).

[**-type** (**e1crcmf**|**e1crc**|**e1mf**|**e1**)]

The type of E1 line. Choose from the following.

- **e1crcmf**—G.704 (Table 4b) with TS16 multiframing enabled. Type **-type e1crcmf**.
- **e1crc**—ITU-T Recommendation G.704 (Table 4b).Type **-type e1crc**.
- **mf**—G.704 (Table 4a) with TS16 multiframing enabled. Type **-type e1mf**.
- **e1**—ITU-T Recommendation G.704 (Table 4a).Type **-type e1**.

[**-clock** (**loop**|**local**)]

The source from which the E1 port derives timing. Type **-clock loop** or **-clock local**.

- **loop**—derives timing from the device on the other end of the loop.
- **local**—derives timing from the Avidia system (local oscillator).

[**-trap** (**enabled**|**disabled**)]

Enables or disables E1 trap generation. Enabling trap generation causes the management card to send a trap when the line status changes for the E1 port. Type **-trap enabled** or **-trap disabled**.

[**-admin up**|**down**)]

Specifies the administrative status of the line. Type **-admin up** to activate the line. Type **-admin down** to deactivate it.

[**-id** <circuit identifier>|"<circuit identifier with space>"]

A text string that identifies the circuit.

`<circuit identifier>`

The `circuit identifier` text string can contain any characters and can be any length. However, if you include quotation marks in the `name` text string, the quotation marks must be preceded by a backward slash (\). You can use multiple words separated by an underscore. For example, you could name the circuit as follows:

`Circuit_100`

`<circuit identifier with spaces>`

The `circuit identifier with spaces` text string can contain any characters and be any length. You can use multiple words separated by spaces. If you include quotation marks in the `circuit identifier with spaces` text string, the quotation marks must be preceded by a backward slash (\). For example, you could name the circuit as follows:

`Circuit 100`.

[**-loopback** (**none**|**local**|**line**)]

The type of loopback to start, if any. See the *Avidia System Fault Management User Manual* for more information on using loopback mode.

- **none**—no loopback is initiated.
- **local**—the signal is looped back within the card at the transceiver.
- **line**—the signal is received at the line interface and is looped back through the transmitter. The near-end interface transmits the loopback to the far-end device. You can activate this test either from the near-end or far-end. A line loopback tests the complete signal for the port, including channels that are blocked by the user.

[**-scrambling** (**enable|disable**)]

Enables or disables cell scrambling. Cell scrambling is not an ATM defined format for E1, but is implemented by many vendors. An ATM cell has two parts: header and payload. Cell scrambling scrambles the payload so that it does not resemble the header. In the event that an ATM network looses sync, it will attempt to synchronize on what it sees as the cell header. In some cases, the cell payload can resemble the cell header, so the network attempts to synchronize on the cell payload rather than the cell header. Scrambling the cell payload precludes it from looking like a cell header. Choose to enable or disable cell scrambling based on whether or not the ATM equipment in the network supports cell scrambling.

Example

```
::e1=> set 2.1 -type e1 -clock loop -trap enabled -admin up
-id company_b -scrambling enable
```

```
::e1=> set 2.1 -type e1 -clock loop -trap enabled -admin up
-id “company_b” -scrambling enable
```

Displaying E1 Port Configurations

::root=> configuration e1

From the `::e1=>` prompt, enter the show command in the following format.

show `[<port>]`

Parameter

`[<port>]`

The slot and port number for which you want to display the configuration (format *slot.port*). Omitting this parameter displays the configurations for all configured E1 channels.

Examples

`::e1=>` **show 15.1**

`::e1=>` **show**

The following example illustrates the show e1 command.

```
::e1=> show 15.1

           *****     THE E1 CONFIGURATION TABLE FOR PORT 15.1     *****
                Circuit Identifier:       Building_A
                         Line Code:       HDB3
                           Framing:       E1-CRC4
             Transmit Clock Source:       Local timing
                      Elapsed Time:       880
                   Valid Intervals:       2
                 Invalid Intervals:       0
                       Line Status:       NoAlarm
           Line Status Last Change:       Mon, Jan 29 2001 10:21:34
                         Send Code:       Sending looped or normal data
               Facilities Data Link:      FdlNone
                  Loop Back Status:       NoLoopback
                      Admin Status:       Down
    Line Status Change Trap Enable:       Enabled
                   Cell Scrambling:       Enabled

::e1=>
```

The E1 Configuration Table displays the following information.

Information	Descriptions
Circuit Identifier	A text string that identifies the circuit.
Line Code	The type of coding on the line. Currently HDB3 is the only line coding supported for E1.
Framing	The type of E1 line. • E1CRCMF—G.704 (Table 4b) with TS16 multiframing enabled. • E1 CRC4—ITU-T Recommendation G.704 (Table 4b). • E1MF—G.704 (Table 4a) with TS16 multiframing enabled. • E1—ITU-T Recommendation G.704 (Table 4a).
Transmit Clock Source	The timing source. • Loop Timing derives timing from the device on the other end of the loop. • Local Timing derives timing from the Avidia system (local oscillator).
Elapsed Time	The number of seconds that have elapsed since the current 15-minute data collection period began.
Valid Intervals	The number of 15-minute data collection intervals for which data is collected. The Avidia system supports 96 intervals, or 25 hours, or data collection.
Invalid Intervals	The number of 15-minute data collection intervals for which data has not been collected.
Line Status	The status of the line interface. Options: • NoAlarm—No alarm is present. • RcvFarEndLOF—Remote loss of frame alarm. • RcvAIS—Remote Alarm Indication Signal (AIS). • LossOfFrame—Local loss of frame alarm. • LossOfSignal—Local loss of signal alarm.
Line Status Last Change	The time at which the line entered its current status (see the Line Status description above for a definition of line status).
Send Code	The type of data currently being transmitted. Currently, the only data type supported is Sending looped or normal data.
Facilities Data Link	This feature is currently not supported, therefore FdlNone displays.

Information	Descriptions
Loop Back Status	The type of loopback currently in effect. • NoLoopback—no loopback is initiated. • Local—the signal is looped back within the card at the transceiver. • Line—the signal is received at the line interface and is looped back through the transmitter. The near-end interface transmits the loopback to the far-end device. You can activate this test either from the near-end or far-end. A line loopback tests the complete signal for the port, including channels that are blocked by the user. See the *Avidia System Fault Management User Manual* for more information on using loopback mode.
Admin Status	The configured admin status of the line, either Up or Down.
Line Status Change Trap Enable	Indicates whether E1 trap generation is enabled or disabled. Enabling trap generation causes the management card to send a trap when the line status changes for the E1 port.
Cell Scrambling	Indicates whether cell scrambling is enabled or disabled. Cell scrambling is not an ATM defined format for E1, but is implemented by many vendors. An ATM cell has two parts: header and payload. Cell scrambling scrambles the payload so that it does not resemble the header. In the event that an ATM network looses sync, it will attempt to synchronize on what it sees as the cell header. In some cases, the cell payload can resemble the cell header, so the network attempts to synchronize on the cell payload rather than the cell header. Scrambling the cell payload precludes it from looking like a cell header. Choose to enable or disable cell scrambling based on whether or not the ATM equipment in the network supports cell scrambling.

CONFIGURING DS3 SERVICE

Configure DS3 service for both 1-port (AV 323) and 4-port (AV324) cards using the following procedures. The port redundancy configuration applies only to the DS3 1-port card, however.

Setting Up the DS3 Ports for Service

Configuring DS3 Ports

```
::root=> configuration ds3
```

From the `::ds3=>` prompt, enter the set command in the following format.

set `<port>` [**-clock** (**loop**|**local**)] [**-lbo** index] [**-type** (**m23**|**cbit**)] [**-mode** (**direct**|**plcp**)] [**-loopback** (**none**|**local**|**line**|**remote**)] [**-scrambling** (**enable**|**disable**)][**-id** `<circuit identifier>`|"`<circuit identifier with space>`"]

Parameters

`<port>`

The slot and port number you want to configure (format *slot.port*).

[**-clock** (**loop**|**local**)]

The source from which the DS3 port derives timing. Type **-clock loop** or **-clock local**.

- **loop** derives timing from the device on the other end of the loop.
- **local** derives timing from the Avidia system.

[**-lbo** index]

The line build out, in feet. Determine the value for `<index>`, based on the length of the line, as follows:

Index	Line Build Out
0	0 to 225 feet (68.5 meters)
1	More than 225 feet

[-type (m23|cbit)]

The framing type for each port. The framing type provides a synchronization of framing for the network (channel banks).

- `m23`—ANSI T1.107-1988[9]
- `cbit`—ANSI T1.107a-1990[9a]

Type **`-type m23`** or **`-type cbit`**.

[-mode (direct|plcp)]

The ATM mapping setting, which sets how ATM cells map to DS3 frames. Enter the option that is compatible with your DS3 network, either **`-mode direct`** to directly map ATM cells to DS3 frames, or **`-mode plcp`** to use the ATM Physical Layer Convergence Protocol (PLCP).

[-loopback (none|local|line|remote)]

The type of loopback to start, if any. See the *Avidia System Fault Management User Manual* for more information on using loopback mode.

- **`none`**—no loopback is initiated.
- **`local`**—the signal is looped back within the card at the transceiver.
- **`line`**—the signal is received at the line interface and is looped back through the transmitter. The near-end interface receives the loopback from the far-end device. You can activate this test either from the near-end or far-end. A line loopback tests the complete signal for the port, including channels that are blocked by the user.
- **`remote`**—the signal is sent to the far end, where it is looped back. This loopback tests the entire data path to the far end.

[-scrambling (enable|disable)]

Enables or disables cell scrambling. Cell scrambling is not an ATM defined format for DS3, but is implemented by many vendors. An ATM cell has two parts: header and payload. Cell scrambling scrambles the payload so that it does not resemble the header. In the event that an ATM network looses sync, it will attempt to synchronize on what it sees as the cell header. In some cases, the cell payload can resemble the cell header, so the network attempts to synchronize on the cell payload rather than the cell header. Scrambling the cell payload precludes it from looking like a cell header. Choose to enable or disable cell scrambling based on whether or not the ATM equipment in the network supports cell scrambling.

[**-id** <circuit identifier>|"<circuit identifier with space>"]

A text string that identifies the circuit.

`<circuit identifier>`

The `circuit identifier` text string can contain any characters and can be any length. However, if you include quotation marks in the `name` text string, the quotation marks must be preceded by a backward slash (\). You can use multiple words separated by an underscore. For example, you could name the circuit as follows:

`Circuit_100`

`<circuit identifier with spaces>`

The `circuit identifier with spaces` text string can contain any characters and be any length. You can use multiple words separated by spaces. If you include quotation marks in the `circuit identifier with spaces` text string, the quotation marks must be preceded by a backward slash (\). For example, you could name the circuit as follows:

`Circuit 100`.

Example

```
::ds3=> set 12.1 -clock local -lbo 0 -type cbit -mode direct
-loopback none -scrambling enable -id Circuit_100
```

Displaying DS3 Port Configurations

```
::root=> configuration ds3
```

From the `::ds3=>` prompt, enter the show command in the following format.

show [<port>]

Parameter

[<port>]

The slot and port number for which you want to display the configuration (format *slot.port*). Omitting this parameter displays the configurations for all configured DS3 channels.

Examples

::ds3=> **show 4.1**

::ds3=> **show**

The following example illustrates the show ds3 command.

```
::ds3=> show 12.1

           THE DS3 CONFIGURATION TABLE FOR PORT 12.1

                      Time Elapsed:       3213
                   Valid Intervals:       96
                         Line Type:       CbitParity
                       Line Coding:       B3ZS
                         Send Code:       SendNoCode
                Circuit Identifier:
                  Cell Scrambling :       Enabled
                     Framing Mode :       Direct
                       Line Status:       LOS
             Transmit Clock Source:       localTiming
      Actual Transmit Clock Source:       local timing
                 Invalid Intervals:       0
                               LBO:       0 to 225 feet
           Line Status Last Change:       Wed, Sep 012 2001 11:19:19
    Line Status Change Trap Enable:       Enabled
                  Loop Back Status:       NoLoopback
                    Channelization:       disabled
               Ds1 For Remote Loop:       1
                      Admin Status:       Up

::ds3
```

The DS3 Configuration Table displays the following information.

Information	Descriptions
Time Elapsed	The number of seconds that have elapsed since the current 15-minute data collection period began.
Valid Intervals	The number of 15-minute data collection intervals for which data is collected. The Avidia system supports 96 intervals, or 24 hours, of data collection.
Line Type	The type of DS3 line. Options: • M23 is ANSI T1.107-1988[9] • CbitParity is ANSI T1.107a-1990[9a]
Line Coding	The type of coding on the line. B3ZS is the only line type currently supported.
Send Code	The type of data currently being transmitted. Currently, only SendNoCode is supported, indicating that the line is sending looped or normal data.
Circuit Identifier	A text string that identifies the circuit. This feature is not yet supported.
Cell Scrambling	Indicates whether cell scrambling is enabled or disabled. Cell scrambling is not an ATM defined format for DS3, but is implemented by many vendors. An ATM cell has two parts: header and payload. Cell scrambling scrambles the payload so that it does not resemble the header. In the event that an ATM network looses sync, it will attempt to synchronize on what it sees as the cell header. In some cases, the cell payload can resemble the cell header, so the network attempts to synchronize on the cell payload rather than the cell header. Scrambling the cell payload precludes it from looking like a cell header. Choose to enable or disable cell scrambling based on whether or not the ATM equipment in the network supports cell scrambling.
Framing Mode	The mode used to map ATM cells to frames. Options: • Direct—provides a direct mapping of ATM cells to DS3 frames, but does not include the overhead of PLCP (such as frame alignment) • PLCP—provides the mapping of ATM cells to DS3 frames (12 cells are mapped to a DS3 frame) using the ATM Physical Layer Convergence Protocol (PLCP)
Line Status	The status of the line interface. Options: • NoAlarm—No alarms are present. • RcvRAIFailure—Receiving a remote alarm indication. • mitRAIAlarm—Transmitting a remote alarm indication. • RcvAIS—Receiving an AIS. • mitAIS—Transmitting an AIS. • LOF—Receiving a loss-of-frame error. • LOS—Receiving a loss-of-signal error.
Transmit Clock Source	The configured clocking source. • loopTiming derives timing from the device on the other end of the loop. • localTiming derives timing from the Avidia system (local oscillator).

Information	Descriptions
Actual Transmit Clock Source	The clocking source currently in use. If the port is currently in loopback mode, then the clocking for the port will be derived from the source specified in the loopback configuration. Otherwise, the Configured Tx Clock Source will be the same as the Actual Tx Clock Source. • Loop Timing derives timing from the device on the other end of the loop. • Local Timing derives timing from the Avidia system.
Invalid Intervals	The Avidia system does not have invalid intervals, therefore 0 displays.
LBO	The length of the line. Options: • 0 to 225 feet (68.5 m) • More than 225 feet
Line Status Last Change	The time and date of the last line status change.
Line Status Change Trap Enable	Indicates whether DS3 trap generation is enabled or disabled.
Loop Back Status	The type of loopback currently in effect.
Channelization	This feature is currently disabled, therefore Disabled displays.
DS1 For Remote Loop	Indicates which DS1 will be looped back. A value of 0 means no DS1 will be looped. A value of 29 means all DS1s will be looped.
Admin Status	The configured admin status of the line, either Up or Down.

Configuring DS3 Port Redundancy

You can implement physical port redundancy for a DS3 1-port card in a network card slot with a second DS3 1-port card in another network card slot. Only one port on a DS3 1-port card can carry traffic at any time. See the *System Technology and Applications Overview* for information about DS3 physical port redundancy.

Setting DS3 Single Physical Link Redundancy

```
::root=> configuration ds3 redundancy
```

From the `::redundancy=>` prompt, enter the set command in the following format.

set `<option> [-y]`

When you change the redundancy setting for a DS3 card, you must reset the system.

Parameter

<option>

The redundancy option you want to implement for the two DS3 line cards. Select one of the following.

Option	Description
0	No DS3 physical port redundancy.
1	Port 1 on the card is the primary link and the redundant link is Port 1 on the second network card.
2	Port 2 on the card is the primary link and the redundant link is Port 2 on the second network card.

[-y]

The system resets without first displaying a confirmation message. Omitting this parameter causes a confirmation message to display. Enter **-y** to reset the system or **-n** to cancel the command.

Example

```
::redundancy=> set 1
::redundancy=> set 1 -y
```

Displaying DS3 Port Redundancy

::root=> configuration ds3 redundancy

From the `::redundancy=>` prompt, enter the show command in the following format.

show

The following example illustrates the show command.

```
::redundancy=> show
DS3 port redundancy through port 1.

::redundancy=>
```

CONFIGURING SUBTENDED SYSTEMS 4

Avidia systems can both subtend and be subtended by other Avidia systems. The command described in this section creates a subtending management relationship between an AV2200 chassis that is being subtended by another system such as an AV8000, AV6000, AV3000, or another AV2200.

An AV2200 chassis uses a DS1 or E1 card in its first slot for both management and network uplink functions. Also, the AV2200 chassis does not have an Ethernet port. Thus, it is important that the management relationship be set up between the subtending system and the subtended AV2200 system so that full configuration and management control is available to that subtended AV2200 system through the inband management connection.

When setting up subtending, there are other considerations you must make, such as:

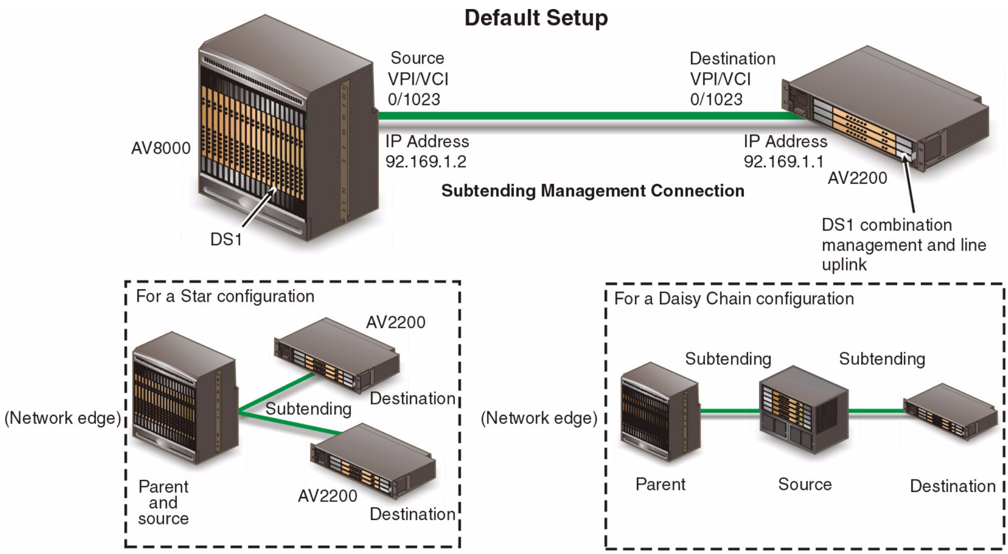
- whether or not you will implement the IMA feature on the DS1 and E1 cards in subtended chassis
- whether or not you will be subtending multiple AV2200 systems from one Avidia system (requires assignment of unique IP addresses)

Go to the following sections for more information.

SETTING UP SUBTENDING MANAGEMENT

Add a subtending management connection between a subtending system and a subtended AV2200 system from the `::subtend=>` prompt. From this prompt, you can also modify and display subtending parameters. See the figure below for an example default setup for subtending. The example indicates which system is designated the parent, source, and destination dependent on installation configuration.

This section describes how to subtend an Avidia 2200 system by creating a subtending management connection. To subtend other Avidia systems, see the *System Technology and Applications Overview* for more information.



Confirming IP Routing is Enabled

Prior to setting up a subtending management connection, ensure that the global IP routing parameter is set to on for all chassis in the subtend group that use either an AV210 or AV220 management card. By default, this parameter is set to off for both of these management cards. See “Configuring Global IP Routing Settings” on page 320 for instructions on how to set this parameter to on.

When subtending an AV2200 system that is using either a DS1 or E1 management card, the global IP routing parameter is set to on by default.

Adding a Subtended System Management Connection

```
::root=> configuration subtend
```

Ensure that the global IP routing parameter is set to on for all chassis in the subtend group that use either an AV210 or AV220 management card (all chassis except the AV2200). Global IP routing is set to off by default and must be set to on before configuring applications requiring IP routing capabilities.

From the `::subtend=>` prompt, enter the new command in the following format. See the sample configuration on page 108.

```
new <slot.port> <vpi> <vci>
[-encap (llc-snap|vcmuxrt)]-srcipaddr <sourceipaddr>
-dstipaddr <destipaddr> -mask <subnetmask>
-parentipaddr <paripaddr> -parentslotport <pslot.pport>
[-admin(up|down)]
```

Parameters

`<slot.port>`

The slot and port for the DS1 or E1 card on the subtending system (source). Or, if IMA is set up for this card and you create a subtending management connection for a group, specify slot and group number for this value (for example, 5.g2 indicates slot 5 and group 2 where the connection will be set up).

`<vpi>`

The VPI for the subtending management connection. For the initial subtending management connection to an AV2200 system, use 0 for the VPI value that matches the default value of 0 used on the subtended AV2200 system. This VPI value must match the value for the subtended end of the connection.

`<vci>`

The VCI for the subtending management connection. For the initial subtending management connection to an AV2200 system, use 1023 for the VCI value that matches the default value of 1023 used on the subtended AV2200 system. This VCI value must match the value for the subtended end of the connection.

-encap (**llc-snap|vcmuxrt**)

The encapsulation used for the subtending management connection. Select either:

- llc-snap—allows multiple protocols to run over the same PVC
- vcmuxrt—used for routing sessions and allows only one protocol to run over the PVC

-srcipaddr <sourceipaddr>

The IP address for the logical port on the subtending (source) chassis. This IP address and the destination IP address must be on the same subnet. For the initial subtending management connection to an AV2200 system, use an IP address of 192.169.1.*x*, where *x* is a value on the same subnet as 192.169.1.1 (default destination IP address).

-dstipaddr <destipaddr>

The WAN IP address of the logical port on the subtended (destination) chassis. For the initial subtending management connection to an AV2200 system, use 192.169.1.1. This is a default IP address value for the subtended AV2200 system. This IP address and the source IP address must be on the same subnet.

-mask <subnetmask>

The subnet mask for the source and destination IP addresses used in the subtending management connection.

-parentipaddr <paripaddr>

The IP address of the parent subtending system. The parent system is the system that is on the edge of the network through which the destination chassis is ultimately subtended. This can be the same slot and port as the source system, or it can be the slot and port a system to which the source system is subtended (daisy-chain configuration). See page 108 for an example showing source and parent for both a daisy-chain and star configuration.

-parentslotport <pslot.pport>

The slot and port for the parent subtending system. The parent system is the system that is on the edge of the network through which the destination chassis is ultimately subtended. This can be the same slot and port as the source system if the source is on the edge of the network, or it can be the slot and port of a system to which the source system is subtended (daisy-chain configuration).

[**-admin**(**up|down**)]

Specifies the administrative status of the subtending management connection. Type **-admin up** to activate the connection. Type **-admin down** to deactivate it. When you select admin up, the subtending management connection is automatically activated.

Example

::subtend=> **new 5.1 0 1023 -encap vcmuxrt -srcipaddr 192.169.1.2 -dstipaddr 192.169.1.1 -mask 255.255.255.0 -parentipaddr 192.169.1.2 -parentslotport 5.1 -admin up**

Modifying a Subtended System Management Connection

::root=> configuration subtend

Changes you make to the subtending management connection must first be made on the subtended (destination) AV2200 system. This modify command changes the parameters for the subtending (source) to match the parameters you previously changed on the subtended AV2200 system (destination). For example, if you want to change the VPI and VCI to new values that fit the numbering scheme for your network, telnet to the subtended AV2200 system and change the VPI and VCI values. Then on the subtending system, use the modify command to change the VPI and VCI values to match those you changed on the subtended (destination) system.

From the ::subtend=> prompt, enter the new command in the following format.

modify <index> <**vpi**> <**vci**> [**-encap** (**llc-snap|vcmuxrt**)] [**-srcipaddr** <sourceipaddr>] [**-dstipaddr** <destipaddr>] [**-mask** <subnetmask>] [**-parentipaddr** <paripaddr>][**-parentslotport** <pslot.pport>] [**-admin** (**up|down**)]

Parameters

<index>

The subtending table index number that is associated with the subtending configuration you want to modify. For information on the subtending table, see “Displaying Subtending Information” on page 113.

Change the subtended chassis VPI and VCI or destination IP address prior to changing these values. This command changes the parameters for the subtending (source) to match the parameters you previously changed on the subtended AV200 system (destination).

<**vpi**>

The VPI for the subtending management connection. When modifying, use a VPI value that matches the scheme used for your network and change it to match the VPI on the subtended AV2200 system.

<**vci**>

The VCI for the subtending management connection. When modifying, use a VCI value that matches the scheme used for your network and change it to match the VCI on the subtended AV2200 system.

[**-encap** (**llc-snap|vcmuxrt**)]

The encapsulation used for the subtending management connection. Select either:

- llc-snap—allows multiple protocols to run over the same PVC
- vcmuxrt—used for routing sessions and allows only one protocol to run over the PVC

[**-srcipaddr** <sourceipaddr>]

The IP address of the logical port on the subtending (source) chassis. When modifying, use a IP address that matches the scheme used for your network and change it to be on the same subnet as the subtended AV2200 system.

[**-dstipaddr** <destipaddr>]

The WAN IP address of the logical port on the subtended (destination) chassis. This IP address should be on the same subnet as the source IP address.

[**-mask** <subnetmask>]

The subnet mask for the source and destination IP addresses used in the subtending management connection.

[**-parentipaddr** <paripaddr>]

The IP address of the parent subtending system. The parent system is the system that is on the edge of the network through which the destination chassis is ultimately subtended. This can be the same slot and port as the source system, or it can be the slot and port a system to which the source system is subtended (daisy-chain configuration). For an example showing source and parent for both a daisy-chain and star configuration, see page 108.

[**-parentslotport** <pslot.pport>]

The slot and port for the parent subtending system. The parent system is the system that is on the edge of the network through which the destination chassis is ultimately subtended. This can be the same slot and port as the source system if the source is on the edge of the network, or it can be the slot and port of a system to which the source system is subtended (daisy-chain configuration).

[**-admin**(**up**|**down**)]

Specifies the administrative status of the subtending management connection. Type **-admin up** to activate the connection. Type **-admin down** to deactivate it. It is important to note that if you telnet to a subtended AV2200 system and set the administrative status to down, you will not be able to set up another telnet session or otherwise manage the system remotely.

Example

::subtend=> **modify 5 50 100 -encap vcmuxrt -srcipaddr 196.169.2.101 -dstipaddr 196.169.2.103 -mask 255.255.255.0 -parentipaddr 192.169.2.102 -parentslotport 5.1 -admin up**

Displaying Subtending Information

::root=> configuration subtend

From the ::subtend=> prompt, enter the show command in the following format.

show [<slot>]

Parameters

[<slot>]

The slot and port (or slot and group number when configured for IMA) for the DS1 or E1 card on the subtending system (source). Omitting this parameter displays all subtending information.

Example

::subtend=> **show**

The following example illustrates the show command.

```
::subtend=> show

Idx Port       SrcVPI  SrcVCI  SrcIP           DstIP           Mask
    ParentPort DstVPI  DstVCI  ParentIP        Encap           Oper
-----------------------------------------------------------------------------
1   2          0       1025    22.10.11.1      22.10.11.2      255.255.255.0
    g2         0       110     22.10.11.1      VC-MUXRt        up

::subtend=>
```

The following table describes the information displayed after you enter the show command.

Column	Description
Idx	The index number that is associated with a specific subtending configuration.
Port	The source port or group for the DS1 or E1 subtending card.
SrcVPI	The VPI at the source subtending chassis.
SrcVCI	The VCI at the source subtending chassis.
SrcIP	The IP address of the logical port on the subtending (source) chassis.
DstIP	The WAN IP address of the logical port on the subtended (destination) chassis.
Mask	The subnet mask for the source and destination IP addresses.
ParentPort	The port (or group) for the parent subtending system. The parent system is the system that is on the edge of the network through which the destination chassis is ultimately subtended.
DstVPI	The VPI at the destination subtended chassis.
DstVCI	The VCI at the destination subtended chassis.
ParentIP	The IP address of the parent subtending system. The parent system is the system that is on the edge of the network through which the destination chassis is ultimately subtended.
Encap	The encapsulation used for the subtending management connection. • llc-snap allows multiple protocols to run over the same PVC • vcmuxrt is used for routing sessions and allows only one protocol to run over the PVC
Oper	The operational status of the subtending management connection as up or down.

Deleting a Subtended System

```
::root=> configuration subtend
```

From the `::subtend=>` prompt, enter the delete command in the following format.

`delete` `<index>`

Parameters

`<index>`

The subtending table index number that is associated with the subtending configuration you want to delete. For information on the subtending table, see “Displaying Subtending Information” on page 113.

Example

`::subtend=>` **`delete 1`**

Setting Up Subtending for Multiple AV2200 Systems

You can subtend more than one AV2200 system from a subtending system. When subtending multiple AV2200 systems, it is very important that you use unique VPI/VCI combinations for the PVC and unique IP addresses when setting up the subtending management connection. For a detailed description of cards and chassis that can be used, see the *System Technology and Applications Overview*.

DETERMINING SUBTENDING CONFIGURATION WHEN USED WITH IMA

When setting up a subtending management connection to an AV2200 chassis, consider other features that you may implement at the same time such as IMA. The process of setting up subtending in conjunction with other features may impact the order of implementation.

When initially setting up a subtending management connection to a remote AV2200 system, the DS1 or E1 UNI interface port 1 (link 1) on the subtended AV2200 system uses a default VPI/VCI and IP address so that it can easily connect to the subtending system for management. Because port 1 (link 1) has a default subtending management connection (PVC) assigned to it, this link cannot be added to an IMA group until the PVC is removed (see rules for adding links to IMA groups on page 133). Follow the process below to both subtend a remote AV2200 system and set up IMA groups. The process below also provides instruction for making port 1 (link 1) available for inclusion in a group.

1 Use the subtend new command (see page 109) to set up the subtending management connection from the subtending system to the remote AV2200 system.

2 Configure the DS1 or E1 ports.

3 Use a telnet session to the AV2200 to:

- Set up IMA groups on the subtended AV2200 system (see page 121).
- Add links (other than link 1) to the IMA groups (see page 134).

4 Set up a new subtending management connection over an IMA group as follows:

a On the remote subtended AV2200 system, use the subtend new command to set up a management connection assigned to an IMA group. Access the remote AV2200 system using a telnet session. From the command-line interface `::root` directory, enter **`configuration subtend`** to access the subtend command (see “Adding a Subtended System Management Connection” on page 109).

If you subtend multiple AV2200 systems from one subtending system, each subtending management connection must have a unique IP address. Also, the source and destination IP addresses for a subtending management connection must be on the same subnet.

b From the subtending system, use the subtend command to complete the set up of the new subtending management connection to the remote AV2200 system. Enter the same VPI and VCI assigned to the subtending management connection assigned to an IMA group in Step a. Assign IP addresses for the source and destination that meets your system requirements and are on the same subnet as the remote AV2200 system.

It is important to document the ATM PVC numbers and IP address and subnet values you use when setting up a new subtending management connection to a remote AV2200 system. After you create the new subtending connection, reassign the default route, delete the default connection, then save this configuration, only the new connection is valid. The default subtending connection is no longer available.

5 Once the new subtending connection is set up, do the following.

a use the ping command from the subtending system to ensure that the new subtended management connection was made and is active. (From the `root::` directory, enter **`admin`** to access the ping command; for more information about the ping command, see the *Avidia System Administrator Guide*.)

b assign the default routing entry to the new subtending management connection (from the `root::` directory, enter **`configuration routing routingtb`**, then use the new command to associate the default destination IP address 0.0.0.0 to the new subtending management connection entered as the next hop).

c delete the PVC for subtending management associated with port 1 (link 1). The PVC should be index 1 with a VPI and VCI of 0/1023.

6 Add port 1 (link 1) to any IMA group or continue to use it as a UNI interface, as required for your application.

7 Save the new configuration using the save command (see the *Avidia System Administrator Guide* for more information on using the save command).

SETTING UP IMA 5

Inverse Multiplexing for ATM (IMA) provides the capability to transmit and receive a single high-speed data stream over multiple slower-speed DS1 or E1 physical links. IMA aggregates these DS1 or E1 links into groups that appear as a single larger-bandwidth logical pipe. IMA distributes the ATM datastream, cyclically in a round-robin method, onto these multiple parallel DS1 or E1 links to transmit at the higher bandwidth. IMA is available on the Avidia 8xDS1, 8xDSX-1, and 8xE1 cards and supports symmetric configuration and operation.

Go to the following sections for more information.

ABOUT IMA GROUPS AND LINKS

IMA groups can contain from one to eight DS1 or E1 links, with a maximum of four groups on a single card. Each DS1 or E1 link (port) can be assigned to and be part of only one IMA group. The total number of links defines the aggregate bandwidth for the group and the minimum number of links defines both the:

- bandwidth within which CBR, rt-VBR, and nrt-VBR traffic can be set up (the total bandwidth for these QoS cannot exceed the bandwidth of the minimum number of links)
- minimum number of links that must be operational for the group to remain in service

The bandwidth calculations used in the following example are generalized. Actual user bandwidth calculations must take into account overhead for both DS1 or E1 transmission as well as IMA.

For example, a DS1 IMA group can be configured to meet a user bandwidth requirement with:

- a total of six links for a maximum aggregate bandwidth of 6 x 1.544 Mbps
- a minimum of four links which defines the minimum number of links required for the group to remain in service and the total bandwidth of 4 x 1.544 Mbps to which subscriber traffic can be assigned with CBR, rt-VBR, and nrt-VBR QoS
- unlimited assignment of UBR QoS based on over-subscription models

The DS1 or E1 links can be dynamically added or deleted from an IMA group without affecting the continuity. There are conditions that apply, however, and are covered in “Configuring IMA Links” on page 133. In addition, any single DS1 or E1 link on an 8xDS1/DSX-1 or 8xE1 card that is not configured as part of an IMA group can be used as a UNI interface without IMA.

CONFIGURING IMA GROUPS

Complete the following before setting up IMA groups and links:

1. **set up DS1 or E1 port configuration (see “Configuring Network Services” on page 73)**
2. **for a remote AV2200 system, set up the subtending management connection (see “Configuring Subtended Systems” on page 107)**

Setting Up an IMA Group

```
::root=> configuration atm ima group
```

From one to four IMA groups can be configured on any DS1 or E1 card using the new command. From the `::group=>` prompt, enter the new command in the following format.

```
new <slot> <groupid>
[-version (imaVersion)][-minlinks <minNumOfLinks>]
[-framelength (imaFrameLength)][-clockmode <clockOper>]
[-desiredtrl <desiredTrlVal>] [-maxdelay [<maxDiffDelay>]
[-testmode <testOper>] [-alias [<ifName>]
[-admin (adminStatus)]
```

Parameters

`<slot>`

The slot number for the DS1 or E1 card on which you will configure an IMA group.

`<groupid>`

The identifying number for the IMA group from 1 to 4. When configuring IMA groups, there is a maximum of four IMA groups on a card.

[-version(imaVersion)]

The version of IMA that will apply to this group. Select one of the following.

- `1.0` when the IMA group at the other end of the connection conforms only to IMA Version 1.0
- `Fallback` (default configuration) when the IMA group at the other end of the connection can be either IMA version 1.1 or 1.0

  With this configuration, the IMA group comes up as Version 1.1, then checks the version of the IMA group at the other end of the connection. If the other end is configured with IMA Version 1.0, the IMA group automatically falls back to IMA Version 1.0. This mode allows the IMA group to inter-operate with an IMA group at the other end of the connection with an IMA Version 1.0 or 1.1.
- `1.1` when the IMA group at the other end of the connection conforms only to IMA version 1.1

[-minlinks <minNumOfLinks>]

The minimum number of links you specify for the group from 1 to 8. This number can be the same as or less than the total number of links assigned to the group. The default is 1. The minimum number of links define the:

- bandwidth within which CBR, rt-VBR, and nrt-VBR traffic can be set up
- number of links that must be operational for the group to remain in service

[-framelength (imaFrameLength)]

The number of cells in an IMA frame. Select `32`, `64`, `128` (default), or `256` cells as the IMA frame length. IMA performance is a function of the frame length. When the frame size is small, the overhead for processing is greater. When the IMA frame size is very large, the protocol between the sending and receiving IMA groups takes longer to process.

[**-clockmode** <clockOper>]

The transmit clock mode for the IMA group. Select the clock mode as `itc` (independent) or `ctc` (common and the default).

Independent (itc) mode allows each link in the group to derive its transmit clock separately. The clock source that you selected when you configured each DS1 or E1 port determines the transmit clock source for the link. When using Independent clock source, it is preferable to select the clock for all ports in the group as either loop or local. For more information about configuring the transmit clock source for DS1 or E1 ports, see “Configuring DS1 Service” on page 84 or “Configuring E1 Service” on page 91.

Common (ctc) mode allows you to select a common transmit clocking source for all links in the IMA group. When the transmit clock mode is Common, a link in the group can be specified as the timing reference for the group (see desiredtrl command below). When you select Common mode, the IMA clock supersedes the clock selected when you configured each DS1 or E1 port. For more information about configuring the Transmit Clock Source, see “Configuring DS1 Service” on page 84 or “Configuring E1 Service” on page 91.

[**-desiredtrl** <desiredTrlVal>]

The link that is set as the transmit timing reference link for the group. When the clock mode is set to ctc, select either a specific link (`1` to `8`) or select `0` for auto which automatically defaults to the lowest number link that is up in the group as the transmit timing reference for the group. The default is 0 (auto). When the clock mode is set to itc, you can select a transmit timing reference link, but it is not required.

[-**maxdelay** [<maxDiffDelay>]

This value specifies the maximum differential delay for all links in the group. If any link exceeds this maximum value, then the link is automatically removed from service and a Loss of Delay Sync (LODS) alarm for that link is generated. Enter a value for the maximum delay between `5` to `125 msec` for an 8xDS1 group or between `5 to 100 msec` for an 8xE1 group. The default value for both DS1 and E1cards is 25 msec. If you are attempting to add a link to an existing group and that link exceeds this delay, it is not added to the group. Each end of the IMA connection can have a maximum differential delay specified.

Maximum differential delay specifies the difference allowed between the fastest and the slowest links in the group and limits the total cell delay added to all cells in the group.

[**-testmode** <testOper>]

The operational status for test mode. Select either `enable` or `disable` (default). When `enable` is selected, this test verifies connectivity for the IMA group by sending a test pattern on one link (test pattern procedure). The test pattern is then received by the other links in the group and verified for accuracy. The link that sends the test pattern is automatically selected and a test pattern is automatically generated. To end test mode, select `disable`.

[**-alias** [<ifName>]

The name for the IMA group that makes it easy to identify. The name must be 64 characters or less in length and can be a combination of alpha-numeric values.

[**-admin** (adminStatus)]

The operational status for the IMA group. Select `Up` to activate the IMA group so that it is capable of being operationally up and passing data. Select `Down` to block the IMA group so that it is not able to pass data.

Examples

```
::group=> new 3 1  -version fallback -minlinks 3
-framelength 64 -clockmode ctc -desiredtrl 2 -maxdelay 25
-testmode disable -alias Bldg3 -admin up
```

Modifying an IMA Group

```
::root=> configuration atm ima group
```

Change the parameters for the group, as required. The following parameters, however, have these restrictions:

- frame length for the IMA group cannot be changed
- minimum number of links for the IMA group can be increased, but can be decreased only if all the PVCs for the group are first deleted

Use the modify command to change parameters for an IMA group, as required. From the `::group=>` prompt, enter the modify command in the following format.

```
modify <slot> <groupid>
[-version (imaVersion)][-minlinks <minNumOfLinks>]
[-clockmode <clockOper>] [-desiredtrl <desiredTrlVal>]
[-maxdelay [<maxDiffDelay>] [-testmode <testOper>]
[-alias [<ifName>] [-admin (adminStatus)]
```

Parameters

`<slot>`

The slot number for the DS1 or E1 card where you will change parameters for an IMA group.

`<groupid>`

The identifying number for the IMA group from 1 to 4 that you want to modify.

[**-version**(imaVersion)]

The version of IMA that will apply to this group. Select one of the following.

- `1.0` when the IMA group at the other end of the connection conforms only to IMA Version 1.0
- `fallback` (default configuration) when the IMA group at the other end of the connection can be either IMA version 1.1 or 1.0

  With this configuration, the IMA group comes up as Version 1.1, then automatically checks the version of the IMA group at the other end of the connection. If the other end is configured with IMA Version 1.0, the IMA group automatically falls back to IMA Version 1.0. This mode allows the IMA group to inter-operate with an IMA group at the other end of the connection with an IMA Version 1.0 or 1.1.
- `1.1` when the IMA group at the other end of the connection conforms only to IMA version 1.1

[**-minlinks** <minNumOfLinks>]

The minimum number of links you specify for the group from 1 to 8. The minimum number of links for the IMA group can be increased (the minimum number of links can be decreased only if all the PVCs for the group are first deleted). This number can be the same as or less than the total number of links assigned to the group. The default is 1. The minimum number of links define the:

- bandwidth within which CBR, rt-VBR, and nrt-VBR traffic can be set up
- number of links that must be operational for the group to remain in service

[-clockmode <clockOper>]

The transmit clock mode for the IMA group. Select the clock mode as `itc` (independent**)** or `ctc` (common and the default).

Independent mode (`itc`) allows each link in the group to derive its transmit clock separately. The clock source that you selected when you configured each DS1 or E1 port determines the transmit clock source for the link. When using Independent clock source, it is preferable to select the clock for all ports in the group as either loop or local. For more information about configuring the Transmit Clock Source, see “Configuring DS1 Service” on page 84 or “Configuring E1 Service” on page 91.

Common mode (`ctc`) allows you to select a common transmit clocking source for all links in the IMA group. When the transmit clock mode is Common, a link in the group can be specified as the timing reference for the group (see desiredtrl command). When you select Common mode, the IMA clock supersedes the clock selected when you configured each DS1 or E1 port. For more information about configuring the Transmit Clock Source, see “Configuring DS1 Service” on page 84 or “Configuring E1 Service” on page 91.

[-desiredtrl <desiredTrlVal>]

The link that is set as the transmit timing reference link for the group. When the clock mode is set to ctc, select either a specific link (`1` to `8`) or select `0` for auto which defaults to the lowest number link that is up in the group as the transmit timing reference for the group. Auto is the default. When the clock mode is set to itc, you can select a transmit timing reference link, but it is not required.

[-**maxdelay** [<maxDiffDelay>]

This value specifies the maximum differential delay for all links in the group. If any link exceeds this maximum value, then the link is automatically removed from service and a Loss of Delay Sync (LODS) alarm for that link is generated. Enter a value for the maximum delay between `5` to `125 msec` for an 8xDS1 group or between `5 to 100 msec` for an 8xE1 group. The default value for both DS1 and E1cards is 25 msec. If you are attempting to add a link to an existing group and that link exceeds this delay, it is not added to the group. Each end of the IMA connection can have a maximum differential delay specified.

Maximum differential delay specifies the difference allowed between the fastest and the slowest links in the group and limits the total cell delay added to all cells in the group.

[-testmode <testOper>]

The operational status for test mode. Select either `enable` or `disable` (default). When `enable` is selected, this test verifies connectivity for the IMA group by sending a test pattern on one link (test pattern procedure). The test pattern is then received by the other links in the group and verified for accuracy. The link that sends the test pattern is automatically selected and a test pattern is automatically generated. To end test mode, select `disable`.

[**-alias** [<ifName>]

A name for the IMA group that makes it easily identified. The name must be 64 characters or less in length and can be a combination of alpha-numeric values.

[**-admin** (adminStatus)]

The operational status for the IMA group. Select `Up` to activate the IMA group so that it is capable of being operationally up and passing data. Select `Down` to block the IMA group so that it is not able to pass data.

Examples

```
::group=> modify 3 1  -version 1.0 -testmode enable
-admin down
```

Displaying IMA Group Configurations

```
::root=> configuration atm ima group
```

From the `::group=>` prompt, enter the show command in the following format.

show <slot> [<groupid>]

Parameter

[<slot>]

The slot where the DS1 or E1 card resides that has the IMA group for which you want to view information.

[<groupid>]

The number of the group (1 through 4) for which you want to view information.

Examples

```
::group=> show 3 1
```

The following example shows the information presented for an IMA group.

```
::group=> show 3 1
***************  Information of IMA group1 on slot3  ***************

                          Group Admin status:       Up
                    Group Operational Status:       Up
                        Group Interface Name:       Bldg3
                         Group ATM Interface:       5
                         List of Links Added:       1  5
                                 IMA Version:       IMA_1.0
                        Near-end Group State:       Operational
                         Far-end Group State:       Operational
                        Group Failure status:       NoFailure
                              Group Symmetry:       SymmetricOperation
                         Min No. Of Tx Links:       1
                         Min No. Of Rx Links:       1
                     Near-end Tx Clock mode:       Common Transmit Clock
                      Far-end Tx Clock mode:       Common Transmit Clock
            Desired Tx Timing Reference Link:       AUTO
             Actual Tx Timing Reference Link:       1
             Actual Rx Timing Reference Link:       1
                             Group Tx Ima Id:       0
                             Group Rx Ima Id:       0
                       Group Tx Frame Length:       32

Press 'Return' or 'Enter' to continue or 'q' to quit ....
```

```
Press 'Return' or 'Enter' to continue or 'q' to quit ....
Group Rx Frame Length:       32
              Max Differential Delay (in MS):       25
               Least Delay Link in the Group:       5
      Latest Observed Max Diff Delay (in MS):       1
                           Group Alpha Value:       2
                            Group Beta Value:       2
                           Group Gamma Value:       1
                          Group Running Time:       86740
                    Group unavailable Count:       0
                Near-end Group Failure Count:       0
                 Far-end Group Failure Count:       0
                 Group Tx Cell Rate (in CPS):       7016
                 Group Rx Cell Rate (in CPS):       7016
                   No. of Configured Tx Link:       2
                   No. of Configured Rx Link:       2
                       No. of Active Tx Link:       2
                       No. of Active Rx Link:       2
                      Test Link of the Group:       AUTO
                          Group Test Pattern:       255
                 Group Test Procedure status:       Disabled
         No. of Valid Intervals of the Group:       96

Press 'Return' or 'Enter' to continue or 'q' to quit ....
```

```
Press 'Return' or 'Enter' to continue or 'q' to quit ....
       No. of Invalid Intervals of the Group:       0
            Time Elapsed in Current Interval:       770
                   Group Tx OAM label value:       1
                   Group Rx OAM label value:       1
```

The following describes the fields and status displayed for the IMA group.

Information	Description
Group Admin status	The administration status can be either up or down. Up means the group is capable of being operationally up to transmit data. Down means the group is not capable of being operationally up.
Group Operational status	The IMA group is up and available for data transmission.
Group Interface Name	The literal name assigned to this IMA group to make it easily identifiable.
Group ATM Interface	The logical ATM interface (not directly correlated to a physical port) over which ATM connections for the group are carried. This is automatically configured and not user configurable. The value that displays in this field (1 - 8) is used primarily for fault isolation.
List of Links Added	The links (ports) for the card that are assigned to this IMA group.
IMA Version	The IMA version supported by this group. The version can be IMA_1.1, IMA_1.0, or IMA_1.1 fallbackto IMA_1.0.
Near-end Group State	The current state of the IMA group at the near end.
Far-end Group State	The current state of the IMA group at the far end.
Group Failure status	The reason the IMA group failed: • No Failure—no links have failed in the IMA group. • IMA Link Failure—indicates which of the IMA links failed. • LIF Failure—a Loss of IMA Frame defect caused the link failure. An LIF defect occurs when the IMA cells are unsynchronized for at least two frames. • LODS Failure—one of the links has exceeded the maximum differential delay value specified (Link Out of Delay Synchronization defect). • Misconnected—a link is connected incorrectly. • Blocked—one of the links in the group is blocked, perhaps being used by another operation. • Fault—a fault has been detected either on one of the links in the group or in the link protocol for one of the links in the group. • Far End Tx Link Unusable—the transmit link at the far end cannot be used. • Far End Rx Link Unusable—the receive link at the far end cannot be used.
Group Symmetry	Only symmetrical configuration and symmetrical operation is supported (SymmetricOperation).
Min No. of Tx Links	The minimum number of links specified for the transmit side. Minimum number of links determines how many links must be operational for the group to remain in service.
Min No. of Rx Links	The minimum number of links specified for the transmit side. Minimum number of links determines how many links must be operational for the group to remain in service.

Information	Description
Near-end Tx Clock mode	The transmit clock mode selected for the near end is either Common Transmit Clock (ctc mode) or Independent Transmit Clock (itc mode).
Far-end Tx Clock mode	The transmit clock mode selected for the far end is either Common Transmit Clock (ctc mode) or Independent Transmit Clock (itc mode).
Desired Tx Timing Reference Link	The link in the group selected as the reference transmit clock source for the group. Either a link number (1 through 8) or auto (which automatically defaults to the lowest number link that is up in the group as the transmit timing reference for the group).
Actual Tx Timing Reference Link	The number of the link that is actually used for the reference transmit clock source for the transmit side.
Actual Rx Timing Reference Link	The number of the link that is actually used for the reference transmit clock source for the receive side.
Group Tx Ima Id	The IMA ID that is automatically generated and used by the near-end function. The value (zero-relative value) can be 0 through 3, where 0 indicates group 1, 1 indicates group 2, 2 indicates group 3, and 3 indicates group 4.
Group Rx Ima Id	The IMA ID that is automatically generated and used by the far-end function. The value (zero-relative value) can be 0 through 3, where 0 indicates group 1, 1 indicates group 2, 2 indicates group 3, and 3 indicates group 4.
Group Tx Frame Length	The length of the frame, in cells, for the transmit side. The frame length can be 32, 64, 128, or 256 cells in length.
Group Rx Frame Length	The length of the frame, in cells, for the receive side. The frame length can be 32, 64, 128, or 256 cells in length.
Max Differential Delay (in MS)	The most recent maximum differential delay for all links in the group, specified in milliseconds.
Least Delay Link in the Group	The link in the group with the least link propagation delay.
Latest Observed Max Diff Delay (in MS)	The latest observed maximum differential delay (in milliseconds) between the links having the least and the most link propagation delay among the receives currently configured in the IMA group.
Group Alpha Value	The number of consecutive invalid ICP (IMA Control Protocol) cells. This is an IMA frame synchronization control and is not configurable. Alpha causes IMA frame sync to be lost.
Group Beta Value	The number of consecutive errored ICP cells. This is an IMA frame synchronization control and is not configurable. Beta causes IMA frame sync to be lost.
Group Gamma Value	The number of consecutive valid ICP cells. This is an IMA frame synchronization control and is not configurable. Gamma causes IMA frame sync to be restored.
Group Running Time	The number of seconds the IMA group has been operating.

Information	Description
Group Unavailable Count	The count of 1-second intervals where the IMA group traffic state machine is down. It is also called IMA group unavailable seconds.
Near-end Group Failure Count	The count for all near-end group failures. The possible group failures that generate failure alarms include Config-Aborted and Insufficient-Links.
Far-end Group Failure Count	The count for all far-end group failures. The possible group failures that generate failure alarms include Start-up-FE, Config-Aborted-FE, Insufficient-Links-FE, and Blocked-FE.
Group Tx Cell Rate (in CPS)	The current cell rate of the IMA group in the transmission direction.
Group Rx Cell Rate (in CPS)	The current cell rate of the IMA group in the receive direction.
No. of Configured Tx Link	The number of links configured in the transmission direction.
No. of Configured Rx Link	The number of links configured in the receive direction.
No. of Active Tx Link	The number of links currently active in the transmission direction.
No. of Active Rx Link	The number of links currently active in the receive direction.
Test Link of the Group	The link used for testing by the group. The link that sends the test pattern is automatically selected.
Group Test Pattern	The current test pattern for the IMA group. The test pattern is automatically generated. The test link that was automatically selected sends the test pattern to the other links in the group.
Group Test Procedure status	The current status of the test pattern procedure.
No. of Valid Intervals of the Group	The number of 15 minute intervals for which the group is operational.
No. of Invalid Intervals of the Group	The number of 15 minute intervals for which the group is not operational.
Time Elapsed in Current Interval	The number of seconds that have elapsed in the current 15 minute interval.
Group Tx OAM label value	The OAM value transmitted by the near end IMA group.
Group Rx OAM label value	The OAM value transmitted by the far end IMA group.

Deleting an IMA Group

```
::root=> configuration atm ima group
```

Use the delete command to remove an IMA group. An IMA group cannot be deleted if there are links or PVCs associated with the group. From the `::group=>` prompt, enter the delete command in the following format.

`delete` `<slot> [<groupid>]`

Parameters

`[<slot>]`

The slot where the DS1 or E1 card resides that has the IMA group that you want to delete. See “Displaying IMA Group Configurations” on page 127 for slot information.

`[<groupid>]`

The number of the group (1 through 4) that you want to delete. See “Displaying IMA Group Configurations” on page 127 for group id information.

Example

`::group=>` **`delete 3 1`**

CONFIGURING IMA LINKS

After defining the IMA group, you define the links for the group (see “Configuring IMA Groups” on page 121). The number of links you attach to the IMA group must be the same as or greater than the number specified for the minimum number of links for the IMA group. This number also specifies how many links must be active in the group for the group operational status to be up (enabled). For information on how to specify the minimum number of links for a group, see page 122.

DS1 or E1 links can be dynamically added or deleted from an IMA group without affecting the continuity for the group. The administrative status for the physical DS1 or E1 link can be either up or down to add the link to a group. To add a link to a group, the link:

- must be in UNI mode
- cannot have any PVCs assigned to it, including a subtending management connection

The following conditions apply when adding or deleting links to IMA groups. A link cannot be:

- added to or deleted from an IMA group that has test mode enabled (see page 123).
- added to a group if there are PVCs associated with the UNI link and the link is in UNI mode.
- deleted from a group if it is the last link in the group and there are PVCs still associated with the group. You must delete the PVCs for the group before you can delete the last link in the group.

Any single DS1 or E1 link on an 8xDS1/DSX-1 or 8xE1 card that is not configured as part of a group can be used as a UNI interface without IMA.

Adding an IMA Link

```
::root=> configuration atm ima link
```

From one to eight links can be assigned to any group on a DS1 or E1 card. Use the add command to assign IMA links to a group. From the `::link=>` prompt, enter the add command in the following format.

add `<slot.port> <groupid>`

Parameters

`<slot.port>`

The slot number for the DS1 or E1 card and the port number on that card for the link that you will add to an IMA group.

`<groupid>`

The number for the IMA group (from 1 to 4) to which you want to assign this link. The IMA group must have been previously created (see “Setting Up an IMA Group” on page 121).

Examples

`::link=>` **add 3.5 1**

Displaying IMA Links

```
::root=> configuration atm ima link
```

From the `::link=>` prompt, enter the show command in the following format.

show <slot.port>

Parameter

[<slot.port>]

The slot where the DS1 or E1 card resides that has the IMA group and the port (or link) number assigned to the IMA group for which you want to view information.

Examples

::link=> **show 3.5**

The following example shows the information presented for an IMA links.

```
::group=> show 3.5
*****************  Information of IMA link 3.5  *****************

                 Physical Layer Admin status:       Up
           Physical Layer Operational Status:       Up
                       IMA Group of the Link:       1
               IMA Link Tx State at Near-end:       Active
               IMA Link Rx State at Near-end:       Active
                IMA Link Tx State at Far-end:       Active
                IMA Link Rx State at Far-end:       Active
      IMA Link Rx Failure Status at Near-end:       NoFailure
       IMA Link Rx Failure Status at Far-end:       NoFailure
                          Tx LID of the Link:       4
                          Rx LID of the Link:       4
           Latest Relative Delay of the Link:       0
            No. of ICP violation on the Link:       0
            No. of OIF anomalies on the Link:       0
   No. of Severe Errored seconds at Near-end:       0
    No. of Severe Errored seconds at Far-end:       0
      No. of unavailable seconds at Near-end:       0
       No. of unavailable seconds at Far-end:       0
      No. of Tx Unusable seconds at Near-end:       0
      No. of Rx Unusable seconds at Near-end:       0

Press 'Return' or 'Enter' to continue or 'q' to quit ....
```

```
  No. of Tx Unusable seconds at Far-end:       0
        No. of Rx Unusable seconds at Far-end:       0
       No. of Tx transmit failure at Near-end:       0
        No. of Rx receive failure at Near-end:       0
        No. of Tx transmit failure at Far-end:       0
         No. of Rx receive failure at Far-end:       0
                       No. of Tx Stuff events:       469670
                       No. of Rx Stuff events:       472745
                            Link Test Pattern:       255
                   Link Test Procedure status:       Disabled
           No. of Valid Intervals of the Link:       96
         No. of Invalid Intervals of the Link:       0
             Time Elapsed in Current Interval:       733

::link=>
```

The following describes the fields and status displayed for the IMA links.

Information	Description
Physical Layer Admin Status	The administrative status of the physical link. The link can be up or down. This will be the same as the DS1 or E1 administrative status.
Physical Layer Operational Status	The operation status of the physical link. The link can be up or down. This will be the same as the DS1 or E1 administrative status.
IMA Group of the Link	Identifies the group to which the link is attributed from 1 through 4.
IMA Link Tx State at Near-end	The operational state of the transmit links on the near end. Four transmit link states are defined and include Not In Group, Unusable, Usable, and Active.
IMA Link Rx State at Near-end	The operational state of the receive links on the near end. Four receive link states are defined and include Not In Group, Unusable, Usable, and Active.
IMA Link Tx State at Far-end	The operational state of the transmit side at the far end. Four transmit link states are defined and include Not In Group, Unusable, Usable, and Active.
IMA Link Rx State at Far-end	The operational state of the receive side at the far end. Four receive link states are defined and include Not In Group, Unusable, Usable, and Active.
IMA Link Rx Failure Status at Near-end	The failure status of the near end link.
IIMA Link Rx Failure Status at Far-end	The failure status of the far end link.
Tx LID of the Link	The transmit LID used by the link. The LID (Link IDentifier) is a field in the ICP cell that identifies the IMA link on which the ICP cells are transmitted. It determines the round-robin order to retrieve cells from the incoming IMA links at the IMA receiver.
Rx LID of the Link	The receive LID used by the link. The LID is a field in the ICP cell that identifies the IMA link on which the ICP cells are transmitted. It determines the round-robin order to retrieve cells from the incoming IMA links at the IMA receiver.

Information	Description
Latest Relative Delay of the Link	The last measured delay on this link measured relative to the link in the group with the least delay.
No. of ICP violation on the Link	The number of IMA control protocol violations which is the count of errored, invalid, or missing ICP cells, except during seconds where an SES-IMA (severely error seconds) or UAS-IMA (unavailable seconds) condition is reported.
No. of OIF anomalies on the Link	The number of out of IMA frame anomalies that occur at the near-end, except during SES-IMA or UAS-IMA conditions.
No. of Severe Errored seconds at Near-end	The number of Severely Errored Seconds (SES) at the near-end. SES for the near-end indicates a count of 1-second intervals that contain ≥30% of the ICP cells counted as IV-IMAs (invalid or missing ICP cells), or one or more link defects (such as LOS, AIS, LCD), LIF defects, or LODS defects, except during UAS-IMA condition (unavailable seconds)
No. of Severe Errored seconds at Far-end	The number of Severely Errored Seconds (SES) at the far-end. SES for the far-end indicates a count of 1-second intervals containing one or more RDI-IMA (remote defect indicators) defects, except during UAS-IMA-FE condition (unavailable seconds at the far end).
No. of unavailable seconds at Near-end	The number of Unavailable Seconds at the near-end. Unavailable Seconds are seconds during which the IMA receiver is unavailable.
No. of unavailable seconds at Far-end	The number of Unavailable Seconds at the far-end. Unavailable Seconds are seconds during which the IMA receiver is unavailable.
No. of Tx Unusable seconds at Near-end	The count for unusable seconds on the transmission side for the near-end.
No. of Rx Unusable seconds at Near-end	The count for unusable seconds on the receive side for the near-end.
No. of Tx Unusable seconds at Far-end	The count for unusable seconds on the transmission side for the far-end.
No. of Rx Unusable seconds at Far-end	The count for unusable seconds on the receive side for the far-end.
No. of Tx transmit failure at Near-end	The number of times a near-end transmit failure alarm condition has been entered on this link (for example, some form of implementation specific transmit fault).
No. of Rx receive failure at Near-end	The number of times a near-end receive failure alarm condition has been entered on this link (for example, an LIF, LODS, RFI-IMA, Misconnected or some form of implementation specific receive fault).
No. of Tx transmit failure at Far-end	The number of times a far-end transmit failure alarm condition has been entered on this link (for example, Tx-Unusable-FE).
No. of Rx receive failure at Far-end	The number of times a far-end receive failure alarm condition has been entered on this link (for example, Rx-Unusable-FE).
No. of Tx Stuff events	The number of transmit stuff events that have occurred. A stuff event occurs when an ICP cell is repeated over an IMA link to compensate for timing differences with other links within the IMA group.

Information	Description
No. of Rx Stuff events	The number of receive transmit stuff events that have occurred. A stuff event occurs when an ICP cell is repeated over an IMA link to compensate for timing differences with other links within the IMA group.
Link Test Pattern	The current test pattern for the IMA group. The test pattern is automatically generated. The test link that was automatically selected sends the test pattern to the other links in the group.
Link Test Procedure status	The current status of the link test pattern.
No. of Valid Intervals of the Link	The number of 15 minute intervals for which the link is operational.
No. of Invalid Intervals of the Link	The number of 15 minute intervals for which the link is not operational.
Time Elapsed in Current Interval	The accrued time for the 24-hour interval of data collecting.

Deleting an IMA Link

```
::root=> configuration atm ima link
```

From the `::link=>` prompt, enter the delete command in the following format.

delete `<slot.port>`

Parameter

`[<slot.port>]`

The slot where the DS1 or E1 card resides with the IMA group and the port (link) number that you want to delete from that group.

A link cannot be deleted from an IMA group when:

- test mode is enabled (see page 123) for the group
- it is the last link in the group and there are PVCs still associated with the group (delete the PVCs for the group before the link can be deleted)

Examples

```
::link=> delete 3.5
```

COMPLETING OTHER CONFIGURATION AFTER IMPLEMENTING IMA

After you set up the IMA groups and attach links to the group, complete the following:

1 Configure ATM PVCs (connections) and ATM traffic management for the group (see “Configuring Cell PVPCs” on page 238 and “Configuring ATM Policing/UPC” on page 160). It is important to note that the last link in an IMA group cannot be deleted if there are still ATM PVCs set up for the IMA group.

2 If bridging/routing will be set up over the ATM PVC, configure the session, router group, and bridge or router as applicable (see “Configuring Bridging and Routing” on page 309).

3 If an IDSL subscriber card running Frame Relay will connect to the IMA group using a PVC, then configure Frame Relay as applicable (see “Configuring Frame Relay Interworking” on page 287).

4 It is recommended that the IMA groups at both ends of the connection comprise the same number of links. Although you can configure an additional link(s) at either end, the extra link(s) is not a functional part of the IMA group.

OAM loopback diagnostics can be run on the IMA group, however:

- When viewing the StarGazer Network Map, the links on a DS1, DSX-1, or E1 card will not show separately when configured as part of an IMA group. The group shows as one logical entity.
- When you activate port utilization or performance charting through StarGazer for a DS1, DSX-1, or E1 card, the calculations are made for the IMA group and not for individual links.

CONFIGURING ATM TRAFFIC 6

This chapter provides instruction for configuring ATM traffic parameters, including configuring traffic profiles. Before configuring traffic profiles or selecting parameter values for an Avidia system, you must understand the limitations and constraints surrounding these parameters as they apply to Avidia systems.

Go to the following sections for more information.

See the *Avidia System Technology and Applications Overview* for more detailed information about the Avidia systems and ATM traffic.

About Traffic Contract and QoS Parameters

The following tables list parameter values relative to card type and service category.

Traffic Category	Description
Unspecified Bit Rate (UBR)	UBR is a best-effort service that is best suited for LAN traffic. When traffic congestion occurs, data is dropped.
Constant Bit Rate (CBR)	CBR is the highest QoS, with a guaranteed constant bandwidth. It is best suited for applications that transmit at a fixed bandwidth, such as uncompressed voice and video, and circuit emulation. When configuring CBR traffic, the specified peak cell rate applies to both tagged and non-tagged cells. This traffic type does not set the Cell Loss Priority (CLP) bit on transmitted cells that do not conform to the QoS contract.
Real-time Variable Bit Rate (rt-VBR)	rt-VBR carries a variable bandwidth. It is well suited for real-time services such as compressed voice and video which require stringent cell transfer latency and less bursty traffic. It is not well suited for LAN traffic due to the unpredictability of LAN traffic burst size.
Non-real-time Variable Bit Rate (nrt-VBR)	nrt-VBR carries variable bandwidth. It is well suited for data services such as frame relay over ATM which requires guaranteed bandwidth and lower QoS. It is not well suited for LAN traffic due to the unpredictably of LAN traffic burst size.

Avidia supports TM 4.0 compatible traffic contract specifications. The following table indicates the traffic parameters that are available for each supported QoS service category. The traffic parameters include:

- PCR—Peak Cell Rate
- SCR—Sustained Cell Rate
- MBS—Maximum Burst Size
- CDVT—Cell Delay Variation Tolerance measured in microseconds (μs) and supported on a per connection basis
- Max CTD—Cell Transfer Delay measured in milliseconds (ms)
- CLR—Cell Loss Ratio

QoS Service Category	PCR	CDVT	MaxCTD	CLR	SCR	MBS	Shaper[1]
UBR — Unspecified Bit Rate[2]							
CBR — Constant Bit Rate	X	X	X	X			X
rt-VBR — Real-Time Variable Bit Rate	X	X	X	X	X	X	
nrt-VBR — Non-Real-Time Variable Bit Rate	X	X	X	X	X	X	

[1] Shaper applies to the DS3 4-port card only.
[2] There are no traffic descriptors for UBR service (best effort-admit all).

The following table shows the range and default values for each of the supported traffic parameters.

Traffic Parameter	Units	Range	Default Value	Increment
PCR	Cells / Sec.	150 — 353207	150	1
SCR	Cells / Sec.	150 — 353206	150	1
MBS	Cells	1 — 4000	1	1
CDVT	Microsecond (us)	150 — 180000	1500	1
Max CTD	Millisecond (ms)	20 — 1000	20	1
CLR	Ratio	10^{-5} — 10^{-12}	10^{-9}	1
Shaper[1]	On/Off	1 is on 2 is off	2 is off	—

[1] Shaper applies to the DS3 4-port card for CBR services only.

The method used to determine upper bounds for the Cell Loss Ratio (CLR) parameter is based on the card type and the service category under which it is operating. The table below shows the upper limits of the CLR parameter for each service category and for each type of Avidia card. There is no CLR guarantee for UBR.

	Card Type							
Service Category	**OC3/ STM-1**	**DS3 1-port**	**DS3 4-port**	**DS1/E1**	**ADSL 12-port**	**ADSL 24-port**	**G.shdsl**	**SDSL**
CBR	10^{-9}	10^{-8}	10^{-8}	10^{-8}	10^{-7}	10^{-7}	10^{-7}	10^{-7}
rt-VBR	10^{-9}	10^{-8}	10^{-8}	10^{-8}	10^{-7}	10^{-7}	10^{-7}	10^{-7}
nrt-VBR	10^{-7}	10^{-6}	10^{-6}	10^{-6}	10^{-5}	10^{-5}	10^{-5}	10^{-5}

Avidia supports Cell Delay Variation Tolerance (CVDT) on a per connection basis. CVDT is also a function of card type. The table below shows the default values for this traffic parameter for each relevant Service Category and for each Avidia card type. These values represent the maximum allowed tolerance (in µseconds) supported by Avidia systems.

	Card Type							
Service Category	**OC3/ STM-1**	**DS3 1-port**	**DS3 4-port**	**DS1/E1**	**ADSL 12-port**	**ADSL 24-port**	**G.shdsl**	**SDSL**
CBR	150 µs	250 µs	250 µs	750 µs	1500 µs	1500 µs	1500 µs	1500 µs
rt-VBR	150 µs	250 µs	250 µs	750 µs	1500 µs	1500 µs	1500 µs	1500 µs^{-}
nrt-VBR	250 µs	500 µs	500 µs	850 µs	1500 µs	1500 µs	1500 µs	1500 µs

You can enable traffic shaping for an Avidia DS3 4-port card using the CBR service category only. Shaping controls the rates of outgoing traffic from an ATM interface. For DS3 4-port cards, there is a limitation to the number of distinct, shaped CBR rates (unique PCR value) that can be supported for the port and for the card. There is also a limit to the combined distinct, non-shaped CBR rates and distinct rt-VBR (unique SCRs) that can be supported for the port and for the card (see page 145).

The ADSL 24-port card has a limitation to the number of non-shaped CBR and rt-VBR rates that can be supported. See page 148 for more information.

For a more detailed explanation of the traffic types and their related parameters, see the *Avidia System Technology and Applications Overview*.

Configuring ATM Traffic Profiles

ATM traffic profiles are pre-configured combinations of traffic descriptors and related parameters, that define the traffic QoS contract. You assign traffic profiles to both upstream and downstream traffic when configuring PVPCs and PVCCs. It is efficient to configure the ATM traffic profiles before configuring ATM service on Avidia card ports.

Rate Restriction for CBR and rt-VBR Connections

These rate restrictions apply to two cell cards: the DS3 4-port and ADSL 24-port. The DS3 4-port card rate restrictions exist at the port and also at the card level. The restrictions are implemented when assigning traffic profiles to PVPCs or PVCCs for shaped CBR traffic and for non-shaped CBR and rt-VBR traffic. See the section below for DS3 4-port card rate restrictions.

Additionally, there are rate restrictions that apply to the ADSL 24-port card at the port and also at the card level. The restrictions are implemented when assigning traffic profiles to PVPCs or PVCCs for non-shaped CBR and rt-VBR traffic. See the section on page 148 for ADSL 24-port card rate restrictions.

DS3 4-port Card Rate Restrictions

The DS3 4-port card supports these maximum number of distinct rates for shaped CBR connections and for the total of non-shaped CBR and rt-VBR connections:

For this interface	Maximum distinct rates for shaped CBR only	Maximum distinct rates for combined non-shaped CBR and rt-VBR
Port	32	16
Card	128	64

Only DS3 4-port cards support shaped CBR connections.

Maximum distinct rates for shaped CBR. A shaped CBR connection has the shaper parameter set to 1or enabled. A distinct rate means that the shaped CBR traffic profile has a unique PCR value. There can be a maximum of **32** shaped CBR traffic profiles with different PCR values (distinct rates) assigned to PVPCs and PVCCs at a port level. There can be a maximum of **128** shaped CBR traffic profiles with different PCR values (distinct rates) assigned to PVPCs and PVCCs at a card level.

For example:

You can create 32 profiles for shaped CBR and assign different PCR values from 4500 through 4531 for a total of 32 distinct rates.

```
::traffic=> new 6 cbr 4500 3000 150 10 1

::traffic=> new 7 cbr 4501 3000 150 10 1

::traffic=> new 8 cbr 4502 3000 150 10 1
         .
         .
         .
::traffic=> new 37 cbr 4531 3000 150 10 1
```

When you have assigned each of the 32 traffic profiles to PVPCs or PVCCs on a port, you have reached the maximum distinct rates for the port. You can assign any of the 32 traffic profiles multiple times because they are not distinct rates. A distinct rate occurs only when a new and distinct PCR value is assigned to a PVPC or PVCC.

Follow the example above for the maximum of 128 distinct rates for a DS3 4-port card.

Maximum distinct rates for non-shaped CBR and rt-VBR. A non-shaped CBR connection has the shaper parameter set to 2 or disabled. For non-shaped CBR traffic, distinct rate means that the CBR traffic profile has a unique PCR value. For rt-VBR traffic, distinct rate means that the rt-VBR traffic profile has a unique SCR value. A combination of **16** distinct-rate non-shaped CBR and distinct rate rt-VBR traffic profiles can be assigned to PVPCs or PVCCs at a port level. A combination of **64** distinct-rate non-shaped CBR and distinct rate rt-VBR traffic profiles can be assigned to PVPCs or PVCCs at a port level.

For example:

You can create eight distinct non-shaped CBR profiles and eight distinct rt-VBR profiles. The following are eight distinct, non-shaped CBR profiles (distinct PCR).

```
::traffic=> new 6 cbr 4500 3000 150 10 2
         .
         .
::traffic=> new 13 cbr 4507 3000 150 10 2
```

The following are eight distinct rt-VBR profiles (distinct SCR).

```
::traffic=> new 14 rt-vbr 4500 3000 150 10 2000 250
         .
         .
::traffic=> new 21 rt-vbr 4500 3000 150 10 2007 250
```

When you have assigned all 16 traffic profiles to PVPCs or PVCCs on a port, you have reached the maximum distinct rates for the port. You can assign any of the 16 traffic profiles multiple times because they are not distinct rates. A distinct rate occurs only when a new and distinct PCR or SCR value is used, as applicable.

Follow the example above for the maximum of 64 distinct rates for a DS3 4-port card. You can have any combination of distinct rates for non-shaped CBR connections combined with rt-VBR connections for a combined total of 64.

ADSL 24-port Card Rate Restrictions

The ADSL 24-port card supports these maximum number of distinct rates for non-shaped CBR connections combined with rt-VBR connections:

For this interface	Maximum distinct rates for combined non-shaped CBR and rt-VBR
Port	16
Card	384

A non-shaped CBR connection has the shaper parameter set to 2 or disabled. For non-shaped CBR traffic, distinct rate means that the CBR traffic profile has a unique PCR value. For rt-VBR traffic, distinct rate means that the rt-VBR traffic profile has a unique SCR value. A combination of **16** distinct-rate non-shaped CBR and distinct rate rt-VBR traffic profiles can be assigned to PVPCs or PVCCs at a port level. A combination of **64** distinct-rate non-shaped CBR and distinct rate rt-VBR traffic profiles can be assigned to PVPCs or PVCCs at a port level.

For example:

You can create eight distinct non-shaped CBR profiles and eight distinct rt-VBR profiles (or any combination for a total of 16). The following are eight distinct, non-shaped CBR profiles (distinct PCR).

```
::traffic=> new 6 cbr 4500 3000 150 10 2
         .
         .
::traffic=> new 13 cbr 4507 3000 150 10 2
```

The following are eight distinct rt-VBR profiles (distinct SCR).

```
::traffic=> new 14 rt-vbr 4500 3000 150 10 2000 250
         .
         .
::traffic=> new 21 rt-vbr 4500 3000 150 10 2007 250
```

When you have assigned all 16 traffic profiles to PVPCs or PVCCs on a port, you have reached the maximum distinct rates for the port (or any combination for a total of 16). You can assign any of the 16 traffic profiles multiple times because they are not distinct rates. A distinct rate occurs only when a new and distinct PCR or SCR value is used, as applicable.

Follow the example above for the maximum of 384 distinct rates for an ADSL 24-port card. You can have any combination of distinct rates for non-shaped CBR connections combined with rt-VBR connections for a combined total of 384.

Adding ATM Traffic Profiles

The ATM Traffic Profiles are stored in an ATM traffic descriptor table. Each profile has an index number assigned to it. You use the index number to assign a profile to a PVPC or PVCC.

```
::root=> configuration atm traffic
```

1 From the `::traffic=>` prompt, enter **`show`** to view the ATM traffic descriptor table.

2 Note the next available index number.

3 Enter the new command in the following format.

`new` `<index> <type>`

Parameters

`<index>`

The ATM traffic descriptor table index number you want to associate with the configuration. This is an identifying number for a traffic profile. The default index 0 is for UBR.

`<type>`

One of the following supported traffic descriptors with associated parameters:

- **`cbr`** `<PCR> <CDVT> <MaxCTD> <CLR> [Shaper]`
- **`nrt-VBR`** `<PCR> <CDVT> <MaxCTD> <CLR> <SCR> <MBS>`
- **`rt-VBR`** `<PCR> <CDVT> <MaxCTD> <CLR> <SCR> <MBS>`

`<PCR>`

The peak cell rate, in cells per second, to be applied to all cells regardless of the CLP tagging. This parameter is optional for UBR traffic. The Peak Cell Rate must be greater than or equal to the Sustained Cell Rate. The valid range is 150-353,207 cells/sec.

`<CDVT>`

The maximum allowable Cell Delay Variation Tolerance, or delay between consecutive ATM cells, in cells per µsec. The valid range is 150-180000 µsec. The default is 1500 µsec.

`<MaxCTD>`

The maximum Cell Transfer Delay, or elapsed time, between the transmission of a cell and the receipt of that cell at its destination, in msec. The valid range is 20-1000 msec.

`<CLR>`

The maximum Cell Loss Ratio, or number of lost cells divided by the total number of transmitted cells. This value is represented as 10^{-n}, where *n* is the required input for this parameter. The valid range is 5 - 12.

`<Shaper>`

Traffic shaping that can be enabled for the CBR service category on an Avidia DS3 4-port card only. Enter 1 to enable shaping. Enter 2 to disable shaping. The default is shaping disabled.

`<SCR>`

The Sustained Cell Rate (minimum guaranteed transmission rate), in cells per second, to be applied to all cells regardless of the CLP tagging. The valid range is 150-353,206 cells/sec.

`<MBS>`

The Maximum Burst Size, defined in terms of the maximum "number-of-cells" which can be transmitted at the selected Peak Cell Rate. The valid range is 1 to 4000 cells.

Examples

```
::traffic=> new 6 cbr 4500 3000 150 10 1
::traffic=> new 7 rt-vbr 4500 3000 150 10 2000 250
```

Displaying ATM Traffic Profiles

`::root=> configuration atm traffic`

From the `::traffic=>` prompt, enter the **`show`** command in the following format.

`show` `[<index>]`

Parameter

`[<index>]`

The index number of the ATM traffic profile you want to display. Omitting this parameter displays the entire ATM traffic descriptor table.

Examples

`::traffic=>` **`show`**

`::traffic=>` **`show 1`**

The following screen illustrates an example of both atm traffic show commands.

```
::traffic=> show

Index TYPE                        PCR    SCR   MBS    CDVT   MaxCTD CLR SHPR
0     UBR: NoTrafficDescriptor
1     nrt-VBR: ClpTransparentScr  150    150    1     1500    20     9

::traffic=> show 1

Index TYPE                        PCR    SCR   MBS    CDVT   MaxCTD CLR SHPR
1     nrt-VBR: ClpTransparentScr  150    150    1     1500    20     9

::traffic=>
```

Deleting ATM Traffic Profiles

```
::root=> configuration atm traffic
```

1. From the `::traffic=>` prompt, enter **`show`** to display the configured traffic profiles.
2. Note the index number of the profile you want to delete.
3. Enter the delete command in the following format.

   `delete` `<index>`

Parameter

`<index>`

The ATM traffic descriptor table index number of the entry you want to delete.

Example

```
::traffic=> delete 2
```

SETTING UP OVERSUBSCRIPTION FOR CONNECTION ADMISSION CONTROL

Connection Admission Control (CAC) is invoked during call setup and determines if new ATM connections are admitted or rejected. When calls are admitted, CAC establishes the appropriate resources for the connection. Oversubscription (os) for Avidia is part of the CAC function and applies to all Avidia cell cards for nrt-VBR service category only. You can enable oversubscription control system-wide for all cell cards.

Enabling and Disabling Oversubscription

```
::root=> configuration atm os
```

1 From the `::os=>` prompt enter the admin command as follows.

admin <enable|disable>

2 When prompted to save the change and then reboot the system, do one of the following.

- enter **y** (yes) to immediately save the changes and reboot. Both the administrative status and operational status will change.
- enter **n** (no) to change the administrative status. The operational status will remain in its current state. If you want to keep the change, you must save the configuration. Also, for the system to recognize the change operationally, you must reboot the system.

When oversubscription administrative status (enable or disable) is changed from one status to another, the operational status is updated only when the new configuration is saved and the system is rebooted. See the *Avidia System Administrator Guide* for instructions on saving configuration and rebooting a system.

Parameters

<**enable|disable**>

The operational state for oversubscription management function within CAC. Enter **enable** to turn on oversubscription for all Avidia cell cards using nrt-VBR service category. Enter **disable** to turn off oversubscription for all Avidia cell cards using nrt-VBR service category.

Example

`::os=>`**`admin disable`**

```
::os=> sh
**** nrt-VBR Over Subscription ****

  Admin Status         : Enabled

  Operational Status   : Enabled

localhost::os=> admin disable
nrt-VBR OverSubscription Admin Status modified successfully!!.

 The Operational Status will be updated only
 after you save and reboot the system

Do you want to save and reboot the system now? (y/n): y
```

Displaying OS Information

For oversubscription, you can show the operational status for this feature that can be enabled system-wide for Avidia cell cards.

`::root=> configuration atm os`

From the `::os=>` prompt, enter the show command in the following format.

`show`

Information similar to the following displays, indicating the administrative and operational status of oversubscription as enabled or disabled.

```
::os=> show

 **** nrt-VBR Over Subscription ****

  Admin Status         : Disabled

  Operational Status   : Disabled

::os=>
```

SETTING UP FOR PACKET DISCARD

With packet discard, the ATM device discards entire packets during periods of congestion to reduce the congestion and to increase goodput (goodput is the ratio of good frames/packets. transferred relative to the total number of frames/packets received). Avidia supports packet discard (pd) on the DS3 4-port card, ADSL 24-port card, and G.shdsl card.

In Avidia, packet discard occurs at the ATM Adaptation Layer 5 (AAL5) where frame transmissions are segmented into cells for transmission over an ATM network. Avidia supports partial packet discard (PPD) and early packet discard (EPD). When Avidia drops a cell due to PPD, all subsequent cells that are part of the same packet, except the last cell, are discarded. The packet will then have to be retransmitted by a higher layer protocol. PPD can occur at both the ingress and the egress paths. For PPD to occur at the ingress path, both packet discard and UPC must be enabled (UPC enabled for the port and UPC set to drop for the VCL). For PPD to occur at the egress path, only packet discard must be enabled. See the section below to enable packet discard. For setting up UPC, see “Configuring ATM Policing/UPC” on page 160.

EPD manages congestion on the egress path only by monitoring buffers for a fill volume based on an occupancy threshold. When this threshold is reached, entire packets are dropped and no new packets are accepted until the congestion clears. For EPD to occur at the egress path, only packet discard must be enabled. See the section below to enable packet discard.

Setting Up Port Packet Discard

Set up port packet discard from the `::port=>` prompt.

Modifying Port Packet Discard

```
::root=> configuration atm pd port
```

1 From the `::port=>` prompt, enter **`show`** to display the Packet Discard table.

2 Note the index number of the Packet Discard table entry that you want to modify.

3 From the `::port=>` prompt, enter the modify command as follows.

```
modify <index> <enable|disable>
```

Parameters

`<index>`

The index number of the Packet Discard table entry you want to modify.

<**enable|disable**>

The status of packet discard for the selected port.

- **enable**—activates the packet discard feature
- **disable**—deactivates the packet discard feature

Example

::port=> **modify 4 enable**

Displaying the Port Packet Discard Table

::root=> configuration atm pd port

To verify the packet discard setting for a port, from the `::port=>` prompt enter **`show`**. Information similar to the following displays.

```
::port=> show
 Index     Port  PD Status
     1      1.1   disable
     2      4.1   disable
     3      4.2   disable
     4      4.3   disable
     5      4.4   disable
     6      4.5   disable
     7      4.6   disable
     8      4.7   disable
     9      4.8   disable
    10      9.1   disable
    11      9.2   disable
    12      9.3   disable
    13      9.4   disable
    14      9.5   disable
    15      9.6   disable
    16      9.7   disable
    17      9.8   disable
    18      9.9   disable
    19     9.10   disable
    20     9.11   disable
```

Setting Up VPL Packet Discard

Set up VPL (PVPC path-level) packet discard from the `::vpl=>` prompt.

Displaying the VPL Packet Discard Table

```
::root=> configuration atm pd vpl
```

To verify the packet discard setting for VPLs, from the `::vpl=>` prompt, enter **`show`**. Information similar to the following displays.

```
::vpl=> show
 Index     Port      VPI  PD Status
     1     12.1      100   disable
     2     12.1      101   enable
::vpl=>
```

Modifying VPL Packet Discard

```
::root=> configuration atm pd vpl
```

1. From the `::vpl=>` prompt, enter **`show`** to display the packet discard table.
2. Note the index number of the packet discard table entry that you want to modify.
3. From the `::vpl=>` prompt, enter the modify command as follows.

   `modify` `<index>` `<`**`enable|disable`**`>`

Parameters

`<index>`

The index number of the packet discard table entry you want to modify.

`<`**`enable|disable`**`>`

The status of packet discard for the selected VPL.

- **enable**—activates the packet discard feature for this VPL
- **disable**—deactivates the packet discard feature for this VPL

Example

`::vpl=>` **`modify 2 enable`**

Setting Up VCL Packet Discard

Set up VCL (PVCC circuit-level) packet discard from the `::vcl=>` prompt.

Displaying the VCL Packet Discard Table

```
::root=> configuration atm pd vcl
```

To verify the packet discard setting for VCLs, from the `::vcl=>` prompt, enter **`show`**. Information similar to the following displays.

```
::vcl=> show
 Index     Port      VPI      VCI  PD Status
     1      1.1        0     1024   disable
     2      1.1        0     1025   disable
     3      1.1        0     1026   disable
     4      1.1        0     1027   disable
     5      1.1        0     1028   disable
     6      1.1        0     1029   disable
     7      1.1        0     1030   disable
     8      1.1        0     1031   enable
     9      1.1        0     1032   disable
    10      1.1        0     1057   disable
    11      1.1        0     1058   disable
    12      1.1        0     1059   disable
    13      1.1        0     1060   disable
    14      1.1        0     1061   disable
    15      1.1        0     1062   disable
    16      1.1        0     1063   disable
    17      1.1        0     1064   disable
    18      1.1        0     1065   disable
    19      1.1        0     1066   disable
    20      1.1        0     1067   disable
::vcl=>
```

Modifying VCL Packet Discard

```
::root=> configuration atm pd vcl
```

1 From the `::vcl=>` prompt, enter **`show`** to display the packet discard table.

2 Note the index number of the packet discard table entry that you want to modify.

3 From the `::vcl=>` prompt, enter the modify command as follows.

`modify` `<index>` `<`**`enable|disable`**`>`

Parameters

`<index>`

The index number of the packet discard table entry you want to modify.

`<`**`enable|disable`**`>`

The status of packet discard for the selected VCL.

- **enable**—activates the packet discard feature for this VCL
- **disable**—deactivates the packet discard feature for this VCL

Example

`::vcl=>` **`modify 8 enable`**

CONFIGURING ATM POLICING/UPC

Policing, or UPC, monitors and regulates traffic at the UNI to comply with the agreed upon traffic contracts (assigned traffic profile). Policing protects the network resources from intentional or unintentional variations to the traffic contract by dropping cells that violate the traffic agreement through tagging.

Cell Loss Priority (CLP) provides the capability of tagging cells. Cell tagging is available for the DS3 4-port, ADSL 24-port , and G.shdsl cards. UPC for Avidia polices CBR, rt-VBR, and nrt-VBR service categories. You can enable or disable policing for the ATM port, VCL, or VPL. Policing must be enabled at the port level, however, to select tagging for VCLs or VPLs.

Setting Up ATM Port Policing

You enable or disable policing (UPC) for ATM ports from the `::port=>` prompt.

Displaying the Port Table

```
::root=> configuration atm upc port
```

To verify the policing configuration for each port, from the `::port=>` prompt enter **`show`**. Information similar to the following displays.

```
::port=> show

                  UPC
Index     Port     Status

1         1.1      enable
2         3.1     disable
3         3.2      enable
4         3.3      enable
5         3.4      enable

::port=>
```

Configuring ATM Port Policing

```
::root=> configuration atm upc port
```

1 From the `::port=>` prompt enter **`show`** to display the UPC table.

2 Note the index number of the UPC table entry for which you want to configure policing.

3 From the `::port=>` prompt enter the modify command as follows.

`modify` `<index>` `<`**`enable|disable`**`>`

Parameters

`<index>`

The index number of the UPC table entry you want to configure.

`<`**`enable|disable`**`>`

The administrative status of policing on the selected port.

Example

```
::port=> modify 4 enable
```

Setting Up VCL Policing

Policing, or UPC, enables you to specify whether traffic must conform to the configured traffic contract. When policing is enabled, traffic that does not conform to the contract is deleted. You can enable or disable policing by VCL (PVCC circuit-level).

Displaying the VCL Table

`::root=> configuration atm upc vcl`

To verify the policing configuration for each PVCC, from the `::vcl=>` prompt, enter **`show`**. Information similar to the following displays.

```
::vcl=> show

                                           UPC
Index     Port       VPI      VCI       Status

1         1.1        0        1024      drop
2         2.1        0         115      pass

::vcl=>
```

Configuring VCL Policing

`::root=> configuration atm upc vcl`

1 From the `::vcl=>` prompt enter **`show`** to display the PVCC table.

2 Note the index number of the PVCC table entry for which you want to configure policing.

3 From the `::vcl=>` prompt enter the modify command as follows.

`modify` `<index>` `<`**`drop|pass|tag`**`>`

Parameters

`<index>`

The index number of the PVCC table entry you want to configure.

<**drop|pass|tag**>

The administrative status of policing on the selected PVCC. Drop means that cells violating QoS contracts are dropped. Tag means that cells violating QoS contracts are tagged (CLP bit set to 1) but passed. Pass means that cells violating QoS contracts are passed. Tagging applies to the 24-port ADSL, G.shdsl, and 4-port DS3 cards only.

Example

```
::vcl=> modify 4 drop
```

Setting Up VPL Policing

Policing, or UPC, enables you to specify whether traffic must conform to the configured traffic contract. When policing is enabled, traffic that does not conform to the contract is deleted. You can enable or disable policing by VPL (PVPC path-level).

Displaying the VPL Policing Table

`::root=> configuration atm upc vpl`

To verify the policing configuration for each PVPC, from the `::vpl=>` prompt, enter **`show`**. Information similar to the following displays.

```
::vpl=> show

                                  UPC
Index     Port        VPI       Status

1         1.1         0         drop
2         2.1         0         pass

::vpl=>
```

Configuring VPL Policing

```
::root=> configuration atm upc vpl
```

1. From the `::vpl=>` prompt enter **`show`** to display the PVPC table.
2. Note the index number of the PVPC table entry for which you want to configure policing.
3. From the `::vpl=>` prompt enter the modify command as follows.

   `modify` `<index>` `<`**`drop|pass|tag`**`>`

Parameters

`<index>`

The index number of the PVPC table entry you want to configure.

`<`**`drop|pass|tag`**`>`

The administrative status of policing on the selected PVPC.

- Drop—cells violating QoS contracts are dropped.
- Tag—cells violating QoS contracts are tagged (CLP bit set to 1) but passed.
- Pass—cells violating QoS contracts are passed.

Example

`::vpl=>` **`modify 4 drop`**

7 CONFIGURING ATM ROUTING

This chapter provides instructions for configuring ATM routing which comprises both IISP (static) and PNNI (dynamic) routing. ATM routing protocols distribute topology information and determine the path of travel for ATM connections (SPVCS and SVCs). You will set up SPVCs in Chapter 9, “Configuring ATM Connections.”

Also, this chapter provides procedures to view the protocol statistics for monitoring and troubleshooting PNNI. See the *Avidia System Technology and Applications Overview* for more information about IISP and PNNI ATM routing.

See the following sections for more detailed information:

Configuring IISP Routing

IISP is an ATM routing protocol that uses static routes (as opposed to dynamic routes) to determine the path for data to travel. It is useful in smaller networks where there are only a limited number of routes to manually set up.

Adding IISP Routing Table Entries

```
::root=> configuration atm route
```

From the `::route=>` prompt, enter the new command in the following format.

new `<address> <length> <slot.port>` [**-admin** (**active|inactive**)]

Parameters

`<address>`

The ATM address of the destination ATM end system. The address can be up to 20 octets and the first octet must be 39, 45, or 47 (only these addresses are supported). Each octet must be separated by a colon.

`<length>`

The number of destination ATM address prefix octets that are used by the Avidia system to determine whether the ATM routing table entry matches a particular SPVC request. For example, if you set the matching length to 2, then all SPVCs for which the first two octets of the destination ATM address prefix match the first two octets of the ATM routing table entry will be routed according to the slot and port information in that table entry.

`<slot.port>`

The network card slot and port to which the traffic is routed to reach the destination.

[**-admin** (**active|inactive**)]

The administrative status of the routing table entry. Enter **-admin active** to activate it or enter **-admin inactive** to deactivate it.

Example

```
::route=> new 39:26:34:34:75:85:11:08 5 12.1 -admin active
```

Displaying IISP Routing Table Entries

```
::root=> configuration atm route
```

From the `::route=>` prompt, enter the show command in the following format.

show [<slot.port>]

Parameter

[<slot.port>]

The slot and port through which traffic is routed to reach the destination. Omitting this parameter displays the entire ATM routing table.

Examples

::route=> **show**

::route=> **show 11.1**

Information similar to the following displays.

```
::route=> show 11.1
Index   Address                    Slot  Length      Admin     Oper
1       39:26:34:34:75:85:11:08    11.1  5           Active    Active
2       39:69:24:97:21:35:34:36    11.1  8           Inactive  Inactive
::route=>
```

Information	Description
Index	The ATM routing table row number.
Address	The ATM address of the destination ATM end system.
Slot	The network card slot to which you want to route the traffic when the current network card fails.
Length	The number of destination ATM address prefix octets the system considers when determining whether the ATM routing table entry matches a particular SPVC request.
Admin	The static route administrative status. • Active • Inactive
Oper	The static route operational status. • Active—the route is available. • Inactive—not operational.

Changing IISP Routing Admin Status

```
::root=> configuration atm route
```

From the `::route=>` prompt, enter the admin command in the following format.

admin <index> <(**active|inactive**)>

Parameters

<index>

The ATM routing table index number of the entry you want to change.

<(**active|inactive**)>

Enter **active** to activate the route or **inactive** to deactivate it.

Examples

```
::route=> admin 2 active
```

Deleting IISP Routing Table Entries

```
::root=> configuration atm route
```

From the `::route=>` prompt, enter the delete command in the following format.

`delete` `<index>`

Parameter

`<index>`

The index number of the ATM routing table row you want to delete.

Example

`::route=>` **`delete 2`**

CONFIGURING PNNI ROUTING

This section provides instruction for configuring PNNI routing (ATM dynamic routing) and viewing the protocol statistics for monitoring and troubleshooting. The sections through which you can accomplish the configuration using the command-line interface is indicated.

- Node—Avidia can fulfill the role of a PNNI node within a peer group of other switches also running PNNI. You can enable or disable Avidia as a PNNI node, as well as configure its level in the PNNI hierarchy (see “Managing a PNNI Node” on page 173).
- Routing Table—The PNNI routing table may contain several routes. Route in the table can be added, deleted, or displayed (see “Using Static Routes” on page 177).
- Hello timer—After Avidia is enabled and configured as a node, it uses the Hello protocol to discover its neighbors, advertise its existence, and exchange initial information by transmitting Hello packets. You can modify the Hello timer to specify when to send the Hello packets (see “Configuring Hello Timers” on page 182).
- PNNI Topology State Elements (PTSEs) timer—PNNI nodes describe their local network topology to each other by exchanging PTSEs. PTSEs are encapsulated in PNNI Topology State Packets (PTSPs) and can be configured for when they are sent to a neighbor (see “Managing PTSE Timers” on page 185).
- Administrative Weights—When there are two redundant connections of the same QoS type to the same destination, the preference may be to send traffic over one connection instead of the other. For example, if one CBR connection exits out one DS3 port on an Avidia system to a remote ATM switch and a second CBR connection exits out a second DS3 port to the same ATM switch, you can assign a lower administrative weight to the first DS3 port to allow all CBR traffic to use the first connection as its primary transport (see “Managing Interface Administrative Weights” on page 193).
- Path Computation—You can specify one of the following methods per QoS type to compute path costs for the PNNI routing protocol: administrative weight, cell transfer delay, and cell delay variation (see “Calculating Path Costs” on page 195).
- Peer Group Leader Timers—Although the Avidia system cannot be a Peer Group Leader, it can participate in its election. You can adjust the election timers as needed (see “Managing Peer Group Leader Timers” on page 198).
- Summary Advertisements—Instead of advertising several routes with common bytes in its ATM prefix, you can summarize them into a single route to minimize the number of advertised routes and reduce the amount of resources that excess routes consume (see “Managing Summary Advertisements” on page 201).

In addition, the command-line interface allows you to display PNNI routing protocol statistics for the node, Hello timer, adjacent neighbor, and DTL information. These statistics are useful for monitoring and troubleshooting the PNNI routing configuration.

Managing a PNNI Node

To configure a PNNI node, system routing mode must first be disabled. When the PNNI node is enabled, then system routing mode must be set to dynamic for PNNI signaling to function. You will set system routing mode (“Configuring ATM System Signaling Characteristics” on page 208) later in this process when you set other ATM system parameters.

Configuring a PNNI Node

```
::root=> configuration atm pnni node
```

From the `::node=>` prompt, enter the set command in the following format.

set [**-admin** (**up** | **down**)] [**-level** <number>]

Parameters

[-**admin** (**up** | **down**)]

The administrative status of the PNNI node. Enter `-admin up` to enable it or `-admin down` to disable it. It can only be modified when the node has been disabled after issuing the set command with the `-admin down` parameter.

[**-level** <number>]

The hierarchical level for this node. The PNNI hierarchical level indicates how many bits of the ATM prefix are used to identify nodes in a PNNI group. The default level is 96 (12 bytes) and can be set up to level 104 (13 bytes). This hierarchical level for the ATM address is analogous to a subnet mask for an IP address. The hierarchical level should be the same for each node in a PNNI group.

Examples

::node=> **set -admin up -level 96**

::node=> **set -admin down**

::node=> **set -level 88**

After configuring the Avidia as a node, verify the configuration as described in “Displaying PNNI Node Configuration” on page 174.

To see if the Avidia is communicating with other nodes, refer to “Displaying PNNI Hello Statistics” on page 184 and “Displaying PNNI Neighbor Statistics” on page 189.

Displaying PNNI Node Configuration

::root=> configuration atm pnni node

You can view the node information specific to the Avidia using the show command. To view additional information about other nodes see “Displaying PNNI Node Statistics” on page 175 and “Displaying PNNI Neighbor Statistics” on page 189.

From the `::node=>` prompt, enter the show command in the following format.

show

Example

::node=> **show**

The following screen illustrates an example of the show command.

```
::node=> show

Oper. Mode  : up
Hier. Level : 96
Node ID     : 60:A0:39:00:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00:00
PeerGroup ID: 60:39:00:00:00:00:00:00:00:00:00:00:00:00
::node=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Oper. Mode	The status of the node. • up—node is administratively enabled • down—node is administratively disabled
Hier. Level	The PNNI hierarchical level in decimal format. Also the number of bits used for determining the peer group ID.
Node ID	The 22-byte identifier for the PNNI node in hexidecimal format. The first byte represents the hierarchical level in hexidecimal. For example, 60 in hexidecimal format is equivalent to 96 in decimal format. The second byte is decimal 160 (hex A0). The remainder node ID is the ATM address.
PeerGroup ID	The identifier for the PNNI peer group in hexidecimal format. The first byte represents the hierarchical level in hexidecimal.

Displaying PNNI Node Statistics

`::root=> display stats pnni node`

You can view statistics about the Avidia system by issuing the show command.

From the `::node=>` prompt, enter the show command in the following format.

`show`

Example

`::node=>` **`show`**

The following screen illustrates the show command.

```
::node=> show

The Highest Version PNNI Supported        : PNNI 1.0
The Lowest Version  PNNI Supported        : PNNI 1.0
No. of DTL Originators                    : 0
No. of DTL Borders                        : 0
No. of Crankback Originators              : 0
No. of Crankback Borders                  : 0
No. of Alternate Route Originators        : 0
No. of Alternate Route Borders            : 0
No. of Route Fail Originators             : 0
No. of Route Fail Borders                 : 0
No. of Route Fail Unreachable Originators : 0
No. of Route Fail Unreachable Borders     : 0
::node=>
```

The following table describes the information displayed:

Information	Description
The Highest Version PNNI Supported	The latest version of PNNI supported by the Avidia using the current version of SwitchWare.
The Lowest Version PNNI Supported	The earliest version of PNNI supported by the Avidia using the current version of SwitchWare.
No. of DTL Originators	The number of switching systems that build the initial Designated Transit List for a given connection.
No. of DTL Borders	The number of border nodes that have at least one link that crosses over into another peer group that participates in DTL calculation.
No. of Crankback Originators	The number of nodes that can recalculate a route to a destination in the case of a failed path using the original DTL.
No. of Crankback Borders	The number of border nodes involved in the crankback function of the PNNI network.
No. of Alternate Route Originators	The number of nodes that find an alternate route in the case of a failed path.
No. of Alternate Route Borders	The number of border nodes involved in determining an alternate route in the case of a failed link to a destination.
No. of Route Fail Originators	The number of nodes in the PNNI network that originate a failed route message.
No. of Route Fail Borders	The number of border nodes that generate a route failed message in response to a downed link in a path to a destination.
No of Route Fail Unreachable Originators	The number of nodes in the PNNI network that originate a failed route message in response to an unreachable destination.
No. of Route Fail Unreachable Borders	The number of border nodes that generate a route failed message in response to an unreachable destination.

For more statistics about other nodes in the PNNI network, see “Displaying PNNI Neighbor Statistics” on page 189.

For information about the Avidia node only, see “Displaying PNNI Node Configuration” on page 174.

Using Static Routes

PNNI is a dynamic routing protocol. By using this command, you can extend the routing capability of PNNI beyond the nodes that support PNNI to the nodes that do no support PNNI.

Configuring a Static Route

```
::root=> configuration atm pnni route
```

From the `::route=>` prompt, enter the new command in the following format.

new `<address> <length (bytes)> <slot.port>`

Parameters

`<address>`

The ATM address of the destination ATM end system. The address can be up to 19 octets. The first octet must be 39, 45, or 47. Each octet must be separated by a colon.

`<length (bytes)>`

The number of destination ATM address prefix octets that is used by the Avidia system to determine whether the ATM routing table entry matches a particular SPVC request. For example, if you set the matching length to 2, then all SPVCs for which the first two octets of the destination ATM address prefix match the first two octets of the ATM routing table entry will be routed according to the slot and port information in that table entry.

`<slot.port>`

The slot.port combination is the interface from which data is sent to reach the destination ATM address. In the example below, 2.1 represents slot 2 port 1.

Example

```
::route=> new 39:1:2:3:4:5:6:7:8:9:10:11:12 13 2.1
```

Displaying PNNI Routes

::root=> configuration atm pnni route

Displaying the PNNI routing table is useful for monitoring and troubleshooting ATM level connectivity. For example, if you cannot send traffic to a destination, be sure to check the routing table to see if there is a path to it. Although the Address field may be correct, you should verify the Length field as well since this pair of values determines the reachable address of interest.

From the `::route=>` prompt, enter the show command in the following format.

show [**detail**]

Parameters

[**detail**]

In addition to the base ATM information, it also displays the Advertising Node ID for the PNNI routing table.

Examples

::route**=> show**

::route**=> show detail**

The following screen illustrates an example of the show command.

```
::route=> show

************************** PNNI Route Address Table *************************
Idx Address                                                  Len(bits) AddrId
                                                   Type       Port      Oper
-----------------------------------------------------------------------------
1   39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00  104       1
                                                  Local       N/A       Adver

2   39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:01  152       1
                                                  Local       N/A       Adver

3   39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00  104       1
                                                   Pnni       N/A       Adver

4   39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00  152       1
                                                   Pnni       N/A       Adver

::route=> show detail

************************** PNNI Route Address Table *************************
Idx Address                                               Len(bits) AddrId Port
Advertising NodeId                                                  Type   Oper
-----------------------------------------------------------------------------
1   39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00  104      1     N/A
60:A0:39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:01:00    Local Adver
2   39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:01  152      1     N/A
60:A0:39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:01:00    Local Adver
3   39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00  104      1     N/A
60:A0:39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00    Pnni  Adver
4   39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00  152      1     N/A
60:A0:39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00    Pnni  Adver

::route=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Index	The routing table row number.
Address	The ATM address of the destination ATM network.
Advertising Node id	The Node ID of the routing device that advertised the PNNI route.
Length (Bits)	The number of destination ATM address prefix bits the system considers when determining whether the ATM routing table entry matches a particular destination.
Addr Id	The identifier of the destination address prefix automatically assigned by the Avidia. It is used to differentiate the routes with the same destination but different slot and port numbers. Each unique destination address prefix is assigned a unique Address ID.
Port	The slot and port combination to which the Avidia routes traffic destined for the specified ATM network address.
Type	The type of destination route entry. • Local—entry created by Avidia internally. • PNNI—entry learned through PNNI from other switches. • Mgmt—entry created by administrator for static route.
Oper	The operational status of the route. Options • Down—the route is not advertised to other switches. • Adver—the route is being advertised to other switches using PNNI routing protocol.

Deleting PNNI Static Routes

```
::root=> configuration atm pnni route
```

From the `::route=>` prompt, enter the delete command in the following format.

```
delete <address> <length> <address id>
```

Parameters

`<address>`

The ATM address of the destination ATM end system. The address can be up to 19 bytes.

`<length>`

The number of destination ATM address prefix octets.

`<address id>`

The identifier of the destination address prefix automatically assigned by Avidia. It is used to differentiate the routes with the same destination but different slot and port numbers. Each unique destination address prefix is assigned a unique Address ID.

Example

```
::route=> delete 39:1:2:3:4:5:6:7:8:9:10:11:12 13 1
```

Configuring Hello Timers

The commands in this section are used to tune PNNI protocol parameters that may affect network performance.

Modifying the Hello Timer

```
::root=> configuration atm pnni timer hello
```

From the `::hello=>` prompt, enter the modify command in the following format.

modify [**-holddown** <tenths-of-second>] [**-interval** <seconds>] [**-inactivity** <number>][**-all default**]

Parameters

[**-holddown** <tenths-of-second>]

The initial value in tenths-of-second to “hold down” the transmission of Hello packets until it resends them. The default is 10.

[**-interval** <seconds>]

The interval in seconds in which the Avidia transmits Hello packets. The default is 15.

[-inactivity <number>]

The amount of time in seconds after which the neighbor is considered down if no Hello packets are received from it. The default is 5.

[**-all default**]

The option to set all hello timer parameters to default values.

Example

```
::hello=> modify -holddown 10 -interval 15 -inactivity 5
```

Displaying the Hello Timer Configuration

```
::root=> configuration atm pnni timer hello
```

From the `::hello=>` prompt, enter the show command in the following format.

show

Example

::hello=> show

The following screen illustrates an example of the show command.

```
::hello=>show

Hello Holddown                  :10 tenths-of-second
Hello Interval                  :15 second
Hello Inactivity Factor         :5

::hello=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Hello Holddown	The initial value in tenths-of-second to “hold down” the transmission of Hello packets until it resends them.
Hello Interval	The interval in seconds in which the Avidia transmits Hello packets.
Hello Inactivity Factor	The amount of time in seconds after which the neighbor is considered down if no Hello packet is received from it.

Displaying PNNI Hello Statistics

::root=> display stats pnni hello

From the `::hello=>` prompt, enter the show command in the following format.

show

Example

::hello=> show

The following screen illustrates an example of the show command.

```
::hello=> show

********** PNNI Link Table 1 **********
Link Type    : Lowest Level Horizontal Link
Link State   : twoWayInside(5)
Remote NodeId:
60:A0:39:00:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00:00
Remote PortId: 240
Hellos RX    : 1066
Hellos TX    : 1070
********** PNNI Link Table 2 **********
Link Type    : Lowest Level Horizontal Link
Link State   : twoWayInside(5)
Remote NodeId:
60:A0:39:00:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00:00
Remote PortId: 241
Hellos RX    : 1064
Hellos TX    : 1070

::hello=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Link Type	The indicator of the type of link being described. **Lowest Level Horizontal Link** is the only value supported in this release.
Link State	The state of the link between peers. **twoWayInside** specifies that a Hello has been received from the neighbor and they are ready for bi-directional communication.
Remote Node ID	The ATM node identifier of the remote switch on the opposite side of the link.
Remote Port ID	The port ID of the remote switch on the opposite side of the link.
Hellos Received	The number of Hello packets received
Hellos Transmitted	The number of Hello packets transmitted

Managing PTSE Timers

A PNNI node maintains a map of the network in the form of a database. The node also exchanges this database information with other nodes using PNNI Topology State Elements (PTSEs).

Configuring the PTSE Timer

```
::root=> configuration atm pnni timer ptse
```

To configure how and when the node sends and receives PTSEs, use the modify command.

From the `::ptse=>` prompt, enter the modify command in the following format.

modify [**-holddown** <tenths-of-second>] [**-refresh** <seconds>] [**-lifetime** <percentage-factor>] [**-rxmt** <seconds>] [**-delayack** <tenths-of-second>] [**-avcr-pm** <percent>] [**-avcr-mt** <percent>][**-all default**]

Parameters

[**-holddown** <tenths-of-second>]

The initial value in tenths-of-second to “hold down” PTSE updates until it resends them. The default is 10.

[**-refresh** <seconds>]

The interval in seconds in which the switch will refresh its PTSE values. The default is 1800.

[**-lifetime** <percentage-factor>]

The lifetime of a PTSE expressed in the percentage of the PTSE Refresh Interval. The default is 200.

[**-rxmt** <seconds>]

The interval in seconds between retransmissions of unacknowledged PTSE packets. The default is 5.

[**-delayack** <tenths-of-second>]

The amount of time in tenths-of-second between transmissions of delayed PTSE acknowledgement packets. The default is 10.

[**-avcr-pm** <percent>]

The available cell rate proportional multiplier. This is the percentage of change from the current available cell rate. The default is 50.

[**-avcr-mt** <percent>]

The available cell rate minimum threshold. The percentage of the maximum cell rate which is considered the threshold for the minimum change of the available cell rate. The default is 3.

[**-all default**]

The option to set all PTSE timer parameters to default values.

Examples

```
::ptse=> modify -holddown 10
::ptse=> modify -holddown 20 -refresh 1800 -lifetime 200 -rxmt 5
```

Displaying the PTSE Timer Configuration

`::root=> configuration atm pnni timer ptse`

From the `::ptse=>` prompt, enter the show command in the following format.

`show`

Example

`::ptse=>` **`show`**

The following screen illustrates an example of the show command.

```
::ptse=> show

PTSE Holddown            :    10 tenths-of-second
PTSE Refresh Interval    :  1800 second
PTSE Lifetime Factor     :   200 percentage-factor
PTSE Retransmit Interval :     5 seconds
PTSE Ack-delay           :    10 tenths-of-second
PTSE Avcr-pm             :    50 percent
PTSE Avcr-mt             :     3 percent

::ptse=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
PTSE Holddown	The initial value in tenths-of-second to suppress PTSE updates until it resends them.
PTSE Refresh Interval	The interval in seconds in which the switch will refresh its PTSE values.
PTSE Lifetime Factor	The lifetime of a PTSE expressed in the percentage of the PTSE Refresh Interval.
PTSE Retransmit Interval	The interval in seconds between retransmissions of unacknowledged PTSE packets.
PTSE Ack-delay	The amount of time in tenths-of-second between transmissions of delayed PTSE acknowledgement packets.
PTSE Avcr-pm	The available cell rate proportional multiplier. This is the percentage of change from the current available cell rate.
PTSE Avcr-mt	The available cell rate minimum threshold. This is the percentage of the maximum cell rate which is considered the threshold for the minimum change of the available cell rate.

Displaying PNNI Neighbor Statistics

`::root=> display stats pnni neighbor`

PNNI neighbor statistics are useful for troubleshooting and monitoring a PNNI connection with its direct neighbors. They indicate whether or not the Avidia is exchange topology database information with its neighbor.

From the `::neighbor=>` prompt, enter the show command in the following format.

`show`

Example

`::neighbor=>` **`show`**

The following screen illustrates an example of the show command.

```
::neighbor=> show

********** PNNI Neighboring Peer Table 1 **********
Remote NodeId:
60:A0:39:00:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00:00
Peer State   : Full
DbSums RX    : 5
DbSums TX    : 5
PTSP RX      : 32
PTSP TX      : 29
PTSE REQ RX  : 1
PTSE REQ TX  : 0
PTSE ACK RX  : 29
PTSE ACK TX  : 20

::neighbor=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Remote Node ID	The node ID of the ATM switch located on the other side of a link.
Peer State	The status of the peer node. • Negotiating—the two systems are determining who will start the database synchronization. • Exchanging—the Avidia is sending database information to the remote system. • Loading—the Avidia is receiving database information from the other system. • Full—the Avidia has received all available database information.
DbSums Received	The number of PNNI database summaries received.
DbSums Transmitted	The number of PNNI database summaries transmitted.
PTSP Received	The number of PNNI Topology State Packets received.
PTSP Transmitted	The number of PNNI Topology State Packets transmitted.
PTSE Received	The number of PNNI Topology State Elements received.
PTSE Transmitted	The number of PNNI Topology State Elements transmitted.
PTSE ACK Received	The number of PNNI Topology State Element acknowledgements received in response to PTSEs send to a remote node.
PTSE ACK Transmitted	The number of PNNI Topology State Element acknowledgements transmitted

Displaying the DTL Table

```
::root=> display stats pnni dtl
```

A Designated Transit List (DTL) is a source-routing mechanism that allows the ingress ATM switch (in this case, the Avidia) to define the full hierarchical path across a PNNI network.

Use the show command to display the mapping between the index in the DTL table and the destination ATM address.

From the `::dtl=>` prompt, enter the show command in the following format.

show [(**all** | <index>)]

Parameters

[(**all** | <index>)]

Specify either the **all** parameter or an **index** number, not both. The **all** parameter displays the detailed information including the DTL entry number and port ID for the DTL table. The **index** parameter displays the mapping between the corresponding index in the DTL table and associated destination ATM address.

Examples

::dtl=> **show**

::dtl=> **show 1**

::dtl=> **show all**

The following screen illustrates an example of the show command.

```
::dtl=> show

**************************** PNNI DTL Table ****************************
Idx DTL NodeId                                                        LinkType
---------------------------------------------------------------------------
1   60:A0:39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00:00 LastEntry
2   60:A0:39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00:00 LastEntry
3   60:A0:39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00:00 LastEntry
4   60:A0:39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00:00 LastEntry
5   60:A0:39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00:00 LastEntry
6   60:A0:39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00:00 LastEntry
7   60:A0:39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00:00 LastEntry
8   60:A0:39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00:00 LastEntry

::dtl=> show 1

**************************** PNNI DTL Table ****************************
Idx DTL#  DTL NodeId
          PortId       LinkType
---------------------------------------------------------------------------
1   1     60:A0:39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:01:00
          265          Horizontal

1   2     60:A0:39:00:00:00:00:00:00:00:00:00:00:01:00:00:00:00:00:00:00
          240          Horizontal

1   3     60:A0:39:00:00:00:00:00:00:00:00:00:00:02:00:00:00:00:00:00:00
          0            LastEntry
::dtl=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
DTL Index	The index number that references a single DTL stack.
DTL Entry	The index in the current DTL stack that references a single entry in it.
DTL Node Id	The destination Node ID for which the DTL has been built.
Port Id	The port on the current node to use as an exit. If a port is not needed, it is coded as a zero.
Link Type	The type of DTL link: • Horizontal—PNNI links between nodes within the same peer group. • LastEntry—the last DTL Entry of the group with the same DTL Index.

Managing Interface Administrative Weights

When there are two redundant connections of the same QoS type to the same destination, the administrator may prefer to send traffic over one connection instead of the other. For example, if one CBR connection exits out the first DS3 port of the Avidia system to a remote ATM switch and a second CBR connection exits out the second DS3 port to the same ATM switch, the administrator can assign a lower administrative weight to the first DS3 port to allow all CBR traffic to use the first connection as its primary transport.

Setting Interface Administrative Weights

`configuration atm pnni interface`

Use the new command to set the administrative weight(s) to one or more QoS types on a specified interface.

From the `::interface=>` prompt, enter the show command in the following format.

`set` `<slot.port> [`**`-cbr`**` <number>] [`**`-rt-vbr`**` <number>] [`**`-nrt-vbr`**` <number>] [`**`-ubr`**` <number>] [`**`-all default`**`]`

Parameters

`<slot.port>`

The slot.port combination is the interface for which the administrative weight will be set. For example, 12.1 represents slot 12 port 1.

`[`**`-cbr`**` <number>]`

The administrative weight for the Constant Bit Rate (CBR) service category (1 - 1000000). The default value is 5040.

`[`**`-rt-vbr`**` <number>]`

The administrative weight for the Real-Time Variable Bit Rate (rt-VBR) service category (1 - 1000000). The default value is 5040.

`[`**`-nrt-vbr`**` <number>]`

The administrative weight for the Non-Real-Time Variable Bit Rate (nrt-VBR) service category (1 - 1000000). The default value is 5040.

[**-ubr** <number>]

The administrative weight for the Unspecified Bit Rate (UBR) service category (1 - 1000000). The default value is 5040.

[**-all default**]

To set all administrative weights to default values enter **-all default** as the parameter.

Examples

::interface=> **set 12.1 -cbr 1000**

::interface=> **set 12.1 -cbr 1000 -rt-vbr 2000**

::interface=> **set 12.1 -all default**

Displaying Interface Administrative Weights

::root=> configuration atm pnni interface

Use the show command to display the current administrative weights.

From the `::interface=>` prompt, enter the show command in the following format.

show

Example

::interface=> show

The following screen illustrates an example of the show command.

```
::interface=> show

              AdmWeight     AdmWeight     AdmWeight     AdmWeight
Slot.Port     CBR           rt-VBR        nrt-VBR       UBR
-------------------------------------------------------------------
  12.1        5040          5040          5040          5040

::interface=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Slot.Port	The slot.port combination is the interface for which the administrative weights are shown. For example, 12.1 represents slot 12 port 1.
AdmWeight CBR	The administrative weight for the Constant Bit Rate (CBR) service category (1 - 1000000). The default value is 5040.
AdmWeight rt-VBR	The administrative weight for the Real-Time Variable Bit Rate (rt-VBR) service category (1 - 1000000). The default value is 5040.
AdmWeight nrt-VBR	The administrative weight for the Non-Real-Time Variable Bit Rate (nrt-VBR) service category (1 - 1000000). The default value is 5040.
AdmWeight UBR	The administrative weight for the Unspecified Bit Rate (UBR) service category (1 - 1000000). The default value is 5040.

Calculating Path Costs

There are three methods to compute path costs for the PNNI routing protocol: administrative weights, cell transfer delay, and cell delay variation. The administrator can specify one of the methods per QoS type.

Modifying Path Computation

```
::root=> configuration atm pnni pathcompute
```

Use the modify command to set the method to compute path costs.

From the `::pathcompute=>` prompt, enter the modify command in the following format.

modify [**-ubr** mode] [**-cbr** mode] [**-rt-vbr** mode] [**-nrt-vbr** mode]

Parameters

[-ubr mode]

The mode (or method) of path computation for the Unspecified Bit Rate (UBR) service category. The mode can be set to one of the following.

- **AW** to calculate path costs based on the administrative weights that the administrator manually configures as described in "Managing Interface Administrative Weights" on page 193
- **CTD** to calculate path costs based on Cell Transfer Delay
- **CDV** to calculate path costs based on Cell Delay Variation

[-cbr mode]

The mode (or method) of path computation for the Constant Bit Rate (CBR) service category. The mode can be set to one of the following. **AW**, **CTD**, or **CDV**. See the UBR parameter above for more detailed descriptions.

[-rt-vbr mode]

The mode (or method) of path computation for the Real-Time Variable Bit Rate (rt-VBR) service category. The mode can be set to one of the following. **AW**, **CTD**, or **CDV**. See the UBR parameter above for more detailed descriptions.

[-nrt-vbr mode]

The mode (or method) of path computation for the Non-Real-Time Variable Bit Rate (nrt-VBR) service category. The mode can be set to one of the following. **AW**, **CTD**, or **CDV**. See the UBR parameter above for more detailed descriptions.

Examples

```
::pathcompute=> modify -ubr aw
```

```
::pathcompute=> modify -ubr aw -cbr cdt -rt-vbr cdv
```

Displaying Path Computation Methods

::root=> configuration atm pnni pathcompute

Use the show command to display the current method used to calculate paths for the different QoS types.

From the `::pathcompute=>` prompt, enter the show command in the following format.

show

Example

`::pathcompute=>` **show**

The following screen illustrates an example of the show command.

```
::pathcompute=> show

QOS            Path Computation Mode
--------------------------------------
ubr            Admin Weight
cbr            Cell Transfer Delay
rt-vbr         Cell Transfer Delay
nrt-vbr        Admin Weight

::pathcompute=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
QOS	The ATM Quality of Service type. • ubr for Unspecified Bit Rate • cbr for Constant Bit Rate • rt-vbr for Real-Time Variable Bit Rate • nrt-vbr for Non-Real-Time Variable Bit Rate
Path Computation Mode	The method of calculating path costs for the PNNI routing protocol. • Admin Weight to calculate path costs based on the administrative weights configured by the administrator as described in “Managing Interface Administrative Weights” on page 193 • Cell Transfer Delay to automatically calculate path costs based on traffic management values. • Cell Delay Variation to calculate path costs based on a fixed constant in the Avidia system software.

Managing Peer Group Leader Timers

Every PNNI network contains at least one collection of PNNI devices known as a Peer Group. For every Peer Group has a leader known as the Peer Group Leader (PGL). The PGL represents the entire Peer Group when there are multiple Peer Groups in the network. Although the Avidia system cannot be a PGL, it can participate in its election.

Setting Peer Group Leader Timers

`configuration atm pnni pgl`

Use the set command to set the PGL timers.

From the `::pgl=>` prompt, enter the set command in the following format.

set [**-init** <seconds>] [**-override** <seconds>] [**-reelect** <seconds>] [**-all default**]

Parameters

[**-init** <seconds>]

The amount of time in seconds that the Avidia system will delay advertising its choice of preferred PGL after receiving the initial PNNI database packet from its neighbor (1 - 120 seconds). The default value is 15 seconds.

[**-override** <seconds>]

The amount of time in seconds the Avidia system will wait for itself to be declared the preferred PGL by unanimous agreement among its peer (1 - 120 seconds). The default value is 30.

[**-reelect** <seconds>]

The amount of time in seconds after losing connectivity to the current PGL that the Avidia system will wait before restarting the process of electing a new PGL (1 - 120 seconds). The default value is 15.

[**-all default**]

To set all PGL timers to default values enter **`-all default`** as the parameter.

Examples

::pgl=> **set -init 20**

::pgl=> **set -init 20 -reelect 100**

::pgl=> **set -all default**

Displaying Peer Group Leader Information

::root=> configuration atm pnni pgl

Use the show command to display the Peer Group Leader (PGL) information.

From the `::pgl=>` prompt, enter the show command in the following format.

show

Example

::pgl=> **show**

The following screen illustrates an example of the show command.

```
::pgl=> show

************ PNNI Peer Group Leader (PGL) Table **************
Leadership Priority  : 0
PGL State            : Not PGL
Preferred PGL NodeId :
   00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
Active PGL NodeId    :
   00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
Active Parent NodeId :
   00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
PGL Init Interval    : 15  secs
PGL Override Delay   : 30  secs
PGL Reelection Time  : 15  secs

::pgl=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Leadership Priority	The priority value of the Avidia system to become a PGL. Since the Avidia system cannot be a PGL, its priority is not configurable and has been set to **0** to indicate its PGL inability.
PGL State	The status of whether or not the Avidia system is the PGL. Since the Avidia system cannot be a PGL, its only value is Not PGL.
Preferred PGL NodeId	The Avidia system's vote on which PNNI device should be the PGL. A Node ID of all zeros indicates that there is no preferred PGL.
Active PGL NodeId	The Node ID of the current PGL. A Node ID of all zeros indicates that there is no known active PGL.
Active Parent NodeId	The Node ID of the current parent. A Node ID of all zeros indicates that there is no known active parent.
PGL Init Interval	The amount of time in seconds that the Avidia system will delay advertising its choice of preferred PGL after having the initialize operation (1 - 120 seconds). The default value is 15 seconds.
PGL Override Delay	The amount of time in seconds the Avidia system will wait for itself to be declared the preferred PGL by unanimous agreement among its peer (1 - 120 seconds). The default value is 30.
PGL Reelection Time	The amount of time in seconds after losing connectivity to the current PGL that the Avidia system will wait before restarting the process of electing a new PGL (1 - 120 seconds). The default value is 15.

Managing Summary Advertisements

Instead of advertising several routes with common bytes in its ATM prefix, the administrator can summarize them into a single route to minimize the number of advertised routes and reduce the amount of resources that excess routes consume (examples: memory and processing time).

Creating Summary Advertisements

`configuration atm pnni summary`

Use the new command to create a summary advertisement.

From the `::summary=>` prompt, enter the new command in the following format.

`new` `<address> <length(bytes)> [`**`-type`** `(`**`int`**`|`**`ext`**`)] [`**`-supp`**`]`

Parameters

`<address>`

The ATM end system address in xx:xx:... format allowing up to 19 octets.

`<length(bytes)>`

The prefix length in bytes for the summary address.

`[`**`-type`** `(`**`int`**`|`**`ext`**`)]`

The type of summary address.

- **int** represents internal summary addresses. Internal summary addresses have originated from the PNNI domain.
- **ext** represents external summary addresses. External summary addresses originate from other protocol domains (Example: IISP).

`[`**`-supp`**`]`

The option to suppress other addresses that are summarized by the summary prefix. If used, other addresses that have been summarized will not be advertised.

Example

```
::summary=> new 39:2:3:4:5:6:7:8:9:10:11:12:13 13 -type int
-supp
```

Displaying Summary Advertisements

::root=> configuration atm pnni summary

Use the show command to display the summary advertisement information.

From the `::summary=>` prompt, enter the show command in the following format.

show

Example

`::summary=>` **show**

The following screen illustrates an example of the show command.

```
::summary=> show

********************** PNNI Summary Advertising Table **********************
Idx Summary Prefix                                             Len Sup Type State
                                                              (bits)
-------------------------------------------------------------------------------
1   39:02:03:04:05:06:07:08:09:10:11:12:13:00:00:00:00:00:00 104  N  INT  Adver

::summary=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Idx	The index number referencing a summarized address entry.
Summary Prefix	The summarized address representing a range of ATM end system addresses.
Len (bits)	The length of the summary address in number of bits.
Sup	The option to suppress other addresses that are summarized by the summary prefix. • N indicates that there is no suppression of other addresses so that they will be advertised. • Y indicates that there is suppression of other addresses so that they will not be advertised.
Type	The type of summary address. • INT represents an internal type in which the address originated from within the PNNI domain • EXT represents an external type in which the address originated from another protocol domain such as IISP.
State	The state of the summary prefix address such as down or advertising.

Deleting Summary Advertisements

```
::root=> configuration atm pnni summary
```

Use the delete command to remove the summary advertisement information. Use the show command to display information you will need to delete summary advertisements.

From the `::summary=>` prompt, enter the delete command in the following format.

`delete` `<address> <length(bytes)>`

Parameters

`<address>`

The ATM end system address in xx:xx:... format allowing up to 19 octets.

`<length(bytes)>`

The prefix length in bytes for the summary address.

Example

```
::summary=> delete 39:2:3:4:5:6:7:8:9:10:11:12:13 13
```

Displaying Routing Nodes

The administrator can view selectable information for a particular route to a specified destination node.

```
::root=> display stats pnni routenode
```

Use the show command to display information on PNNI nodes.

From the `::routenode=>` prompt, enter the show command in the following format.

`show [-qos (cbr|rt-vbr|nrt-vbr|ubr)][-node <node id>][-dtl]`

Parameters

`[-qos (cbr|rt-vbr|nrt-vbr|ubr)]`

The Quality of Service type for the connection to the destination node.

`[-node <node id>]`

The node ID of the PNNI in xx:xx:... format. The maximum length is 22 bytes.

`[-dtl]`

The DTL option used to display a detailed Designated Transit List containing information about the intermediate and destination nodes in the path to the destination node.

Example

```
::routenode=> show -node
60:a0:39:2:3:4:5:6:7:8:9:10:11:12:1:11:22:33:44:55:66:0
```

```
::routenode=> show -dtl
```

```
::routenode=> show -qos cbr
```

The following screen illustrates an example of the show command.

```
::routenode=> show -qos cbr

*********************** PNNI Route Node Table *********************************
Idx  QoS     Destination NodeId
               Admin      CDV     CTD       MCR       ACR       CLR0    CLR0+1
               Weight    (usec)  (usec)
-------------------------------------------------------------------------------
1    CBR     60:A0:39:02:03:04:05:06:07:08:09:10:11:12:01:11:22:33:44:55:66:00
outgoing port: 12.1
forward link:  5040       150     20000     353207    353207    12      5
backward link: 5040       150     20000     353207    353207    12      5


::routenode=> show -node 60:a0:39:2:3:4:5:6:7:8:9:10:11:12:1:11:
22:33:44:55:66:0

*********************** PNNI Route Node Table *********************************
Idx  QoS     Destination NodeId
               Admin      CDV     CTD       MCR       ACR       CLR0    CLR0+1
               Weight    (usec)  (usec)
-------------------------------------------------------------------------------
1    CBR     60:A0:39:02:03:04:05:06:07:08:09:10:11:12:01:11:22:33:44:55:66:00
outgoing port: 12.1
forward link:  5040       150     20000     353207    353207    12      5
backward link: 5040       150     20000     353207    353207    12      5

2    rt-VBR  60:A0:39:02:03:04:05:06:07:08:09:10:11:12:01:11:22:33:44:55:66:00
outgoing port: 12.1
forward link:  5040       150     20000     353207    353207    12      5
backward link: 5040       150     20000     353207    353207    12      5

3    nrt-VBR 60:A0:39:02:03:04:05:06:07:08:09:10:11:12:01:11:22:33:44:55:66:00
outgoing port: 12.1
forward link:  5040       250     20000     353207    353207    12      5
backward link: 5040       250     20000     353207    353207    12      5

4    UBR     60:A0:39:02:03:04:05:06:07:08:09:10:11:12:01:11:22:33:44:55:66:00
outgoing port: 12.1
forward link:  5040       250     20000     353207    353207    12      5
backward link: 5040       250     20000     353207    353207    12      5

::routenode=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
ACR	The Available Cell Rate in cells per second.
Admin Weight	The administrative weight assigned to an interface and its QoS type as described in “Managing Interface Administrative Weights” on page 193.
Backward link	The path in the backward direction coming from the destination node.
CDV	The Cell Delay Variation in microseconds.
CLR0	The cumulative Cell Loss Ratio (CLR) for Cell Loss Priority (CLP) = 0 traffic.
CLR0+1	The cumulative Cell Loss Radio (CLR) for Cell Loss Priority (CLP) = 0 + 1 traffic.
CTD	The Cell Transfer Delay in microseconds.
Destination NodeId	The node ID of the destination ATM device.
DTL#	The index in the current DTL stack that references a single entry in it.
Forward link	The path in the forward direction going to the destination node.
Idx	The index number that references a single DTL stack.
LinkType	The type of link in the path to the destination node. • Horizontal represents an intermediate node where there is at least one more node to cross in order to reach the destination node. • LastEntry represents the destination node where the link terminates.
MCR	The Maximum Cell Rate in cells per second.
Outgoing port	The slot and port on the Avidia system that leads to the destination node.
PortId	The port on the current node to use as an exit. If a port is not needed, it is coded as a zero.
QoS	The Quality of Service type which includes CBR, UBR, rt-VBR, and nrt-VBR.

CONFIGURING ATM SYSTEM PARAMETERS 8

There are several ATM system parameters that allow the flexible customization of an Avidia system. These ATM system parameters are required to set up ATM connections related to IISP and PNNI. You will configure ATM connections in the following Chapter 9, “Configuring ATM Connections.” You configured ATM routing parameters in Chapter 7, “Configuring ATM Routing.” Also, see the *Avidia System Technology and Applications Overview* for more detailed information about ATM system parameters.

The following sections provide configuration instruction:

CONFIGURING ATM SYSTEM SIGNALING CHARACTERISTICS

The atm system set command configures the Avidia system wide signaling related characteristics. This command can be used to set the switch route mode to either static (IISP) or dynamic (PNNI), enable/disable signaling globally, or enable/disable ILMI globally.

Setting Up ATM System Signaling Characteristics

```
::root=> configuration atm system
```

From the `::system=>` prompt, enter the set command in the following format.

`set` `[`**`-route static/dynamic/disable`**`] [`**`-sig enable/disable`**`] [`**`-ilmi enable/disable`**`]`

Parameters

`[`**`-route static/dynamic/disable`**`]`

The routing mode you will use for the Avidia system.

- **static—**represents static routing using IISP
- **dynamic—**represents dynamic routing using PNNI
- **disable—**represents the disabling of both static IISP and dynamic PNNI routing

`[`**`-sig enable/disable`**`]`

Whether or not signaling is enabled for the Avidia system.

- **enable—**activates signaling globally
- **disable—**deactivates signaling globally

`[`**`-ilmi enable/disable`**`]`

The option to enable or disable the ILMI protocol, where one of its functions is to send the 13-byte prefix to the remote ATM end-station. If the ATM end-station is ILMI-compliant, you can enable it to send the prefix automatically. Otherwise, if the ATM end-station is not ILMI-compliant, you can disable it.

Example

```
::system=> set -route dynamic -sig enable -ilmi enable
```

Displaying the ATM System Signaling Characteristics

The ATM system show command displays the Avidia system wide signaling related characteristics. This command can be used to show whether the switch route mode is static (IISP) or dynamic (PNNI), if signaling is enabled/disabled globally, or ILMI is enabled/disabled globally.

`::root=> configuration atm system`

From the `::system=>` prompt, enter the show command in the following format.

`show`

Example

`::system=>` **`show`**

The following screen illustrates an example of the show command.

```
::system=> show
Routing mode: Dynamic
System Signaling Admin: Enabled
System ILMI Admin: Enabled

::system=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Routing mode	The routing mode to configure for the Avidia system. • static—represents static routing using IISP • dynamic—represents dynamic routing using PNNI • disable—represents the disabling of both static IISP and dynamic PNNI routing
System Signaling Admin	The option to enable or disable signaling globally. • Enabled—indicates that signaling has been activated. • Disabled—indicates that signaling has been deactivated.
System ILMI Admin	The option to enable or disable the ILMI protocol. • Enabled—indicates that ILMI has been activated. • Disabled—indicates that ILMI has been deactivated.

Displaying the ATM System Signaling Statistics

QSAAL, which is Signaling ATM Adaptation Layer, transports Q.2931 messages between the ATM switch and the host over the ATM layer. Q.2931 is the signaling standard for ATM to support SPVCs. The show command displays the signaling and ILMI statistics for the Avidia system.

```
::root=> display stat signaling
```

From the `::signaling=>` prompt, enter the show command in the following format.

show `[<slot.port>][-qsaal] [-qsaalrx] [-qsaaltx]`

Parameter

`[<slot.port>]`

The slot.port combination. For example, 2.1 represents slot 2 port 1.

`[-qsaal]`

The option to view statistics only specific to QSaal signaling.

`[-qsaalrx]`

The option to view statistics only specific to QSaal inbound signaling statistics.

`[-qsaaltx]`

The option to view statistics only specific to QSaal outbound signaling statistics.

Examples

`::system=>` **show**

`::system=>` **show 2.1**

The following screen illustrates an example of the show command.

```
::signaling=> show

Signaling Statistic Table

                 QSaal                 Q93b                 ILMI
 Slot       Current Status       Current Status       Current Status
  2.1             Up                   Up                   Up
  3.1             Up                   Up                   Up

::signaling=> show 2.1
                      Signaling statistics for 2.1
                     QSaal Current Status: Up
                        Connection Events: 0
                             Errored PDUs: 0
                      Q93b Current Status: Up
                       Call Proceeding Rx: 0
                       Call Proceeding Tx: 0
                               Connect Rx: 0
                               Connect Tx: 0
                          Connect Ack. Rx: 0
                          Connect Ack. Tx: 0
                                 Setup Rx: 0
                                 Setup Tx: 0
                               Release Rx: 0
                               Release Tx: 0
                       Release Confirm Rx: 0
                       Release Confirm Tx: 0
                               Restart Rx: 2
                               Restart Tx: 2
             Total Connections Established: 0
                  Total Active Connections: 0
                            Last Cause Rx: 0
                            Last Cause Tx: 0
                      ILMI Current Status: Up

::signaling=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
QSaal Current Status	The current QSaal signaling layer status on this port. • Up—layer is operational • Down—layer is not operational
Connection Events	The number of QSaal connection events that have occurred on the port.
Errored PDUs	The number of QSaal PDUs with errors.
Q93b Current Status	The current Q93b signaling layer status on this port. • Up—layer is operational • Down—layer is not operational
Call Proceeding Rx	The number of Call Proceeding messages received on the port.
Call Proceeding Tx	The number of Call Proceeding messages transmitted on this port.
Connect Rx	The number of Connect messages received on the port.
Connect Tx	The number of Connect messages transmitted on the port.
Connect Ack. Rx	The number of Connect Acknowledgement messages received on the port.
Connect Ack Tx	The number of Connect Acknowledgement messages transmitted on the port.
Setup Rx	The number of Setup messages received on the port.
Setup Tx	The number of Setup messages transmitted on the port.
Release Rx	The number of Release messages received on the port.
Release Tx	The number of Release messages transmitted on the port.
Release Confirm Rx	The number of Release Confirm messages received on the port.
Release Confirm Tx	The number of Release Confirm messages transmitted on the port.
Total Connections Established	The total number of SPVC or SVC connections that have been established through this port.
Total Active Connections	The total number of SPVC or SVC connections that is currently active on this port.
Last Cause Rx	The number of Last Release Cause messages received on the port.
Last Cause Tx	The number of Last Release Cause messages transmitted on the port.
ILMI Current Status	The current status of ILMI on the port. • Up—ILMI is operational • Down—ILMI is not operational

Clearing the ATM System Signaling Statistics

The clear command removes the signaling and ILMI statistics for any specified slots and ports of the Avidia system.

```
::root=> display stat signaling
```

From the ::signaling=> prompt, enter the show command in the following format.

clear [<slot.port>] [**-all**]

Parameter

[<slot.port>]

The slot.port combination for which to clear the statistics. For example, 2.1 represents slot 2 port 1.

[**-all**]

The option to clear the signaling statistics for all slot and ports.

Examples

::system=> **clear 2.1**

::system=> **clear -all**

CONFIGURING STATIC ATM ADDRESSES

The administrator can create, delete, flush, or display local interface ATM addresses.

Creating Static ATM Address

The atm system address new command configures an ATM interface on the local Avidia system.

```
::root=> configuration atm system address
```

From the `::address=>` prompt, enter the new command in the following format.

new `<ESI> <slot.port>`

Parameters

`<ESI>`

The ESI portion of the ATM address which is 6 bytes in xx:xx:xx:xx:xx:xx format.

`<slot.port>`

The slot.port combination that is the interface for which you assigns the ATM address. For example, 2.1 represents slot 2 port 1.

Example

```
::system=> new 0:0:0:0:18:1 18.1
```

Displaying Static ATM Addresses

The atm system address show command displays the interface ATM addresses assigned to the Avidia system.

::root=> configuration atm system address

From the `::address=>` prompt, enter the show command in the following format.

show [slot.[port]]

Parameters

[slot.[port]]

The optional slot.port combination that you want to view. For example, 2.1 represents slot 2 port 1.

Example

::address=> **show**

::address=> **show 12.1**

The following screen illustrates an example of the atm system address show command.

```
::address=> show
ATM Address Table

                    ATM Address                                Slot   Source
-------------------------------------------------------------------------------
39:00:00:00:00:00:00:00:00:00:00:03:00:00:00:00:11:01:00    11.1   Static
39:00:00:00:00:00:00:00:00:00:00:03:00:00:00:00:12:01:00    12.1   Static
39:00:00:00:00:00:00:00:00:00:00:03:00:00:00:00:17:01:00    17.1   Static
39:00:00:00:00:00:00:00:00:00:00:03:00:00:00:00:17:02:00    17.2   Static
39:00:00:00:00:00:00:00:00:00:00:03:00:00:00:00:18:01:00    18.1   Static

::address=> show 12.1
ATM Address Table

                    ATM Address                                Slot   Source
-------------------------------------------------------------------------------
39:00:00:00:00:00:00:00:00:00:00:03:00:00:00:00:12:01:00    12.1   Static

::address=>
```

The following table describes the information displayed after you enter the atm system address show command:

Information	Description
ATM Address	The 20-byte ATM address assigned to a local interface (slot.port). The first 13 bytes is the prefix. The next 6 bytes is the ESI portion. The last 1 byte is the SEL portion used as an application selector.
Slot	The slot.port combination of the interface for which you assigned the ATM address. For example, 2.1 represents slot 2 port 1.
Source	The type of ATM address. Static represents a configured address. Dynamic represents an address learned from ILMI.

Deleting Static ATM Addresses

The atm system address delete command removes an ATM address from the address table.

```
::root=> configuration atm system address
```

From the `::address=>` prompt, enter the new command in the following format.

delete `<address> <slot.port>`

Parameters

`<address>`

The 20 byte ATM address to be removed from the ATM address table.

`<slot.port>`

The slot.port combination of the interface for which you will remove the ATM address. For example, 2.1 represents slot 2 port 1.

Example

```
::address=> delete 39:00:00:00:00:00:00:00:00:00:00:00:03:00:00
:00:00:18:01:00 18.1
```

Flushing Static ATM Addresses

The ATM system address flush command removes all static ATM addresses with an old system prefix and replaces them with the current system prefix.

```
::root=> configuration atm system address
```

From the `::address=>` prompt, enter the new command in the following format.

`flush` `[-y]`

Parameters

`[-y]`

The option used to skip the confirmation to flush the addresses.

Example

`::address=>` **`flush -y`**

SETTING UP ALIASES FOR ATM ADDRESSES

Use an ATM address alias instead of entering a full 20-byte ATM address when setting up SPVC connections. An alias is a name that represents the ATM address. For example, an ATM address of 39:00:00:00:00:00:00:00:00:00:00:00:03:00:00:00:00:18:01:00 can be represented by the alias Slot18Port1.

Creating Aliases

```
::root=> configuration atm system alias
```

From the `::alias=>` prompt, enter the new command in the following format.

new `<alias> <ATM address>`

Parameters

`<alias>`

A user-friendly name to associate with the ATM address (up to 14 characters).

`<ATM address>`

The 20-byte ATM address in xx:xx:xx:... format.

Example

```
::alias=> new Slot18Port1 39:00:00:00:00:00:00:00:00:00:00
:00:03:00:00:00:00:18:0
```

Displaying Aliases

::root=> configuration atm system alias

From the `::alias=>` prompt, enter the show command in the following format.

show [alias]

Parameter

[alias]

The name that you previously assigned to an ATM address (case-sensitive).

Examples

::alias=> **show**

::alias=> **show Slot18Port1**

The following screen illustrates an example of the show command.

```
::alias=> show

Address Alias Table

Alias          Address                                                  Len
-----          -------                                                  ---
Slot18Port1    39:00:00:00:00:00:00:00:00:00:00:00:03:00:00:00:00:18:00     19

::alias=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Alias	A user-friendly name that is case-sensitive and is associated with an ATM address.
Address	The ATM address associated with the alias.
Len	The length of the ATM address.

Deleting Aliases

```
::root=> configuration atm system alias
```

From the `::alias=>` prompt, enter the delete command in the following format.

`delete` `<alias>`

Parameters

`<alias>`

The name that you previously assigned to an ATM address (case-sensitive). Use the show command (page 220) to display aliases assigned to ATM addresses.

Example

```
::alias=> delete Slot18Port1
```

Configuring ATM Interfaces

For an ATM interface, represented by a slot.port combination, you can enable or disable signaling, and enable or disable the ILMI protocol. Additionally, you can update an existing ATM interface and display ATM interface configuration.

Setting the ATM Interface Configuration

```
::root=> configuration atm system interface
```

From the `::interface=>` prompt, enter the set command in the following format.

set `<slot.port> [sig_option] [ilmi_option]`

Parameters

`<slot.port>`

The slot.port combination of the interface for which you will enable or disable signaling and ILMI protocol. For example, 2.1 represents slot 2 port 1.

`[sig_option]`

The option to enable or disable signaling.

- **-sig enable—**enables signaling
- **-sig disable—**disables signaling.

`[ilmi_option]`

The option to enable or disable ILMI.

- **-ilmi enable—**enables signaling
- **-ilmi disable—**disables signaling.

Example

```
::interface=> set 18.1 -sig enable -ilmi disable
```

Updating the ATM Interface Configuration

The atm system interface update command enables or disables signaling and the ILMI protocol. In addition, you can update the interface type as described below.

```
::root=> configuration atm system interface
```

From the `::interface=>` prompt, enter the update command in the following format.

update `<slot.port>`
<**uni31pub/uni31priv/iisp/uni40pub/uni40priv/pnni**>
<**user/network**> [**-sig enable/disable**] [**-ilmi enable/disable**]

Parameters

`<slot.port>`

The slot.port combination of the interface for which you will enable or disable signaling and ILMI protocol. For example, 2.1 represents slot 2 port 1.

<**uni31pub/uni31priv/iisp/uni40pub/uni40priv/pnni**>

The type of interface. All interfaces can be UNI3.1/4.0 user or network. Line card interface can be set to UNI3.1/UNI4.0 user/network, PNNI, or IISP. Subtending DS3 line channel card can be set to UNI3.1/UNI4.0 user/network, or IISP.

- **uni31pub**—UNI 3.1 public
- **uni31priv**—UNI 3.1 private
- **iisp**—IISP
- **uni40pub**—UNI 4.0 public
- **uni40priv**—UNI 4.0 private
- **pnni**—PNNI

<**user/network**>

The type of interface. All interfaces can be UNI3.1/4.0 user or network. Line card interface can be set to UNI3.1/UNI4.0 user/network, PNNI, or IISP. Subtending DS3 line channel card can be set to UNI3.1/UNI4.0 user/network, or IISP. When an interface is configured as PNNI interface type, it's default to be network side, user can not configure it to user side.

`[sig_option]`

The option to enable or disable signaling.

- `-sig enable`—enables signaling
- `-sig disable`—disables signaling.

`[ilmi_option]`

The option to enable or disable ILMI.

- `-ilmi enable`—enables signaling
- `-ilmi disable`—disables signaling.

Example

```
::interface=> update 18.1 uni31priv user -sig enable -ilmi
disable
```

Displaying the ATM Interface Configuration

`::root=> configuration atm system interface`

From the `::interface=>` prompt, enter the show command in the following format.

`show` `[slot.[port]]`

Parameter

`[slot.[port]]`

The slot.port combination of the interface for which information is shown. For example, 2.1 represents slot 2 port 1. You can also display information for an entire slot and all its ports by specifying the slot only.

Examples

`::interface=>` **`show`**

`::interface=>` **`show 18`**

`::interface=>` **`show 18.1`**

The following screen illustrates an example of the show command.

```
::interface=> show
Slot       Interface Type                Signaling       ILMI
11.1       PNNI Network                  Enable          Enable
12.1       PNNI Network                  Enable          Enable

::interface=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Slot	The slot.port combination. For example, 18.1 represents slot 18 port 1.
Interface Type	The type of interface configured as described in “Updating the ATM Interface Configuration” on page 223.
Signaling	The status of the signaling feature. • Enabled—indicates that signaling has been activated. • Disabled—indicates that signaling has been deactivated.
ILMI	The status of the ILMI protocol. • Enabled—indicates that ILMI has been activated. • Disabled—indicates that ILMI has been deactivated.

Setting the Maximum SVC VPI/VCI

This parameter sets the maximum VPI/VCI combination that you can create on this ATM port. See the cell card connection space table in the *Avidia System Technology and Applications Overview* for for more information on maximum connections allowed per port and per card.

```
::root=> configuration atm system interface advance maxsvccvpi
```

From the `::maxsvccvpi=>` prompt, enter the set command in the following format.

`set` `slot.port [`**`-maxvpi`**` n] [`**`-maxvci`**` n]`

Parameters

`slot.port`

The slot.port combination of the interface for which you will set the maximum VPI. For example, 2.1 represents slot 2 port 1.

`[`**`-maxvpi`**` n]`

The maximum value (from 0 to 255) of the VPI for an SVC connection.

`[`**`-maxvci`**` n]`

The maximum value (from 32 to 1023) of the VCI for an SVC connection.

Example

`::maxsvccvpi=>` **`set 12.1 -maxvpi 12 -maxvci 200`**

Displaying the Maximum SVC VPI/VCI

::root=> configuration atm system interface advance maxsvccvpi

From the `::maxsvccvpi=>` prompt, enter the show command in the following format.

show [slot.[port]]

Parameter

[slot.[port]]

The slot.port combination of the interface for which you will show information. For example, 2.1 represents slot 2 port 1. You can also display information for an entire slot and all its ports by specifying the slot only.

Examples

::maxsvccvpi=> **show**

::maxsvccvpi=> **show 3.1**

The following screen illustrates an example of the show command.

```
::svccvpci=> show
Slot      max vpi  max vci
2.1        3          1023
3.1        3          1023

::svccvpci=> show 3.1
Slot      max vpi  max vci
3.1        3          1023

::svccvpci=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Slot	The slot.port combination. For example, 18.1 represents slot 18 port 1.
max svcc vpi	The maximum value for a VPI on the interface.

Setting the Q93B Timer Attributes

```
::root=> configuration atm system interface advance q93b
```

Q93B timers control the timing of SVCs at the Q93B layer. The Q93B signaling layer provides the means to establish, maintain, and terminate SVCs across an ATM-based network between communication nodes. You can modify the Q93B timer attributes from the `::q93b=>` prompt. Enter the set command in the following format.

set [slot.port] ([**-t303** n] [**-t308** n] [**-t309** n] [**-t310** n] [**-t313** n][**-t316** n] [**-t322** n]) **||** [**-all default**]

Parameters

[slot.port]

The optional slot.port combination of the interface for which you will set the maximum VPI. For example, 2.1 represents slot 2 port 1.

([**-t303** n] [**-t308** n] [**-t309** n] [**-t310** n] [**-t313** n][**-t316** n] [**-t322** n]) **||** [**-all default**]

- [**-t303** n]—maximum time (in seconds) to wait for a network response to a setup request. Its range is 1 - 255.
- [**-t308** n]—maximum time (in seconds) to wait for a network response to a release request. Its range is 1 - 255.
- [**-t309** n]—maximum time (in seconds) to wait during a SSCOP connection loss. Its range is 1 - 255.
- [**-t310** n]—maximum time (in seconds) to wait for a final response after receiving a Call Proceeding message. Its range is 1 - 255.
- [**-t313** n]—maximum time (in seconds) to wait for a network response to a Connect request. Its range is 1 - 255.
- [**-t316** n] —maximum time (in seconds) to wait for a network response to a Restart request. Its range is 1 - 255.
- [**-t322** n]—maximum time (in seconds) to wait for a network response to a Status Enquiry request. Its range is 1 - 255.
- [**-all default**]—sets all timers to their default values.

Example

::q93b=> **set 12.1 -t303 100**

Displaying the Q93B Timer Attributes

::root=> configuration atm system interface advance q93b

From the `::q93b=>` prompt, enter the show command in the following format.

show [slot.[port]]

Parameter

[slot.[port]]

The slot.port combination of the interface for which you will show information. For example, 2.1 represents slot 2 port 1. The administrator can also display information for an entire slot and all its ports by specifying the slot only.

Examples

::alias=> **show**

::alias=> **show 12.1**

The following screen illustrates an example of the show command.

```
::q93b=> show

Q93b Timer Configuration Table

Slot     T303     T308     T309     T310     T313     T316     T322
11.1      30       30       10       30       30       120      4
12.1      100      255      255      255      255      255      255

::q93b=> show 18.1

Q93b Timer Configuration Table

Slot     T303     T308     T309     T310     T313     T316     T322
18.1      100      255      255      255      255      255      255

::q93b=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Slot	The slot.port combination. For example, 18.1 represents slot 18, port 1.
T303	The maximum time (in seconds) to wait for a network response to a setup request.
T308	The maximum time (in seconds) to wait for a network response to a release request.
T309	The maximum time (in seconds) to wait during a SSCOP connection loss.
T310	The maximum time (in seconds) to wait for a final response after receiving a Call Proceeding message.
T313	The maximum time (in seconds) to wait for a network response to a Connect request.
T316	The maximum time (in seconds) to wait for a network response to a Restart request.
T322	The maximum time (in seconds) to wait for a network response to a Status Enquiry request.

Setting the SSCOP Timer Attributes

::root=> configuration atm system interface advance sscop

From the `::sscop=>` prompt, enter the set command in the following format.

set <slot.port> ([**-cc** n] [**-keepalive** n] [**-noresponse** n] [**-poll** n] [**-idle** n]) || [**-all default**]

Parameters

[slot.port]

The optional slot.port combination of the interface for which you will set the SSCOP timer attributes.

([**-cc** n][**-keepalive** n][**-noresponse** n][**-poll** n][**-idle** n]) || [**-all default**]

- [**-cc** n] is the connection control timer that specifies the maximum time (in tenths of a second) to wait for a response during the outgoing link establish, release, resynchronize, and recovery phases. Its range is 1 - 2500.
- [**-keepalive** n] is the interval (in tenths of a second) at which Keep-Alive messages are sent. Its range is 1 - 2550.
- [**-noresponse** n] is the period (in tenths of a second) in which no response is received. Its range is 1 - 2550.
- [**-poll** n] is the Peer poll time (in tenths of a second). Its range is 1 - 1000.
- [**-idle** n] is the period (in tenths of a second) during which no Poll protocol data units are sent. Its range is 0 - 2550.
- [**-all default**] is used to set all timers to their default values. This option cannot be used with other timer option. If slot.port is not given then only the [-all default] can be used. This will set all timers for all slots to their default values.

Example

::sscop=> **set 12.1 -cc 1000 -keepalive 100 -noresponse 100**

Displaying the SSCOP Timer Attributes

```
::root=> configuration atm system interface
advance sscop
```

From the `::sscop=>` prompt, enter the show command in the following format.

show [slot.[port]]

Parameter

[slot.[port]]

The slot.port combination of the interface for which you will show information. For example, 2.1 represents slot 2 port 1. The administrator can also display information for an entire slot and all its ports by specifying the slot only.

Examples

::alias=> **show**

::alias=> **show 12.1**

The following screen illustrates an example of the show command.

```
vxTarget::sscop=> show

SSCOP Timer Configuration Table

Slot     CC     Keep-Alive      No-Response     Poll       Idle
11.1     10        20               70          7          150
12.1     10        20               70          7          150

::sscop=> show 18.1

SSCOP Timer Configuration Table

Slot     CC     Keep-Alive      No-Response     Poll       Idle
18.1     10        20               70          7          150

::sscop=>
```

The following table describes the information displayed after you enter the show command.

Information	Description
Slot	The slot.port combination. For example, 18.1 represents slot 18 port 1.
CC	The maximum time (in tenths of a second) to wait for a response during the outgoing link establish, release, resynchronize, and recovery phases.
Keep-Alive	The interval (in tenths of a second) at which Keep-Alive messages are sent.
No-Response	The period (in tenths of a second) in which no response is received.
Poll	The Peer poll time (in tenths of a second).
Idle	The period (in tenths of a second) during which no Poll protocol data units are sent.

Configuring the ATM Prefix

The ATM prefix is the first 13 bytes of a full 20-byte ATM address assigned to the Avidia system (similar to the network portion of an IP address). The default ATM prefix is 39:0:0:0:0:0:0:0:0:0:0:0:0. The administrator can modify this prefix using the update command or display its configuration with the show command.

Updating the ATM Prefix

```
::root=> configuration atm system prefix
```

From the `::prefix=>` prompt, enter the update command in the following format.

update `<address>`

Parameters

`<address>`

The 13-byte prefix or the full 20-byte ATM address to be assigned to the Avidia system.

Example

```
::prefix=> update 39:00:00:00:00:00:00:00:00:00:00:00:03
```

Displaying the ATM Prefix

`::root=> configuration atm system prefix`

This show command is used to display the configured ATM prefix. The ATM system prefix is the 13-byte ATM prefix configured on the Avidia system.

From the `::prefix=>` prompt, enter the show command in the following format.

`show`

Examples

`::prefix=>` **`show`**

The following screen illustrates an example of the show command.

```
::prefix=> show

ATM System Prefix: 39:00:00:00:00:00:00:00:00:00:00:00:03

::prefix=>
```

CONFIGURING ATM CONNECTIONS 9

This chapter provides instruction for setting up ATM connections between cards in an Avidia system, including:

- permanent virtual connections (PVPCs and PVCCs) for ATM cell transmissions
- permanent virtual connections (PVPCs and PVCCs) for frame transmissions
- Soft Permanent Virtual Circuits (SPVCs) and viewing SVCs for use with IISP and PNNI routing

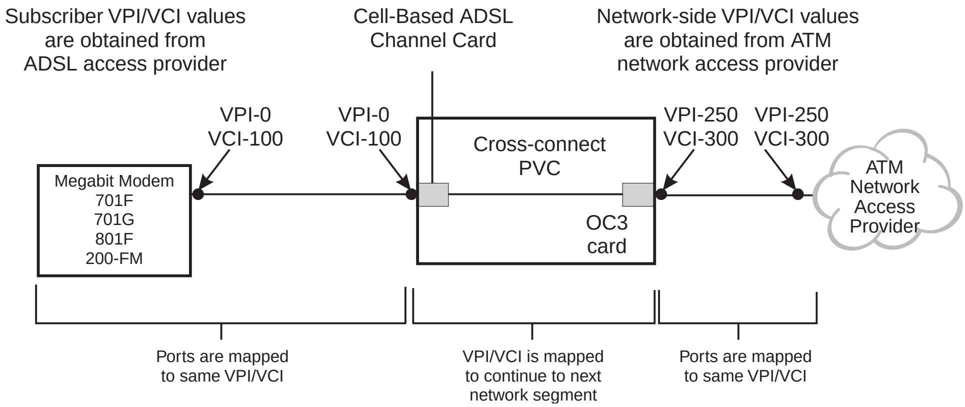
The following sections provide configuration instruction:

When you configure ATM connections, you will apply ATM traffic profiles that you set up in Chapter 6, “Configuring ATM Traffic.” Also, see the *Avidia System Technology and Applications Overview* for more detailed information about the Avidia systems and their ATM capabilities. That document also provides ATM connection space information for the Avidia cards and system.

SETTING UP PERMANENT CONNECTIONS FOR CELL CARDS

This section provides procedures for configuring both PVPCs (see below) and PVCCs (see page 250), including backups connections, for Avidia cell cards.

The following figure shows an example of a configured permanent connection, including the specific VPI and VCI values associated with each segment of the connection. Connections can be set up between subscriber to network card slots, subscriber to subscriber slots, any slot and the management card, and more, in Avidia systems.



Configuring Cell PVPCs

Configure primary PVPCs and backup PVPCs using the command-line interface. Backup PVPCs are redundant to primary PVPCs. A primary PVPC automatically switches to a backup PVPC if the primary PVPC were to fail. Backup PVPCs are usually connected to a second network card. However, in the case of a DS3 4-port card, you can connect the backup PVPC to a different port on the same card.

PVPCs carry data between defined points within the Avidia chassis, such as between a cell-based subscriber card (such as an ADSL or G.shdsl) and a network card or a network card and another network card, and more. PVPCs also carry data from subscriber modems to Avidia subscriber cards, and from Avidia network cards to other destinations in the ATM backbone network.

PVPC configuration requires specifying a Virtual Path Identifier (VPI). For PVPCs, the system only translates the VPI value and does not check or change any configured Virtual Channel Identifier (VCI) value. PVPC configuration also requires assigning a traffic profile to the transmit and receive directions. For information on assigning CBR and rt-VBR traffic profiles to PVPCs, see “Rate Restriction for CBR and rt-VBR Connections” on page 145.

You can view and configure cross-connect PVPCs between ATM ports on ADSL, G.shdsl, and cell-based SDSL cards, and ATM ports on OC3, DS3 1-port and 4-port cards, DS1, and E1 cards.

Viewing ATM Port Settings

You cannot currently configure ATM port settings, however you can display the preconfigured ATM settings for the OC3 card, which may be useful when configuring virtual circuits.

`::root=> configuration atm`

From the `::atm=>` prompt, enter the show command in the following format.

`show`

Information similar to the following displays.

```
::atm=> show

slot  MaxPVPCs MaxPVCCs PVPCs  PVCCs  MaxVPIBits  MaxVCIBits
12    255      4093     1      0      12          9

::atm=>
```

The following table describes the information displayed after you enter the atm show command.

Column	Description
Slot	The slot number of the ATM port for which the information is displayed.
MaxPVPCs	The maximum number of PVPCs that can be configured on the selected port.
MaxPVCCs	The maximum number of PVCCs that can be configured on the selected port.
PVPCs	The current number of PVPCs configured on the selected port.
PVCCs	The current number of PVCCs configured on the selected port.
MaxVPIBits	The number of VPI bits in each cell header that are used by the Avidia system.
MaxVCIBits	The number of VCI bits in each cell header that are used by the Avidia system.

Restoring Service for all PVCs on a Port

You can manually switch all of the backup PVCs on a port back to the configured primary PVC.

```
::root=> configuration atm
```

From the `::atm=>` prompt, enter the restore command in the following format.

restore <port>

Parameter

<port>

The port for which you want to switch the backup PVCs to the primary PVCs (format slot.port).

Example

```
::atm=> restore 3.3
```

Adding ADSL Cell Card PVPCs

```
::root=> configuration atm cell pvpc
```

From the `::pvpc=>` prompt, do one of the following:

- To add one PVPC, enter the new command in the following format. The PVPC table index number is automatically assigned.

  ```
  new <src port> <vpi> <dst port> <vpi>
  [-admin (up|down)][-txtraf <src index>] [-rxtraf <src index>]
  [-backup [<lport> <vpi>]]
  ```

- To add multiple PVPCs to a port with the same traffic profile for all, enter the range command in the following format. The PVPC table index numbers are automatically assigned. At the confirmation message, enter **Y** to create the PVPCs or enter **N** to cancel the command.

  ```
  range <#pvps> <src port> <vpi> <dst port> <vpi>
  [-admin (up|down)][-txtraf <src index>] [-rxtraf <src index>]
  [-y]
  ```

Parameters

`<#pvps>`

The number of PVPCs you want to create with the same traffic profile using the range command. Verify that the ports you plan to use for the PVPCs support the number of PVPCs you intend to create. See the *Avidia System Technology and Applications Overview*.

`<src port>`

One of the PVPC ports (format *slot.port)*. When setting up a VPC over an IMA group, the group number is entered instead of the port (format *slot.groupnumber*). For example, for slot 2 group 1, enter **2.g1**. This port can be on either card.

`<vpi>`

The VPI associated with the preceding `<port>` parameter in the command line. For a summary of the supported VPI ranges for each card, see the *Avidia System Technology and Applications Overview*.

`<dst port>`

The other PVPC port (format *slot.port)*. When setting up a VPC over an IMA group, the group number is entered instead of the port (format *slot.groupnumber*). For example, for slot 2 group 1, enter **2.g1**. This port can be on either card.

`<vpi>`

The VPI associated with the preceding `<port>` parameter in the command line. For a summary of the supported VPI ranges for each card, see the *Avidia System Technology and Applications Overview*.

`[`**`-admin`**` (`**`up`**`|`**`down`**`)]`

- **`-admin up`** —activates the PVPC
- **`-admin down`**—deactivates the PVPC

If you omit this parameter, the default admin status **`up`** is assigned.

`[`**`-txtraf`**` <src index>] [`**`-rxtraf`**` <src index>]`

The index number of the transmit (**-txtraf**) and receive (**-rxtraf**) traffic profiles you want to assign to the source port of this PVPC. Transmitted traffic refers to all traffic transmitted out of the Avidia chassis, while received traffic refers to all traffic received into the Avidia chassis. The transmit and receive traffic profiles assigned to the PVPC source port are adjusted to reflect the same service on the destination port. For instructions on viewing the list of configured profiles, see "Displaying ATM Traffic Profiles" on page 151.

If you omit this parameter, an index of 0 (no profile) is assigned. If you specify a profile for transmitted traffic, but not for received traffic, the received traffic is automatically configured to match the transmitted traffic.

`[`**`-backup`**` [<lport> <vpi>]]`

Configures a backup PVPC using the specified destination port (format *slot.port*) and VPI. Use the network card port (format *slot.port*) for the destination port. The VPI values can either be the same value as the primary PVPC or a different value. Omitting the `<lport> <vpi>` parameters automatically establishes a backup PVPC on the other network card using the same VPI as the primary PVPC.

`[`**`-y`**`]`

Results in the creation of the specified range of PVPCs without first displaying a confirmation message. If you omit this parameter, a confirmation message displays.

Examples

```
::pvpc=> new 8.5 9 12.1 9 -admin up -txtraf 3 -rxtraf 5 -backup
11.1 5 254
```

```
::pvpc=> range 5 8.5 9 12.1 9 -admin up -txtraf 3
 -rxtraf 5
```

Example for VPC over IMA group

```
::pvpc=> new 8.g3 9 12.1 9 -admin up -txtraf 3 -rxtraf 5 -backup
11.1 5 254
```

Adding a Backup PVPC to an Existing Cell Card PVPC

You can configure backup PVPCs at the same time you configure a primary PVPC, as described in the previous section. However, you can also add a backup PVPC to an existing primary PVPC configuration.

```
::root=> configuration atm cell pvpc
```

From the `::`pvpc=> prompt, enter the backup command in the following format.

backup `<index> [<lport> <vpi>]`

Parameters

`<index>`

The PVPC Table row index number of the primary PVPC for which you want to configure a backup PVPC.

`[<lport> <vpi>]`

Configures a backup PVPC using the specified destination port (format *slot.port*), and VPI. Use the network card port (format *slot.port*) for the destination port. The VPI value can either be the same value as the primary PVPC or a different value. Omitting this parameter automatically establishes a backup PVPC on the other network card using the same VPI as the primary PVPC.

Examples

```
::pvpc=> backup 3 12.1 25
```

```
::pvpc=> backup 3
```

Displaying Cell Card PVPC Information

::root=> configuration atm cell pvpc

From the `::pvpc=>` prompt, enter the show command in the following format.

show [<port> [<vpi>]]

Parameters

[<port>]

The port number for which you want to display the configured PVPC (format *slot.port)*. Omitting this parameter displays all configured PVPCs.

[<vpi>]

The VPI associated with the specified port. Omit this parameter if you did not specify a port. If you did specify a port, but omit this parameter, all of the PVPCs configured on that port display.

Example

::pvpc=> **show 11.1 9**

Information similar to the following displays.

```
::pvpc=> show 11.1 9
                                 Source      Source
      Source     Destination     TxTraffic  RxTraffic
Index Port  VPI  Port   VPI      Index      Index    Admin  Oper
2     3.1   9    11.1   9        1          2        up     up

::pvpc=>
```

The following table describes the information displayed after you enter a show pvp command.

Column	Description
Index	The PVPC table index number of the displayed PVPC.
Source Port	The subscriber-side port number.
VPI	The subscriber-side VPI.
Destination Port	The network-side port number.
VPI	The network-side VPI.
Source TxTraffic Index	The ATM traffic profile assigned for transmitted (downstream) data.
Source RxTraffic Index	The ATM traffic profile assigned for received (upstream) data.
Admin	The configured status of the PVPC, either up (activated) or down (deactivated).
Oper	The current operational status of the PVPC, either up (PVPC is passing data) or down (PVPC is not passing data).

Restoring Service from a Backup PVPC to a Primary Cell Card PVPC

After traffic has switched from a primary PVPC to the configured backup PVPC, you can manually switch it back.

```
::root=> configuration atm cell pvpc
```

1 From the `::pvpc=>` prompt, enter **`show`** to display the configured cell card PVPCs.

2 Note the PVPC table index number of the PVPC for which you want to restore service.

3 From the `::pvpc=>` prompt, enter the restore command in the following format.

   `restore` `<index>`

Parameter

`<index>`

The PVPC Table row index number of the primary PVPC for which you want to switch traffic from the backup PVPC back to the primary PVPC.

Example

```
::pvpc=> restore 3
```

Changing Cell Card PVPC Admin Status

```
::root=> configuration atm cell pvpc
```

1 From the `::pvpc=>` prompt, enter **`show`** to display the configured parameters for all PVPCs.

2 Note the index number of the PVPC for which you want to change the status.

3 Enter the admin command in the following format.

`admin` `<index> (`**`up|down`**`)`

Parameters

`<index>`

The index number of the PVPC you want to activate or deactivate.

`(`**`up|down`**`)`

- **`up`**—activates the PVPC
- **`down`**—deactivates the PVPC

Example

```
::pvpc=> admin 2 up
```

Deleting Primary and Backup Cell Card PVPCs

`::root=> configuration atm cell pvpc`

If you remove a card from the system, the PVPCs associated with the ports on that card are disabled, however the PVPC configuration is not automatically removed from the PVPC table. Be sure to delete unused PVPC configurations so the PVPC configuration table accurately reflects the PVPCs in use in the system.

1 From the `::pvpc=>` prompt, enter **`show`** to display all configured PVPCs.

2 Note the index number of the PVPC you want to delete (or for which you want to delete the backup PVPC).

3 Enter the delete command in the following format.

delete <index> [**-backup**]

Parameters

<index>

The index number of the PVPC you want to delete.

[**-backup**]

Enter **-backup** to delete the backup PVPC associated with the primary PVPC and leave the primary PVPC configuration in place. Omitting this parameter deletes both the primary PVPC and any configured backup PVPC.

Examples

::pvpc=> **delete 2 -backup**

::pvpc=> **delete 2**

Configuring Cell Card PVCCs

Configure primary PVCCs and backup PVCCs using the command-line interface. Backup PVCCs are redundant to primary PVCCs. A primary PVCC automatically switches to a backup PVCC if the primary PVCC were to fail.

PVCCs carry data between defined points within the Avidia chassis, such as between a subscriber card and a network card (see “Setting Up Permanent Connections for Frame Cards” on page 259 for creating cross-connects from a frame-based card). PVCCs also carry data from subscriber modems to Avidia subscriber cards, and from Avidia network cards to other destinations in the ATM backbone network.

PVCC configuration requires specifying a VPI and VCI. VPI and VCI combinations must be unique only on the same user port, as the circuit is remapped to a different VPI and VCI on the network interface. This enables different subscribers to use the same VPI and VCI combinations without creating conflict in the network. PVPC configuration also requires assigning a traffic profile to the transmit and receive directions. When assigning CBR and rt-VBR traffic profiles to PVCCs, see “Rate Restriction for CBR and rt-VBR Connections” on page 145.

You can configure cross-connect PVCCs between cell-based subscriber cards and either network cards or the management card.

Adding Cell Card PVCCs

```
::root=> configuration atm cell pvcc
```

From the `::pvcc=>` prompt, do one of the following.

- To add one PVCC, enter the new command in the following format. The PVCC table index number is automatically assigned.

  ```
  new <src port> <vpi> <vci> <dst port> <vpi> <vci>
  [-admin (up|down)][-txtraf <src index>] [-rxtraf <src index>]
  [-backup [<lport> <vpi> <vci>]]
  ```

- To add multiple PVCCs to a port with the same traffic profile for all, enter the range command in the following format.

  ```
  range <#pvcs> <src port> <vpi> <vci> <dst port> <vpi> <vci>
  [-admin (up|down)][-txtraf <src index>] [-rxtraf <src index>]
  [-y]
  ```

Parameters

`<#pvcs>`

The number of PVCCs you want to create with the same traffic profile. Verify that the ports you plan to use for the PVCCs support the number of PVCCs you intend to create. See the *Avidia System Technology and Applications Overview* for more information.

`<src port>`

One of the PVCC ports (format *slot.port)*. Or, for ports implementing IMA, specify slot.groupnumber (**2.g1**, for example). This port can be on either card.

`<dst port>`

The other PVCC port (format *slot.port)*. Or, for ports implementing IMA, specify slot.groupnumber (**2.g1**, for example). This port can be on either card.

`<vpi>`

The VPI associated with the preceding `<port>` parameter in the command line. For a summary of the supported VPI ranges for each card, see the *Avidia System Technology and Applications Overview*.

`<vci>`

The VCIs associated with the preceding `<port>` parameter in the command line. When using the range command, the first PVCC is assigned the VCI you specify for this parameter, and each additional PVCC is assigned the next sequential VCI. Before assigning a VCI, verify that it has not already been assigned to a PVCC with the same VPI on the same port. For instructions on viewing the already-configured PVCCs, see "Displaying Cell Card PVCC Information" on page 254. For a summary of the supported VPI ranges for each card, see the *Avidia System Technology and Applications Overview*.

`[`**`-admin`** `(`**`up`**`|`**`down`**`)]`

- **`up`**—activates the PVCC
- **`down`**—deactivates the PVCC

If you omit this parameter, the default admin status **`up`** is assigned.

`[`**`-txtraf`**` <src index>] [`**`-rxtraf`**` <src index>]`

The index number of the transmit (**-txtraf**) and receive (**-rxtraf**) traffic profiles you want to assign to the source port of this PVCC. Transmitted traffic refers to all traffic transmitted out of the Avidia chassis, while received traffic refers to all traffic received into the Avidia chassis. The transmit and receive traffic profiles assigned to the PVPC source port are adjusted to reflect the same service on the destination port. For instructions on viewing the list of configured profiles, see “Displaying ATM Traffic Profiles” on page 151.

If you omit this parameter, an index of 0 (no profile) is assigned. If you specify a profile for transmitted traffic, but not for received traffic, the received traffic is automatically configured to match the transmitted traffic.

`[`**`-backup`**` [<lport> <vpi> <vci>]]`

Configures a backup PVCC using the specified destination port (format *slot.port*), VPI and VCI. Use the network card port (format *slot.port*) for the destination port. The VPI and VCI values can either be the same values as the primary PVCC or different values. Omitting the `<lport> <vpi> <vci>` parameters automatically establishes a backup PVCC on the other network card using the same VPI and VCI as the primary PVCC.

`[`**`-y`**`]`

Results in the creation of the specified range of PVCCs without first displaying a confirmation message. If you omit this parameter, a confirmation message displays.

Examples

```
::pvcc=> new 2.5 0 33 12.1 0 33 -admin up -txtraf 3 -rxtraf 5
-backup 11.1 0 33
```

```
::pvcc=> range 4 2.5 0 33 12.1 0 33 -admin up -txtraf 3
-rxtraf 5 -y
```

Adding a Backup PVCC to an Existing Cell Card PVCC

You can configure backup PVCCs at the same time you configure a primary PVCC, as described in the previous section. However, you can also add a backup PVCC to an existing primary PVCC configuration.

```
::root=> configuration atm cell pvcc
```

From the `::pvcc=>` prompt, enter the backup command in the following format.

`backup` `<index> [<lport> <vpi> <vci>]`

Parameters

`<index>`

The PVCC Table row index number of the primary PVCC for which you want to configure a backup PVCC.

`[<lport> <vpi> <vci>]`

Configures a backup PVCC using the specified destination port (format *slot.port*), VPI and VCI. Use the network card port (format *slot.port*) for the destination port. Or, for ports implementing IMA, specify slot.groupnumber (**2.g1**, for example). The VPI and VCI values can either be the same values as the primary PVCC or different values. Omitting this parameter automatically establishes a backup PVCC on the other network card using the same VPI and VCI as the primary PVCC.

Examples

`::pvcc=>` **`backup 3 12.1 0 100`**

`::pvcc=>` **`backup 3`**

Displaying Cell Card PVCC Information

::root=> configuration atm cell pvcc

From the `::pvcc=>` prompt, enter the show command in the following format.

show [<port> [<vpi> [<vci>]]] [**-backup**]

Parameters

[<port>]

Specifies a port for which to display the PVCC configuration (format *slot.port)*. Omitting this parameter displays all configured PVCCs.

[<vpi>]

The VPI configured for the specified port. Omit this parameter if you did not specify a port or to display all the configured PVCCs for the specified port.

[<vci>]

The VCI configured for the specified port. Omit this parameter if you did not specify a port, or if you specified a port but did not specify a VPI.

[**-backup**]

Displays information about the backup PVCC(s).

Examples

::pvcc=> **show**

::pvcc=> **show 2.1 0 4009**

The following screen illustrates an example of both show PVCC commands.

```
::pvcc=> show
                                                  Source     Source
                Source         Destination        TxTraffic  RxTraffic
Index Admin Oper Port VPI VCI  Port VPI VCI       Index      Index
  1   up    up   2.1   0  400  12.1  0  401       3           3
  2   up    up   2.1   0  201  12.1  0  200       2           1
  3   up    up   2.1   0   32  12.1  0  32        2           1

::pvcc=> show 2.1 0 400
                                                  Source      Source
                Source         Destination        TxTraffic    RxTraffic
Index Admin Oper Port VPI VCI  Port VPI VCI       Index       Index
  1   up    up   2.1   0  400  12.1  0  401       3           3

::pvcc=>
```

The following table describes the information displayed after you enter a show pvc command.

Column	Description
Index	The PVCC table index number of the displayed PVCC.
Admin	The configured status of the PVCC, either up (activated) or down (deactivated).
Oper	The current operational status of the PVCC, either up (PVCC is passing data) or down (PVCC is not passing data).
Source Port	The PVCC source port number. This is the lower-numbered of the two PVCC ports. If you assigned the higher-numbered port to the `<src port>` parameter during PVCC configuration, the system automatically reassigns the higher-numbered port to the `<dest port>` parameter.
VPI	The source port VPI.
VCI	The source port VCI.
Destination Port	The PVCC destination port number. This is the higher-numbered of the two PVCC ports. If you assigned the lower-numbered port to the `<dest port>` parameter during PVCC configuration, the system automatically reassigns the lower-numbered port to the `<src port>` parameter.
VPI	The destination port VPI.
VCI	The destination port VCI.
Source TxTraffic Index	The ATM traffic profile assigned to data transmitted from the source port. The transmit traffic profile assigned to the PVCC source port are adjusted to reflect the same service on the destination port.
Source RxTraffic Index	The ATM traffic profile assigned to data received on the source port. The receive traffic profile assigned to the PVCC source port are adjusted to reflect the same service on the destination port.

Restoring Service from a Backup PVCC to a Primary Cell Card PVCC

After traffic has switched from a primary PVCC to the configured backup PVCC, you can manually switch it back.

```
::root=> configuration atm cell pvcc
```

1 From the `::pvcc=>` prompt, enter **`show`** to display the configured cell card PVCCs.

2 Note the PVCC table index number of the PVCC for which you want to restore service.

3 From the `::pvcc=>` prompt, enter the restore command in the following format.

   `restore` `<index>`

Parameter

`<index>`

The PVCC Table row index number of the primary PVCC for which you want to switch traffic from the backup PVCC back to the primary PVCC.

Example

```
::pvcc=> restore 3
```

Changing Cell Card PVCC Admin Status

```
::root=> configuration atm cell pvcc
```

1. From the `::pvcc=>` prompt, enter **`show`** to display the configured parameters for all PVCCs.
2. Note the index number of the PVCC for which you want to change the status.
3. Enter the admin command in the following format.

   `admin` `<index> (`**`up|down`**`)`

Parameters

`<index>`

The index number of the PVCC you want to activate or deactivate.

`(`**`up|down`**`)`

- **`up`**—activates the PVCC
- **`down`**—deactivates the PVCC

Example

```
::pvcc=> admin 2 up
```

Deleting Primary and Backup Cell Card PVCCs

::root=> configuration atm cell pvcc

If you remove a card from the system, the PVCCs associated with the ports on that card are disabled, however the PVCC configuration is not automatically removed from the PVCC table. Be sure to delete unused PVCC configurations so the PVCC configuration table accurately reflects the PVCCs in use in the system. See “Maintaining ATM Connections” on page 284.

1 From the ::pvcc=> prompt, enter **show** to display the configured parameters for all PVCCs.

2 Note the index number of the PVCC you want to delete (or for which you want to delete the backup PVCC).

3 Enter the delete command in the following format.

delete <index> [**-backup**]

Parameters

<index>

The index number of the PVCC you want to delete.

[**-backup**]

Enter **-backup** to delete the backup PVCC associated with the primary PVCC and leave the primary PVCC configuration in place. Omitting this parameter deletes both the primary PVCC and any configured backup PVCC.

Examples

::pvcc=> **delete 2 -backup**

::pvcc=> **delete 2**

SETTING UP PERMANENT CONNECTIONS FOR FRAME CARDS

You can configure cross-connect PVCCs between frame-based cards and network cards or the management card.

Configuring Frame Card PVCCs

```
::root=> configuration atm frame pvcc
```

For frame cards, the VPI is always zero and the system automatically assigns the VCI. Therefore, you do not enter this information during frame card PVCC configuration.

From the `::pvcc=>` prompt, do one of the following.

- To add one PVCC, enter the new command in the following format. The PVCC table index number is automatically assigned.

  ```
  new <cport> <lport> <lvpi> <lvci> [-mode (vcmux|llc)]
  [-admin (up|down)][-txtraf <index>] [-rxtraf <index>]
  [-backup [<lport> <vpi> <vci>]]
  ```

- To add multiple PVCCs to a port with the same traffic profile for all, enter the range command in the following format.

  ```
  range <#pvcs> <cport> <lslot> <lvpi> <lvci>
  [-mode (vcmux|llc)] [-admin (up|down)] [txtraf <index>]
  [-rxtraf <index>] [-y]
  ```

Parameters

`<#pvcs>`

The number of PVCCs you want to create with the same traffic profile. To verify that the ports you plan to use for the PVCCs support the number of PVCCs you intend to create, see the *Avidia System Technology and Applications Overview*

`<cport>`

The SDSL frame or IDSL card slot number or slot and port number for the PVCC. To map the PVCC to a specific service type on a specific port, specify *slot.port*. Otherwise, use the format *slot*.

`<lport>`

The PVCC network card slot and port number (format *slot.port).*

`<lslot>`

The network card slot number for the PVCC.

`<lvpi>`

The network card VPI. For a summary of the supported VPI ranges for each card, see the *Avidia System Technology and Applications Overview*.

`<lvci>`

The network card VCI. When using the range command, the first PVCC is assigned the VCI you specify for this parameter, and each additional PVCC is assigned the next sequential VCI. Before assigning a VCI, verify that it has not already been assigned to a PVCC with the same VPI on the same port. For instructions on viewing the already-configured PVCCs, see "Displaying Frame Card PVCC Information" on page 263. For a summary of the supported VPI ranges for each card, see the *Avidia System Technology and Applications Overview*.

[**-mode** (**vcmux|llc**)]

The encapsulation mode. Enter **`-mode vcmux`** or **`-mode llc`**. This setting must match the encapsulation protocol used at the remote end. The default is **`llc`**. LLC (Logical Link Control) encapsulation is supported by most ATM devices but has more overhead than vc-mux encapsulation. Use LLC only if the remote device that is connected to the frame card port uses RFC1483 Ethernet bridging (it will not work with token ring networks). Vcmux does not use an encapsulation header and works with any network protocol.

Both encapsulation modes are from IETF RFC1483 Multiprotocol Encapsulation over ATM Adaptation Layer 5.

[**-admin** (**up**|**down**)]

- **up**—activates the PVCC
- **down**—deactivates the PVCC

If you omit this parameter, the default admin status **up** is assigned.

[**-txtraf** <src index>] [**-rxtraf** <src index>]

The index number of the transmit (**-txtraf**) and receive (**-rxtraf**) traffic profiles you want to assign to the source port of this PVCC. Transmitted traffic refers to all traffic transmitted out of the Avidia chassis, while received traffic refers to all traffic received into the Avidia chassis. The transmit and receive traffic profiles assigned to the PVPC source port are adjusted to reflect the same service on the destination port. For instructions on viewing the list of configured profiles, see “Displaying ATM Traffic Profiles” on page 151.

If you omit this parameter, an index of 0 (no profile) is assigned. If you specify a profile for transmitted traffic, but not for received traffic, the received traffic is automatically configured to match the transmitted traffic.

[**-backup** [<lport> <vpi> <vci>]]

Configures a backup PVCC using the specified destination port (format *slot.port*), VPI and VCI. Use the network card port (format *slot.port*) for the destination port. The VPI and VCI values can either be the same values as the primary PVCC or different values. Omitting the `<lport> <vpi> <vci>` parameters automatically establishes a backup PVCC on the other network card using the same VPI and VCI as the primary PVCC.

[**-y**]

Results in the creation of the specified range of PVCCs without first displaying a confirmation message. If you omit this parameter, a confirmation message displays.

Examples

```
::pvcc=> new 2.5 12.1 50 100 -mode vcmux -admin up  -txtraf 3
-rxtraf 5 -backup 11.1 50 100
```

```
::pvcc=> range 16 2 12 50 100 -mode vcmux -admin up  -txtraf 3
-rxtraf 5
```

Adding a Backup PVCC to an Existing Frame Card PVCC

You can configure backup PVCCs at the same time you configure a primary PVCC, as described in the previous section. However, you can also add a backup PVCC to an existing primary PVCC configuration.

```
::root=> configuration atm frame pvcc
```

From the `::pvcc=>` prompt, enter the backup command in the following format.

backup `<index> [<lport> <vpi> <vci>]`

Parameters

`<index>`

The PVCC Table row index number of the primary PVCC for which you want to configure a backup PVCC.

`[<lport> <vpi> <vci>]`

Configures a backup PVCC using the specified network card port (format *slot.port*), VPI and VCI. The VPI and VCI values can either be the same values as the primary PVCC or different values. Omitting this parameter automatically establishes a backup PVCC on the other network card using the same VPI and VCI as the primary PVCC.

Examples

```
::pvcc=> backup 3 12.1 0 100
::pvcc=> backup 3
```

Displaying Frame Card PVCC Information

```
::root=> configuration atm frame pvcc
```

From the `::pvcc=>` prompt, enter the show command in the following format.

show `[<slot> [<vpi> [<vci>]]]`

Parameters

`[<slot>]`

Specifies a slot for which to display the PVCC configuration. Omitting this parameter displays all configured PVCCs.

`[<vpi>]`

The VPI configured for the specified port. Omit this parameter if you did not specify a port or to display all the configured PVCCs for the specified port.

`[<vci>]`

The VCI configured for the specified port. Omit this parameter if you did not specify a port, or if you specified a port but did not specify a VPI.

Examples

`::pvcc=>` **show**

`::pvcc=>` **show 2 0 50**

The following example illustrates both show PVCC commands.

```
::pvc=> show
                  Channel                  Line
Index  Admin  Oper Port  VCI  Type  Encap   Port  VPI  VCI  TxIDx
RxIDx
2      up     up   2.1   50   TLS   vcmux   12.1  50  100    2      2
3      down   down 2.2   51   TLS   vcmux   12.1  50  101    2      3

::pvc=> show 2 0 50
              Channel                    Line
Index  Admin  Oper Port  VCI  Type  Encap   Port  VPI  VCI  TxIDx
RxIDx
2      up     up   2.1   50   TLS   vcmux   12.1  50  100    2      2

::pvc=>
```

The following table describes the information displayed after you enter a show pvc command.

Column	Description
Index	The PVCC table index number of the displayed PVCC.
Admin	The administrative status of the PVCC. • Up indicates active. • Down indicates inactive.
Oper	The operational status of the PVCC. • Up indicates operational and passing data. • Down indicates not operational.
Channel Port	The subscriber card slot and port.
VCI	The subscriber card VCI.
Type	The type of service on the line. Currently, Transparent LAN Service is the only supported service, therefore TLS displays.
Encap	The encapsulation mode.
Line Port	The network card port number.
VPI	The network card VPI.
VCI	The network card VCI.
TxIDx	The ATM traffic profile assigned for transmitted traffic.
RxIDx	The ATM traffic profile assigned for received traffic.

Restoring Service from a Backup PVCC to a Primary Frame Card PVCC

After traffic has switched from a primary PVCC to the configured backup PVCC, you can manually switch it back.

```
::root=> configuration atm frame pvcc
```

1. From the `::pvcc=>` prompt, enter **`show`** to display the configured frame card PVCCs.
2. Note the PVCC table index number of the PVCC for which you want to restore service.
3. From the `::pvcc=>` prompt, enter the restore command in the following format.

   `restore` `<index>`

Parameter

`<index>`

The PVCC Table row index number of the primary PVCC for which you want to switch traffic from the backup PVCC back to the primary PVCC.

Example

```
::pvcc=> restore 3
```

Changing Frame Card PVCC Admin Status

```
::root=> configuration atm frame pvcc
```

1 From the `::pvcc=>` prompt, enter **`show`** to display the configured parameters for all PVCCs.

2 Note the index number of the PVCC you want to activate or deactivate.

3 Enter the admin command in the following format.

`admin` `<index> (`**`up|down`**`)`

Parameters

`<index>`

The index number of the PVCC you want to activate or deactivate.

`(`**`up|down`**`)`

- **`up`**—activates the PVCC
- **`down`**—deactivates the PVCC

Example

```
::pvcc=> admin 2 up
```

Deleting Primary and Backup Frame Card PVCCs

::root=> configuration atm frame pvcc

If you remove a card from the system, the PVCCs associated with the ports on that card are disabled, however the PVCC configuration is not automatically removed from the PVCC table. Be sure to delete unused PVCC configurations so the PVCC configuration table accurately reflects the PVCCs in use in the system.

1. From the ::pvcc=> prompt, enter **show** to display the configured parameters for all PVCCs.
2. Note the index number of the PVCC you want to delete (or for which you want to delete a backup PVCC).
3. Enter the delete command in the following format.

   delete <index> [**-backup**]

Parameters

<index>

The index number of the PVCC you want to delete.

[**-backup**]

Enter **-backup** to delete the backup PVCC associated with the primary PVCC and leave the primary PVCC configuration in place. Omitting this parameter deletes both the primary PVCC and any configured backup PVCC.

Examples

::pvcc=> **delete 2 -backup**

::pvcc=> **delete 2**

Changing the Encapsulation Mode

```
::root=> configuration atm frame pvcc
```

From the `::pvcc=>` prompt, enter the encap command in the following format.

`encap` `<index> [`**`-port`**` <xDSL_port>] [`**`-mode`**` (`**`vcmux|llc`**`)]`

Parameters

`<index>`

The index number of the PVCC for which you want to change the encapsulation mode. To display the configured frame card PVCCs, see "Displaying Frame Card PVCC Information" on page 263.

`[`**`-port`**` <xDSL_port>]`

The card port number of the PVCC. Typing **`-port 0`** removes the mapping between the PVCC and the port to which it is mapped.

`[`**`-mode`**` (`**`vcmux|llc`**`)]`

The available encapsulation mode options. Enter either **`-mode vcmux`** or **`-mode llc`**.

Example

```
::pvcc=> encap 2 -port 4.2 -mode llc
```

SETTING UP SPVCS

This section provides procedures for setting up SPVCs (Soft Permanent Virtual Circuits). You can view information about SVCs that are automatically set up as part of those connections on page 283. For more information about setting up static and dynamic ATM routing, see “Configuring ATM Routing” on page 167.

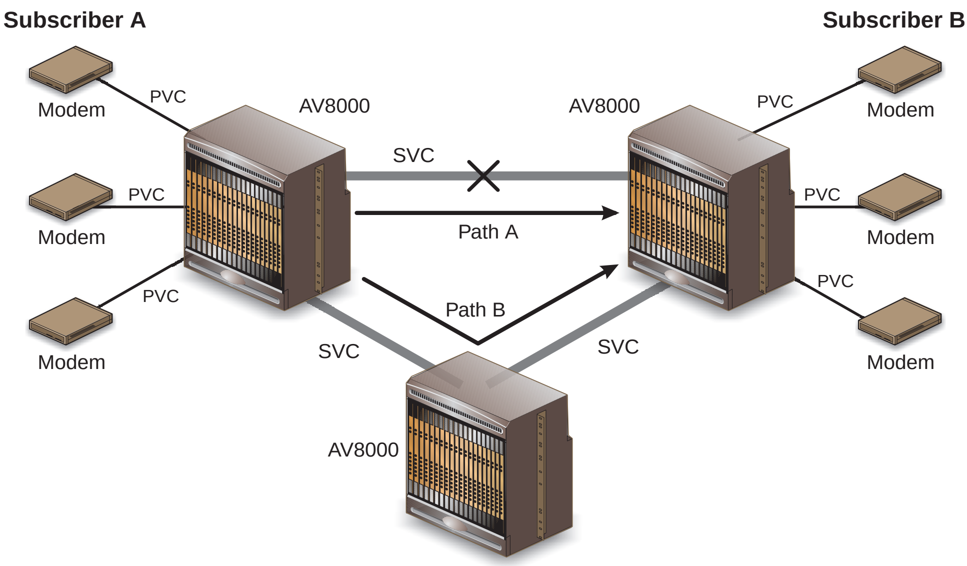
SPVCs provide a VCC between the subscriber card and the network card, and a SVC (Switched Virtual Circuit) between the same network card and the destination ATM end system. SVCs are virtual connections that are established through an ATM network using signaling (the end-points are defined when the call is initiated and terminated at the end of the call). SPVCs, then, enable ATM connection redundancy end-to-end.

SPVC Redundancy

ATM routing determines the path that traffic takes in order to reach its final destination and provides a service for setting up SPVCs and SVCs. If the primary path of a SPVC fails and a secondary path to the same destination is available, the SPVC is rerouted across it. With automatic rerouting, SPVC redundancy protects systems from end-to-end link failure.

An SPVC is built over a combination of PVCs and SVCs. You set up an end-to-end SPVC for the xDSL subscriber (CPE modem or IAD) from the Avidia system to a destination network endpoint. PVCs are built between the subscriber card and an Avidia system network card, with the rest of the connections being SVCs. SVCs are automatically set up in the network between Avidia systems and ATM uplink connection devices. With the use of PNNI dynamic routing or multiple IISP static routes to the same destination, an SPVC connection is reliable and capable of self-healing in the event that a network failure occurs. If a failure occurs, the most cost-effective alternate routes are identified and the connection is re-established. Also, the xDSL subscriber services continue to function because their endpoints (defined connections) are not altered during or after the connection recovery process.

The following is an example network with an SPVC. An SPVC exists between Subscriber A and Subscriber B originally using the two endpoint PVCs and the SVC noted by path A. In this scenario, if path A fails, the originating Avidia system detects the failure of path A. With the SPVC reroute mechanism, the originating Avidia will reroute the connection using the path B. Once the SPVC connection is re-established between Subscriber A and Subscriber B, Subscriber A can continue sending traffic to Subscriber B.



Adding SPVCs

```
::root=> configuration atm cell spvc
```

From the `::spvc=>` prompt, enter the new command in the following format.

new <slot.port> <vpi> <vci> <Dst Addr> <Dst Info> [**-txtraf** <src index>] [**-rxtraf** <src index>][**-interval** <interval>] [**-retrynumber** <n>][**-admin** (**up**|**down**)][**-alt** <priority> <Dst Address> <Dst Info>] [**-alt** <priority> <Dst Address> <Dst Info>]

Parameters

<slot.port>

The SPVC subscriber card slot and port (format *slot.port*).

<vpi>

The VPI of the VCC between the subscriber card and the network card. This must match that VPI between the CPE and the subscriber card.

<vci>

The VCI of the VCC between the subscriber card and the network card. This must match that VCI between the CPE and the subscriber card.

<Dst Addr>

The ATM address of the destination ATM end system. The address can be 13 or 20 octets. Each octet must be separated by a colon.

`<Dst Info>`

Only the first option shown below is applicable when Avidia joins a PNNI network. Otherwise, it could be one of the following two formats:

- <vpi> <vci> if the <Dst Address> is a ATM end system 20-byte address
- <slot> <port> <vpi> <vci> if destination is Avidia

[**-txtraf** `<src index>`]

The traffic descriptor profile index to assign to transmitted traffic.

[**-rxtraf** `<src index>`]]

The traffic descriptor profile index to assign to received traffic.

[**-interval** `<interval>`]

The retry interval, or number of seconds the system waits before reattempting to establish the SPVC after a failed call attempt. The range is 0 to 3600. A value of 0 indicates that there will be no retry. The default value is 10.

[**-retrynumber** `<n>`]

The retry limit, or maximum number of allowable unsuccessful call setup attempts. The range is 0 to 65535. A value of 0 indicates no limit. If a limit is not specified, it is infinite.

[**-admin** (**up**|**down**)]

The SPVC administrative status.

- **-admin up**—activates the SPVC
- **-admin down**—deactivates the SPVC

[**-alt** `<priority> <Dst Address> <Dst Info>`]

The alternate destination for using the multi-homing feature. The **-alt** parameter only takes effect if the retry number is not infinite. A maximum of two alternate destinations can be specified with a priority of **1** (first priority) or **2** (second priority). The format of the destination information is the same as <Dst Info> above.

Example

```
::spvc=> new 3.1 0 100 39:0:0:0:0:0:0:0:0:0:0:0:0:1:2:3:4:5:6
-retrynumber 3 -alt 1
39:84:0:0:0:0:0:0:0:0:0:0:f:0:20:48:d:0:b:0 0 103
```

Updating SPVCs

You add or delete alternate destination information entries using the update command. Through the command parameter `-alt`, you can add a multi-homing address to this SPVC. Through the command parameter `-del`, you can delete a multi-homing address from this SPVC.

```
::root=> configuration atm cell spvc
```

From the `::spvc=>` prompt, enter the new command in the following format.

```
update <slot.port> <vpi> <vci> [-alt <priority> <Dst Address>
<Dst Info>] [-del <priority>]
```

Parameters

`<slot.port>`

The SPVC subscriber card slot and port (format *slot.port*).

`<vpi>`

The VPI of the VCC between the subscriber card and the network card.

<vci>

The VCI of the VCC between the subscriber card and the network card.

<Dst Info>

This option is only applicable when Avidia joins a PNNI network. It could be one of the following two formats:

- <vpi> <vci> if the <Dst Address> is a ATM end system 20-byte address
- <slot> <port> <vpi> <vci> if destination is Avidia

`[-alt <priority> <Dst Address> <Dst Info>]`

The alternate destination for using the multi-homing feature. The **-alt** parameter only takes effect if the retry number is not infinite. A maximum of two alternate destinations can be specified with a priority of **1** (first priority) or **2** (second priority). The format of the destination information can be one of the following.

- <vpi> <vci> if the <Dst Address> is a ATM end system 20-byte address
- <slot> <port> <vpi> <vci> if destination is Avidia

Example

```
::spvc=> update 3.1 0 100 -alt 1
39:84:0:0:0:0:0:0:0:0:0:0:f:0:20:48:d:0:b:0 0 103
```

Changing SPVC Admin Status

::root=> configuration atm cell spvc

From the appropriate ::spvc=> prompt, enter the admin command in the following format.

admin <slot.port> <vpi> <vci> <(**up|down**)>

Parameters

<slot.port>

The SPVC subscriber card slot and port (format *slot.port*).

<vpi>

The VPI of the VCC between the subscriber card and the network card.

<vci>

The VCI of the VCC between the subscriber card and the network card.

<(**up|down**)>

- **up**—activates the SPVC
- **down**—deactivates the SPVC

Example

::spvc=>**admin 3.1 0 100 up**

Displaying SPVCs

::root=> configuration atm cell spvc

From the `::spvc=>` prompt, enter the show command in the following format.

show [<slot.port> [<vpi> [<vci>]]]

Parameters

[<slot.port>]

The slot and port for which you want to display SPVC information (format *slot.port*). Omitting this parameter displays all configured SPVC information for the system. Or, if the SPVC is created for an IMA group, use slot.groupnumber (**1.g2**, for example).

[<vpi>]

The specific VPI for which you want to display all configured SPVC information. Omitting this parameter displays SPVC information for all VPIs.

[<vci>]

The specific VCI for which you want to display all configured SPVC information. Omitting this parameter displays SPVC information for all VCIs.

Examples

::spvc=>**show**

::spvc=>**show 3.1 0 100**

Information similar to the following displays.

```
::spvc=>
                 Source           Destination
Admin Oper       Slot  VPI  VCI  Address
up    connected  3.1   0    100  390000000000...

Source  Source     Last
TxTraf  RxDesc     Rel     Retry
Index   Index      Cause   Fail
4       4          ???     2

::spvc=>
```

Information	Description
Admin	The SPVC administrative status. • Up—activated • Down—deactivated
Oper	The SPVC operational status. • In Progress—attempting to connect • Connected—operational • Retries Exhausted—the failure count has exceeded the retry limit
Source Slot	The subscriber card slot and port (format *slot.port*).
Source VPI	The VPI of the VCC between the subscriber card and the network card.
Source VCI	The VCI of the VCC between the subscriber card and the network card.
Destination Address	The ATM address of the destination ATM end system.
Source TxTraf Index	The traffic descriptor profile index assigned to the SPVC transmitted traffic.
Source RxDesc Index	The traffic descriptor profile index assigned to the SPVC received traffic.
Last Rel Cause	The reason the SPVC was last disabled. This displays as a numeric code. For code definitions, see the *Avidia System Technology and Applications Overview*.
Retry Fail	The number of times the system has attempted to restart non-operational SPVC but failed.

Displaying SPVC Details

```
::root=> configuration atm cell spvc
```

From the appropriate `::spvc=>` prompt, enter the detailshow command in the following format.

`detailshow` `<slot.port> <vpi> <vci>`

Parameters

`<slot.port>`

The slot and port for which you want to display SPVC information (format *slot.port*).

`<vpi>`

The specific VPI for which you want to display all configured SPVC information.

`<vci>`

The specific VCI for which you want to display all configured SPVC information.

Example

`::spvc=>`**`detailshow 3.1 0 103`**

Information similar to the following displays.

```
::spvc=> det 3.1 0 103
Admin Status: Up
Operation Status: Connected
Source Port: 3.1
Source VPI: 0
Source VCI: 103
Destination Address: 3900000000000000000000000000010203040506
Target Vpi: 0
Target Vci: 0
Outgoing Port: 2.1
Outgoing Vpi: 0
Outgoing Vci: 33
Alternate Destination Info
  Priority         Alternate Destination Address           Vpi       Vci
   1 (Active)  398400000000000000000000f0020480d000b00      0       103
Source TxTraffic Index: 0
Source TxTraffic Service Category: UBR
Source RxTraffic Index: 0
Source RxTraffic Service Category: UBR
Last release cause: 3
Retry Failures: 4
Retry Interval: 10
Retry Limit: 3
DTL: len=2 ptr=27
     60a0 39840000000000000000000040000000000000000 00000018
     60a0 398400000000000000000000f00000000000000 fffffffe
::spvc=>
```

Information	Description
Admin Status	The SPVC administrative status. • Up—activated • Down—deactivated
Operation Status	The SPVC operational status. • In Progress—attempting to connect • Connected—operational • Retries Exhausted—not operational
Source Port	The subscriber card slot and port (format *slot.port*).
Source VPI	The VPI of the VCC between the source subscriber card and the network card.
Source VCI	The VCI of the VCC between the source subscriber card and the network card.
Destination Address	The ATM address of the destination ATM end system.
Target Vpi	The VPI of the VCC between the target subscriber card and the target network card.
Target Vci	The VCI of the VCC between the target subscriber card and the target network card.
Outgoing Port	The network card slot and port that the SVC originates from to connect upstream.
Outgoing Vpi	The dynamically assigned VPI of the SVC going out of the Avidia system to connect upstream.
Outgoing Vci	The dynamically assigned VCI of the SVC going out of the Avidia system to connect upstream.
Alternate Destination Info	The information of the alternate destination used for multi-homing.
Priority	The priority of the alternate. A maximum of two alternate destinations can be specified with a priority of **1** (first priority) or **2** (second priority).
Alternate Destination Address	The ATM address of the alternate destination ATM end system for the multi-homing feature.
Vpi	The VPI of the VCC between the alternate target subscriber card and the target network card.
Vci	The VCI of the VCC between the alternate target subscriber card and the target network card.
Source Tx Traffic Index	The traffic descriptor profile index assigned to the SPVC transmitted traffic.
Source TxTraffic Service Category	The QoS type used for the SPVC traffic.
Source Rx Traffic Index	The traffic descriptor profile index assigned to the SPVC received traffic.
Source TxTraffic Service Category	The QoS type used for the SPVC traffic.

Information	Description
Last Release Cause	The reason the SPVC was last disabled. This displays as a numeric code. For code definitions, see the *Avidia System Technology and Applications Overview*.
Retry Failures	The number of times the system has attempted to restart non-operational SPVC but failed.
Retry Interval	The number of seconds the system waits before attempting to re-establish the SPVC after a failed call attempt (range: 0 to 3600).
Retry Limit	The maximum allowable number of unsuccessful call setup attempts (range: 0 to 65535).
DTL	The designated transit list. This is the path to the destination given the ATM addresses of the devices along the way.

Deleting SPVCs

```
::root=> configuration atm cell spvc
```

From the appropriate `::spvc=>` prompt, enter the delete command in the following format.

```
delete <slot.port> <vpi> <vci>
```

Parameters

`<slot.port>`

The SPVC subscriber card slot and port (format *slot.port*).

`<vpi>`

The VPI of the VCC between the subscriber card and the network card.

`<vci>`

The VCI of the VCC between the subscriber card and the network card.

Example

```
::spvc=> delete 4.3 100 100
```

Restarting SPVCs

You can manually attempt to restart an SPVC that is not operational.

```
::root=> configuration atm cell spvc
```

From the appropriate `::spvc=>` prompt, enter the restart command in the following format.

`restart` `[<slot.port> <vpi> <vci> [[slot.port] [vpi vci]]] || [`**`-all`**`]`

Parameters

`<slot.port>`

The SPVC subscriber card slot and port (format *slot.port*).

`<vpi>`

The VPI of the VCC between the subscriber card and the network card.

`<vci>`

The VCI of the VCC between the subscriber card and the network card.

`[[slot.port] [vpi vci]]`

The optional range limit. If this range is specified, then a range of SPVCs will be restarted. If just the `[vpi vci]` value is given, then the range of SPVCs only applies to that particular slot.port.

`[`**`-all`**`]`

Used to restart all SPVCs.

Example

`::spvc=>` **`restart 4.3 100 100`**

Rerouting SPVCs

You can manually reroute one or more SPVC to a specified destination.

```
::root=> configuration atm cell spvc
```

From the appropriate ::spvc=> prompt, enter the restart command in the following format.

reroute <priority> [<slot.port> <vpi> <vci> [[slot.port] [vpi vci]]]|| [**-all**]

Parameters

<priority>

The priority of the alternate destination to which the SPVC will be rerouted.

<slot.port>

The SPVC subscriber card slot and port (format *slot.port*).

<vpi>

The VPI of the VCC between the subscriber card and the network card.

<vci>

The VCI of the VCC between the subscriber card and the network card.

[[slot.port] [vpi vci]]

The optional range limit. If this range is specified, then a range of SPVCs will be rerouted. If just the [vpi vci] value is given, then the range of SPVCs only applies to that particular slot.port.

[**-all**]

Used to reroute all SPVCs.

Example

::spvc=> **reroute 2 4.3 100 100**

DISPLAYING SVC INFORMATION

SVCs are automatically set up to complete SPVCs. You can view information about these SVCs.

```
::root=> configuration atm cell svc
```

From the `::svc=>` prompt, enter the show command in the following format.

show

Information similar to the following displays.

```
::svc=> show

SVC Entries Table

                    Source                              Destination
Index      Slot      Vpi        Vci        Slot       Vpi        Vci
----------------------------------------------------------------------

::svc=>
```

MAINTAINING ATM CONNECTIONS

When you delete cell card PVCCs, mapping information stored in the internal PVCC tables may not automatically be deleted. This results in mismatched PVCCs, or PVCCs for which the mapping data is not consistent across all PVCC tables. Therefore, after deleting PVCCs, you should check for mismatched internal PVCCs and delete them.

A VCL (as established in the MIB) is established at each end of a PVCC connection. The command-line interface provides a utility for you to maintain connections that may lose a VCL endpoint (broken connection) or VCLs that are no longer used.

Before deleting mismatched PVCCs, be sure they are not a result of a card being temporarily removed. Once the card is replaced, the PVCC data will no longer be mismatched.

`::root=> configuration atm vcl`

1 From the `::vcl=>` prompt, enter **`show`** to display the mismatched internal PVCCs.

```
::vcl=> show


ifIndex               VPI              VCI

65665                  0               213
65729                  0               1027

::vcl=>
```

2 Note the ifIndex number, VPI and VCI of the internal PVCC you want to delete.

3 Enter the delete command in the following format.

delete <ifIndex> <vpi> <vci>

Parameters

`<ifIndex>`

The internal index number of the internal PVCC you want to delete.

`<vpi>`

The VPI of the internal PVCC you want to delete.

`<vci>`

The VCI of the internal PVCC you want to delete.

Example

```
::vcl=> delete 65665 0 213
```

CONFIGURING FRAME RELAY INTERWORKING 10

This chapter describes how to configure and monitor frame relay interworking from the command-line interface. Go to the following sections for more information.

CONFIGURING FRAME RELAY LINKS

Configure frame relay link parameters from the `::link=>` prompt. From this prompt you can add, modify, view, or delete a frame relay link using the commands described.

Adding a Frame Relay Link

```
::root=> configuration frame-relay link
```

From the `::link=>` prompt, enter the new command in the following format.

new <slot.port> [**-lmitype** (**lmi**|**annexa**|**annexd**|**none**)]
[**-pollinterval** <int>] [**-enqinterval** <int>] [**-errthreshold** <val>]
[**-monevents** <val>]

Parameters

<slot.port>

The card slot and port (format *slot.port*).

[**-lmitype** (**lmi**|**annexa**|**annexd**|**none**)]

The LMI (Local Management Interface) type defines a method of exchanging status information between the customer device and the network.

- **lmi**—LMI Rev-1
- **annexa**—ITU 0.933 Annex-A
- **annexd**—ANSI T1 617 Annex-D
- **none**—no LMI support

If the LMI type is set to NONE, the poll interval, inquiry interval, error threshold, and monitor events parameters are not used.

[**-pollinterval** <int>]

The poll interval value in seconds. Poll Interval is the number of seconds between LMI status inquiry messages. The valid range is 5 to 30, with 15 as the default.

[**-enqinterval** <int>]

The inquiry interval value. Inquiry interval is the number of poll intervals before a full status inquiry message is sent. The valid range is 1 to 255, with 6 as the default.

[**-errthreshold** <val>]

The error threshold value. Error threshold is the number of consecutive poll intervals in which the LMI status inquiry messages are not received that are required for the link to be declared down. The valid range is 1 to 10, with 3 as the default.

[**-monevents** <val>]

The monitor events value. Monitor events is the number of poll intervals in which the LMI status inquiry messages are not received that are required for the link to be declared down. The valid range is 1 to 10, with 4 as the default.

Example

```
::link=> new 5.1 -lmitype lmi -pollinterval 15 -enqinterval 6
-errthreshold 3 -monevents 4
```

Modifying Frame Relay Link Settings

```
::root=> configuration frame-relay link
```

From the `::link=>` prompt, enter the set command in the following format.

set <slot.port> [**-lmitype** (**lmi**|**annexa**|**annexd**|**none**)] [**-pollinterval** <int>] [**-enqinterval** <int>] [**-errthreshold** <val>] [**-monevents** <val>]

Parameters

<slot.port>

The card slot and port (format *slot.port*).

[**-lmitype** (**lmi|annexa|annexd|none**)]

The LMI (Local Management Interface) type defines a method of exchanging status information between the customer device and the network. The options are:

- **lmi**—LMI Rev-1
- **annexa**—ITU 0.933 Annex-A
- **annexd**—ANSI T1 617 Annex-D
- **none**—no LMI support

If the LMI type is set to NONE, the poll interval, inquiry interval, error threshold, and monitor events parameters are not used.

[**-pollinterval** <int>]

The poll interval value in seconds. Poll Interval is the number of seconds between LMI status inquiry messages. The valid range is 5 to 30, with 15 as the default.

[**-enqinterval** <int>]

The inquiry interval value. Inquiry interval is the number of poll intervals before a full status inquiry message is sent. The valid range is 1 to 255, with 6 as the default.

[**-errthreshold** <val>]

The error threshold value. Error threshold is the number of consecutive poll intervals in which the LMI status inquiry messages are not received that are required for the link to be declared down. The valid range is 1 to 10, with 3 as the default.

[**-monevents** <val>]

The monitor events value. Monitor events is the number of poll intervals in which the LMI status inquiry messages are not received that are required for the link to be declared down. The valid range is 1 to 10, with 4 as the default.

Example

```
::link=> set 5.1 -lmitype lmi -pollinterval 15 -enqinterval 6
-errthreshold 3 -monevents 5
```

Deleting Frame Relay Links

```
::root=> configuration frame-relay link
```

Before deleting a frame relay configuration, you must first delete all the circuit configurations under that link.

1 From the `::link=>` prompt, enter **`show`** to display the configured links.

2 Note the index number of the frame relay link you want to delete.

3 From the `::link=>` prompt, enter the delete command in the following format to delete the link.

```
delete <slot.port>
```

Parameters

```
<slot.port>
```

The card slot and port (format *slot.port*) of the frame relay link you want to delete.

Example

```
::link=> delete 5.1
```

Displaying Frame Relay Link Settings

```
::root=> configuration frame-relay link
```

From the `::link=>` prompt, enter the show command in the following format.

show [<slot.port>]

Parameter

[<slot.port>]

The card slot and port (format *slot.port*) for which you want to display the configuration. Omitting this parameter displays the configurations for all configured IDSL channels.

Examples

::link=> **show 5.1**

::link=> **show**

The example illustrates both show frame-relay commands.

```
::link=> show 5.1

Link     State      PollInt    FullEnqInt ErrThreshold MonEvents
5.1      none       N/A        N/A         N/A          N/A


::link=> show

Link     State      PollInt    FullEnqInt ErrThreshold MonEvents
5.1      none       N/A        N/A        N/A          N/A
5.2      annexa     15         20         5            5
5.4      lmi        10         20         3            4

::link=>
```

Status Box	Description
Link	The card slot and port (format *slot.port*).
State	The LMI (Local Management Interface) type, which defines a method of exchanging status information between the customer device and the network. The options are: • LMI—LMI Rev-1 • ANNEXA—ITU 0.933 Annex-A • ANNEXD—ANSI T1 617 Annex-D • NONE—no LMI support If the LMI type is set to NONE, the poll interval, inquiry interval, error threshold, and monitor events parameters are not used.
PollInt	The poll interval value, which is the number of seconds between LMI status inquiry messages (range: 5-30).
FullEnqInt	The enquiry interval value, which is the number of poll intervals before a full status inquiry message is sent (range: 1-255).
ErrThreshold	The error threshold value, which is the number of consecutive poll intervals in which the LMI status inquiry messages are not received that are required for the link to be declared down (range: 1-10).
MonEvents	The monitor events value, which is the number of poll intervals in which the LMI status inquiry messages are not received that are required for the link to be declared down (range: 1-10).

CONFIGURING FRAME RELAY FRF.8 CIRCUITS

FRF.8 defines how frames are translated between ATM and frame devices.

Adding a Frame Relay FRF.8 Circuit

```
::root=> configuration frame-relay frf8
```

From the `::frf8=>` prompt, enter the new command in the following format. The index number and the frame relay VPI/VCI on the frame card are automatically assigned.

```
new <fslot.port> <dlci> <lslot.port> <lvpi> <lvci>
[-admin (up|down)] [-lpmode (1|2)] [-lpvalue (0|1)]
[-cimode (1|2)] [-demode (1|2)] [-devalue (0|1)] [-CIR <value>]
[-Be <value>] [-Bc <value>] [-type (ubr|cbr|nrt-vbr|rt-vbr)]
```

Parameters

`<fslot.port>`

The frame card slot and port.

`<dlci>`

The DLCI (Data Link Connection Identifier) is the logical channel a data frame travels from the transmitted device to the destination device. The valid range is 16 to 991.

`<lslot.port>`

The network card slot and port (format *slot.port*).

`<lvpi>`

The ATM VPI of the frame relay (fr) VCC between the frame card and the network card.

`<lvci>`

The ATM VCI of the fr VCC between the frame card and the network card.

`[-admin (up|down)]`

The administrative status of the line where **up** activates the port and **down** deactivates the port.

[-lpmode (1|2)]

The LP mode determines the content of the ATM CLP (Cell Loss Priority) field when translating from frame relay to ATM.

1—The frame relay header DE (Discard Eligibility) field is mapped into the ATM CLP field of every ATM cell generated by the segmentation process of the AAL5 (ATM Adaptation Layer Type 5) PDU (Protocol Data Unit) containing the information for that frame.

2—The ATM CLP field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information of that frame is set to the LP value.

[-lpvalue (0|1)]

The LP Value determines the content of the ATM cell CLP field when the LP mode is set to **2**.

0—The network cannot discard cells.

1—The network can discard cells.

[-cimode (1|2)]

The CI Mode determines the content of the ATM EFCI (Explicit Forward Congestion Indicator) field.

1—The frame relay FECN (Forward Explicit Congestion Notification) field is mapped to the ATM EFCI field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information of that frame. This mode provides congestion indication to the end points, where higher-level protocol entries might be involved in traffic control mechanisms.

2—The ATM EFCI field is set to "congestion not experienced."

[-demode (1|2)]

The DE mode determines the content of the frame relay DE field when transmitting from ATM to frame relay.

1—If the ATM CLP field of one or more cells belonging to a frame is set, the frame relay DE field is set.

2—If the ATM CLP field of one or more cells belonging to a frame is set, the frame relay DE field is set to the DE value.

[-devalue (0|1)]

The DE value determines the content of the frame relay DE field when the DE mode is set to **2**.

0—The network cannot discard frames.

1—The network can discard frames.

[**-CIR** <value>]

The committed information rate (circuit throughput) in bits per second. The valid range is 0 to 144000, with 0 as the default.

[**-Be** <value>]

The excess burst is the maximum number of uncommitted data bits that the network will attempt to deliver. The valid range is 0 to 144000, with 144000 as the default.

[**-Bc** <value>]

Committed burst is the maximum number of data bits that the network agrees to transfer under normal conditions during the measurement interval. The valid range is 0 to 144000, with 0 as the default.

[**-type** (**ubr**|**cbr**|**nrt-vbr**|**rt-vbr**)]

The type determines the traffic class.

- **ubr** (Unspecified Bit Rate) is a best-effort class of traffic that is best suited for LAN. When network congestion occurs, the data is stored in a buffer until it can be sent.
- **cbr** (Constant Bit Rate) carries a guaranteed constant bandwidth. It is best suited for applications that require fixed bandwidth, such as uncompressed voice, video, and circuit emulation. CBR is a Quality of Service class defined by the ATM Forum for ATM network.
- **nrt-vbr** (non-real-time Variable Bit Rate) carries variable bandwidth. It is well suited for data services such as frame relay over ATM, which requires guaranteed bandwidth and lower Quality of Service. It is not well suited for LAN traffic due to the unpredictability of LAN traffic burst size.
- **rt-vbr** (real-time Variable Bit Rate) carries a variable bandwidth. It is well suited for real-time services such as compressed voice and video, which require stringent cell transfer latency and less bursty traffic. It is not well suited for LAN traffic due to the unpredictability of LAN traffic burst size.

Example

```
::frf8=> new 5.1 16 2.1 0 100
```

```
::frf8=> new 5.1 16 2.1 0 100 -admin up -lpmode 1 -lpvalue 0
-cimode 1 -demode 1 -devalue 0 -CIR 0 -Be 144000 -Bc 0 -type ubr
```

Modifying Frame Relay FRF.8 Circuit Parameters

```
::root=> configuration frame-relay frf8
```

You can modify a subset of the parameters that you configured when creating the frame relay circuit.

1. From the `::frf8=>` prompt, enter **show** to display the configured circuits.
2. Note the index number of the frame relay FRF.8 circuit configuration you want to modify.
3. From the `::frf8=>` prompt, enter the set command in the following format.

   set <index> [**-admin** (**up**|**down**)] [**-lpmode** (**1**|**2**)] [**-lpvalue** (**0**|**1**)] [**-cimode** (**1**|**2**)] [**-demode** (**1**|**2**)] [**-devalue** (**0**|**1**)] [-**CIR** <value>] [-**Be** <value>] [-**Bc** <value>]

Parameters

<index>

The index number of the frame relay FRF.8 circuit you want to modify.

[**-admin** (**up**|**down**)]

The administrative status of the line. **up** activates the port, **down** deactivates the port.

[**-lpmode** (**1**|**2**)]

The LP mode determines the content of the ATM CLP field when translating from frame relay to ATM.

- **1**—The frame relay header DE field is mapped into the ATM CLP field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information for that frame.
- **2**—The ATM CLP field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information of that frame is set to the LP value.

[**-lpvalue** (**0**|**1**)]

The LP Value determines the content of the ATM cell CLP field when the LP mode is set to **2**.

- **0**—The network cannot discard cells.
- **1**—The network can discard cells.

[-cimode (1|2)]

The CI Mode determines the content of the ATM EFCI field.

- **1**—The frame relay FECN field is mapped to the ATM EFCI field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information of that frame. This mode provides congestion indication to the end points, where higher-level protocol entries might be involved in traffic control mechanisms.
- **2**—The ATM EFCI field is set to "congestion not experienced."

[-demode (1|2)]

The DE Mode determines the content of the frame relay DE field when transmitting from ATM to frame relay.

- **1**—If the ATM CLP field of one or more cells belonging to a frame is set, the frame relay DE field is set.
- **2**—If the ATM CLP field of one or more cells belonging to a frame is set, the frame relay DE field is set to the DE value.

[-devalue (0|1)]

The DE Value determines the content of the frame relay DE field when the DE mode is set to **2**.

- **0**—The network cannot discard frames.
- **1**—The network can discard frames.

[-**CIR** <value>]

The committed information rate (circuit throughput) value in bits per second. The valid range is 0 to 144000, with 0 as the default.

[-**Be** <value>]

The excess burst value is the maximum number of uncommitted data bits that the network will attempt to deliver. The valid range is 0 to 144000, with 144000 as the default.

[-**Bc** <value>]

Committed burst is the maximum number of data bits that the network agrees to transfer under normal conditions during the measurement interval. The valid range is 0 to 144000, with 0 as the default.

Example

```
::frf8=> set 1 -demode 2 -devalue 1
```

Deleting Frame Relay FRF.8 Circuits

```
::root=> configuration frame-relay frf8
```

1. From the `::frf8=>` prompt, enter **`show`** to display the configured circuits.
2. Note the index number of the frame relay FRF.8 circuit you want to delete.
3. From the `::frf8=>` prompt, enter the delete command in the following format to delete the circuit.

   `delete` `<index>`

Parameters

`<index>`

The index number of the frame relay FRF.8 circuit you want to delete.

Example

`::frf8=>` **`delete 3`**

Displaying Frame Relay FRF.8 Circuit Settings

```
::root=> configuration frame-relay frf8
```

From the `::frf8=>` prompt, enter **`show`**.

Examples

`::frf8=>` **`show`**

The example illustrates the show command.

```
::frf8=> show

Idx Fport DLCI Lp Vpi Vci  Admn LpM LpV CiM DeM DeV CIR     Be      Bc
    TPIx
1   5.1   16   2  128 250  up   1   1   1   1   0   1       144000  0
    1

::frf8=>
```

Status Box	Description
Idx	The index number of the frame relay FRF.8 circuit.
Fport	The frame card slot and port number in the format *slot.port*. For example, slot 4 port 1 would be 4.1.
DLCI	The Data Link Connection Identifier (range: 16-991).
Lp	The network card slot and port number in the format *slot.port*.
Vpi	The fr VPI of the fr VCC between the frame card and the network card.
Vci	The fr VCI of the fr VCC between the frame card and the network card.
Admn	The administrative status of the line: up (activated) or down (deactivated).
LpM	The LP mode, which determines the content of the ATM CLP field when translating from frame relay to ATM. • 1—The frame relay header DE field is mapped into the ATM CLP field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information for that frame. • 2—The ATM CLP field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information of that frame is set to the LP value.
LpV	The LP value, which determines the content of the ATM cell CLP field when the LP mode is set to 2. • 0—The network cannot discard cells. • 1—The network can discard cells.
CiM	The CI mode, which determines the content of the ATM EFCI field. • 1—The frame relay FECN field is mapped to the ATM EFCI field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information of that frame. This mode provides congestion indication to the end points, where higher-level protocol entries might be involved in traffic control mechanisms. • 2—The ATM EFCI field is set to "congestion not experienced."
DeM	The DE mode, which determines the content of the frame relay DE field when transmitting from ATM to frame relay. • 1—If the ATM CLP field of one or more cells belonging to a frame is set, the frame relay DE field is set. • 2—If the ATM CLP field of one or more cells belonging to a frame is set, the frame relay DE field is set to the DE value.
DeV	The DE value, which determines the content of the frame relay DE field when the DE mode is set to 2. • 0—The network cannot discard frames. • 1—The network can discard frames.

Status Box	Description
CIR	The committed information rate (circuit throughput) value in bits per second (range: 0-144000)
Be	The excess burst value, which is the maximum number of uncommitted data bits that the network will attempt to deliver (range: 0-144000).
Bc	The committed burst value, which is the maximum number of data bits that the network agrees to transfer under normal conditions during the measurement interval (range: 0-144000).
TPIx	The traffic profile index.

CONFIGURING FRAME RELAY FRF.5 CIRCUITS

FRF.5 defines how frames are encapsulated so that they can be carried by the ATM network to another frame relay device.

Adding a Frame Relay FRF.5 Circuit

```
::root=> configuration frame-relay frf5
```

From the `::frf5=>` prompt, enter the new command in the following format. The index number and the VPI/VCI on the frame card are automatically assigned.

```
new <fslot.port> <dlci> <lslot.port> <lvpi> <lvci>
[-admin (up|down)] [-txlpmode (1|2)] [-clpmask (0|1)]
[-rxlpmode (1|2)] [-CIR <value>] [-Be <value>] [-Bc <value>]
[-type (ubr|cbr|nrt-vbr|rt-vbr)]
```

Parameters

`<fslot.port>`

The frame card slot and port.

`<dlci>`

The DLCI (Data Link Connection Identifier) is the logical channel a data frame travels from the transmitted device to the destination device. The valid range is 16 to 991.

`<lslot.port>`

The network card slot and port (format *slot.port*).

`<lvpi>`

The frame relay (fr) VPI of the fr VCC between the frame card and the network card.

`<lvci>`

The fr VCI of the fr VCC between the frame card and the network card. When using the range command, the first fr PVC is assigned the fr VCI you specify for this parameter. Each additional fr PVC is assigned the next sequential fr VCI.

[**-admin** (**up**|**down**)]

The administrative status of the line. **up** activates the port, **down** deactivates the port.

[**-txlpmode** (**1**|**2**)]

The Tx LP mode determines the content of the FR-SSCS (Frame Relay - Service Specific Convergence Sublayer) PDU header DE and ATM cell ATM CLP fields.

- `1`—The frame header DE field is copied in the FR-SSCS PDU header DE field and mapped into the ATM CLP field of every ATM cell generated by the frame.
- `2`—The frame header DE field is copied into the FR-SSCS PDU header DE field. The ATM CLP field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information of that frame is set to the CLP mask value.

[**-clpmask** (**0**|**1**)]

The CLP Mask determines the content of the ATM cell CLP field when the Tx LP mode is set to **2**.

- `0`—The network cannot discard cells.
- `1`—The network can discard cells.

[**-rxlpmode** (**1**|**2**)]

The Rx LP mode determines the loss priority settings when transmitting from ATM to frame relay.

- `1`—The frame relay header DE field is set if the CLP field of one or more ATM cells of a frame is set to 1 or if the FR-SSCS PDU header DE field is set to 1.
- `2`—The frame relay header DE field is copied into the FR-SSCS PDU header DE field, independent of the ATM CLP field value received.

[-**CIR** <value>]

The committed information rate (circuit throughput) value in bits per second. The valid range is 0 to 144000, with 0 as the default.

[-**Be** <value>]

The excess burst value is the maximum number of uncommitted data bits that the network will attempt to deliver. The valid range is 0 to 144000, with 144000 as the default.

[-**Bc** <value>]

Committed burst is the maximum number of data bits that the network agrees to transfer under normal conditions during the measurement interval. The valid range is 0 to 144000, with 0 as the default.

[**-type** (**ubr**|**cbr**|**nrt-vbr**|**rt-vbr**)]

The type determines the traffic class.

- `ubr` (Unspecified Bit Rate) is a best-effort class of traffic that is best suited for LAN. When network congestion occurs, the data is stored in a buffer until it can be sent.
- `cbr` (Constant Bit Rate) carries a guaranteed constant bandwidth. It is best suited for applications that require fixed bandwidth, such as uncompressed voice, video, and circuit emulation. CBR is a Quality of Service class defined by the ATM Forum for ATM network.
- `nrt-vbr` (non-real-time Variable Bit Rate) carries variable bandwidth. It is well suited for data services such as frame relay over ATM which requires guaranteed bandwidth and lower Quality of Service. It is not well suited for LAN traffic due to the unpredictability of LAN traffic burst size.
- `rt-vbr` (real-time Variable Bit Rate) carries a variable bandwidth. It is well suited for real-time services such as compressed voice and video which require stringent cell transfer latency and less bursty traffic. It is not well suited for LAN traffic due to the unpredictability of LAN traffic burst size.

Example

```
::frf5=> new 5.1 16 2.1 128 250
```

```
::frf5=> new 5.1 16 2.1 128 250 -admin up -txlpmode 1 -clpmask 0
-rxlpmode 1 -CIR 0 -Be 144000 -Bc 0 -type ubr
```

Modifying Frame Relay FRF.5 Circuit Parameters

```
::root=> configuration frame-relay frf5
```

You can modify a subset of the parameters that you configured when creating the frame relay circuit.

1 From the `::frf5=>` prompt, enter **`show`** to display the configured circuits.

2 Note the index number of the frame relay FRF.5 circuit configuration you want to modify.

3 From the `::frf5=>` prompt, enter the set command in the following format.

```
set <index> [-admin (up|down)] [-txlpmode (1|2)]
[-clpmask (0|1)] [-rxlpmode (1|2)][-CIR <value>]
[-Be <value>] [-Bc <value>]
```

Parameters

`<index>`

The index number of the frame relay FRF.5 circuit you want to modify.

`[-admin (up|down)]`

The administrative status of the line. **`up`** activates the port, **`down`** deactivates the port.

`[-txlpmode (1|2)]`

The Tx LP mode determines the content of the FR-SSCS PDU header DE and ATM cell ATM CLP fields.

- `1`—The frame header DE field is copied in the FR-SSCS PDU header DE field and mapped into the ATM CLP field of every ATM cell generated by the frame.
- **`2`**—The frame header DE field is copied into the FR-SSCS PDU header DE field. The ATM CLP field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information of that frame is set to the CLP mask value.

`[-clpmask (0|1)]`

The CLP Mask determines the content of the ATM cell CLP field when the Tx LP mode is set to **`2`**.

- `0`—The network cannot discard cells.
- `1`—The network can discard cells.

[**-rxlpmode** (**1**|**2**)]

The Rx LP mode determines the loss priority settings when transmitting from ATM to frame relay.

- `1`—The frame relay header DE field is set if the CLP field of one or more ATM cells of a frame is set to 1 or if the FR-SSCS PDU header DE field is set to 1.
- `2`—The frame relay header DE field is copied into the FR-SSCS PDU header DE field, independent of the ATM CLP field value received.

[-**CIR** <value>]

The circuit throughput (committed information rate) value in bits per second. The valid range is 0 to 144000, with 0 as the default.

[-**Be** <value>]

The excess burst is the maximum number of uncommitted data bits that the network will attempt to deliver. The valid range is 0 to 144000, with 144000 as the default.

[-**Bc** <value>]

The committed burst is the maximum number of data bits that the network agrees to transfer under normal conditions during the measurement interval. The valid range is 0 to 144000, with 0 as the default.

Example

```
::frf5=> set 2 -admin down -txlpmode 2 -clpmask 0
```

Deleting Frame Relay FRF.5 Circuits

```
::root=> configuration frame-relay frf5
```

1. From the `::frf5=>` prompt, enter **`show`** to display the configured circuits.
2. Note the index number of the frame relay FRF.5 circuit you want to delete.
3. From the `::frf5=>` prompt, enter the delete command in the following format to delete the circuit.

   `delete` `<index>`

Parameters

`<index>`

The index number of the frame relay FRF.5 circuit you want to delete.

Example

```
::frf5=> delete 3
```

Displaying Frame Relay FRF.5 Circuit Settings

`::root=> configuration frame-relay frf5`

From the `::frf5=>` prompt, enter **`show`**.

Examples

`::frf5=>` **`show`**

The example illustrates the show command.

```
::frf5=> show

Idx Fport DLCI Lp Vpi Vci  Admn TxLpM CLPM RxLpM CIR     Be      Bc
  TPIx

::frf5=>
```

Status Box	Description
Idx	The index number of the frame relay FRF.5 circuit.
Fport	The frame card slot and port number in the format *slot.port*. For example, slot 4 port 1 would be 4.1.
DLCI	The Data Link Connection Identifier (range: 16-991).
Lp	The network card slot and port number in the format *slot.port*.
Vpi	The fr VPI of the fr VCC between the frame card and the network card.
Vci	The fr VCI of the fr VCC between the frame card and the network card.
Admn	The administrative status of the line: up (activated) or down (deactivated).
TxLpM	The Tx LP mode, which determines the content of the FR-SSCS PDU header DE and ATM cell ATM CLP fields. • 1—The frame header DE field is copied in the FR-SSCS PDU header DE field and mapped into the ATM CLP field of every ATM cell generated by the frame. • 2—The frame header DE field is copied into the FR-SSCS PDU header DE field. The ATM CLP field of every ATM cell generated by the segmentation process of the AAL5 PDU containing the information of that frame is set to the CLP mask value.
CLPM	The CLP Mask setting, which determines the content of the ATM cell CLP field when Tx LP mode is set to 2. • 0—The network cannot discard cells. • 1—The network can discard cells.
RxLpM	The Rx LP mode, which determines the loss priority settings when transmitting from ATM to frame relay. • 1—The frame relay header DE field is set if the CLP field of one or more ATM cells of a frame is set to 1 or if the FR-SSCS PDU header DE field is set to 1. • 2—The frame relay header DE field is copied into the FR-SSCS PDU header DE field, independent of the ATM CLP field value received.
CIR	The committed information rate (circuit throughput) value in seconds (range: 0-144000)
Be	The excess burst value, which is the maximum number of uncommitted data bits that the network will attempt to deliver (range: 0-144000).
Bc	The committed burst value, which is the maximum number of data bits that the network agrees to transfer under normal conditions during the measurement interval (range: 0-144000).
TPIx	The traffic profile index.

CONFIGURING BRIDGING AND ROUTING 11

This chapter describes how to enable global bridging and/or routing, and then configure other parameters for these services using the command-line interface. Then, the chapter describes how to set up sessions over which bridging and routing services will run. Go to the following sections for more information.

DETERMINING WHAT YOU NEED TO SET UP

You can use bridging and routing sessions for many applications, including the following as examples:

- frame-based uplink connections for subscriber data using the AV220 FAMC
- subtending management connections using either the AV210 AMC or AV220 FAMC
- in-band management using either the AV210 AMC or AV220 FAMC

To implement these applications, determine the type of service that is required. Then, enable or configure global system parameters for bridging and/or routing services prior to setting up the bridging and routing sessions. For example:

- Prior to setting up a subtending management connection between an AV8000 chassis and an AV2200 chassis, global routing must be enabled for the AV8000 chassis AMC or FAMC.
- To forward subscriber frame-based traffic using the AV220 FAMC as an IP/Ethernet uplink, bridging and/or routing should be globally enabled for the system.

Although this is the recommended order, you can set up the sessions first, then enable the global setting and other parameters.

The procedures in this chapter set up bridging (including spanning tree protocol) and routing global configuration and other system parameters prior to setting up sessions. Determine which global services to enable and which parameters to configure dependent on the requirements for your application. Session setup includes assigning an ATM PVC over which bridging, routing, or brouting services run.

For more information about the IP/Ethernet uplink application using the AV220 FAMC, subtending, or in-band management, refer to the *Avidia System Technology and Applications Guide*.

Enabling System Bridging and Parameters

If you plan to specify bridging or brouting as the service type for any session, you enable bridging and then configure several system-wide bridging parameters. These parameters are made available to any bridging session in the system set up over an ATM PVC. Each parameter has a default value; you can modify each values.

Modifying System Bridging Parameters

```
::root=> configuration bridging
```

From the `::bridging=>` prompt, enter the modify command in the following format.

modify [**-bridging** (**on**|**off**)] [**-wanbroadcast** (**on**|**off**)] [**-wanucflood** (**on**|**off**)] [**-lanmaclearn** (**on**|**off**)] [**-age** <sec>]

Parameters

[**-bridging** (**on**|**off**)]

Determines whether or not bridging is enabled for the Avidia system. Enter **-brenable on** to enable bridging. Enter **-brenable off** to disable bridging. The default value is off.

[**-wanbroadcast** (**on**|**off**)]

Determines whether or not WAN to WAN broadcasting is enabled. This affects only broadcast frames (destination MAC all ones (1s)) received from the WAN ports. Enter **-wanbcenable on** to enable WAN to WAN broadcasting. Enter **-wanbcenable off** to disable WAN to WAN broadcasting. The default value is off.

[**-wanucflood** (**on**|**off**)]

Determines whether or not unicast frames of unknown port destination that are received at any port are flooded to all WAN ports. Enter **-wanucflood on** to enable WAN flooding. Enter **-wanucflood off** disables WAN flooding. The default value is off.

[**-lanmaclearn** (**on**|**off**)]

Determines whether or not source MAC address learning is enabled for the LAN port. Enter **-lanmaclearn on** to enable MAC address learning. Enter **-lanmaclearn off** to disable MAC address learning. The `LAN MAC Learn` parameter cannot be disabled if the `WAN Uc Flood` parameter is enabled. The default value is on.

[-age <sec>]

Specifies the interval, in seconds, after which bridging table entries are deleted if they are not relearned. The valid range is 10—1000000 seconds. The default is 300 seconds.

Example

::bridging=> **modify -bridging on -wanbroadcast on -wanucflood on -lanmaclearn on -age 300**

Displaying System Bridging Parameters

::root=> configuration bridging

To verify system bridging configuration, from the `::bridging=>` prompt, enter **show**. Information similar to the following displays.

```
::bridging=> show

  Bridging                :       On
  WAN Broadcast           :       On
  WAN Unicast Flood       :       On
  LAN MAC Learn           :       On
  Aging Time (sec)        :       300

  Note: 'LAN MAC Learn' Can not be set to Off if 'WAN Unicast Flood' is On!
::bridging=>
```

Information	Description
Bridging	Indicates whether system bridging is enabled or disabled.
WAN Broadcast	Indicates whether or not WAN Broadcast is enabled.
WAN Unicast Flood	Indicates whether or not WAN Unicast Flood is enabled.
LAN MAC Learn	Indicates whether or not LAN MAC Learn is enabled.
Aging Time (sec)	Specifies the interval, in seconds, after which bridging table entries are deleted if they are not relearned.

CONFIGURING STP PARAMETERS

To provide redundancy for bridging applications without loops, enable Spanning Tree Protocol (STP) for the system. You can configure several system-wide and port-specific STP parameters. Each parameter has a default value; you can modify each value.

Modifying System STP Parameters

```
::root=> configuration bridging globalstp
```

From the `::globalstp=>` prompt, enter the modify command in the following format.

modify [**-stp** (**on**|**off**)] [**-stppri** <priority>][**-maxage** <sec>]
[**-hellotime** <sec>] [**-fddelay** <sec>]

Parameters

[**-stp** (**on**|**off**)]

Enables or disables Spanning Tree Protocol for the system. Enter **on** to enable it. Enter **off** to disable it. The default value is on.

[**-stppri** <priority>]

The priority of the system (the entire chassis) within the network. The valid range is 0 to 65535. The value 0 indicates the highest priority. The default value is 32768.

[**-maxage** <sec>]

The number of seconds after which entries in the bridging table will be deleted if they are not re-learned. The valid range is 6 to 40. The default value is 20.

[**-hellotime** <sec>]

The interval, in seconds, at which you want the system to send Spanning Tree Protocol packets. The valid range is 1 to 10. The default value is 2.

[**-fddelay** <sec>]

The number of seconds you want the system to wait before changing the state of a particular interface (changing to blocked, for example). The valid range is 4 to 30. The default value is 15.

This delay prevents the interface states from changing so rapidly that the STP cannot keep up with the current topology of the network and cannot manage bridging efficiently.

Example

`::globalstp=>` **`modify -stp on -maxage 25 -hellotime 6 -fddelay 25`**

Displaying System STP Parameters

`::root=> configuration bridging globalstp`

To verify system bridging configuration, from the `::globalstp=>` prompt, enter **`show`**. Information similar to the following displays.

```
::globalstp=> show


  Spanning Tree Protocol(STP)     :       On
  STP Priority                    :       32768
  STP Bridge MaxAge (sec)         :       25
  STP Bridge Hello Time (sec)     :       6
  STP Bridge Forward Delay (sec)  :       25
::globalstp=>
```

Changing STP Port Priority

You can change the priority for each STP port. Use the show command to display information about the STP ports and to select the bridge port for which you want to change the priority.

Displaying STP Port Parameters

```
::root=> configuration bridging stpport
```

To verify port-specific bridging STP information, from the `::stpport=>` prompt, enter **`show`**. Information similar to the following displays.

```
::stpport=> sh
   BridgePort  Slot  Port  Vpi   Vci  StpPort   Priority          State
            1     1     1    0     1        1        128       Learning
            2     4     1    0   101        2        128       Learning
            3     4     1    0   102        3        128       Learning
            4     4     1    0   103        4        128       Learning
            5     4     1    0   104        5        128       Learning
            6     4     1    0   105        6        128       Learning
            7     4     1    0   106        7        128       Learning
            8     4     1    0   107        8        128       Learning
            9     4     1    0   108        9        128       Learning
           10     4     1    0   109       10        128     Forwarding
           11     4     1    0   110       11        128     Forwarding
           12     4     1    0   111       12        128     Forwarding
           13     4     1    0   112       13        128     Forwarding
           14     4     1    0   113       14        128     Forwarding
           15     4     1    0   114       15        128     Forwarding
           16     4     1    0   115       16        128     Forwarding
           17     4     1    0   116       17        128     Forwarding
           18     4     1    0   117       18        128     Forwarding
           19     4     1    0   118       19        128     Forwarding
           20     4     1    0   119       20        128     Forwarding
           21     4     1    0   120       21        128     Forwarding

Press 'Return' or 'Enter' to continue or 'q' to quit ....
```

See the following table for a description of the fields above.

Information	Description
BridgePort	The reference number for the port and its bridging session.
Slot	The slot number in the Avidia system.
Port	The port number of the card in the Avidia system.
Vpi	The VPI of the bridging session.
Vci	The VCI of the bridging session.
StpPort	The port running the STP protocol.
Priority	The priority of the port within the network.
State	The current state for each bridging port.

Modifying STP Port Priority

```
::root=> configuration bridging stpport
```

1 From the `::stpport=>` prompt, enter **`show`** to display the configured STP ports.

2 Note the bridgeport number of the STP port for which you want to change the priority.

3 Enter the modify command in the following format.

`modify` `<bridgeport> [`**`-priority`** `<priority>]`

Parameters

`<bridgeport>`

The number representing the bridging session. Use the show command (page 315) to determine the number to specify as the bridgeport.

`[`**`-priority`** `<priority>]`

The priority of the port within the network. The valid range is 0 to 255. The value 0 indicates the highest priority. The default value is 128.

Example

`::stpport=>` **`modify 2 30000`**

CONFIGURING THE BRIDGE FORWARDING TABLE

The bridge forwarding table displays a list of ports from which frames may be received and the corresponding ports to which those frames are allowed to be forwarded.

Adding Bridge Forwarding Table Entries

```
::root=> configuration bridging filter
```

From the `::filter=>` prompt enter the new command in the following format.

new `<dest macaddr> <srcport> <port,port,...>`

Parameters

`<dest macaddr>`

The MAC address of the device for which the packet is destined. The MAC address format is *xx:xx:xx:xx:xx:xx* where *x* is either a space, an integer ranging from 0 to 9 or a letter ranging from a to f.

`<srcport>`

The source bridge session port.

`<port,port,...>`

The bridge session ports to which you want to allow frame forwarding from the specified source port. To specify multiple ports, separate each port number with a comma.

Examples

```
::filter=> new 00:10:4b:24:15:a3 3 4,5,6,7,8
```

Displaying the Bridge Forwarding Table

::root=> configuration bridging filter

To verify filtering configuration, from the `::filter=>` prompt, enter the **show** command as follows.

show [<dest macaddr>]

Parameter

[<dest macaddr>]

The MAC address of the bridge forwarding table entry you want to display (format *xx:xx:xx:xx:xx:xx*). Omitting this parameter displays all bridge forwarding table entries.

Examples

::filter=> **show 00:10:4b:24:15:a3**

::filter=> **show**

Information similar to the following displays.

```
::filter=> show

Index     DestMacAddress      SourceBridgePort DestBridgePort
1         00:10:4b:24:15:a3   3                4,5,6,7,8
2         03:14:6b:13:12:b1   3                2,3

::filter=>
```

Information	Description
Index	The bridge forwarding table row index number.
DestMacAddress	The MAC address of the device for which the packet is destined.
SourceBridgePort	The logical bridge session port.
DestBridgePort	The logical bridge session ports to which the frame can be forwarded.

Deleting Bridge Forwarding Table Entries

```
::root=> configuration bridging filter
```

1. From the `::filter=>` prompt, enter **`show`** to display the configured sessions.
2. Note the index number of the bridge forwarding table entry you want to delete.
3. Enter the delete command in the following format.

   `delete` `<index>`

Parameter

`<index>`

The bridge forwarding table index number of the entry you want to delete.

Example

```
::filter=> delete 2
```

ENABLING SYSTEM ROUTING PARAMETERS

If you plan to specify routing or brouting as the service type for any session, enable global IP routing to allow IP forwarding and set the packet time-to-live parameter. You must enable global IP routing prior to setting up subtending management connections.

When global IP routing is enabled, it indicates that the session acts as an IP gateway for forwarding datagrams received by, but not addressed to, it. IP gateways forward datagrams. IP hosts do not (except those source-routed via the host). Although you may choose to disable global IP routing (IP forwarding), static routing entries can still be added to the routing table.

Configuring Global IP Routing Settings

`::root=> configuration routing`

From the `::routing=>` prompt, enter the modify command as follows.

`modify` `[`**`-routing`** `(`**`on`**`|`**`off`**`)]`

Parameters

`[`**`-routing`** `(`**`on`**`|`**`off`**`)]`

Enables or disables IP forwarding. Enter **`-routing on`** to enable IP forwarding. Enter **`-routing off`** to disable IP forwarding. The default value is off.

Examples

`::routing=>` **`-routing on`**

Displaying Global IP Routing Settings

`::root=> configuration routing`

From the `::routing=>` prompt, enter **`show`**. The information provided shows the state of routing services for the system.

```
::routing=> show
Routing           : On
::routing=>
```

Configuring IP Packet Time-to-Live

Specify the time-to-live value for IP datagrams in the Avidia system.

Configuring Global IP Routing Settings

```
::root=> configuration routing ip
```

From the `::ip=>` prompt, enter the modify command as follows.

modify [**-ttl** <ttl>]

Parameters

[**ttl** <ttl>]

Sets the time-to-live value for internally-generated IP datagrams that do not contain a time-to-live value. The time-to-live value is the number of hops a packet is allowed to cross before it reaches it's destination. The default value is 64.

Examples

`::ip=>` **ttl 56**

Displaying Global IP Routing Settings

```
::root=> configuration routing ip
```

From the `::ip=>` prompt, enter **show**. Information similar to the following displays.

```
::ip=> show

Time To Live   :       56

::ip=>
```

CONFIGURING ROUTING INFORMATION

The following sections provide procedures to statically add entries to tables that contain information that is dynamically learned such as MAC addresses that are mapped to IP addresses, and IP addresses. Also, this section contains procedures that allow you to define and change RIP parameters.

Configuring IP ARP

The IP ARP table maps MAC addresses to IP addresses. The router builds this table by sending ARP requests to the destination IP addresses and learning the corresponding MAC addresses from the received responses. You can also enter information manually into the IP ARP table.

Adding IP ARP Table Entries

```
::root=> configuration routing arptb
```

From the `::arptb=>` prompt enter the new command in the following format.

`new` `<ipAddr> <macAddr>`

Parameters

`<ipAddr>`

The IP address that is mapped to the MAC address you enter in the next parameter. The format for the IP address is *xxx.xxx.xxx.xxx*.

`<macAddr>`

The MAC address mapped to the IP address entered for the `<ipAddr>` parameter above. The MAC address format is *xx:xx:xx:xx:xx:xx*, where *x* is either a space, an integer ranging from 0 to 9, or a letter ranging from a to f.

Example

`::arptb=>` **`new 10.0.0.101 00:60:35:00:68:78`**

Displaying the IP ARP Table

```
::root=> configuration routing arptb
```

To verify your IP ARP configuration, from the `::arptb=>` prompt, enter the **`show`** command as follows.

`show` `[<ipaddr>]`

Parameter

`[<ipaddr>]`

The IP address of the IP ARP table entry you want to display (format *xxx.xxx.xxx.xxx*). Omitting this parameter displays all IP ARP Table entries.

Examples

```
::arptb=> show
::arptb=> show 10.0.0.101
```

Information similar to the following displays.

```
::arptb=> show
Index Slot Port       IpAddr        MacAddr     Type
   1   1   1   10.0.0.101   00:60:35:00:68:78 Static
   2   1   1   10.0.0.220   00:05:5e:da:90:d0 Dynamic
   3   1   1   10.0.10.21   08:00:20:9c:19:13 Dynamic
   4   1   1   10.0.10.35   00:60:08:59:ff:93 Dynamic
   5   1   1   10.0.10.41   00:d0:b7:1b:41:fc Dynamic
   6   1   1   10.0.11.34   00:20:a7:60:2d:2e Static
   7   1   1   10.0.11.40   00:aa:00:bf:12:7c Dynamic
   8   1   1  10.0.11.108   00:b0:d0:e9:05:f8 Dynamic
   9   1   1  10.0.11.210   00:b0:d0:e9:06:06 Dynamic
  10   1   1  10.0.11.212   00:10:a4:97:dd:d5 Dynamic
  11   1   1   10.0.20.14   00:d0:b7:5c:58:de Dynamic
  12   1   1  10.0.20.113   00:01:02:76:53:7d Dynamic
  13   1   1  10.0.20.126   00:b0:d0:78:96:1d Dynamic
  14   1   1  10.0.20.254   10:20:b7:64:09:f4 Dynamic
  15   1   1  10.0.30.250   00:b0:d0:78:96:36 Dynamic
  16   1   1  10.0.60.101   00:50:8b:0a:2c:e8 Dynamic
  17   1   1  10.10.0.100   00:10:a4:97:e2:7b Dynamic

::arptb=>show 10.0.0.101
Index Slot Port       IpAddr        MacAddr     Type
   1   1   1   10.0.0.101   00:60:35:00:68:78 Static

::arptb=>
```

Information	Description
Index	The IP ARP Table row index number.
Slot Port	The slot and port on which the IP ARP entry was learned. The FAMC is always installed in slot 1 and, since the FAMC only has one Ethernet port, these values are always 1.
IPAddr	The IP address that is mapped to the corresponding MAC address.
MacAddr	The MAC address that is mapped to the corresponding IP address.
Type	The type of entry, either dynamic (learned) or static (entered manually).

Deleting IP ARP Table Entries

You can only delete static IP ARP table entries. You cannot delete dynamic IP ARP table entries.

```
::root=> configuration routing arptb
```

1. From the `::arptb=>` prompt, enter **`show`** to display the configured sessions.
2. Note the index number of the IP ARP table entry you want to delete.
3. Enter the delete command in the following format.

```
delete <index>
```

Parameter

```
<index>
```

The IP ARP table index number of the entry you want to delete. Static ARP table entries (with the exception of the one for the LAN port), as well as dynamically learned ARP table entries, can be deleted.

Example

```
::arptb=> delete 1
```

Configuring Static Routing

If you specified routing or brouting as the service type for a session, the FAMC builds and maintains a table of dynamically learned routes. You can manually add or delete routes from this table, as well as display them.

The IP routing table contains the information that is used by the AV220 FAMC to route data. Packets for which the network portion of the destination IP address match the IP address listed in the first column of the IP routing table are routed based on the data displayed in the corresponding table row.

Adding IP Routing Table Entries

```
::root=> configuration routing routingtb
```

From the `::routingtb=>` prompt, enter the new command in the following format.

`new` `<destip> <nexthop> [`**`-hopcount`**` <hopcount>] ] [`**`-netmask`**` <netmask>]`

Parameters

`<destip>`

The IP address to which packets must be sent to qualify for routing based on this IP routing table entry.

`<nexthop>`

The IP address of the next router in the network to which the packet is to be forwarded.

`[`**`-hopcount`**` <hopcount>]`

The number of hops the packet can make between the source and the destination. If the packet makes the maximum number of hops allowed by the RIP configuration (see “Modifying RIP” on page 332), and is not yet at its destination, it is deleted.

`[`**`-netmask`**` <netmask>]`

The Variable Length Subnet Mask (VLSM) for the destination network. When this parameter is omitted, the default class-based network route or host route is added, dependent on what you enter for the `destip` parameter shown above.

Examples

`::routingtb=>` **`new 10.0.0.0 10.0.5.2`**

Adds a class A route with a subnet mask of 255.0.0.0 for destination network 10.x.x.x.

`::routingtb=>` **`new 10.0.6.2 10.0.5.2 -netmask 255.255.255.0`**

Adds a route with a subnet mask of 255.255.255.0 for destination network 10.0.6.x.

`::routingtb=>` **`new 10.0.6.2 10.0.5.2`**

Adds a route with a subnet mask of 255.255.255.255 (host route) for destination 10.0.6.2.

`::routingtb=>` **`new 10.0.6.3 10.0.5.2 -netmask 255.255.255.254`**

Adds a route with a subnet mask of 255.255.255.254 (host route) for destination 10.0.6.3.

`::routingtb=>` **`new 0.0.0.0 10.0.5.2`**

Adds a default route.

`::routingtb=>` **`new 100.90.57.3 100.90.57.4 -hopcount 10`**

Displaying the IP Routing Table

`::root=> configuration routing routingtb`

To verify your IP routing configuration, from the `::routingtb=>` prompt, enter the **`show`** command as follows.

`show` `[<ipaddr>]`

Parameter

`[<ipaddr>]`

The IP address of the IP routing table entry you want to display (format *xxx.xxx.xxx.xxx*). Omitting this parameter displays all IP routing table entries.

Examples

`::routingtb=>` **`show`**

`::routingtb=>` **`show 10.0.0.0`**

Information similar to the following displays.

```
::routingtb=> show

Route Types Ty:  D-Direct; I-Indirect; O-Other; IV-Invalid
Protocol Types Pr: L-Local; N-Network Mgnt; R-Rip; O-Other
Column Headers : Sl-Slot; Po-Port; Hop-HopCount; Ty-Route Types;
Pr-Protocol

Index    DestIp        Mask        NextHop     Sl Po Vpi Vci Hop Ty Pr Age
 1       10.0.0.0     255.0.0.0     10.0.11.34  1  1   0   1  0  D  L 7944
 2      100.0.0.0     255.0.0.0     10.0.0.220  1  1   0   1  2  I  R  13
 3     160.16.0.0   255.255.0.0     10.0.0.220  1  1   0   1  2  I  R  13

::routingtb=> show 10.0.0.0

Route Types Ty:  D-Direct; I-Indirect; O-Other; IV-Invalid
Protocol Types Pr: L-Local; N-Network Mgnt; R-Rip; O-Other
Column Headers : Sl-Slot; Po-Port; Hop-HopCount; Ty-Route Types;
Pr-Protocol

Index    DestIp        Mask        NextHop     Sl Po Vpi Vci Hop Ty Pr Age
 1       10.0.0.0     255.0.0.0     10.0.11.34  1  1   0   1  0  D  L 7944

::routingtb=>
```

Information	Description
Index	The index number of the IP Routing Table row.
DestIp	The IP address of the routing entry.
Mask	The subnet mask used to specify what portion of the IP address is considered when determining whether to route the packet based on the data in this table row.
NextHop	The IP address of the next router in the network to which the packet is to be forwarded.
Sl Po	The slot and port of the session over which the packet is routed.
Vpi Vci	The VPI and VCI of the session over which the packet is routed.
Hop	The number of hops the packet is allowed to make to get to its destination. This value is used by the RIP. If the packet makes the maximum allowable hops and is not yet at its destination, it is deleted.
Ty	The type of routing connection. • D—Direct (local connection) • I—Indirect (requires multiple hops) • IV—Invalid (the route is invalid) • O—Other (none of the above options)
Pr	Protocol—the method by which the IP Routing Table entry was learned. • L—Local indicates a route that is reachable over the locally configured interface: ATM session • R—RIP indicates the route dynamically learning using RIP • N—Network Management indicates a route statically configured • O—Other
Age	The number of seconds the IP Routing Table entry has been in the table. Learned entries are automatically deleted once their age exceeds the maximum, which is determined by the routing protocol. The maximum age under RIP is 180 seconds.

Deleting IP Routing Table Entries

`::root=> configuration routing routingtb`

1 From the `::routingtb=>` prompt, enter **`show`** to display the routing table.

2 Note the index number of the IP routing table entry you want to delete.

3 Enter the delete command in the following format. Local interface routes cannot be deleted (see page 329 for information about how IP table entries occurred).

`delete` `<index>`

Parameter

`<index>`

The IP routing table index number of the entry you want to delete.

Example

```
::routingtb=> delete 2
```

Configuring Dynamic Routing Parameters

The RIP configuration table displays information about the Routing Information Protocol (RIP) used for each routing session. You configure RIP information initially during session configuration; you can, however, modify the RIP information using the following procedures.

Displaying the RIP Configuration Table

```
::root=> configuration routing rip
```

To verify the RIP configuration for a session, from the `::rip=>` prompt, enter the **`show`** command as follows.

`show` `[<ipaddr>]`

Parameter

`[<ipaddr>]`

The IP address of the RIP Configuration Table entry you want to display (format *xxx.xxx.xxx.xxx*). Omitting this parameter displays all RIP Configuration Table entries.

Examples

`::rip=>` **`show`**

`::rip=>` **`show 11.0.0.1`**

Information similar to the following displays.

```
::rip=> show
 Index       IpAddr         Send   Receive Default-Metric Authentication
     1        11.0.0.1      ripv1    ripv1        0             No
     2        13.0.0.1      ripv1    ripv1        0             No

222.222.223.22::rip=> show 11.0.0.1
 Index       IpAddr         Send   Receive Default-Metric Authentication
     1        11.0.0.1      ripv1    ripv1        0             No

::rip=>
```

Information	Description
Index	The RIP Configuration Table row index number.
IPAddr	The IP address of the routing session.
Send	The type of RIP packets to be sent. The RIP type is determined by the RIP version used by the other routers in the network. • donotsend (no RIP packets are sent) • ripv1 • ripv1c (RIP2-type packets that are compatible with RIP 1) • ripv2
Receive	The type of RIP packets to be received. • ripv1 • ripv2 • v1orv2 • donotrecv (no RIP packets are received)
Default-Metric	Number that is used for the default route entry in RIP updates originated on this interface.
Authentication	Indicates whether a password is required to enable the router to learn information from the session ports in the same network segment. • No Authentication • Simple Password (text string).

Modifying RIP

```
::root=> configuration routing rip
```

1 From the `::rip=>` prompt, enter **show** to display the RIP configuration for each session.

2 Note the index number of the RIP Configuration Table entry you want to modify.

3 Enter the modify command in the following format.

```
modify <index> [-send(ripv1c|ripv1|ripv2|donotsend)]
[-recv(ripv1|ripv2|v1orv2|donotrecv)] [-key <plain text
password>] [-auth none] [-defaultmetric <count>]
```

Parameters

`<index>`

The RIP configuration table index number of the entry you want to modify (see page 331).

[**-send**(**ripv1c**|**ripv1**|**ripv2**|**donotsend**)]

- **ripv1c**—send RIP Version 1c packets only (RIP 2-type packets that are compatible with RIP Version 1)
- **ripv1**—send RIP Version 1 packets only
- **ripv2**—RIP Version 2 packets only
- **donotsend**—no RIP packets are sent

[**-recv**(**ripv1**|**ripv2**|**v1orv2**|**donotrecv**)]

- **ripv1**—receive RIP Version 1 packets only
- **ripv2**—receive RIP Version 2 packets only
- **v1orv2**—receive either RIP Version 1 or RIP Version 2 packets
- **donotrecv**—no RIP packets are received

[**-key** <plain text password>]

This parameter enables you to set a password, or key. The password allows the system to receive RIP table updates from remote routers. RIP updates only occur if the same password is used by the remote router. The password is used only for RIP version 2 packets; no password control is available for RIP version 1. Omit this parameter to prevent RIP updates from remote routers.

The password can be up to 16 characters and can contain any keyboard character. Avidia supports only plain text passwords; MD5 password encoding is not supported.

[**-auth none**]

Include this parameter to disable the **key** parameter. If no **key** has been set, this parameter has no effect.

[-**defaultmetric** <count>]

The number that is used for the default route entry in RIP updates originated on this interface. A value of zero indicates that no default route should be originated. In this case, a default route via another router may be propagated.

Example

```
::rip=> modify 2 -send ripv1c -recv v1orv2 -key admin
```

Configuring Bridging and Routing Sessions

You can configure bridging and routing sessions over PVCs that terminate on the Avidia management card. This bridging/routing sessions can be used for applications such as inband management, a management connection for subtending, or also for an Ethernet uplink. Use bridging or routing sessions that terminate on the AV210 AMC for inband or subtending management connections. Use bridging and routing sessions that terminate on the AV220 FAMC for IP/Ethernet uplink applications as well as for inband or subtending management connections. You can set up the following number of sessions:

- for the AV210 AMC, you can configure up to 96 bridging, routing, and brouting sessions
- for the AV220 FAMC, you can configure up to 254 bridging, routing, and brouting sessions

To configure a bridging or routing session, configure a PVC between the AMC or FAMC and another system card (subscriber or line card), then set up the service for the session (bridging, routing, or brouting). The system automatically assigns a VPI and VCI to the AMC or FAMC for the session. If you are configuring a session using a frame-based card, the system automatically assigns the VPI and VCI and configures the session to use VC-MUX_Bridged encapsulation mode.

Although the process described in this chapter recommends that you turn on global settings (such as "Enabling System Routing Parameters" on page 320) prior to creating sessions, the system will allow you to create the sessions first.

Adding Sessions

```
::root=> configuration atm session
```

From the `::session=>` prompt, enter the new command in the following format.

new <slot.port> <vpi|*****> <vci|*****> <(**llc-snap**|**vcmuxbr**|**vcmuxrt**)>
[-**dlci** <dlci>] [**-subs** <subscriber>] [**-service**
(**none**|**bridge**|{{**route**|**broute**} **-ipaddr** <ipaddr> **-mask** <ipmask>})]
[**-stppri** <priority>] [**-stpcost** <cost>][-**admin** (**up**|**down**)]

Parameters

`<slot.port>`

The slot and port for this PVC.

`<vpi|*>`

The VPI value for this PVC. Enter an asterisk **(*)** for the PVC when setting up a session to a frame card (SDSL frame or IDSL). The system automatically assigns the VPI in this case.

`<vci|*>`

The VCI value for this PVC. Enter an asterisk **(*)** for the PVC when setting up a session to a frame card (SDSL frame or IDSL). The system automatically assigns the VCI in this case.

`<(`**`llc-snap|vcmuxbr|vcmuxrt`**`)>`

The encapsulation mode selected for this session. The type of service specified for the `-service` parameter (see below) determines the appropriate encapsulation mode to select. Also, the configured encapsulation mode must match the encapsulation mode used by the adjacent segments in the network.

If you specified service type:	Set the encapsulation mode to:
broute	llc-snap
route	llc-snap or vcmuxrt
bridge	for SDSL—vcmuxbr for all other cards—vcmuxbr or llc-snap

`[`**`-dlci`**` <dlci>]`

The DLCI (Data Link Connection Identifier) of the frame relay circuit for this session. This parameter is used only when configuring a session for the AV412 IDSL card.

`[`**`-subs`**` <subscriber>]`

A name that identifies the session. This is a text string that can be up to 32 characters in length and can contain any character.

[-service (**none|bridge|**{{**route|broute**} **-ipaddr** <ipaddr> **-mask** <ipmask>})]

- none—assigns no service to the session. This is the default service configuration.
- bridge—configures the session for bridging only.
- route—configures the session for routing only.
- broute—configures the session for both bridging and routing.
- -ipaddr <ipaddr>—the IP address assigned to the session (format *xxx.xxx.xxx.xxx*). Include this parameter only if you specified **route** or **broute** for the service type.
- -mask <ipmask>—the subnet mask assigned to the session (format *xxx.xxx.xxx.xxx*). Include this parameter only if you specified **route** or **broute** for the service type.

[**-stppri** <priority>]

Omit this parameter if you specified **route** for the service type. This parameter sets the STP priority for the session. The valid range is from 0 to 255, with 0 being the highest priority. The default value is 128.

[**-stpcost** <cost>]

Omit this parameter if you specified **route** for the service type. This parameter sets the STP path cost for the session. The valid range is from 1 to 65535. The value 1 is the lowest cost, indicating that the session is the closest to the root bridge. The default value is 250 for WAN ports and 100 for LAN ports.

[-**admin** (**up|down**)]

The admin status of the session. **Up** enables the session. **Down** disables the session. The default value is up.

Examples

```
::session=> new 4.2 100 100 llc-snap -subs company123 -service
broute -ipaddr 10.0.1.9 -mask 255.0.0.0 -admin up
```

```
::session=> new 4.2 100 100 vcmuxbr -subs company-a -service
bridge -stppri 128 -stpcost 250 -admin down
```

Modifying Sessions

::root=> configuration atm session

From the `::session=>` prompt, enter the modify command in the following format.

modify <index> [-**admin** (**up**|**down**)][**-subs** <subscriber>] [**-service** (**none**|**bridge**|{{**route**|**broute**} [**-ipaddr** <ipaddr> **-mask** <ipmask>]}})] [-encap(**llc-snap**|**vcmuxbr**|**vcmuxrt**)][**-stppri** <priority>] [**-stpcost** <cost>]

Parameters

<index>

The index number of the Session Configuration Table row that contains the session you want to modify.

[-**admin** (**up**|**down**)]

The admin status of the session. **Up** enables the session. **Down** disables the session.

[**-subs** <subscriber>]

A name that identifies the session. This is a text string that up to 32 characters and can contain any keyboard character.

[**-service** (**bridge**|{{**route**|**broute**|**none**} [**-ipaddr** <ipaddr> **-mask** <ipmask>]}})]

- none—assigns no service to the session. This is the default service configuration.
- bridge—configures the session for bridging only.
- route—configures the session for routing only.
- broute—configures the session for both bridging and routing.
- -ipaddr <ipaddr>—the IP address assigned to the session (format xxx.xxx.xxx.xxx). Include this parameter only if you specified route or broute for the service type.
- -mask <ipmask>—the subnet mask assigned to the session (format *xxx.xxx.xxx.xxx*). Include this parameter only if you specified **route** or **broute** for the service type.

`[-encap(`**`llc-snap|vcmuxbr|vcmuxrt`**`)]`

The encapsulation mode you want to use for this PVC. The type of service specified for the `-service` parameter determines the appropriate encapsulation modes. In addition, the configured encapsulation mode must match the encapsulation mode used by the adjacent segments in the network.

If you specified service type:	Set the encapsulation mode to:
broute	llc-snap
route	llc-snap or vcmuxrt
bridge	for SDSL—vcmuxbr
	for all other cards—vcmuxbr or llc-snap

`[`**`-stppri`**` <priority>]`

Omit this parameter if you specified **`route`** or **`broute`** for the service type. This parameter sets the STP priority for the session. The valid range is from 0 to 255, with 0 being the highest priority. The default value is 128.

`[`**`-stpcost`**` <cost>]`

Omit this parameter if you specified **`route`** for the service type. This parameter sets the STP path cost for the session. The valid range is from 1 to 65535. The value 1 is the lowest cost, indicating that the session is the closest to the root bridge. The default value is 250 for WAN ports and 100 for LAN ports.

Example

```
::session=> modify 2 -admin down -subs company123 -service broute
-ipaddr 10.0.1.9 -mask 255.0.0.0 -encap llc-snap -stppri 128
-stpcost 500
```

Displaying Sessions

```
::root=> configuration atm session
```

To verify your session configuration, from the `::session=>` prompt, enter the **`show`** command as follows.

`show` `[<slot>]`

Parameter

`[<slot>]`

The slot number for which you want to display the session configurations. Omitting this parameter displays all session configurations.

Examples

`::session=>` **`show`**

`::session=>` **`show 2`**

Information similar to the following displays.

```
::session=> show

Service Types Ser: Bridging-B; Routing-R; BRouting-BR; None-N
 Encap Types Encap: LLCSNAP-LLC; VcMuxBr-VcB; VcMuxRt-VcR

                                                                     STP
Idx St Pt Vpi  Vci  Dlci    Subs   Admin Oper Ser     IpAddr  Encap  Pri Cost
1   1  1   0    1  n/a    Alias.1   up    up   R    10.0.11.34   n/a   n/a n/a

::session=>
```

The first row of the Session Configuration Table displays information for a session that connects the FAMC to the ATM network. The VPI and VCI for this session are assigned internally.

Information	Description
Idx	The Session Configuration Table row index number.
St Pt	The slot and port on which the session is configured.
Vpi Vci	The session VPI and VCI. For SDSL sessions, the VPI and VCI value is n/a.
Dlci	The Data Link Connection Identifier of the frame relay circuit that is used for this session
Sub	A name assigned to identify the session.
Admin	The administrative status of the session. Up indicates the session is enabled. Down indicates the session is disabled.
Oper	The operational status of the session. Up indicates the session is operational and passing data. Down indicates the session is not operational.
Ser	The type of service configured for the session. • B—bridging • R—routing • BR—both bridging and routing • N—none or no service
IpAddr	The IP address of the FAMC logical port or WAN address used for the session (routing or brouting sessions only).
Encap	The configured encapsulation mode. • LLC—LLC-SNAP • VcB—Vc Mux Bridged • VcR—Vc Mux Routed
STP Pri	The Spanning Tree Protocol priority of the session. The range is from 0 to 255, with 0 being the highest priority. The default is 128.
STP Cost	The Spanning Tree Protocol path cost of the session. The valid range is 1 to 65535, with 1 being the lowest cost. The default value is 250 for WAN ports and 100 for LAN ports.

Deleting Sessions

```
::root=> configuration atm session
```

1 From the `::session=>` prompt, enter **`show`** to display the configured sessions.

2 Note the index number of the session configuration table row you want to delete.

3 Enter the delete command in the following format.

`delete` `<index>`

Parameter

`<index>`

The session configuration table row index number of the session you want to delete.

Example

```
::session=> delete 1
```

MODIFYING THE IP ADDRESS

When initially setting up the Avidia system (see the *Avidia Getting Started Guide*), you entered an IP address that would set up the Avidia system as part of a subnet and allow communication on a network. Also, the IP address enables access to the Avidia system for telnet sessions. To modify the IP address or associated parameters, see the appropriate section in the *Avidia System Administor Guide*.

CONTACTING ADC A

ADC Customer Service Group provides expert pre-sales and post-sales support and training for all its products. Technical support is available 24 hours a day, 7 days a week by contacting the ADC Technical Assistance Center (TAC).

Sales Assistance
800.366.3891 extension 73000
(USA and Canada)
952.917.3000
Fax: 952.917.3237

- Quotation Proposals
- Ordering and Delivery
- General Product Information

Systems Integration
800.366.3891, extension 73000 (USA and Canada)
952.917.3000

- Complete Solutions (from concept to installation)
- Network Design and Integration Testing
- System Turn-Up and Testing
- Network Monitoring (upstream or downstream)
- Power Monitoring and Remote Surveillance
- Service/Maintenance Agreements
- Systems Operation

ADC Technical Assistance Center
800.638.0031
714.730.3222
Fax: 714.730.2400
Email: wsd_support@adc.com

- Technical Information
- System/Network Configuration
- Product Specification and Application
- Training (product-specific)
- Installation and Operation Assistance
- Troubleshooting and Repair/Field Assistance

Online Technical Support

- www.adc.com/Knowledge_Base/index.jsp

Online Technical Publications

- www.adc.com/library1/

Product Return Department

800.366.3891 ext. 73748 or
952.917.3748
Fax: 952.917.3237
Email: repair&return@adc.com

- ADC Return Material Authorization (RMA) number and instructions must be obtained before returning products.

All telephone numbers with an 800 prefix are toll-free in the USA and Canada.

INDEX

B

D

E

F

O

P

Q

R

S

T

U

V

X

ADC DSL Systems, Inc.

Corporate Office

14402 Franklin Avenue
Tustin, CA 92780

Tel: 714.832.9922
Fax: 714.832.9924

Technical Assistance

800.638.0031
714.730.3222

ISO 9001

DNV

DNV Certification, Inc.
Certificated Firm

1235002 Revision A