

# 28 Configuring ATM Services

## Introduction

Alcatel Omni Switch/Routers, OmniSwitches, and OmniStacks provide several powerful ATM services. ATM Services run over an ATM backbone and provide a variety of mechanisms to switch or route traffic (including Groups and VLANs) over a connection-oriented ATM network:

- Classical IP, ATM Trunking, and Point-to-Point (PTOP) Bridging provide solutions for inter-connecting IP-based networks via ATM backbones.
- LANE Client Services provide connectivity between ATM and non-ATM (legacy) networks by emulating the services of a LAN.
- VLAN Clusters provide a loop-free bridging topology over a meshed ATM backbone.

## ATM Services

OmniStack supports five ATM services:

- LANE Client (Ethernet and Token Ring) - enables devices on legacy Ethernet- and Token Ring-based LANs to communicate over ATM networks. (See *LANE Client (LEC) Services* on page 28-3.) FDDI services can be supported over either topology by performing appropriate packet translations. Note that OmniStack switches do not provide Token Ring or FDDI ports.
- ATM Trunking - enables Groups and VLANs to be extended across an ATM backbone network. (See *ATM Trunking* on page 28-8.)
- Classical IP Routing (RFC 1577) - provides connectivity between IP-based networks via an ATM backbone network. (See *Classical IP Routing* on page 28-10.)
- Point to Point Bridging - enables two groups to communicate across an ATM network using a single virtual circuit (VC). (See *Point-to-Point Bridging* on page 28-12.)
- VLAN Clusters - enables mesh-interconnection of point-to-point and point-to-multipoint virtual circuits. (See *VLAN Clusters* on page 28-13.)

You can run multiple services of the same or different type on a single port. Each ATM port (a single base MAC address) can support up to 16 bridging services. Bridging services include all ATM services except Classical IP. It is possible to add more base MAC addresses. If locally-administered MAC support is enabled, the MAC space is doubled, allowing twice as many ATM services (32). For more information on adding MAC addresses, contact Alcatel Internetworking technical support.

All ATM access ports must be associated with at least one ATM service. When a switch containing an OmniStack containing an ATM uplink port is booted up without configuration information, or when an ATM access is hot-swapped into a chassis, a default service is automatically created. This default service will be an Ethernet (802.3) LANE Client. You can delete this default service only after you have created another one. If you delete all services and don't create a new one, a PTOF PVC service will automatically be created.

### ◆ Note ◆

Only one (1) service (either PTOF or Emulated LAN) is supported per *group* on an OmniStack.

### PVC/SVC Support

ATM services use either PVCs, Switched Virtual Circuits (SVCs), or both, depending upon the service. If you are setting up a service that supports both SVCs and PVCs, you will be prompted for different parameters, depending upon which virtual circuit type you chose.

◆ **Note** ◆

All newly-installed or unconfigured ATM access ports default to SVC mode, ready to support SSCOP and ILMI protocols.

The table below lists what services support which connection types (SVC or PVC):

Service	SVC	PVC
LANE Client	X	
ATM Trunking	X	X
Classical IP	X	X
PTOP Bridging	X	X
VLAN Clusters		X

## LANE Client (LEC) Services

In a LANE configuration, ATM stations become LECs to allow non-ATM devices on legacy Ethernet- and Token Ring-based LANs to communicate over ATM networks and support existing applications. Such a configuration is called an Emulated LAN, or ELAN. This ability to work with existing networking infrastructure makes it possible to plan for a gradual transition from legacy networks to an ATM-based network.

Because ATM is a connection-oriented technology, and Token Ring and Ethernet LANs are connectionless (i.e., based upon MAC addresses), you need some way of correlating ATM addresses to MAC addresses. This is one of the functions that LANE services provides. The OmniStack supplies a LAN Emulation Client (LEC) function, not LANE Services (LES). The OmniMSS normally provides LES. For information on configuring LANE services, see Chapter 27, “LANE Server Configuration.”

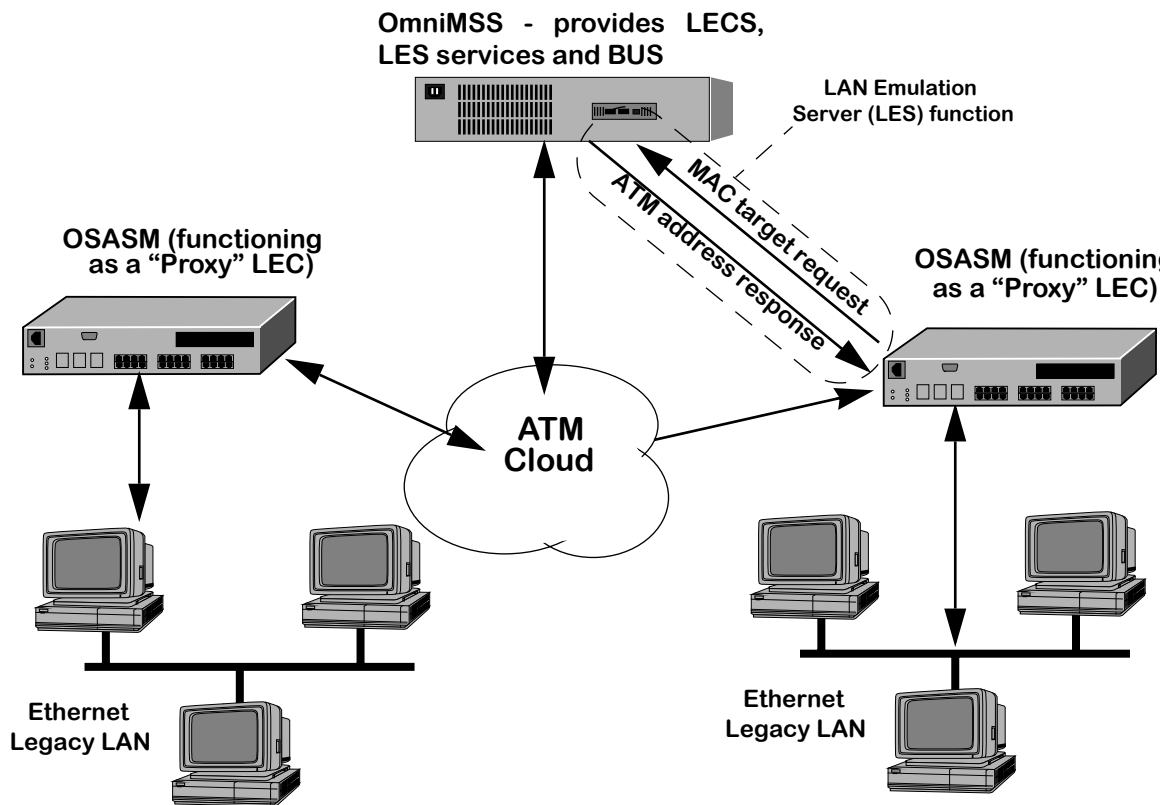
An ELAN consists of the following components:

- **LANE Client (LEC):** An LEC is responsible for forwarding data and address resolution. This function is provided by an end-station ATM access configured as a LANE Client.
- **LAN Emulation Configuration Server (LECS):** An LECS assigns clients to particular ELAN services. This function is usually provided by an MSS (Multiprotocol Switching Services)-type device.
- **LAN Emulation Server (LES):** The LES uses Address Resolution Protocol (ARP) to translate and map MAC addresses to ATM addresses. This service can be provided either by the LES functionality of the OmniStack MPM, or an OmniMSS.
- **Broadcast and Unknown Server (BUS):** The BUS handles initial unicast, multicast and broadcast traffic sent to it by the LEC. This service can be provided either by the BUS functionality of the OmniStack MSM, or an OmniMSS.

The figure on the following page shows the interrelationships of the major components in a typical LANE configuration.

### ◆ Note ◆

Up to 16 LANE LECs are supported per port.



**LANE Services Architecture**

Both the LES and BUS can use either a point-to-multipoint connection or a bidirectional point-to-point connection to communicate with a client (LEC). The LECS uses a point-to-point connection.

## Token Ring vs. Ethernet Networks

Token Ring 802.5 LE clients and Ethernet 802.3 clients perform similar functions with the following differences:

- For Token Ring LECs, MAC data frames are transmitted within an 802.5 ELAN type frame using an 802.5 frame format. For Ethernet LECs, MAC data frames are transmitted within an 802.3 ELAN type frame using an 802.3 frame format.
- Token Ring LE\_ARPs use a non-canonical MAC address format (i.e., the most significant bit of each address byte is transmitted first), whereas Ethernet LEC clients use a canonical format.
- Source-routed traffic is supported by Token Ring, but not by Ethernet LEC clients.

## Source-Routed Traffic

Source-routed traffic is handled by assigning a ring number to the ELAN and adding intelligence to the forwarding decision of the Token Ring LEC. The LEC examines frames for the next hop after the ELAN of which it is a member. With this information, the LEC can forward the frame to the correct next hop LEC. Knowledge of the next hop allows a LEC to avoid forwarding frames to all LECs on the ring—an action that would typically occur in traditional Token Ring networks.

From the perspective of the source routing logic and AutoTracker, a Token Ring LEC is treated like another Token Ring interface. For this reason, source routing commands, such as **sts** (Spanning Tree Statistics) and **stc** (Spanning Tree Configuration), may be used with Token Ring LECs. For more information on using these commands, see Chapter 15, “Configuring Bridging Parameters.”

Ethernet and Token Ring LECs cannot be directly connected. However, ELANs to which dissimilar LECs belong can be connected through the switch via translational bridging or routing.

## LANE Version 2.0

In Release 4.0 and higher, LANE Version 2.0 is supported on ATM access modules for the OmniStack. This enhanced version of LANE provides support for ATM Forum Multiprotocol Over ATM (MPOA).

## LAN Emulated Client Start-Up and Back-Off Timers

Alcatel LECs provide the capability of backing-off if the LEC notices calls being released or when multiple LECs on the same switch are being enabled at the same time (e.g., a cable is disconnected/reconnected). The amount of time (in ticks) and nature (fixed/random) of the back-off period can be controlled using the variables described in the table below.

Timer Name	Description	Range	Default value
<b>atmlec_randomize_throttle</b>	This flag determines if the procedure uses random back off or fixed back off.	0 (fixed back off) or 1 (random back off)	1
<b>atmlec_backoff</b>	The back off percentage in both random and fixed procedures. For example, setting this flag will set the percentage to 500%.	>= 100	300
<b>atmlec_lecs_throttle_ticks</b>	All values for ticks should be a power of two (e.g., 8, 16, 32, 64, etc.). Each tick is 16.66 milliseconds long.	Power of 2 and >=2	32
<b>atmlec_les_throttle_ticks</b>	All values for ticks should be a power of two (e.g., 8, 16, 32, 64, etc.). Each tick is 16.66 milliseconds long.	Power of 2 and >=2	32
<b>atmlec_bus_throttle_ticks</b>	All values for ticks should be a power of two (e.g., 8, 16, 32, 64, etc.). Each tick is 16.66 milliseconds long.	Power of 2 and >=2	32
<b>atmlec_lecs_retry</b>	Number of LECS retries before restarting the LEC	>= 3	7
<b>atmlec_les_retry</b>	Number of LES retries before restarting the LEC	>= 3	7
<b>atmlec_bus_retry</b>	Number of BUS retries before restarting the LEC	>= 3	7

It should be noted that the adjustment of these values needs to be done only if the ATM network (which the LECs are connected) is not capable of processing the total number of calls that could be generated by all the LECs connected to the ATM network. This scenario is most likely to occur under the following two situations:

- During a global restart of all the LECs due to power on or power failure.
- During a global attempt to join an ELAN when a central LANE server resource such as LECs/LES/BUS is disconnected/reconnected or some failure.

Each LEC needs to setup a call to the LEC/LES and BUS before it stops retrying. If any fails, the LEC backs off and continues the process of attempting to join the ELAN. The default values are chosen so that calls to the LECs/LES/BUS are individually throttled by a time period of 16.66 — 266.56 milliseconds.

To modify these default timers, you must edit the **mp4.cmd** command file. (See Chapter 5, “Managing Files,” for more information on editing the command file.). For example, to change the **atmlec\_lecs\_throttle\_ticks** timer on an OmniStack to 64, add :

```
atmlec_lecs_throttle_ticks=64
```

to the **mp4.cmd** file.

◆ **Note** ◆

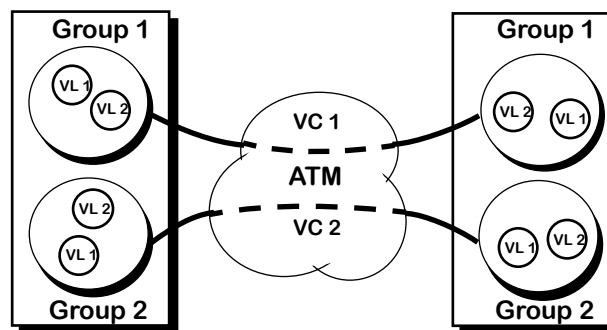
You must add the timers after the **cmlnit** line.

## ATM Trunking

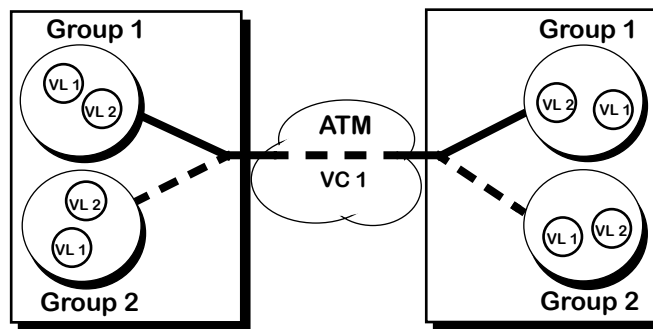
ATM Trunking is a proprietary service that allows Groups and VLANs to be extended across an ATM backbone network. This trunking service operates in a manner similar to Frame Relay Trunking (for more information on Frame Relay Trunking, see the “Trunking” section in Chapter 31, “Managing Frame Relay”).

### Groups over ATM

An ATM trunk is actually a virtual connection, rather than a physical line. A common implementation is to connect to an external router to provide interconnectability. This service enables a single ATM access port to send traffic to multiple destinations on the other side of the ATM cloud. A single ATM port can support several trunk port connections to other switches on an ATM network. The switch will bridge between the assigned trunk ports.



With straight group-to-group bridging (no trunking), different groups must use two separate virtual circuits across an ATM interface.



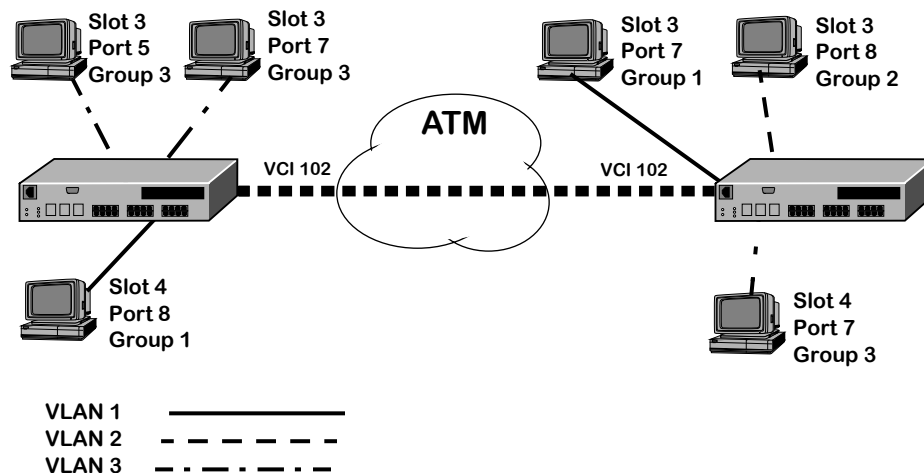
With Trunking, separate Groups can share the same ATM virtual circuit. Group 1 traffic will only be sent to Group 1 and Group 2 traffic will only be sent to Group 2.

## VLANs over ATM

An ATM trunking service supports VLANs distributed across an ATM network. Trunk ports encapsulate the bridged frames within a proprietary frame, which includes information needed to reproduce the frame on the opposite end of the trunk and to maintain VLAN separation. Each switch will only participate in those VLANs to which it is assigned.

VLAN Groups can be carried within the encapsulation header. As long as the same VLAN policies are maintained at both ends of the trunk, VLAN segregation may be maintained (via AutoTracker rules; for more details, see Chapter 20, “Managing AutoTracker VLANs”). If a port is configured as a trunk port, it can support groups distributed across multiple switches connected by LANs or ATM networks.

In the example below, members of three different Groups on one side of the ATM cloud are able to communicate with members of their respective Groups on the far end of the ATM cloud (via VCI 102).



### Typical VLAN Over ATM Configuration

Physical LAN interfaces are mapped one-to-one to virtual bridge ports. For ATM interfaces, a Trunking service and a Point-to-Point Bridging service could also be run simultaneously on the same VLAN.

## Spanning Tree and Trunking

Via a Trunk port, each Group with its own spanning tree can be extended across an ATM network. As with normal Spanning Tree, BPDUs are processed and Spanning Tree dynamically controls the forwarding state.

## Translations Across Trunks

The switch sends frames onto the trunk in the same format as the original LAN type. Any necessary translation is performed at the destination switch.

# Classical IP Routing

In classical IP (CIP) routing, ATM is used to interconnect ATM switches with IP-based ATM devices in a routed environment. ATM networks are configured as Logical IP Subnetworks (LISs). Communication between the LIS-configured ATM networks is accomplished through the routing of Groups. A Group is created for routing CIP only. Each Group consists of a router port and its associated ATM CIP service.

### ◆ Note on Terminology ◆

You can use SVC and PVCs in CIP routing. Using PVCs in CIP is also known as *routed 1483*.

## LLC Header Encapsulation

CIP is routed across ATM networks by the use of routed Protocol Data Units (PDUs) encapsulated in LLC Headers and distributed over ATM Adaptation Layer 5 (AAL 5). For a detailed description of LLC encapsulation, refer to RFC-1483, *"Multiprotocol Encapsulation Over ATM Adaptation Layer 5."*

## IP to ATM Address Resolution

For SVC-based CIP services, the following sequence establishes a CIP connection over an ATM network:

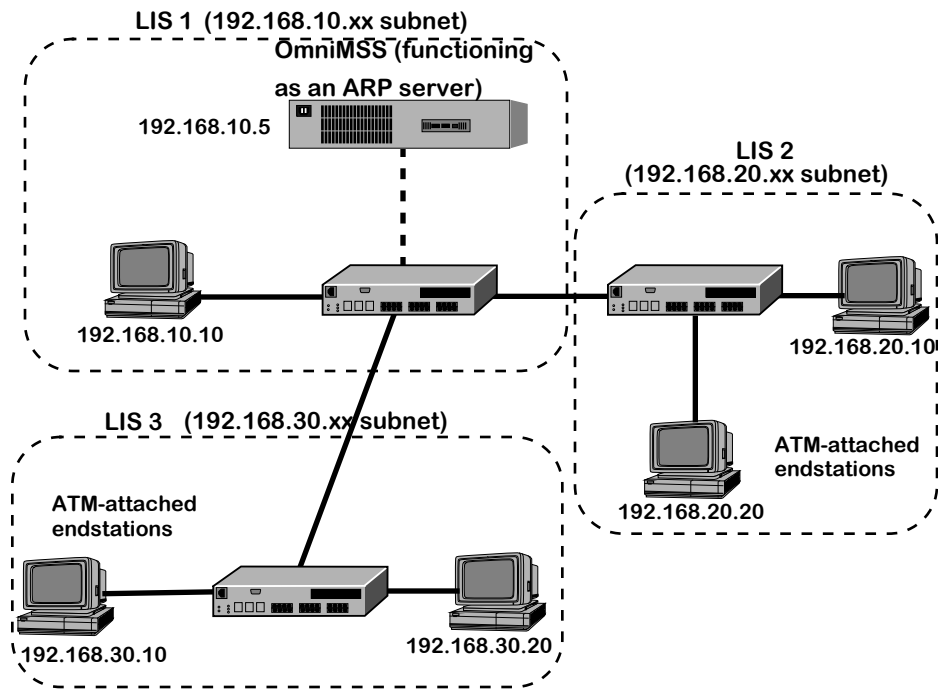
1. An IP Host sends a request to the ARP server. IP addresses are resolved to ATM addresses via the Inverse ARP function of the ARP server within the LIS. An MSS-type device usually provides the ARP server function. (For PVC-based CIP services, no ARP server is required; VCs are configured manually via VCI numbers.)
2. The ARP Server returns an ATM address to the requesting station. Once it has the ATM address, the IP Host will establish an SVC.
3. Once the setup is completed and confirmed a VCI now exists, and data can be sent.

## IP Over ATM Signaling

CIP over ATM uses local ATM call control signaling to initiate and terminate ATM connections. For a complete description of the content and format of ATM signaling, refer to RFC-1577, *ATM Signaling Support for IP over ATM."*

## Typical CIP over ATM Configuration

In the following illustration, three ATM networks are configured as Logical IP Subnetworks (LIS1, LIS2, and LIS3). The ATM switches in subnets 20.xx and 30.xx provide IP routing services for their respective endstations.



**Classical IP Architecture**

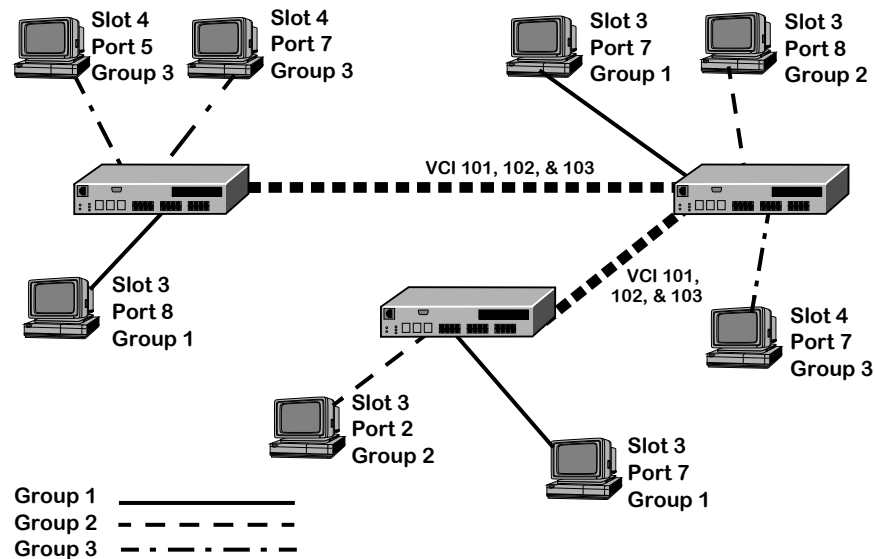
## Point-to-Point Bridging

Point to point bridging is a service that enables two Groups to communicate across an ATM network using a single virtual circuit (VC). The VC can be configured to be a Switched Virtual Circuit (SVC) or a Permanent Virtual Circuit (PVC).

Point to point bridging can use either of two types of encapsulation.

- RFC 1483 -- LLC encapsulation. RFC 1483 defines two methods for transmitting data over a VC: VC-Based Multiplexing and LLC encapsulation. The OmniStack supports only LLC encapsulation. The main advantage of RFC 1483 is its interoperability with other vendors.
- OmniStack encapsulation. OmniStack encapsulation is a more efficient method, because it uses fewer bytes and word-aligns the frame for transmission.

The following illustration shows how multiple instances of Point-to-Point bridging can be supported over separate VCIs. Three Groups are linked over the ATM backbone in a one-to-one configuration, with Group 1 communicating over VCI 101, Group 2 communicating over VCI 102, and Group 3 communicating over VCI 103.



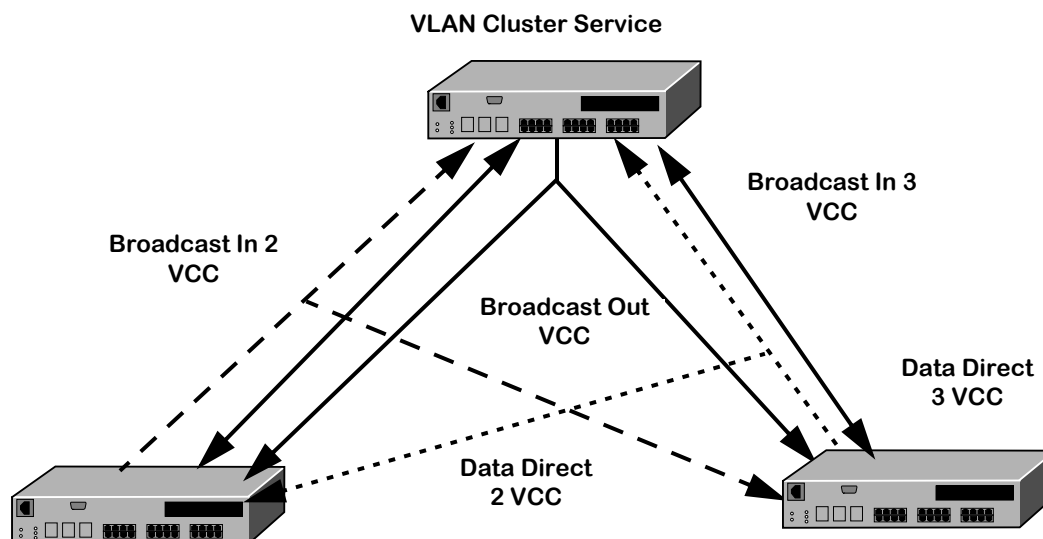
Point-to-Point Bridging

## VLAN Clusters

A VLAN cluster (X-LANE) consists of a collection of switches interconnected over an ATM-switched network, in which the switches are mesh-interconnected with point-to-point and (optionally) point-to-multipoint virtual circuits. Up to 33 switches (including the local switch) may be included in a VLAN cluster. The mesh of circuits acts as a single VLAN cloud, appearing as a loop-free bridge topology. This configuration is further optimized through the use of point-to-multipoint virtual circuits to provide a distributed broadcast/unknown capability.

A VLAN cluster implementation is similar to LANE, but has the following advantages:

- It is more scalable.
- It is static (no dynamic VCs)
- The need for PNNI is eliminated
- The packet format remains unchanged; no translations are made
- A number of VLAN Groups can be attached to the same VLAN Cluster
- It is not susceptible to a single point of failure or choke point, as is LANE, in which the LE servers must be distributed to avoid creating a single point of failure.



### VLAN Clusters

The VLAN Cluster service can interface to multiple VLAN Cluster services over a single ATM interface. You have the option of configuring one or more Groups to multiplex each set of mesh interconnections. (The number of Groups that can be multiplexed depends upon the encapsulation—Alcatel Trunking or 1483—that you select.) The user also has the option to select one of two methods for forwarding of broadcast, multicast, or unknown unicast destination traffic. These two methods are either to allow all traffic to bi-directionally traverse point-to-point (Data Direct) circuits along with the known unicast traffic, or to allow broadcast, multicast and unknown unicast traffic to use a separate set of point-to-multipoint virtual circuits.

VLAN Clusters can use either of two types of ATM virtual circuits; point-to-point or point-to-multipoint. The following paragraphs describe how these circuits are configured for each method of operation.

### Method 1

Method 1 provides both point-to-point virtual circuits (for VLAN forwarding) and point-to-multipoint (for flooding) virtual circuits.

- **Data Direct** circuits (Data Direct 2 and Data Direct 3, above) are point-to-point virtual circuits that forward frames that have known unicast destination addresses with a learned association with the circuit. These circuits are used for two-way frame forwarding between pairs of switches in a full mesh throughout the VLAN Cluster.
- **Broadcast** circuits (Broadcast Out, Broadcast In 2, and Broadcast In 3, above) are point-to-multipoint virtual circuits that are used to forward frames that have a broadcast, multicast, or unknown unicast destination address. These circuits are used for one-way traffic only. One circuit originates at each switch and terminates at all switches in the cluster. This configuration provides a distributed BUS function, in contrast to the centralized BUS server provided with LANE.

### Method 2

In Method 2, Data Direct circuits provide the functionality of both types of circuits used in method 1. That is, Data Direct circuits provide point-to-point virtual circuits that handle both VLAN forwarding and flooding traffic.

These types of frames must be sent to each switch that is part of the Cluster. Therefore, a copy of a frame is sent on each Data Direct virtual circuit within the Cluster. This method minimizes the number of connections required to support full connectivity between OmniStacks while providing a loop-free bridged topology.

VLAN Clusters can be configured to use the same encapsulation as that used by either Alcatel's ATM trunking service or RFC 1483 encapsulation. With VLAN Clusters, OmniStacks learn the data associated with a remote switch by directly associating the MAC addresses with the circuit.

# Configuring ATM Services

The five ATM Services (LANE Client, Trunking, Classical IP, Point-to-Point Bridging, and VLAN Clusters) are created and configured primarily with the following commands:

- **cas** - Create a Service. Use this command to create a new ATM service.
- **mas** - Modify a Service. Use this command to modify an existing ATM service.
- **das** - Delete a Service. Use this command to delete an existing ATM service.
- **vas** - View a Service. Use this command to view configuration information for one or all ATM services currently on the switch.

In addition, you can view status and statistical information for LANE Client, Classical IP, and VLAN Clusters services with the **vss** command. The **vss** command is part of the ATM menu, but it is not necessary to actually be in the ATM menu when you invoke the command.

## Services Menu

To view the Services menu, type **services** at any prompt, then type **?** to see the list of commands.

/Services % ?				
Command	Service Menu			
-----	-----			
cas	Create a service (PTOP bridging/Classical IP/Trunking/LANE			
mas	Modify a service			
das	Delete a service			
vas	View a service			
Main	File	Summary	VLAN	Networking
Interface	Security	System	Services	Help
Services %				

## Creating a Service

Any of the five ATM services is created by basically the same process, with additional configuration required for some services. Those parameters unique to a particular service are described under the applicable heading later in this chapter. To create an ATM service, follow the steps below:

1. Type **cas**, followed by the slot/port for the service. A screen similar to that shown below is displayed:

```

/Services % cas 2/1

Slot 2 Port 1 Service 1 Configuration

1) Description (30 chars max)      : LAN Emulation Service 2
2) Service type { LANE Client (1),
    1483 Scaling (2)
    Trunking (4),
    Classical IP(5),
    PTOP Bridging(6),
    VLAN cluster(7) } : LAN Emulation
21) LAN Type { 802.3 (1),
    802.5 (2) } : 802.3
22) Change LANE Cfg { NO (1),
    YES (2) } : NO
23) V2 Capable { Disable (1),
    Enable (2) } : Enable
3) Connection Type { PVC(1),
    SVC(2) } : SVC
30) SEL for the ATM address : 02
4) LAN Emulated Groups : 1
5) LECS Address (40-char-hex) : 4700790000000000000000000000A03E00000100
6) Admin Status { disable(1),
    enable(2) } : Enable
7) Bandwidth Group (1-8) : 1

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

2. The following fields are common to all ATM service types. Enter values for the remaining fields, as described below:
  - a. **1. Description:** Enter a description of this service (up to 30 characters).
  - b. **2. Service Type:** Note that ATM services for ports on a newly-installed ATM board default to 802.3 LANE Client (LEC). To change the port to another service, enter one of the following: **2=4** (for Trunking); **2=5** (for Classical IP); **2=6** (for PTOP Bridging); **2=7** (for VLAN Cluster).

### ◆ Note ◆

1483 scaling services (option 2) are *not* supported on the OmniStack.

- c. **3. Connection Type:** Enter **3=1** for PVC or **3=2** for SVC. For more details, see *PVC/SVC Support* on page 28-2.

- d. **6. Admin Status:** Enter **6=1** to disable the Administrative Status, **6=2** to enable it. Disabling Admin Status has the effect of taking the Port off-line.
- e. **7. Bandwidth Group:** A bandwidth group is a reserved amount of bandwidth on a port. All OSASM modules allow you to configure up to eight (8) bandwidth groups. Bandwidth groups are ordered by priority, with bandwidth group 1 having the highest priority and bandwidth group 8 having the lowest. See Chapter 26, “Managing OSASM Access Ports,” for documentation on configuring and displaying bandwidth group parameters.

### Creating a LANE Client Service

To create a LANE Client service:

1. Type **cas** followed by the slot/port for the service. A screen similar to that shown below is displayed:

```
/Services % cas 2/1
```

#### Slot 2 Port 1 Service 2 Configuration

- |     |  |   |                         |
|-----|--|---|-------------------------|
| 1)  | Description (30 chars max)   | : | PTOP Bridging Service 1 |
| 2)  | Service type { LANE Client (1),<br>1483 Scaling (2)<br>Trunking (4),<br>Classical IP(5),<br>PTOP Bridging(6),<br>VLAN cluster(7) } | : | PTOP Bridging           |
| 10) | Encaps Type { Private (1),<br>RFC1483(2) }   | : | Private                 |
| 3)  | Connection Type { PVC(1),<br>SVC(2) }  | : | PVC                     |
| 4)  | PTOP Groups  | : | 1                       |
| 5)  | PTOP connection  | : | none                    |
| 6)  | Admin Status { disable(1),<br>enable(2) }  | : | Enable                  |
| 7)  | Bandwidth Group (1-8)  | : | 1                       |

```
Enter (option=value/save/cancel) : 2=1
```

2. Note that, if this is a previously-unconfigured port, the service will have already defaulted to an 802.3 LANE Client service. In that case, this step is not necessary. If you are changing from another service (such as PTOp, as shown above) to LANE Client, enter:

```
2=1 (for LANE Client)
```

#### ◆ Note ◆

The connection type must be SVC to use LANE client service. If the connection type is not already SVC, it will automatically be set to SVC when you select LANE Client as the service type.

This will display the LANE Client menu, shown below. This menu contains default values for the new service you are creating.

**Slot 2 Port 1 Service 2 Configuration**

```

1) Description (30 chars max)      : LAN Emulation Service 2
2) Service type { LANE Client (1),
    1483 Scaling (2),
    Trunking (4),
    Classical IP(5),
    PTOp Bridging(6),
    VLAN cluster(7) } : LAN Emulation
21) LAN Type { 802.3 (1),
    802.5 (2) } : 802.3
22) Change LANE Cfg { NO (1),
    YES (2) } : NO
23) V2 Capable { Disable (1),
    Enable (2) } : Enable
3) Connection Type { PVC(1),
    SVC(2) } : SVC
30) SEL for the ATM address : 02
4) LAN Emulated Group : 1
5) LECS Address (40-char-hex) : 4700790000000000000000000000A03E00000100
6) Admin Status { disable(1),
    enable(2) } : Enable
7) Bandwidth Group (1-8) : 1

```

Enter (option=value/save/cancel) :

3. To change any of the remaining fields, enter the option number, followed by the value you want to change, as described in the paragraphs below:
  - a. **21. LAN type:** The type of LAN supported by the LE Client. Enter **21=1** for Ethernet (802.3), or **21=2** for Token Ring (802.5) clients.
  - b. **22. Change LANE Cfg:** Enter Yes (2) if you want to make LANE configuration changes. A submenu appears, allowing you to change your LANE configuration parameters. This submenu is described below.
  - c. **23. V2 Capable:** The version of LANE supported by the LE Client. Enter **23=1** for Version 1.0, or **23=2** for Version 2.0. See *LANE Version 2.0* on page 28-5 for more information on LANE Version 2.0.
  - d. **3. Connection Type:** Enter **3=2** for SVC. LANE client service supports only SVC. For more details, see *PVC/SVC Support* on page 28-2.
  - e. **30. SEL for the ATM address:** For SVCs, enter a hexadecimal selector (SEL) byte from **0** to **ff** for the ATM address. This value *must* be equal to the last byte of both end point addresses of the SVC. (This option will *not* appear unless you select SVC as the connection type in option 3.)
  - f. **4. LAN Emulated Groups:** Enter the number of the group(s) that is to be part of the LANE client service.
  - g. **5. LECS Address:** Enter the 40 character hex address of the LECS (LAN Emulation Configuration Server). The default is the ATM Forum-defined, well-known LECS address.
4. After you have made all the changes, type **save** to create your configuration. If you need to configure additional LANE Client parameters, continue to the next section.

## Setting LANE Client Parameters

LANE configuration parameters are set from a submenu that you access from the **cas** or **mas** command by typing **22=2** (change LANE configuration) while the LANE Client menu is displayed. A screen similar to that shown below will then be displayed.

### ◆ Note ◆

If you have multiple ELANs configured in your ATM network, you will need to specify an ELAN name (line 16) that this service is to join. The ELAN name must match the name used in the LECS. If the names do not match, this ELAN will be joined with the default ELAN.

```

Enter (option=value/save/cancel) : 22=2
Slot 2 Port 1 Service 4 LANE Configuration Parameters
1) Proxy { NO (1), YES (2) } : YES
2) Max Frame Size { 1516 (1), 4544 (2)
                      9234 (3), 18190 (4)
                      1580 (5) } : 1516
3) Use translation options{NO (1), YES (2) } : YES (use Swch menu to set)
4) Use Fwd Delay time { NO (1), YES (2) } : NO
5) Use LE Cfg Server (LECS) { NO (1), YES (2)} : YES
6) Use Default LECS Address (LECS) { NO (1), YES (2)} : YES
7) Control Time-out (in seconds) : 10
8) Max Unknown Frame Count : 10
9) Max Unknown Frame Time (in seconds) : 10
10) VCC Time-out Period (in minutes) : 20
11) Max Retry Count : 2
12) Aging Time (in seconds) : 300
13) Expected LE_ARP Resp Time (in seconds) : 1
14) Flush Time-out (in seconds) : 4
15) Path Switching Delay (in seconds) : 6
16) ELAN name (32 chars max) : ELAN 1
17) Ring Number (1 - 4095) : 0
18) Bridge Number (1 - 15) : 0
19) Initial Control Timeout (in seconds) : 5
20) Control Timeout Multiplier (2-5) : 2

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

Modify the fields, as applicable, as described below:

**1. Proxy:** Always set to YES. Instead of registering MAC addresses at initialization time, the switch processes every LE\_ARP sent by the LES. It looks up the forwarding table (filtering database) maintained by source learning to check whether the requested MAC address can be reached through another interface on the virtual bridge (same virtual LAN).

**2. Max Frame Size:** The maximum size of a data frame that the LE client will send over the Multicast Send VCC, or receive on either the Multicast Send VCC or the Multicast Forward VCC. Enter **2=1** for 1516 frames; **2=2** for 4544 frames; **2=3** for 9234 frames; **2=4** for 18190 frames, or **2=5** for 1580 frames.

**3. Use translation options:** Indicate whether you want to use the frame translations offered through the **switch** menu, which is described in Chapter 16, "Configuring LAN Switch Translations." If you choose **No**, Ethernet frames will be used by default for 802.3 ELANs.

**4. Use Fwd Delay time:** (Default NO) If used, it is the maximum time (in seconds) that an LE Client will maintain an entry for a non-local MAC address in its MAC table without verification.

- 5. Use LE Cfg Server:** (Default YES). If you set this parameter to NO, you will need to enter a LES Address, as it will be set to all zeroes. You can enter this address after you exit this submenu and return to the **cas** or **mas** menu.
- 6. Use Default LECS address:** (Default YES). If you set this parameter to NO, you will need to enter a LECS Address. You can enter this address after you exit this submenu and return to the **cas** or **mas** menu.
- 7. Control Time-out:** The timeout period (in seconds) used for most request/response control frame interactions. Default 120, Min=10, Max=300.
- 8. Max Unknown Frame Count:** The number of frames as specified in item 9 below.
- 9. Max Unknown Frame Time:** The length of time (in seconds) during which the LE Client will send no more than the number of frames specified in Maximum Unknown Frame Count (see item 8 above) to the BUS for a given unicast LAN Destination. It is also the maximum time the LE Client will wait before it must initiate an ARP frame to resolve that LAN Destination. Default=1, Min=1, Max=60.
- 10. VCC Time-out Period:** The maximum length of time (in minutes) that an LE Client will keep a Data Direct VCC after it has not been used to transmit or receive frames. Used only for SVC Data Direct VCCs. Default=20, No Max or Min.
- 11. Max Retry Count:** Maximum number of times an LE Client may retry an **LE\_ARP\_REQUEST** for a given frame's LAN Destination. The original request does not count. Default=1, Min=0, Max=2.
- 12. Aging Time:** The maximum time (in seconds) that an LE Client will maintain an entry in its LE\_ARP cache. If the address is not resolved within this time period, the entry is deleted. Default=300, Min=10, Max=300.
- 13. Expected LE\_ARP Resp Time:** The maximum time (in seconds) the LE Client expects an ARP request/response cycle to take. Used for retries and verifies. Default=1, Min=1, Max=30.
- 14. Flush Time-out:** Length of time (in seconds) an LE Client will wait for an **LE\_FLUSH\_RESPONSE** after sending an **LE\_FLUSH\_REQUEST**, after which it will begin taking recovery action. Default=4, Min=1, Max=4.
- 15. Path Switching Delay:** After sending a frame to the BUS, the length of time (in seconds) the LE Client will wait before assuming the frame has either been delivered to the client or has been discarded. Default=6, Min=1, Max=8.
- 16. ELAN name:** Enter a name (up to 32 characters) for the emulated LAN the LEC either wants to join or has last joined.
- 17. Ring Number:** The ring number assigned to the Token Ring for participation in source routing. This field displays only for 802.5 Token Ring clients, not 802.3 Ethernet.
- 18. Bridge Number:** A unique number used to identify the source routing bridge. This field displays only for 802.5 Token Ring clients. If you are configuring an 802.3 Ethernet client, this field will not display.
- 19. Initial Control Timeout:** The timeout period (in seconds) used for timing out most request/response control frame interactions. The valid range is 1 to 10 seconds. (The default is 5 seconds.)
- 20. Control Timeout Multiplier:** The retry multiplier of the control timeout parameter (set in option 19 above). The valid range is 2 to 5. (The default is 2.)

## Creating a Trunking Service

To create a trunking service:

1. Type **cas**, followed by the slot/port for the service:
2. From the **cas** menu, enter:

**2=4**

This will display the Trunking menu (shown below).

Enter (option=value/save/cancel) : 2=4

### Slot 2 Port 1 Service 2 Configuration

- |    |   |                      |
|----|---|----------------------|
| 1) | Description (30 chars max)  | : Trunking Service 2 |
| 2) | Service type { LANE client (1),<br>1483 Scaling (2),<br>Trunking (4),<br>Classical IP(5),<br>PTOP Bridging(6),<br>VLAN cluster(7) } | : Trunking           |
| 3) | Connection Type { PVC(1),<br>SVC(2) }   | : PVC                |
|    | 30) SEL for the ATM address   | : 02                 |
| 4) | Trunked Groups  | : 1                  |
| 5) | Connection  | : none               |
| 6) | Admin Status { disable(1),<br>enable(2) }   | : Enable             |
| 7) | Bandwidth Group (1-8)   | : 1                  |

3. You must create at least one connection. Type **5=** followed by the connection number, which must be in the range from 1-1023. For example:

**5=700**

Enter (option=value/save/cancel) : 5=700

Conn VCI 700 doesn't exist, VCI 700 will be created w/default values!

4. Finish your configuration by changing the default values of any of the remaining fields, if required, as described below:
  - a. **3. Connection Type:** Enter **3=1** for PVC or **3=2** for SVC. ATM Trunking supports either connection type. For more details, see *PVC/SVC Support* on page 28-2.
  - b. **30. SEL for the ATM address:** For SVCs, enter a hexadecimal selector (SEL) byte from **0** to **ff** for the ATM address. This value *must* be equal to the last byte of both end point addresses of the SVC. (This option will *not* appear unless you select SVC as the connection type in option 3.)
  - c. **4. Trunked Groups:** Enter the number of the group that is to be part of the trunking service. The group number must match the group number on the remote switch.

### ◆ Note ◆

The maximum number supported in ATM trunking is 48, depending on the number of MAC addresses available. Each group will use up one (1) MAC address for the vport. Therefore, if you want to trunk 48 groups, you must have 48 MAC addresses.

- d. **5. Connection:** Enter the number of the VCI that is to be part of the trunking service. Use the command **vc** to view VCI numbers. If the VCI you name doesn't exist, it will be created.
5. After you have made all the changes, type **save** to create your configuration.

### Creating a Classical IP Service

To create a Classical IP service:

1. Type **cas** followed by the slot/port for the service. It shows the default service:

```
/Services % cas 2/1
```

```
Slot 2 Port 1 Service 7 Configuration
1) Description (30 chars max)          : PTOP Bridging Service 7
2) Service type { LANE client (1),
    1483 Scaling (2)
    Trunking (4),
    Classical IP(5),
    PTOP Bridging(6),
    VLAN cluster(7) }                 : PTOP Bridging
10) Encaps Type { Private (1),
    RFC1483(2) }                      : Private
3) Connection Type { PVC(1),
    SVC(2) }                          : PVC
4) PTOP Groups                        : 1
5) PTOP connection                    : none
6) Admin Status { disable(1),
    enable(2) }                      : Enable
7) Bandwidth Group (1-8)              : 1
```

2. Enter:

```
2=5
```

#### ◆ Note ◆

The group to which you are assigning Classical IP must be a CIP group. If it is not, the following error message will be displayed:

**Group is not CIP..**

You must create a new group with ATM CIP enabled. You cannot modify an existing group to enable CIP. See the **crgp** command in the VLAN menu in Chapter 17, “Managing Groups and Ports.”

3. Once the group is defined as a CIP group, you can now run CIP over that group. To do this, you must first assign the service you are creating to the CIP group. For example, to assign the service to Group 4, enter:

```
4=4
```

The following message will be displayed:

**Warning Group is CIP, change Group (n)? :**

Enter ‘Yes’

4. You can now create the CIP service. To create the service, enter:

Enter (option=value/save/cancel) : 2=5

A screen similar to the following will be displayed:

```

Slot 2 Port 1 Service 7 Configuration
1) Description (30 chars max)      : Classical IP Service 7
2) Service type { LANE client (1),
    1483 Scaling (2)
    Trunking (4),
    Classical IP(5),
    PTOp Bridging(6),
    VLAN cluster(7) } : Classical IP
3) Connection Type { PVC(1),
    SVC(2) } : PVC
4) Classical IP Groups : 4
5) Neighboring connections : none
6) Admin Status { disable(1),
    enable(2) } : Enable
7) Bandwidth Group (1-8) : 1

```

Enter (option=value/save/cancel) :

5. Before you can save the CIP service, you must specify a connection using a VCI. If the VCI doesn't exist, the system will create it. For example to specify the connection as VCI 201, enter:

5=201

A screen similar to the following will be displayed:

Conn VCI 201 doesn't exist, VCI 201 will be created w/ default values!

Enter (option=value/save/cancel) :

6. Enter **save** to create the service.
7. Enter values for the following fields as described below if any of the defaults do not match your desired configuration:
- 3. Connection Type:** Choose PVC or SVC. Classical IP supports both. For more details, see *PVC/SVC Support* on page 28-2.

#### ◆ Note ◆

The CIP service uses PVC as the default connection type. A CIP configuration that uses PVCs is known as a routed 1483 configuration. With PVCs you do not need an ARP server. To use SVCs, you will need to supply an ARP server address. For details on how to accomplish this, see *Modifying a Classical IP Service* on page 28-32.

- 30. SEL for the ATM address:** For SVCs, enter a hexadecimal selector (SEL) byte from 0 to ff for the ATM address. This value *must* be equal to the last byte of both end point addresses of the SVC. (This option will *not* appear unless you select SVC as the connection type in option 3.)
- 4. Classical IP Groups:** Enter the group number that is to be part of the Classical IP service.

- d. **5. Neighboring connections:** Enter the number of the VCI that is to be part of the Classical IP service. Use the command **vvc** to view VCI numbers. If the VCI you name doesn't exist, it will be created.

8. After you have made all the changes, type save to create the service.

## Creating a PTOp Bridging Service

To create a PTOp Bridging service:

1. Type **cas**, followed by the slot/port for the service. It shows the current values for the default service. A screen similar to the following will be displayed:

Services % cas 2/1

```
Slot 2 Port 1 Service 1 Configuration
1) Description (30 chars max)      : LANE Client 1
2) Service type { LANE client (1),
    1483 Scaling (2)
    Trunking (4),
    Classical IP(5),
    PTOp Bridging(6),
    VLAN cluster(7) } : LANE Client
10) Encaps Type { Private (1),
    RFC1483(2) } : Private
3) Connection Type { PVC(1),
    SVC(2) } : PVC
4) PTOp Groups: 1
5) PTOp connection: none
6) Admin Status { disable(1),
    enable(2) } : Enable
7) Bandwidth Group (1-8) : 1

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

2. To select PTOp Bridging as the service, enter:

2=6

A screen similar to the following will be displayed:

```
Slot 2 Port 1 Service 1 Configuration

1) Description (30 chars max)      : PTOp Bridging Service 1
2) Service type { LANE client (1),
    1483 Scaling (2)
    Trunking (4),
    Classical IP(5),
    PTOp Bridging(6),
    VLAN cluster(7) } : PTOp Bridging
10) Encaps Type { Private (1),
    RFC1483(2) } : Private
3) Connection Type { PVC(1),
    SVC(2) } : PVC
4) PTOp Groups : 1
5) PTOp connection : none
6) Admin Status { disable(1),
    enable(2) } : Enable
7) Bandwidth Group (1-8) : 1

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

3. A PTOP bridging service must have at least one connection. To create that connection, type **5=** followed by the connection number, which is in the range from 1-1023. For example:

**Enter (option=value/save/cancel) : 5=2**

**Conn VCI 2 doesn't exist, VCI 2 will be created w/default values!**

**Services % cas 2/1**

4. Finish your configuration by changing the default values of any of the remaining fields, if required, as described below:
  - a. **10. Encaps Type:** Select the encapsulation type to use for frames. You can select RFC 1483 encapsulation or the same encapsulation used for Alcatel ATM trunking (i.e., private encapsulation). The 1483 encapsulation enables interoperability with other vendor switches. Enter **10=1** for private encapsulation or **10=2** for 1483 encapsulation.
  - b. **3. Connection Type:** Enter **3=1** for PVC or **3=2** for SVC. PTOP Bridging supports either type. For more details, see *PVC/SVC Support* on page 28-2.
  - c. **30. SEL for the ATM address:** For SVCs, enter a hexadecimal selector (SEL) byte from **0** to **ff** for the ATM address. This value *must* be equal to the last byte of both end point addresses of the SVC. (This option will *not* appear unless you select SVC as the connection type in option 3.)
  - d. **4. PTOP Groups:** Enter the number of the Group that is to be part of the PTOP service.
  - e. **5. PTOP Connection:** Enter the number of the VCI that is to be part of the PTOP service. Use the **vvc** command first to determine what VCI numbers have been assigned. If the VCI you name doesn't exist, it will be created.
5. After you have made all the changes, type **save** to create your configuration.

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

**Creating service, please wait...**

**Enabling service...  
/Services %**

### Creating a VLAN Cluster Service

To create a VLAN cluster service:

1. Type **cas**, followed by the slot/port for the service. It shows the default service (LANE Client):

Services % cas 2/1

```
Slot 2 Port 1 Service 1 Configuration
1) Description (30 chars max)      : LANE Client 1
2) Service type { LANE client (1),
    1483 Scaling (2)
    Trunking (4),
    Classical IP(5),
    PTOp Bridging(6),
    VLAN Cluster (7),
    VLAN cluster(7) }              : LANE Client
10) Encaps Type { Private (1),
    RFC1483(2) }                   : Private
3) Connection Type { PVC(1),
    SVC(2) }                       : PVC
4) PTOp Groups: 1
5) PTOp connection: none
6) Admin Status { disable(1),
    enable(2) }                    : Enable
7) Bandwidth Group (1-8)          : 1
```

2. Enter:

2=7

3. This will display the VLAN Cluster menu, as shown below.

```
Slot 2 Port 1 Service 1 Configuration
1) Description (30 chars max)      : VLAN cluster Service 1
2) Service type { LANE client (1),
    1483 Scaling (2)
    Trunking (4),
    Classical IP(5),
    PTOp Bridging(6),
    VLAN cluster(7) }              : VLAN cluster
21) Number of others in cluster    : 0
22) Change cluster information
    { NO (1), YES (2) }            : NO
23) Encapsulation format
    { 1483 (1), Alcatel trunking (2) } : 2
3) Connection Type { PVC(1),
    SVC(2) }                       : PVC
4) Trunked Groups                  : 1
5) Broadcast Out VC                : 0
6) Admin Status { disable(1),
    enable(2) }                    : Enable
7) Bandwidth Group (1-8)          : 1
Enter (option=value/save/cancel) :
```

4. Finish your configuration by changing the default values of any of the remaining fields, if required, as described below:
  - a. **21. Number of others in cluster:** The number of switches included in this VLAN cluster. You may include up to 32 switches in a single cluster. This field must be greater than zero (0).

- b. **22. Change cluster info:** Enter Yes (2) if you want to configure Data Direct and Broadcast virtual circuits. A submenu appears, allowing you to configure these virtual circuits. This submenu is described in *Modifying VLAN Cluster Parameters* on page 28-37.
- c. **23. Encapsulation format:** Select the encapsulation type to use for frames. You can select RFC 1483 encapsulation or the same encapsulation used for Alcatel ATM trunking. The 1483 encapsulation enables interoperability with other vendor switches, such as the Newbridge 36150 and 36170.

◆ **Note** ◆

Alcatel trunking encapsulation is not supported on the OmniStack.

- d. **3. Connection Type:** Enter **3=1** for PVC. VLAN Clusters supports only PVC. For more details, see *PVC/SVC Support* on page 28-2.
  - e. **4. Trunked/Bridged Groups:** Enter the number of the Group that is to be part of this VLAN cluster service. If you selected 1483 encapsulation in Line 23, this line will read **Bridged Group** and you can specify only one Group. If you select the Alcatel trunking encapsulation in Line 23, this line will read **Trunked Groups** and you can specify multiple Groups.
  - f. **5. Broadcast Out VC:** Enter the number of the VCI to where broadcast frames will be sent. Use the command **vvc** to see what VCI numbers have already been assigned. If the VCI you name doesn't exist, it will be created.
5. After you have made all the changes, type **save** to create your configuration.

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

Creating service, please wait...

Enabling service...

/Services %

## Modifying a Service

To modify a service, type **mas**, followed by the slot/port and service number for the service. (The **vas** command shows the service numbers.) It shows the current values. Enter the number of the value you want to change followed by an equal sign and the new value.

### Modifying a LANE Client Service

To modify a LANE client service, type **mas** followed by the slot/port and service number for the service. It shows the current values.

Services % mas 2/1 4

#### Slot 2 Port 1 Service 4 Configuration

- |    |                               |   |  |
|----|-------------------------------|---|--|
| 1) | Description (30 chars max)    | : | LANE Client Service 4                    |
| 2) | LAN Emulated Groups           |   |  |
|    | 21) LAN Type { 802.3 (1),     |   |  |
|    | 802.5 (2) }                   | : | 802.3                                    |
|    | 22) Change LANE Cfg { NO (1), |   |  |
|    | YES (2) }                     | : | NO                                       |
|    | 23) V2 Capable { Disable (1), |   |  |
|    | Enable (2) }                  | : | Enable                                   |
| 3) | LECS Address (40-char-hex)    | : | 4700790000000000000000000000A03E00000100 |
| 4) | Admin Status { disable(1),    |   |  |
|    | enable(2) }                   | : | Enable                                   |
| 6) | Connection Type { PVC(1),     |   |  |
|    | SVC(2) }                      | : | SVC                                      |
|    | 60) SEL for the ATM address   | : | 04                                       |
| 7) | Bandwidth Group (1-8)         | : | 1  |

Enter (option=value/save/cancel) :

Enter the number of the value you want to change followed by an equal sign and the new value, for example to change the ATM address selector from 04 to 05, enter:

60=05

Enter (option=value/save/cancel) : 60=05

#### Slot 2 Port 1 Service 4 Configuration

- |    |                               |   |  |
|----|-------------------------------|---|--|
| 1) | Description (30 chars max)    | : | LANE Client Service 4                    |
| 2) | LAN Emulated Groups           |   |  |
|    | 21) LAN Type { 802.3 (1),     |   |  |
|    | 802.5 (2) }                   | : | 802.3                                    |
|    | 22) Change LANE Cfg { NO (1), |   |  |
|    | YES (2) }                     | : | NO                                       |
|    | 23) V2 Capable { Disable (1), |   |  |
|    | Enable (2) }                  | : | Enable                                   |
| 3) | LECS Address (40-char-hex)    | : | 4700790000000000000000000000A03E00000100 |
| 4) | Admin Status { disable(1),    |   |  |
|    | enable(2) }                   | : | Enable                                   |
| 6) | Connection Type { PVC(1),     |   |  |
|    | SVC(2) }                      | : | SVC                                      |
|    | 60) SEL for the ATM address   | : | 05                                       |
| 7) | Bandwidth Group (1-8)         | : | 1  |

Enter (option=value/save/cancel) :

After you have made all the changes, type **save** to update your configuration.

## Modifying a Trunking Service

To modify an ATM trunking service, type **mas** followed by the slot/port and service number for the service. It shows the current values.

Services % mas 2/1 2

### Slot 2 Port 1 Service 2 Configuration

- |    |   |                      |
|----|---|----------------------|
| 1) | Description (30 chars max)                | : Trunking Service 2 |
| 2) | Trunked Groups                            | : 1                  |
| 3) | Connection                                | : 700                |
| 4) | Admin Status { disable(1),<br>enable(2) } | : Enable             |
| 6) | Connection Type { PVC(1),<br>SVC(2) }     | : PVC                |
| 7) | Bandwidth Group (1-8)                     | : 1                  |

Enter the number of the value you want to change followed by an equal sign and the new value, for example to change the Connection Type to SVC, type:

6=2

Enter (option=value/save/cancel) : 6=2

### Slot 2 Port 1 Service 2 Configuration

- |     |   |                      |
|-----|---|----------------------|
| 1)  | Description (30 chars max)                | : Trunking Service 2 |
| 2)  | Trunked Groups                            | : 1                  |
| 3)  | Address (40-char-hex)                     | : none               |
| 4)  | Admin Status { disable(1),<br>enable(2) } | : Enable             |
| 6)  | Connection Type { PVC(1),<br>SVC(2) }     | : SVC                |
| 60) | SEL for the ATM address                   | : 02                 |
| 7)  | Bandwidth Group (1-8)                     | : 1                  |

Enter (option=value/save/cancel) :

After you have made all the changes, type **save** to update your configuration.

### Modifying a Classical IP Service

To modify a Classical IP service:

1. Type **mas**, followed by the slot/port and service number for the service. It shows the current values. Enter the number of the value you want to change followed by an equal sign and the new value. For example, to change the connection type to SVC, type:

**6=2**

**Enter (option=value/save/cancel) : 6=2**

**Slot 2 Port 1 Service 7 Configuration**

- |     |   |                          |
|-----|---|--------------------------|
| 1)  | Description (30 chars max)                | : Classical IP Service 7 |
| 2)  | Classical IP Groups                       | : 4                      |
| 3)  | Neighboring addresses (40 chr-hex):       | none                     |
| 4)  | Admin Status { disable(1),<br>enable(2) } | : Enable                 |
| 6)  | Connection Type { PVC(1),<br>SVC(2) }     | : SVC                    |
| 60) | SEL for the ATM address                   | : 07                     |
| 7)  | Bandwidth Group (1-8)                     | : 1                      |

Note that when you create an SVC connection, there are several other parameters you can change. The parameters below are the same as those used in the **cva** command, which can be found in the ATM menu. The **cva** command is described in Chapter 26, "Configuring OSASM Access Ports." The example below shows the service being modified with a new neighboring address:

**Enter (option=value/save/cancel) : 3=111111111122222222223333333333334444444444**

**Address '111111111122222222223333333333334444444444':  
doesn't exist, this address will be created with default values!**

**Connection Address 111111111122222222223333333333334444444444 Configuration**

- |     |   |               |
|-----|---|---------------|
| 1)  | Description (30 chars max)                        | : Address 3   |
| 2)  | Requested Tx QoS Class { Unspecified }            | : 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 }            | : 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        |

After you have made all changes, type **save** to update your configuration.

Enter (option=value/save/cancel) : save  
Creating address connection, please wait...

### Slot 2 Port 1 Service 7 Configuration

- 1) Description (30 chars max) : Classical IP Service 7
- 2) Classical IP Groups : 4
- 3) Neighboring addresses (40 chr-hex) : 11111111112222222223333333334444444444
- 4) Admin Status { disable(1),  
enable(2) } : Enable
- 6) Connection Type { PVC(1),  
SVC(2) } : SVC
- 60) SEL for the ATM address : 07
- 7) Bandwidth Group (1-8) : 1

Enter (option=value/save/cancel) : save  
Modifying service, please wait...

Resetting service, please wait...  
Enabling service...  
/Services %

### Adding Static ARP Entries for CIP

To add static entries to the CIP ARP table, use the **aat** command (found in the ATM menu):

1. Enter **aat**, followed by the slot number, a slash (/), the port number and the CIP service number where you want to create this static entry. For example, to add an ARP entry for service number 4 on the first port in slot 2, you would enter:

**aat 2/1 4**

Make sure the service number you indicate is an ATM CIP service. You cannot use the **aat** command with any service type but CIP. See *Modifying a Classical IP Service* on page 28-32 for more information on creating a CIP service.

2. The following prompt displays:

**Enter <IP addr> <vci> :**

Enter the IP address and the Virtual Circuit Identifier (VCI) for the CIP ARP entry you want to add. Press **<Enter>** when complete.

3. A message displays indicating the CIP ARP entry was added to the table:

**Static entry successfully added to the CIP ARP table.**

The screen again prompts you to enter more ARP entries.

**Enter <IP addr> <vci> :**

4. Continue entering ARP entries until you are complete. Press **<Enter>** at the **Enter <IP addr> <vci> :** prompt when you are done adding entries, and you will be exited from the **aat** command.

## Modifying a PTOp Bridging Service

To modify a PTOp Bridging service:

1. Type **mas** followed by the slot/port and service number for the service. The current values are displayed.

```
/Services % mas 2/1 1
```

### Slot 2 Port 1 Service 1 Configuration

```

1) Description (30 chars max)      : PTOp Bridging Service 1
2) PTOp Groups                     : 1
3) PTOp connection                 : 2
4) Admin Status { disable(1),
                               enable(2) } : Enable
5) Encaps Type { Private (1),
                RFC1483(2) }           : Private
6) Connection Type { PVC(1),
                   SVC(2) }             : PVC
7) Bandwidth Group (1-8)           : 1

```

```
Enter (option=value/save/cancel) : 5=2
```

2. Enter the number of the value you want to change followed by an equal sign and the new value, for example to change the encapsulation type to RFC1483, type:

```
5=2
```

The modified configuration is now displayed.

### Slot 2 Port 1 Service 1 Configuration

```

1) Description (30 chars max)      : PTOp Bridging Service 1
2) PTOp Groups                     : 1
3) PTOp connection                 : 2
4) Admin Status { disable(1),
                               enable(2) } : Enable
5) Encaps Type { Private (1),
                RFC1483(2) }           : RFC 1483
6) Connection Type { PVC(1),
                   SVC(2) }             : PVC
7) Bandwidth Group (1-8)           : 1

```

3. After you have made all the changes, type **save** to update your configuration.

```
Enter (option=value/save/cancel) : save
Modifying service, please wait...
```

```
Resetting service, please wait...
Enabling service...
```

```
/Services %
```

### Modifying a VLAN Cluster Service

To modify a VLAN Cluster service:

1. Type **mas**, followed by the slot/port and service number for the service. The current values are displayed.

```
Services % mas 2/1
Slot 2 Port 1 Service 1 Configuration

1) Description (30 chars max)      : VLAN cluster Service 1
2) Trunked Groups                  : 1
   21) Number of others in cluster : 2
   22) Change cluster information
       { NO (1), YES (2) }         : NO
   23) Encapsulation format
       { 1483 (1), Alcatel trunking (2) } : 2
3) Broadcast Out VC                : 0
4) Admin Status { disable(1),
                  enable(2) }       : Enable
6) Connection Type { PVC(1),
                    SVC(2) }         : PVC
7) Bandwidth Group (1-8)           : 1
```

2. Enter the number of the value you want to change followed by an equal sign and the new value. For example to change the description, type:

```
1=Cluster VLAN 1
```

A screen similar to the following will be displayed:

```
Slot 2 Port 1 Service 1 Configuration

1) Description (30 chars max)      : Cluster VLAN 1
2) Trunked Groups                  : 1
   21) Number of others in cluster : 2
   22) Change cluster information
       { NO (1), YES (2) }         : NO
   23) Encapsulation format
       { 1483 (1), Alcatel trunking (2) } : 2
3) Broadcast Out VC: 0
4) Admin Status { disable(1),
                  enable(2) }       : Enable
6) Connection Type { PVC(1),
                    SVC(2) }         : PVC
7) Bandwidth Group (1-8)           : 1

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

3. After you have made all the changes, type **save** to update your configuration.

## Modifying VLAN Cluster Parameters

Before you modify VLAN Cluster parameters, make sure you have created at least one VLAN Cluster. To modify VLAN Cluster parameters:

1. Access the VLAN Cluster Service submenu by typing **22=2** from either the **cas** or **mas** menu. A screen similar to that shown below is displayed.

### Slot 2 Port 1 Service 5 VLAN Cluster Configuration

Member Index	Description (a)	Data-Direct VCC (b)	Broadcast IN VC (c)
1	CLUSTERNUMBER1	201	202
2	CLUSTERNUMBER2	299	301

The following fields are fields that you can configure:

- a. **Description:** A 30 character description.
  - b. **Data-Direct VCC:** Enter the circuit number to be used as a point-to-point virtual circuit for a known unicast destination.
  - c. **Broadcast IN VC:** Enter the circuit number to be used as a one-way (in) broadcast virtual circuit.
2. To change one of parameters, type the index number of the VLAN Cluster, followed by a, b, or c, depending upon which value you want to change. For example, to change the description for index 1, type:

**1a=CLUSTER1**

The updated configuration will be displayed, as shown below:

### Slot 2 Port 1 Service 5 VLAN Cluster Configuration

Member Index	Description (a)	Data-Direct VCC (b)	Broadcast IN VC (c)
1	CLUSTER1	201	202
2	CLUSTERNUMBER2	299	601

save|cancel|? : save

3. After you have made all the changes, type **save** to update your configuration.

## Deleting a Service

To delete a service, type **das** followed by the slot/port and service number for the service.

**das 2/1 4**

A screen similar to that shown below is displayed.

**/Services % das 2/1 4**

### ATM Services

Slot	Serv Port	Service Num	Service Description	Type
====	=====	=====	=====	=====
2	1	1	PTOP Bridging Service 1	PTOP Priv
2	1	2	Trunking Service 2	Trunking
2	1	3	LANE Client Service 3	802.3 LEC
2	1	4	LANE Client Service 4	802.5 LEC

### ATM Services

Slot	Port	Serv Num	VC Typ	Oper Status	SEL	Groups	Conn VCI's/Addresses
====	=====	=====	=====	=====	=====	=====	=====
2	1	1	PVC	Disabled	N/A	1	100
2	1	2	PVC	Disabled	N/A	1	500
2	1	3	SVC	Initial	03	1	
2	1	4	SVC	Initial	04	1	

**Remove ATM Slot 2 Port 1 Service 4 (n)? : y**

Type **y**, then press **<Enter>** to delete the service, or type **n** or **<Enter>** to keep the service. If you choose to delete the service, the following messages will be displayed.

**Removing ATM Slot 2 Port 1 Service 4, please wait...**

**ATM Slot 2 Port 1 Service 4 removed**

**/Services %**

## Deleting Static ATM ARP Entries for CIP

To delete static entries from the CIP ARP table using the **dat** command:

1. Enter **dat**, followed by the slot number, a slash (/), the port number and the CIP service number where you want to delete this static entry. For example, to delete an ARP entry for service number 4 on the first port in slot 2, you would enter:

**aat 2/1 4**

Make sure the service number you indicate is an ATM CIP service. You cannot use the **dat** command with any service type but CIP. See *Modifying a Classical IP Service* on page 28-32 for more information on CIP services.

2. The following prompt displays:

**Enter <IP addr> <vci> :**

Enter the IP address and the Virtual Circuit Identifier (VCI) for the CIP ARP entry you want to delete. Press **<Enter>** when complete.

3. A message displays indicating the CIP ARP entry was deleted from the table:

**Static entry successfully deleted from the CIP ARP table.**

The previous prompt re-displays for you to enter more ARP entries.

**Enter <IP addr> <vci> :**

Continue entering ARP entries until you are completed. Press **<Enter>** at the **Enter <IP addr> <vci> :** prompt when you have finished deleting entries. You will be exited from the **dat** command.

## Viewing ATM Access Port Services

Before configuring a service, you can view the current ATM service configurations to determine whether you need to add a new service or modify an existing one. To view all ATM services on a switch, type **vas**. If you include the slot/port number, it displays only the services related to that port. The display includes the service number. You will need the service number to modify or delete a service.

**/Services % vas 2/1**

ATM Services				
Slot	Port	Serv Num	Service Description	Service Type
====	====	====	=====	=====
2	1	1	PTOP Bridging Service 1	PTOP Priv
2	1	2	Trunking Service 2	Trunking
2	1	3	LAN Emulation Service 3	802.3 LEC
2	1	4	LAN Emulation Service 4	802.5 LEC

ATM Services							
Slot	Port	Serv Num	VC Typ	Oper Status	SEL	Groups	Conn VCI's/Addresses
====	====	====	====	=====	=====	=====	=====
2	1	1	PVC	Disabled	N/A	1	100
2	1	2	PVC	Disabled	N/A	1	500
2	1	3	SVC	Initial	03	1	
2	1	4	SVC	Initial	04	1	

The fields displayed by the **vas** command are described below.

**Slot.** The slot number of the ATM service.

**Port.** The port number of the ATM service.

**Serv Num.** The ATM service number.

**Service Description.** A text description of the service. This can be entered with the **cas** command or modified with the **mas** command.

**Service Type.** The Service Type column for Ethernet LECs reads **802.3 LEC**. For Token Ring LECs, this column reads **802.5 LEC**. All ports on a newly-installed switch will automatically configure as 802.3 LECs.

**VC Type.** The virtual circuit type, which can be PVC (Permanent Virtual Circuit) or SVC (Switched Virtual Circuit).

**Oper Status.** The operational status of the ATM service, which can be **Enabled**, **Disabled**, or **Initial** (in an initializing mode).

**SEL.** The last byte of the ATM address.

**Groups.** The VLAN group number(s) associated with this service.

**Conn VCI's.** The Virtual Circuit Identifier (VCI) number used in this service.

**Addresses.** The MAC address(es) mapped to this service.

## Viewing General Service Statistics on a Port

To view general statistics for LANE Client services on a port, type in **vss** followed by the slot/port. For example, if you wanted to obtain statistics information for port 1 on the board in slot 2, you would enter:

**vss 2/1**

This command displays a screen similar to the following:

### Statistics for slot 2 interface 1

Srvc	Pkts In	Pkts Out	UPkts In	UPkts Out	BcPkts In	BcPkts Out	McPkts In	McPkts Out
====	=====	=====	=====	=====	=====	=====	=====	=====
1	331	40974	1007	1005	1324	39969	4000	4010
2	300	40001	990	988	1300	30000	3000	3001
3	200	30000	1000	1001	1205	40000	2654	2700

**Pkts In.** The total number of packets received at this Emulated LAN.

**Pkts Out.** The total number of packets sent from this Emulated LAN.

**UPkts In:** The number of packets received in a unicast format at this Emulated LAN. Unicast packets are transmitted to one recipient.

**UPkts Out:** The number of packets sent in a unicast format from this Emulated LAN.

**BcPkts In.** The number of packets received in a broadcast format at this Emulated LAN. Broadcast packets are transmitted to all recipients in the network.

**BcPkts Out.** The number of packets sent in a broadcast format from this Emulated LAN.

**McPkts In:** The number of packets received in a multicast format at this Emulated LAN. Multicast packets are transmitted to a select group of recipients.

**McPkts Out:** The number of packets sent in a multicast format from this Emulated LAN.

## Viewing Service Statistics for a LANE Client

To view statistics for a specific LANE Client service, type in **vss** (found in the ATM menu), followed by the slot/port and the service number for the service. For example, if you wanted to obtain statistics information for slot 2, port 1, service 1, you would enter:

**vss 2/1**

This command displays a screen similar to the following:

### Status/Statistics for slot 2 interface 1 Service 1

#### Service: LAN Emulation Service 1

```
LEC status      : Initial
ELAN Name       : default
ELAN Type       : 802.3
LEC ID          : 0
LES version     : ATM Forum 1.0
LES address     : 3903488001bc900001017838c00020da8436a0c1 (learned)
BUS address     : 3903488001bc900001017838c00020da8436a0c1
LECS address    : 4700790000000000000000000000a03e00000100 (ILMI/well-known LECS addr)
```

```
BUS
MC Forward VPC/VCC : 0/0    MC Send VPC/VCC      : 0/0
Echo suppress      : 0
```

```
LES
Control Direct VPC/VCC : 0/47    Cntl Distribute VPC/VCC : 0:48
Control Frames Sent   : 19367    Control Frames Rcvd     : 19415
LE arps Sent          : 13       LE arps Received        : 23
```

```
LECS
Configuration VPC/VCC : 0/0
Packets Sent          : 0       Packet Received         : 0
```

```
STATISTICS
Packets In            : 331     Unicast Packets In      : 1007
Packets Out           : 40974   Unicast Packets Out     : 1005
Broadcast Pkts In     : 1324    Multicast Packets In    : 4000
Broadcast Pkts Out    : 39969   Multicast Packets Out   : 4010
```

Token Ring LECs display two additional fields after the **LEC ID** field. These additional fields are **Bridge Num** and **Ring Num**.

The following section describes the fields displayed by VSS for a specific LANE Client service (the fields displayed by VSS for general Lane Client services are also included under the heading labeled **STATISTICS**).

**Service:** The name of the service.

**LEC Status:** The current status of the LEC. The LEC may be either **Operational** or **Non-Operational**.

**ELAN Name:** The name of the Emulated LAN.

**ELAN Type:** The Emulated LAN type. Possible options are 802.3 (Ethernet) or 802.5 (Token Ring).

**LEC ID:** The LAN emulation client identifier.

**Bridge Num:** A unique number used to identify the source routing bridge. This field displays only for 802.5 Token Ring clients.

**Ring Num:** The ring number assigned to the Token Ring for participation in source routing. This field displays only for 802.5 Token Ring clients.

**LES version:** The version of the LAN Emulation Server.

**LES address:** The address of the LAN Emulation Server.

**BUS address:** The address of the Broadcast Unknown Server.

**LECS address:** The address of the LAN Emulation Configuration Server.

**BUS:**

**MC Forward VPC/VCC:** VPC contains the VPI that identifies the VPC where it connects to this LE Client. VCC contains the VCI that identifies the VCC where it connects to this LE Client.

**MC Send VPC/VCC:** VPC contains the VPI that identifies the VPC where it connects to this LE Client. VCC contains the VCI that identifies the VCC where it connects to this LE Client.

**Echo Suppress:** The number of packets received with the client's LEC-ID.

**LES:**

**Control Direct VPC/VCC:** VPC contains the VPI that identifies the VPC where it connects to this LE Client. VCC contains the VCI that identifies the VCC where it connects to this LE Client.

**Cntl Distribute VPC/VCC:** VPC contains the VPI that identifies the VPC where it connects to this LE Client. VCC contains the VCI that identifies the VCC where it connects to this LE Client.

**Cntl Frames Sent:** The number of control frames sent to the LES.

**Cntl Frames Rcvd:** The number of control frames received from the LES.

**LE arps Sent:** The number of LE ARPs sent to the LES.

**LE arps Received:** The number of LE ARPs received from the LES.

**LECS:**

**Configuration VPC/VCC:** VPC contains the VPI that identifies the VPC where it connects to this LE Client. VCC contains the VCI that identifies the VCC where it connects to this LE Client.

**Packets Sent:** The number of packets sent to the LAN Emulation Configuration Server.

**Packets Received:** The number of packets received from the LAN Emulation Configuration Server.

### STATISTICS :

**Packets In:** The total number of packets received at this Emulated LAN.

**Packets Out:** The total number of packets sent from this Emulated LAN.

**Broadcast Pkts In:** The number of packets received in a broadcast format at this Emulated LAN. Broadcast packets are transmitted to all recipients in the network.

**Broadcast Pkts Out:** The number of packets sent in a broadcast format from this Emulated LAN.

**Unicast Packets In:** The number of packets received in a unicast format at this Emulated LAN. Unicast packets are transmitted to one recipient.

**Unicast Packets Out:** The number of packets sent in a unicast format from this Emulated LAN.

**Multicast Packets In:** The number of packets received in a multicast format at this Emulated LAN. Multicast packets are transmitted to a select group of recipients.

**Multicast Packets Out:** The number of packets sent in a multicast format from this Emulated LAN.

## Viewing the LANE LE\_ARP Table

This command is useful for showing MAC to ATM identifier mappings. To view the ATM LANE LE\_ARP table, type in **vlat**, followed by the slot/port and service number for the service.

**Interface/ATM % vlat 2/1 2**

**ATM LANE LE\_ARP Table**

MAC Address	ATM Network Prefix	ESI	SEL	VPI/VCI	Age	Remote
=====	=====	=====	==	=====	=====	=====
0020da0210e0	39000000000000000000000000000000	0020da0210e0	00	101/153	5	True
0020da021210	39000000000000000000000000000000	0020da021210	00	181/106	59	True
0020da05f674	39000000000000000000000000000000	0020da05f674	00	166/138	226	False
0020da220053	39000000000000000000000000000000	0020da220053	00	185/146	233	True
0020da0204b0	39000000000000000000000000000000	0020da0204b0	00	169/108	257	True

**Interface/ATM %**

**MAC Address:** The MAC addresses of learned stations attached to the emulated LAN.

**ATM Network Prefix:** The first 13 bytes of the ATM address.

**ESI:** End station identifier, consisting of the next 6 bytes of the ATM address.

**SEL:** The last byte of the ATM address.

**VPI:** Virtual Path Identifier.

**VCI:** Virtual Circuit Identifier.

**Age:** The time since the MAC has been seen by this service.

**Remotes:** This field will read **True** if the MAC was learned via the LE-ARP response from the ATM end station. This field will read **False** if the LE-ARP response came from the LES (i.e., the entry was already in the LES database).

Token Ring 802.5 LECs contain an additional display that maps source route descriptor to ATM address. The following table is an example of the **vlat** command issued for a Token Ring LEC:

**/Services % vlat 2/1 2**

**ATM LANE LE\_ARP Table**

MAC Address	ATM Network Prefix	ESI	SEL	VPI/VCI	Age	Remote
=====	=====	=====	==	=====	=====	=====
0020af0133d3	47000580ffe1000000f215120b0020da6fc640	0020da6fc640	02	0/ 47	191	True
0020af0136af	47000580ffe1000000f215120b0020da6d2b4002	0020da6d2b4002		0/ 48	95	True

**ATM 802.5 LANE (SR RD to ATM\_ADDRESS) LE\_ARP Table**

SR RD	ATM Network Prefix	ESI	SEL	VPI/VCI	Age	Remote
=====	=====	=====	=====	=====	=====	=====
00e1	47000580ffe1000000f21512	0b0020da6d2760	02	0/ 41	161	False
00a1	47000580ffe1000000f21512	0b0020da6d2760	02	0/ 41	267	False

The top table is the same as a standard **vlat** display. The second table shows how the source route descriptor maps to the ATM address. The **SR RD** field displays the source route descriptor, consisting of 4 hex nibbles. The left three (3) nibbles represent the ring number; the right-most nibble represents the bridge number.

## Viewing ATM Service Statistics for Classical IP

To view ATM service statistics, type in **vss** and press **<Enter>**. A screen similar to the following will be displayed:

```

/Interface/ATM % vss 2/1 3

Status/Statistics for slot 2 interface 1 Service 3

Service      : Classical IP Service 3

>From IP:

Packets Received   = 0   Broadcast Packets Received= 0   Packets Discarded = 0

>To IP:

Packets Sent       = 0

>From net:

Packets Received   = 0   Packets Discarded       = 0
ARP Response       = 0   Inv ARP Request        = 0
Inv ARP Response   = 0   Inv ARP Request        = 0   Negative ARP Reply = 0

>To net:

Packets Received   = 0   Packets Discarded       = 0
ARP Response       = 0   Inv ARP Request        = 0
Inv ARP Response   = 0   Inv ARP Request        = 0   Negative ARP Reply =0

/Interface/ATM %
  
```

**Service:** The name of the service.

### From IP:

**Packets Received:** The number of packets received via IP.

**Broadcast Packets Received:** The number of broadcast packets received via IP.

**Packets discarded:** The number of packets received via IP that were discarded.

### To IP:

**Packets sent:** The number of packets sent via IP.

### From net:

**Packets received:** The number of packets received via the network.

**Packets discarded:** The number of packets received via the network that were discarded.

**ARP response:** The number of ARP response packets received via the network.

**ARP request:** The number of ARP request packets received via the network.

**Inv ARP response:** The number of inverse ARP response packets received via the network.

**Inv ARP request:** The number of inverse ARP request packets received via the network.

**Negative ARP Reply:** The number of inverse ARP negative acknowledgment packets received via the network.

**To net:**

**Packets sent:** The number of packets sent via the network.

**Packets discarded:** The number of packets sent via the network that were discarded.

**ARP response:** The number of ARP response packets sent via the network.

**ARP request:** The number of ARP request packets sent via the network.

**Inv ARP response:** The number of inverse ARP response packets sent via the network.

**Inv ARP request:** The number of inverse ARP request packets sent via the network.

**ARP Acknowledge:** The number of inverse ARP negative acknowledgment packets sent via the network.

## Viewing the CIP ARP Table

To view the ARP table for CIP, enter **vat** followed by **<Enter>**. This table (similar to that shown below) lists the IP addresses that are mapped to an ATM address.

**Interface/ATM % vat**

IP Address	ATM Address	VCI	TTL	Type
=====	=====	=====	=====	=====
186.207.183.15	470000580ffe10000000f215120b00204815120b 0		15	static
186.207.182.11	470000580ffe10000000f215120b0020416ad721 16		11	dynamic

**/Interface/ATM %**

**IP Address:** The IP Address for this entry.

**ATM Address:** The ATM address to which the IP address maps.

**VCI:** The Virtual Circuit Identifier for this ATM address.

**TTL:** The Time To Live counter for this address entry expressed in minutes. The entry ages out after the number of minutes indicated in this column.

**Type:** Indicates whether this address was entered by the user (static) or created by the system (dynamic).

## Viewing Service Statistics for VLAN Clusters

To view VLAN Cluster service statistics, type in **vss** and press **<Enter>**. A screen similar to the following will be displayed:

```
/Interface/ATM % vss 2/1 5
Status/Statistics for slot 2 interface 1 Service 5

Number of additional members in this cluster is : 2
Broadcast Out VCI used on this cluster          : 500

Additional Member : 1
-----
Description       : CLUSTERNUMBER1
Data-Direct VCI   : 201
Broadcast In VCI  : 202

Additional Member : 2
-----
Description       : CLUSTERNUMBER2
Data-Direct VCI   : 299
Broadcast In VCI  : 301

/Interface/ATM %
```

**Description:** The description for the additional VLAN Cluster member.

**Data-Direct VCI:** The circuit number of the point-to-point virtual circuit for a known unicast destination.

**Broadcast In VCI:** The circuit number of the one-way (in) broadcast virtual circuit.

