26 Managing ATM Ports

ATM access, or uplink, ports allow switch traffic to connect to an ATM network. In typical configurations, LAN traffic from Ethernet devices is translated and switched out an ATM port to an ATM-based network.

You can configure several services on these ATM access ports to facilitate communication between the access port and an ATM switched port. These services include LAN Emulation, Classical IP, and Point-to-Point bridging. The configuration of these services is described in Chapter 28, “Configuring ATM Services.”

This chapter provides overview information and configuration instructions for ATM uplink sub-module ports. It focuses on the ATM layer configuration parameters. The following are OmniStack uplink sub-modules providing ATM access ports:

- OSASM2-155FM-1
- OSASM2-155RFM-1
- OSASM2-155FS-1
- OSASM2-155RFS-1
- OSASM2-622FM-1
- OSASM2-622RFM-1
- OSASM2-622RFS-1
- OSASM2-DS3-1
- OSASM2-E3-1

Note

The OmniStack’s front panel is divided into several areas labeled S1, S2, S3, etc. These areas relate to the conceptual division of the switch into several modules. S1 is the management module (referred to as the MPM), S2 is the uplink module (if the switch supports an uplink module), and S3, S4, etc. are the device connection (i.e., Ethernet port) modules.

As a result, ATM uplink ports, when they exist, will always be in slot 2 in an OmniStack switch.

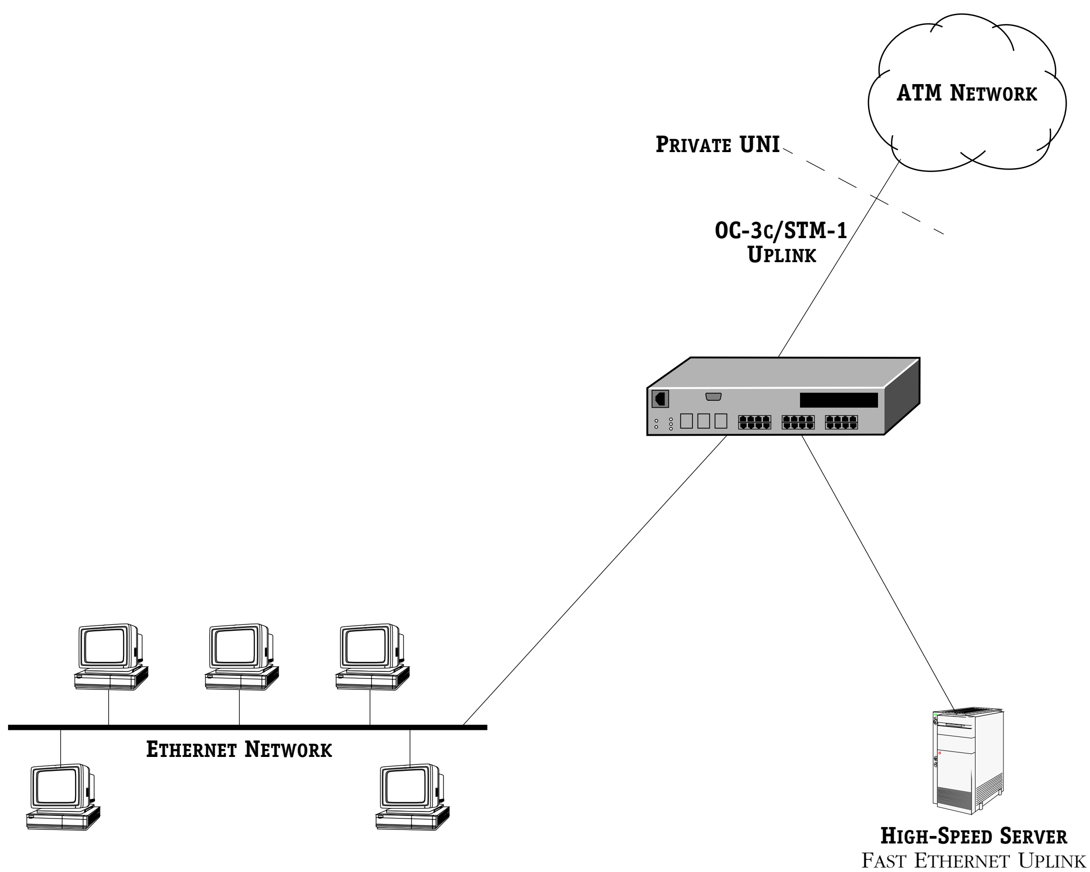
LAN Switch With ATM Uplinks

The OmniStack can switch frames from LAN interfaces, such as Ethernet, to an ATM-based network. It supports ATM uplink connections that are compatible with User-to-Network (UNI) versions 3.1 and 3.0 to provide comprehensive LAN-to-ATM internetworking. These ATM uplink connections provide connectivity to a native ATM network.

Typically you will configure services on ATM access ports in order to bridge LAN traffic (i.e., Ethernet) onto the ATM network. LAN traffic enters the OmniStack through an Ethernet port and exits through an ATM access, or uplink, port. It is on such an access port that you configure one of several ATM services.

These services include Point-to-Point Bridging (PTOP), Classical IP, Trunking, and VLAN clusters. ATM services are configured through the **cas** command. The **cas** command and all ATM service types are described in detail in Chapter 28.

The network in the illustration below shows an OmniStack switching traffic for Ethernet, Fast Ethernet, and ATM uplink interfaces. It serves as a LAN switch while having an OC-3 uplink to the ATM network.



OmniStack as a LAN-to-ATM Internetworking Device

The ATM Menu

User Interface commands for configuring and monitoring ATM uplink ports are in the ATM menu, shown below. To view the ATM Menu, type **atm** at any prompt.

```
Command        ATM Management Menu
---------------  --------------------------------------------------------
vap            View the list of ATM ports configurations
map            Modify an ATM port configuration
vvc            View virtual channel connections
cvc            Create a virtual channel connection
mvc            Modify a virtual channel connection
dvc            Delete a virtual channel connection
vva            View virtual atm addresses
cva            Create a virtual atm address
mva            Modify a virtual atm address
dva            Delete a virtual atm address
vlat           View ATM LANE LE_ARP table
vat            View ATM CIP Arp Table
aat            Add static ATM Arp entry for CIP
dat            Delete static ATM Arp entry for CIP
vss            View ATM Service statistics
vls            View atm layer statistics table
vlrs           View atm layer rx error statistics table
vlts           View atm layer tx error statistics table
vcs            View atm connection statistics table
vcrs           View atm connection rx error statistics table
vcts           View atm connection tx error statistics table
vbwg           View the bandwidth group table
mbwg           Modify the bandwidth group table
vgptovc        View group to VC mapping table (Scaling)

     Main      File      Summary  VLAN      Networking
     Interface Security  System   Services  Help
```

Several commands apply to the ATM service commands that can be set up on ATM access ports. These commands include those for Classical IP (**vat**, **aat**, **dat**), LAN Emulation (**vlat**), and the **vss** command. These commands are described in Chapter 28, “Configuring ATM Services.”

Note

The **vgptovc** command is only supported on the OmniSwitch FCSM II module.

Modifying an ATM Access Port Configuration

Use the **map** command to alter ATM access port configuration settings. Ports are configured with default settings until you modify them using the **map** command. To use this command, enter **map** followed by the slot and port number ATM port you want to modify. For example, to change settings for port 1 in slot 2, you would enter:

map 2/1

A screen similar to the following displays:

```
Slot 2 Port 1 Configuration

1)   Description (30 chars max)                  : ATM PORT
2)   Conn Type { PVC(1), SVC(2)                  : SVC

     30) Sig version { 3.0(1) 3.1(2) }           : 3.0
     31) Signaling VCI (0..1023)                 : 5
     32) ILMI Enable {(False(1),True(2)}         : True
     33) ESI (12 hex-chars)                      : 0020da79efbf
     34) ILMI VCI (0..1023)                      : 16
     35) ILMI Polling {(Off(1),On(2)}            : Off

3)   Max VCCs (1-1023)                           : 1023
4)   Max VCI bits (1..10)                        : 10
5)   UNI Type                                    : Private
6)   Tx SAR Buffer Size (4096-131072)            : 16384
7)   Rx SAR Buffer Size (4096-131072)            : 16384
8)   Tx Frame Buffer Size (1800-16384)           : 4600
9)   Rx Frame Buffer Size (1800-16384)           : 4600
10)  Pl Scramble {(False(1),True(2)}             : True
11)  Timing Mode {(Loop(1),Local(2)}             : Local
12)  Loopback Config { NoLoop(1), DiagLoop(2),
                       LineLoop(3) }             : NoLoop
13)  Phy media { SONET(1),SDH(2)}                : SONET


Enter (option=value/save/cancel) : cancel
```

You change a value in the field by entering the line number for the value, an equal sign (=), and then the new value for the variable. For example, to change the **Description** field variable to read “Switch Uplink Port,” you would enter a 1 (the line number for **Description**), an equal sign, and then the new description as follows:

1=Switch Uplink Port

The variables in the **map** command screen are explained in the following sections.

1) Description

A description of this port, up to 30 alphanumeric characters long. This identifier will be used in displays for other software commands.

2) Conn Type

Indicates whether connections established on this port will be Permanent Virtual Circuits (PVCs) or Switched Virtual Circuits (SVCs). You create PVCs through the **cvc** command, which is described in *Creating a Virtual Channel Connection* on page 26-8. PVC information is stored in flash memory on the switch; if you restart the switch, the PVC would be restored.

Switched Virtual Circuits, or SVCs, are learned by the OmniStack through communication with the ATM attached devices. SVCs are built up and taken down based on demands for virtual connections by ATM end devices. If an SVC connection is lost or the switch is restarted, then the circuit is lost and the source device must request the connection again.

The type of connection you choose can affect the type of ATM services you can set up on a port. For example, LANE requires SVC connections, and VLAN clusters requires PVC connections.

Enter a **1** to select PVC, or enter a **2** to select an SVC.

SVC Configuration Options. If you select SVC, you will see an additional menu of options. The items in this menu are described as follows:

30) Sig Version

The version of the User-to-Network Interface (UNI) used on this port. The OmniStack is compliant with ATM Forum UNI specifications versions 3.0 and 3.1. You select which version your ATM network supports. (The signalling version you are using must match the signalling version being used on the network.)

♦ Important Note ♦

If you change the **Signaling Ver** from UNI 3.0 to UNI 3.1 (or vice versa), then you *must* reboot the switch.

31) Signalling VCI

The Virtual Channel Identifier (VCI) used for signalling. For ATM access ports, this VCI is typically set to 5.

32) ILMI Enable

Indicates whether you want to enable Integrated Local Management Interface (ILMI). Normally ILMI should be enabled. The only reasons not to enable ILMI are if the ATM network switch does not support ILMI or if the ATM network switch is unable to register the network prefix with the OmniStack in a timely manner. The disadvantage of disabling ILMI is that the ATM network switch needs to have a static route configuration to map the ATM address of the OmniStack port to its port configuration. In this case, you will need to enter the full ATM address instead of just the End Station Identifier (ESI).

33) ESI

The 6-byte End Station Identifier (ESI) for this port. This value, which functions like a MAC address for this port, is used by the ATM switch to identify this particular ATM access port.

In software releases prior to 4.1, the ESI assigned to each ATM access port used the base MAC address for the module and the slot/port number (e.g., 2/1). In release 4.1 and later, the method for assigning an ESI has changed. The base MAC address is still used, but the interface number is used instead of the slot/port number.

With this change, there could be some backward compatibility problems when upgrading to Release 4.1 and later since the ESI of the ATM access ports will change. Fortunately, this change will only affect SVC-based PTOP and trunking services since the remote station stores the old ESI in its system. PVC-based services are not affected.

34) ILMI VCI

The Virtual Channel Identifier (VCI) that will be reserved for ILMI management signaling on this port. For ATM access ports, this VCI is typically set to 16.

35) ILMI Polling

The ILMI status messages sent out at regular intervals (about every 3-5 seconds) from this port. If you want to enable ILMI polling, select the **On** option. If you want to disable ILMI polling, select the **Off** option. The default value for **ILMI Polling** is **Off**.

3) Max VCCs

The maximum number of Virtual Channel Connections (VCCs) allowed on this port. This parameter is not configurable and will always read **1023**. Each port can support up to 1023 virtual connections. You configure these VCCs through the **cvc** command.

4) Max VCI Bits

The maximum number of bits that can be used for Virtual Channel Identifiers (VCIs) created on this port. This parameter is not configurable and will always read **10** (i.e., these ports support up to 10 bits per Virtual Path). The maximum number of Virtual Channels is 2^n-1 where n is the maximum VCI bits.

5) UNI Type

Specifies the type of User-to-Network Interface (UNI) that this port supports. ATM supports both Private and Public UNI connections, but typically Private is used for ATM uplink, or access, connections to an ATM switch. Only **Private** is supported on this port.

6) Tx SAR Buffer Size and 7) Rx SAR Buffer Size

The size of the segmentation cell buffer (**Tx SAR Buffer Size**) and the reassembly cell buffer (**Rx SAR Buffer Size**) on this UNI. These buffers comprise the entire Segmentation and Reassembly (SAR) buffer for this ATM access port. The size is fixed at 131,072 bytes.

♦ Important Note ♦

You *cannot* configure these fields on an OmniStack ATM access module.

8) Tx Frame Buffer Size

The size of the transmit frame buffer, or the maximum size of packets that can be transmitted from ATM to the switch. This value can range from 1800 to 131,072 bytes, but must be less than or equal to the **Tx SAR Buffer Size**. This value should be greater than or equal to the **Tx Maximum Frame Size** (set through the **cvc** command) of all connections on this port.

9) Rx Frame Buffer Size

The size of the receive frame buffer on this UNI, or the maximum size of packets that can be received from the switch. This value can range from 1800 to 131,072 bytes, but must be less than or equal to the **Rx SAR Buffer Size** and should be greater than or equal to the **Rx Maximum Frame Size** (set through the **cvc** command) of all connections on this port.

10) Pl Scramble

Payload scramble. This option determines whether chip hardware on the module will perform cell scrambling/descrambling, which randomizes cell payloads. Payload scrambling helps avoid continuous non-variable bit patterns and improves cell delineation. Cell delineation is the process used to determine cell boundaries by finding the Header Error Control (HEC) in cell headers. By default, payload scrambling is enabled as required by UNI specifications.

11) Timing Mode

This parameter allows you to specify which clock the switch will use for this port. The choices are **Local** and **Loop**. Local is the transmit, or internal, clock. The local clock is generated by this switch; this is the default setting for ATM access ports. Loop is the receive, or external, clock. In a loop configuration, this port derives clocking from a remote device, such as an ATM switch or another OmniStack ATM port.

Your choice of timing mode may be determined by the device to which this port is connected. Some ATM switches require uplink ports to generate their own clock. Other ATM switches require uplink ports to use their clock.

Note

If you set an ATM port to **loop** and you are connecting it to another ATM uplink, or access, port (i.e., not a pure ATM switch port), then that other port must be on an OmniStack switch.

12) Loopback Config

The loopback configuration for this port. In live network situations, use the **NoLoop** option, which is the default. The other two loopback configurations, **DiagLoop** and **LineLoop**, are intended mainly for debugging or test situations. The following provides more detail on the three loopback configurations:

NoLoop No loopback occurs between receive and transmission paths.

DiagLoop Interface transmission path is connected to receive path at the connectors. The port receives it's own transmission rather than the signal coming over the cable.

LineLoop The interface receive path is looped to the transmission path at the connectors. The signal on the receive connector is not passed into the UNI and processed.

13) Phy media

The type of physical media standard used for this port. In North America, ATM broadband services are delivered over Synchronous Optical Network (SONET) facilities. SONET is a high-speed fiber optic system that uses Synchronous Transfer Signal Level 1 (STS-1).

Outside North America, ATM broadband services use Synchronous Digital Hierarchy (SDH). SDH is a high-speed fiber optic system that uses Synchronous Transfer Mode (STM-1). The OmniStack supports both SONET and SDH fiber systems. You select the system with which you want this port to be compatible.

Creating a Virtual Channel Connection

The **cvc** command allows you to create a Permanent Virtual Circuit (PVC) for a physical port and logical VCI that you specify. These PVCs are used mainly by ATM services, which are described in Chapter 28. The commands for setting up ATM services (**cas** and **mas**) also create these PVCs, so use of the **cvc** command before configuring ATM services is not required.

To begin setting up a permanent virtual circuit, enter **cvc** followed by the slot number, a slash (/), and the port number where you want to set up the virtual circuit. After the slot and port number, leave a space, then specify the Virtual Channel Identifier (VCI). For example, the following command specifies a virtual circuit with a VCI of 100 on the first port in slot 2:

```
cvc 2/1 100
```

The initial message will be followed by a screen of options similar to the following:

```
Slot 2 Port 1 Connection VCI 100 Configuration

  Available bandwidth: Tx=353208 Rx=353208

1)  Description (30 chars max)                              : Connection 200

2)  Requested Tx QoS Class { Unspecified(0) }               : Unspecified
3)  Requested TX Best Effort { False (1), True (2) }        : True
4)  Requested Tx Traffic Descriptor { NoCLPNoSCR(2) }       : NoCLP NoSCR
    20)  Peak Cell Rate (cells/sec) for CLP=0+1             : 353208

5)  Requested Rx QoS Class { Unspecified(0) }               : Unspecified
6)  Requested RX Best Effort { False (1), True (2) }        : True
7)  Requested Rx Traffic Descriptor { NoCLPNoSCR(2) }       : NoCLP NoSCR
    30)  Peak Cell Rate (cells/sec) for CLP=0+1             : 353208

More y/n? (y)  :
```

This portion of the **cvc** screen shows “requested” parameters. These are the values for parameters that you would ideally like to meet on this virtual circuit. These values, such as the Peak Cell Rate (PCR), may not always be possible to meet depending upon traffic patterns. Therefore, you can also specify “acceptable” values for each of these parameters. You will see the acceptable parameters after you enter press **<Enter>** at the **More y/n?** prompt.

```
8)  Acceptable Tx QoS Class { Unspecified(0) }              : Unspecified
9)  Acceptable TX Best Effort { False (1), True (2) }       : True
10) Acceptable Tx Traffic Descriptor { NoCLPNoSCR(2)        : NoCLP NoSCR
    40)  Peak Cell Rate (cells/sec) for CLP=0+1             : 12200

11) Acceptable Rx QoS Class { Unspecified(0) }              : Unspecified
12) Acceptable RX Best Effort { False (1), True (2) }       : True
13) Acceptable Rx Traffic Descriptor { NoCLPNoSCR(2) }      : NoCLP NoSCR
    50)  Peak Cell Rate (cells/sec) for CLP=0+1             : 12200

14) Tx Maximum Frame Size                                   : 4520
15) Rx Maximum Frame Size                                   : 4520


Enter (option=value/save/cancel) :
```

The values you enter for the fields on the bottom half of the **cvc** screen represent what you consider acceptable. The hardware will make its best attempt to meet your requested parameters first. If it can not meet these requirements, it will attempt to meet your acceptable requirements. If it also cannot meet your acceptable requirements, then the VCC will not be operational. However, if you do not enter acceptable values, then the hardware will send traffic at the best possible rate below your requested rate.

For example, if you enter a requested Tx (transmit) Peak Cell Rate (PCR) of 150000 cells/second, then the OSASM will make its best attempt to meet this rate. If the module cannot support that rate, then software will find the best possible rate below 150000 cells/second. If you did not enter any acceptable parameters, then the software might, as an example, find that traffic could be sent at 75000 cells/second on this VCC, and traffic would be transmitted at this rate. However, if you had entered an *acceptable* PCR of 100000 cells/second, the software would find that it could not meet this requirement and the VCC would not be operational.

1) Description: (30 chars max)

A textual description for this virtual circuit. The description may be up to 30 characters long. This description will be used in displays for other software commands to identify this virtual circuit.

2) Requested Tx QoS Class

The Quality of Service (QoS) for cells transmitted (from source to destination) on this virtual circuit. For ATM uplink connections to an ATM switch only the **Unspecified** QoS is supported. This QoS transmits data on a best effort basis; bandwidth is not guaranteed, but as much data as possible will be transmitted as long as bandwidth is available.

3) Requested Tx Best Effort

This field indicates whether you want this port to transmit traffic on a “best effort” basis or to use a Peak Cell Rate (PCR) parameter to transmit traffic. If you select True (option **2**), then the port will transmit traffic if any bandwidth is available on the port. If you select False (option **1**), then the Peak Cell Rate (PCR) parameter will be used to transmit traffic on this VCC. You enter a PCR value in line 20 of this screen. If data cannot be sent at the PCR you specify, then no data will be sent on the VCC.

4) Requested Tx Traffic Descriptor

The traffic descriptor to be used. The traffic descriptor determines which traffic parameters you specify. Only the **NoCLPNoSCR** traffic descriptor is supported. **NoCLPNoSCR** requires you to enter the Peak Cell Rate (PCR) on line 20. However, if you select **True** on line 3 (**Requested Tx Best Effort**), then the PCR will not be used to determine traffic flow, and traffic will be transmitted on a best effort basis.

20) Peak Cell Rate (cells/sec) for CLP=0+1

This value is only relevant if you enter **False** on line 3, **Requested Tx Best Effort**. In this field you specify the Peak Cell Rate (PCR), in cells per second, allowed for traffic transmitted on this VCC. The PCR is the fastest cell rate allowed on the connection. When using Peak Cell Rate, the bandwidth of an ATM uplink port can be partitioned among multiple connections each with a dedicated bandwidth. The ATM driver calculates the best rate nearest to the requested rate that the ATM hardware can support. This rate is shown using the **vvc** command. The CLP=0+1 in this field means that both high priority (CLP=0) and low priority (CLP=1) cells will be checked for PCR. CLP is an acronym for “Cell Loss Priority.”

5) Requested Rx Qos Class

The Quality of Service (QoS) for cells received (from destination to source) on this virtual circuit. For ATM uplink connections to an ATM switch only the **Unspecified** QoS is supported. This QoS receives data on a best effort basis; bandwidth is not guaranteed, but as much data as possible will be received as long as bandwidth is available.

6) Requested Rx Best Effort

This field indicates whether you want this port to receive traffic on a "best effort" basis or to use a Peak Cell Rate (PCR) parameter. If you select True (option **2**), then the port will receive traffic if any bandwidth is available on the port. If you select False (option **1**), then the PCR parameter will be used. You enter a PCR value in line 20 of this screen. If data cannot be received at the PCR you specify, then this VCC will not be operational.

7) Requested RX Traffic Descriptor

The traffic descriptor to be used. Only the **NoCLPNoSCR** traffic descriptor is supported. **NoCLP-NoSCR** requires you to enter the Peak Cell Rate (PCR) on line 20. However, if you select **True** on line 6 (**Requested Rx Best Effort**), then the PCR will not be used to determine traffic flow, and traffic will be received on a best effort basis.

30) Peak Cell Rate (cells/sec) for CLP=0+1

This value is only relevant if you enter **False** on line 6, **Requested Rx Best Effort**. In this field you specify the Peak Cell Rate (PCR), in cells per second, allowed for traffic received on this VCC. The PCR is the fastest cell rate allowed on the connection. When using PCR, the bandwidth of an ATM uplink port can be partitioned among multiple connections each with dedicated bandwidth. The ATM driver calculates the best rate nearest to the requested rate that the ATM hardware can support. This rate is shown using the **vvc** command. The CLP=0+1 in this field means that both high priority (CLP=0) and low priority (CLP=1) cells will be checked for PCR.

8)Acceptable Tx QoS Class — 13)Acceptable Rx Traffic Descriptor

Definitions for fields 8 through 14, 40, and 50 are similar to those for fields 2 through 7, 20, and 30, respectively. The parameters are the same except these values specify your minimum acceptable thresholds. You do not have to enter any parameters for fields 8 through 13. However, if you do, the ATM software will use them to determine whether traffic can be sent on this VCC. If software determines your acceptable values cannot be met, then the VCC will not be operational.

14) Tx Maximum Frame Size

The maximum frame size for traffic transmitted on this connection. Frames are composed of ATM cells. You specify the largest possible frame size, in bytes, in the field. If a frame exceeds this size, it will be discarded and counted as an error in statistics tables. The value in this field must be greater than zero (0), but less than the **Tx Frame Buffer Size**, which is specified through the **map** command.

15) Rx Maximum Frame Size

The maximum frame size for traffic received on this connection. Frames are composed of ATM cells. You specify the largest possible frame size, in bytes, in the field. If a frame exceeds this size it will be discarded and counted as an error in statistics tables. The value in this field must be greater than zero (0), but less than the **Rx Frame Buffer Size**, which is specified through the **map** command.

Modifying a Virtual Channel Connection

You can modify any parameters for a virtual circuit that you previously configured. The **mvc** command enables you to modify a virtual circuit. It uses the same screens and allows you to change the same parameters as the **cvc** command.

To begin modifying a virtual circuit, enter **mvc** followed by the slot number, a slash (/), and the port number for the virtual circuit. After the slot and port number, leave a space, then specify the Virtual Channel Identifier (VCI). For example, the following command modifies a virtual circuit with a VCI of 100 on the first port in slot 2:

mvc 2/1 100

For more information on the **mvc** screens and parameters, see *Creating a Virtual Channel Connection* on page 26-8.

Deleting a Virtual Channel Connection

To delete a virtual channel connection enter **dvc** followed by the slot number where the circuit was set up, the physical port number for the circuit, and the VCI of the circuit. For example, if wanted to delete virtual channel 100 on port 1 in slot 2, you would enter:

dvc 2/1 100

Note that there is a space between the slot/port specification and the VCI specification. After you specify to delete a circuit, you will receive a message asking you to confirm the deletion:

Remove ATM Slot 2 Port 1 Connection 100 (n)? :

Stop the deletion by pressing **<Enter>** or entering **N** at this prompt. A message similar to the following displays:

ATM Slot 2 Port 1 Connection 100 not removed

Confirm the deletion by entering a **Y** at the confirmation prompt. The VPI or VCI will be removed and a message similar to the following displays:

Removing ATM Slot 2 Port 1 Connection 100, please wait...

ATM Slot 2 Port 1 Connection 100 removed

Creating a Virtual ATM Address

The **cva** command allows you to create a virtual ATM address in this switch. To create an ATM address, enter **cva** followed by the a 40-character ATM address.

The following command creates the address **1234342525675845624198645276452354672456**

```
cva 1234342525675845624198645276452354672456
```

and displays a screen similar to the following:

```
Connection Address 1234342525675845624198645276452354672456 Configuration

1)   Description (30 chars max)                              : Address 2

2)   Requested Tx QoS Class { Unspecified(0) }               : Unspecified
3)   Requested TX Best Effort { False (1), True (2) }        : True
4)   Requested Tx Traffic Descriptor { NoCLPNoSCR(2) }       : NoCLP NoSCR
     20)  Peak Cell Rate (cells/sec) for CLP=0+1             : 353208

5)   Requested Rx QoS Class { Unspecified(0) }               : Unspecified
6)   Requested RX Best Effort { False (1), True (2) }        : True
7)   Requested Rx Traffic Descriptor { NoCLPNoSCR(2) }       : NoCLP NoSCR
     30)  Peak Cell Rate (cells/sec) for CLP=0+1             : 353208

14)  Tx Maximum Frame Size                                   : 4520
15)  Rx Maximum Frame Size                                   : 4520


Enter (option=value/save/cancel) :
```

The options in this screen are the same as those used in the **cvc** command. Refer to the section, *Creating a Virtual Channel Connection* on page 26-8 for a description of these parameters.

Once you have set up values in these fields you should enter **save** and press <**Enter**>. The ATM address will then be created with the values you entered and the following message will display:

```
Creating address connection, please wait...
```

An index number will be assigned to this address. This index number is useful. It allows you to refer to this address using other commands without typing in the entire 40-byte address. You can see the index number assigned to the address using the **vva** command, which provides information on all configured virtual ATM addresses in the switch. The **vva** command is described in *Viewing Virtual ATM Addresses* on page 26-21.

Modifying Virtual ATM Addresses

You can modify parameters for a virtual ATM address that you previously configured through the **mva** command. The **mva** command uses the same screens and allows you to change the same parameters as the **cva** command.

To begin modifying an ATM address, enter **mva** followed by the index number assigned to the ATM address. You can view the index numbers for ATM addresses through the **vva** command, which is described in *Viewing Virtual ATM Addresses* on page 26-21. For example, you would enter the command

mva 2

to modify the virtual ATM address with an index number of 2. You can also enter the entire ATM address after the **mva** command if you prefer.

For more information on the **mva** parameters, see *Creating a Virtual Channel Connection* on page 26-8. Once you have set up values you should enter **save** and press **<Enter>**.

Deleting a Virtual ATM Address

To delete an ATM virtual address enter **dva** followed by the index number of the address you want to delete. You can obtain the index number for an address through the **vva** command, which is described in *Viewing Virtual ATM Addresses* on page 26-21. For example, to delete the virtual ATM address with an index number of 4, you would enter:

dva 4

After you specify to delete an address, you will receive a message asking you to confirm the deletion:

Remove Address 4 (n)? :

Stop the deletion by pressing **<Enter>** or entering **N** at this prompt. A message similar to the following displays:

address xxxxxxxxxxyyyyyyyyyyaaaaaaaaaabbbbbbbbbb not deleted

Confirm the deletion by entering a **Y** at the confirmation prompt. The address will be removed and a message similar to the following displays:

address index 4 removed

Viewing ATM Port Configuration Information

The **vap** command allows you to view basic information on an ATM access port. To view ATM access port configuration information, enter **vap** at a system prompt. The following is a sample display.

```
                              ATM Port Table

                                                      Conn Tran  Media UNI Max  VCI
Slot Port          ATM Port Description               Type Type  Type  Typ VCC  bits
==== ==== ============================== ==== ===== ===== === ========
2    1             ATM PORT                           SVC  --     --   Pri 1023 10


Slot Port Loopback Cfg Tx Clk Source
==== ==== =========== =============
2    1    NoLoop       LocalTiming

                                           End System    Sig Sig  ILMI   ILMI ILMI
Slot Port     ATM Network Prefix           Identifier    Ver VCI  Enable VCI  Poll
==== ==== ========================== ============ === ==== ====== ==== ====
2    1    3903488001bc90000101dbd400  0020da98e910  3.0 5    True   16   Off

                                  Status
                                  =======

Slot Port        Sscop Up                   Sscop Down          Up   Dn   Status
==== ==== ======================== ======================== ==== ==== ======
2    1    WED SEP 29 10:03:37 1999 WED SEP 29 10:03 :32 1999 2    1    Up

Slot Port        Ilmi Up                    Ilmi Down           Up   Dn   Status
==== ==== ======================== ======================== ==== ==== ======
2    1    WED SEP 29 10:03:30 1999          --------            1    0    Up

Slot Port        Phy Up                     Phy Down            Up   Dn   Status
==== ==== ======================== ======================== ==== ==== ======
2    1    WED SEP 29 10:02:11 1999          --------            1    0    Enb (SVC)

Slot Port Tx SegSz  Rx Seg Sz Tx Buff Sz Rx Buff Sz
==== ==== ========= ========= ========= ==========
2    1      16384     16384     4600       4600

                    ATM HSM3   Redundant  Port Status
Slot Port Primary   Secondary  FailOver      Reason of Last Failover
==== ==== ======== ========== ========== ==== =====================
2    1    Active    Inactive     0
```

Description, **Conn Type** (Connection type). These fields are described earlier in *Modifying an ATM Access Port Configuration* on page 26-4.

Tran Type. The transmission, or connection, type. Possible transmission types are **STS3c** (OC-3), **STS12c** (OC-12), **DS3**, **E3**, and **--** (unknown type).

Media Type. The physical connector type used on this port. Possible types in this column are **Multi** (multimode fiber), **Sngle** (single mode fiber), **STP** (shielded twisted pair), **UTP** (unshielded twisted pair), **Coax** (coaxial cable), and **UNKN** (unknown connector).

UNI Typ (UNI type), **Max VCC**, **VCI Bits (**maximum VCI bits**)**. These fields are described in *Modifying an ATM Access Port Configuration* on page 26-4.

Loopback Cfg. The loopback configuration for this port.

NoLoop	No loopback occurs between receive and transmission paths.
DiagLoop	Interface transmission path is connected to receive path at the connectors. The port receives its own transmission rather than the signal coming over the cable.

LineLoop The interface receive path is looped to the transmission path at the connectors. The signal on the receive connector is not passed into the UNI and processed.

Tx Clk Source (timing mode). This field is described in *Modifying an ATM Access Port Configuration* on page 26-4.

ATM Network Prefix. The network prefix portion of the ATM address.

End Station Identifier. The end station identifier (ESI) portion of the ATM address.

The following column headings fall under the table heading labeled **Status**.

SSCOP. The current state of the Service-Specific Connection Oriented Protocol (SSCOP). SSCOP operates on the ATM control plane and is a peer-to-peer protocol that helps set up connections and provides a reliable transport mechanism for signaling. The **Sscop Up** and **Sscop Down** columns will indicate the last time SSCOP last came up and went down, respectively. The **Up** and **Dn** (down) columns will indicate the number of times SSCOP came up and went down, respectively. The SSCOP **Status** column will indicate Up or Down. This value will always indicate **Dn** (down) if the Connection Type configured on this port is PVC.

ILMI. The Integrated Local Management Interface (ILMI) enabled on this port. The **Ilmi Up** and **Ilmi Down** columns will indicate the last time ILMI last came up and went down, respectively. The **Up** and **Dn** (down) columns will indicate the number of times ILMI came up and went down, respectively. The ILMI **Status** column will indicate Up or Down. This value will always indicate **Down** if the Connection Type configured on this port is PVC.

PHY. The operational status of the port. The **Phy Up** and **Phy Down** columns will indicate the last time PHY last came up and went down, respectively. The **Up** and **Dn** (down) columns will indicate the number of times PHY came up and went down, respectively. The PHY **Status** column will indicate whether the port is **Enabled** or **Disabled** and provides information on upper service layers. The port will be enabled if the port is connected on this end and the far end. If there is a disconnection at either end, then the operational status will be **Disabled**. Possible values are as follows:

Enb (PVC) Port is enabled to support PVCs.

Enb (SVC) Port is enabled to support SVCs.

Enb (CTL) Port is enabled to pass control signals.

Dis (R) The receive is disabled on this port.

Dis (T/R) Both the transmit and receive are disabled.

Dis (T) Disabled transmit on this port.

Sig Ver, **Sig VCI**, **ILMI Enable**, **ILMI VCI**, **ILMI Poll**, **Tx Seg Sz** (transmit SAR buffer size), **Rx Seg Sz** (receive SAR buffer size), **Tx Buff Sz** (transmit frame buffer size), **Rx Buff Sz** (receive frame buffer size). These fields are described in *Modifying an ATM Access Port Configuration* on page 26-4.

The column headings under the table heading labeled **ATM HSM3 Redundant Port Status** display only if you have an OSASM2 with a redundant port

Primary. Indicates whether the primary port is active or inactive. If the primary port experiences a failover (activating the secondary port), it will remain inactive and will re-activate only when both its failover has been repaired *and* the secondary port experiences a failover

Secondary. Indicates whether the secondary port is active or inactive. If it is active, the primary port has experienced a failover.

FailOver. The total number of failovers that has occurred.

Reason of Last Failover. A brief explanation of the most recent failover. Port failovers occur, for example, when there is a physical disconnection. The following is an example of a **Reason of Last Failover** message: **SgnlLoss Cell Loss**.

Viewing SSCOP, ILMI, and PHY

You can view general and detailed Service-Specific Connection Oriented Protocol (SSCOP), Integrated Local Management protocol (ILMI), and Physical information on an OSASM submodule. The **vap** command is used to provide this information.

To view SSCOP, ILMI, and PHY information on an OSASM submodule, you enter the **vap** command along with the following parameters:

vap sip

where **s** indicates SSCOP, **i** indicates ILMI, and **p** indicates PHY. This command displays a screen similar to the following:

```
                              ATM Port Table

                                          Conn Tran  Media UNI Max  VCI
Slot Port       ATM Port Description      Type Type  Type  Typ VCC  bits
==== ==== ============================== ==== ===== ===== === ========
2    1              ATM PORT              SVC   --     --  Pri 1023 10

Slot Port Loopback Cfg Tx Clk Source
==== ==== ============ =============
2    1    NoLoop       LocalTiming

                                          End System   Sig Sig  ILMI   ILMI ILMI
Slot Port     ATM Network Prefix          Identifier   Ver VCI  Enable VCI  Poll
==== ==== ==========================    ============ === ==== ====== ==== ====
2    1    3903488001bc90000101dbd400  0020da98e910 3.0 5    True   16   Off

                              Status
                              =======

Slot Port        Sscop Up                  Sscop Down             Up   Dn   Status
==== ==== ======================== ======================== ==== ==== ======
2    1    WED SEP 29 10:03:37 1999  WED SEP 29 10:03 :32 1999 2    1    Up

Slot Port        Ilmi Up                   Ilmi Down              Up   Dn   Status
==== ==== ======================== ======================== ==== ==== ======
2    1    WED SEP 29 10:03:30 1999         --------            1    0    Up

Slot Port        Phy Up                    Phy Down               Up   Dn   Status
==== ==== ======================== ======================== ==== ==== ======
2    1    WED SEP 29 10:01:46 1999         --------            1    0    Enb (CTL)

Slot Port        Phy Up                    Phy Down               Up   Dn   Status
==== ==== ======================== ======================== ==== ==== ======
2    1    WED SEP 29 10:02:25 1999         --------            1    0    Enb (PVC)

Slot Port Tx SegSz  Rx Seg Sz Tx Buff Sz Rx Buff Sz
==== ==== ========= ========= ========== ==========
2    1        16384     16384      4600       4600

                    ATM HSM3   Redundant  Port Status
Slot Port Primary   Secondary  FailOver      Reason of Last Failover
==== ==== ========  ========== ========== ==== =====================
2    1    Active    Inactive    0
```

Additionally, you may enter the parameters for SSCOP, ILMI, and PHY in any order and combination. For example, if you wanted to view only the ILMI and PHY, you enter the **vap** command along with the respective parameters as follows:

vap ip

or

vap pi

This command displays a screen similar to the following:

```
                                ATM Port Table

                                   Status
                                   =======
Slot  Port       Ilmi Up                       Ilmi Down            Up   Dn  Status
==== ==== ======================== ========================  ==== ==== ======
2     1    WED SEP 29 10:03:30 1999               --------          1    0    Up

Slot  Port       Phy Up                        Phy Down             Up   Dn  Status
==== ==== ======================== ========================  ==== ==== ======
2     1    WED SEP 29 10:02:11 1999               --------          1    0    Enb (SVC)

Slot  Port  Tx SegSz  Rx Seg Sz  Tx Buff Sz   Rx Buff Sz
==== ==== ========= ========= ========== ==========
2     1       16384      16384       4600         4600

                      ATM HSM3    Redundant    Port Status
Slot  Port  Primary   Secondary   FailOver        Reason of Last Failover
==== ==== ========  ==========  ==========  ==== =====================
2     1    Active     Inactive       0
```

Descriptions of the columns included in the two displays above are described earlier in *Modifying an ATM Access Port Configuration* on page 26-4.

Viewing Virtual Channel Connections

The **vvc** command provides information on all VCIs associated with a given ATM access port. The following is sample of the output from a **vvc** display for ATM access ports.

```
                              ATM Connections

                         Connection        Conn  Circuit  Operational
Slot Port VPI VCI        Description       Type  Type        Status
==== ==== === ==== ================= ===== ====== ====================
2    1    0   5    Connection 5      VCC   PVC    LocalUp
End2endUnknown
2    1    0   16   Connection 16     VCC   PVC    LocalUp
End2endUnknown

                                                         Tx Max    Rx Max
Slot Port VPI VCI      Up Time            Down Time      Frame Sz  Frame Sz
==== ==== === ==== ================= ================= ======== ========
2    1    0   5   THU MAY 02 00:21:00                    4600      4600
2    1    0   16  THU MAY 02 00:14:00                    4600      4600


                     Actual Tx Traffic Information

                   Tx Traffic        Peak      Tx    Best
Slot Port VPI VCI  Descrip Type      Cell Rate QoS   Effort
==== ==== === ==== ============== ========= ==== =====
2    1    0   5    NoCLP NoSCR           0  Uns   True
2    1    0   16   NoCLP NoSCR           0  Uns   True


                     Actual Rx Traffic Information

                   Rx Traffic        Peak      Rx    Best
Slot Port VPI VCI  Descrip Type      Cell Rate QoS   Effort
==== ==== === ==== ============== ========= ==== ======
2    1    0   5    NoCLP NoSCR           0  Uns   True
2    1    0   16   NoCLP NoSCR           0  Uns   True
```

VPI. The virtual path identifier for this virtual channel. This virtual path defaults to **0** for ATM access connections.

VCI. The virtual channel identifier for this virtual channel. For PVCs, this value is specified during the virtual channel creation procedure via the **cvc** command. Some commonly used VCI are 5 (for signalling) and 16 (for ILMI).

Connection Description. A textual description of up to 30 characters for this virtual connection. Entered through the **cvc** command.

Connection Type. Indicates whether this connection is a virtual path or a virtual channel. All ATM access connections, or uplink connections, are virtual channels. Therefore, this column will always display as **VCC** (Virtual Channel Connection).

Circuit Type. The circuit type is configured with the **map** command. All circuit types on a single ATM port will be the same. The circuit type can be either **PVC** (Permanent Virtual Circuit) or **SVC** (Switched Virtual Circuit).

Operational Status. The current operational status of this virtual connection. This status will display as one of the following:

Unknown	The switch cannot tell if either the local or remote end of this connection is operational.
End2endUp	Remote end is operational. This value displays only if the end-to-end status of this connection is known.
End2endDown	Remote end is not operational. This value displays only if the end-to-end status of this connection is known.
LocalUp, End2endUnknown	Only local information is known. The local end of the connection is operational, but the switch cannot tell if the remote end is up or down.
LocalDown	Only local information is known. The local end of the connection is not operational.

Note

PVCs will always have an operational status in which the remote end status is unknown (i.e., **LocalUp,End2endUnknown** or **LocalDown**).

Up Time. The time and date when this virtual channel became active.

Down Time. The time and date when this virtual channel became inactive.

TX Max Frame Sz and **Rx Max Frame Sz**. Descriptions for these variables are provided in the section, *Creating a Virtual Channel Connection* on page 26-8.

Traffic information is supplied for Transmit (Tx) and Receive (Rx) traffic. These variables are **Tx/Rx Traffic Descrip Type**, **Peak Cell Rate**, **Tx/Rx QoS**, and **Best Effort**. Descriptions for these variables are provided in the section, *Creating a Virtual Channel Connection* on page 26-8.

Viewing Virtual ATM Addresses

The **vva** command allows you to view information on all ATM addresses in an OmniStack. The **vva** display provides information on all end system addresses associated with a given ATM uplink port. The following is sample of the output from a **vva** display.

```
                        ATM Addresses
Addr
Indx                     ATM Address                          Description
==== ========================================   ==========================
1    12345678909876543212345678909876543211234  Address 1
2    12343425256758456241986452764523546724486  Address 2

Addr          Conn  VC   TxMax  Rx Max
Indx VPI VCI  Type  Type  SDU    SDU   Arp Server
==== === ==== ==== ==== ====== ====== ==========
1    0   0000 VCC   SVC   4520   4520   False
2    0   0000 VCC   SVC   4520   4520   False

            Requested Tx Traffic Information

Addr Tx Traffic      Peak   Tx  Best
Indx Descriptor Type Rate   QoS Effort
==== =============== ====== === ======
1    NoCLP NoSCR     353208 Uns True
2    NoCLP NoSCR     353208 Uns True

            Requested Rx Traffic Information

Addr Rx Traffic      Peak   Rx  Best
Indx Descriptor Type Rate   QoS Effort
==== =============== ====== === ======
1    NoCLP NoSCR     353208 Uns True
2    NoCLP NoSCR     353208 Uns True

            Acceptable Tx Traffic Information

Addr Tx Traffic      Peak   Tx  Best
Indx Descriptor Type Rate   QoS Effort
==== =============== ====== === ======
1    NoCLP NoSCR     12200  Uns True
2    NoCLP NoSCR     12200  Uns True

            Acceptable Rx Traffic Information

Addr Rx Traffic      Peak   Rx  Best
Indx Descriptor Type Rate   QoS Effort
==== =============== ====== === ======
1    NoCLP NoSCR     12200  Uns True
2    NoCLP NoSCR     12200  Uns True
```

Addr Indx. An index that you can use to identify ATM addresses in this display. The index numbers are consistent throughout the rows in this display.

ATM Address. The ATM address for which QoS parameters were configured in the **cva** command.

Description. A textual description of up to 30 characters for this virtual connection. Entered through the **cva** command.

VPI. The virtual path identifier for this ATM address. This virtual path defaults to **0** for ATM access connections.

VCI. The virtual channel identifier for this ATM address. This value is specified during the virtual channel creation procedure via the **cva** command.

Conn Type. Connection Type. Indicates whether this connection is a virtual path or a virtual channel. All ATM access connections, or uplink connections, are virtual channels. Therefore, this column will always display as **VCC** (Virtual Channel Connection).

VC Type. The virtual channel type is configured with the **map** command. All circuit types for each ATM port will be the same. The circuit type can be either **PVC** (Permanent Virtual Circuit) or **SVC** (Switched Virtual Circuit).

Tx Max SDU. The maximum frame size for traffic transmitted on this connection. This value is configured via the **cva** command.

Rx Max SDU. The maximum frame size for traffic received on this connection. This value is configured via the **cva** command.

Arp Server. Indicates whether this address is an ARP server.

Traffic information is supplied for Transmit (Tx) and Receive (Rx) traffic. These variables are **Tx/Rx Traffic Descriptor Type**, **Peak Rate**, **Tx/Rx QoS**, and **Best Effort**. Descriptions for these variables are provided in the section, *Creating a Virtual Channel Connection* on page 26-8.

Viewing the ATM Layer Statistics Table

The **vls** command displays the ATM Layer Statistics Table. This table includes information at the ATM Service Data Unit (SDU), ATM cell, and octet level. Information for SDUs, which are composed of cells, are directly related to statistics for cells. When an SDU is counted, the cells in that SDU are counted and then added to the corresponding cell count.

The following is a sample **vls** display:

ATM Layer Statistics

Slot	Port	Rx SDUs	Tx SDUs	Rx Cells	Tx Cells	Rx Octets	Tx Octets
====	====	==========	==========	==========	==========	=========	=========
2	1	0	6716	0	15775	0	757200

Rx SDUs. The number of Service Data Units received on this port.

Tx SDUs. The number of Service Data Units transmitted on this port.

Rx Cells. The number of cells received on this port. The value is derived from the **Rx SDUs** statistic. Once an SDU is received on the port, the cells in the SDU are counted and added to this statistic.

Tx Cells. The number of cells transmitted on this port. The value is derived from the **Tx SDUs** statistic. Once an SDU is transmitted on the port, the cells in the SDU are counted and added to this statistic.

Rx Octets. The number of octets, or bytes, received in the form of SDUs on this port.

Tx Octets. The number of octets, or bytes, transmitted in the form of SDUs on this port.

Viewing the ATM Layer Rx Error Statistics Table

The **vlrs** command displays the ATM Layer Rx (Receive) Error Statistics Table for each ATM access port. This table includes discard and error information at the ATM Service Data Unit (SDU), or frame, level and the ATM cell level.

Note that statistics for SDUs, which are composed of cells, are directly related to statistics for cells. When an SDU error or discard is counted, the cells in that SDU are counted and then added to the corresponding cell discard or error statistic for each port.

The following is a sample **vlrs** display:

ATM Layer Rx SDU Error Statistics

Slot	Port	Discards	Errors	Invalid Sz	No Buffers	Trash	CRC Errors
====	====	==========	==========	==========	==========	=========	==========
2	1	0	0	0	0	0	0

ATM Layer Rx Cell Error Statistics

Slot	Port	Discards	Errors	No Buffers	Trash	CRC Errors
====	====	==========	==========	==========	==========	==========
2	1	0	0	0	0	0

SDU Discards. The number of Service Data Units (SDU), or frames, that have been discarded due to one of the following reasons: an invalid size error, CRC error, invalid format error, the frame was larger than the receive SAR buffer, or the frame was larger than the maximum size allowed on this port. Invalid size and CRC errors are also displayed in this table and described below. An invalid format error occurs when a frame is received in the wrong format. For example, a PTOP frame may be received that should be in 1483 format but instead is in Private encapsulation. The receive SAR buffer size (**Rx SAR Buffer Size**) is configured through the **map** command. The maximum frame size allowed on this port is configured through the **cvc** or **mvc** command.

SDU Errors. The number of Service Data Units that had one or more of the following errors: invalid size, invalid format, frame larger than SAR buffer size, CRC error, or the frame was larger than that allowed on this port. This error statistic will typically match the **SDU Discards** statistic.

SDU Invalid Size. The number of Service Data Units, or frames, received that are either larger than the receive frame buffer or had an AAL5 length mismatch. One cell in an SDU contains an AAL trailer that includes a length field; an AAL5 mismatch error occurs when that length field is incorrect. The receive frame buffer size (**Rx Frame Buffer Size**) is configured through the **map** command.

SDU No Buffers. The number of SDUs that were discarded because there was no room in the receive frame buffer. Note that the SDUs counted in this statistic are not included in the **Rx SDU Discards** or **Errors** statistics in the **vlrs** display. The receive frame buffer size (**Rx Frame Buffer Size**) may be configured through the **map** command.

SDU Trash. The number of Service Data Units that were discarded at the ATM physical layer. These SDUs were discarded by the Segmentation and Reassembly (SAR) due to a lack of reassembly buffer space. Note that the SDUs counted in this statistic are not included in the **Rx SDU Discards** or **Errors** statistics in the **vlrs** display.

SDU CRC Errors. The number of SDUs received with errors in the CRC (cyclical redundancy check) header. This error is counted in the **Rx SDU Discards** and **Errors** columns of the **vlrs** display.

Cell Discards. The total number of cells discarded as a result of SDU Discards. SDUs are discarded due to invalid size, CRC errors, invalid format, frame size larger than SAR buffer, or frame size larger than allowed on this port. For each SDU discarded, the number of cells within that SDU are counted and then added to this statistic.

Cell Errors. The total number of cells within SDUs that had one or more of the following errors: invalid size, invalid format, frame larger than SAR buffer size, CRC error, or the frame was larger than that allowed on this port. For each errored SDU, the number of cells within that SDU are counted and then added to this statistic.

Cell No Buffers. The total number of cells that were discarded because there was no room in the receive frame buffer. Note that the cells counted in this statistic are not included in the **Rx Cell Discards** or **Errors** statistics in the **vlrs** display.

Cell Trash. The total number of cells that were discarded at the ATM physical layer. These cells were discarded by the Segmentation and Reassembly (SAR) due to a lack of reassembly buffer space. Note that the cells counted in this statistic are not included in the **Rx Cell Discards** or **Errors** statistics in the **vlrs** display.

Cell CRC Errors. The number of cells received with errors in the CRC (cyclical redundancy check) header. This error is counted in the **Rx Cell Discards** and **Errors** columns of the **vlrs** display.

Viewing the ATM Layer Tx Error Statistics Table

The **vlts** command displays the ATM Layer Tx (Transmit) Error Statistics Table for each port. This table includes discard and error information at the ATM Service Data Unit (SDU), or frame, level and the ATM cell level.

Note that statistics for SDUs, which are composed of cells, are directly related to statistics for cells. When an SDU error or discard is counted, the cells in that SDU are counted and then added to the corresponding cell discard or error statistic.

The following is a sample **vlts** display.

```
                     ATM Layer Tx Error Statistics

                Tx SDU        Tx SDU      Tx SDU     Tx Cell      Tx Cell      Tx Cell
Slot  Port  Discards         Errors    No Buffers  Discards      Errors     No Buffers
==== ==== ========== =========== ========== ==========  ========== =========
2     1     0             0             0            0             0             0
```

Tx SDU Discards. The number of Service Data Units discarded because there was no room in the transmit SAR buffer or the SDU was larger than the transmit frame buffer. Transmit SAR buffer size (**Tx SAR Buffer Size**) and transmit frame buffer size (**Tx Frame Buffer Size**) are configured through the **map** command.

Tx SDU Errors. The number of Service Data Units that were received from the switch backplane in an invalid format.

Tx SDU No Buffers. The number of SDUs that were discarded because there was no room in the transmit frame buffer to dequeue and attempt to transmit frames. Note that the SDUs counted in this statistic are not included in the **Tx SDU Discards** statistic. The transmit frame buffer size (**Tx Frame Buffer Size**) is configured through the **map** command.

Tx Cell Discards. The total number of cells discarded as a result of SDU Discards. SDUs are discarded because there is no room in the transmit SAR buffer, or the SDU was larger than the transmit frame buffer. For each SDU discarded, the number of cells within that SDU are counted and then added to this statistic.

Tx Cell Errors. The total number of cells within SDUs that were received from the switch backplane in an invalid format.

Tx Cell No Buffers. The total number of cells within SDUs that were discarded because there was no room in the transmit frame buffer. Note that the cells counted in this statistic are not included in the **Tx Cell Discards** statistic.

Viewing the ATM Connection Statistics Table

The **vcs** command displays the ATM Connection Statistics Table for each virtual channel. This table includes information at the ATM Service Data Unit (SDU), ATM cell, and octet level. Information for SDUs, which are composed of cells, are directly related to statistics for cells. When an SDU is counted, the cells in that SDU are counted and then added to the corresponding cell count.

Note

Information is displayed for a virtual channel only if that channel has been used for data transmission. If a virtual channel has been configured, but not used, then it will not be displayed by **vcs**.

The following is a sample **vcs** display:

ATM Connection Statistics

Slot	Port	VCI	Rx SDUs	Tx SDUs	Rx Cells	Tx Cells	Rx Octets	Tx Octets
====	====	====	=========	=========	==========	==========	=========	========
2	1	100	0	6769	0	15892	0	762816
2	1	1002	0	349	0	1047	0	50256
2	1	1004	0	2445	0	2445	0	117360
2	1	1005	0	350	0	1050	0	50400
2	1	1007	0	2445	0	2445	0	117360
2	1	1008	350	350	1050	1050	50400	50400
2	1	1010	679	679	679	679	32592	32592
2	1	101	375	353	1142	1056	54816	50688
2	1	1013	679	681	679	681	32592	32688
2	1	1014	350	352	1050	1055	50400	50640
2	1	1016	681	682	681	682	32688	32736
2	1	1017	354	367	1058	1112	50784	53376
2	1	1019	679	679	679	679	32592	32592
2	1	1021	0	1052	0	2104	0	100992
2	1	1022	0	2452	0	2452	0	117696

Slot. The port's slot number.

Port. The number of the port.

VCI. The virtual channel identifier.

Rx SDUs. The number of Service Data Units received on this virtual channel.

Tx SDUs. The number of Service Data Units transmitted on this virtual channel.

Rx Cells. The number of cells received on this virtual channel. The value is derived from the **Rx SDUs** statistic. Once an SDU is received on the virtual channel, the cells in the SDU are counted and added to this statistic.

Tx Cells. The number of cells transmitted on this virtual channel. The value is derived from the **Tx SDUs** statistic. Once an SDU is transmitted on the virtual channel, the cells in the SDU are counted and added to this statistic.

Rx Octets. The number of octets, or bytes, received as SDUs on this virtual channel.

Tx Octets. The number of octets, or bytes, transmitted as SDUs on this virtual channel.

Viewing the ATM Connection Rx Error Statistics Table

The **vcrs** command displays the ATM Connection Rx (Receive) Error Statistics Table on a virtual channel-by-virtual channel basis. This table includes discard and error information at the ATM Service Data Unit (SDU), or frame, level and the ATM cell level for each virtual channel.

Note that statistics for SDUs, which are composed of cells, are directly related to statistics for cells. When an SDU error or discard is counted, the cells in that SDU are counted and then added to the corresponding cell discard or error statistic.

The following is a sample **vcrs** display:

ATM Connection Rx SDU Error Statistics

Slot	Port	VCI	Discards	Errors	Invalid Sz	No Buffers	Trash	CRC Errors
====	====	====	==========	========	==========	==========	========	=========
2	1	100	0	0	0	0	0	0

ATM Connection Rx Cell Error Statistics

Slot	Port	VCI	Discards	Errors	No Buffers	Trash	CRC Errors
====	====	====	==========	==========	==========	==========	==========
2	1	100	0	0	0	0	0

Slot. The port's slot number.

Port. The number of the port.

VCI. The virtual channel identifier.

SDU Discards. The number of Service Data Units (SDU), or frames, that have been discarded due to one of the following reasons: an invalid size error, CRC error, invalid format error, the frame was larger than the receive SAR buffer, or the frame was larger than the maximum size allowed on this virtual channel. Invalid size and CRC errors are also displayed in this table and described below. An invalid format error occurs when a frame is received in the wrong format. For example, a PTOP frame may be received that should be in 1483 format but instead is in Private encapsulation. The receive SAR buffer size (**Rx SAR Buffer Size**) is configured through the **map** command. The maximum frame size allowed on this virtual connection is configured through the **cvc** or **mvc** command.

SDU Errors. The number of Service Data Units that had one or more of the following errors: invalid size, invalid format, frame larger than SAR buffer size, CRC error, or the frame was larger than that allowed on this virtual channel. This Error statistic will typically match the **SDU Discards** statistic.

SDU Invalid Size. The number of Service Data Units, or frames, received that are either larger than the receive frame buffer or had an AAL5 length mismatch. One cell in an SDU contains an AAL trailer that includes a length field; an AAL5 mismatch error occurs when that length field is incorrect. The receive frame buffer size (**Rx Frame Buffer Size**) is configured through the **map** command.

SDU No Buffers. The number of SDUs that were discarded because there was no room in the receive frame buffer. Note that the SDUs counted in this statistic are not included in the **Rx SDU Discards** or **Errors** statistics in the **vcrs** display. The receive frame buffer size (**Rx Frame Buffer Size**) may be configured through the **map** command.

SDU Trash. The number of Service Data Units that were discarded at the ATM physical layer. These SDUs were discarded by the Segmentation and Reassembly (SAR) due to a lack of reassembly buffer space. Note that the SDUs counted in this statistic are not included in the **Rx SDU Discards** or **Errors** statistics in the **vcrs** display.

SDU CRC Errors. The number of SDUs received with errors in the CRC (cyclical redundancy check) header. This error is counted in the **Rx SDU Discards** and **Errors** columns of the **vcrs** display.

Cell Discards. The total number of cells discarded as a result of SDU discards. SDUs are discarded due to invalid size, CRC errors, invalid format, frame size larger than SAR buffer, or frame size larger than allowed on this virtual channel. For each SDU discarded, the number of cells within that SDU are counted and then added to this statistic.

Cell Errors. The total number of cells within SDUs that had one or more of the following errors: invalid size, invalid format, frame larger than SAR buffer size, CRC error, or the frame was larger than that allowed on this virtual channel. For each errored SDU, the number of cells within that SDU are counted and then added to this statistic.

Cell No Buffers. The total number of cells that were discarded because there was no room in the receive frame buffer. Note that the cells counted in this statistic are not included in the **Rx Cell Discards** or **Errors** statistics in the **vcrs** display.

Cell Trash. The total number of cells that were discarded at the ATM physical layer. These cells were discarded by the Segmentation and Reassembly (SAR) due to a lack of reassembly buffer space. Note that the cells counted in this statistic are not included in the **Rx Cell Discards** or **Errors** statistics in the **vcrs** display.

Cell CRC Errors. The number of cells received with errors in the CRC (cyclical redundancy check) header. This error is counted in the **Rx Cell Discards** and **Errors** columns of the **vcrs** display.

Viewing the ATM Connection Tx Error Statistics Table

The **vcts** command displays the ATM Connection Tx (Transmit) Error Statistics Table on a virtual channel-by-virtual channel basis. This table includes discard and error information at the ATM Service Data Unit (SDU), or frame, level and the ATM cell level.

Note that statistics for SDUs, which are composed of cells, are directly related to statistics for cells. When an SDU error or discard is counted, the cells in that SDU are counted and then added to the corresponding cell discard or error statistic.

The following is a sample **vcts** display.

ATM Connection Tx Error Statistics

Slot	Port	VCI	Tx SDU Discards	Tx SDU Errors	Tx SDU No Buffers	Tx Cell Discards	Tx Cell Errors	Tx Cell No Buffers
====	====	====	========	========	==========	========	=========	=========
2	1	100	0	0	0	0	0	0
2	1	1002	0	0	0	0	0	0
2	1	1004	0	0	0	0	0	0
2	1	1005	0	0	0	0	0	0
2	1	1007	0	0	0	0	0	0
2	1	1008	0	0	0	0	0	0
2	1	1010	0	0	0	0	0	0
2	1	1011	0	0	0	0	0	0
2	1	1013	0	0	0	0	0	0
2	1	1014	0	0	0	0	0	0
2	1	1016	0	0	0	0	0	0
2	1	1017	0	0	0	0	0	0
2	1	1019	0	0	0	0	0	0
2	1	1021	0	0	0	0	0	0
2	1	1022	0	0	0	0	0	0

Slot. The port's slot number.

Port. The number of the port.

VCI. The virtual channel identifier.

Tx SDU Discards. The number of Service Data Units discarded because there was no room in the transmit SAR buffer or the SDU was larger than the transmit frame buffer. Transmit SAR buffer size (**Tx SAR Buffer Size**) and transmit frame buffer size (**Tx Frame Buffer Size**) are configured through the **map** command.

Tx SDU Errors. The number of Service Data Units that were received from the switch backplane in an invalid format.

Tx SDU No Buffers. The number of SDUs that were discarded because there was no room in the transmit frame buffer to dequeue and attempt to transmit frames. Note that the SDUs counted in this statistic are not included in the **Tx SDU Discards** statistic. The transmit frame buffer size (**Tx Frame Buffer Size**) is configured through the **map** command.

Tx Cell Discards. The total number of cells discarded as a result of SDU Discards. SDUs are discarded because there is no room in the transmit SAR buffer, or the SDU was larger than the transmit frame buffer. For each SDU discarded, the number of cells within that SDU are counted and then added to this statistic.

Tx Cell Errors. The total number of cells within SDUs that were received from the switch backplane in an invalid format.

Tx Cell No Buffers. The total number of cells within SDUs that were discarded because there was no room in the transmit frame buffer. Note that the cells counted in this statistic are not included in the **Tx Cell Discards** statistic.

Traffic Shaping

OmniStack ATM ports allow you to configure several traffic parameters. These parameters include the Peak Cell Rate (PCR), Sustaining Cell Rate (SCR), and Maximum Burst Size (MBS). Traffic shaping using these parameters takes place on data that is exiting (i.e., transmitted out) a switch port.

You can divide ATM ports into discrete “bandwidth groups” to which you can assign unique PCR, SCR, and MBS values. This feature is referred to as “traffic shaping.”

On each ATM port you can configure up to eight (8) bandwidth groups. A bandwidth group is a reserved amount of bandwidth on the port. Bandwidth groups are ordered by priority, with bandwidth group 1 having the highest priority and bandwidth group 8 the lowest.

Bandwidth groups are associated with ATM services. When you configure any ATM service on a port through the **cas** command, you are prompted for the bandwidth group to which the service will be associated. By default a service will be associated with bandwidth group 1. ATM services are described in Chapter 28.

Configuring Traffic Shaping

The **mbwg** command allows you to configure the transmit traffic parameters on an ATM port. The syntax for this command is as follows:

mbwg <slot>/<port> <bandwidth group number>

For example if you wanted to set up bandwidth group 1 on Port 1 in slot 2 you would enter

mbwg 2/1 1

Follow these steps to set up traffic parameters on an OSASM port:

1. Enter **mbwg** followed by the slot number, a slash (/), the OSASM port number and then the bandwidth group for which you want to configure parameters. A screen similar to the following displays:

```
The following service numbers use the current Traffic Descriptors
Changing any of the traffic descriptor values would result in
toggling status of the following service numbers...
1

    Bandwidth allocation: Slot 2, Port 1, BwgId=1

                Tx Traffic parameters
1) Best Effort {False (1), True (2) }           : TRUE


Enter (option=value/save/cancel):
```

2. Enter **1=1** at the **Enter (option=value/save/cancel):** prompt to configure traffic parameters. If you enter **1=2**, then traffic will be transmitted on this bandwidth group on a "best effort" basis and you will not be able to configure traffic parameters. A screen similar to the following displays:

```
        Bandwidth allocation: Slot 2, Port 1, BwgId=1

                Tx Traffic parameters
1) Best Effort {False (1), True (2)          : FALSE
    11) Peak Cell Rate (PCR kbps)            : 50
    12) Sustained Cell rate (SCR kbps)       : 50
    13) Maximum Burst Size (MBS cells)       : 5

Enter (option=value/save/cancel):
```

You change a value in a field by entering the line number for the value, an equal sign (=), and then the new value for the variable. For example, to change the **Peak Cell Rate** field to **2000** you would enter an **11** (the line number for **Peak Cell Rate**), an equal sign, and then the new value as follows:

```
11=2000
```

This specification would provide 2 Megabits of bandwidth on this channel.

11) Peak Cell Rate (PCR kbps)

The maximum number of kilobits per second allowed on this bandwidth group. The PCR is specified for all types of ATM traffic.

12) Sustained Cell Rate (SCR kbps)

The maximum *average* cell rate (in kilobits per second) allowed for traffic on this bandwidth group. The SCR is always less than or equal to the Peak Cell Rate. The SCR is not specified for Constant Bit Rate (CBR) traffic as this traffic requires a steady data flow at all times. For CBR traffic, the PCR is equal to the SCR. In the event that the PCR cannot be satisfied due to other configured channels, this channel should at least support the bandwidth you configure here for the SCR.

13) Maximum Burst Size (MBS cells)

The maximum number of cells that can be sent in a burst at the Peak Cell Rate. The MBS is not specified for CBR traffic. CBR traffic is constant and continuous, not bursty.

Note

If most of the traffic in a bandwidth group consists of very small packets (i.e., 64 bytes), then the actual speed achieved will be less than the values you configure for PCR, SCR, and MBS.

Viewing Traffic Shaping Parameters

The **vbwg** command allows you to view the traffic descriptor parameters for one or more ATM ports. When you enter

vbwg

a screen similar to the following displays:

Slot	Port	Bwg	Best Effort	PCR (kbps)	SCR (kbps)	MBS (cells)	Dependent Active Service Numbers
2	1	1	True	-----	------	-----	1
2	1	2	False	20000	20000	200	2
2	1	3	False	20000	20000	300	3
2	1	4	False	20000	20000	400	4
2	1	5	False	20000	20000	500	5
2	1	6	False	20000	20000	600	6
2	1	7	False	20000	20000	700	7
2	1	8	False	20000	20000	800	8

Slot. For OmniStack switches, slot 2 will always be displayed.

Port. The port on slot 2 for which information is supplied.

Bwg. The bandwidth group. You can configure up to eight bandwidth groups on each ATM port through the **mbwg** command. Bandwidth groups are ranked by priority with bandwidth group 1 having the highest priority and bandwidth group 8 having the lowest.

Best Effort. Indicates whether or not traffic will be transmitted from this port on a "best effort" basis. When set to **False**, data transmission will be based on the traffic descriptor parameters—PCR, SCR, and MBS—specified through the **mbwg** command. When set to **True**, traffic is transferred on a "Best Effort" basis.

PCR (kbps). The Peak Cell Rate, which is the maximum number of kilobits per second allowed on this bandwidth group.

SCR (kbps). The Sustained Cell Rate, which is the maximum average cell rate (in kilobits per second) allowed for traffic in this bandwidth group. The SCR is always less than or equal to the Peak Cell Rate.

MBS (cells). The Maximum Burst Size, which is the maximum number of cells that can be sent in a burst at the Peak Cell Rate.

Dependent Active Service Numbers. The number for the active ATM service to which this bandwidth group belongs. A bandwidth group is assigned to a service through the **cas** command. Only services that are currently active are displayed.