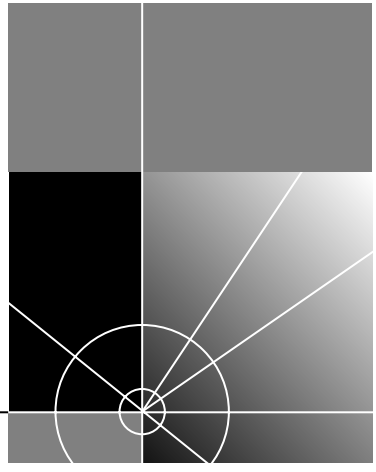
Transcend® Management Software ATM and VLAN Management User Guide

Version 4.2.2 for UNIX®



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Guide written by Debbie Mark.

CONTENTS

ABOUT THIS GUIDE

This guide describes how to use the Transcend ATM and VLAN Network Management application.

Introduction

The ATM and VLAN Management Guide describes the features and functionalities that are implemented using the ATM and VLAN Management Tools.

Audience Description

This guide is intended for the Network Administrator who is responsible for configuring, using and managing ATM and Virtual LANs in a network that may include a wide range of 3COM equipment as well as equipment from other manufacturers. It assumes a working knowledge of ATM Networks and a familiarity with HP OpenView, NNM, Netview or Sunnet for UNIX.

If the information in the Release Notes shipped with your product differs from the information in this guide, follow the Release Notes.

How to Use This Guide

The ATM and VLAN Management User Guide guide is divided into two parts. Part 1 contains an overview of the application and its features.General network management principles that apply to the application and explanations of how the application works are also described.

Part 2 contains procedural information and describes all the network management tasks in the ATM and VLAN Management application

Table 1 shows where to find specific information.

Table 1 Organization of the ATM and VLAN Management User Guide

If you are looking for:	Turn to:
A comprehensive description of the basic components and concepts of the ATM and VLAN Management application	Part 1- Chapter 1
How to configure and launch the ATM and VLAN Manager	Part 1 - Chapter 2
How to use the ATM and VLAN Management Interface	Part 1 - Chapter 3
How to perform network configuration tasks	Part 2- Chapter 4
How to perform network modification tasks	Part 2- Chapter 5
How to perform network troubleshooting tasks	Part 2 - Chapter 6
How to perform network measurement tasks	Part 2- Chapter 7
Supported Devices	Appendix A
Commonly encountered system problems	Appendix B
ATM and VLAN Management Basics	Appendix C

Conventions

Table 2 and Table 3 list conventions that are used throughout this guide.

Table 2 Notice Icons

Icon	Notice Type	Alerts you to...
	Information note	Important features or instructions
	Caution	Risk of personal safety, system damage, or loss of data
	Warning	Risk of severe personal injury

Table 3 Text Conventions

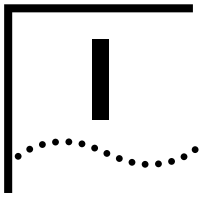
Convention	Description
`Syntax`	The word "syntax" means you must evaluate the syntax provided and supply the appropriate values. Placeholders for values you must supply appear in angle brackets. Example: Enable RIPIP by using the following syntax: `SETDefault!<port> -RIPIP CONTrol = Listen` In this example, you must supply a port number for <port>.

Table 3 Text Conventions (continued)

Convention	Description
`Commands`	The word "command" means you must enter the command exactly as shown in text and press the Return or Enter key. Example: To remove the IP address, enter the following command: **`SETDefault!0 -IP NETaddr = 0.0.0.0`** **Note:** *This guide always gives the full form of a command in uppercase and lowercase letters. However, you can abbreviate commands by entering only the uppercase letters and the appropriate value. Commands are not case-sensitive.*
`Screen displays`	This typeface represents information as it appears on the screen.
The words "enter" and "type"	When you see the word "enter" in this guide, you must type something, and then press the Return or Enter key. Do not press the Return or Enter key when an instruction simply says "type."
[Key] names	Key names appear in text in one of two ways: ■ Referred to by their labels, such as "the Return key" or "the Escape key" ■ Written with brackets, such as [Return] or [Esc]. If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press [Ctrl]+[Alt]+[Del].
Menu commands and *buttons*	Menu commands or button names appear in italics. Example: From the *Help* menu, select *Contents*
Words in *italicized* type	Italics emphasize a point or denote new terms at the place where they are defined in the text. (continued)
Words in **bold-face** type	Bold text denotes key features.

Equipment Conventions

In this guide the term "Edge device" refers to any of the following: SuperStack II Switch 2700, 7200/7400 ATM/Ethernet Interface Card, 7600 Fast Ethernet Interface Card, Super Stack II Switch 1000/3000,NetBuilder II, CoreBuilder 4000,Super Stack II Switch 2000, CoreBuilder 2500/6000 and CoreBuilder 5000 Switch Module and the term "ATM Switch" refers to the CoreBuilder 7000 ATM Switch.



GETTING STARTED WITH THE ATM AND VLAN MANAGER

1 ATM AND VLAN MANAGEMENT OVERVIEW

This chapter introduces you to the ATM and VLAN Management application. The following topics are discussed:

- What is ATM and VLAN Management?
- ATM and VLAN Management Maps
- ATM and VLAN Management Tools
- ATM and VLAN Management Assistants

What is ATM and VLAN Management?

The Transcend ATM and VLAN Management application is a network management software product used for managing switched virtual networks and ATM infrastructures. With this application, you can configure, controll and monitor location-independent virtual workgroups that are created using different technologies based on ATM, Ethernet, Fast Ethernet and FDDI.

The ATM and VLAN Management application manages virtual LANs on all 3Coms ATM and non-ATM switches.You can create virtual LANs with either ATM-based (LAN Emulation) or non ATM-based (Encapsulation/Tagging) methods.

The ATM and VLAN Management application allows you to view and manage the network at various layers of logical and physical layers. Specialized interrelated components are used to manage each abstracted layer. This application provides the network manager with a global view of the status, configuration, performance, and utilization of the ATM infrastructure, LAN Emulation services, and network virtual LANs.

ATM and VLAN Management Components

The ATM and VLAN Management application is composed of the following product components:

- Maps

- Tools
- Assistants or Wizards

These components are network models that represent network information, based on the physical and logical structure of the network.

The maps represent the network model and status information. Different maps are available for the different logical and physical views.

The tools perform various network management tasks and functions. The ATM and VLAN Management tools can be launched from the application or from within a web browser tool (locally or from a remote location). If you launch the tools from within a web browser, only the tasks that do not require any additional configuration assistants can be performed. VLAN moves are allowed from the web interface.

The Assistants or Wizards configure and perform specific actions on the network devices in the management maps. ATM and VLAN Management Assistants are launched from maps or tools.

Supported platforms

The ATM and VLAN Management application runs on all platforms supported by OpneView Windows (OVW), NetView, and SunNet Manager.

You must upgrade Netscape to version 4.03 with JDK1.1 support. Upgrading to Netscape version 4.03 is insufficient to run the web-based ATM VLAN software. You must have the JDK 1.1 support for the software to run properly.

You can dowload JDK software from the JAVA site currently at the following address:

http://developer.netscape.com/software/index.html?content=jdk/download.html

The ATM and VLAN Management application is identical for all platform environments. You can perform network management operations and functions from any workstation.

Functions of ATM and VLAN Management

The ATM and VLAN Management application provides the following functions:

- Automatic discovery of switched network topology (physical and logical)
- Continuous state and status monitoring of relevant logical and physical components with a scalable distributed polling engine.
- End-to-end ATM virtual circuit tracing and graphical display
- Configuration of PVCs (Permanent Virtual Channels)
- Switch and link-level performance measurement with a network-wide bandwidth monitoring and utilization monitoring tool
- Provides the network operator with distributed network management and distributed viewing capabilities

Virtual LAN management capabilities include:

- Policy-based VLAN auto-configuration support
- Common user interface to manage VLANs across all 3Com VLAN-supported products
- Management of ATM-based VLANs (LAN emulation) and non-ATM-based VLANs (VLAN tagging, protocol-based)
- Automatic discovery and logical segmentation of VLANs
- Color-coded, device-level mapping of physical infrastructure to VLANs
- VLAN moves with a simple drag-and-drop operation

Local Area Network Emualtion management capabilities include:

- Automatic discovery and display of the LANE service infrastructure along with the ATM physical network structure
- Mapping of LANE client-server relationships and association ofproxy LAN Emulation Client (LEC) ports
- Virtual circuit tracing between LANE elements and mapping of physical paths over the ATM infrastructure
- Graphic display of LEC and LES/BUS performance statistics
- LECS database synchronization management
- LANE service redundancy management and automatic failover mechanism, isolation of LANE service faults and correlation of affected devices and segments.

ATM and VLAN Management Maps

The ATM and VLAN Management application includes the following maps:

- ATM Device Manager map
- ATM Network map
- LAN Emulation map
- Virtual LAN map
- VLAN Policy map
- Gigabit Network map

ATM Device Manager Map

The ATM Device Manager map (see Figure 1-1), shows the physical topology of the entire switched infrastructure in a single flat topology map. The ATM Device Manager map provides the quickest access to all ATM devices on the network. You also can select the devices graphic

display to show the topology layout using the NMSetup tool. See Figure 1-35 for a description on setting the devices map layout.

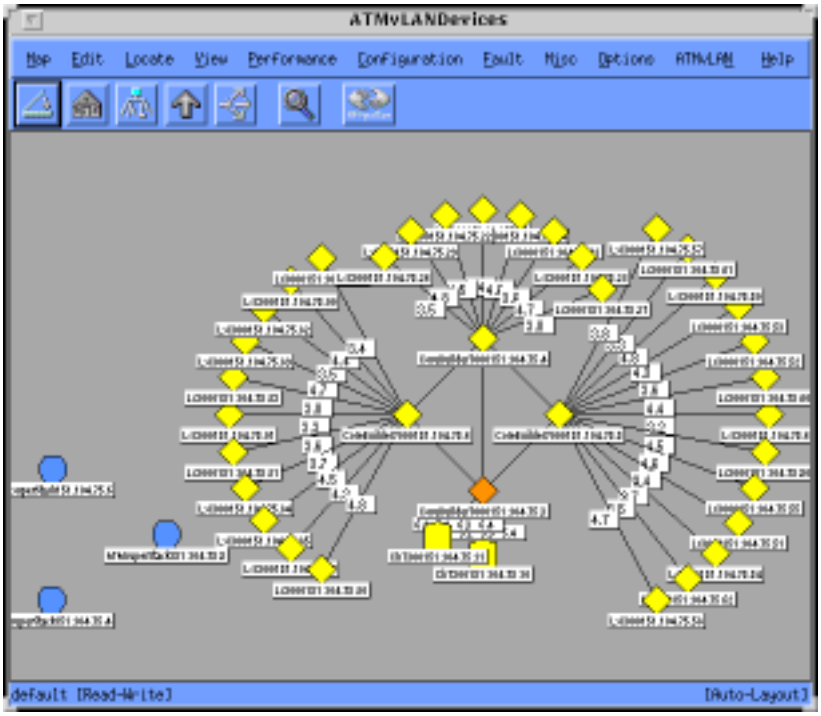


Figure 1-1 ATM Device Manager Map

You can display a device-oriented view including device front panels, device statistics and device parameters using the ATM Device Manager menus and submaps.

Figure 1-2 shows an example of the graph and statistics of a CoreBuilder device. For example, to access teh device statistics window, select the device in the ATMvLAN Devices window and then from the ATMvLAN menu select Graph Assistant.

Figure 1-2 ATM Switch Graph Assistant Window

Figure 1-3 shows the hierarchy in the Topology Browser. To access the ATM Devices map, double click on the ATMvLAN Devices branch or select

the branch and then select the Zoom icon. See page 1-27 for a description of the Zoom icon.

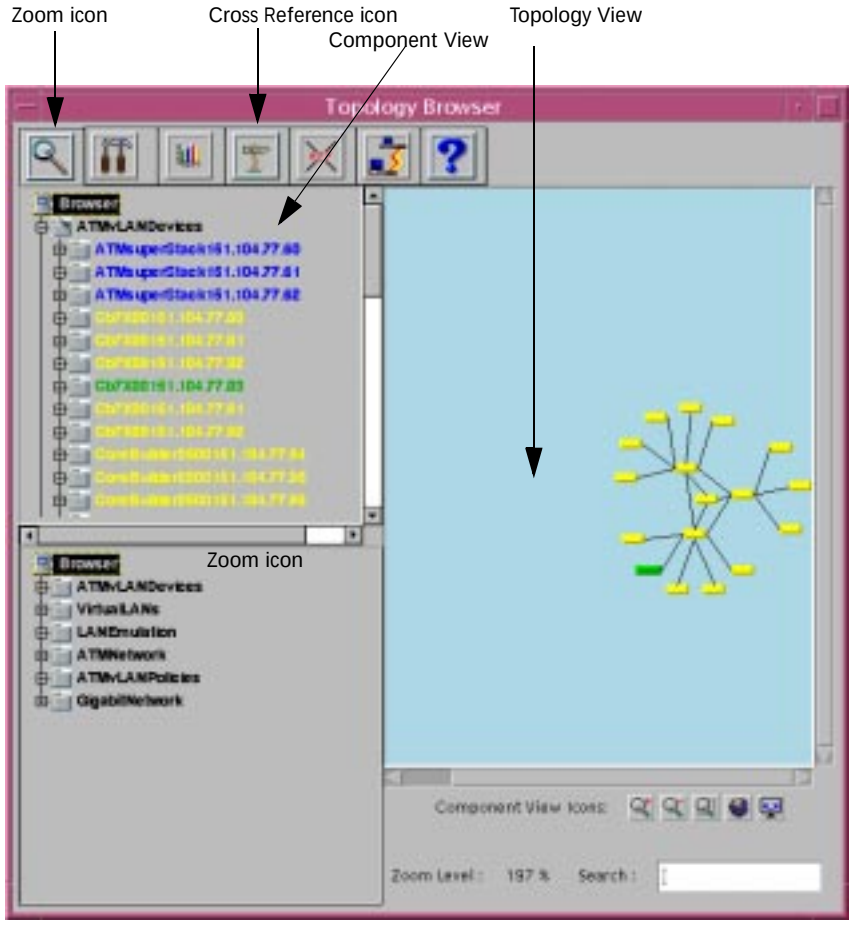


Figure 1-3 Access to the ATM Devices Map through the Topology Browser

To display the selected device in the Topology View, select the device in the Component View and then select the Cross Reference icon.

ATM Network Map

The ATM Network map (see Figure 1-4) allows you to perform management tasks on different ATM devices,depending on their physical connectivity. The ATM Network window displays a hierarchical switching backbone of the network. Each icon represents a switching domain, such as a central high-speed CoreBuilder ATM switch module that is connected

to various ATM devices, such as a SuperStack II switch 2700 and other CoreBuilder modules. The lines connecting the ATM switching domains indicate the P-NNI (Private Network to Network Interface) links between them.

The ATM Network Map provides:

- Displayof the connectivity between ATM switches (CoreBuilder 7000) and ATM edge devices and end stations (SuperStack II Switch 2700/1000/3000, CoreBuilder 2500, CoreBuilder 5000, NETBuilder, ATM adapter)
- Identification of port numbers on the links between switches
- Statistics on traffic to and from different devices and through specific device ports
- Tracing and modification of virtual circuits between devices
- Selection of ATM end points to perform ATM path tracing

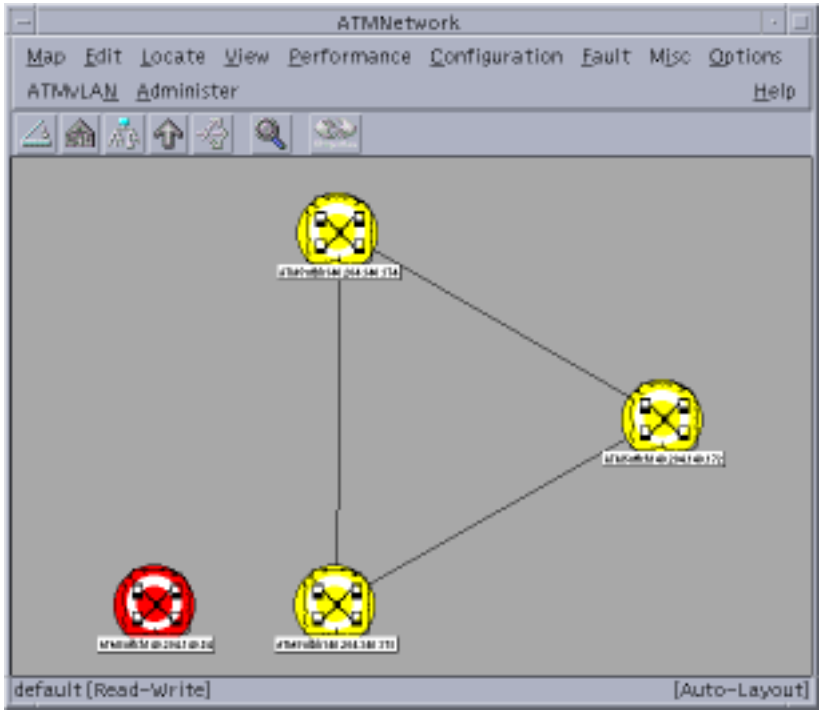


Figure 1-4 ATM Network Map Main Display

Figure 1-5 shows the ATM Switch map, which is an example of the submap of the Network map.

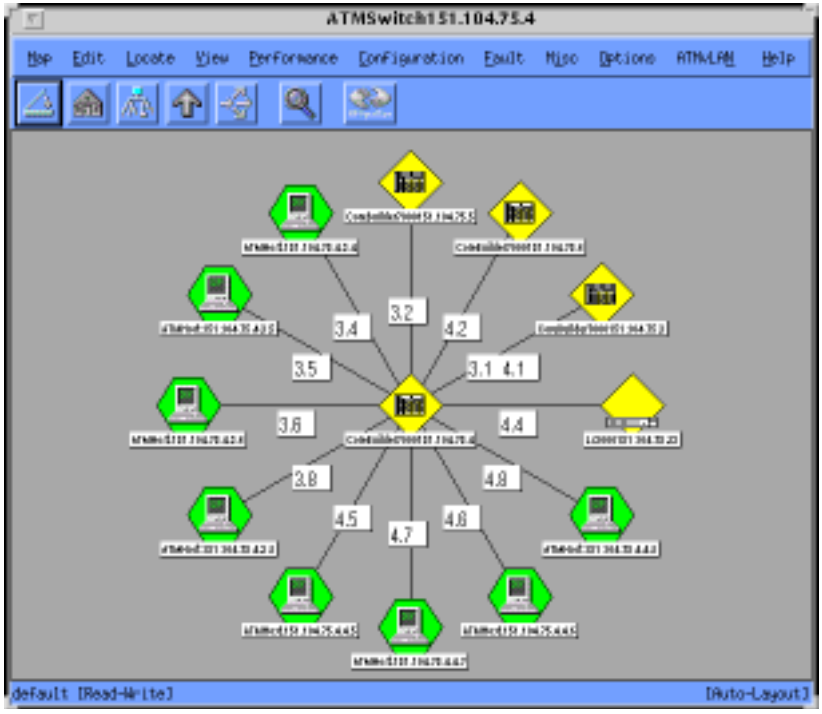


Figure 1-5 ATM Switch Map

Figure 1-6 shows the hierarchy in the Topology Browser from which you can access the ATM Network map.

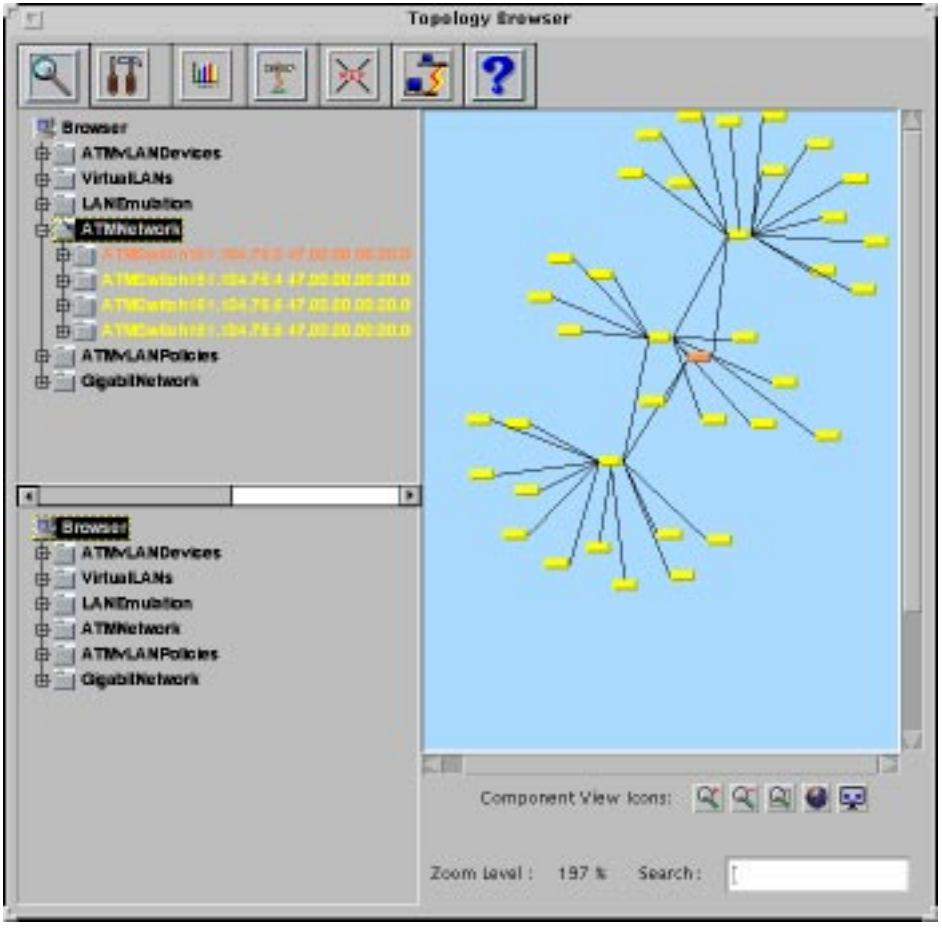


Figure 1-6 Access to the ATM Network Map through the Topology Browser

To display a selected switch in the Topology Browser, select a switch in the Component View and then select the Cross Reference icon.

LAN Emulation Map

The LAN Emulation map (see Figure 1-7), allows you to perform network management tasks on the LAN Emulation clients and servers.

The LAN Emulation provides:

- ATM device display in the LAN emulation process
- Display of the LECS, LES,and LEC port connectivity
- Isolation of LEC, LES, and LECS faults
- Mapping of ELANs to VLAN ports display
- Monitoring of LANE services performance

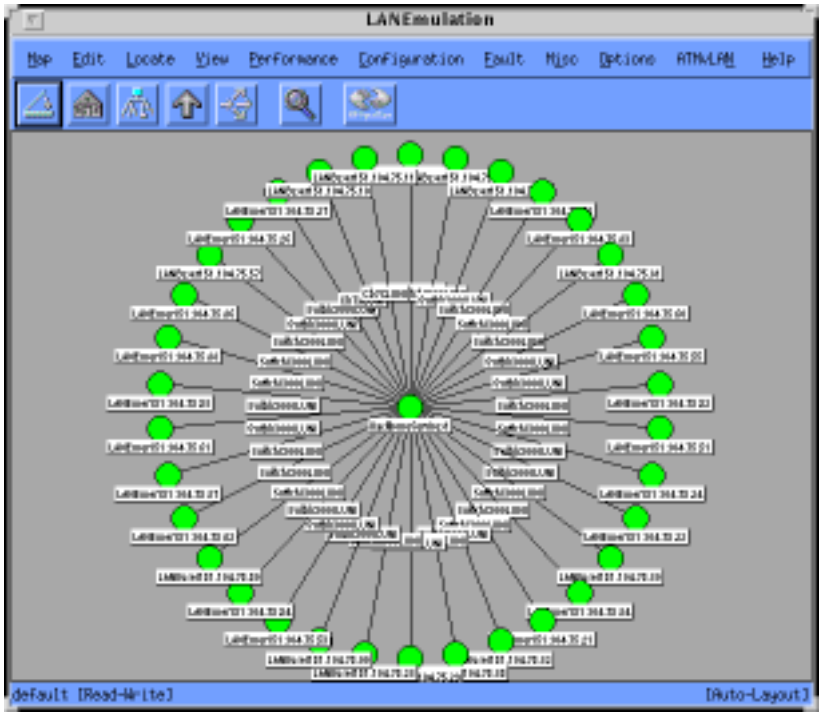


Figure 1-7 LAN Emulation Map Main Display

Figure 1-8 shows the Backbone and Services window which is an example of a submap of the LAN Emulation window. This window displays different emulated LANs, each with the LECs connected to the central LES. The window also shows the active and or enabled LECSs.

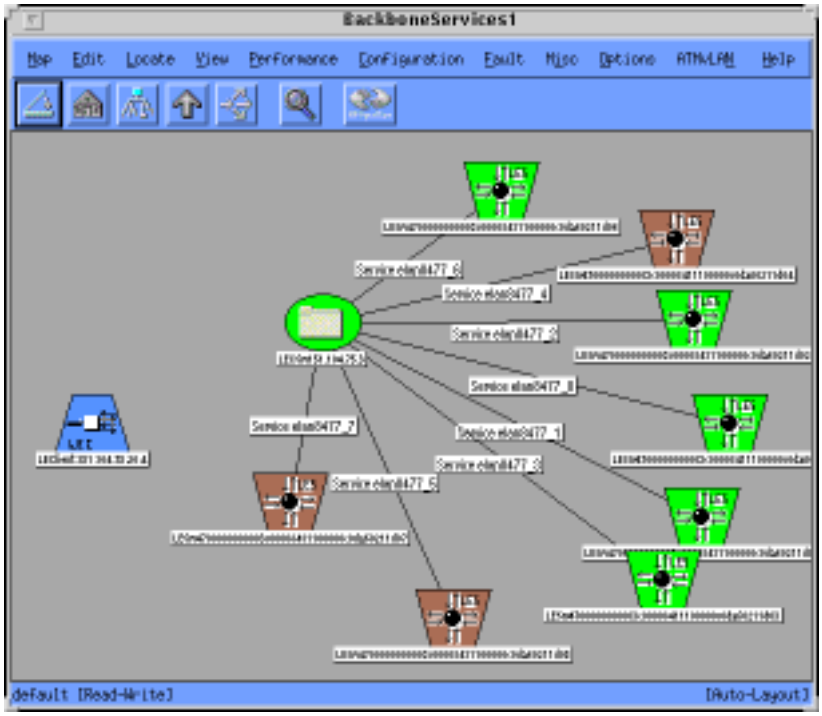


Figure 1-8 LAN Emulation Submap/Backbone and Services Window

Figure 1-9 displays the hierarchy in the Topology Tool from which you can access the LAN Emulation Map.

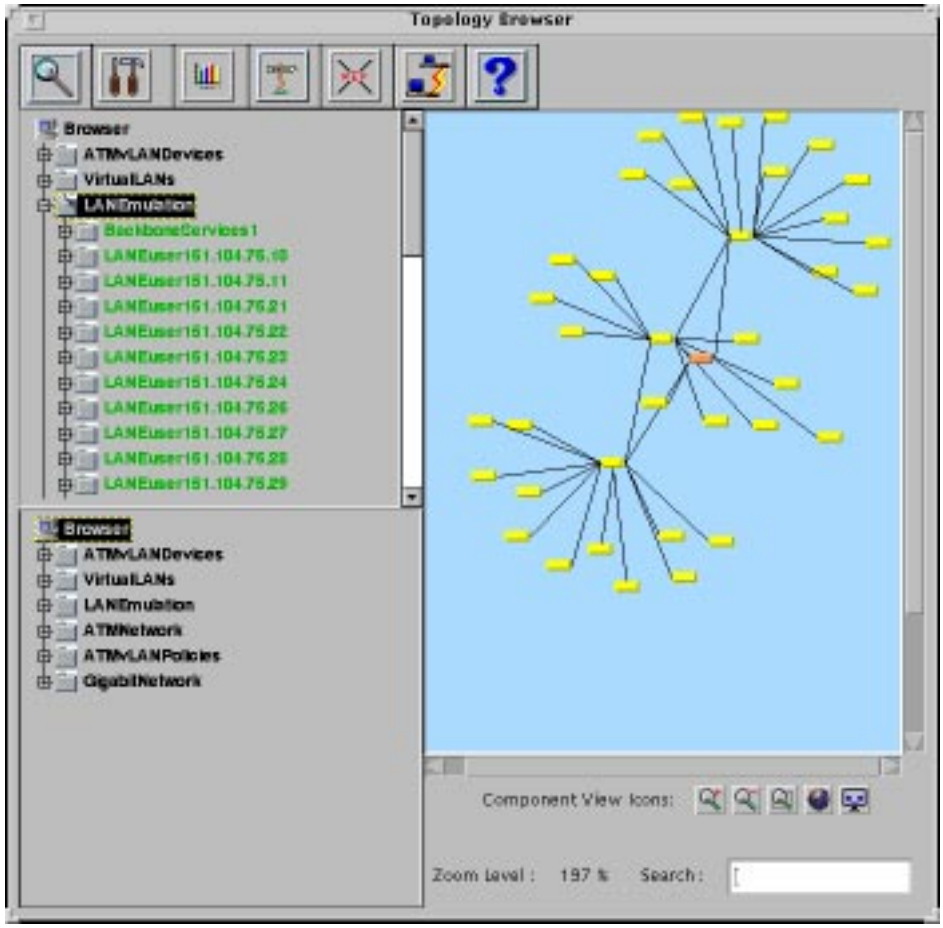


Figure 1-9 Access to the LAN Emulation Map using the Topology Tool Component View

To display a LAN Emulation component in the Topology View, highlight the component in the Component View and then select the Cross Reference icon.

Virtual LANs Map

The Virtual LANs Map (see Figure 1-10), is used to manage the logical connectivity of the end-user through the Virtual LANs. The Virtual LANs maps provide views of the connectivity between Ethernet/ATM ports to the different VLANs. You use the Virtual LANs Map to manage ATM LAN Emulation-based as well as legacy LAN encapsulated or tagged-based VLANs.

The features of the Virtual LANs Map include:

- Re-configuration of VLANs
- Moving segments between VLANs, using simple mouse actions
- Clarification of VLANs to physical ports mapping

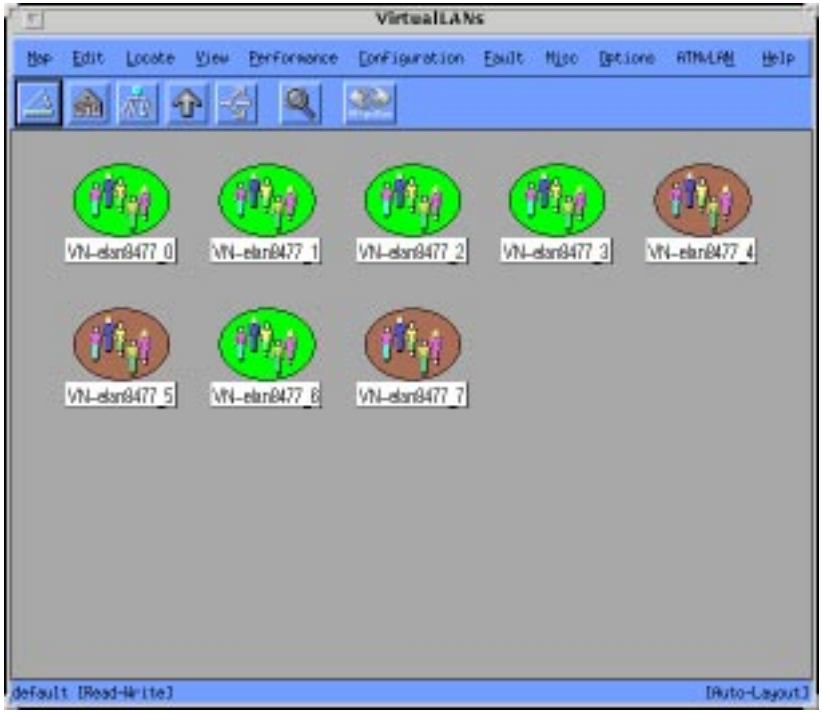


Figure 1-10 The Virtual LANs Map Main Display

Figure 1-11 shows the Ethernet segments that belong to a selected VLAN.

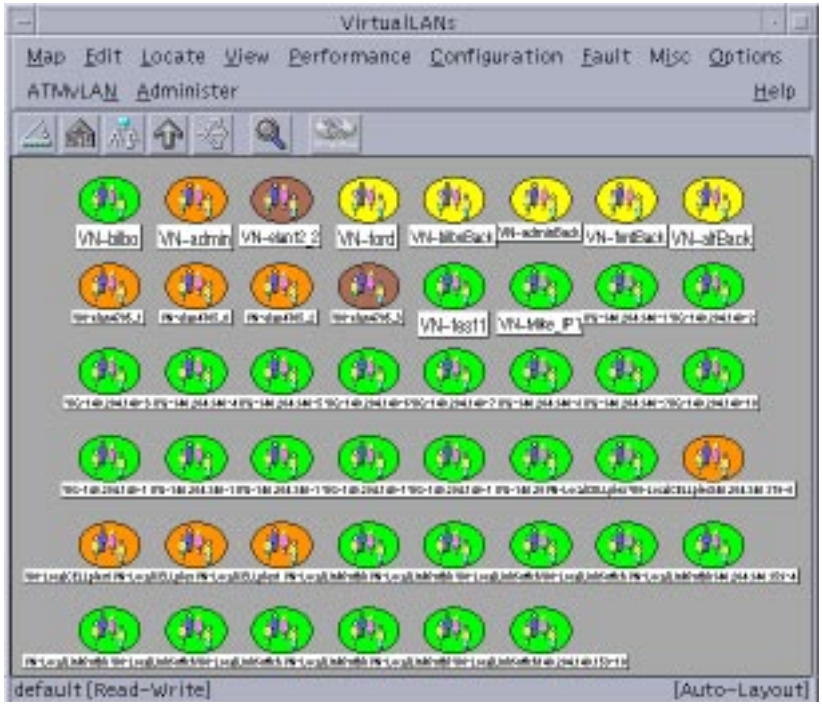


Figure 1-11 The Virtual LANs Submap Displaying Ethernet Segments

Figure 1-12 shows the hierarchy in the Topology Tool from which you can access the Virtual LANs Map.

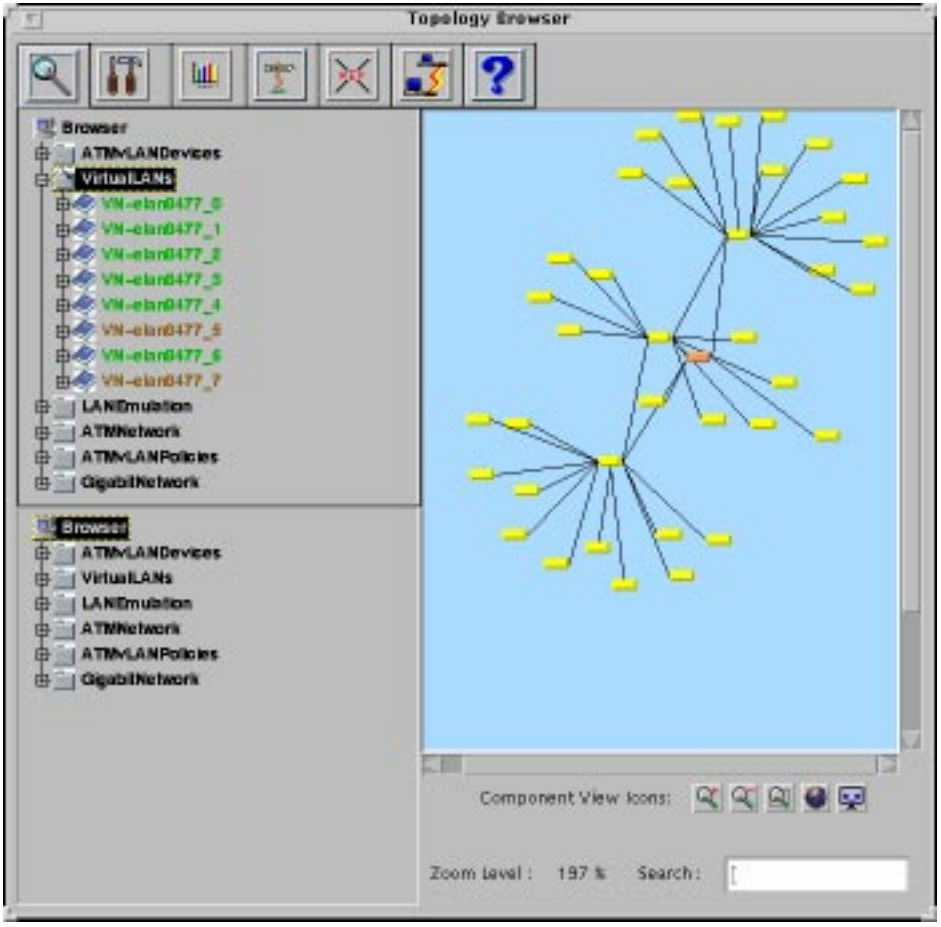


Figure 1-12 Access to the Virtual LANs Map using the Topology Tool Component View

To display components of the Virtual LANs map in the Topology View, select the component in the Component View and then select the Cross Reference icon.

ATM VLAN Policies Map

The ATM VLAN Policies Map (see Figure 1-13), is used for automating the event of the logical connectivity of end-users or segments through Virtual LANs, based on predefined policies. The maps displays the various

pre-defined policies that may be applied to network devices. The devices that have policies applied are contained in the policy icon.

Note: The VLAN Policies may be used only with CoreBuilder 7000, Super Stack II Switch 1000/3000//2700 with ATM downlinks.

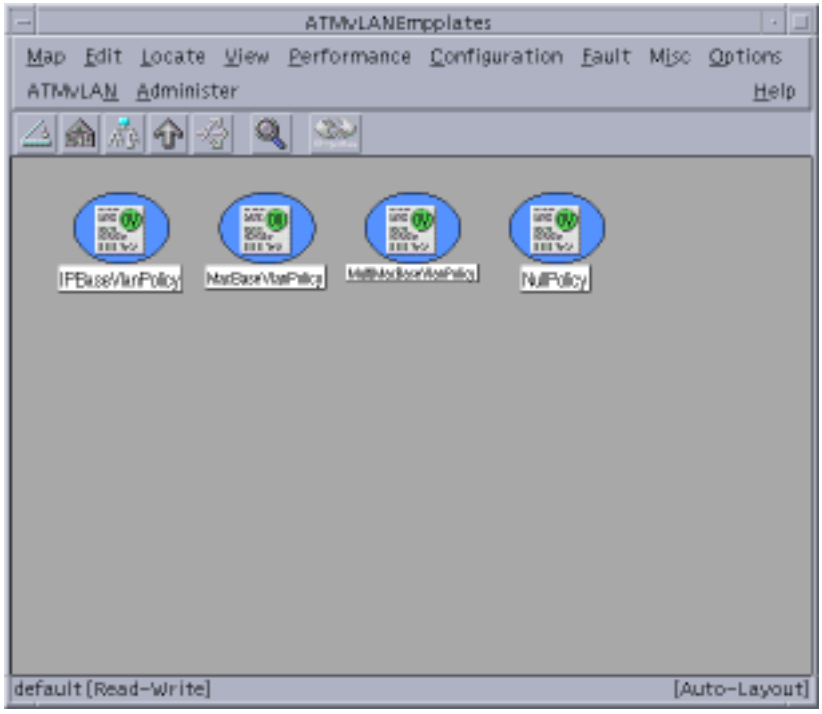


Figure 1-13 The ATMvLAN Policies Map

Figure 1-14 shows the hierarchy in the Topology Tool from which you can access the VLAN Policies Map.

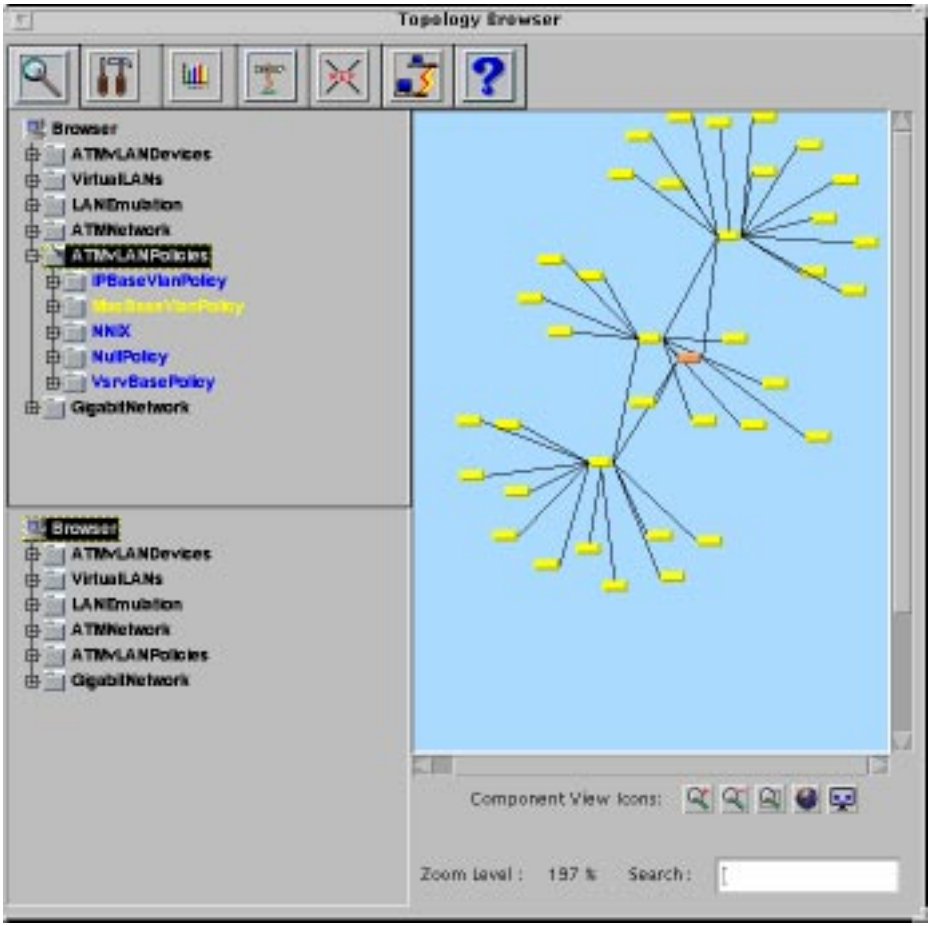


Figure 1-14 Access to the ATMvLAN Policies Map using the Topology Tool

To display a component of the Policies Map in the Topology View, select the component in the Component View and then select the Cross Reference icon.

ATM and VLAN Gigabit Network Map

The ATM and VLAN Gigabit Network Map shows the layer 2 topology of Ethernet/Fast Eternity-based and in the future, Gigabit Ethernet-based

network backbones. The Gigabit Ethernet topology views can be used to identify Virtual LAN trunks, downlink connections within the network.

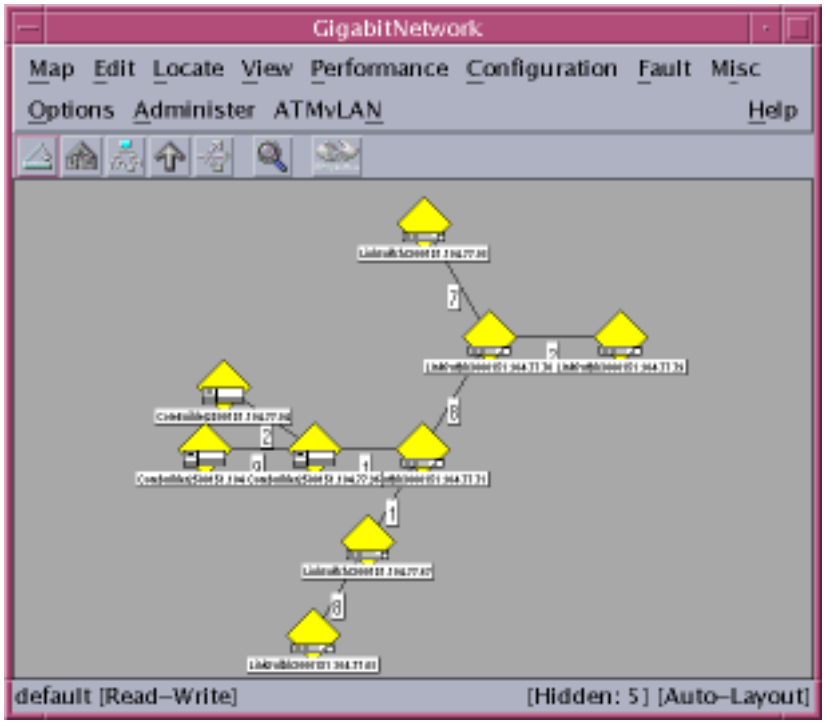


Figure 1-15 The ATM and VLAN Gigabit Network Map

Figure 1-16 shows the hierarchy in the Topology Tool from which you can access the ATM and VLAN Gigabit Network Map.

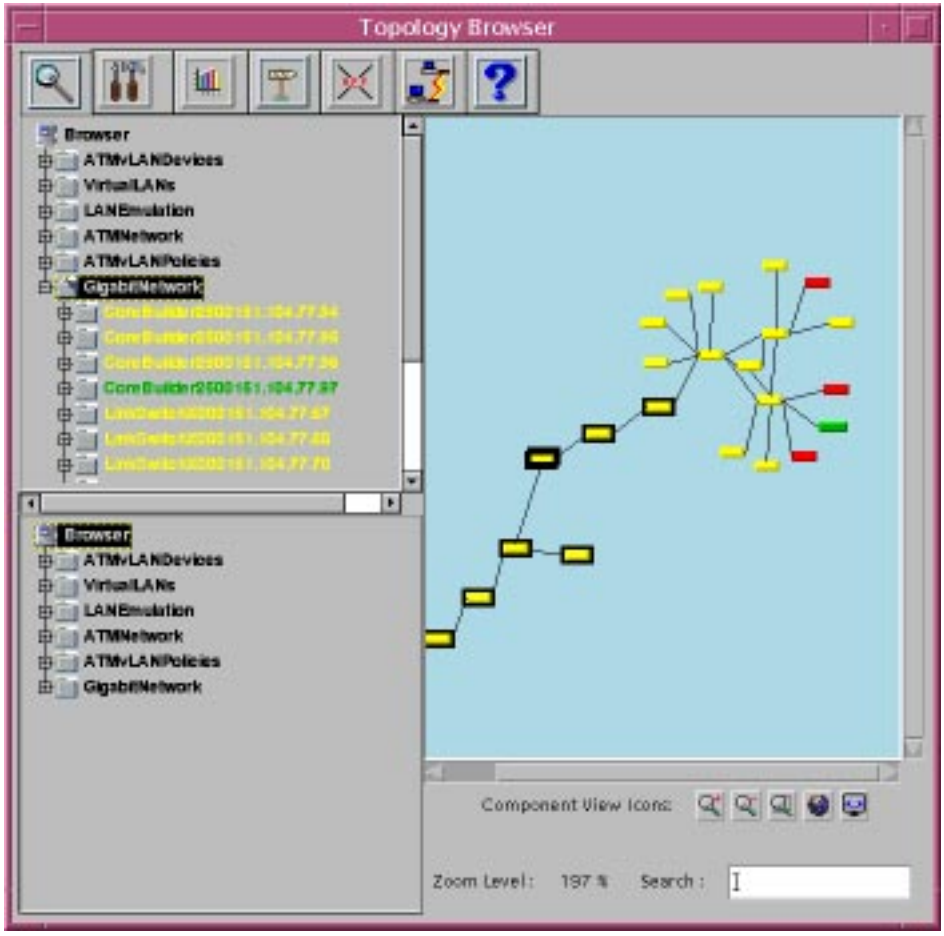


Figure 1-16 Access to the ATM and VLAN Gigabit Network Map using the Topology Tool

To display a component of the Gigabit Ethernet Map in the Topology View, select the component in the Component View and then select the Cross Reference icon.

ATM and VLAN Management Tools

The ATM and VLAN Application Toolbar, see page 1-21, includes the Transcend Topology Browser. You access the Transcend Topology Borwser

using the Topology icon. The Transcend Topology Browser can be used to perform all the network management tasks that are performed using the ATM and VLAN Management Maps and their assistants. The rest of the application tools are used for displaying graphs and statistics and to locate parameters and other information on your network.

The Topology, Locator, Bandwidth, Report, and Fast Setup tools are accessible via a web browser. You can access the ATM and VLAN Management Tools from any station with a web browser, independent of the network management platform.

To access the ATM and VLAN management tools:

Open a web browser.

Enter the URL:

http://machine_ip_address/:7689/WebBase

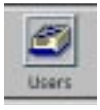
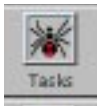
The ATMvLAN Toolbar

The ATM and VLAN Manager Application Toolbar consists of the following tools:

- Topology
- Bandwidth
- Report
- Locator
- Users
- Profile
- Tasks
- Fast Setup
- NMSetup

To invoke an option in the ATMvLAN Application Toolbar, click on one of the icons.

The ATMvLAN Application Toolbar.

Icon Display	Icon Name	Description
	Topology	Opens the Transcend Topology Browser. The Topology Tool consists of the Component View and Topology View. You can perform most network management tasks using this tool. See "Topology Tool" on page 1-23.
	Bandwidth	Opens the NNIx Browser and NNIx topology maps. Allows you to display and view traffic patterns on the network. See "Bandwidth Tool" on page 1-28.
	Report	Opens the NNIt Report Display with information about the NNI traffic in tabular format. See "Report Tool" on page 1-29.
	Locator	Opens the Locator Tool which is used to search and locate the ATMvLAN databases. See "Locator Tool" on page 1-30.
	Users	Opens the Build UDB Tool that builds the entire user's database. See "Users Tool" on page 1-31.
	Profile	Opens the VN Pro Tool that lists an inventory of devices and VLANs on the network. See "Profile Tool" on page 1-33.
	Tasks	Opens the Spider Tool that displays the current tasks on the network. See "Tasks Tool" on page 1-36.
	FSetup	Opens the Fast Setup Wizard for the CoreBuilder 7000. See "FSetup Tool" on page 1-36.

Icon Display	Icon Name	Description
	NMSetup	Opens the NMS Fast Setup Wizard to setup and configure the NMS platform. See "NMS Setup" on page 1-43.

Figure 1-17 The ATMvLAN Toolbar

Topology Tool

The Transcend Topology Browser, formerly called the Wizard Tool is available as a part of the TEM 4.2.2 Unix release.

The Topology Tool (see Figure 1-18), is designed to manage Virtual LANs and switched networks and can be used as a stand-alone (open management platform independent) graphical network management tool. The Topology Tool provides a consolidated interface for performing

various network management tasks required to manage Virtual LANs and switched networks.

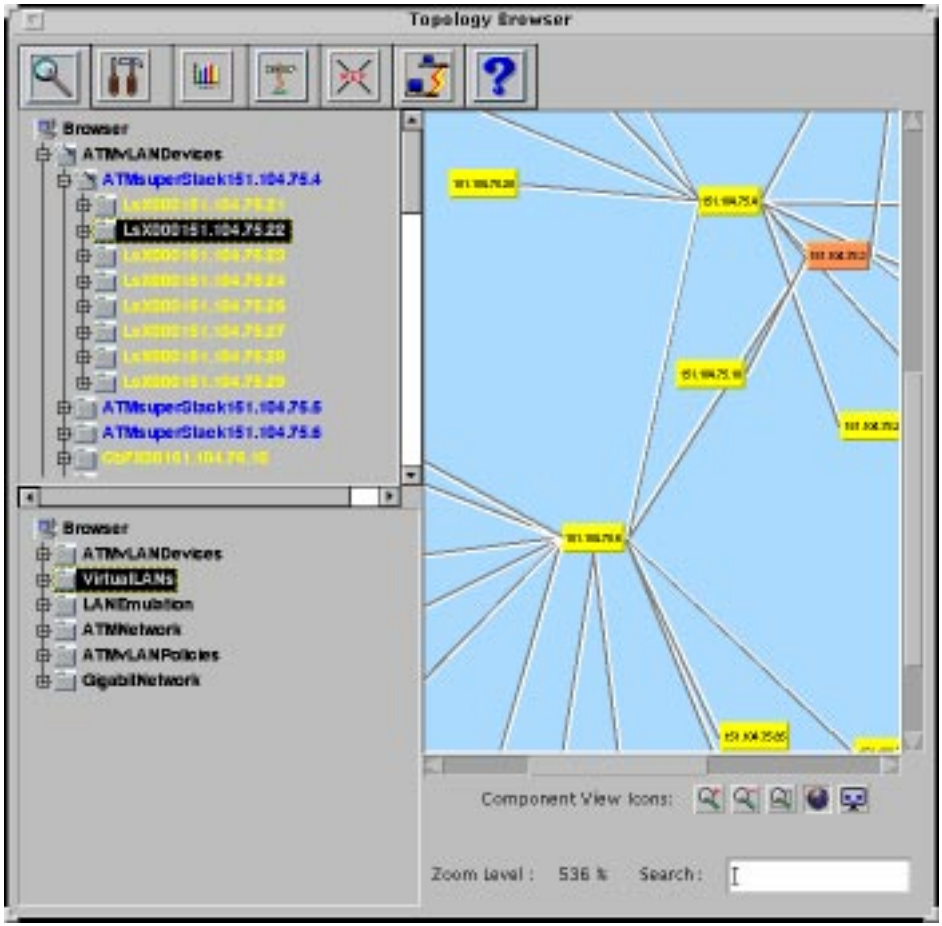


Figure 1-18 The Transcend Topology Browser

In the absence of a management platform (such as HPOV etc.), this tool can be used a the primary GUI for managing the switched network.

All management functions such as monitoring, configuration, statistics gathering etc. can be performed using this interface.

The Transcend Topology Browser is comprised of two sections. The section on the left is the Component View and the section on the right is the Topology View.

The Topology View shows the layer 2 physical topology of large switched infrastructures (networks with more than 500 Switches) in a single hierarchy. For example, all the devices, such as ATM switches, Fast-Ethernet Switches, and there corresponding edge devices, are mapped.

The tree type Component View is hot linked to the Topology View and allows for quick selection of infrastructure components that are dynamically highlighted on the topology map. This feature allows you to select an entry in the Component View, and view the highlighted component in the Topology View using the Cross Reference icon.

For example, if you select a switch or an edge device from the ATMvLAN Devices branch in the Component View, the selected switch is highlighted in the Topology View. If you select a VLAN entry in the VLAN branch, all the switches that belong to the VLAN are highlighted

The Component View has two windows for displaying the components. The two windows allow for opening and viewing different branches at the same time. For example, in the top window, a VLAN branch may be opened displaying all the VLANs. In the bottom window, a specific VLAN branch may be selected, and the segments within the VLAN displayed. When performing VLAN moves, segments may be selected from one window (top or source), and the target VLAN may be selected from the other window (bottom).

Traffic pattern overlays are planned for the future in the Component View as the Topology View will be hot linked to the Bandwidth Tool.

The topology map includes the following icons:

- Zoom Out - This tool is used to magnify the topology map.
- Zoom In - This tool is used to reduce the topology map.
- Select Area - This tool is used to select an area of the topology map. Use this tool by clicking on the icon and then defining an area (square) on the topology map. The selected area is resized to fit the topology map window. When used in conjunction with the Pan tool, you can resize the selected area by resizing one of the rectangles handles using MB1.
- Pan - The tool opens up a display window that allows you to pan the entire network.

- Refresh - This tool updates the network status.

The Topology Tool includes the following features:

- Rearrange - You can rearrange the components for display by dragging them on the Component View to the desired location.
- Search - This feature allows you to enter an IP address and locate the device on the Topology View.
- Highlight - The Component View, in conjunction with the Cross Reference Tool highlights the component selected in the Topology View.
- Identify - Use this feature to identify the device IP Address and its name. You use the identify feature by clicking with the right mouse button on the Topology View.
- Display Front Panel - The feature is the same as the Zoom Physical feature in the ATM and VLAN Management application. You can display device front panels by double clicking on the device in the Topology View.

The Component View reflects the status of all the components that are being actively polled by a distributed polling agent (medp). For customers that do not want to use the platform maps, HPOV, Netview or SunNet Manager, the Transcend Topology Browser may be used as the main console.

For distributed viewing capability, the Topology Tool can be accessed via a web browser.

You must upgrade Netscape to Version 4.03 with JDK1.1 support. Upgrading to Netscape 4.03 is insufficient to run the web-based ATM VLAN software. You must have the JDK 1.1 support for the software to run properly.

The JDK software may be downloaded from the JAVA site *currently* at:

http://developer.netscape.com/software/index.html?content=jdk/download.html

Topology Tool ATMvLAN Objects Toolbar

Icon Display	Icon Name	Description
	Zoom	Zooms in on the selected branch. Performs the same zoom action as when you select an icon and then select ATMvLAN - > Zoom Physical in the ATM and VLAN management maps.
	Configuration Assistant	Opens up the Configuration window for the selected branch. Performs the same action as when you select an icon and then select ATMvLAN - > Configuration Assistant in the ATM and VLAN management maps.
	Graph Assistant	Opens up the Graph window for the selected branch. Performs the same action as when you select an icon and then select ATMvLAN -> Graph Assistant in the ATM and VLAN management maps.
	Cross Reference	Displays the component highlighted in the LANScape Browser in the LANScape topology map.
	Move	Opens up the Configuration window for the selected branch. Performs the same action as when you select an icon and then select ATMvLAN - > Move in the ATM and VLAN management maps.

Icon Display	Icon Name	Description
	Path Assistant	Opens up the Path window for the selected branches. Performs the same action as when you select two icons and then select ATMvLAN -> Path Assistant in the ATM and VLAN management maps.
	Help	Opens up the on-line Help files to help you use the ATM and VLAN Management application,

Bandwidth Tool

The Bandwidth icon opens the Network Node Interface Traffic Tool, NNIx, (see Figure 1-19), and displays all the ATM switches and traffic patterns on the NNI and UNI levels of switches. The NNIx Browser and Maps provide a graphical display of the network link utilization. You can also display the percentage of traffic on the network using the NNIx Maps. The Bandwidth Tool is organized based on enhanced Interswitch Interim Signalling Protocol (IISP) address hierarchy. This tool is used to log the traffic information to a file, so that historical network-wide NNI link level data can be gathered and displayed. The Bandwidth tool is also used to graphically display errors on NNI links across the networks.

See Chapter 7 for a detailed description of the Bandwidth Tool.

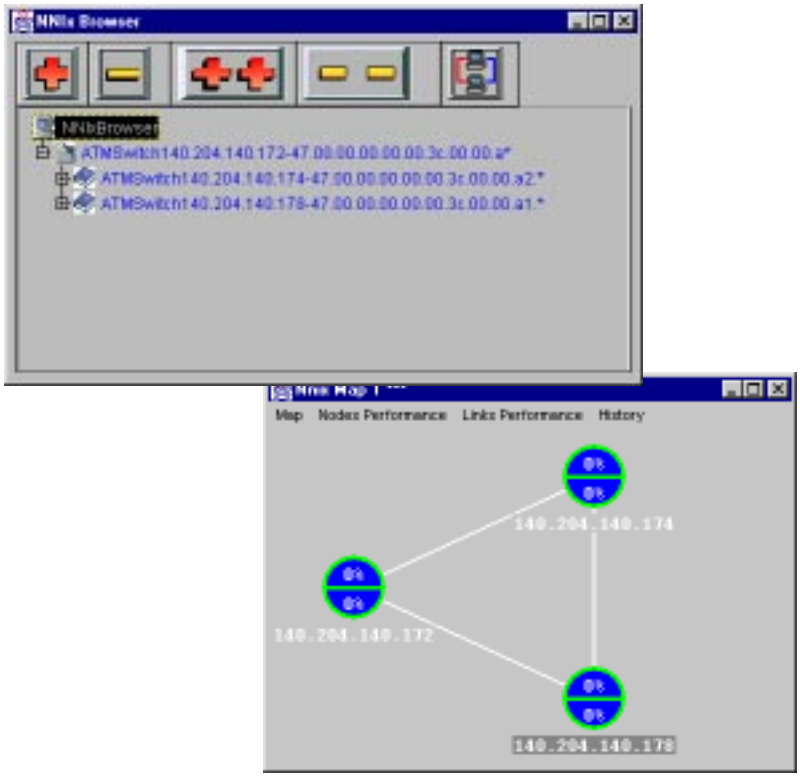


Figure 1-19 The Network Node Interface Traffic Tools

Report Tool

The Report icon opens the Network Node Interface Tabular Tool, NNIt, see Figure 1-20, and is identical to the Bandwidth Tool, except that the information is displayed in a report (tabular) format. The devices that are linked are listed in a directional table, left to right or right to left. The percentage of traffic and number of octets per second going through the switches is also listed in the table.

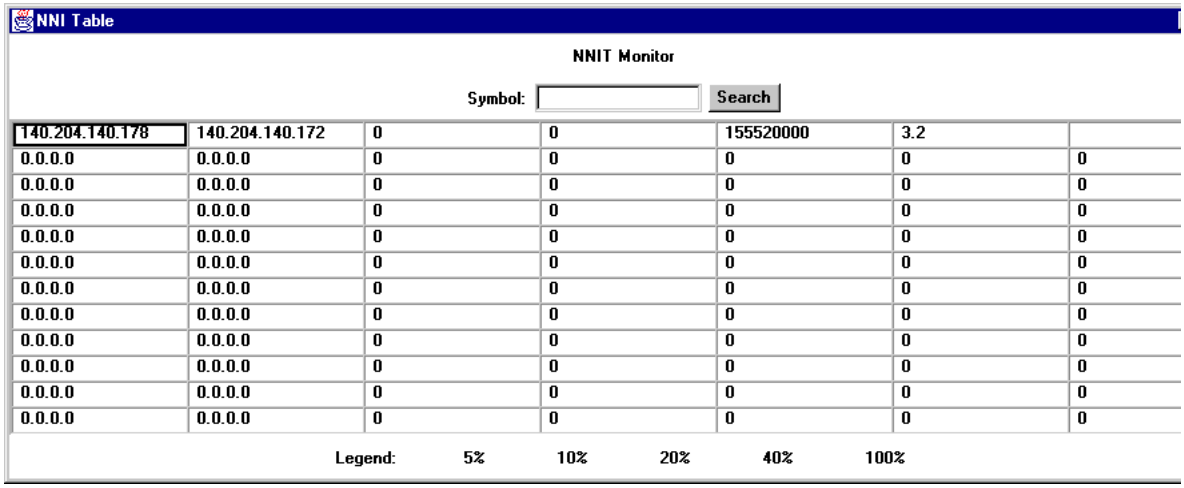


Figure 1-20 The Network Node Interface Tabular Tool

Locator Tool

The Locator Tool, (see Figure 1-21) functions as a search and modification tool to the ATM and VLAN application's databases. These databases are built using other tools. For example, the MAC VDB database is built using the Build UDB Tool. The Manual Discovery database is built using the Manual Discovery Setup. See "Configuring Manual Device Discovery" on page 4-1. The VLAN Aliases and Colors database are built using the VLAN Aliases and Colors Setup. See the description of setting VLAN aliases and colors on page 4-20. The Locator searches these databases and allows you to modify parameters within them.

The Locator Tool uses a search string that is color-coded and displays all other parameters for the selected string in the bottom portion of the dialog box.

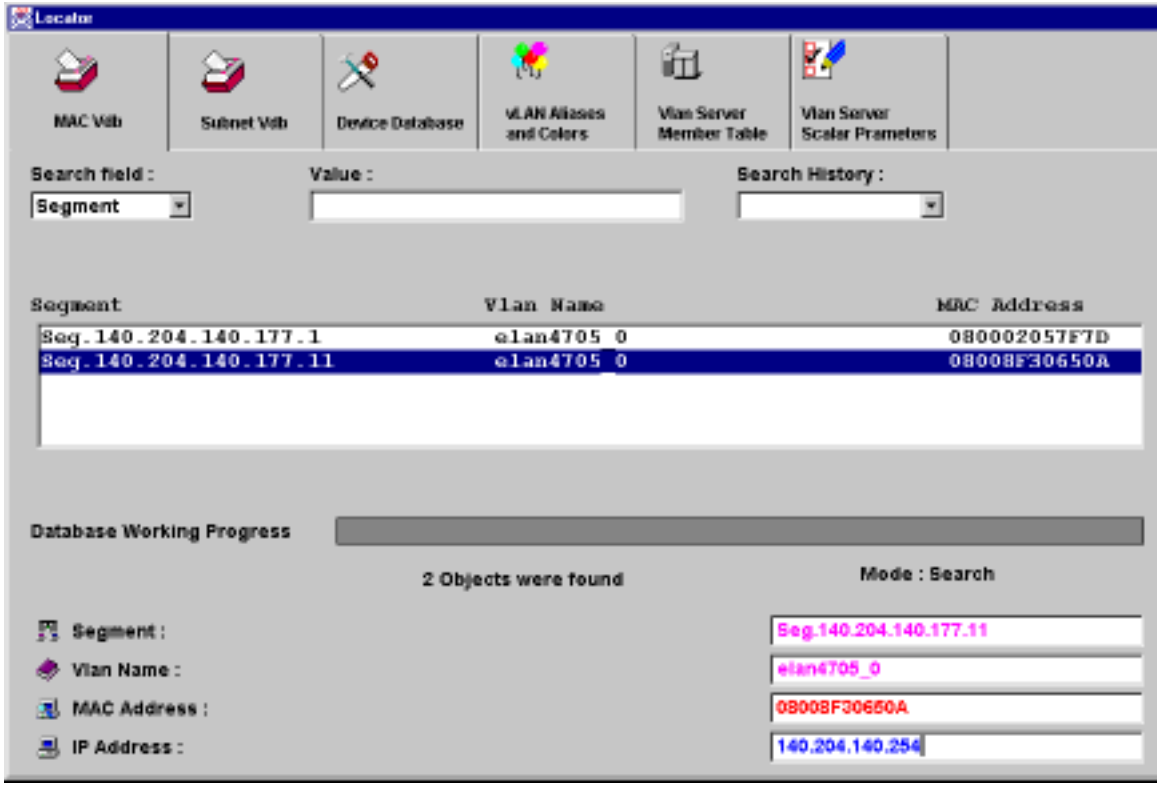


Figure 1-21 The Locator Tool

Users Tool

The Users Tool opens the Build UDB tool, see Figure 1-22, is used to build a parameter database for storing all the information related to MAC addresses in the network. The Users Tool performs an inventory of the existing network, automatically discovers the MAC addresses that exist and their respective locations (device, port) and their current VLAN mapping. The parameter database populated by the Build UDB tool may be modified manually to change VLAN mapping. Use the Locator Tool to edit the database. Devices that enforce the MAC based Automatic VLAN configuration policy will query this database to resolve MAC address to VLAN mapping.

Since the Build UDB Tool requires lots of CPU as well as generates a lot of SNMP traffic, we recommend that you use this tool during periods of low network activity.

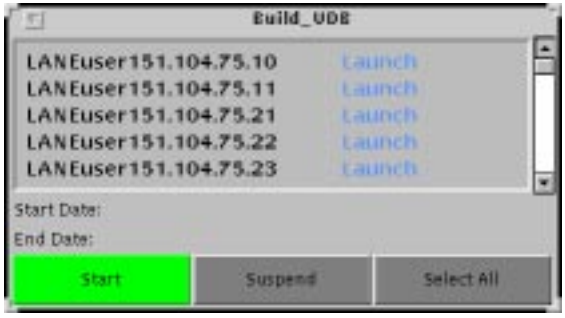


Figure 1-22 The Build UDB Tool

Profile Tool

The Profile icon opens the VnPro Tool that lists all the network devices and their associated VLANs. This tool provides a comprehensive inventory of all the VLANs in the network.

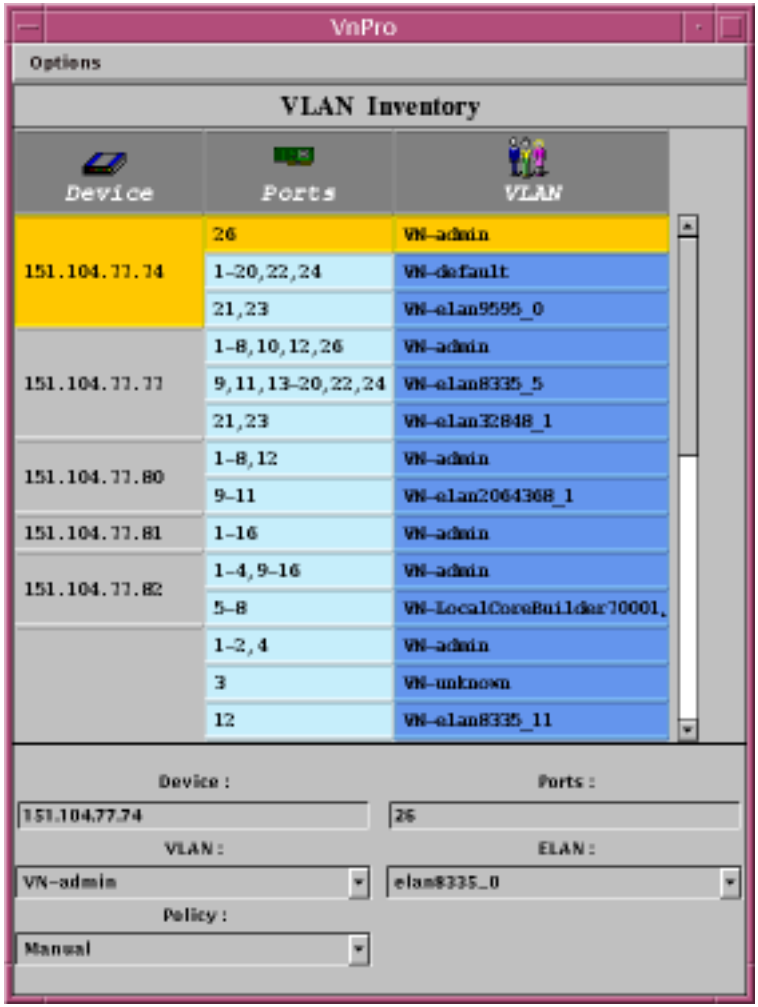


Figure 1-23 The VnPro Tool

The top section displays the VLAN Configuration. The devices, and the associated port numbers and VLAN names are displayed.

To use the VnPro Tool:

Highlight a line in the display.The bottom section displays the information for the selected line. The bottom section of the VnPro Tool is used for display purposes only.

The Options menu allows you to perform the following:

- Move
- Refresh
- Save As
- Quit

The Move option is not implemented in this release.

The Refresh option allows you to update the VLAN Configuration table for the latest device and VLAN information.

The Save As option saves the VnPro information to file. The information can be saved as text or to a file capable of being opened in Excel.

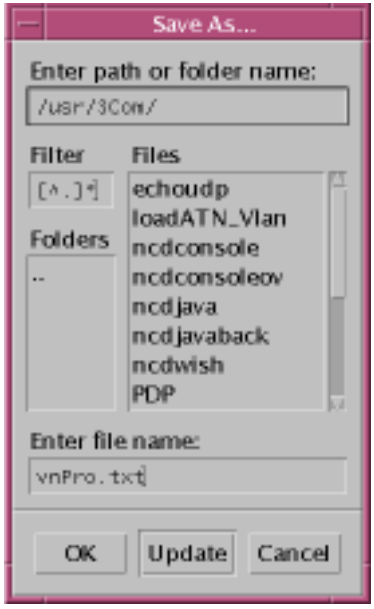


Figure 1-24 VnPRo Save As dialog box

The Quit option exits the VnPro Tool.

A VLAN may be defined without ports when the VLAN is defined in the edge device (Vbridge is allocated) however, the VLAN ports are not associated with the VLAN at this point.

Tasks Tool

The Tasks icon opens the Spider Tool (see Figure 1-25), that provides a graphical display of the underlying distributed processes in the ATM and VLAN Management application. This is only a graphical display tool used to illustrate the underlying network-wide configuration infrastructure/engines and their logical layout. This diagnostic tool displays the active processes and the devices they are applied upon.

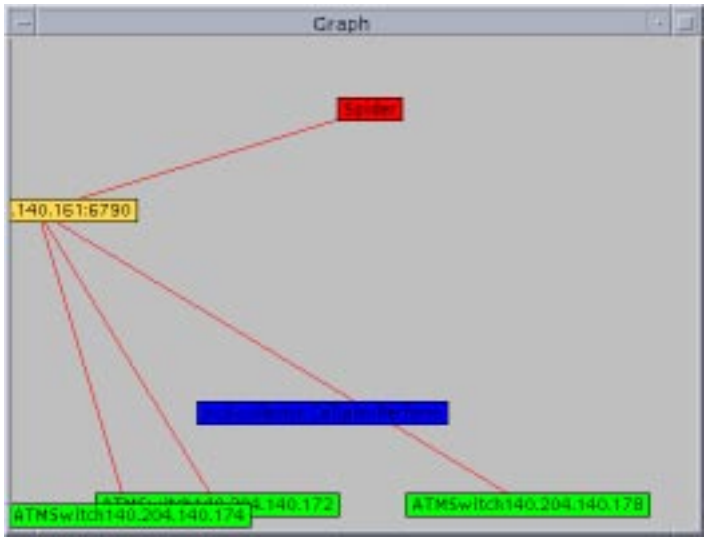


Figure 1-25 The Spider Tool

FSetup Tool

The Fast Setup Tool is a wizard that allows you to configure the CoreBuilder 7000 through the ATM and VLAN Management application. It is a step by step procedure that prompts you to enter the CB7000 parameters required for network management.

To use the Fast Setup Tool:

Click on the FSetup icon in the ATMvLAN Toolbar. The CoreBuilder 7000 first Fast Setup Wizard Panel is displayed. See Figure 1-26.

Figure 1-26 Fast Setup Wizard Step 1

To select the CoreBuilder 7000

1. Enter the CoreBuilder 7000 IP Address or select an address from the drop down menu.
2. SNMP Community String.
3. Click Next. Panel 2 is displayed.

Figure 1-27 Fast Setup Wizard Step 2

1. Enter the Network prefix in the General Parameters wizard panel.
2. Click Next. Panel 3 is displayed.

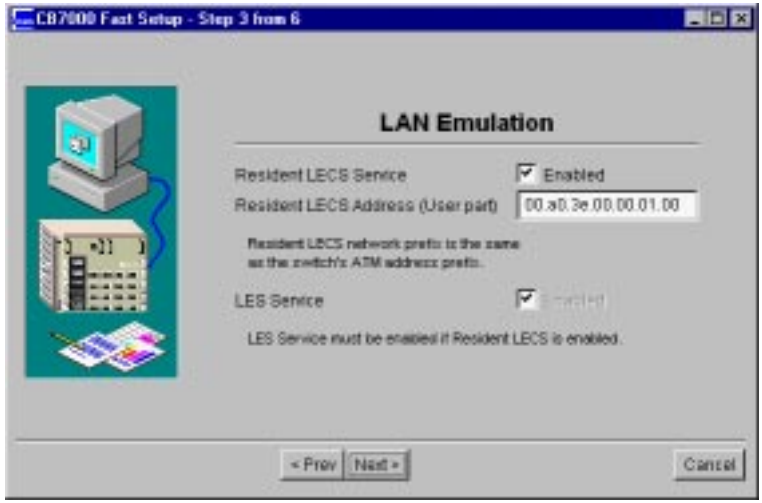


Figure 1-28 Fast Setup Wizard Step 3

1. Select whether you want the Resident LECS Service to be enabled on the selected CoreBuilder. Toggling it on, immediately enables the LES Service. The resident LECS Service does not need to be enabled for the LES Service to be enabled.
2. Enter the User part of the Resident LECS.
3. Click Next. Panel 4 is displayed.

Figure 1-29 Fast Setup Wizard Step 4

1 Enter the prefix and user-part addresses of the Active LECS table.

2 Click Next. Panel 5 is displayed.

Figure 1-30 Fast Setup Wizard Step 5

1. Enter the maximum number of NNI hops.
2. Select the port settings.

   The port settings may be either UNI, NNI or GW.

   Click Next. Panel 6 is displayed.

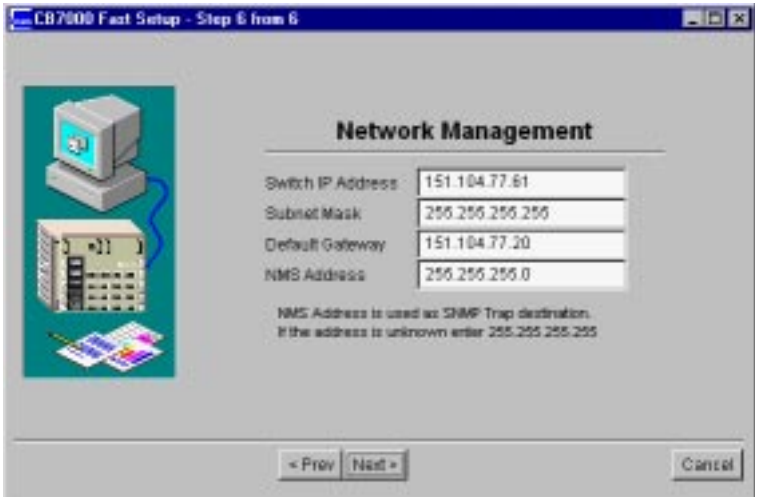


Figure 1-31 Fast Setup Wizard Step 6

1. Enter the Switch IP address, subnet mask and default gateway.
2. Enter the NMS address.

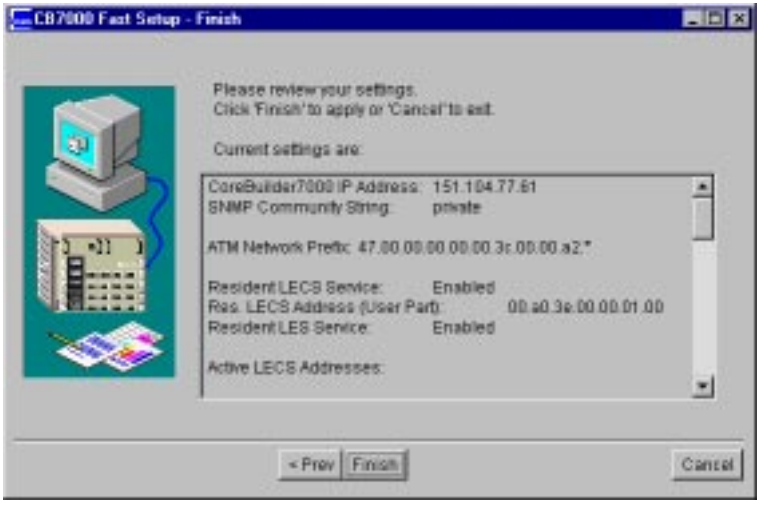


Figure 1-32 Fast Setup Final panel

This panel is to review your settings. Use the scroll bar to view your settings. Click Prev to change settings. Click Finish to apply the settings.

NMS Setup

The ATMvLAN NMSetup Wizard allows you to setup the NMS by following the instructions on the screen.

To use the NMSetup Tool:

Click on the NMSetup icon in the ATMvLAN Toolbar. The NMSetup Wizard Panel is displayed. See Figure 1-33.

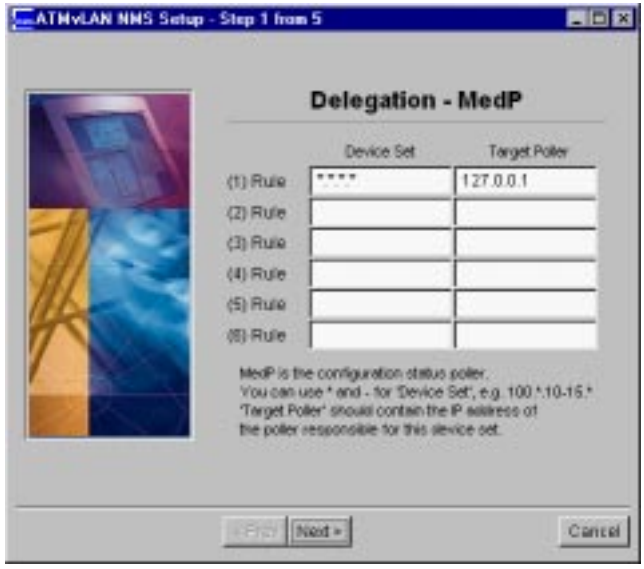


Figure 1-33 NMS Setup Step 1

Define the pollers and the devices that each poller is responsible for in the Delegation MedP panel. Click Next. Step 2 is displayed. See Figure 1-34.

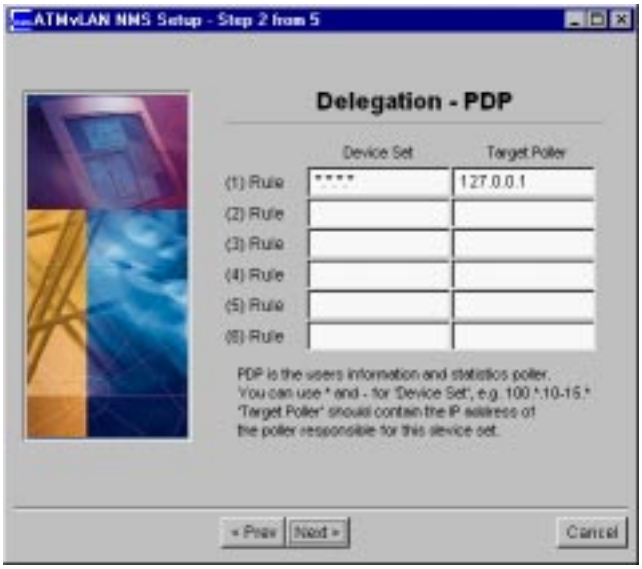


Figure 1-34 NMS Setup Step 2 Delegation PDP

Enter the Device Set and the Target Poller and click Next. Setup 3 is displayed. See Figure 1-35

.

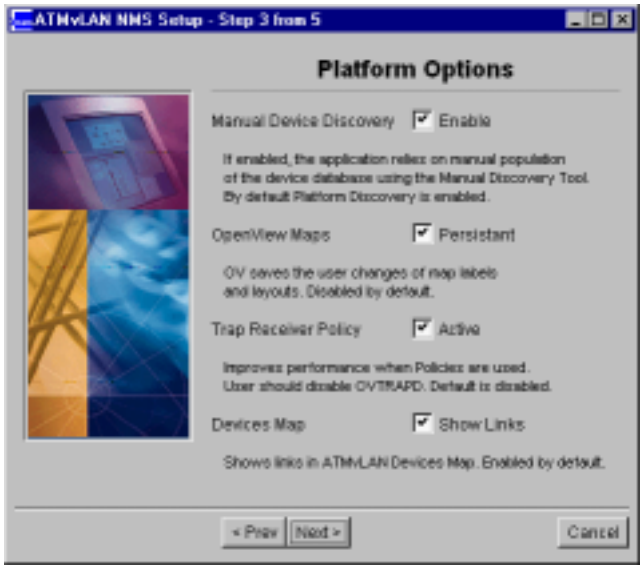


Figure 1-35 NMS Setup Step 3 Platform options

This panel allows you to enable platform options. You can save the graphic display of the OpenView Maps by toggling persistent on.

If Manual Device Discovery is not toggled on, the application will discover from the platform database. When toggled on, the application will rely on manual population of the device database.

Click Next. Step 4 is displayed as in Figure 1-36.

Figure 1-36 NMS Setup Step 4 Advanced Options

Define the number of seconds that the application will wait for the network to settle down before it start the LES failure verification process. This number could be tuned down to about 120 seconds if there are no redundant switch engines in the network. If there are redundant switch engines, the default number should be used.

Enter the fields in the Advanced options panel and click next. Step 5 is displayed. See Figure 1-37.

Figure 1-37 NMS Setup Step 5 Locator

Toggle on the appropriate fields and click Next. The final panel is displayed showing your final NMS Setup settings. See

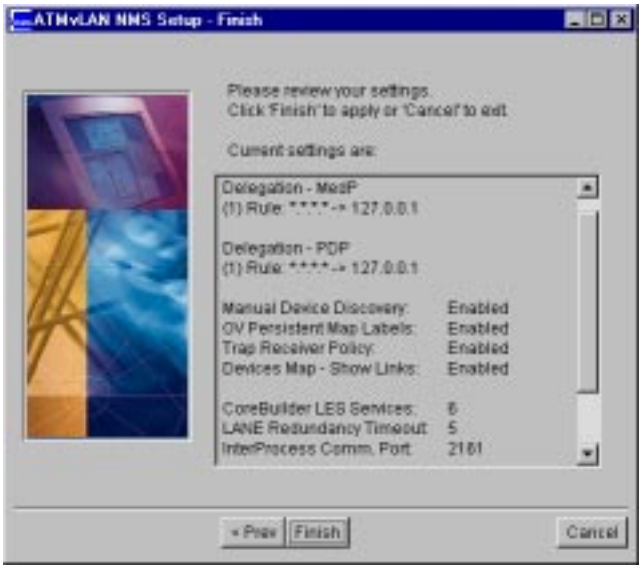


Figure 1-38 NMS Final Panel Review Settings

ATM and VLAN Management Assistants

ATM and VLAN Management Assistants are launched from the ATM VLAN Maps and Tools. These assistants are used to perform various functions such as configuration of services, statistics gathering, troubleshooting and other network tasks.

Configuration Assistants

The configuration assistants are used to configure the network elements in the management maps. ATM and VLAN Management Assistants are launched from maps or tools.

The Configuration Assistants include:

- LECS Redundancy
- LECS Database Configuration and Synchronization
- LES/BUS Redundancy Setup and Activation
- VLAN Aliases and Colors Setup

See Chapter 4 for a more detailed description of these assistants.

2 CONFIGURING AND LAUNCHING THE ATM AND VLAN MANAGER

This chapter contains the following topics:

- Configuring SNMP SmartAgents on Devices
- Device Configuration for VLANs in ATM Networks
- Device Configuration for VLANS in Non-ATM Networks
- Starting Up the ATM and VLAN Manager
- Device Discovery

All 3Com devices including CoreBuilder 7000, SuperStack II Switch 2700, SuperStack II Switch 1000/3000, SuperStack II Desktop Switch, CoreBuilder 7X00, NetBuilder II, CoreBuilder 4000, SuperStack II Switch 2000, CoreBuilder 2500 and CoreBuilder 5000 Fast/Switch Modules may be managed through the ATM and VLAN Management tools. Please refer to the specific device Setup Manual for device initialization and setup instructions.

NMSetup

The NMSetup Tool located in the ATMvLAN Toolbar, opens the NMSetup wizard that allows you to set all the NMS configuration parameters and values in a step by step procedure.

NMSetup

To use the NMSetup Tool:

Click on the NMSetup icon in the ATMvLAN Toolbar. The NMSetup Wizard Panel is displayed. See Figure 2-1.

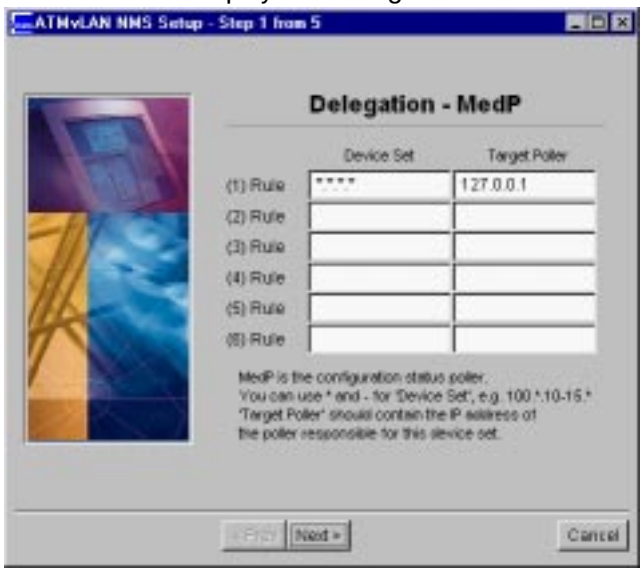


Figure 2-1 NMSetup Step 1

For a detailed description of the NMSetup Tool see page 1-43.

Configuring SNMP SmartAgents on Devices

The NMS performs physical layer management using the SNMP. The NMS polls agents for status, configuration and network traffic information.

The first step in initializing the network for management is to configure the SNMP SmartAgents in the 3Com ATM and VLAN devices.

To configure the SNMP SmartAgents on Devices:

1 Determine the management IP subnet and IP addresses to be used for the ATM devices and the Transcend ATM and VLAN Manager Station.

2 Configure the IP address and default gateway in each ATM switch unit. See the device Installation and Setup Guide for the switches you are using.

It is recommended that all the ATM and VLAN devices be configured as members of the same subnet as the Network Management Station

(NMS). This allows the NMS to access these devices directly over the ATM network instead of going across routers.

3 Configure the IP address, and default gateway of Bridge 0 in each of the edge device units. See the device Installation and Setup Guide for the devices you are using.

Configuring SNMP SmartAgents and Parameters

Community names set on the NMS must correspond with community names set on the agent(s). Configure the SNMP generic parameters on the ATM and VLAN Network Manager as follows:

1 Configure the default SNMP Community Setting on the Network Management Platform according to Table 2-1. See the Network Management Platform Administration Manual.

Table 2-1 Configuring SNMP Community Settings

Device	SNMP Community Setting
CoreBuilder 7000 CoreBuilder 7X00 SuperStack II Switch 2700	Private
SuperStack II Switch 1000/3000/Desktop Switch	Security
SuperStack II Switch 2000	Private
CoreBuilder 2500/6000 CoreBuilder 5000 Switch Module	Public
SuperStack II Switch 2000 TR	Security
NetBuilder II	Public
CoreBuilder 4000	Public

If default SNMP Communities are changed in the devices, you must enter the new communities as well.

2 Verify the IP/SNMP connectivity using the IP Map.

All devices in the management subnet should appear on the IP Map of the management platform. The IP connectivity is verified by the appearance of the IP address. The SNMP connectivity is verified by the appearance of the device icon. The process of establishing connectivity should take about 5 minutes.

CAUTION: *Do not start the ATM and VLAN Network Manager until all the ATM and VLAN devices have been discovered and appear in the IP Map of the management platform.*

Setting Up for Distributed Polling

Polling in SNMP management is the activity whereby the NMS interrogates/polls individual nodes on the network for their current status. It is one if the most important sources of network management control for traffic on the network.

The ATM and VLAN Management application maintains the status and state of all the logical and physical components of the network. You cannot rely on the platform poller alone (such as HPOV SNMP Poller) which only maintains the "ping" status of the network when using the application. The ATM and VLAN Management application uses a platform-independent poller called the Mediation Poller or Medp to actively maintain the status of all the components it is monitoring.

Starting the Poller Locally

In small networks consisting of less than a 100 network devices (ATM and Non-ATM switches), a single central poller is adequate for polling the network and maintaining the state of the logical and physical network. In these types of networks, the Mediation Poller can reside on the NMS. The default configuration installs the mediation poller when the ATM and VLAN Management application is installed. The poller is initialized and activated along with other network management platform processes.

Starting the Poller on Multiple Distributed Machines

When using the application to manage a larger network, consisting of many network devices, or when the network is managed over a wide area, it is possible to distribute the polling.

Distributing polling onto more than one machine has several advantages. The advantages are:

- Localizes polling in remote sites so as not to send polling traffic on WAN links.
- Distributes the polling load onto several machines to get better polling performance and SNMP traffic distribution.
- Frees up CPU resources on the central management station, thus providing better console performance.

The following steps must be followed when installing distributed pollers:

1. Install the Transcend ATM and VLAN Management application on the central machine on top of an open management platform such a HPOV. In a distributed polling environment, this machine is the Central Viewing Station or Central Management Console

   or

   install the Transcend ATM and VLAN Management application as a stand-alone application, on other Unix machines (Solaris, AIX or HPUX). An open management platform is not required. In a distributed polling environment these machines are referred to as *polling stations* or pollers. These machines do not require an open management platform such as HPOV installed on them.

2. On the polling station, start the polling process:

   a Change Directory to /usr/NCDNMS/make/

   b Execute the file "medp."

   It is advised to include these steps in the boot configuration of the polling station so that they are executed automatically when the polling station is booted up.

3. Configure the ATM and VLAN Management application on the central management station to recognize the distributed pollers and delegate polling responsibilities to each poller.

   Before starting the application, edit the following file:

   /usr/NCDNMS/runtime/cnf/mediationd.cnf

   Each line in the /usr/NCDNMS/runtime/cnf/mediationd.cnf consists of three fields, each separated by a colon. The upper lines in the files take priority over the lower lines.

This customization of this file can be performed using the NMS Setup Wizard.

The first field is the range of the IP addresses that devices will be polled from. The second field is the poller IP address. The third field represents the socket port number communication port. The default number for the socket port is 1161

An Example of Distributed Polling.

```
100.200.100.170-180:100.200.100.78:1161
100.200.100.*:100.200.100.79:1161
100.*.*.*:100.200.100.77:1161
*.*.*.*:127.0.0.1:1161
```

Figure 2-2 A Listing of Contents from the C:\TranscendNT\ATMvLAN\runtime\cnf\mediationd.cnf

Line one displays the range of IP addresses (IP address 100.200.100) with their last address field, address ending in numbers between 170 through 180, polled to IP address 100.200.100.78, poller number1.

A hyphen should be used to indicate a range.

Line two displays all other IP addresses in subnet 100.200.100.*, are polled to IP address 100.200.100.79, poller number 2.

A * should be used to indicate a wildcard.

Line three displays that all other IP address in subnet,100.*.*.*, are polled to IP address 100.200.100.77, poller number 3.

Line four displays that all other address in the network are polled to 127.0.0.1, poller number 4 which represents the poller located on the local machine.

Be certain that the last entry in the mediationd.cnf file contains a global subnet (*.*.*.*) in the first field to ensure that all nodes in the network are assigned to a poller.

Device Configuration for VLANs in ATM Networks

A Virtual LAN is logical port group spanning a single device or multiple devices on a network forming a single broadcast or flooding domain. When LAN Emulation protocols are used to create broadcast domains over ATM-based infrastructures, these broadcast domains are also commonly known as Emulated LANs or ELANs. Each Emulated LAN is serviced by a single LES (LAN Emulation Server) and single BUS (Broadcast Unknown Server). Endstations or network devices that join a common Emulated LAN are said to be in a single ELAN or VLAN. These endstations communicate with the LAN Emulation Services (LES/BUS) via another LAN Emulation entity called a LAN Emulation Client (LEC).

To build and manage ATM/LAN Emulation-based Virtual LANs, the LAN Emulation Services and Clients must first be manually configured into their respective default states via device consoles or a local management interface. Only after they are configured, can you use the ATM and VLAN Management application to manage and manipulate the environment.

CoreBuilder 7000 ATM Switch Configuration

The CoreBuilder 7000 ATM Switch supports the LAN Emulation Services (LES/BUS/LECS). Depending on the number of Emulated LANs that need to be created, LANE services must be enabled on one or more CoreBuilder 7000 switches in the network. You can use the CB7000 Fast Setup tool to configure the CB7000 through the ATMvLAN Toolbar. See "The CB7000 Fast Setup Tool" on page 2-8.

The following guidelines should be followed when enabling LAN Emulation Services on the CoreBuilder 7000.

1. When there are multiple CoreBuilder 7000s, the LAN Emulation Services must be distributed amongst all the core switches.

   For example, if 10 Emulated LANS are required and the network is comprised of 5 CoreBuilder 7000s in the core of the network, you should distribute the LANE Services on all the core switches.

   All LANE services should be enabled on all the core switches. Since each CoreBuilder 7000 supports 16 LES/BUS pairs, some of these LES/BUS pairs may be configured as primary LANE servers of an ELAN and the others as backup LANE Servers for the primary LES/BUS pair. See Chapter 4.

2. When there are multiple CoreBuilder 7000s, the LAN Emulation Configuration Server (LECS) may be enabled on multiple switches. Up to 5 LECSs may be configured as active LECSs in the network. You should enable LECSs on some of the core switches in the network.

3 The Network Management Station should be connected directly to the switch running the primary LECS. This will ensure that the NMS always has access to the LECS so that it can enable the backup LES when the primary LES fails. See "Description of LES/BUS Redundancy" on page 4-10.

The CB7000 Fast Setup Tool

This CB700 Fast Setup icon opens a wizard that allows to configure the CoreBuilder 7000.

To use the Fast Setup Tool.

Click on the FSetup icon in the ATMvLAN Toolbar. Step by step procedures are displayed that allow you to configure the CB7000.

ATM Edge Device Configuration

ATM edge devices such as Super Stack II Switch 2700, CoreBuilder 7200, Switch 1000, CoreBuilder 5000 Switch Modules etc., provide the legacy LAN-to- ATM integration. Some of these edge devices need to be pre-configured to enable the LAN Emulation Clients within them. Typically, this involves configuring the local bridge groups within the devices and their corresponding LECs. Please refer to the appropriate device configuration manuals for information on VLAN/ELAN configuration of these devices.

Device Configuration for VLANS in Non-ATM Networks

Virtual LANs in non-ATM (Fast Ethernet) environments are created by using Layer 2 encapsulation or Tagging as a means to create broadcast or flooding domains. Ports that are common to multiple Virtual LANs are known as Virtual LAN Trunks (VLT). Switch 1000/3000s and CoreBuilder 5000 Fast Modules support this feature. VLTs must be configured on the switches prior to using the ATM and VLAN application to manipulate the VLT-based VLANS. Please refer to the Switch 1000/3000/CoreBuilder 5000 Fast Module configuration manuals for information on VLT-based Virtual LANs.

Starting Up the ATM and VLAN Manager

This section describes the start-up procedure for the ATM and VLAN Management application for the HPOV/OVW platform:

Setting Up and Customizing the ATM and VLAN Management Application

Before you begin to use the ATM and VLAN Management application there are several tasks that you should perform to setup and customize the ATM and VLAN Management application. They are as follows:

1. Login to the UNIX workstation and start the OVW. See "Login to the UNIX Workstation and Start the OVW" on page 2-10.
2. Discover devices via the OpenView IP Map. See "Discover devices via the HP OpenView IP Map" on page 2-10.
3. Verify that you network is up and running. See "Verify that your network is up and running." on page 2-11.
4. Customize the VLAN colors and aliases. See "Customize the VLAN colors and aliases." on page 2-11.
5. Customize some of the other application configuration files using the NMSetup Wizard. See "Customizing the Application Configuration Files" on page 2-12.
6. Restart the ATM and VLAN Management application.

Login to the UNIX Workstation and Start the OVW

From the HPOV Root Window select ATMvLAN and then select Load Transcend ATMvLAN Maps.

After a few seconds, icons representing the six ATM and VLAN Management maps appear in the Root window. The ATMvLAN Toolbar and the Virtual LANs and LAN Emulation windows appear.

Discover devices via the HP OpenView IP Map

Ping devices if they don't appear in the IP map. Start the ATM and VLAN Management application only after all the devices are discovered by HPOV and are displayed in the IP map.

If you encounter problems discovering devices from the HPOV platform database, or if you want to setup the application to ignore the platform

discovery database, you can manually discover devices using the Manual Device Discovery Assistant. See "Using the Manual Device Discovery Assistant" on page 4-2.

Verify that your network is up and running.

As the application begins, it is modeling (understanding the logical and physical structure) the ATMvLAN network. The length of this process depends on the size of the network. For larger networks, it may take up to 15 minutes for your maps to be activated.

To check that the network modeling process is complete open the LAN Emulation Map and verify that all of the icon colors have changed from blue to yellow, green or red.

Common Startup Problems

If the root icons don't change color from blue, it may be because either the MEDP or PDP tasks are not running.

There are two ways to check that the MEDP and PDP process are running on OVW or NetView:

- use the ovstatus command
- use the ps command

The ps command is used for the SunNet Manager to check if the processes are running.

Customize the VLAN colors and aliases.

Customizing the VLAN aliases and colors enables the ATMvLAN device view windows to show what VLANS each port is assigned to. If you do

not customize the colors and alias settings, device view VLAN moves can not be applied.

1 Select the Virtual LANs icon and then select the Configuration Assistant icon. This displays the Virtual LANs configuration window.

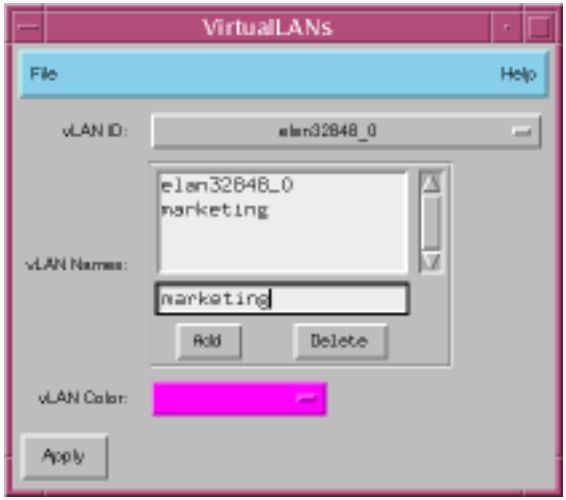


Figure 2-3 Virtual LANs Configuration Assistant

2 Create the VLAN alias and color mapping.

To select a VLAN aliases and associated names:

a Select the VLAN ID from the pop-up list.

b Type in the new VLAN Name.

c Select the VLAN color from the pop-up list.

d Click Add

e Click Apply to save all the updated VLAN names and aliases. Close the window by selecting File -> Close. The changes are applied only after the ATMvLAN Management application is unloaded and re-loaded.

Customizing the Application Configuration Files

There are several settings that can be customized by modifying the values in files stored in the C:\usr\TranscendNT\ATMvLAN\runtime\cnf and C:\usr\TranscendNT\ATMvLAN\runtime\dat directories. These settings affect various features of the ATM and VLAN Management application and can make your ATM network easier to manage. Once changed, the application needs to be unloaded and reloaded for them to be applied.

These files and directories must be backed-up before installing/upgrading to a newer release of the ATM and VLAN Management application.

The ATMvLAN NMSetup Wizard allows you to modify these configuration files. This customization will take effect upon restarting the application after the customization is performed using the customization Wizard.

Table 2-2 lists the names of the some files that you can customize using the NMSetup Wizard.

Table 2-2 ATMvLAN Customization Files

Filename	Description
mediationd.cnf	This file has the information about all the distributed pollers and the devices that each poller is responsible. The setup of distributed pollers is explained in the See "Setting Up for Distributed Polling" on page 2-4.
	This file is customized by the Setup Wizard.
noplatdis.cnf 127.0.0.1.ppp	If this file exists, the application will not discover from the platform database. It will rely on manual population of the device database (C:\TranscendNT\ATMvLAN\runtime\sav\127.0.0.1.ppp) using the Manual Discovery Tool. The default is to use platform discovery and this file by default is noplatdis.cnf.bak
	This file is customized by the Setup Wizard
numcpsrvs.cnf	The number set in this file (1-16) determines the number of LESs displayed in the maps. So if you are only using 2 LES/CoreBuilder, set the number to 2 and only the first 2 LESs of the CoreBuilder are shown in the maps.
	This file is not customized by the Setup Wizard.
protimeout.cnf	The number in this file determines the number of seconds that the application will wait for the network to settle down before it start the LES failure verification process. This number could be tuned down to about 120 seconds if there are not redundant switch engines in the network. See Chapter 4 for a more detailed description. If there are redundant switch engines, the default number should be used.
	This file is customized by the Setup Wizard.
VnRgb.dat	Is the file where the VLAN aliases and color information is saved after the aliases and colors are set. This file must be saved when the application is upgraded to a newer release.
	This files is customized by using the VLAN Aliases and Colors setup assistant.

Table 2-2 ATMvLAN Customization Files

Filename	Description

Spider.cnf	This file format is similar to the mediationd.cnf file. The contents of the file define the location of the distributed proxy smart Agents (pdp). It can either point to the local host or a remote proxy agent. You can assign different proxy agent to different IP address ranges. These proxy smart agents are used for Policy based VLAN configuration, data collection for NNIx tool, MAC address inventory etc.
	`#`
	`#  NCD JAVA Configuration File`
	`#`
	`#  PDP List`
	`# Devices: PDP ip: PDP port`
	`*.*.*.*:127.0.0.1:6790`
	This file is not customized by the Setup Wizard.

Restart the ATM VLAN Application

Unload the ATMvLAN Maps and then reload them.

To unload, select all six ATMvLAN root icons. From the ATMvLAN menu select Unload Transcend ATMvLAN Maps. This allows all the configuration files, color, and alias changes to take affect. Be sure to unload the ATM and VLAN application before you exit HPOV/OVW. Failure to do so will prevent the application from loading successfully next time HPOV/OVW is launched.

Device Discovery

Devices are discovered only if they are up and respond to SNMP queries. The devices must appear in the management platform's IP Map first.

Re-discovering Devices

You can update the application to include new ATM and VLAN devices while the application is running. New devices are ones that have been added after you have initialized the application.

To update and include the new devices:

Select *ATMvLAN --> Load Transcend ATMvLAN Maps.*

This procedure may be performed only at intervals of 15 minute or more.

3 USING THE ATM AND VLAN MANAGEMENT APPLICATION

This chapter describes how to use the ATM and VLAN management application user interface.

The following topics are discussed:

- Navigating ATM and VLAN Maps
- Using the ATM and VLAN Tools
- Using the ATM and VLAN Assistants

Navigating ATM and VLAN Maps

Figure 3-1 displays the Root Window of the ATM and VLAN Manager as it is displayed after starting the application. Each icon opens into several submaps, depending on your network structure, to display the physical and logical components of the network.

Figure 3-1 The ATM and VLAN Manager Root Window

To navigate through a submap:

Click on an icon then select Zoom Physical from the ATMvLAN menu.

Table 3-1 Window Access From the Root Window

Window Name	Select	Action	Description
Root	ATMvLAN Devices	Double click on the icon or select ATMvLAN -> Zoom Physical.	Opens the ATM vLAN Devices window. See Figure 3-2.
	Virtual LANs	Double click on the icon or select ATMvLAN -> Zoom Physical.	Opens the Virtual LANs window. See Figure 3-7.
	LAN Emulation	Double click on the icon or select ATMvLAN -> Zoom Physical.	Opens the LAN Emulation window.
	ATM Network	Double click on the icon or select ATMvLAN -> Zoom Physical.	Opens the ATM Network window.
	ATMvLAN Policies	Double click on the icon or select ATMvLAN -> Zoom Physical.	Opens the ATMvLAN Policies window
	Gigabit Network	Double click on the icon or select ATMvLAN -> Zoom Physical.	Opens the Gigabit Ethernet window.

You can also navigate through submaps using the Topology Tool. Double click on the Component View entry to see the sub-maps.

ATMvLAN Devices Map

The ATMvLAN Devices Map displays all the ATM and VLAN devices on the network. Each device is represented by an icon. Each device is color coded according to its current status in the network

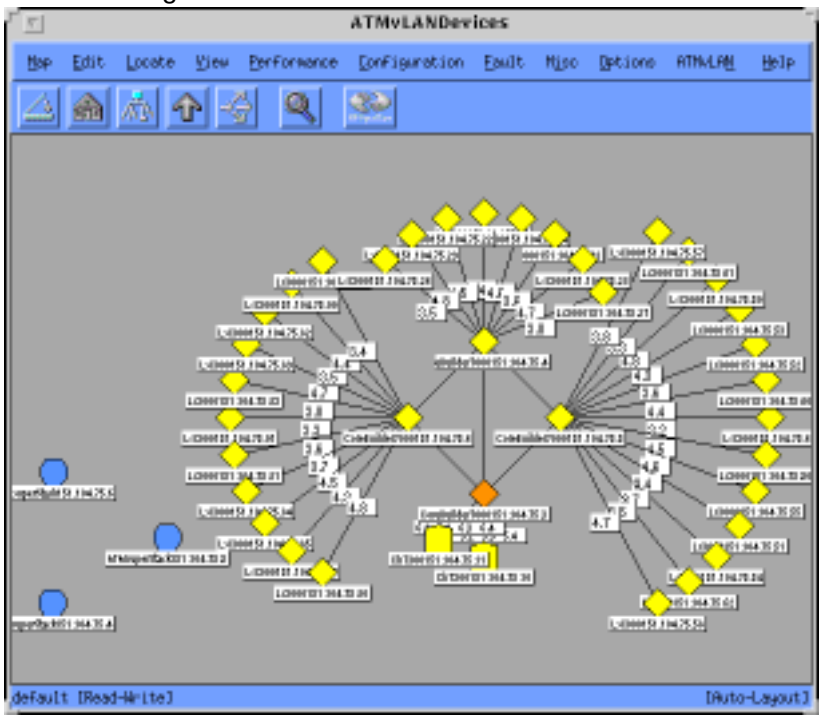


Figure 3-2 The ATMvLAN Devices Window

For the SuperStack II and CoreBuilder products to get true colors of the device front panel, click on the front panel. This updates the colors of the front panel. This may temporarily change other colors on the screen To return to the original colors, click on the front panel window.

Table 3-2 Window Access from the ATMvLAN Devices Map

Window Name	Select	Action	Description
ATMvLAN Devices	SuperStack II Switch 2700	Select the device and then from the ATMvLAN menu select Zoom Physical.	Displays front panel view. See Figure 3-3.
	CoreBuilder Module Device Manager	Double click or from the ATMvLAN menu select Zoom Physical.	Displays front panel view. See Figure 3-4.

Table 3-2 Window Access from the ATMvLAN Devices Map

Window Name	Select	Action	Description
	CoreBuilder 2500/6000 or LANplex 2016/5000 Module Device Manager	Double click or from the ATMvLAN menu select Zoom Physical.	Displays front panel view. See Figure 3-5.
	CoreBuilder 5000 Module Device Manager	Double click or from the ATMvLAN menu select Zoom Physical.	Displays front panel view
	Switch 1000/3000 Module Device Manager	Double click or from the ATMvLAN menu select Zoom Physical.	Displays front panel view
	ATM SuperStack II Switch 2700 Array	Double click or from the ATMvLAN menu select Zoom Physical.	Displays stack front panel view. See Figure 3-6.

To display a device front panel using the Transcend Topology Browser:

1 Select the device in the Component View portion of Topology Browser.

2 Select the Zoom icon in the Topology Browser toolbar.

or

Double click on the device in the Component View of the Topology Browser.

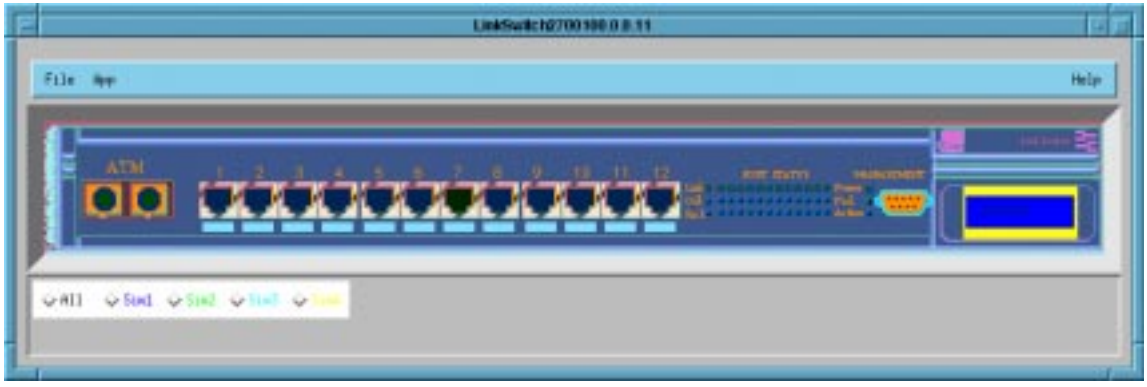


Figure 3-3 SuperStack II Switch 2700

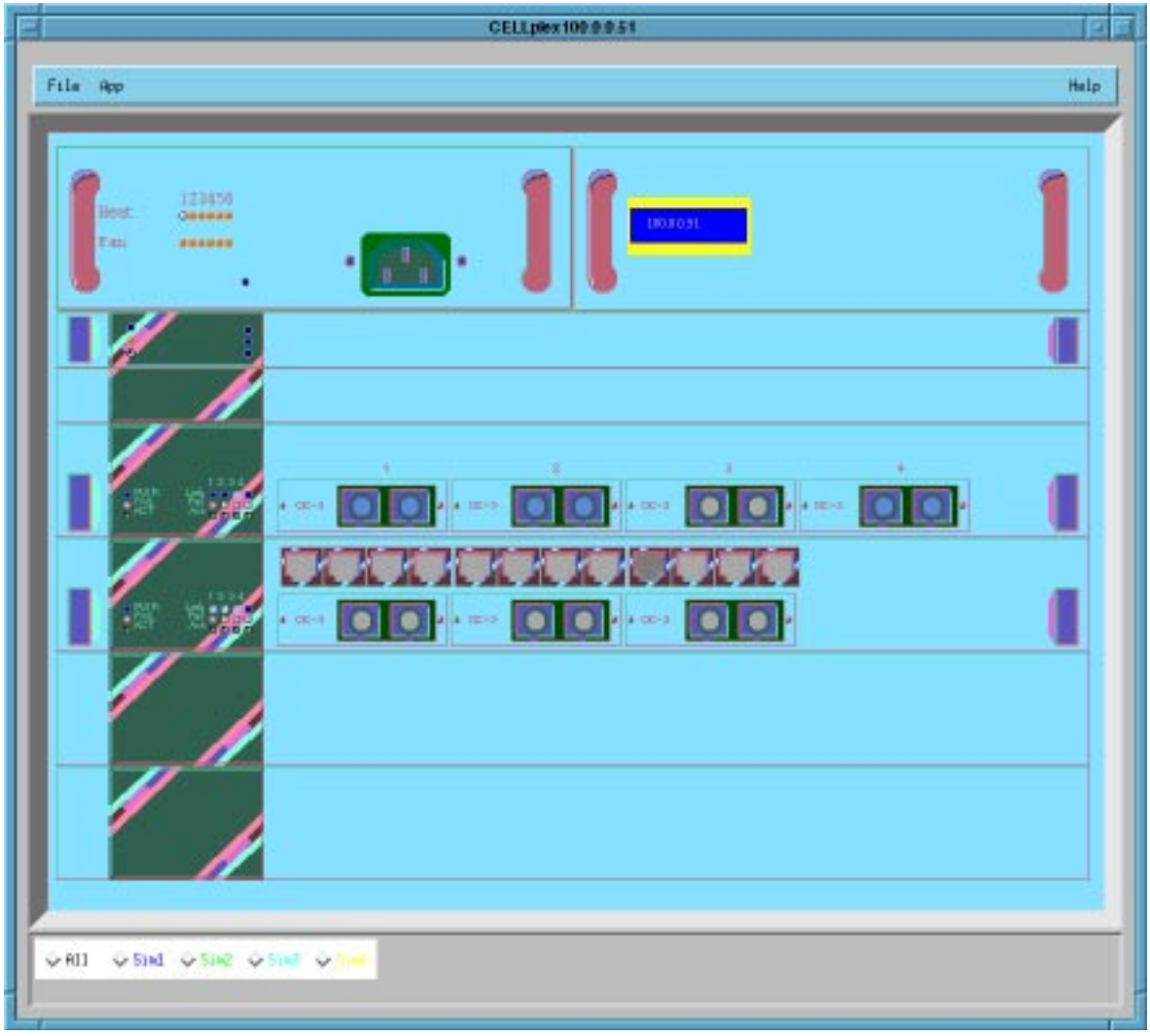


Figure 3-4 CoreBuilder Front Panel Display

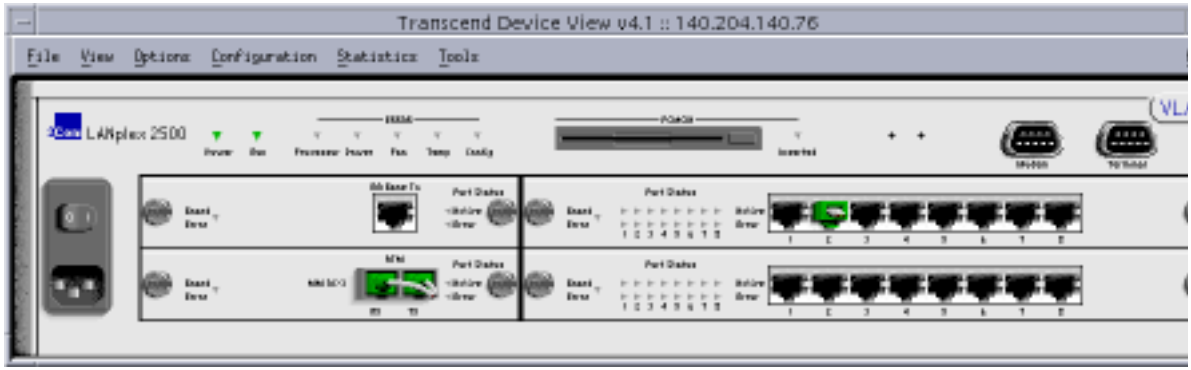


Figure 3-5 CoreBuilder 2500 Module Device Manager Front Panel Display

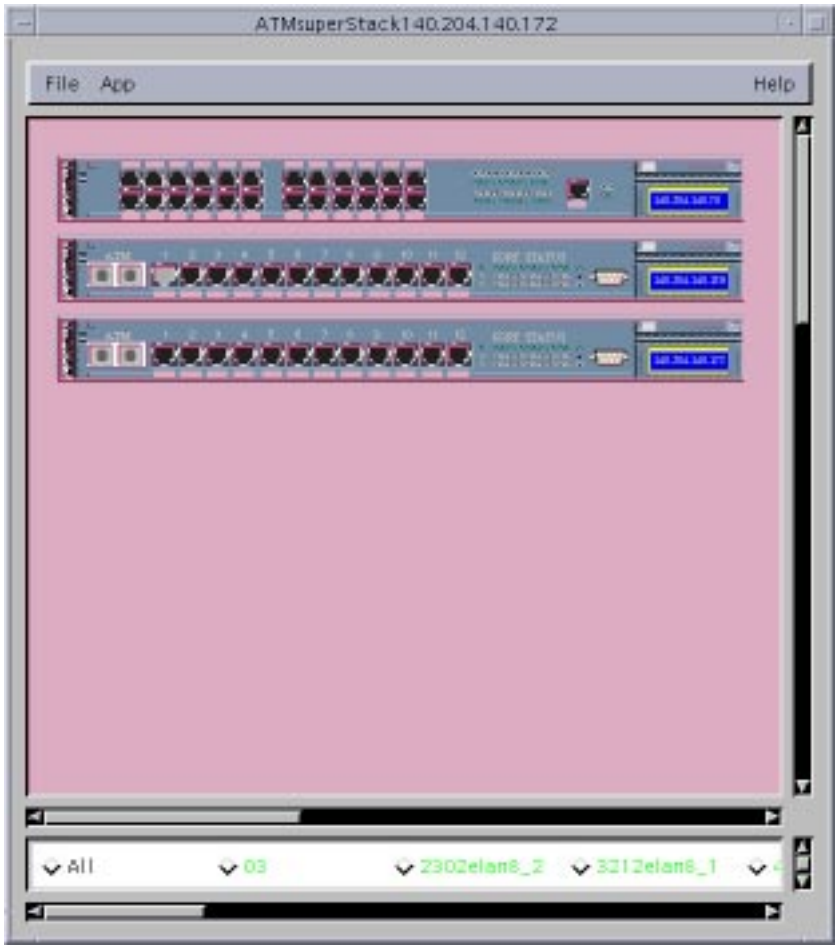


Figure 3-6 ATM SuperStack II Switch 2700 Array

Virtual LANS Map The Virtual LANs Map is used to display the VLANs and the associated segments in the network.

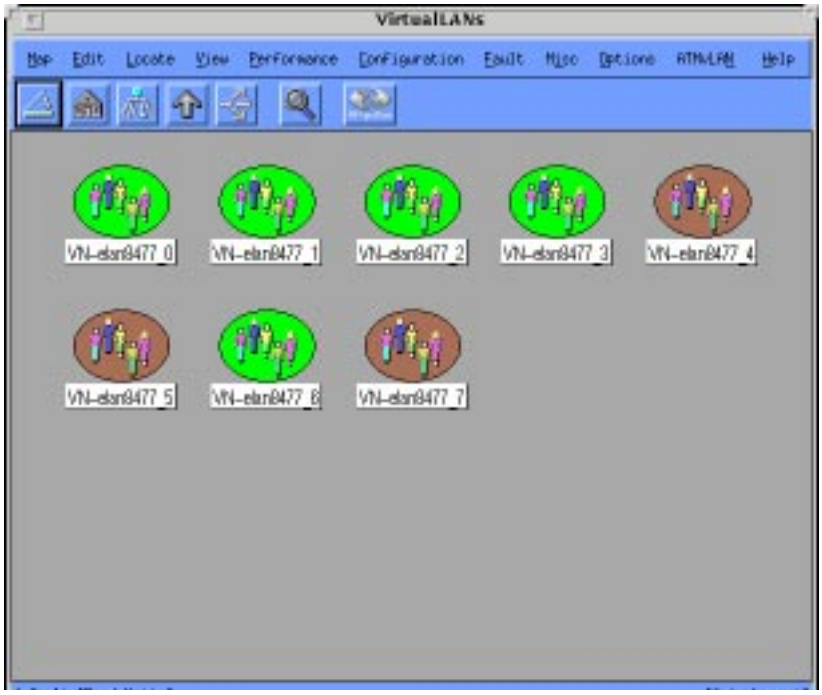


Figure 3-7 The Virtual LANs Window

Table 3-3 Window Access from the Virtual LANs Map

Window Name	Select	Action	Description
Virtual LANs	A Virtual LANs group	Double click or from the ATMvLAN menu select Zoom Physical.	Displays the segments belonging to the selected VLAN. See Figure 3-8.

To locate the Virtual LANs in the Topology Browser Topology View:

1. Select the Virtual LAN in the Component View.
2. Select the Cross Reference icon in the Topology Browser Toolbar.

The devices containing the selected VLAN(s) is highlighted in the Topology View. See Figure 3-10.

Figure 3-8 The VN-elan window

Table 3-4 Window Access from the Vn-elan Map

Window Name	Select	Action	Description
VN-elan	One or more segments and a VLAN in the Virtual LANs window.	From the ATMvLAN menu select the Move icon.	Moves the segments to a different VLAN.

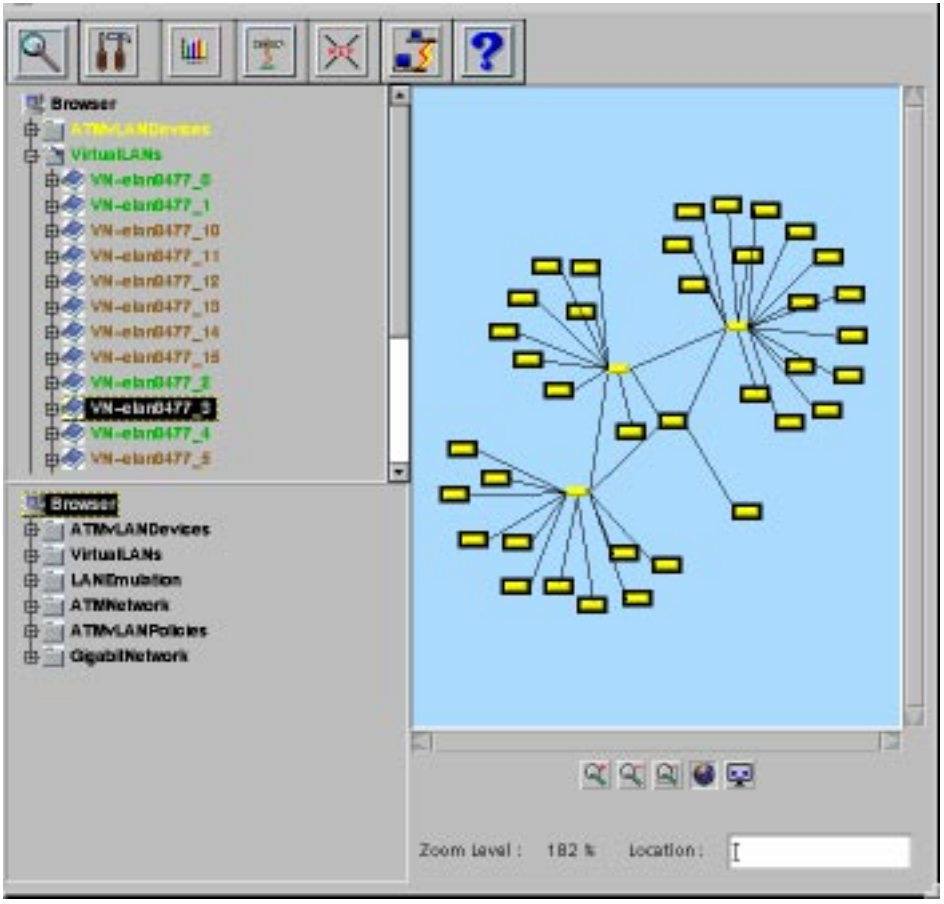


Figure 3-9 Cross Referencing VLANs in the Transcend Topology Browser

LAN Emulation Map

The LAN Emulation Map displays an overview of Emulated LANs. The Backbone and Services in the center are connected to the peripheral, non-backbone, ATM devices, which include edge devices or ATM endstations participating in Emulated LANs.

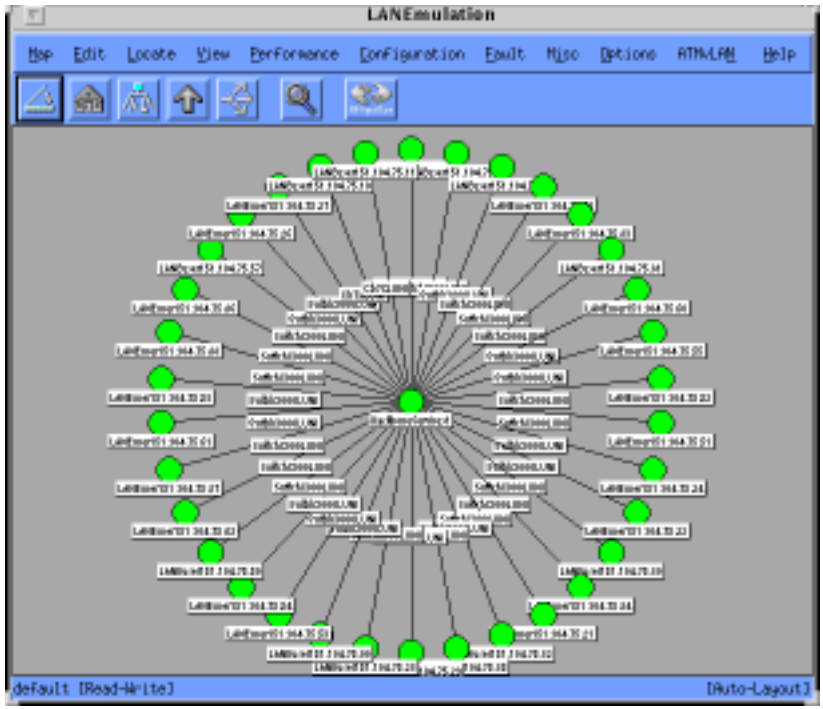


Figure 3-10 The LAN Emulation Window

Table 3-5 Window Access from the LAN Emulation Map

Window Name	Select	Action	Description
LAN Emulation	Backbone and Services Icon	Double click, or from the ATMvLAN menu select Zoom Physical.	Displays Backbone and Services window that shows the LECSs, LESs and BUSes
	LANE User	Double click, or from the ATMvLAN menu select Zoom Physical.	Displays LANE User window.
	LECS icon	Double click, or from the ATMvLAN menu select Zoom Physical.	Displays front panel.

Table 3-5 Window Access from the LAN Emulation Map

Window Name	Select	Action	Description
	LES	Double click, or from the ATMvLAN menu select Zoom Physical.	Displays LECs map showing all LECs connected to the LES.

To display the LAN Emulation components in the Topology Browser:

1. Select the component in the Topology Browser Component View.
2. Select the Cross Reference Tool.

ATM Network Map

You can examine the overall structure of the ATM Network and the connectivity of edge devices. In particular, you can examine the following items:

- ATM Switch topology at Network-to-Network Interface (NNI) level
- Connectivity Between ATM Switch Domains at NNI level
- Edge Device connectivity at User-Network Interface (UNI) level
- Virtual Channels across NNI and UNI Interfaces.
- List the ATM address space of the Network

The ATM Network Map displays the most up to date physical connectivity of the network. If a link between two switches fails, the map deletes the link from the ATM Network Map instead of displaying the link in the critical (red) state.

To detect unexpected changes in the network configuration, you can maintain snapshots of windows of interest. These snapshots may be used as a baseline for comparison, for example, of detecting a link fault. Link faults can cause a link icon to disappear from a window.

The snapshot facility is located in the Map menu of HPOV.

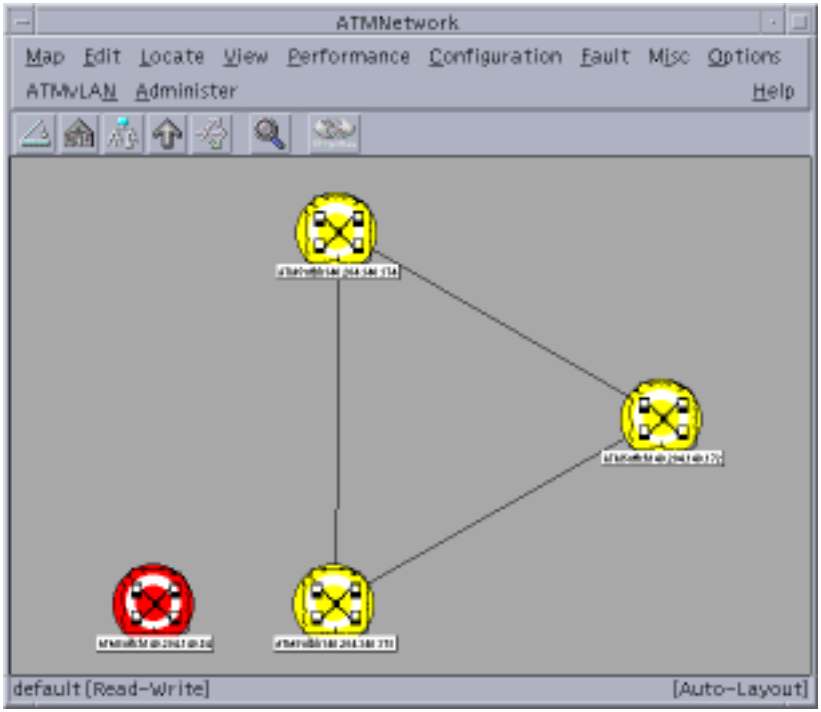


Figure 3-11 The ATM Network Map

Table 3-6 Window Access from the ATM Network Map

Window Name	Select	Action	Description
ATM Network	ATM Switch	Double click, or from the ATMvLAN menu select Zoom Physical.	Displays ATM Switch window
ATM Switch	A device	Double click, or from the ATMvLAN menu select Zoom Physical.	Displays the front Panel Device View

To display the ATM Network components in the Topology View:

1. Select the component in the Topology Browser Component View.
2. Select the Cross Reference Tool.

ATM and VLAN Policies Map

The ATM and VLAN Policies Map shows the different automatic VLAN configuration policies you can use to assign to the VLAN devices.

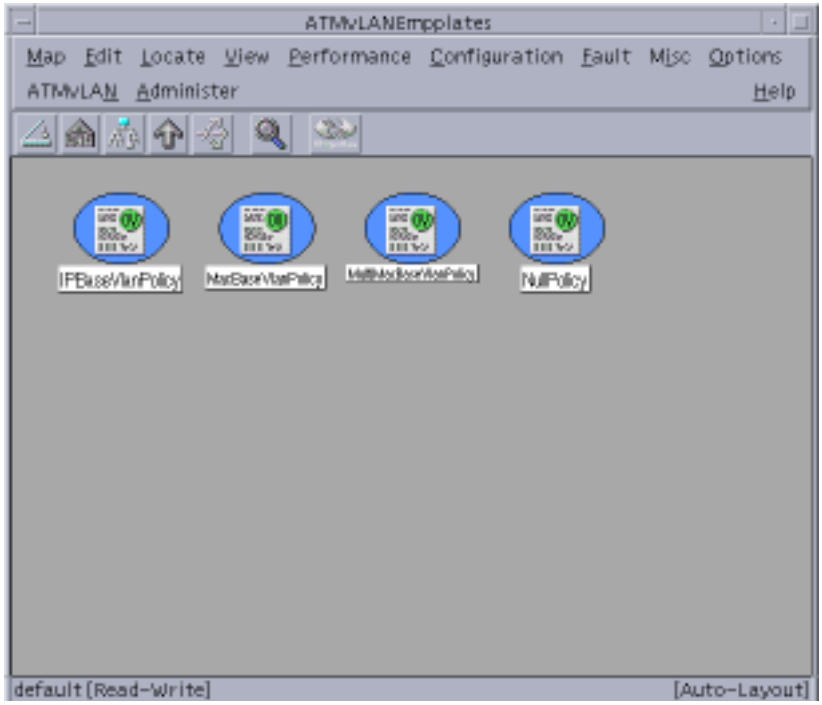


Figure 3-12 The ATM and VLAN Policies Map

Table 3-7 Window Access from the ATM and VLAN Policies Map

Window Name	Select	Action	Description
ATMvLAN Policies	A policy	Double click, or from the ATMvLAN menu select Zoom Physical.	Opens the Policy-based window.
Policy-based window.	One or more segments and a policy icon (to remove a segment from any policy, move it to the Null Policy.	Double click, or from the ATMvLAN menu select the Move icon.	Moves the segments to the newly assigned policy.

To display the ATMvLAN policies components in the Topology Browser Topology View:

1. Select the component in the Topology Browser Component View.
2. Select the Cross Reference Tool

Using the ATM and VLAN Tools

The ATM and VLAN Toolbar automatically appears when you start up the ATM and VLAN Management application. The tools may be used to perform various network tasks and also provide you with an assortment of status displays.

The ATMvLAN Toolbar

The ATMvLAN Toolbar, see Figure 3-13, is displayed when you startup the ATM and VLAN Management application.For a description of the ATMvLAN Toolbar see page 1-21.

Figure 3-13 The ATMvLAN Toolbar

You can perform all the ATM and VLAN Management applications tasks using the Transcend Topology Browser. The other ATM and VLAN tools are used for display purposes and database modifications. You can also view the status of traffic and other network parameters using some of the tools.

To invoke one of the tools, double click on the icon. See Section 2 for a description on how to use these tools to perform network management tasks.

Using the ATM and VLAN Assistants

There are four types of assistants: configuration, graph, path and performance. You can use these assistants to setup parameters trace paths, and see the performance of your devices on the network.

Configuration Assistants

The following section describes the ATM and VLAN configuration assistants.

Backbone and Services Configuration Assistant

To launch the Backbone and Services Configuration Assistant:

1. Select the Backbone and Services icon from the LAN Emulation Map
2. Select Configuration Assistant from the ATMvLAN menu.

To set up the LECS database:

1. Synchronize the LECS databases. See "LECS Database Creation and Synchronization" on page 4-8.
2. Setup the LES/BUS redundancy and activate it. See "Description of LES/BUS Redundancy" on page 4-10.

Manual Device Discovery Configuration Assistant

The Manual Device Discovery Configuration Assistant is used to manually enter devices into the managed devices list.

To launch the Manual Discovery Assistant:

1. From the Root window select the "ATMvLAN Devices" icon.
2. Select Configuration Assistant from the ATMvLAN menu. See "Using the Manual Device Discovery Assistant" on page 4-2.

VLAN Aliases and Colors Configuration Assistant

The VLAN Aliases and Colors Assistant is used to setup the VLAN aliases and colors.

To launch the VLAN Aliases and Colors Assistant:

1. From the Root window, select the Virtual LAN icon.
2. Select Configuration Assistant from the ATMvLAN menu. See "Configuring VLAN Aliases and Colors" on page 4-21 for a more detailed description.

Graph Assistants

To use the graph assistants you select the network component and then select ATMvLAN -> Graph Assistant.Graph assistants display the statistics of the selected component.

Path Assistants

If you want to see the path between two devices or between network components, select the devices and then select the Path icon.

LE Path Assistant

The LE Path Assistant allows you to select any two LE Clients or two Ethernet segments to obtain the following information:

- Address resolution through the LE Server
- Control distributed path (direct)
- Multicast forward addressing through the BUS

- Data Direct

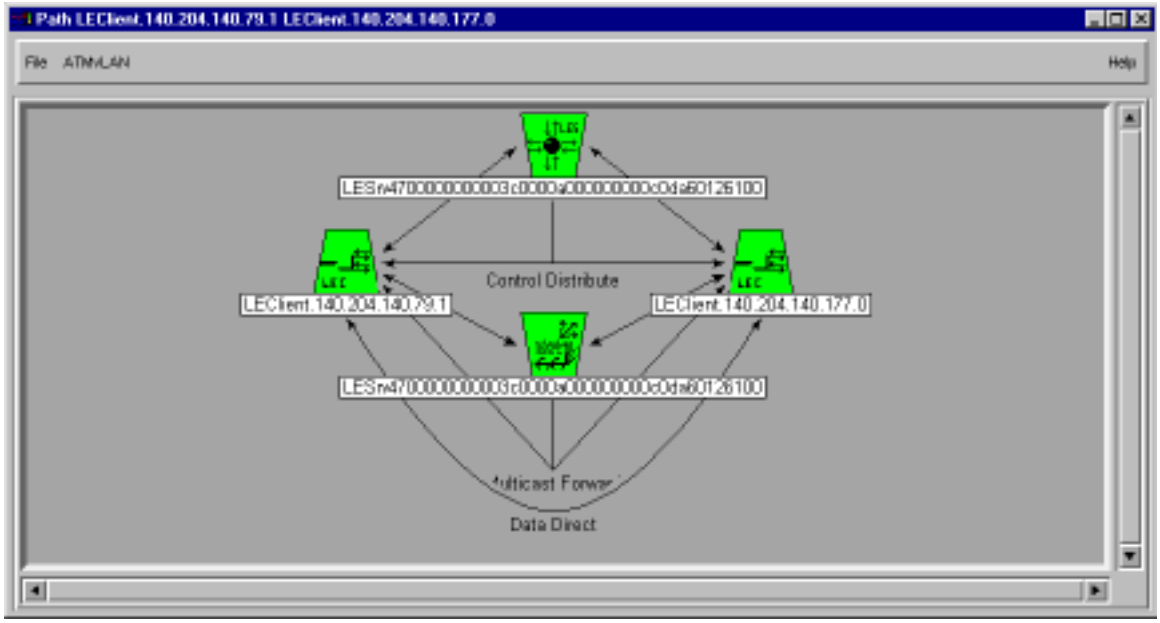


Figure 3-14 This Window Displays the VC Path Between Two LE Clients.

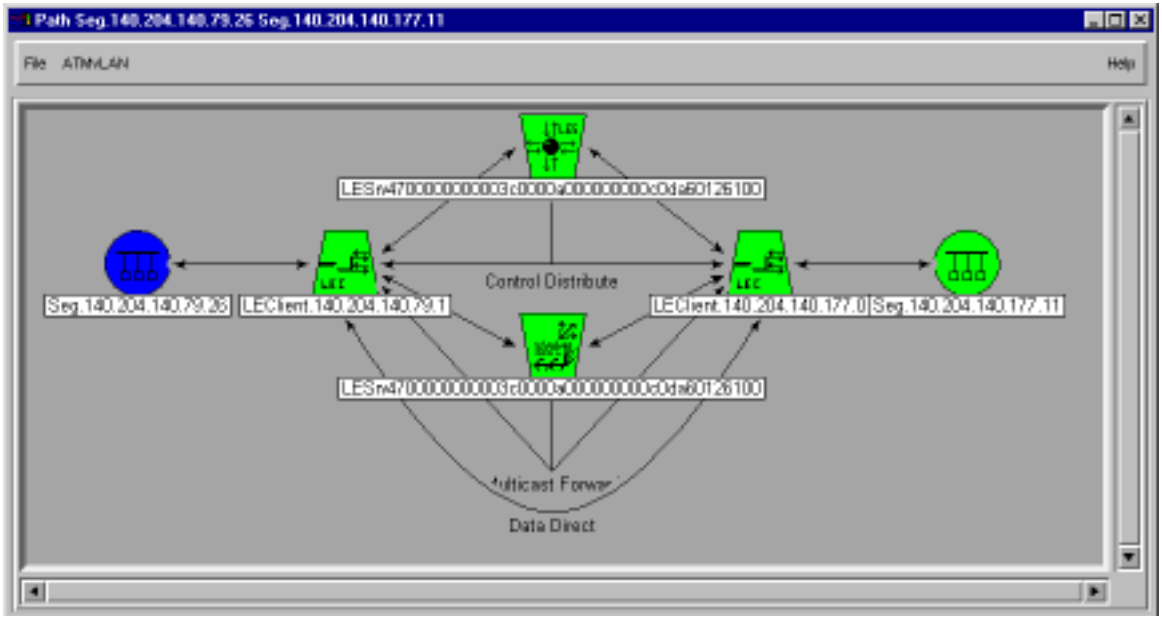
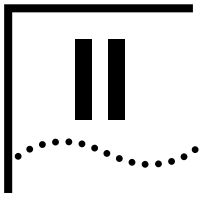


Figure 3-15 This Window Displays the VC Path Between Two Ethernet Segments.

The Path Assistant see Figure 3-15,displays the corresponding segment, its proxy client and its LE services ATM address and assists in verifying that the connections are viable.



OPERATING THE ATM AND VLAN MANAGER

This section provides step-by-step instructions for performing network management tasks using the ATM and VLAN Management application.

4 NETWORK CONFIGURATION TASKS

This chapter describes how to perform the following ATM and VLAN Management network configuration tasks using various configuration assistants.

The following topics are described:

- Configuring Manual Device Discovery
- Configuring LAN Emulation Services
- LANE Redundancy Planning and Setup Guidelines
- Configuring VLAN Aliases and Colors
- Configuring Policy-based VLAN Auto-configuration
- Configuring and Using the MACvDB
- Configuring IP Subnet-based VLAN Auto-configuration
- Configuring or Viewing Administrative Status of ATM and VLAN Components
- Configuring PVCs

Configuring Manual Device Discovery

When running the ATM and VLAN Manager, devices are discovered automatically from the platform database. The application can also be configured to manually discover devices if you encounter difficulties with automatic device discovery from the platform database or if you want to work in the stand-alone mode. The application can either run in the manual discovery mode or automatic discovery mode. In the manual discovery mode, the application will read a static device file that is manually created using the manual discovery configuration screen.

The Manual Discovery Setup allows you to do the following:

- add devices from the database
- delete devices from the database

- clear the entire database

You can sort all the device types according to all the fields contained in the ATM and VLAN Devices database.

After you modify, change, add or delete devices from the ATM and VLAN database you must restart the application for the modifications to take effect.

Using the Manual Device Discovery Assistant

To discover devices manually, you need to set the discovery mode to Manual Discovery mode. Select the Manual Discovery toggle in the Manual Discovery Setup window. See Figure 4-1. You must also enable Manual Discovery mode either through a customization file or the NMSetup Wizard. See Chapter 1, Figure 1-35.

After the mode is set, the device database must be manually populated using the manual discovery database configuration assistant.

Once the database is populated, the ATM and VLAN application must be restarted to recognize the newly entered devices.

If you select automatic (platform) discovery from the Manual Discovery window, changes entered manually are overwritten by the platform discovery.

To use the Manual Device Discovery Tool:

From the Root window, select the ATM Devices icon and then select the Configuration Assistant from the ATMvLAN menu, or in the Topology Browser, select an ATMvLAN Device branch and then select the Configuration icon.

The Manual Discovery window is displayed in Figure 4-1.

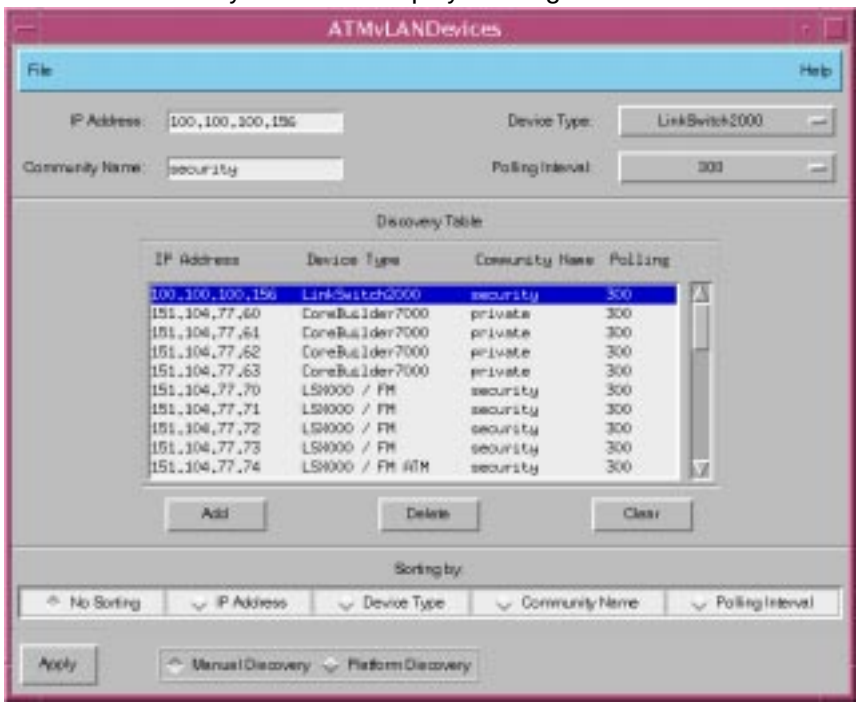


Figure 4-1 Manual Discovery Setup Window

All devices appear initially with the default Community Name and Polling Interval settings. These entries may be modified by changing the Community Name in the appropriate field or using the Polling Interval cascade to select a new value.

The window is divided into three sub-windows. The first section displays all parameters pertaining to the selected device type. The initial values that are displayed in section 1 pertain to the device at the top of the selection list in section two. The second section displays all the ATM and VLAN devices that are in the database.

Section 3 contains radio buttons of all the fields in the database. You can sort all the devices according to the field selected by clicking on the appropriate radio button.

Adding Devices

1 Enter the device's parameters in the display fields of section 1

2 Click Add.

Modifying Devices

1 Double click on a row In the scrolling region. The device and its parameters appear in the display fields of section 1

or

select a Device Type from the cascade in section 1 and enter its parameters.

2 Click Add.

The System verifies that the IP address is unique before adding a device to the database.

Repeat for adding multiple devices.

3 Click Apply and restart the ATMvLAN Manager for modifications to take effect.

Deleting Devices

You can delete one or more devices at once from the ATMvLAN database.

1 Highlight one or more rows in the scrolling region.

2 Click Delete.

3 Click Apply and restart the ATM and VLAN Manager for modifications to take effect.

Clearing the Entire Database

To delete all of the devices from the database at once.

1 Click Clear.

2 Click Apply and restart the ATM and VLAN Manager for modifications to take effect.

Viewing the Manual Device Discovery Database

You can also view and search all the parameters in the manual discovery database using the Locator Tool.

Do not use the Locator Tool to modify the Device Database.

To use the Locator Tool to view the Manual Discovery database:

1. Select the Locator Tool.
2. Select the Device Database tab. See Figure 4-2.
3. Select Search to display all the parameters in the database.

   The parameters are displayed.

   To conduct a search based on a specified parameter.

1. Select the parameter from the Search Field.
2. Enter the search string (may be a partial value) in the Value field.
3. Select Search.

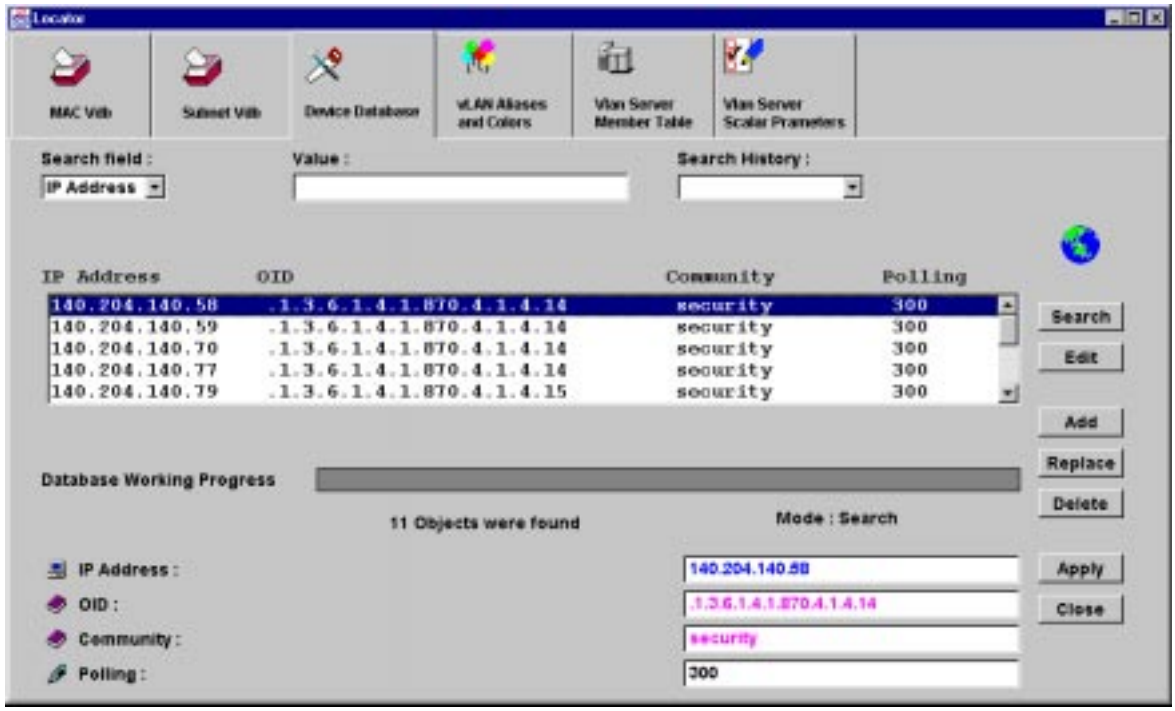


Figure 4-2 Locator Tool Manual Discovery Database

Configuring LAN Emulation Services

The Backbone and Services Configuration Assistant allows you to perform the following functions all in the same window:

- Set the priority order and activate the LECSs in a multiple redundant LECS network.

- Set up the LECS database (Set the primary LES and set the backup LES of each ELAN)
- Activate the Automatic LANE Redundancy Monitor
- Setup for Quick LANE Redundancy

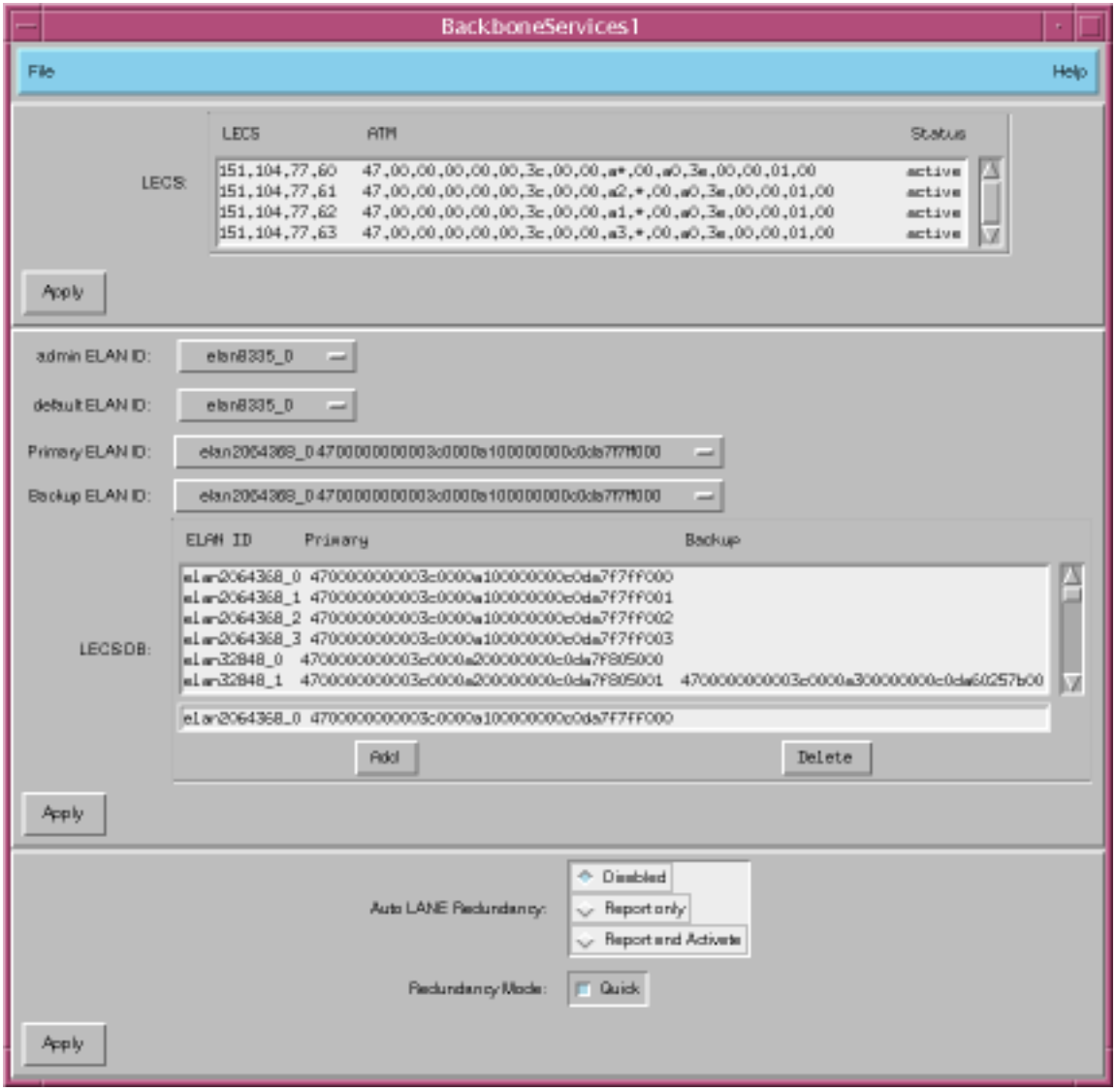


Figure 4-3 The Backbone and Services Configuration Window

To access the Backbone and Services Configuration Assistant:

1. From the LAN Emulation map or Topology Browser LAN Emulation component, select the Backbone and Services icon or branch.
2. Select the Configuration icon from the Topology Browser or from the ATMvLAN menu.

   The Backbone and Services Configuration Assistant window is displayed as shown in Figure 4-3.

   The top sub-window within this setup screen allows for the setup of the LECSs in the network. The application automatically discovers all the LECSs in the network that are enabled or active and displays them. The redundancy order can be changed/set according to the LECS priority. When the redundancy order is changed, the change sets the priority order and applies the order to all the CoreBuilder 7000s in the network.

   A LECS may be in one of three states:

   Enabled - The LECS can be configured but is unrecognized by all the CoreBuilder 7000s in the network. The icon is colored yellow in the maps or Topology Browser Component View.

   Active - Each CoreBuilder 7000 in the network recognizes the LECS in operation. You may have up to 5 LECSs in the Active state. The icon is colored green

   Disabled - The LECS cannot be recognized, enabled or activated by network management. Icon is blue.

   To change the priority order:

1. Use the middle mouse button and drag and drop the LECS to the desired position.

   For a two-button mouse, press both buttons simultaneously to drag and drop.

2. Click Apply.

LECS Priority List Setup

The LECS priority list is applied to all the CoreBuilders in the network. Performing this step converts all the LECSs to the active state. When a LECS is shown as active, it means that every CoreBuilder 7000 in the network is aware of this LECS.

LECS Database Creation and Synchronization

The second section is used to build the LECS database. This section allows you to enter LAN Emulation Servers (LES) and their corresponding backup LAN Emulation Servers into the LECS database. Initially, the LECS database window shows the default LECS database displaying only a subset of the LAN Emulation Servers that exist in the network.

The default LECS database (the subset) is taken from one of the LECS that was discovered and shown in the first part of the form.

To build/modify the LECS database:

1. Select the admin and default elan ID from the toggle buttons on the side of each entry.
2. Populate the database with all the ELAN IDs (LESs) and their corresponding backup LESs using the selection buttons.

In order not to setup a backup for a LES, select the backup LES address to be the same as the primary LES address.

3. Click Add to add the entry to the database or click Delete to delete unwanted entries from the LECS database.
4. Click Apply

The LECS database shown in the window is applied to all the active and enabled LECSs in the network. After this step LECSs are all said to be synchronized.

Enabling Automatic LANE Redundancy

The third section allows you to set up the Automatic LANE redundancy procedure. There are three possibilities for Automatic LANE redundancy.

- **Disabled** - instructs the NMS not to automatically activate the backup LES and a failure report is not issued.
- **Report Only** - The NMS issues a failure report but does not automatically activate the backup LES.
- **Report and Activate** - The NMS issues a failure report and automatically activates the backup LES.

Quick LANE Redundancy Mode

The Quick LANE Redundancy mode button (which is selected by default), allows for a quick LES/BUS failover to backup the LES/BUS, when the primary LES/BUS fails. When this button is selected, the LANE redundancy monitoring software performs some vital checks to determine if the

primary LES is actually down and activate the backup LES upon completion of the vital checks. These vital checks only take a few seconds (10-15 seconds) to complete.

Quick LANE redundancy mode is recommended for most networks.

When the Quick LANE redundancy mode is not selected, the LANE redundancy monitoring software will perform a more comprehensive evaluation of the failed ELAN by checking the status of every LAN Emulation Client (LEC) within the failed ELAN, status of the switch where the primary LES resides before the LANE redundancy monitor activates the backup LES. This is recommended only you want every aspect of the ELAN to be checked before a backup LES/BUS is activated. Under working in this mode, depending on the size of the network, the LES/BUS redundancy could take 3-5 minutes to complete.

In addition to all the parameters configured from this window, an additional timeout parameter must be configured in a file called "protimeout.cnf" located in the /usr/ATMVLAN/runtime/cnf directory. This timeout parameter determines the amount of time the LANE redundancy monitoring software should wait before performing any LANE service checks upon failure of a LES/BUS. This timeout allows for the VCCs to ageout and the network to return to study state.

In the Quick LANE redundancy mode, this timeout parameter in this file should be set to "5" seconds. When the quick LANE redundancy mode is not selected, this parameter should be set to 120 seconds if there are no redundant Switch Engines in the network and 333 seconds (default), if there are redundant Switch Engines in the network.

LANE Redundancy Planning and Setup Guidelines

Transcend Management Software supports the configuration/setup and activation of the LANE Service (LES/BUS and LECS) redundancy feature.

The following lists guidelines to help you set up the LANE Redundancy mechanism:

1. ATM address structure and physical network connectivity should allow for ATM route recovery for cases of switch or link failure.
2. The primary and backup LES for an ELAN should not be on the same switch.
3. The primary LECS should not be configured on a switch with primary LESs.

4 The Network Management Station should have direct access to at least one LECS in the network, when an ELAN fails.

5 Do not use too many primary LESs on a single switch. Distribute the LESs across the backbone.

6 Sixteen is the default number of active LANE Servers (LES) per CoreBuilder7000 that can be viewed in LAN Emulation maps. You can change the number of managed LANE servers for all CoreBuilders in the network by editing the following file:

\TranscendNT\ATMvLAN\runtime\cnf\numcpsrvs.cnf

Change the number in the file to the number of LANE servers used. The number should be less than or equal to the number of servers in the CoreBuilder 7000.

If you manually change the LECS database on a CoreBuilder 7000 using the console terminal interface, the Backbone and Services Configuration tool may have problems reading the database in the CoreBuilder. If an error message appears, manually reset the LECS database to the factory default.

Workaround At the terminal prompt select 1, 2 and 7.

(1) SYS:Platform config

(2) RES:Reset config to factory default

(7) RBO:Reboot

Description of LES/BUS Redundancy

LAN Emulation Services (LES/BUS/LECS) may be activated on each CoreBuilder 7000 switch in the network. LAN Emulation Services allow you to create Emulated LANs (ELANs) on the ATM/Ethernet based infrastructure. Given that each Emulated LAN is serviced by only one LES/BUS pair, this could potentially become a point of failure. The LES/BUS redundancy feature allows you to configure an additional LES/BUS pair (running elsewhere in the network, on a different CoreBuilder 7000) as a dynamic/hot backup for the primary LES/BUS pair servicing a particular ELAN.

The ATM and VLAN Management software also works with non-3Com device LECs when connected to a 3Com LECS. The LAN Emulation Configuration Server (LECS) database may be configured with a primary and backup LAN Emulation Server (LES) for each ELAN. Under normal circumstances, the LECS serves (returns) the primary LES address when a LAN Emulation Client (LEC) requests the LES address for an ELAN.

When LAN Emulation redundancy is activated on the NMS, see Activating LANE Redundancy, and when a switch running the primary LES fails, the NMS detects the failure. For the description of failure resolution, see "LES Failure Resolution" on page 4-11. The backup LES in the LECS database is then activated.

It is critical that the NMS be connected directly to the switch running the LECS or have direct access to this switch.

The LANE clients that go back to the Initial State (As per the LANE 1.0 Specification, the LECs have to go back to the Initial state when the connection to the LES fails.) then re-establish connection with the LECS (LECS Connect Phase and Configuration Phase) to get the LES address. After the LANE Monitor on the NMS triggers the activation of the backup LES in the LECS database, the LECS serves the backup LES address for the requested ELAN. This enables all the LANE clients (LECs) to rejoin the ELAN. The ELAN is thus served by the backup LES/BUS pair).

LES Failure Resolution

To prevent the activation of the backup LES/BUS when the primary LES is actually active, the LANE Monitor software performs the following checks to verify the failure.

1. Verifies that if any one LEC is in the operational state, the backup LES is not activated. The primary LES is assumed to be active one.
2. Verifies that the switch running the primary LES is up and active. If this is not verifiable via direct SNMP contact, you can verify whether the switch is OK via the neighboring switches address tables.

If either check indicates a LES failure, the backup LES is activated. The LES failure resolution is reported as inconclusive. You can manually active the redundant LES.

These important steps ensure the integrity of LANE services and provide a robust and reliable recovery mechanism.

Pre-conditions for LANE Redundancy to Take Effect

Some LECs cannot bind to the backup LES even when they get the correct information about the backup LES from the LECS. This may occur because of problems related to **route redundancy**. It is important to ensure that ATM re-routing operates even when some links or a switch is

down. If a LEC cannot bind to the backup LES, it is necessary to check if the LEC can connect to the LES and the LES can in turn, connect back to the LEC. Correct E-IISP planning for route failover/redundancy is required for LANE redundancy to work.

How Does The Primary LES Regain Control of the ELAN?

The primary LES will not automatically start serving the ELAN when it becomes active again, if the backup LES is activated. Since doing so will result in both LESs being active at the same time and also may possible cause a VLAN split.

The LECS continues to serve/return the backup LES address (even when the primary LES is active again) until the LECS is manually reset to start serving the primary LES address for ELAN configuration requests.

Restoring LANE Clients To Use The Primary LES

Restoring the LANE clients to use the primary LES may be done in one of the following ways:

1. Automatic recovery to the to primary LES when the backup LES fails
2. Manually returning the Clients (LECs) back to the primary LES.

Automatic Recovery to the Primary LES when the Backup LES Fails

The primary LES and its backup LES can be configured in the LECS database to back each other up. Under such configuration, the network will automatically revert to the primary LES when the backup LES fails.

For example, if LES A is the primary LES and LES B is its backup, the LECS database will contain an additional entry after the first entry with LES B as the primary LES and LES A as its backup.

Using this setup, when the primary LES fails, the LECs connect to the backup LES and remain there even though the primary LES becomes active again. When the backup LES fails, the LECs connect back to the primary LES.

When the switch is becomes operative, if a new LEC wants to join the LES, it joins the primary LES of the ELAN that is currently being served by the backup LES. This would result in a split ELAN. This condition must be carefully monitored and fixed manually by first fixing the LECS database Redundancy Assistant) and then resetting the new LECs.

Since an LECS may be located on the same switch as the primary LES, if the primary LECS (primary LECS is the one on the top of the priority list) fails along with the primary LES, its database cannot be altered by the "LANE Monitor" to point to the backup LES when the LES failure condition happens. This LECS's database still points to the primary LES while all the other LECSs point to the backup LES. Under these conditions if new LECs (LANE Client) become active, they could join the primary LES of the ELAN that is currently being served by the backup LES. This would result in a split ELAN. This condition must be carefully monitored and fixed manually by first fixing the LECS database (using the Manual LANE redundancy Assistant) and then resetting the new LECs.

Manually Modifying LANE Redundancy

You can modify the database of an LECS that was not automatically changed by the LANE monitor using the Manual LANE redundancy Configuration Assistant.

To modify the database:

1. From the LAN Emulation window or Topology Browser select the Backbone and Services icon or branch.
2. Select the Zoom icon or Zoom Physical from the ATMvLAN menu.
3. Select the LECS which contains the database you want to modify.
4. Select the Configure icon. The Manual LANE Redundancy window is displayed. See Figure 4-4.

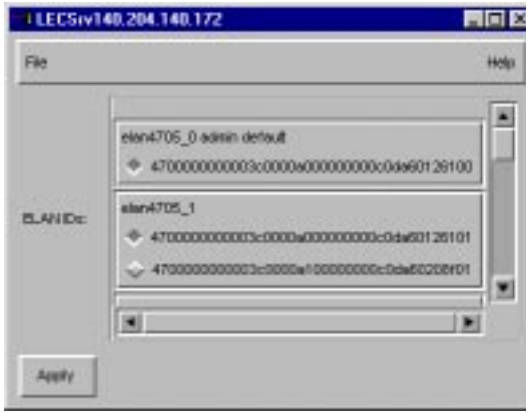


Figure 4-4 The Backbone and Services Configuration Assistant/Manual LANE Redundancy

Each ELAN contains two entries of LES addresses.

5 For each ELAN, select the LES that was not automatically changed.

6 Click Apply to update the database.

Manual LANE Redundancy operates on only one LECS at a time. You can select the LECS in the Topology Browser or in the Backbone and Services map.

The Automatic LANE redundancy monitor, see the description on page 4-8, must be disabled and then restarted after manually fixing the LECS database.

The LANE clients that are split and located on the primary LES may be moved to the backup LES using either one of the following methods:

1 Use the VLAN Move operation.

   a Select the ports in the primary ELAN in the VLAN map.

   b Move the ports to a temporary ELAN. (This temporary ELAN ID must be in the LECS database)

   c Move the ports to the backup ELAN.

2 Software reset the backup LES/BUS after modifying the database.

   The software reset of the LES/BUS must be done via the Command Line Interface of the CB7000. The software reset feature is only supported in the CB7000 3.5 or later version.

Manually Returning the Clients (LECs) Back to the Primary LES

Returning the clients back to the primary LES should be done during a scheduled network down time.

To manually force the LECs back to the primary LES you must first perform the following:

1 Reset all the LECS databases using the Manual LANE Redundancy Configuration Assistant.

2 Disable the "Automatic LANE Redundancy Monitor".

   After the above settings are adjusted you can return the clients back to the primary LES by performing the either one of following tasks:

a Move the ports in the backup ELAN to a temporary ELAN using the VLAN move option. Then move the ports from the temporary ELAN to the primary ELAN. It is important to first move to temporary ELAN first and this temporary ELANID must be in the LECS database.

b Software reset the backup LES/BUS after modifying the database.

The software reset of the LES/BUS must be done via the Command Line Interface of the CB7000. The software reset feature is only supported in the CB7000 3.5 or later version.

3 Enable the Automatic LANE Redundancy.

LECS Redundancy

The CoreBuilder 7000 switch supports LAN Emulation Configuration Service. The LECS may be activated on more than one switch in the network (up to 5).

Each CoreBuilder 7000 in the network is configured with the address of the active LECS. The configuration of multiple active LECS addresses (up to 5) is only possible using the LECS Select dialog box, upper part of the Backbone and Services window.

One active LECS address can be entered via the command line interface (LMA) and the remaining have to be set via the NMS. This limitation will be eliminated in a future release of the CoreBuilder 7000 software.

How Do Lane Clients Take Advantage of Multiple LECSs?

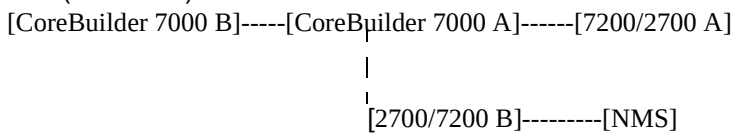
If a LAN Emulation Client (LEC) uses the Well Known LECS Address (WKA) to configure a direct connection to the LECS, the first CoreBuilder 7000 in to which connection is established converts the WKA to the first active LECS address (first among up to 5 LECS addresses programmed into the CoreBuilder 7000 via the LMA and NMS). The CoreBuilder 7000 then forwards this connection request to the active LECS. If the connection setup fails, the CoreBuilder 7000 changes the WKA to the next active LECS address and then tries to connect again. This process is continued until an active LECS is reached. If none of the LECSs are reachable, then the direct configuration setup request is rejected.

If a LAN Emulation client does not support the use of WKA, it may also request the LECS addresses from the CoreBuilder 7000 via the ILMI and try to reach the LECSs directly.

An Example of Setting Up and Activating LANE Redundancy

The following is an example of a simple 2 CoreBuilder 7000 setup demonstrating the LES/BUS and LECS redundancy.

Equipment (Hardware)



Software

3.1 or later version running on CoreBuilder 7000 and LS2700/7200

Hardware configuration: CoreBuilder 7000 A:

- ATM address A*
- IP addr/Gateway/Mask
- LECS active
- LES/BUS active
- Active LECS address: Use Default (pointing to a*)

Hardware configuration: CoreBuilder 7000 B:

- ATM address B*
- IP addr/Gateway/Mask
- LECS active
- LES/BUS active
- Active LECS address: Use Default (pointing to A*)

LS2700/7200 (A and B)

- Bridge 0: Ports 1-6, ELAN name: admin, IP address/Gateway/Mask.
- Bridge 1, ports 7-12, ELAN name: use ELAN ID elanxxx_0 from switch B (NOTE: the LES/BUS for bridge 1 must be on switch B)

To configure the NMS:

1. Connect the NMS to port 1 on one of the 2700s.
2. Ping all the devices. Be certain that both the CoreBuilder 7000 management ports are connected to the bridge 0 ports on the 2700s. Make sure they appear in the HPOV IP map.
3. Run the ATMvLAN application.

   Make sure all that all the devices appear in the ATM Devices Map and that the LES/BUSs from both the CoreBuilders appear in the LAN Emulation Backbone and Services map.

   Be certain that there are segments in the admin VLAN, they will appear as VN-ELANxxx_0, and in the 2nd VLAN (bridge 1 VLAN) in the VLAN Map. Only two VLAN icons appear green, the rest appear brown indicating that they are empty.

To setup LANE Redundancy (LES/BUS/LECS):

1 From the LANE Emulation map or Topology Browser, select the Backbone and services icon or branch.

2 Select the Configure icon or Configuration Assistant from the ATMvLAN menu.

The Backbone and Services window is displayed as in Figure 4-5.

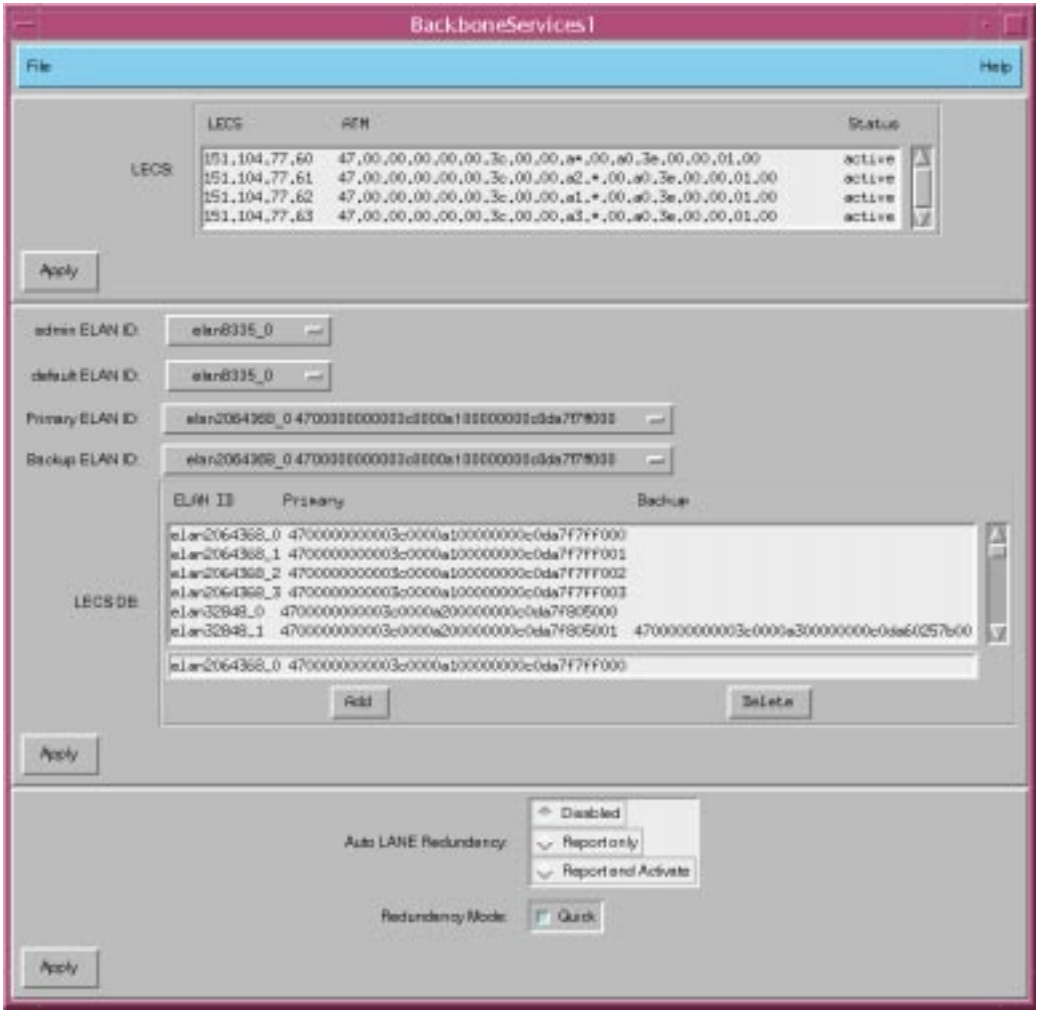


Figure 4-5 The Backbone and Services Window

To setup LECS priority:

1. Make sure the LECS with on the B* switch is the first one in the list. If not, change the order using the middle mouse button.
2. Click Apply.

   This applies the two active LECS addresses to each switch. The LECS on switch B* is the primary one.

To setup the LECS database for LES/BUS redundancy:

1. In the second section of the dialog box, set the ELAN ID for Admin/Default VLAN using the appropriate toggles.

   Be certain to select ELANID_0 from switch A.
2. Select the primary ELAN ID. This should be same ELAN ID as the one selected for the Admin VLAN above.
3. Select the backup ELAN ID using the backup toggle The backup ELANID should be the elanID_0 from switch B. You will notice in the window that shows the database, an additional entry with ELANID_0 and the two LES addresses.
4. Add this entry to the database using the Add button.

   If you don't see it in the window, scroll down to check.
5. Select the primary ELANID_1 (for bridge 1) from switch B.
6. Select the backup for ELAN ID_1 from switch A.
7. Add these entries to the database by clicking Add.

   The setup consists of two ELANS each backed-up with a LES from the other CoreBuilder.

   In this example, the primary LES/BUS is running on switch B for bridge 1, and the backup is on switch A. The primary LES /BUS for the admin ELAN is running on switch A and the backup is on switch B.
8. Click Apply to have the database modified.

   A confirmation box is displayed indicating that the changed have been applied to both switches.
9. In the bottom section of the dialog box toggle on Report and Activate and click Apply.

At this stage, the "LANE Monitor" tracks LES/BUS failure and activates redundancy if there is a failure of primary LES.

Bridge 0's LES/BUS is on CoreBuilder 7000 A and its backup is on CoreBuilder 7000 B.

Bridge 1's LES/BUS is on CoreBuilder 7000 B and its backup on CoreBuilder 7000 A. Both switches have LECS databases and each LECS database has the admin ELAN pointing to switch A LES/BUS ELAN_ID.

Following this procedure, check all the above steps once again. Try to achieve an intuitive understanding of the network.

If you power-off Switch B, (you have taken down bridge 1's LES/BUS), the NMS realizes that the primary LES for bridge 1 runs on the switch that failed and reports it. It then moves the pointer in the LECS database running on switch A to the backup LES/BUS for bridge 1. All the segments from bridge 1 move the backup ELAN. This takes a few minutes for adjustment.

You will first notice that the LECs for bridge 1 on both the edge devices are in a fatal state. They are then are recovered using the backup LES/BUS on the switch A.

This example effectively demonstrates both LES/BUS and LECS recovery.

LECS Recovery

While selecting the LECS, the primary LECS was set to switch B. When switch B failed, the LECs were pointed to switch A's LECS (the second one in the list) by the CoreBuilder 7000 automatically.

How to Move the "admin" ELAN LES/BUS Pair from One CoreBuilder 7000 to Another.

If you want to move the "admin" ELAN LES/BUS pair from one CoreBuilder 7000 to another, perform the following steps:

1. In the Backbone and Services Configuration window, change the "admin" alias mapping to a new LES/ELAN-ID and select Apply.

   This changes the "admin" LES in all of the LECS databases in one step.

2. Reset the CoreBuilder 7000 with the old "admin" LES.

   This step releases all the connections (LECs) from the old "admin" LES/BUS pair.

All the LECs join the new "admin" ELAN since the LECS points them to the new "admin" LES.

It takes approximately 15 seconds to update the LECSs via Transcend Management Software. It takes about two minutes to reboot the switch with the old LES, and about five to fifteen minutes for all the LECs to join the new LES.

Quick LANE Redundancy

Quick LANE Redundancy performs automatic LANE redundancy, however, it differs in the conditions that are used to trigger and activate the LES/BUS pair redundancy.

Automatic LANE Redundancy is activated when the following conditions are met:

- One LES/BUS is in critical state (red)
- All of the attached LECs are in critical state
- All links to the CoreBuilder are disconnected
- The CoreBuilder is in critical state

Quick LANE Redundancy is activated when the following conditions are met:

- One LES/BUS is in critical state (red)
- At least one attached LEC is reported in critical state
- The CoreBuilder is in critical state

To enable Quick LANE Redundancy, toggle on the Redundancy mode button in the Backbone and Services Configuration Assistant window.

Configuring VLAN Aliases and Colors

To make it easier to identify and work with VLANs on the ATM and VLAN Manager, the VLANs can be given application-oriented names or ***aliases*** (such as engineering, marketing, etc.) and colors to distinguish them on the device displays.

These aliases are local to the management station and are not reflected in the LECS database in the ATM switches.

The following steps listed below illustrate the VLAN alias and color setup. This procedure is common for both ATM-based VLANs as well as non-ATM VLAN alias setup.

1 From the Root window select the Virtual LANs icon and then from the ATMvLAN menu select Configuration Assistant
or
in the Topology Browser select a Virtual LANs component and then select the Configure icon.

The Virtual LANs VLAN Configuration Assistant for the VLAN Aliases and Colors dialog box is displayed as in Figure 4-6. For ATM-based VLANs the VLAN ID is the ELAN ID; for non ATM-based VLANs, the VLAN ID is the Work Group number.

For CoreBuilder 2500/6000 VLANs, the VLAN ID is the VLAN name given by the user.

Figure 4-6 Virtual LANs Configuration Assistant for Aliases and Colors

The VLAN Names field lists all the VLANs that have been defined in the NMS.

2 Select a VLAN ID from the VLAN ID cascade and enter a user-friendly name in the entry field.

3 Select a color using the color option button.

4 Click Add.

The name is added to the list.

5 Click Apply to update the database.

If you do not click Apply, none of your changes are entered into the database.

Before you begin changing/moving VLANs in the network, you must define the admin and default VLANs using this option.

Select the ELAN that the admin VLAN is using. Enter the "admin" in the entry field and click Add and then click Apply.

Retaining VLAN Aliases and Colors

You can retain VLAN aliases and colors for subsequent installations.

To save the colors save the file:

\TranscendNT\ATMvLAN\runtime\dat\VnRgb.dat

After you reinstall the ATMvLAN Management application, restore the saved file to the original directory.

VLAN Aliases cannot be added to the LECS database from the Backbone and Services Configuration window. The LECS database uses ELAN IDs only. Aliases have significance in the local management station only.

Viewing the VLAN Aliases and Colors Database

You can also view and search all the parameters in the VLAN Aliases and Colors database using the Locator Tool.

Do not use this window to modify the database and ignore the Type field in the display section.

To use the Locator Tool to view the VLAN Aliases and Colors database:

1 Select the Locator Tool.

2 Select the VLAN Aliases and Colors tab. See Figure 4-7.

3 Select Search to display all the parameters in the database.

The parameters are displayed.

To conduct a search based on a specified parameter.

1 Select the parameter from the Search Field.

2 Enter the search string (may be a partial value) in the Value field.

3 Select Search.

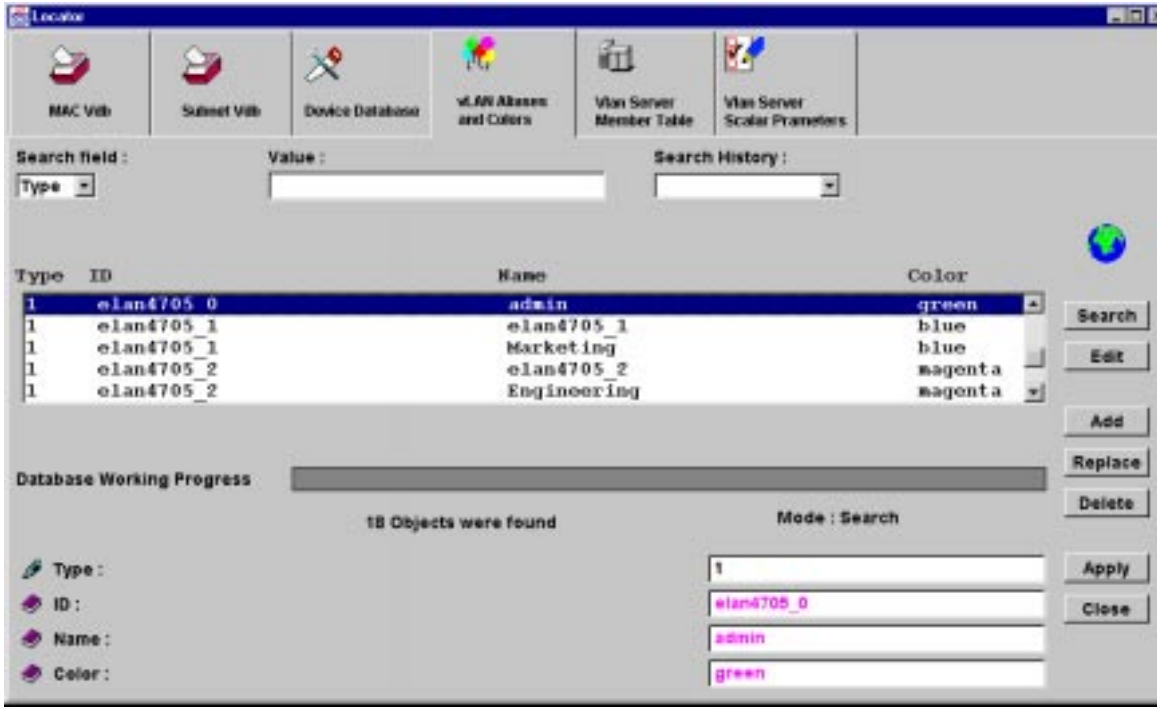


Figure 4-7 Locator Tool VLAN Aliases and Colors

Configuring Policy-based VLAN Auto-configuration

This section describes the implementation of Policy based VLAN auto-configuration in ATM based VLAN environments.

Policy based VLAN auto-configuration deals with VLAN configuration automation based on pre-defined policy or criteria. VLANs are logical associations of ports in the network based on users and services that are grouped together as a layer 2 broadcast domain.

The policy dictates the method of creating a logical association. The policy can be defined to automatically configure VLANs based on users' MAC addresses and user/server subnet (layer 3) IDs. Policy-based

auto-configuration can be extended to include protocol-based VLAN auto-configuration and application-based VLAN auto-configuration.

Automatic Configuration of VLANs and Network Security

One of the most important considerations in automatic VLAN configuration is network security. Network administrators must have complete control over how known users access and use the network. In addition to this, administrators must also have complete control over who accesses the network and the times and locations where the network was accessed from. Network intrusions must be detectable and dealt with automatically.

When devices are setup for auto configuration based on a policy, all unused ports, or ports whose link status is down, are automatically placed in the default VLAN. The ports are moved out of the default VLAN only when a recognized endstation or user connects to a port. This ensures that unknown users do not have access to all VLANs in the network. The default VLAN can be secured by not enabling any network services within this VLAN, as well as not as connecting the default VLAN to the rest of the routed network.

VLAN Server and Automatic VLAN Configuration

The VLAN server is a parameter database or repository that holds the VLAN mapping information. The VLAN Server is an important component of the VLAN auto-configuration system. Devices that support VLAN auto-configuration query the VLAN Server to resolve the VLAN mapping information based on a pre-defined policy or criteria. For example: Devices that enforce the MAC address based automatic VLAN configuration policy query the VLAN server to resolve MAC address to VLAN mapping. The VLAN Server may contain VLAN mapping information based on MAC address, IP subnet, Protocol type etc., depending on what policies are enforced on the network

There are two types of VLAN servers currently implemented:

1. Stand-alone NT based VLAN Server.
2. Integrated TEM/Unix or TEM/NT based VLAN server.

Stand-alone NT based VLAN Server.

This server is used by SuperStack II Switch1000/3000 and Desktop switches when configured in AutoSelect Mode, to execute automatic VLAN configuration based on MAC addresses. See the description of AutoSelect Mode VLAN configuration.

Integrated TEM/Unix or TEM/NT Based VLAN Server.

This server is integrated with the TEM application and is use in policy-based VLANs. Policy-based VLANs are supported on ATM-based switches such as the CoreBuilder 7000/7x00, SuperStack II Switch 1000 with ATM downlink, Switch 3000 with ATM downlink and Desktop Switch with ATM downlink.

The integrated VLAN server can be populated using the BuildvDB tool in the ATMvLAN Tool bar and can be viewed and modified using the MACVdb Tool.

Auto-select VLAN Configuration. The following describes how to configure the auto-select mode on Ethernet and Fast Ethernet based networks.

Auto-select mode allows devices to automatically partition their ports into VLANs based on the MAC address of the endstation attached to the port. This mode is supported on SuperStack II Switch 1000, SuperStack II Switch 3000 and Desktop Switch.

Please refer to the SuperStack II Switch 1000 and 3000 Configuration Manual for a description of this feature.

When Auto-select mode is enabled, these switches communicate with the stand-alone VLAN Server to determine the MAC address to VLAN association. If a MAC address to VLAN association is not found in the VLAN server member table, the VLAN server returns a default VLAN ID (VLAN 1) and then enters the new MAC address into its member database and associates this new MAC address with VLAN 1.

To move a MAC addresses from one VLAN to another, or to change a MAC address to VLAN association in the VLAN Server member database, the VLAN server database must be modified using the Locator tool. By modifying the mapping between a MAC address and the corresponding VLAN, you can indirectly move segments on the devices that are in the "AutoSelect" mode to various VLANs based on the MAC address to VLAN association.

The stand-alone VLAN Server database can be viewed and modified using the VLAN Server Member tab under the Locator Tool. The VLAN Server Scalar Parameters Tool under in the Locator is used to configure the

ATMvLAN application to recognize and communicate with an NT based stand-alone VLAN Server (IP address and SNMP community string).

Configuring MAC-based VLAN Auto-configuration Policy

This section describes how to configure devices to enforce the MAC-based policy.

When a device is configured for the MAC-based policy, it automatically partitions its ports into VLANs, based on the MAC address of the endstation that is attached to its ports. When an endstation attaches to a device, it automatically configures the endstation's port to the correct VLAN based on the endstation's MAC address. The device queries the VLAN Server to determine the correct VLAN associated with the endstation MAC address.

Under Auto-configuration mode, only one endstation is allowed to be connected to a device port.

The following steps describe the configuration of MAC based Policy on devices:

1. Define two aliases; "unknown" and "default" using the ATM and VLAN Aliases and Colors Configuration Tool. See "Configuring VLAN Aliases and Colors" on page 4-21.
2. Populate the Integrated VLAN Server database with MAC address to VLAN mapping information. See "Populate the Integrated VLAN Server database with MAC address to VLAN mapping information using Build UDB" on page 4-27
3. Apply the MAC-based VLAN auto-configuration to the devices. See "Apply the MAC-based VLAN Auto-configuration to the Devices" on page 4-31.
4. Verify that automatic VLAN auto-configuration is activated.

Populate the Integrated VLAN Server database with MAC address to VLAN mapping information using Build UDB

1. Connect a PC to any port on an edge device.
2. Generate some traffic from this PC so that its MAC address is learned by the device.
3. Select the Users icon (from the ATMvLAN Toolbar).

4 Using the Build UDB tool, do an inventory of the network so that the MAC address location (device/port/VLAN) where this PC is attached to is learned and stored.

Build UDB Tool

The Build UDB tool can be configured to do an MAC address inventory of the entire network or a selected subset of devices on the network.

To open the Build UDB Tool, see Figure 4-8, start the tool from the by selecting the Users icon. The Build UDB Tool lists all the edge devices in the network.

To use the Build UDB Tool:

1 Select the Select All button to select all the listed devices or highlight the devices that you want include. All the selected devices will be included in building the current devices database. The devices are sequentially added/updated to any previous database builds that were performed.

For multiple device selection, press Ctrl and the left mouse button.

2 Select the Start button in the Build UDB. Once started, the Build UDB Tool queries all the selected edge devices and collects MAC address information.

Once the Build UDB Tool finishes a sweep of the network, you can verify the location of the endstation MAC addresses by using the MACvDB tab in the Locator Tool.

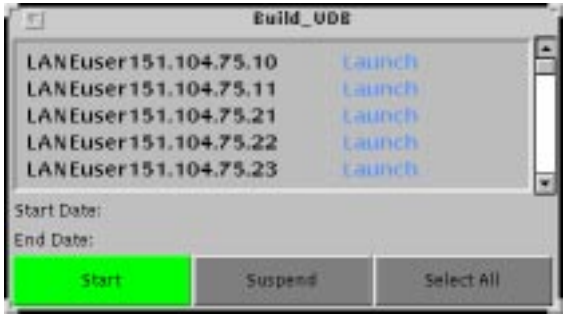


Figure 4-8 The Build UDB Tool

Configuring and Using the MACvDB

The MACvDB is used to perform the following two functions:

1. Finding a MAC address in the network.
2. Mapping MAC addresses to VLANs.

Finding a MAC Address

Locating a MAC address allows the network administrator to see which switch the endstation is attached to.

Mapping a MAC Address to a VLAN

This feature is used by the MAC-based policy to determine the MAC address to VLAN mapping. By changing the MACvDB you can redirect MAC addresses to different VLANs. The MACvDB, see Figure 4-9, is populated automatically when you initiate the BuildvDB Tool. You use the Locator Tool to search, configure and modify parameters for the MAC-based policies.

Searching the MACvDB

To search the MACvDB using the Locator Tool:

1. Click on the Locator Tool icon.
2. Select the MACvDB tab.

   To search the MACvDB you may select one of the following search strings:

   - Segment
   - Switch
   - MAC Address
   - IP Address

   To search the databases:

1. From the Search Field cascade, select the type of search string you want to locate in the database.
2. In the Value field enter a partial value of the search string you are searching for and click Search.

   A search progress bar is displayed indicating the number of matches found for your search query.

The Search History indicates the searches you have perform thus far.

To display the contents of your database:

- Select Search.

Once the parameters appear in the display section you can edit or modify the database.

It is recommended that you use the Edit mode if you are going to perform extensive modification to the database.

Modifying the MACvDB

To modify the MACvDB database:

1. Click Edit.
2. Select a row in the display.
3. Use the bottom portion of the dialog box to edit parameters.
4. Select Replace.

   A warning message appears if you try to modify the database while in Search mode.

   To add or delete database parameters:

1. Select a row.
2. Click Add or Delete.

A warning message appears.

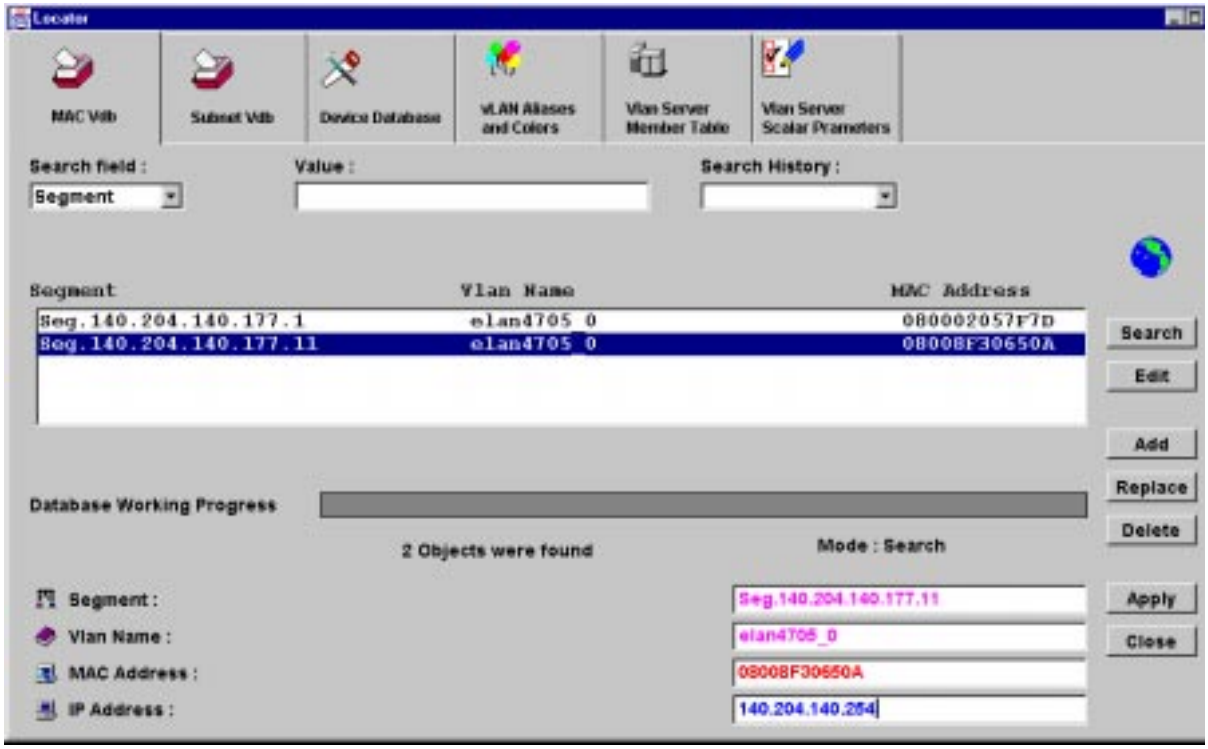


Figure 4-9 The Locator Tool/MACvDB Tab

Apply the MAC-based VLAN Auto-configuration to the Devices

To apply the MAC-based auto-configuration policy to the devices you have to move the devices into the MAC-based policy.

To move the devices into the MAC-based policy:

1. Select the edge device in the ATMvLAN Devices map
2. Select the MacBaseVlanPolicy icon in the ATMvLAN Policies map and then select the VLAN Move icon or the Move option from the ATMvLAN menu.

   The policy icon turns yellow, indicating that there are devices in the policy.

To remove a device from a policy:

1. Select the device in the policy map and then select the NullPolicy icon.
2. Select the Move icon or the Move option from the ATMvLAN menu.

This removes the device from the policy.

Once a device or port is put into a policy, all open/unused ports are automatically placed into the default VLAN. You will notice a message on the NMS screen saying that VLAN move has taken place.

Verify that Automatic VLAN Auto-configuration is Activated.

1. Move the PC from the port on the SuperStack II Switch 2700 to another open port on another SuperStack II 2700 (or another port on the same 2700) or SuperStack II 1000 (the destination device must also be assigned to the policy) and generate a few pings.

   A message is displayed that the VLAN move completed successfully.

2. Open the front panel view of the device and then check the VLAN colors. The port on the device where the PC is connected is now configured into the VLAN that its MAC address was mapped to. This VLAN configuration change may take a few seconds to be reflected in VLAN maps.

Configuring IP Subnet-based VLAN Auto-configuration

This section describes the IP Subnet-based VLAN auto-configuration policy. If an endstation IP subnet address is pre-mapped to a VLAN, then the edge devices configured for this policy will automatically configure the correct VLAN on the port that this station attaches based on the endstation's IP Subnet Address.

How Does IP Subnet-based VLAN Auto-configuration Compare to DHCP?

When DHCP is enabled in the network, roving endstations can automatically query for and get an IP address and network access dynamically. The access to the network may not be optimal as the endstation is configured into the subnet of the building or location. Its services may be in another subnet or building. With IP Subnet-based VLANs, roving endstations can maintain their IP address and VLAN/Subnet and get optimal performance connectivity (layer 2 connectivity) to their services (file services, print services).

To configure of IP Subnet -based policy on devices you have to populate the VLAN server database with IP-Subnet to VLAN mapping information.

1. Start the Locator Tool and select the SubnetVdb tab,.
2. Click on the Search button to bring up the Subnet vDB inventory database. See "Searching the Subnet vDB" on page 4-33.
3. Modify the Subnet vDB to map IP subnets to VLANs. See "Modifying the Subnet" on page 4-34.
4. Move the devices into the IP Subnet-based policy. See See "Moving Devices into the IP Subnet-based Policy" on page 4-35.
5. Verify that automatic IP Subnet-based VLAN auto-configuration is activated.

Configuring and Modifying the Subnet vDB

The Subnet vDB, see Figure 4-10, allows you to configure the Subnet based policies.

Searching the Subnet vDB

To search the Subnet vDB using the Locator Tool:

1. Click on the Locator Tool icon.
2. Select the Subnet vDB tab.

   To search the Subnet vDB you may select one of the following search strings:

   - Protocol
   - Subnet Address
   - Mask
   - VLAN Name

1. From the Search Field cascade, select the type of search string you want to locate in the database.
2. In the Value field enter a partial value of the search string you are searching for and click Search.

   A search progress bar is displayed indicating the number of matches found for your search query.

   The Search History indicates the searches you have perform thus far.

   To display the contents of your database:

- Select Search.

Once the parameters appear in the display section you can edit or modify the database.

Modifying the Subnet

To modify the SubnetvDB:

1. Select a row.
2. Use the bottom portion of the dialog box to edit parameters.
3. Select Replace.

   A warning message appears if you try to modify the database while in Search mode.

To add or delete database parameters:

1. Select a row.
2. Edit the parameters.
3. Click Add or Delete.

A warning message appears.

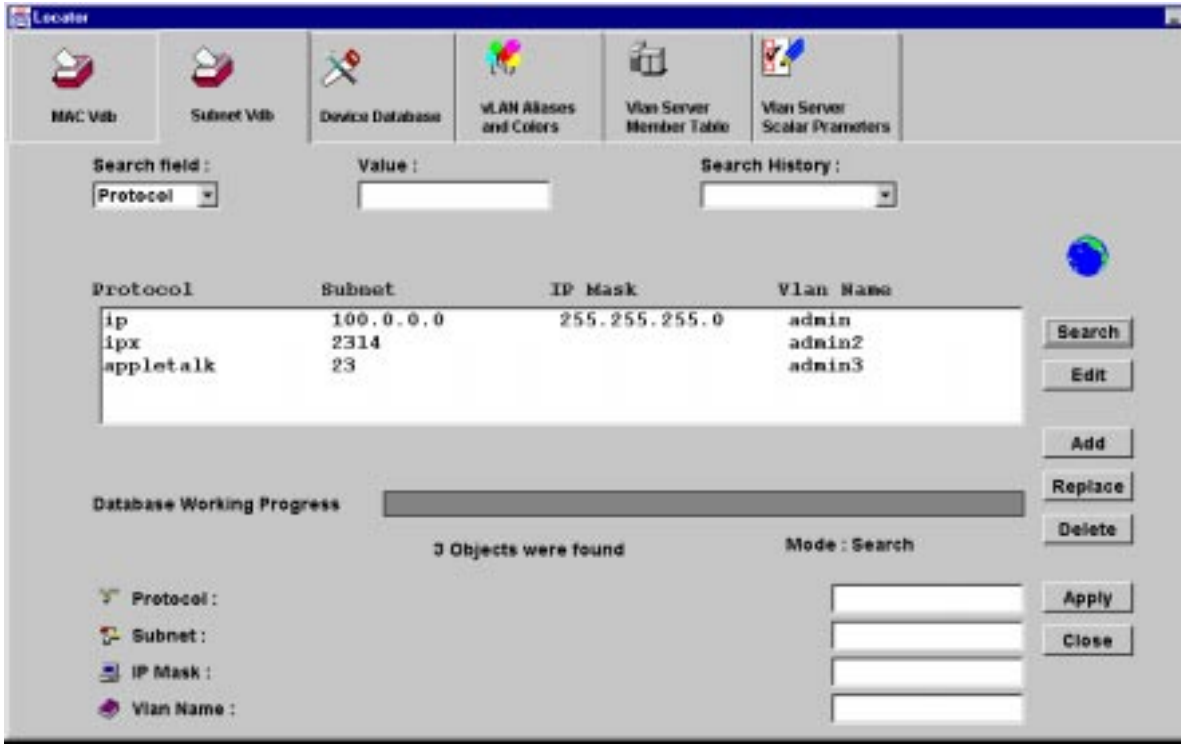


Figure 4-10 The Locator Tool Subnet vDB

Moving Devices into the IP Subnet-based Policy

To move the devices into the IP Subnet-based policy:

1. Select the edge device in the ATMvLAN Devices map
2. Select the IP Subnet-based VLAN Policy icon in the ATMvLAN Policies map.
3. Select the VLAN Move icon or the Move option from the ATMvLAN menu.

   The policy icon turns yellow, indicating that there are devices in the policy.

Verify that Automatic IP Subnet-based VLAN Auto-configuration Activated.

1 Move the PC from the port on the SuperStack II Switch 2700 to another open port on another SuperStack II 2700 (or another port on the same 2700) The destination device/port must also be assigned to the policy also. Generate a few pings to an unknown destination so that a broadcast ARP is generated.

The first few packets must be a broadcast so that the switch can capture the information about the endstation. Switch 2700 and CoreBuilder 7x00 cannot capture Unicast packets. The ping must be to an unknown destination so that an ARP broadcast is continuously generated.

A message is displayed that the VLAN move completed successfully.

If the PC's IP subnet is mapped to VLAN elanxx_x, when the PC is connected to a switch and it generates a broadcast, the device automatically configures the port to the VLAN that is mapped to PC's IP Subnet address.

2 Open the front panel view of the device and then check the VLAN colors. The port on the device where the PC is connected is now configured into the VLAN that its MAC address was mapped to. This VLAN configuration change may take a few seconds to be reflected in VLAN maps.

Configuring AutoSelect VLANs on Ethernet and FastEthernet based Networks

Devices such as SuperStack II Switch 1000, 3000, and Desktop Switches, can be configured to automatically partition their ports into VLANs based on the MAC addresses of the endstations that are attached to them. The mode of operation on these devices is called the *AutoSelect Mode.*

The behavior of devices when configured in the AutoSelect Mode is similar to policy-based VLAN auto-configuration based on MAC addresses, although using policies applies only to ATM edge devices. Non-ATM devices cannot be configured based on policies.

When devices are configured to AutoSelect Mode, an external VLAN Server must be enabled in the network in order for the devices to query and retrieve MAC address to VLAN mapping information. This database can be populated using the VLAN Server Member Table Tool under the

Locator Tool. The external VLAN server is also populated automatically when devices register their MAC addresses in it. By default all MAC addresses that are automatically registered are associated with VLAN 1 (default VLAN).

Configuring and Modifying the External VLAN Server Scalar Parameters

The VLAN Server Scalar Parameters, see Figure 4-11, allows you to view configure the ATMvLAN application to recognize the VLAN server (IP address and SNMP Community String) as well as configure the VLAN server's Scalar parameters.

The External VLAN server's IP address and SNMP community string may also be setup using a Configuration Assistant.

To setup the External VLAN server IP address and SNMP community string:

- Select a work group VLAN icon in the VLAN map and then select the Configuration Assistant option in the Transcend -> ATMvLAN menu.

Searching the VLAN Server Scalar Parameters

To search the VLAN Server Scalar Parameters using the Locator Tool:

1. Click on the Locator Tool icon.
2. Select the VLAN Server Scalar Parameters.

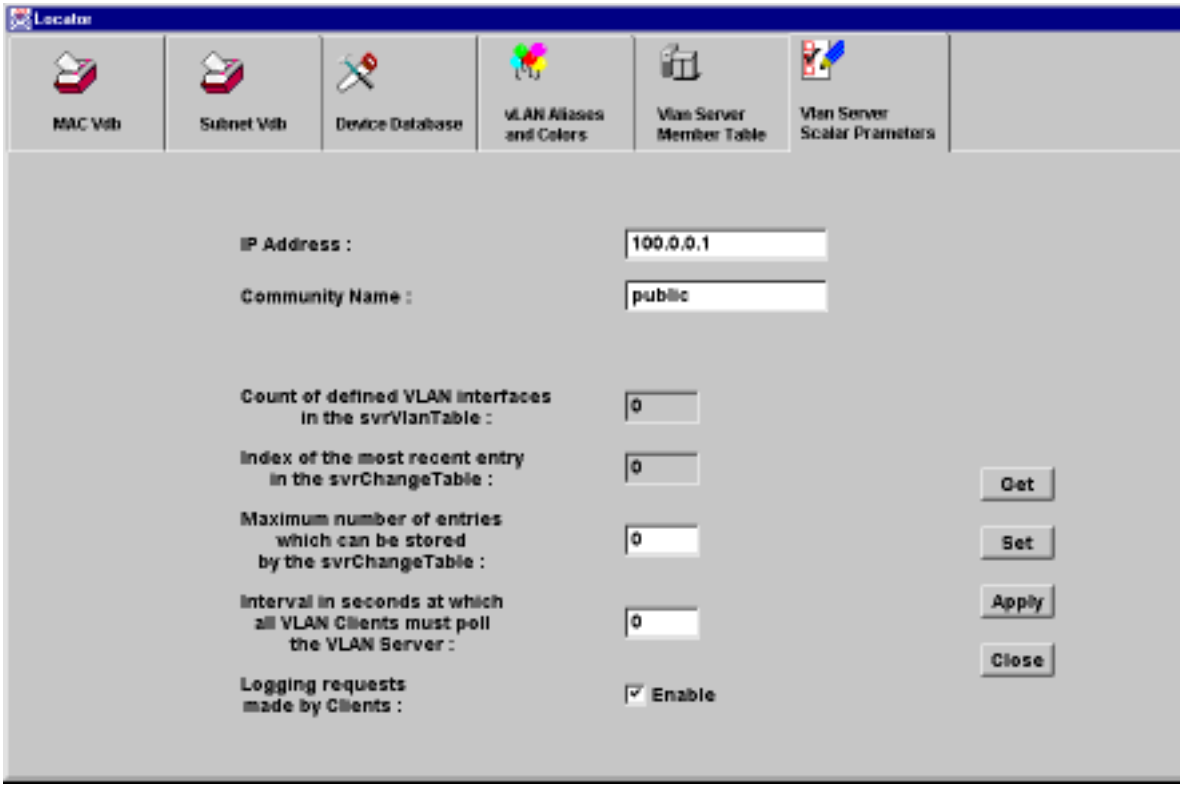


Figure 4-11 The Locator Tool VLAN Server Scalar Parameters

Configuring and Modifying the VLAN Server Member Table

The VLAN Server Member Table, see Figure 4-12, allows you to view and modify the External VLAN Server database.

Searching the VLAN Server Member Table

To search the VLAN Server Member Table using the Locator Tool:

1. Click on the Locator Tool icon.
2. Select the VLAN Member Table tab.
3. Select the Get Button to download the VLAN Server database to a local database.
4. Use the Search Button to find and MAC address.
5. Use Edit Button to change its VLAN mapping.
6. Use Apply Button to save it locally in the local database
7. Use Set Button to upload the modified database to the VLAN Server.

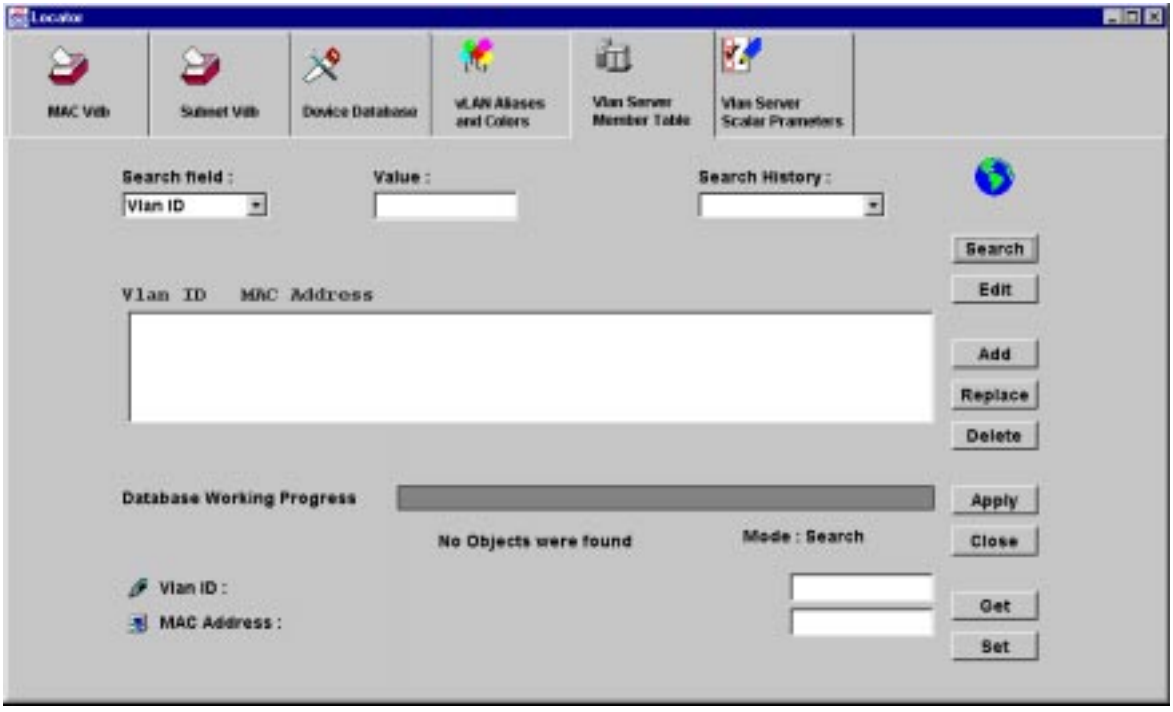


Figure 4-12 The Locator Tool VLAN Server Member Table

Configuring or Viewing Administrative Status of ATM and VLAN Components

To view or configure administrative status select the icon in the management maps and then select Configuration Assistant from the ATMvLAN menu

or

select the device component in the Topology Browser and then use the Configure icon to display the configuration dialog box.

The LEC Configuration Parameter and Status Assistant

The LEC Configuration dialog box, see Figure 4-13, shows the configuration, time-out, and status parameters of the LEC.

To access the LEC Configuration dialog box:

1. From one of the ATM and VLAN management maps, select an LEC icon, or in the LAN Emulation branch in the Topology Browser, select an LEC.
2. Select the Configure icon.

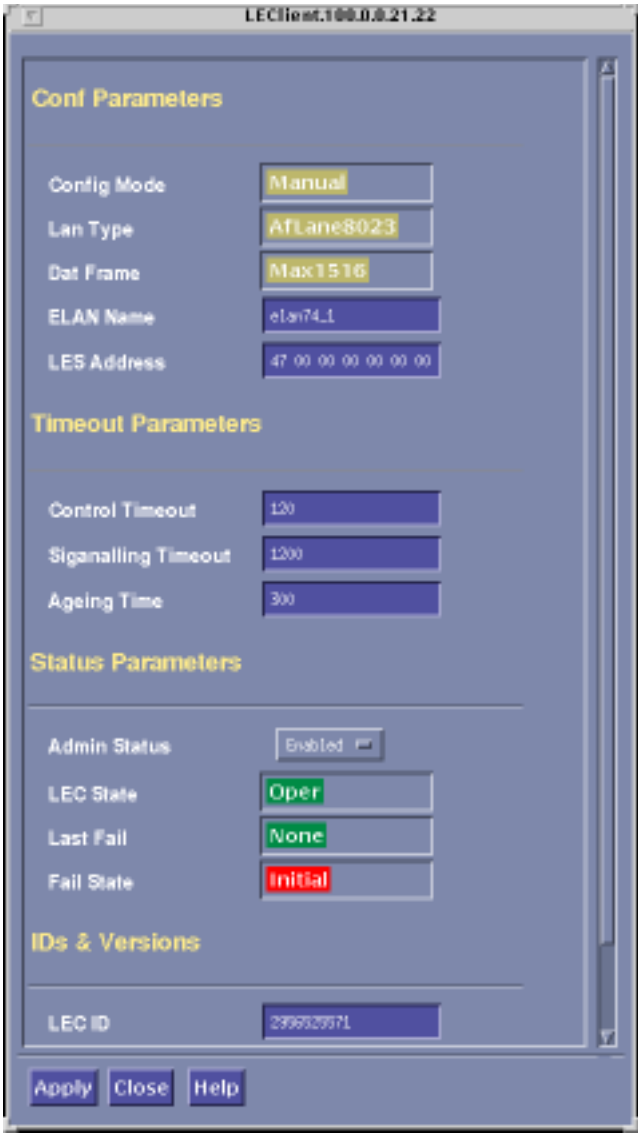


Figure 4-13 The LEC Configuration Dialog Box

Table 4-1 Configuration Parameters

Parameters	Meaning
Config Mode	Indicates whether this LAN Emulation Client should auto-configure the next time it is restarted.
LAN Type	The data frame format which this client will use the next time it returns to the Initial State.
Dat Frame	The maximum data frame size which this client will use the next time it returns to the Initial State.
ELAN Name	The ELAN Name which this client will use the next time it returns to the Initial State.
LES Address	The LAN Emulation Server which this client will use the next time it is started in Manual Configuration Mode.

Table 4-2 LEC Timeout Parameters

Parameters	Meaning
Control Time-out	Time-out period used for timing out most request/response control frame interactions.
Signaling Time-out	Time-out period used for timing out attempts to create VC.
Ageing Time	The maximum time that an LE Client will maintain an entry in its LE_ARP cache in the absence of a verification of that relationship.

Table 4-3 LEC Status Parameters

Parameters	Meaning
Admin Status	The desired state of the LAN Emulation Client.
LEC State	The current state of the LAN Emulation Client.
Last Fail	Status code from the last failed Configure response or Join response.
Fail State	The state this client was in when it updated the lecLastFailureRespCode.

Table 4-4 LEC Configuration Window Actions

Parameters	Meaning
LEC ID	LE Client Identifier. Assigned by LE Server in the Join phase.

LE Server Parameters & Status Configuration Assistant

The LE Server Parameters & Status Window is displayed in Figure 4-14. It shows the Parameters and Status Parameters o the selected LES.

Figure 4-14 LES Parameters and Status Configuration Assistant

To access the window:

- From Backbone and Services window, select an LEServer icon and then select the Configure icon.
- From the VN_Name window, select an LES icon and then select the Configure icon.

Table 4-5 LES Parameters

Parameters	Meaning
Description	The ELAN Name of this LES.
Type	Either Ethernet or Token-Ring Bus.
MTU	The size of the largest packet which can be sent/received to/from the LES, specified in octets.
Speed	An estimate of the LES's current bandwidth
Address	The LES's ATM address.

The LES Status is:

Table 4-6 LES Status

Status	Meaning	Values
Admin Status	The desired state of the LES.	Enabled Disabled Test
Oper Status	The current operational state of the LES.	Up Down Testing Unknown Dormant

Table 4-7 Window Actions:

To	Select	Click
Change administration status of LES	Admin Status option menu	Apply
Close window		Close

Ethernet Port Parameters & Status Configuration Assistant

The window shows the Port Parameters and the Port Status of the selected Ethernet port.

Ethernet Port Parameters & Status Window is displayed in Figure 4-15.

Figure 4-15 The LsEthPort Parameters Configuration Assistant

To access the LsEthPort Configuration Assistant window:

- In the ATM Switch window, from Switch x.x.x.x, select an Ethernet port and then with the device view displayed, select Configuration Assistant from the ATMvLAN Toolbar.
- From an ATM SuperStack, select an Ethernet port on a SuperStack II Switch 2700 module and then with the device view displayed, select Configuration Assistant from the ATMvLAN Toolbar.
- From the CoreBuilder 7000 Front Panel, select an Ethernet port on a 7200 Card and then with the device view displayed, select Configuration Assistant from the ATMvLAN Toolbar.

The port parameters are:

Table 4-8 Port Parameters

Parameters	Meaning
Description	A textual string containing information about the interface, including the name of the manufacturer, the product name, and the version of the hardware/software.
Type	The type of interface (Ethernet)
MTU	The size of the largest packet which can be sent/received on the interface, specified in octets.
Speed	An estimate of the interface's current bandwidth in bits per second.
Address	The interface's MAC address.

The Port Status is:

Table 4-9 Port Status

Status	Meaning	Values
Admin Status	The desired state of the interface. (The port is enabled/disabled by software).	Enabled Disabled Test
Oper Status	The current operational state of the interface.	Up Down Testing Unknown Dormant

ATM Port Parameters & Status

ATM Port Parameters & Status Window is displayed in Figure 4-16. It shows the Port Parameters and the Port Status of the selected ATM port.

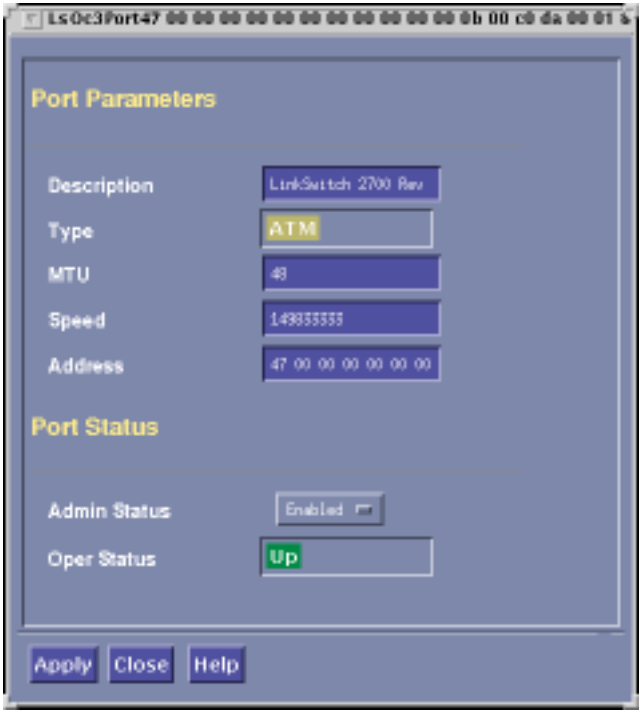


Figure 4-16 LsOc3Portx x Window/ATM Port Parameters and Status

To access the window:

1. From Switch x.x.x.x, select an ATM port or from an ATM SuperStack, select an ATM port on a SuperStack II Switch 2700 module.
2. With the device view displayed, select Configuration Assistant from the ATMvLAN Toolbar.

The port parameters are:

Table 4-10 Port Parameters

Parameters	Meaning
Description	A textual string containing information about the interface, including the name of the manufacturer, the product name, and the version of the hardware/software.
Type	The type of interface (ATM).

Table 4-10 Port Parameters

Parameters	Meaning
MTU	The size of the largest packet which can be sent/received on the interface, specified in octets.
Speed	An estimate of the interface's current bandwidth in bits per second.
Address	The interface's ATM address.

The port status is:

Table 4-11 Port Status

Status	Meaning	Values
Admin Status	The desired state of the interface. (The port is enabled/disabled by software).	Enabled Disabled Test
Oper Status	The current operational state of the interface.	Up Down Testing Unknown Dormant

Table 4-12 Window Actions:

To:	Select:	Click
Change administration status of port	Admin Status option menu	Apply
Close window		Close

SuperStack II Switch 2700 Parameter and Status Information

The SuperStack II Switch 2700 Parameter and Status Information window is displayed in Figure 4-17. The window shows system and chassis Information. This information is read-only.

Figure 4-17 The LinkSwitch/SuperStack II Switch 2700 Configuration Assistant

To access the LinkSwitch/SuperStack II Switch 2700 Configuration Assistant:

- From ATMSwitchx.x.x.x, select SuperStack II Switch 2700 icon and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.
- From ATM devices, select SuperStack II Switch 2700 icon and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.
- From an ATM SuperStack II Switch 2700 icons, select SuperStack II Switch 2700 icon and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.
- From the LANE User icon, select SuperStack II Switch 2700 icon and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.
- From a Switch x.x.x.x, select "System patch" and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.

- From an ATM SuperStack, select "System patch" for a SuperStack II Switch 2700 module and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.

The system information is:

Table 4-13 System Information

Parameters	Meaning
Description	A textual description of the SuperStack II Switch 2700 module.
Sys Oid	System Object Id. Vendor identification of the SuperStack II Switch 2700 module.
Contact	The textual identification of the contact person for this SuperStack II Switch 2700 module, with information on how to contact this person.
Location	The physical location of this SuperStack II Switch 2700 module.

The chassis information is:

Table 4-14 Chassis Information

Status	Meaning
Chassis Type	An authoritative identification of the SuperStack II Switch 2700 module.
Serial Number	The serial number of this SuperStack II Switch 2700 module.

Table 4-15 Window Actions:

To:	Select:	Click
Close window		Close

CoreBuilder 7000 Module ATM Port Parameters & Status

The CoreBuilder 7000 Module ATM Port Parameters & Status Window is displayed in Figure 4-18. It shows the Port Parameters and the Port Status of the selected CoreBuilder 7000 module port.

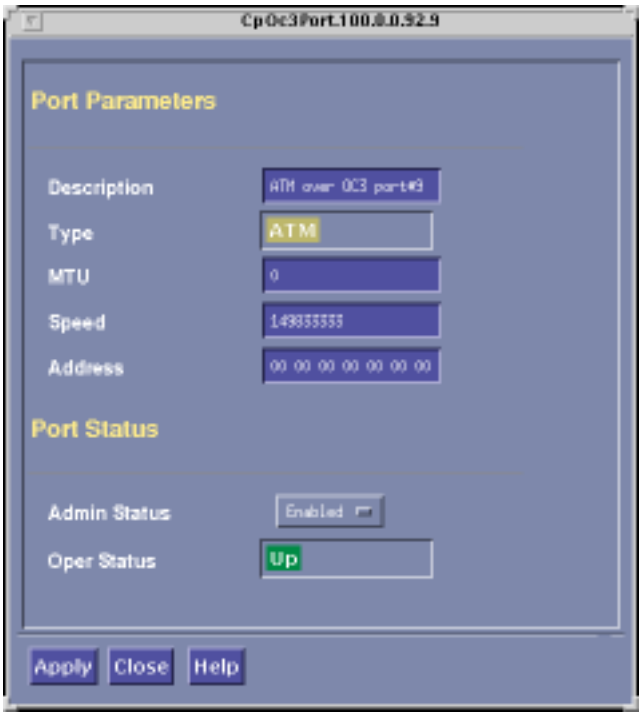


Figure 4-18 CoreBuilder Module ATM Port Parameters & Status

To access the window:

From a CoreBuilder.x.x.x.x, select an ATM port and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.

The Port Parameters are:

Table 4-16 Port Parameters

Parameters	Meaning
Description	A textual string containing information about the interface, including the name of the manufacturer, the product name, and the version of the hardware/software.
Type	The type of interface (ATM).
MTU	The size of the largest packet which can be sent/received on the interface, specified in octets.

Table 4-16 Port Parameters

Parameters	Meaning
Speed	An estimate of the interface's current bandwidth in bits per second.
Address	The interface's ATM address.

The Port Status is:

Table 4-17 Port Status

Status	Meaning	Values
Admin Status	The desired state of the interface. (The port is enabled/disabled by software).	Enabled Disabled Test
Oper Status	The current operational state of the interface.	Up Down Testing Unknown Dormant

Table 4-18 Window Actions:

To:	Select:	Click
Change administration status of port	Admin Status option menu	Apply
Close window		Close

CoreBuilder 7000 Module Parameter and Status Information

CoreBuilder 7000 Module Parameter and Status Information Window is displayed in Figure 4-19. It shows system and chassis information. This information is read-only.

Figure 4-19 CoreBuilder Parameter and Status Configuration Assistant

To access the window:

- From CoreBuilderx.x.x.x, select IP Address Label and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.
- From ATMSwitchx.x.x.x, select the CoreBuilder 7000 module icon and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.
- From ATM devices, select the CoreBuilder 7000 module icon and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.

The System Information is:

Table 4-19 System Information

Parameters	Meaning
Description	A textual description of the SuperStack II Switch 2700 module.
Sys Oid	System Object Id. Vendor identification of the CoreBuilder 7000 module.
Contact	The textual identification of the contact person for this CoreBuilder 7000 module, with information on how to contact this person.
Location	The physical location of this CoreBuilder 7000 module.

The Chassis Information is:

Table 4-20 Chassis Information

Status	Meaning
Chassis Type	An authoritative identification of the CoreBuilder 7000 module.
Serial Number	The serial number of this CoreBuilder 7000 module.

Table 4-21 Window Actions:

To:	Select:	Click
Close Window		Close

CoreBuilder 7000 Module Switch Board Parameters & Status

CoreBuilder 7000 Module.x.x.x.x Parameters & Status Window is displayed in. It shows the Module Parameters and the Status of a CoreBuilder 7000 Module.

Figure 4-20 The CB Switch Module Parameters and Status Configuration Assistant

To access the window:

- From a CoreBuilder.x.x.x.x, select Switch Board Module and then with the device view displayed, select Configuration Assistant from the ATMvLAN menu.

The Module Parameters are:

Table 4-22 Module Parameters

Parameters	Meaning
Location	Module slot number starting from 1. Counting starts at the upper-most module.
Type	An authoritative identification of the type of physical Module in this physical location. (Switch Board).
S/W Version	A textual description of the version/revision for this Module's software.
H/W Version	A textual description of the version/revision for this Module's hardware.
Serial	The serial number of the physical Module present in this physical location.

The Module Status is:

Table 4-23 Module Status

Status	Meaning	Values
Admin Status	The desired state of the module.	None Enabled Disabled Reset Load Test
Oper Status	The current operational state of the module.	Other Invalid Test Oper Reset Warning nonFatalError fatalError

Table 4-24 Window Actions:

To:	Select:	Click:
Change administration status of module	Admin Status option menu	Apply

Table 4-24 Window Actions:

To:	Select:	Click:
Close window		Close

Configuring PVCs

You can configure Permanent Virtual Channels between ATM devices.

To configure Permanent Virtual Channels between ATM devices:

1. Locate the ATM devices that are to be connected. See "Locate the ATM Devices" on page 4-57.
2. Display existing VCs between ATM devices. See "Display Existing VCs" on page 4-57.
3. Establish new Permanent Virtual Channels. See "Establishing Permanent Virtual Channels" on page 4-57.

Locate the ATM Devices

To locate the two ATM devices, proceed as follows:

1. Select an ATM Network Map.
2. Select two ATM switches for which the PVC is to be established.

Display Existing VCs

To display existing VCs between two ATM devices:

1. Select the two ATM switches for which the PVC is to be established.
2. Select the Path icon or Path Assistant from the ATMvLAN menu.

The ATM Path Assistant window displayed showing the existing VCs between the two ATM devices.

Establishing Permanent Virtual Channels

To establish a PVC between the two ATM devices:

1. In the ATM Path Assistant window select VC -> Add PVC.
2. In the VPI-VCI field enter the Virtual Path Identifier/Virtual Channel Identifier for the new PVC.

Enter the VPI and VCI with a space between them.

VPI is in the range 0:4 and VCI in the range 64:511

The new PVC is displayed in the window.

Pinpointing Channel Congestion

If you want to locate channel congestion, you can examine the ATM Paths using the VC Path Assistant. Congestion can be pinpointed to the individual links of the channel by means of the VC Path Statistics window.

To display the VC Path Statistics window for a particular channel from the VC Path Assistant window select the channel and then select Statistics from the VC menu.

The VC Path Statistics window appears as in Figure 4-21.

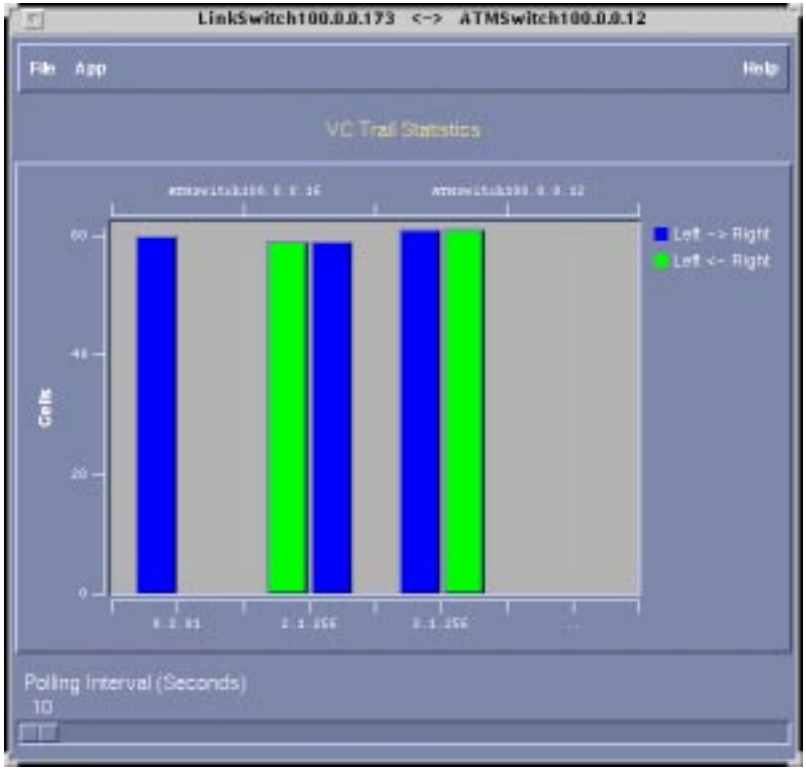


Figure 4-21 VC Path Statistics

The VC Statistics window shows the traffic through each link of the trail in a bar graph. If the traffic is normal, the height of each bar should be approximately the same. However if the height of successive bars in the direction of the flow decreases sharply at a certain link, then that particular link is the source of congestion on the trail.

Virtual Channels Across NNI and UNI Interfaces

You can easily examine Virtual Channels in the Network-Network Interface (NNI) and User-Network Interface (UNI) even if the icons are located on two different Switch Domain windows.

To examine Virtual Channels:

1 In the ATM Network window, double click on an ATM Switch Domain and select Zoom Physical from the ATMvLAN menu.

The Virtual Path window is displayed as shown in Figure 4-22.

2 Select any two ATM devices in the ATM Switch window.

3 Select the Path icon or Path Assistant from the ATMvLAN menu.

The Path ATM Switch window is displayed showing all paths between the two ATM devices.

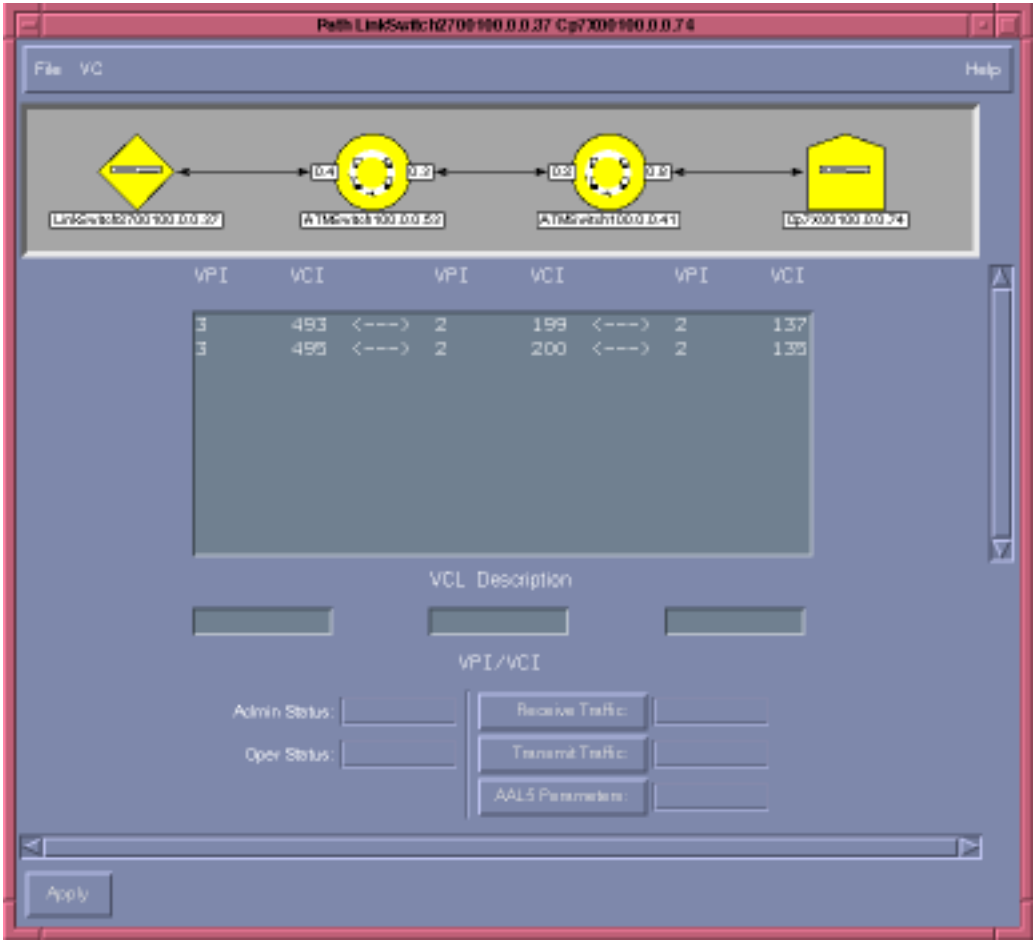


Figure 4-22 The Virtual Path window

5 NETWORK MODIFICATION TASKS

This chapter describes how to perform the following ATM and VLAN Management network modification tasks.

The following topics are described:

- VLAN Moves
- Enabling and Disabling Ports
- Manual LECS Database Modification

VLAN Moves

There are two types of VLAN moves:

- moving Ethernet segments between VLANs
- moving Ethernet segments or devices between policies

Moving Ethernet Segments Between VLANs

Frequently, it is necessary to move, or reassign one or more Ethernet Segments (Ethernet ports) from one VLAN to another VLAN. This operation is required when a port which was previously used by a member of one group is to be used by a member of a different group. One example might be transferring a port from a member of the Engineering VLAN to a member of the Marketing VLAN. Non ATM-based VLANs are moved in exactly the same way as ATM-based VLANs.

Several methods are provided for moving Ethernet segments between VLANs. They are detailed in the following sections.

- Using the VLAN Move Operation
- Drag-and-Drop Ethernet Segments Between VLAN Windows.
- For the SuperStack II Switch 2700 or CoreBuilder with 7x00 card, see Drag-and-Drop on Front Panel Window.
- Automatic VLAN Moves Based on Policies.
- Moving Ports Between Protocol-based VLANs.

The first two methods work on all VLAN types; the others apply to specific types of VLANs as denoted. With the first method you can "aggregate" segments to move many segments at once and you can move segments to different VLANs at the same time. The second and third methods are more intuitive and are quicker for moving individual segments.

Using the VLAN Move Operation

To use the VLAN Move operation:

1. Select the Ethernet segments to be moved in either the VLAN-name window or the LANE User window.
2. Select the destination VLAN in the Virtual LANs window and then from the ATMvLAN menu select ATMvLAN Move.

You can locate the Ethernet segment icons by stepping down through windows. Alternatively, if the segment label is known to you, you can use the HPOV Locate option. see "Locating Ethernet Segments Using the HPOV Locate Option" on page 5-6.

To locate Ethernet segments:

1 In the Root window, double click on the Virtual LANs icon or highlight the icon and from the ATMvLAN menu select Zoom Physical. Alternatively, you can descend through the LAN Emulation windows to the LANE User window. See "Using the LAN Emulation Window" on page 5-6.

The Virtual LANs Window is displayed as in Figure 5-1.

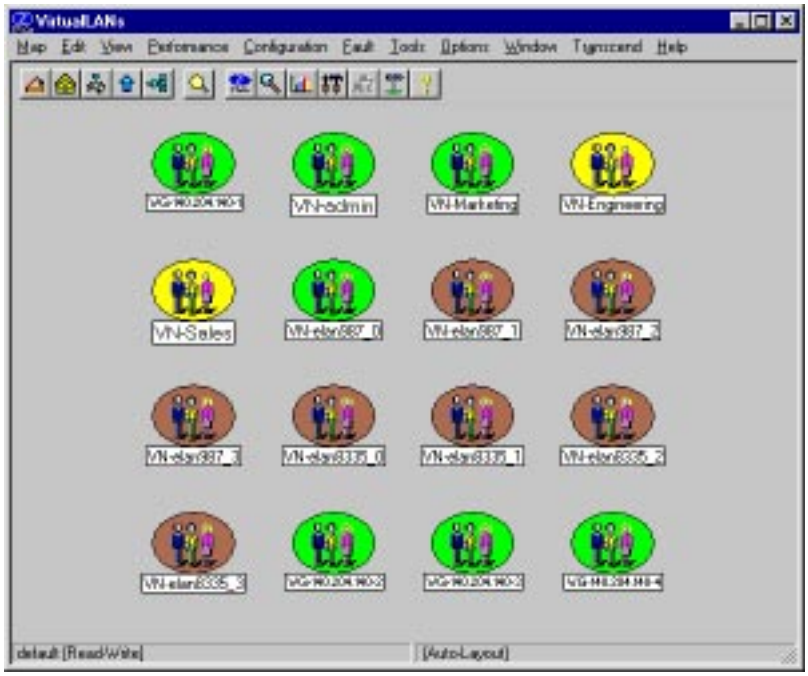


Figure 5-1 The Virtual LANs window

2 In the Virtual LANs window, double click on the source VN-vLAN_name or WG-name icon, or highlight the icon and then select the Zoom Physical from the ATMvLAN menu.

The VN-vLAN_name window appears as in Figure 5-2, with the Ethernet segments associated with the selected VLAN displayed.

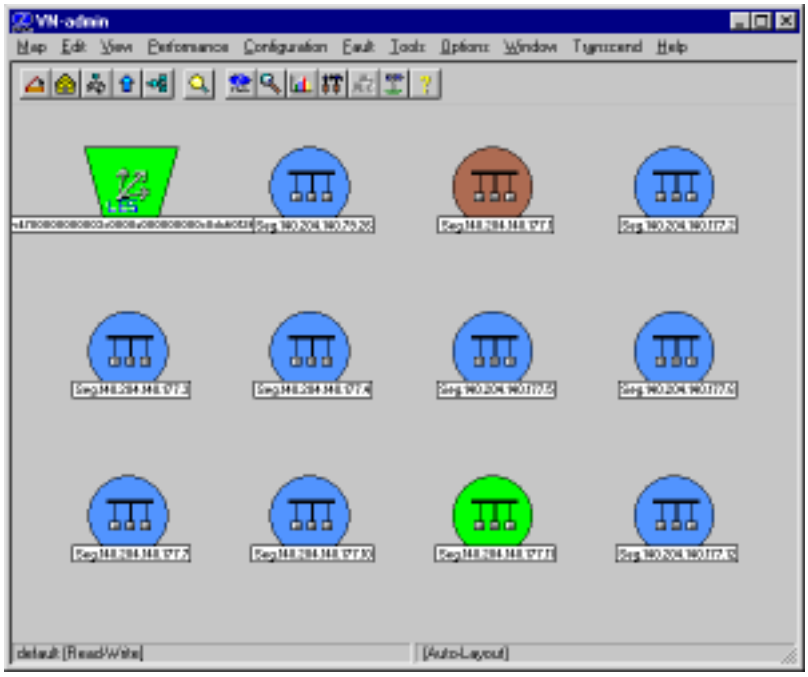


Figure 5-2 The VN_name window

3 Reposition the VN-vLAN_name window so that it is separate from the Virtual LANs window.

4 In the VN-vLAN_name window, identify the Ethernet segment icons to be moved by their IP addresses and port numbers.

The IP Address with the addition of the number of the port to which the segment is connected identifies the Ethernet segment. The last number in the segments icon label indicates the port number. For example, the following icon label indicates that Ethernet segment 100.0.0.0 is connected to port 6.

```
Seg.100.0.0.90.6
```

5 Select the Ethernet segment icons to be moved.

In the HPOV platform, use CTRL/MB1 for multiple selections. You may also select a rectangle over an area to enclose multiple Ethernet segment icons using the drag/MB1 feature.

The port icons, colored brown, are part of the admin VLAN. These icons cannot be moved from the admin VLAN to other VLANs in SuperStack II Switch 2700 or CoreBuilder with the 7X00 card units.These ports can be moved from the admin VLAN to other VLANs in SuperStack II Switch 1000/3000 and Desktop Switches.

6 In the Virtual LANs window, select the destination VLAN.

Be certain to press Ctrl/MB1 when selecting the destination VLAN, so that Ethernet segments remain selected in the source window.

7 Select the Path Assistant option from the ATMvLAN menu**.**

The VLAN Move window is displayed, indicating the destination VLAN name and device and address of the segment moved.

The Ethernet segments are not moved until the Apply button is pressed. Meanwhile, the icons of the segments turn yellow. At this point you can select another set of source and destination icons and select the Move icon or ATMvLAN Move again. Each time you select the Move option, the new segments are added to the VLAN Move window. See Figure 5-3.

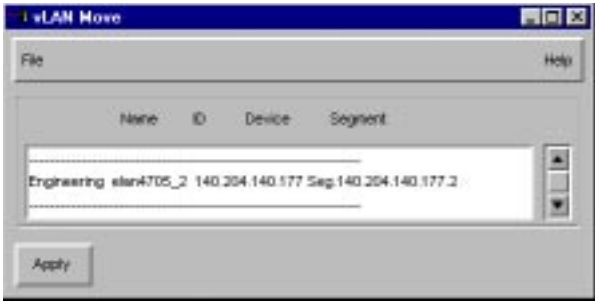


Figure 5-3 The VLAN Move window

8 Repeat steps 5 to 7 until all Ethernet Segments to be moved are listed on the VLAN Move window.

9 To execute the move, click Apply in the VLAN Move window. To cancel the move, close the VLAN Move window.

An information box is displayed for each segment moved successfully.

Using the LAN Emulation Window

1. In the Root window, double click on the LAN Emulation icon or highlight the icon and select the Zoom icon.
2. Double click on the source LANE User or highlight the icon and select the Zoom icon.

   The LANE User window is displayed with the Ethernet segments associated with the selected VLAN.
3. Proceed with step 4 as described in the previous section.

Locating Ethernet Segments Using the HPOV Locate Option

A quick way to locate a specific Ethernet Segment in a large system with many Ethernet Segments is the Network Management Platform (e.g., HP OpenView) Locate service.

To use the Locate option:

1. In an OpenView window, select Locate->Objects->by_Symbol_Label.

   The Locate by Label dialog box is displayed.
2. Type in the Ethernet Segment port address and click Apply.

   A list of occurrences of the label in all OpenView Windows is displayed.
3. Highlight the Ethernet segment (port address) you want to locate.

   The selected Ethernet segment will be highlighted in the VLAN and/or LAN Emulation window that is open on your display.

Drag-and-Drop Ethernet Segments Between VLAN Windows

The "Drag-and-Drop" method is also available for moving Ethernet segments between VLANs. With this method you open both source and destination VN-VLAN-name windows and drag an Ethernet segment from the source window and drop it into the destination window.

Perform the following steps to use this method. Refer to the previous method for details:

1. Open the source VN-vLAN_name or WG-name window and locate the Ethernet segments to be moved by their IP addresses and port numbers.
2. In the VN-vLAN_name or WG-name window, select the Ethernet segment icons to be moved.

In the HPOV platform, use CTRL/MB1for multiple selections or select a rectangle over an area to enclose multiple Ethernet segment icons using the drag/MB1 feature.

3 Open the destination window. You do not need to select anything.

4 Using the middle mouse button, drag the Ethernet segment from the source VLAN window to the destination VLAN window and release.

The VLAN Move window is displayed. See Figure 5-3.

5 Repeat steps 2 to 4 until all Ethernet Segments to be moved are listed on the VLAN Move Window.

6 To execute the moves, click Apply in the VLAN Move window. To cancel the operation close the VLAN Move window.

An information box is displayed for each segment moved successfully.

Drag-and-Drop on Front Panel Window

This method makes it possible to move one or more Ethernet segments between VLANs using the drag-and-drop technique in a single window.

To use drag-and-drop on the Front Panel window method:

1 Open either the Superstack II Switch 2700 or CoreBuilder with 7x00 card Front Panel window. See Chapter 4 for a description on how to access these windows.

The front panel of the device containing destination Ethernet ports (segments) is displayed. See Figure 5-4 for an example of the SuperStack II Switch 2700 Front Panel display.

Only VLANs whose names and colors were defined at setup appear on the front panel VLAN display. Defining VLAN aliases is described "Configuring VLAN Aliases and Colors" on page 4-21.

When you toggle on a VLAN name, the lines underneath the ports become the alias color of the VLAN, thus making it easier to identify the ports associated with the VLAN.

Figure 5-4 SuperStack II Switch 2700 Front Panel Display

2 Click on the destination Ethernet ports (segments).

You can use the drag/MB1 feature to select a rectangle and enclose multiple ports. The selected port's background is displayed in blue. If you are moving segments to one port only you do not need to perform this step.

To undo a selection, click on the bottom of the Front Panel Display window.

3 Using MB2, select the VLAN button on the bottom of the Front Panel and drag it to the new port number and release (drop).

When selecting the VLAN, a move icon appears, containing a square and a running figure. Be certain to place the square portion of the icon directly over the port.

If you drop the destination VLAN on a port which you did not select, the result will be that the port will be moved along with the selected ports.

The VLAN Move window is displayed.

4 Click Apply.

An information box is displayed for each segment moved successfully.

Automatic VLAN Moves Based on Policies

In addition to the manual VLAN Move method above, devices can be setup to automatically configure themselves into VLANs based on policies. Using this method, ports automatically move between VLANs. The changes are dynamically reflected in the VLAN maps. Policy-based VLAN Auto-configuration is described in detail in Chapter 4.

Moving Ports Between Protocol-based VLANs

The VLAN Move method described in "Moving Ethernet Segments Between VLANs" on page 5-1 also works for moving ports between protocol-based VLANs in the CoreBuilder 2500 with one important difference. When the source and destination VLAN are not of the same protocol type, the port will belong to both source and destination VLAN after the move is complete. It is moved to the destination VLAN but not removed from the source VLAN. This behavior takes into account the possibility that one port can belong to several protocol-based VLANs as long as they are of different types (two different IP VLANs are considered to be different types). On the other hand, if the source and destination VLANs are of the same type, the port will be deleted from the source VLAN.

Removing a Port from a Protocol-based VLAN

In the event that a port is not removed from a source VLAN subsequent to a VLAN Move operation, it can be removed by performing the following:

1. Select the segment(s) to be removed from the source VLAN window.
2. Select the ATMvLAN Move from the ATMvLAN menu.
3. When the VLAN Create window appears select the protocol type "None."

   For each segment that was selected, a list of VLANs that the segment belongs to is displayed.
4. For each segment, select the VLANs from which the segment is to be removed.

   A list of all segments to be removed is displayed in the VLAN Move window.
5. Press Apply on the VLAN Move window.

   The segments are removed from the VLANs.

Local VLANs and VLAN Move

Local VLANs act as "holding" VLANs in the event that LAN Emulation connectivity is incomplete. Although local VLANs cannot be directly established by the ATMVLAN manager, they can be activated during a VLAN Move operation involving ATM-based VLANs.

When Ethernet segments in a device are reassigned to a different VLAN they are detached from the LEC of the old VLAN and attached to the LEC of the new VLAN. When the new VLAN already exists in the device, then the new segments are simply added to the others.

A different situation occurs when the new VLAN does not yet exist in the device. A new LEC for the new VLAN needs to be established in the device and that LEC needs to be connected to its LES. This process can take time and in some cases may not succeed. Meanwhile, the Ethernet segments to be moved are placed in a local VLAN created to hold them temporarily. This is signified by a new VLAN icon with the label "Local VLAN" appearing on the VLAN window. The segments to be moved are inside the local VLAN icon and will appear on the destination VLAN display only when the connection to the LES is complete.

Policy-Based Moves

Adding a segment or device to a policy results in the enforcement of the policy on that device. The policies may be configuration policies, security policies or other predefined policies. Devices or proxies that enforce the policy continuously follow the following three procedures:

1. Snooping
2. Resolution
3. Configuration

Snooping

The device or proxy enforcing a policy will first snoop the frames going throughout the device. Snooping allows the device to recognize various frames or frame contents. This information is then used in the policy resolution process.

For example: If a segment is assigned to a MAC-based auto-VLAN configuration policy, the device containing that segment snoops on the frames originating from behind that segment. After snooping it tries to resolve the MAC address of the station residing behind that segment. This information (the source MAC address) is then used to resolve the VLAN configuration of that port.

Using the information derived from the snooping procedure, the device then attempts to resolve something based on the policy it is trying to enforce. For example, if the policy is a MAC-based auto-VLAN configuration policy, the device will resolve the MAC address to VLAN mapping using external services where the mapping information is stored. This may result in a query to an external server asking for the VLAN mapping information. This resolution then results in a configuration change, thus enforcing that policy.

Configuration

Following snooping and resolution, the device enforcing a policy will make the necessary configuration changes in the device to enforce the policy.

For example, if a device is enforcing a security policy on a segment, the device first snoops for the MAC address of the station connected to that segment. The device then resolves (concludes) if that MAC address is allowed to use the network. The resolution may be based on a query to an external MAC address inventory server. If the device resolves not to allow the endstation to use the network, (if the MAC address is unknown to the inventory server), the device can configure the port into a partitioned state, thus enforcing a security policy on that port.

The following configuration policies are available in this release:

- MAC-based automatic VLAN configuration policy

  Segments or devices assigned to this policy automatically are configured into various VLANs based on a predefined MAC address to VLAN mapping. **This policy can be applied to the CoreBuilder 7x00-series interface cards and SuperStack II Switch 2700, 1000, 3000 and Desktop Switches when used as ATM edge devices.**

  The MAC address to VLAN mapping information is stored in a parameter database named MAC Vdb. This database can be automatically populated with MAC address information by using the BuildvDB tool. The BuildvDB tool, once activated, automatically builds an inventory of MAC addresses that exist in the network.

- MAC-based VLSR

  This policy is exactly same as the above MAC based policy but in this case the MAC address to VLAN mapping is stored in an external VLAN server parameter database. This policy is to be used when an external

VLAN server is deployed in the network. This policy is not supported in this release.

- IP Subnet based automatic VLAN configuration policy

  Segments or devices assigned to this policy will automatically be configured into various VLANs based on a predefined IP Subnet address to VLAN mapping. A parameter database called Subnet Vdb must be created and setup using the Locator Tool prior to using this policy. This policy can only be applied to CoreBuilder 7x00-series interface cards and SuperStack II Switch 2700 ports in this release.

- Null Policy

  This policy is used for removing segments and devices from assigned policies. Once segments or devices are placed in the Null Policy, the original policy is no longer enforced on that device or segment.

Performing Policy-based VLAN Moves

ATM and VLAN Policies Map

The ATM and VLAN Policies Map, see Figure 5-5, is used for managing the logical connectivity of end-users or segments through Virtual LANs based on predefined policies. The ATM and VLAN Policies Map displays a set of policies and the segments or devices assigned to each policy.

Each policy icon represents a predefined policy to which various segments and devices in the network may be assigned. Once a segment or a device is assigned to a policy via a simple move mechanism, the device

associated to the segment (or another proxy device) will enforce the policy on that device or segment.

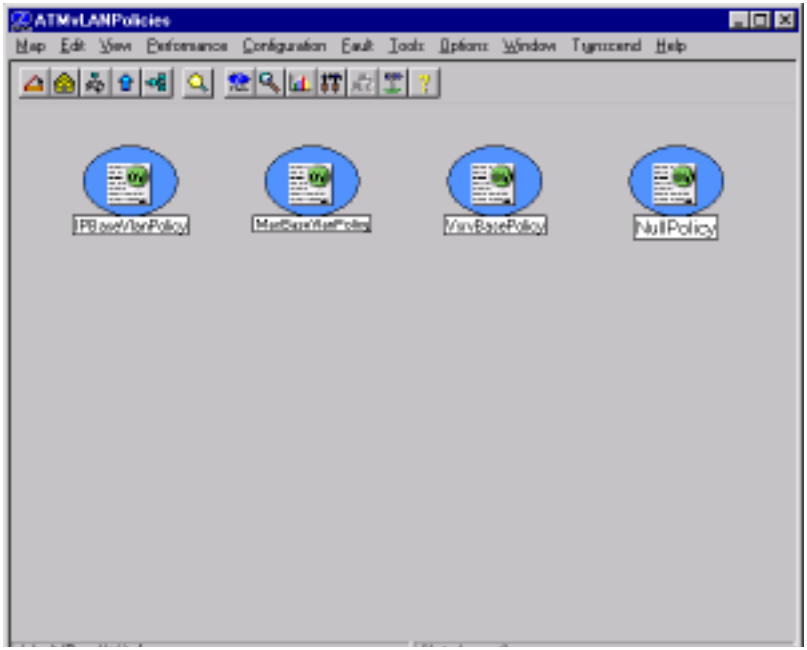


Figure 5-5 ATM and VLAN Policy Map

You can move segments from one policy to another using the same operations as the VLAN Move. See "Moving Ethernet Segments Between VLANs" on page 5-1.

For a more detailed description, see "Configuring Policy-based VLAN Auto-configuration" on page 4-24.

Enabling and Disabling Ports

You can enable or disable ports from each device front panel display.

1. Double click on the port or select ATMvLAN Configuration Assistant. The appropriate Configuration window appears.
2. Toggle on Enable or Disable.
3. Click Apply for changes to take effect.

Manual LECS Database Modification

The Manual LANE Redundancy Configuration Assistant is used for manually modifying a specific LECS database, to enable a backup LES, or to re-enable a primary LES when the backup is enabled. This configuration assistant allows the operator to manage manual LANE redundancy.

The failed LES is located according to its address by scrolling the ELAN IDs window and the backup LES is activated by clicking on its radio button.

Manually Modifying LANE Redundancy

You can modify the database of an LECS that was not automatically changed by the LANE monitor using the Manual LANE redundancy Assistant.

To modify the database:

1. From the LAN Emulation window or Topology Browser select the Backbone and Service icon or branch.
2. From the ATMvLAN menu select Zoom Physical. The Backbone and Services window is displayed.
3. Select the LECS which contains the database you want to modify.
4. Select the Configure Assistant option from the ATMvLAN menu. The Manual LANE Redundancy window is displayed. See Figure 5-6.

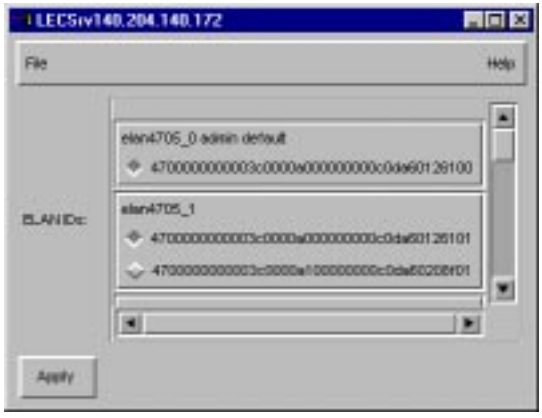


Figure 5-6 The Backbone and Services Configuration Assistant/Manual LANE Redundancy

Each ELAN contains two entries of LES addresses.

5 For each ELAN, select the LES that was not automatically changed.

6 Click Apply to update the database.

Manual LANE Redundancy operates on only one LECS at a time. You can select the LECS in the Topology Tool or in the Backbone and Services map.

The Automatic LANE redundancy monitor, see page 4-14, must be disabled and then restarted after manually fixing the LECS database.

6 NETWORK TROUBLESHOOTING TASKS

This chapter describes how to perform the following ATM and VLAN Management network troubleshooting tasks.

The following topics are described:

- Color Status and Propagation
- Device Level Troubleshooting
- LANE Level Troubleshooting
- ATM Network Level Troubleshooting
- Virtual LANs Level Troubleshooting
- Path Assistants for Identifying Connectivity and Performance Problems

Color Status and Propagation

An extensive context status notification scheme is supported in the ATM and VLAN Management software.

The same network event may cause different status on different logical maps/icons. For example, an LEC that cannot join its LES is considered a critical event in the LAN Emulation Map and not necessarily a fault in the ATM or Device map. The severity depends on the context or the logical domain. Colors propagate upwards to the parent icon, so that the next highest level window's color is influenced.

There are high-end platform-configured icon status colors defined for Transcend icons. Each status has a default color that can be changed by the user.

The icon statuses are listed in Table 6-1 according to the severity of the fault.

Table 6-1 Color Coding Key

Status	Color
Critical	Red
Major	Orange
Minor	Yellow
Normal	Green
User-definable	Brown
Unknown	Blue

Device Level Troubleshooting

Table 6-2 indicates operating statuses of the ATMvLAN Device icons.

Table 6-2 Color Key For Root Window and Devices

Map	Icon	Status /Color	Status Cause
Root	Each icon reflects highest priority status of maps below it.		
ATMvLAN Devices	CoreBuilder, Switch 2700, 7X00, Switch X000,CoreBuilder 5000, CoreBuilder 2500/6000, and LANplex 2016/5000	Critical	Does not respond to SNMP.
		Major	There is a hardware problem in the device.
		Minor	There are device ports which are enabled but in down state.
		Normal	Device operating normally.

LANE Level Troubleshooting

Table 6-3 indicates operating statuses of the ATMvLAN Device icons

Table 6-3 Color Key for LANE Level

LAN Emulation	All icons reflect highest priority status of maps below it.		
Backbone and Services	LES	Critical	Not defined for this version
		Major	Does not respond to SNMP
		Minor	There is a user-defined name for this VLAN ID, but there is no LEC connected.
		Brown	There is no LEC connected.
		Normal	In operational state.
	LEC	Critical	The LEC is not connected to the LES. It may be in join, configure or LECS connect state.
		Major	Does not respond to SNMP
		Minor	In initial state
		Normal	In operational state.
	LECS	Major	Does not respond to SNMP
		Minor	Enabled but not active.
		Unknown	The LES is enabled but the LECS is disabled on the CoreBuilder device.
		Normal	Enabled and operational.
LANE User	LEC	Critical	The LEC is not connected to the LES. It may be in join, configure or LECS connect state.
		Major	Does not respond to SNMP.
		Minor	In initial state
		Normal	In operational state.
	Segment	Major	The device connecting this segment does not respond to SNMP.
		Brown	The first segment on the device may appear in this status. All other segments on the device are operating normally.
		Unknown	Device (all segments) operating normally.

ATM Network Level Troubleshooting

Table 6-4 indicates operating statuses of the ATM and VLAN Network icons.

Table 6-4 Color Key for Network icons

ATM Network	Switch Domain	Critical	One or more of the lower level devices has an error of highest severity
		Major	One or more of the lower level devices has a hardware problem.
		Minor	One or more lower level devices has device ports which are enabled but in down state.
		Normal	Device operating normally.
ATM Switch Domain	This icon shows the highest priority status of the edge devices below it.		

Virtual LANs Level Troubleshooting

Table 6-5 indicates operating statuses of the ATM and VLAN Network icons.

Table 6-5 Color Key for Virtual LANs Icons

Virtual LANs	Virtual LAN	Critical	The LES is in major state.
		Major	One of the devices configured to use this VLAN does not respond to SNMP.
		Minor	There is a user-defined name for this VLAN ID but there is no LEC connected.
		Brown	There is no segment connected.
VLAN	LES	Critical	Not defined for this version.
		Major	Does not respond to SNMP.
		Minor	There is a user-defined name for this VLAN ID but there is no LEC connected.
		Brown	There is no LEC connected.

Table 6-5 Color Key for Virtual LANs Icons

	Normal	Device operating normally.
Segment	Major	The device connecting this segment does not respond to SNMP.
	Brown	The first segment on the device may appear in this status. All other segments on the device are operating normally.
	Unknown	Device (all segments) operating normally.

Identifying VLAN Splits

After the redundancy in the LAN Emulation Server has taken effect, the LAN Emulation Clients (LECs) are moved to the backup services. There may be circumstances where some of the LAN Emulation Clients (LECs) remain connected to the primary LAN Emulation Server (LES) and are not moved to the backup LES. This condition creates a *VLAN (ELAN) split.* The VLAN split is caused because several LAN Emulation Clients (LECs) belonging to the same ELAN are bound to different LAN Emulation Servers. The split may occur when a LAN Emulation Server(LES) fails and the NMS changes the LAN Emulation Configuration Server database.

Indications in the VLAN Map

You can see the indication of the VLAN split in the VLAN Map when the icon for the primary VLAN (ELAN), with respect to the backup, is still green. This condition indicates that LAN Emulation Clients are still attached.

Under normal circumstances only one ELAN either primary or backup, should be green.

Indications in the Backbone and Services Window

You can see the indication of a VLAN split in the Backbone and Services window as different LAN Emulation Clients (LECs), belonging to the same ELAN, are bound to both the primary and backup LAN Emulation Server (LES) of an ELAN.

To unify the split VLANS:

- Check that all the LAN Emulation Configuration Servers have the same LAN that is displaying the split.
- Using the Network Management Station, move the ports displayed in the primary VLAN to a temporary VLAN. Move the ports from the temporary VLAN into the backup VLAN.

Empty ELANS in the network are indicated with a brown color key.

Path Assistants for Identifying Connectivity and Performance Problems

You can use the ATM and VLAN Management Path assistants to display the paths ATM devices and between network elements that are part of LAN Emulation.

LE Path Assistant

The LE Path Assistant allows you to select any two LE Clients or two LAN segments and to obtain the following information:

- Address resolution through the LE Server
- Control distributed path (direct)
- Multicast forward addressing through the BUS
- Data direct path

The Path Assistant displays the corresponding segment, its proxy client, its LE services ATM address, and assists in verifying that the connections are viable.

To access the LE Path window, in the Topology Browser, click on two ATM Switches and then click on the Path icon.

ATM Path Assistant

The ATM Path Assistant allows you to select any to ATM UNI or NNI endpoints across the network and to see the physical path as well as the VCCs established between the two endpoint. The following information can be obtained from this assistant window:

- The physical path including all the intermediate switch nodes and the physical link between them
- The ports at the ends of the physical links
- The VCCs established between the end points

The ATM path assistant also allows you to setup PVCs between the selected endpoint.

Tracing a VC Path Between Two ATM End Nodes

To trace a VC Path between two ATM nodes perform the following tasks:

- Select two ATM end nodes in the Topology or management maps, and then select the Path icon.

Tracing the LAN Emulation Control VCCs Between Two LANE Clients

To trace the LAN Emulation control VCCs between two LANE clients perform the following steps:

1. In the LAN Emulation Map or branch entry in the Topology Browser, select two LECs attached to the same LES.
2. Select the Path icon.

   The LE-Assist window is displayed showing the control VCCs between the two LECs and the LANE services (LES/BUS).

7 NETWORK PERFORMANCE MEASUREMENT TASKS

This chapter describes how to perform the following ATM and VLAN Management network performance measurement tasks.

The following topics are described:

- Measuring Network -wide ATM Traffic Performance Using the Bandwidth Icon
- Measuring Device Level Performance
- Displaying Port Level Statistics
- LANE Component Statistics
- Switch Domain Statistics

Measuring Network -wide ATM Traffic Performance Using the Bandwidth Icon

The Bandwidth icon opens the NNIx (Network Node Interface Traffic) Tool that graphically displays the traffic patterns between ATM switches in the network. It can be configured to collect, display and store information about good or bad (error cell) traffic patterns across the network.

The NNIx Tool can be configured to collect traffic information between two or more ATM switches. The ATM switches can be selected from a file browser type selector window called NNIx Browser which lists all the ATM switches in the network hierarchically based on Enhanced IISP address structure. Selected ATM switches can be added to the NNIx Map using the Hide (plus) Button. The Show Subtree (double plus) button can be used to add the entire ATM switch hierarchy (a root switch and all the switches below it). Upon adding switches to the NNIx map, the NNIx tool automatically starts collecting traffic information on the NNI links between the switches and the in and out traffic of each ATM switch.

The Configure option under the map menu of the NNIx map can be used to customize the NNIx tool.

The historical data collected and stored by the NNIx tool can be graphed viewed as line graphs, pie charts and bar graphs.

The following sections describe the various components of the NNIx tool as well as how to configure the tool for historical data collection.

The NNIx Tool is composed of two windows: the NNIx Browser and the NNIx Map.

NNIx Browser

The NNIx Browser lists all the ATM switches in the network. The NNIx Browser is used to select a switch, or multiple switches and add to the NNIx map.

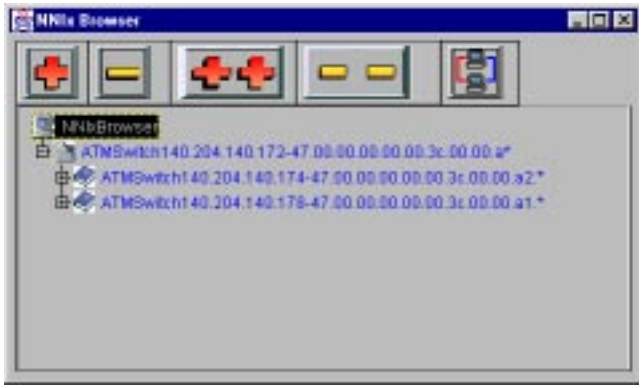


Figure 7-1 The NNIx Browser

You can also select a hierarchy of switches to add or delete from the NNIx map display. You may open several maps simultaneously for display, but only one map may be active at a time. The active map is indicated with three asterisks on the window title bar.

The convention used for active windows is not a highlighted title bar. The NNIx Browser must be open to display NNIx maps. To exit the application, close the NNIx Browser.

To display the switch hierarchy in the NNIx Browser

- Double click on an ATM Switch entry in Browser list.

To select a switch for display on the active NNIx Map

1 Click on the ATM Switch entry in the NNIx Browser.
2 Click on the Show (plus) icon.

To select a switch hierarchy for display on the active NNIx map

1 Click on the ATM Switch entry in the NNIx Browser.
2 Click on the Show Subtree (double plus) icon.

Once the switches are added to the NNIx map, data collection starts automatically.

To delete nodes from the NNIX Map:

SIn the NNIx Browser, select the node and then select the "-" icon

or

in the NNIx Map, select the nodes and then select Map -> Delete Node.

Select Map -> Clear All to clear all the nodes from the Map.

NNIx Map The NNIx Maps display the traffic patterns on the ATM switches. Each NNIx map is given a unique consecutive number. After you close a map, and open a new map, the map receives the first available number of the map that was closed. For example, Maps 1, 2 and 3 are created. Map 2 is closed. The new map will receive the number 2.

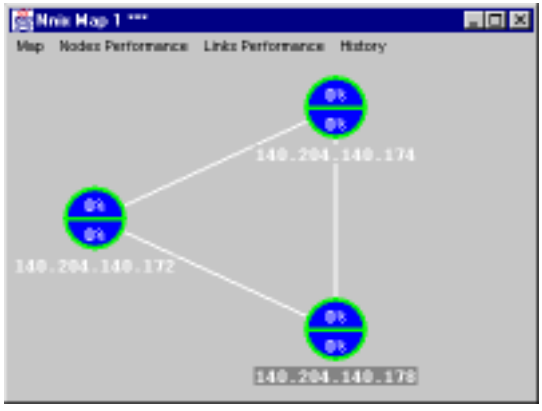


Figure 7-2 NNIx Map

Each ATM switch is displayed as a circular icon which is also a pie chart representing the *in* and *out* UNI traffic corresponding to that switch. The upper 1/2 portion of the pie represents the maximum percentage of speed of the out traffic and is colored red.The lower portion of the circle represents the maximum percentage of speed of the in traffic and is colored magenta.

The IP address of the switch is labeled below a switch icon.

The lines between the switch icons represents the NNI links and the traffic load on each link is dynamically updated and is represented by a unique color. The links are color coded according to the following legend:

0-5% White

5-10% Yellow

10-20% Green

20-40% Blue

40-100% Red

The legend information can also be viewed by selecting the Map Legend option under the Map menu of the NNIx map.

To display the node configuration:

Select the switch in the NNIx Map and then select Node Configuration. The following static parameters of the switch are shown:

- name
- IP address
- ATM address

Configuring and Customizing the NNIx Tool

The NNIx tool has a very rich set of configuration and customization options. To configure and customize the NNIx tool, select the Configuration option in the Map menu of the NNIx Map.

The Configuration and Customization window contains the following tabs.

- Map Configuration Tab

- NNIx Traffic Polling Configuration Tab
- Communication Configuration Tab
- History Configuration Tab
- Simulation Configuration Tab

Map Configuration Tab

The Map Configuration tab allows you to configure the radius of the switch icon as well as the layout of the map itself. See See Figure 7-3..

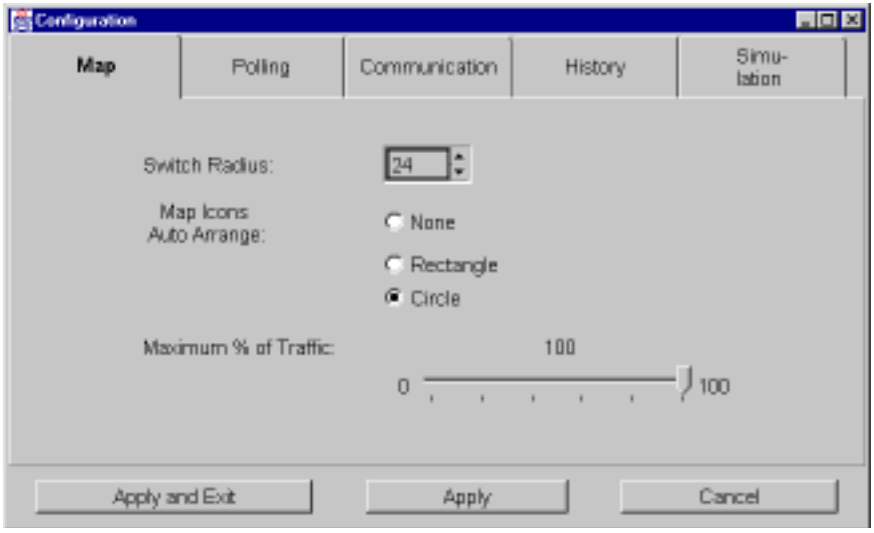


Figure 7-3 The NNIx Configuration Map Tab

The Switch Radius sub-option allows you to modify the switch icon radius. The recommended radius is 24, the default is 16.

The automatic map layout sub-option allow you to select one of the following three layout options:

Disabled - Disables the automatic map layout

Rectangular - The map icons are laid out in a rectangle.

Circular - The map icons are laid out in a circle.

The Max% Traffic option allows you to set the maximum percentage traffic rate represented on a NNI link.

NNIx Traffic Polling Configuration Tab

The NNIx Polling Configuration tab allows you configure the polling interval for data collection of the NNIx Tool. See Figure 7-4.

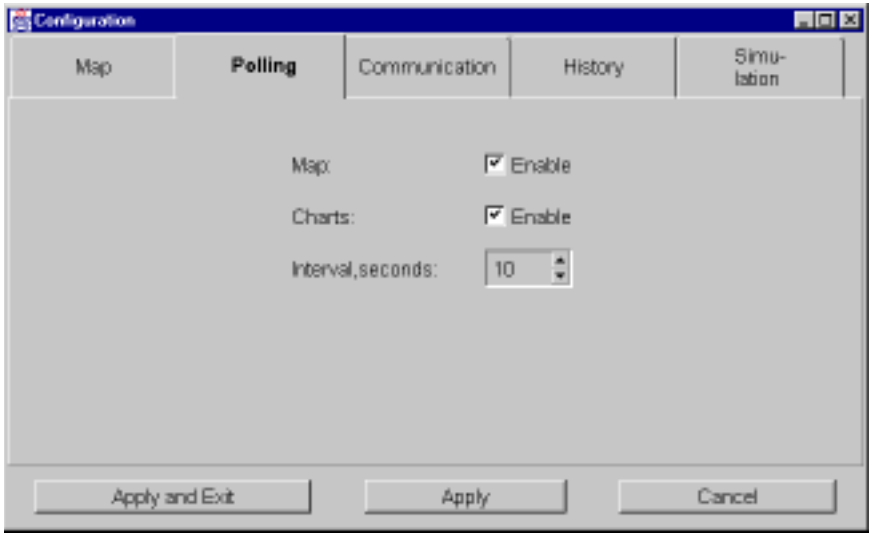


Figure 7-4 The NNIx Polling Configuration Tab

The following 3 sub-options are available:

- **Map Enable** - Check to enable or disable the dynamic updating of traffic on the NNIx map.
- **Chart Enable** - Check to enable or disable the dynamic updating of node and link performance charts.
- **Polling, Seconds**: Allows you to select a polling interval for data collection.

Communication Configuration Tab

The Communication Configuration tab allows you configure the type of data that is monitored and collected. See Figure 7-5.

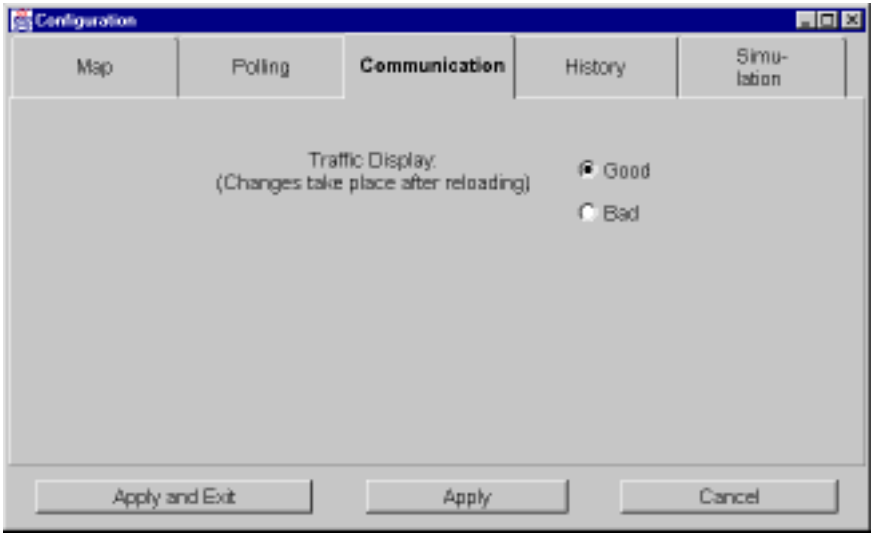


Figure 7-5 NNIx Communication Configuration Tab

- **Good** - configures the NNIx tool to collect data on Good Cells.
- **Bad -** configures the NNIx tool to collect data on Bad Cells such as Errored (BIP etc.), un-recognized ATM Cells.

You must restart the NNIx tool for the changes to take effect.

History Configuration Tab

This History Configuration tab allows you to enable data archiving and also set the storage interval. See Figure 7-6.

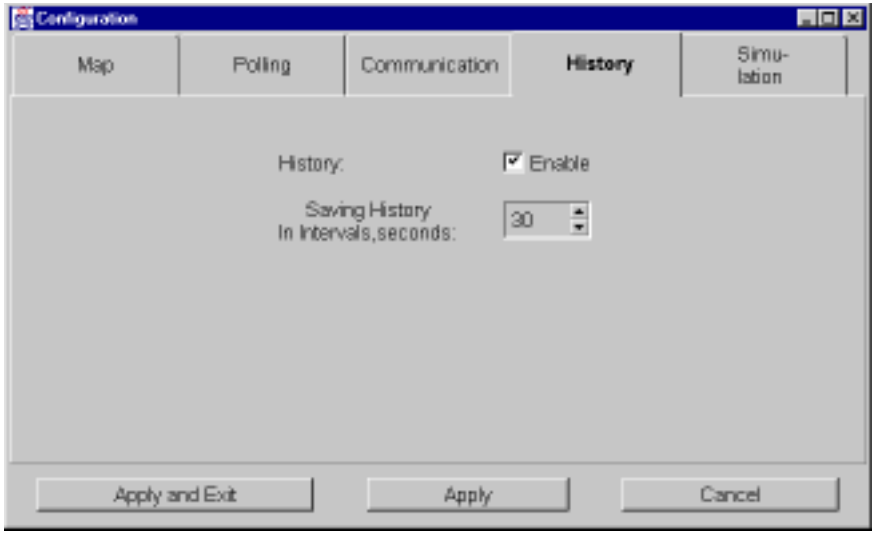


Figure 7-6 The NNIx History Configuration Tab

When History is enabled, polled data is archived into log files in the \TranscendNT\ATMvLAN\runtime\logs directory.

The historical link and node data can be graphed using the History menu option in the NNIx Map.

While viewing a graph, a portion of the graph can be zoomed in on by selecting it with the left mouse button. Press the "R" key to Zoom out.

Simulation Configuration Tab

The Simulation Configuration Tab sets the NNIx tool into a data simulation mode that displays random traffic patterns on the links and nodes. See The number of Switch Nodes can also be also selected.You must re-start the NNIx tool to set it into Simulation mode.

The simulation mode is useful for understanding and using the NNIx tool when no live network traffic or network devices are available.

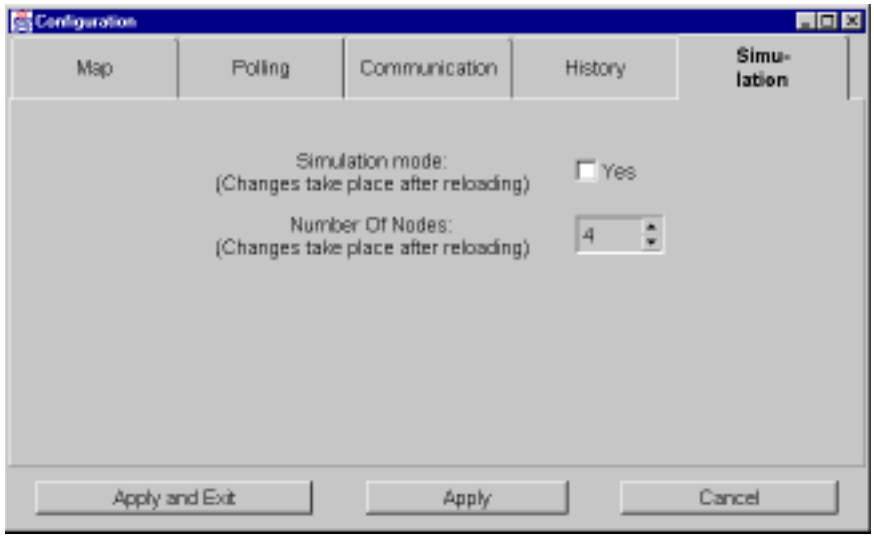


Figure 7-7 The NNIx Simulation Configuration Tab

How to Graph Live Link and Node data

When the NNIx tool is running Link and Node level traffic can be graphed using the Node performance and Link Performance menu options. This information can be viewed as bar charts, pie charts or cumulative pie charts.

To graph data from all links in the same graph:

- Select either the Bar, Pie or Cumulative Pie option from the Link Performance menu in the NNIx Map.

To graph data from all nodes in the same graph:

- Select either the Bar, Pie or Cumulative Pie option from the Node Performance menu in the NNIx Map.

To graph individual links or nodes:

- Select a link or node from the NNIx Map and then select either the Bar, Pie or Cumulative Pie option from the Link or Node Performance menu in the NNIx map.

The bar graph shows the total in/out traffic percentages relative to the switches maximum capacity for a node or link.

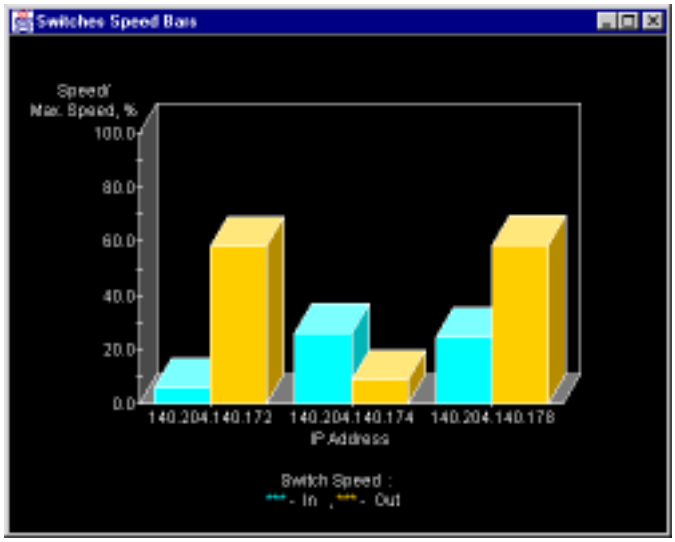


Figure 7-8 The NNIx Bar Chart

The pie chart shows the percentage of in versus out traffic for a node or link.

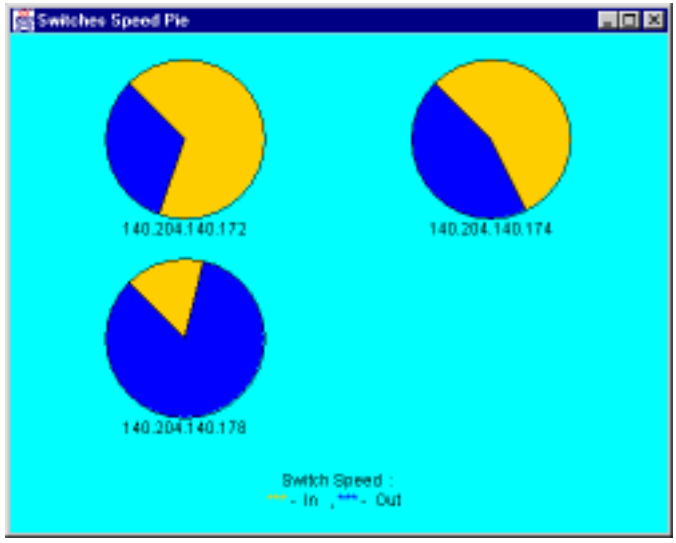


Figure 7-9 The NNIx Pie Chart

The cumulative pie chart shows the combined throughput percentages of in traffic and the combined throughput percentages of out traffic for nodes and links.

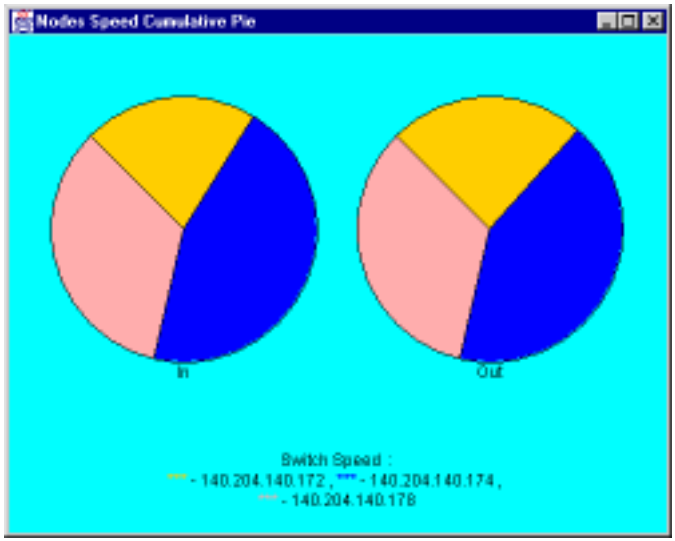


Figure 7-10 The NNIx Cumulative Pie Chart

Measuring Device Level Performance

The Performance Statistics windows display performance statistics for different objects in the ATM Network. The Performance Statistics windows are "live;" that is, there are updated automatically by continuous polling of the system. An object can be device (for example a Switch 2700 or CoreBuilder module), device port (Ethernet or ATM), Emulated LAN entity (LEC or LES) or Virtual Channel. The windows use history graphs, bar charts, pie charts and dials to display the performance information. A sliding selector allows you to set the Polling interval. To access these windows select the Graph Assistant option from the ATMvLAN menu.

History Graph

The history graph has the following features:

Slide bar: Enables display of previous samples.

Toggle legend: Clicking the middle mouse button while the cursor is located inside the history graph will cause the legend to be hidden and the graph to be widened. The widened display contains the same information but is now easier to read. Another click on the middle mouse button restores the original state.

Individual sample display: Clicking the right mouse button while the cursor is located inside the history graph will enter the individual sample display mode. This mode is indicated by the appearance of a cross-hair cursor.

Position the cross-hairs at a desired point on the history graph and click on the left mouse button. The detailed information about this sample point will be displayed on the lower left corner of the graph. This information includes sample number, sample time, sample graph and sample value.

Clicking on the right mouse button while in the individual sample display mode to return to the normal display mode.

Displaying Statistics

To display statistics:

1. Select a network element in the management maps or, in the Component View of the Topology Browser, select a network element component.
2. Select Graph Assistant from the ATMvLAN menu.

   The CoreBuilder performance statistics window is displayed as in Figure 7-11.

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Figure 7-11 CoreBuilder Statistics

Displaying Port Level Statistics

To display port level statistics:

1. Select a port from within the SuperStack II Switch 2700 branch of the Component View of the Topology Browser, or select a port on the front panel display of the SuperStack II Switch 2700 branch.
2. Select Graph Assistant from the ATMvLAN menu. See Figure 7-12.

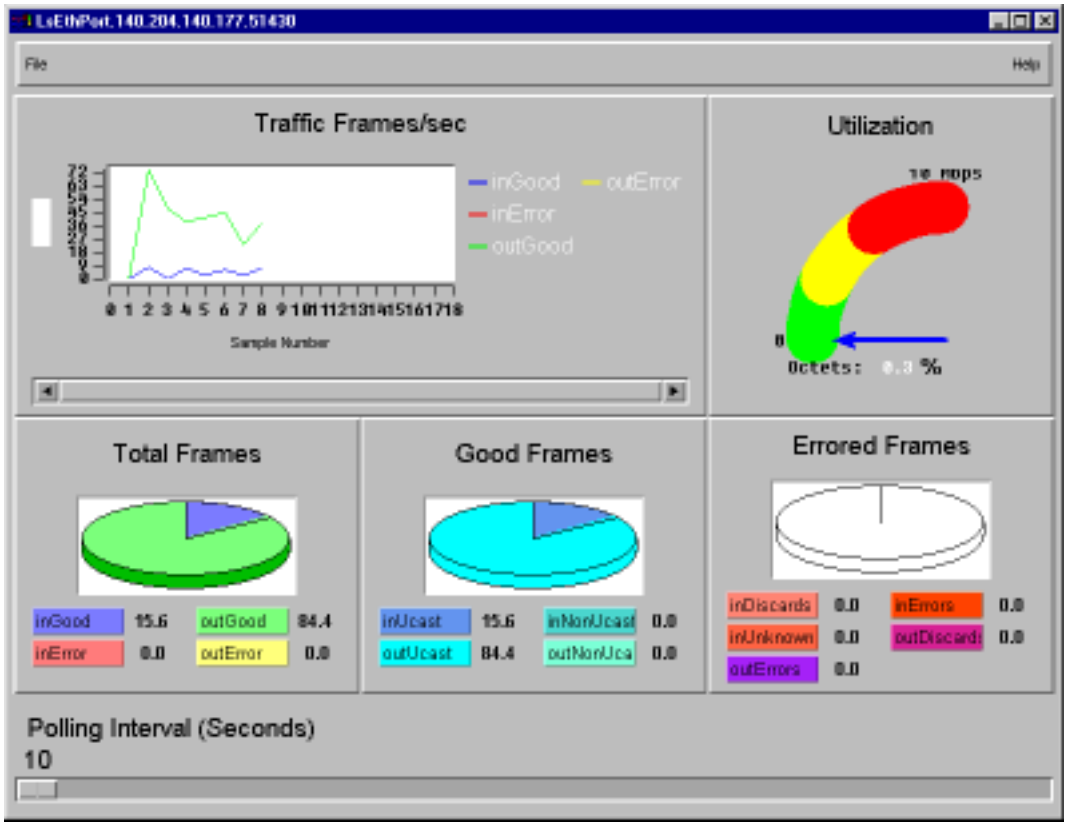

Figure 7-12 SuperStack II Switch 2700 Port Statistics Window

The window shows statistics of the message traffic through selected Switch 2700 Ethernet port. The Switch 2700 Ethernet Port Statistics are as follows:

Traffic History graph through the port in frames per second. Four separated sub-graphs are in the performance window:

Table 7-1 Traffic Graphs

Graph	Meaning
inGood	All valid frames received at the port
inError	Errored frames received at the port
outGood	All valid frames transmitted from the port
outError	Errored frames transmitted from the port

Utilization Dial graph of utilization of maximum bandwidth (10Mbps) of the port.

Total Frames Pie chart showing the distribution of all received and transmitted frames broken down according to the following:

Table 7-2 Total Frames

Graph	Meaning
inGood	All valid frames received at the port
inError	Errored frames received at the port
outGood	All valid frames transmitted from the port
outError	Errored frames transmitted from the port

Good Frames Pie chart showing the distribution of valid received and transmitted frames according to the following:

Table 7-3 Good Frames

Graph	Meaning
inUcast	Unicast frames received at the port excluding discards
inNonUcast	Broadcast and multicast frames received at the port excluding discards
outUcast	Unicast frames transmitted from the port including discards
outNonUcast	Broadcast and multicast frames transmitted from the port including discards

Errored Frames Pie chart showing the distribution of errored received and transmitted frames according to the following:

Table 7-4 Errored Frames

Graph	Meaning
inDiscards	Frames received at the port but discarded for internal reasons
inErrors	Frames received at the port but discarded due to errors
inUnknown	Frames received at the port but discarded due to unknown protocols
outDiscards	Frames discarded from being transmitted from the port for internal reasons
outErrors	Frames discarded from being transmitted from the port due to errors

LANE Component Statistics

The LANE Component Statistics allow you to measure the performance of LAN Emulation Services and LAN Emulation Clients in the network.

You can display statistics for the following LAN Emulation Services:

- LES
- LEC
- LANE User

LES Performance

The LES performance statistics see Figure 7-13, allow you to see the type of load that exists on the LAN Emulation Services and to use this information for load balancing when required.

The LES Performance Statistics are as follows:

Data History graph of transmission rate of Broadcast and Unknown data (BUS) in Emulated LAN.

Data Utilization Utilization of the transmission rate of the BUS service relative to the maximum possible.

Control Frames Pie graph of quality of LE ARPs and other LAN Emulation control frames handled by LES.

Errored Control Frames Pie graph of errored control frames.

Data/Control Octets pie graph of the ratio between LES transmission rate and BUS transmission rate.

To display performance statistics for the LAN Emulation Services:

1. Select an LES icon from the management maps or an LES device component in the Component View of the Topology Browser.
2. Select Graph Assistant from the ATMvLAN menu.

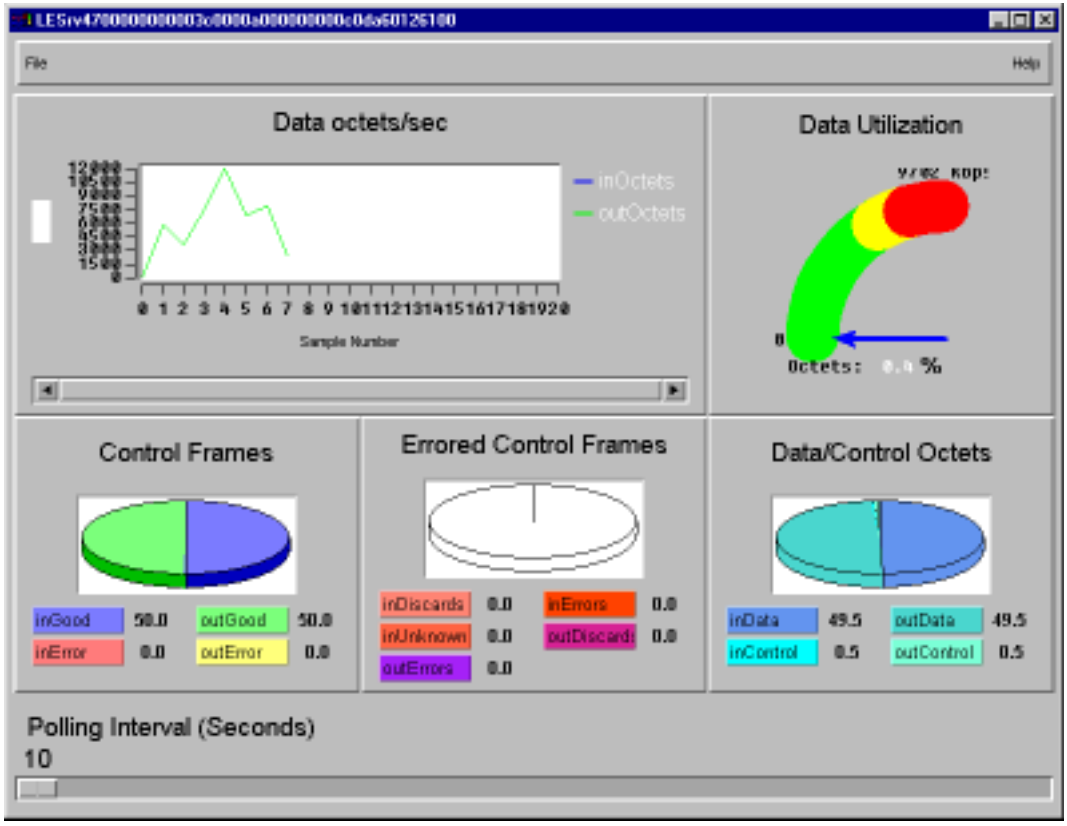

Figure 7-13 LES Graph Assistant

LEC The LEC Graph Assistant, see Figure 7-14, shows statistics of the message traffic through the LEC. The LEC Statistics are:

Data frames/sec History graph of the transmission rate of data frames through the LEC.

Data Frames Pie graph of the distribution of different types of data frames through the LEC.

Data Utilization Utilization of LEC data transmission rate relative to the maximum possible rate.

Control frames/sec History graph of the transmission rate of control frames through the LEC.

Control Frames Pie graph of the ratio of transmission of different types of LEC control frames.

Data/Control Frames Pie graph of the ratio between LEC data frame transmission and LEC control frame transmission.

To display performance statistics for an LAN Emulation Client:

1. Select an LEC icon from the management maps or an LEC device component in the Component View of the Topology Browser.
2. Select the Graph Assistant option from the ATMvLAN menu.

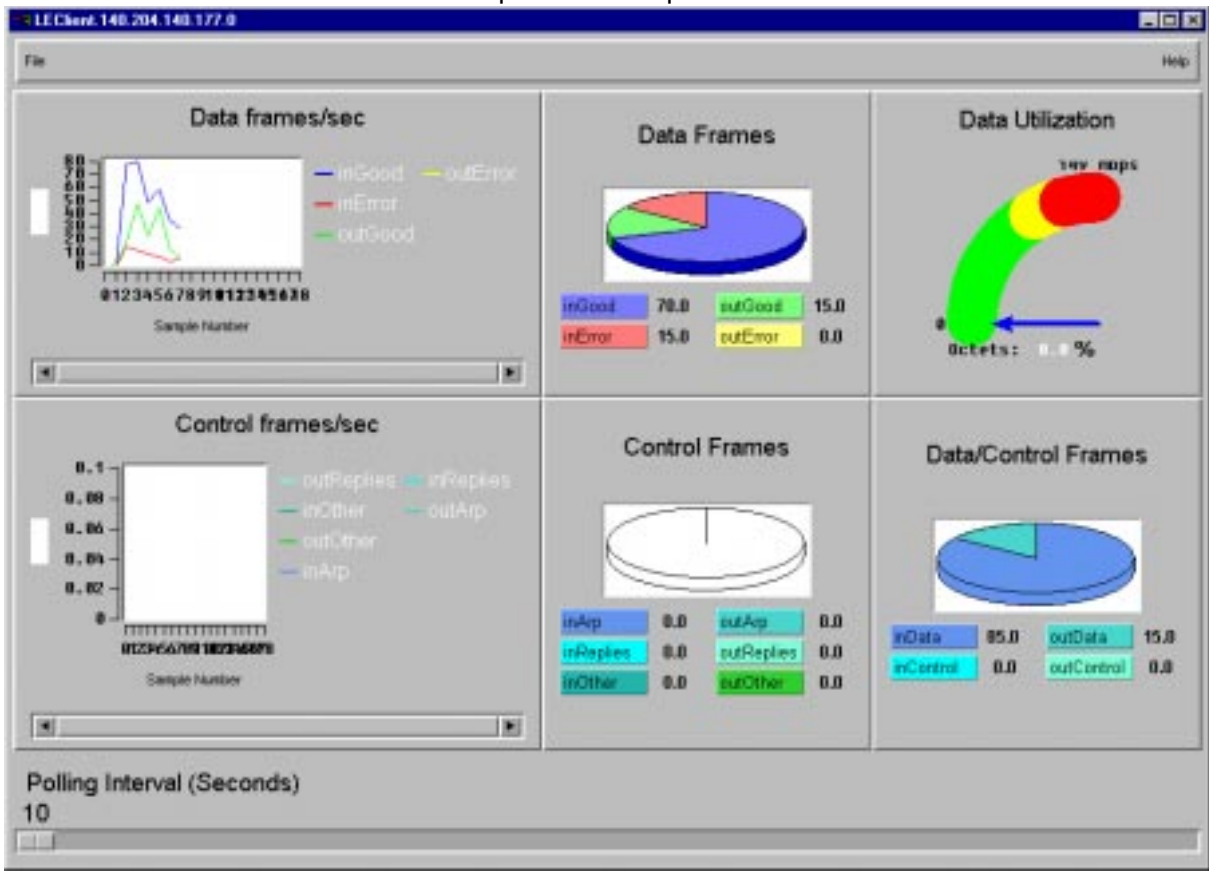

Figure 7-14 LEC Graph Assistant

LANE User The LANE User statistics parameters graph see Figure 7-15, displays a group of statistics per LEC. The display shows the in traffic and out traffic on the LEC and its segments. These graphs use the Transcend common grapher tool. You may select to display all or part of the LEC groups in the LANE User statistic.

To display performance statistics for an LEC:

1. Select the LANE User icon from the management maps or a LANE User device component in the Component View of the Topology Browser.
2. Select the Graph Assistant from the ATMvLAN menu.

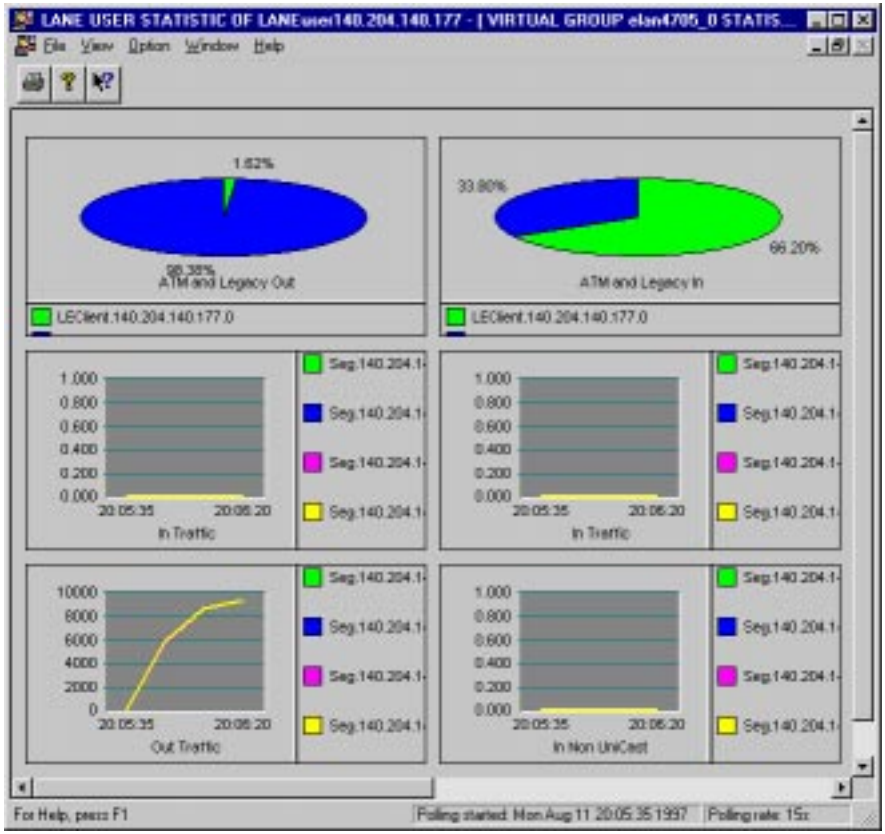

Figure 7-15 Statistic of LANE User Group Window

To zoom into one or more of the graphs:

Double click on the graph. See Figure 7-16.

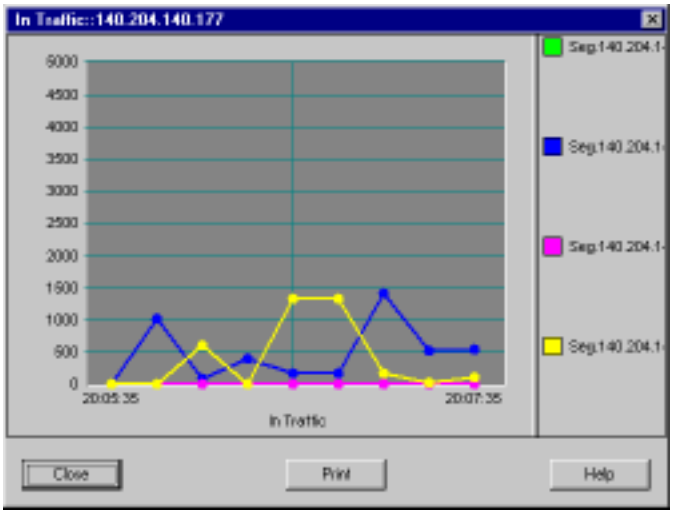

Figure 7-16 LANE USER Statistics Graph Zoom Display

Switch Domain Statistics

To display the statistics from an ATM switch:

1. Select the ATM switch icon.
2. Select Graph Assistant from the ATMvLAN menu.

Figure 7-17 displays the Graph Assistant for the CoreBuilder.

Figure 7-17 Graph Assistant for the CoreBuilder switch

A

SUPPORTED DEVICES

This appendix describes the devices and system software supported for the ATM and VLAN Management application.

Table A-0 Supported Devices

Device	Description
CoreBuilder 7000/HD	CoreBuilder 7000 is an ATM switch, used in an ATM network and serves as an LE services entity as well.
CoreBuilder 7200, 7400, 7600	CoreBuilder 7200, 7400, 7600 are CoreBuilder platform modules. They allow legacy LAN to ATM connectivity. The 7200 and 7400 are Ethernet modules and the 7600 is a Fast Ethernet module. The module's port can be segmented into different vLANs and be part of different ELANs. The connectivity to the backbone is ATM based.
Superstack II Switch 2700	TheSuperStack II Switch 2700 is an Edge device.It allows Ethernet switching and connectivity from Ethernet to ATM. It can be segmented into multiple bridges to allow virtual LANs. The virtual LAN is ATM LE based.
SuperStack II Switch 2000TR	SuperStack II Swtich 2000 is a token ring to ATM edge device and supports token ring LAN Emulation. It can be used for connecting token ring end stations to an ATM switch backbone.
SuperStack II Switch 1000	SuperStack II Switch 1000 is an edge device. It allows Ethernet switching and connectivity form Ethernet to Fast Ethernet and Ethernet to ATM. It can be segmented into multiple bridges to allow virtual LANs. The virtual LAN is both encapsulated based when connected to Fast Ethernet Backbone or LAN Emulation when connected to ATM Backbone.

Table A-0 Supported Devices

Device	Description
SuperStack II Switch 3000	SuperStack II Switch 3000 is a Fast Ethernet switch. It allows Fast Ethernet switching and connectivity form Fast Ethernet to ATM. It can be used as a Backbone switch to connect multiple LS1000 devices, thus creating a FE/Ethernet network. It can be segmented into multiple bridges to allow virtual LAN. The Virtual LAN is both encapsulated based when connected as Fast Ethernet Backbone or LAN Emulation when connected to ATM Backbone.
CoreBuilder 2500	CoreBuilder 2500 is a high end switch. It allows Ethernet, FDDI, Fast Ethernet switching and connectivity form legacy LANs to ATM. It also allows routing to fulfill the function of routing between vLAN as well as IP, IPX and other protocol routing. The FDDI connectivity allows it to be the FDDI backbone edge switch. It can be segmented into multiple bridges to allow virtual LANs. The virtual LAN is LAN Emulation based when connected to the ATM Backbone.
CoreBuilder 5000 Switch Modules	The CoreBuilder 5000 device is a Multifunction hub. It is an Ethernet, FDDI HUB and has the switching capability of ATM, and Ethernet. It also allows connectivity form legacy LAN to ATM. It can be segmented into multiple bridges to allow virtual LANs. The Virtual LAN is LAN Emulation based when connected to ATM Backbone.
CoreBuilder 4000/CoreBuilder 5000 Switch	CoreBuilder 4000 is an ATM switch, used in an ATM network and serves as an LE services entity as well.
Netbuilder II	NetBuilder II is a high perfromance multi-protocol router for LAN and WAN environments. In the ATM and VLAN environments it can be used as an inter VLAN one-armed router connected to the ATM backbone.

B

TROUBLESHOOTING

System Problems

The following system problems can arise during a session:

Icons Present at Startup

Problem:

The Enterprise VLAN icons are already present in the Root window when the application is started. The reason is that HPOV was previously terminated abnormally. Note: this problem is not applicable when using the Save Map option.

Action:

Select the Enterprise VLAN icons in the Root window and then select *Edit-> Delete-> From All Submaps* to remove the icons.

Window Not Generated

Problem:

A Configuration, or Graph window does not open after being requested. The initialization message window remains indefinitely on the screen.

Action:

Restart the Enterprise VLAN Management application.

Problem Starting the Application

Problem:

If you are having problems starting the application or discovering devices, you can enable the error log feature of the Enterprise VLAN application.

Action:

Generate an application error log. To activate the log you need to create a file in : "\TranscendNT\ATMvLAN\runtime\cnf\" directory named "atmvlan.dbg".

Enter the following two lines:

all

end;

in the file.

The log files will be created in the "\TranscendNT\ATMvLAN\runtime\log\" with the name StdError.txt and StdOut.txt .

Note:Do not leave this option o. The StdError.txt and StdOut.txt do not have a maximum size limit.

Set Operation Failed

Problem:

SNMP set operation failed.

Action:

Be certain that you are using the correct SNMP set community. Check network connectivity.

Slow System Startup

Problem:

The Enterprise VLAN icons do not appear in the Root window after starting up the application. It may take between 5 to 20 minutes for

the icons to appear and the application to startup. This situation occurs when the station has a defined DNS and cannot reach it.

Action:

Remove the DNS definition or check how the station can reach the DNS. This is a system problem due to the DNS definition.

Slow System Startup

Problem:

The Enterprise device icons are displayed at a slow rate (one by one) in the Enterprise Devices window.

Action:

Clear the HP OpenView database. This problem occurs when the HP databases are overloaded. Refer to the HPOV documentation.

System Messages

The following are the system messages that may appear on the screen together with their meaning and suggested action for you to take. The messages are displayed in a special dialog box. Three types of messages are displayed: informational, warning, and error.

The following Motif symbols are used:

```
i - info
! - warning
0 - error
```

Message Level Meaning Action

Table B-1 System Messages

Message	Type	Meaning	Action
General: Help utility is not available in this version.	info		None
General: Busy, Cannot open new window. Wait until previous operation is completed.	error	User attempted to open an application while the previous application is still opening.	Wait until previous operation is completed.
General: Cannot close window while it's initializing. Wait until window is open and then close it.	warning		Wait until window is open and then close it.

Table B-1 System Messages

Message	Type	Meaning	Action
ATMvLAN Devices Configuration: Invalid IP address	error		Change IP address.
ATMvLAN Devices Configuration: Invalid Community string	error		Change Community string.
VirtualLANs Configuration: No VLAN IDs found. Operation aborted.	error	Application needs LAN Emulation Services (LES) and they are not defined on the Network	Enable at least one LES and then try again
VirtualLANs Configuration: Cannot open file VnRgb for writing: permission denied. Operation aborted.	error		Change file writing permissions.
VirtualLANs Configuration: No blanks allowed in VLAN name. The VLAN will be [truncated name].	warning		Re-enter VLAN name.
VirtualLANs Configuration: VLAN must have its VLAN ID as one its names. Name not deleted.	warning		
VLAN Move: Trying to move LEC segment - [segment number] - to WorkGroup - [WorkGroup]. Segment skipped	warning		Select a different VLAN.
VLAN Move: Trying to move WorkGroup segment - [segment number]- to - ELAN/[VLAN]. Segment skipped.	warning		Select a different VLAN.
VLAN Move: Select segments from one device only. Operation aborted.	error		You cannot create a local VLAN on more than one device in one action. Use a separate Move command for each device.
VLAN Move: Operation completed successfully for device - [device IP address]	info		None
VLAN Move: No P2C found in device - [device IP address]. Device skipped.	error		Check the P2C card.
VLAN Move: SNMP GET error - [SNMP status]- in device -[device IP address]. Device skipped.	error		Wait for the ATMVLAN maps to refresh. Check the VLAN maps for results of the previous operation and then retry.

Table B-1 System Messages

Message	Type	Meaning	Action
VLAN Move: SNMP SET error - [SNMP status]- in device -[device IP address]. Device skipped.	error		Wait for the ATMVLAN maps to refresh. Check the VLAN maps for results of the previous operation and then retry.
VLAN Move: No available LECs left in device - [device IP address]. Device skipped.	error		Remove one or more VLANs from the device. To remove, use the VLAN Move operation and move all the device segments from the VLAN.
VLAN Move: Cannot find LEC in device [device IP address]. Device skipped.	error		Reset CoreBuilder 2500/6000 or LANplex 2016/5000 and retry the operation. If you do not succeed, you may have a problem with your device.
VLAN Move: Cannot create LEC - No ATM card in device [device IP address]. Device skipped.	error		Check the ATM card.
VLAN Move: Cannot move to VLAN - [VLANID] in device - [device IP address]. Might create two VLANs that use the same ELAN. Device skipped.	error	This move operation is intended to the create a new VLAN. Because of a mismatch between the current and config VLANs in the device, creating the desired VLAN might result in two VLANs that use the same ELAN.	You may perform one of the following actions: **1** Define the "admin" and the "default" VLANs in the VirtualLANs Configuration window. **2** Reset device to synchronize the current and config VLANs. **3** Using the LMA, remove non-existing VLANs from the device. **4** Verify that the desired VLAN is using its primary ELAN.
Polling: SNMP GET Error - [SNMP status] - in device - [device IP Address]. Polling aborted.	error		Restart polling.
Polling: SNMP GET timeout in device [device IP address]. Retrying.	info		None
VC Path Assistant: VC list is full in device - [device IP address]. Operation aborted.	error	No space to define new PVC.	Delete some VCs and try again

Table B-1 System Messages

Message	Type	Meaning	Action
VC Path Assistant: SNMP SET error - [SNMP status] - in device -[device IP address]. Operation aborted.	error		Retry operation
VC Path Assistant: SNMP GET error - [SNMP status] - in device -[device IP address]. Operation aborted.	error		Retry operation
VC Path Assistant: Invalid VPI/VCI pair - [vpi-vci]. Operation aborted.	error		Re-enter vpi vci
VC Path Assistant: Invalid VPI - [vpi]. Operation aborted.	error		Re-enter vpi
VC Path Assistant: Invalid VCI - [vci]. Operation aborted.	error		Re-enter vci
VC Path Assistant: Invalid entry - [entry value]. Operation aborted.	error		Re-enter entry
VC Path Assistant: AAL5 parameters setting window is not available in this version.	info		None
VC Path Assistant: Traffic parameters setting window is not available in this version.	info		None
LECS Configuration: SNMP SET error - [SNMP status] - for LECS - [lecs]. Operation aborted.	error		None
Backbone Services Configuration: ELAN ID changed for LES [LES ATM address]. Remove this address from LECS before you can use the new ID.	warning		Remove the address and re-open the window.
Backbone Services Configuration: Cannot find ELAN ID for backup address of ELAN ID - [ELAN ID]. Changing backup to default.	warning		None
Backbone Services Configuration: Cannot delete (ELAN) because admin uses it. No ELANs deleted.	warning		None
Backbone Services Configuration: Cannot delete (ELAN) because default uses it. No ELANs deleted.	warning		None
Backbone Services Configuration: Cannot delete (ELAN) because it's the backup of admin/backup [VLAN]. No ELANs deleted.	warning		None

Table B-1 System Messages

Message	Type	Meaning	Action
Backbone Services Configuration: SNMP SET error - [SNMP status] - for CoreBuilder - [device IP address]. CoreBuilder skipped.	error		None
Backbone Services Configuration: LECS DB is not synchronized. Make sure to synchronize it using this window.	warning		Synchronize the DB.
Backbone Services Configuration: SNMP GET error - [SNMP status] - for LECS - [device IP address]. Operation aborted.	error		None
VLAN Creation: Must enter VLAN ID. Operation stopped.	warning		Re-enter VLAN ID.
VLAN Creation: No blanks allowed in VLAN ID. Operation stopped.	warning		Re-enter VLAN ID.
VLAN Creation: [network number] must be a valid IP Address. Operation aborted.	error		Re-enter network number.
VLAN Creation: [network mask] must be a valid IP Address. Operation aborted.	error		Re-enter network mask.
VLAN Server: VLAN Server is not defined. Use "VLAN Server Setup" to define it.	warning		Define the VLAN Server IP address and try again.
VLAN Server: SNMP GET error - [SNMP status] - in Server - [device IP address]. Operation aborted.	error		None
LECS Configuration: LECS is not enabled. Operation aborted.	error		None
LECS Operation: SNMP GET error - [SNMP status] - for LECS - [device IP address] Operation aborted.	error		None
LECS Operation: Cannot find LES ATM address for alias - [alias]. Operation aborted.	error		Reset the LECS CoreBuilder to the factory default and restart the operation.
LECS Operation: Cannot find ELAN ID for alias - [alias]. Changing [alias] to [first ELAN in the list].	warning		None
MEDP is not running	error		Start the MEDP Poller. Select Start-> Programs-> Transcend ATMvLAN -> ATMVLAN Poller.

Table B-1 System Messages

Message	Type	Meaning	Action
PDP is not running	error		Start the PDP Poller. Start-> Programs-> Transcend ATMvLAN -> ATMvLAN PDP
Locator - All fields are empty	error	Locator cannot process request since all fields were empty.	Fill in at least one field of data.
Locator - Field <Field Name> is incorrect	error	Incorrect entry in Field Name	Correct the entry.
Locator -Error during writing to file "<File Name>"	error		
Locator - Values are incorrect	error	From VLAN Server setup,	Check the VLAN Server entries in the VLAN Server tab
Locator - New row will be added to Database .Are you sure? Yes,Cancel	warning		
Locator - Row will be deleted from Database. Are you sure?,Yes,Cancel	warning		
Locator - Row will be replaced in Database. Are you sure? Yes,Cancel	warning		
Locator - Database will be saved. Are you sure? Yes,Cancel	warning		
Locator - Changes in Database were not saved. Save and Exit, Exit without Saving,Cancel	warning		
Locator - Changes in Database were not saved. Save,Don't Save,Cancel	warning		

C

ATM AND VLAN MANAGEMENT BASICS

An Introduction to ATM and VLAN Management Basics

In 1986, the International Telecommunications Union (ITU) formed a study group to explore the concept of a high-speed, integrated network that could uniformly handle voice, data, and a variety of other services. This resulted in BISDN, or the Broadband Integrated Services Digital Network. BISDN services require high-speed channels for transmitting digitized voice, data, video, and multimedia traffic. Asynchronous Transfer Mode (ATM) is the switching and multiplexing technology for supporting BISDN services.

One of the greatest challenges in defining ATM was to determine a structure that could efficiently handle any type of traffic. Such a structure must accommodate a variety of bit rates and support bursty communications, since voice, data, and video traffic all exhibit bursty behavior.

Packet-switching has been the technology of choice for bursty data traffic because it consumes bandwidth only when traffic is present. Traditional packet-switching mechanisms cannot achieve the performance and speed required for real-time, two-way traffic. ATM overcomes this limitation by offering fixed-length packets. Each ATM packet, called a cell, consists of a 48-byte payload and a 5-byte header. Fixed-length ATM cells offer several advantages:

- Networking and switching queuing delays are more predictable with fixed-length data cells.
- It is less complex and more reliable to process ATM cells than variable-length packets.
- Fixed-length cells allow cell-relay switches to process cells in parallel, for speeds that far exceed the limitations of bus-based switched architectures

ATM Basics

ATM uses short, fixed-length packets called cells. The first five bytes of each cell, the header, contain the information necessary to deliver the cell to its destination.

The fixed-length cells offer smaller and more predictable switching delays as cell switching is less complex than variable-length packets and can be accomplished in hardware for many cells in parallel. Having all data in the same cell format speeds transmission dramatically by obviating the need for protocol recognition and decoding. A good analogy is containerized shipping, where uniform shape and weight of containers and standardized labeling considerably ease and quicken processing.

The cell format also allows for multiprotocol transmissions. Since ATM is protocol-transparent, the various protocols can be transferred at the same time. With ATM, one line can carry phone, fax, video, data and other information simultaneously. This multiprotocol advantage also offers scalability, greatly reducing the configuration changes necessary for adding a new traffic type to your network.

The Role of Edge Devices

All ATM traffic-handling decisions are based on the information in the destination header, not on the content of the cell payloads. To move traffic through the ATM network, devices at the boundary or edge of the network convert non-ATM traffic streams into cells. The addition of new traffic types requires only a new edge device, deployed where the demand for such traffic exists.

ATM is a connection-oriented transport service. With only five bytes of header, an ATM cell cannot carry the full destination address for each cell. Instead it uses an abbreviated address, called a virtual channel identifier, that provides enough information to establish a connection between two ATM stations. Once a connection exists through the ATM network, communications can ensue.

Legacy LANs employ connectionless transmission technology based on 48-bit addressing. This edge devices must have some way of adapting existing network protocols, such as IP and IPX, to the connection-oriented cell-switching paradigm.

ATM provides the User Network Interface (UNI) which is typically used to interconnect an ATM user with an ATM switch that is managed as part of the same network, as well as the Network-to-Network Interface (NNI)

which is typically used to interconnect two ATM switches managed as part of the same network.

- The UNI is the physical interface between the user and the network. A private UNI consists of a private end-point to private switch interface, whereas a public UNI is typically used to interconnect an ATM user with an ATM switch deployed in a public service provider's network.
- The Network-to-Network Interface (NNI) defines the ATM switch (network) to ATM switch (network) interface. It is also known as a private NNI (P-NNI) when the switches are not part of a WAN. NNI allows multiple switches to be interconnected in arbitrary topology and still work as one network.

ATM is based on a layered architecture. In the protocol stack, the ATM layer sits directly above the physical layer. Many physical layers can be specified, including several for 100 to 155 Mbps. The ATM adaptation layer (AAL) sits above the ATM layer. LAN Emulation (LE) sits above the AAL5 in the protocol hierarchy.

ATM Switching

ATM switching is performed at the ATM layer by defining virtual channels. Cells are switched through the network based on the cell header, therefore the routing is done for every cell and hence the virtual channel.

Virtual Channels

Virtual channels are communications channels that provide for the sequential, unidirectional transport of ATM cells. Multiple virtual channels can exist on a physical link. There are two types of virtual channels: Virtual Path Connection (VPC) and Virtual Channel Connection (VCC). A VPC is a collection of VCCs (see Figure C-1).

A VCC extends between two end-points in the network and is uniquely identified by the Virtual Path Identifier (VPI) and Virtual Channel Identifier (VCI) values. It is also called a point-to-point VCC. A VPC extends between two end-points in the network and may contain multiple VCCs. VPCs are uniquely identified by the VPI value. VPCs and VCCs can be set up either dynamically via signalling or permanently via management.

The VPI/VCI is only meaningful in the context of the given interface. The combination of the VPI/VCI values allows the network to associate a given

cell with a given connection, and therefore it can be routed to the right destination. Identical VPI/VCI combinations may exist on different interfaces.

The VPI is a bundle of VCs. Individual VCs have unique VCI values, but the VCI values may be reused in each VP.

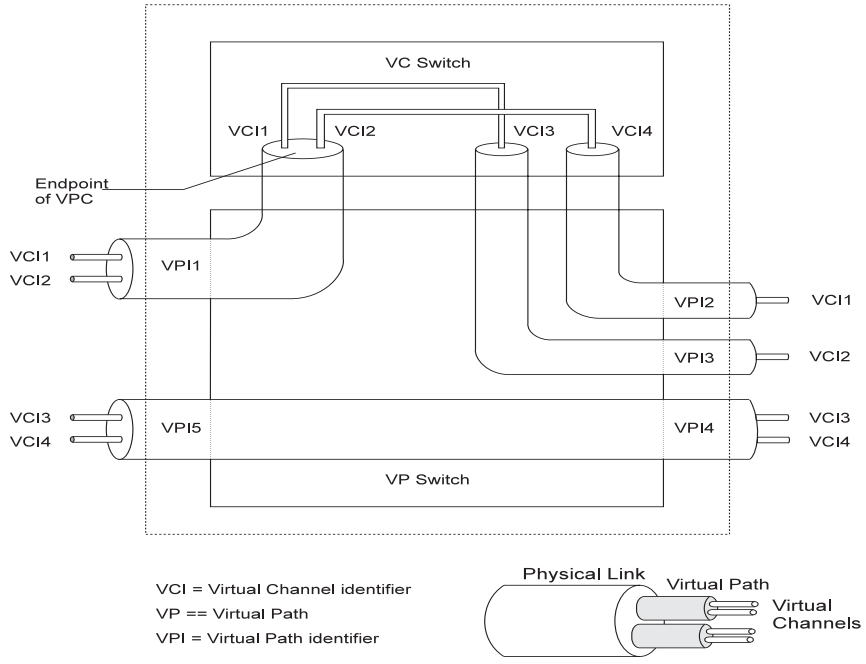

Figure C-1 Virtual Path/Channels Connections

Two levels of virtual channels are supported at the UNI:

- A Virtual Channel Connection (VCC) that consists of a single connection established between two ATM end-points.
- A Virtual Path Connection (VPC) that consists of a bundle of VCCs carried transparently between two ATM end-points.

Connections can be established via management (Permanent Virtual Channels) or dynamically (Switched Virtual Channels).

Permanent Virtual Channels (PVCs) This most basic connection setup requires the definition of each connection by management (for

example, SNMP). Permanent connections generally remain established for long periods of time. These connections are not dynamically checked and reinitiated.

The major features of a PVC include:

- Connections initiated by network administrator.
- Connections established and released manually.
- Long-term duration connections.
- Both point-to-point and point-to-multipoint connections can be established.

Switched Virtual Channels (SVC) An SVC dynamically defines connections as they are needed and releases them when complete, using signaling complying with ATM Forum UNI standards. By using an SVC, ATM devices (for example, a LAN Emulation UNI and an ATM switch) can exchange connection characteristics (for example, QOS, VPI/VCI) when establishing connections. These connections remain active for an arbitrary amount of time and depend upon application demand. Both point-to-point and point-to-multipoint connections can be established. An SVC eliminates the need for an external management station for setting up virtual channels.

The major features of an SVC include:

- Connections initiated by the user/application.
- Connections established and released dynamically.
- Connections established via the signalling protocol.
- Varied connection duration.

Table C-2 compares SVC and PVC connections.

Table C-2 Comparison of SVC and PVC

SVC	PVC
Demand connections	Permanent connections
Not automatically re-established after network failure	Automatically re-established after network failure
Remain active for arbitrary amount of time	Remain active for long periods of time

Table C-2 Comparison of SVC and PVC

SVC	PVC
Supported by signaling standard	Supported by MIB or other management entity

Integrated ATM/Ethernet Switching

ATM Backbone Network When Ethernet LANs are connected through a conventional switching hub or backbone, the bandwidth provided is restricted to the data rate of the Ethernet or FDDI technology running on it. If, instead, the Ethernet LANs are connected through an ATM backbone switch - creating an integrated ATM/Ethernet network - the bandwidth bottleneck is opened up and performance is increased across the combined network. The Ethernet switches pass only those messages whose sender and receiver are in separate Ethernet LANs to the ATM Switch, thereby reducing the message traffic on the combined system. Furthermore, the high-speed switching rate and efficient time-utilization of ATM are responsible for the high throughput of the ATM/Ethernet network system.

The ATM/Ethernet network system also opens new possibilities in network design. Instead of being restricted to LANs, whose users are connected by a physical cable, new efficient LANs can be created which cross physical LAN boundaries. The sophisticated address handling of ATM allows related users in separate physical LANs to be effectively grouped into a common broadcast domain called a Virtual LAN. Virtual LANs are described in the next section.

Virtual LAN Basics

Just as an Ethernet LAN enables a group of stations to communicate efficiently on a common physical bus, so new networking technology such as ATM makes it possible for stations on different LANs to communicate with almost the same efficiency, even when separated by great distances. This allows network managers to group remote stations that need to communicate frequently into a common high-bandwidth broadcast domain called a *Virtual LAN*. For example, marketing department personnel who happen to work in different physical locations could be formed into one Virtual LAN and engineering department personnel into another. The term “Virtual LAN” is used because communicating stations continue to transmit and receive as though they were on the same physical Ethernet LAN. In this manual, the abbreviated expression “VLAN” is used for a Virtual LAN.

In practice, it is not the individual LAN stations that are formed into VLANs but rather the physical Ethernet LANs, called Ethernet segments, that are grouped into VLANs. Thus, all stations on an Ethernet segment will be on the same VLAN. Also, since an Ethernet segment is connected to the network through an Ethernet port in an edge device, the Ethernet port itself is sometimes referred to as a member of the VLAN.

Advantages

A Virtual LAN, as opposed to an Ethernet LAN, has the great advantage of being very easy to manage from a central location. Stations are added or removed from Virtual LANs by software without regard to their location, there is no need to change physical connections.

The organization of the network into VLANs also reduces congestion from broadcast frame transmissions. Broadcast frames are now sent only to members of the same VLAN instead of to all stations on the network.

Virtual LANs also offer network security for their members. Because transmissions do not normally cross from one VLAN to another, a VLAN will remain immune to transmission problems or congestion that may occur in another VLAN in the network.

VLAN Types

According to the enabling technology, VLANs are divided into three types: *ATM-based* VLANs, *tag-based* VLANs and *protocol-based* VLANs. In the following sections each of these VLAN types is discussed. These Virtual LAN types are implemented in 3Com products as follows:

Table B-1 VLAN Types in 3Com products

VLAN Type	3Com Product
ATM-based	CoreBuilder 7000 CoreBuilder 7X00 SuperStack II Switch 2700 CoreBuilder 5000 SwitchModule
Tag-based	SuperStack II Switch 1000/3000
Protocol-based	CoreBuilder 2500/6000

These three VLAN types are discussed in the following sections.

ATM-based VLANs

When the enabling technology is ATM, the VLAN is referred to as an ATM-based VLAN. An ATM-based VLAN is built around an ATM network structure called an Emulated LAN.

LAN Emulation The main objective of the LAN Emulation (LE) is to enable existing applications to access an ATM network via protocol stacks as if they were operating over traditional LANs. LE enables data networking protocol software to benefit from high-speed ATM networking without modification. Legacy end stations can use LE to connect to other legacy systems, as well as to ATM-attached servers, routers, switches and other networking devices. LE is completely independent of upper-layer protocols, services, and applications.

Because LE is implemented in edge devices and end systems, it is completely transparent to the ATM network and to legacy LAN devices. LE masks the connection setup and handshaking functions required by the ATM switch. In addition, it maps the MAC address-based networking protocols into ATM virtual channels. The ATM network appears to function like a connectionless LAN.

LAN Emulation Components An Emulated LAN (ELAN) is composed of a set of LAN Emulation Clients (LECs) and a single LAN Emulation Service, consisting of LAN Emulation Server (LES), and Broadcast and Unknown Server (BUS). In addition there is also a LAN Emulation Configuration Server (LECS) that services all the Emulated LANs that exist in the ATM network. Refer to Figure C-3.

One or more Emulated LANs can run on the same ATM network. Each Emulated LAN is independent of the others and there is no direct communication across Emulated LAN boundaries.

An ATM-based VLAN is simply an ELAN together with all Ethernet LANs attached to the LECs of the ELAN.

LAN Emulation Client (LEC)

The LAN Emulation Client is the entity in end systems (e.g., a Super Stack II Switch 2700 module) which represents the member Ethernet LANs and performs data forwarding, address resolution, and other control functions. If the LEC is attached to an Ethernet bridge, rather than directly to a Ethernet LAN, the LEC acts as a proxy to MAC addresses of Ethernet LANs attached to the bridge. Also provided is a MAC-level

emulated Ethernet service interface to higher level software which implements the LAN Emulation User-to-Network Interface (LUNI).

LAN Emulation Configuration Server (LECS)

The LAN Emulation Configuration Server implements the assignment of individual LAN Emulation Clients to different emulated LANs. When a LEC initializes, it establishes connection to the LECS. Based on its own policies, configuration database and information provided by clients, the LECS assigns any client which requests configuration information to a particular emulated LAN service by giving the client the LES's ATM address. This method supports the ability to assign a client to an emulated LAN based on either the physical location (ATM address) or the identity of a LAN destination which it is representing (ELAN name).

LAN Emulation Server (LES)

The LAN Emulation Server implements the control coordination function for the emulated LAN. The LAN Emulation Server provides a facility for registering and resolving MAC addresses to ATM addresses. Clients may register the LAN destinations they represent with the LAN Emulation Server. A client will also query the LAN Emulation Server when the client wishes to resolve a MAC address and/or route descriptors to an ATM address in a process called LE Address Resolution Protocol (LE_ARP). The LAN Emulation Server will either respond directly to the client or forward the query to other clients and then forward the client response. In an SVC environment, the LES responds directly to the LE_ARP to enable an LEC to locate the BUS.

Broadcast and Unknown Server (BUS)

The Broadcast and Unknown Server handles the following:

- Data sent by a LAN Emulation Client to the broadcast MAC address.
- All multicast traffic.
- Initial frames which are sent by a LAN Emulation Client before the data direct virtual channel to the ATM address has been resolved.

All broadcast, multicast and unknown traffic to and from a LAN Emulation Client passes through a single BUS.

The BUS also handles ATM connections and manages its distribution group.

Virtual Channel Connections (VCC)

Figure B-1 Communication among LAN Emulation Clients and between LAN Emulation Clients and the LAN Emulation Service is performed over ATM Virtual Channel Connections (VCCs). Each LAN Emulation Client must communicate with the LAN Emulation Service over control and data VCCs. Emulated LANs

operate in a Switched Virtual Channel (SVC),Permanent Virtual Channel (PVC), or mixed SVC/PVC environment.

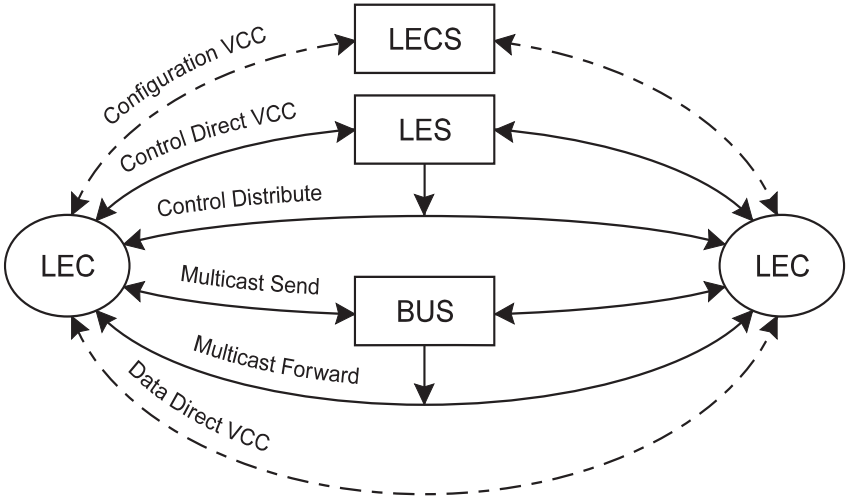

Figure C-3 LAN Emulation Components

Admin and Default VLANs

Two special purpose ATM-based VLANs are established automatically by the system, the Network Administration VLAN and the Default VLAN.

The Network Administration VLAN To control the ATM Network and receive status information from it, the Transcend ATM and VLAN Manager requires SNMP connectivity to each device in the network at all times. In the SuperStack II Switch 2700 module, a special VLAN ("admin" VLAN) is dedicated to efficiently implement this connectivity in a way that is not affected by changes in the network. The initialization procedure described in this chapter establishes such an Admin VLAN.

It is possible for the Transcend ATM and VLAN Manager to operate without a dedicated Network Administration VLAN. To manage the devices, the device must have an IP address configured to one of the bridge groups and the device must be reachable directly via a router. If

the configuration is such, the network manager should ensure that IP connectivity to the device is not affected by VLAN moves.

The Default VLAN When an ATM edge device is initialized, a single VLAN called the ***default VLAN*** is created automatically and all ports of the device are assigned to it.

In the SuperStack II Switch 2700 module, the Admin VLAN is also used as the Default VLAN when the SuperStack II Switch 2700 is first initialized. All ports are initially assigned to the Admin VLAN to ensure that they have connectivity to the network. The Network Administrator can then move the ports to another VLAN. At least one port must remain in the Admin VLAN if the device is to be reached for management purposes.

Non-ATM VLANs

VLANs can be created on non-ATM based switches by using either *packet-tagging* or *packet-filtering* (policy-based) techniques. The Superstack II Switch 1000/3000 uses the packet-tagging mechanism. VLAN management in the Superstack II Switch 1000/3000 system is supported by a "VLAN Server" - a database which stores and retrieves information about station VLAN membership.

The CoreBuilder 2500/6000 uses packet-filtering. The CoreBuilder 2500/6000 can link up with Emulated LANs to create policy-based Virtual LANs "over ATM." The following sections describe both these VLAN mechanisms.

Tag-based VLANs

In *tag-based* VLANS, as employed by the Superstack II Switch 1000/3000, ports can be grouped across multiple switches to form a single broadcast domain. Packets within each VLAN group are tagged with a unique identifier. The switches segment the traffic using these identifiers. Each Superstack II Switch 1000 can support up to 16 VLANs and you can have more than 16 VLANs in your entire network by connecting the 16 Switch VLANs to other VLANS using a router.

Virtual LAN Trunk

VLANs can be defined in a single switch unit or can span several Switch units. When a VLAN spans two switch units, they are connected using *backbone* ports. The tagging method, described below, makes it possible for a single backbone port to carry the traffic for all VLANs defined in a switch. In that case, the backbone port is referred to as a *Virtual LAN*

Trunk (VLT). A VLT port in one switch unit must be connected only to a VLT port in the second switch unit so that the traffic can be switched to the correct VLAN.

Tagging To distinguish between data frames belonging to different VLANS which are sent over a common VLT between two switch units, frame *tagging* is employed. Each frame which is sent along the VLT is tagged with a VLAN identifier.

The tag is added to the frame (*encapsulated*) by the transmitting switch port and is removed by the receiving switch port, restoring the original frame. Alteration of the original frame only occurs in transmissions between switch devices and is not propagated to the rest of the network.

Protocol-based VLANs

Protocol-based vLANS

In the LANplex 2500/6000, VLAN membership is based on a set of policies, or criteria, for grouping users.

Protocol-based VLANs group one or more switch ports together for a specified network layer 3 protocol, such as IP or AppleTalk. These VLANs make flooding decisions based on the network layer protocol of the frame. In addition, for IP VLANs, you can also make flooding decisions based on layer 3 subnet address information.

Protocol-sensitive VLANs allow the restriction of flood traffic for both routable and non-routable protocols. They have a relatively simple configuration comprising one or more protocols and groups of switch ports. These protocol-sensitive VLANs operate independently of each other and are simple to configure.

One port in multiple VLANs

Additionally, the same switch port can belong to multiple VLANs. For example, you could have port 1 on a LANplex assigned to several IP subnet VLANs, plus one IPX VLAN, one AppleTalk VLAN, and one NetBIOS VLAN. In a multiprotocol environment, protocol-sensitive VLANs can be very effective for controlling broadcast and multicast flooding.

Protocol Suite

The protocol suite describes which protocol entities can comprise a protocol-based VLAN. For example, LANplex VLANs support the IP protocol suite, which is made up of the IP, ARP, and RARP protocols.

Table C-1 on Table C-1 lists the protocol suites that the LANplex supports, as well as the protocol types included in each protocol suite.

Table C-1 Protocol Suite Protocol Types

Protocol Suite	Protocol Types
IP	IP, ARP, RARP
Novell	IPX IPX
AppleTalk	DDP, AARP
Xerox	XNS XNS IDP, XNS Address Translation, XNS Compatibility
DECnet	DEC MOP, DEC Phase IV, DEC LAT, DEC LAVC
SNA	SNA Services over Ethernet
Banyan	VINES Banyan
X25	X.25 Layer 3
NetBIOS	NetBIOS
NetBEUI I	NetBEU I
Default	Default (all protocol types)

GLOSSARY

ATM Asynchronous Transfer Mode. A transmission protocol that segments user traffic into small, fixed size cells. Cells are transmitted to their destination, where the original traffic is re-assembled.

AAL ATM Adaptation Layer. A set of protocols that translate user traffic from higher-layer protocols into ATM format.

Backbone The main segment of a campus network, to which are attached department networks, or ribs.

Broadcast A common method of information transmission in which every port on the network receives the packet being sent, though only the port with the proper address passes it on to the user.

Bridge Device connecting between two networks which filters and forwards data between the networks according to their destination address.

BUS Broadcast and Unknown Server. ATM Forum defined specifications in support of LAN-to-LAN connectivity, called LAN Emulation. BUS defines that set of functions implemented in an ATM Network that provides LAN-to-LAN transmission support while a LAN connection is being established. It also supports LAN broadcast service.

Cell An ATM Layer protocol data unit (PDU) characterized by fixed, rather than variable, length payloads.

Connection-oriented Communications A form of packet-switching that requires a predefined circuit from source to destination to be established before data can be transferred.

ELAN Emulated LAN - Set of ATM Forum-developed specifications in support of LAN-to-LAN bridged connectivity over an ATM Network.

Ethernet A CSMA/CD, 10 Mbps, local area data network, developed by Xerox Corporation. It is one of the most popular baseband LANs in use.

Ethernet Port A port of a LinkSwitch to which an Ethernet Segment is connected.

Ethernet Segment A group of end-users connected by Ethernet that is connected to a port of a LinkSwitch.

IP Internet Protocol. The protocol governing packet forwarding within the Transmission Control Protocol/Internet Protocol (TCP/IP) suite of standards developed and used on the Internet.

IP Address Internet Protocol address. A unique identifier for a machine attached to a network made up of two or more interconnected local area or wide area networks.

LAN Local Area Network. A data communications network spanning a limited geographical area, such as a single building or campus. It provides communication between computers and peripherals. LANs are distinguished by their small geographical size, high data rate, and low error rate.

LEC LAN Emulation Client. ATM Forum defined specifications in support of LAN-to-LAN connectivity. called LAN Emulation. LEC defines that set of functions implemented in a LAN edge device (DTE) to interface with an ATM Network in support of LAN Emulation.

LES LAN Emulation Server. ATM Forum defined specifications in support of LAN-to-LAN connectivity, called LAN Emulation. LES defines that set of functions implemented in an ATM Network in support of LAN Emulation.

LECS LAN Emulation Configuration Server. ATM Forum defined specifications in support of LAN-to-LAN connectivity, called LAN Emulation. LECS defines that set of functions implemented in an ATM Network that provides edge device with information regarding the location of the other LAN Emulation Services.

LE ARP LAN Emulation Address Resolution Protocol. The LE ARP is a request for address resolution from a LE Client to the network in order to get an ATM address of another client for connection establishment.

MIB Management Information Base. A database of network management information that describes the specifics of individual network components.

NNI Network-to-Network Interface. The interface between two network nodes. The NNI is a protocol that allows connection between ATM switches to form a multiple switch network.

Network Management Platform (NMP) Window-based data-base tool for Network Management, e.g., SunNet Manager, HP OpenView, NetView/6000

Network Management Station Workstation from which the Network is managed using the Network Management System

Network Management System (NMS) Application of Network Management Platform for a specific Network. Runs on the Network Management Station.

P-NNI Private Network-Node Interface. Set of ATM Forum developed specifications for the interface between two ATM nodes in the same network.

PVC Permanent Virtual Channel. A virtual channel connection that has been established manually, in advance of its need.

SmartAgent Software embedded in LinkSwitch or CELLplex units which communicates with and passes device information to the Network Management System.

SNMP Simple Network Management Protocol. A protocol originally designed to be used in managing TCP/IP internets. SNMP is presently implemented on a wide variety of computers and networking equipment and may be used to manage many aspects of network and end-station operation. The standard protocol used by the ATM Manager to request management data from a managed device.

SVC Switched Virtual Channel. A virtual channel connection that has been established.

UNI User-Network Interface. ATM Forum developed specification for the procedures and protocol between a user equipment and the ATM Network to effectively utilize ATM services and capabilities.

VCI Virtual Channel Identifier. Part of the identifier of a particular virtual circuit in the ATM fabric.

VPI Virtual Path Identifier. Part of the identifier of a particular virtual circuit in the ATM fabric.

VLAN Virtual LAN. A network configuration in which users communicate using LAN protocols as if they were on the same physical LAN, but in

fact they are on physically separate segments. A virtual LAN acts as a broadcast domain.

VPI Virtual Path Identifier. A field in a cell header which identifies the specific virtual path on which the cell is traversing on the current physical circuit.

VCI Virtual Channel Identifier. A field in a cell header which identifies the specific virtual channel on which the cell is traversing on the current physical circuit.

VC Virtual Channel. Each physical circuit in an ATM Network is pre-configured with some number of virtual paths. Each virtual path may support many virtual channels. Neither VPs or VCs are assigned any dedicated bandwidth.

TEM UNIX Transcend Enterprise Manager for UNIX.

TEM Windows Transcend Enterprise Manager for Windows

UI User Interface

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