CHAPTER 1

Introduction

AtmDirector provides the tools you need to perform the following tasks:

- Discover and view your Asynchronous Transfer Mode (ATM) network
- Configure soft permanent virtual channel (SPVC) and soft permanent virtual path (SPVP) connections
- Monitor devices and manage virtual circuits
- Manage faults and performance
- Interact with and configure the devices on your network using CiscoView. (CiscoView is installed separately from AtmDirector.)

This chapter explains the AtmDirector features. For help in completing individual tasks or for information about specific windows, click **Help** in the corresponding window.

For a quick-start tutorial on AtmDirector, see the "Quick-Start Tutorial."

Cisco documentation and additional literature are available on a CD-ROM called Cisco Connection Documentation, Enterprise Series, which ships with your chassis. The CD is updated and shipped monthly, so it might be more up to date than printed documentation. To order additional copies of the Cisco Connection Documentation, Enterprrise Series CD, as a single CD and as an annual subscription. You can also access Cisco technical documentation on the World Wide Web URL http://www.cisco.com.

Note The Cisco Connection Documentation, Enterprise Series CD was previously called UniverCD.

ATM Fabrics

An ATM fabric comprises a group of interconnected ATM switches and end hosts that have been discovered using the Interim Local Management Interface (ILMI) neighbor discovery mechanism. Switches within the ATM network must support RFC 1695, “ATM Interface Configuration Entry,” in order for the discovery process to function.

If the discovery process encounters a switch that does not support ILMI, AtmDirector will not include that switch or any devices connected to it in the fabric. You can seed the discovery process with switches that do not support ILMI to discover these switches individually.

ATM Network Discovery

You provide the discovery process with the Internet Protocol (IP) address and the community string (if it is not set to public or private) of an ATM switch in each ATM fabric you want to discover. These IP addresses are called “seeds,” and the process is called “seeding.” The discovery process uses the seeds provided as starting points to find other ATM devices and their connections. The discovery process adds the device and connection information about the discovered ATM devices to a database. AtmDirector graphically displays the ATM network in a topology map, as shown in Figure 1-1 Refer to “Discover the ATM Network” for steps on seeding the discovery process.

Sometimes you will need to supply AtmDirector with multiple seeds so that discovery can find all of the ATM devices in the network. AtmDirector provides a topology map in a separate window for each discovered ATM network fabric. An ATM network fabric is the group of interconnected ATM switches and the ATM end hosts reachable from the seed ATM device.

The connections between devices are represented as follows:

- Single solid line = single link
- Multiple solid lines = multiple links
- Single dashed line = single VP tunnel
- Multiple dashed lines = multiple VP tunnels

You can obtain detailed information about links. Select a link and press the right mouse button. Then choose the **Describe** option from the popup menu. Figure 1-2 shows an example of this window.

You can also obtain detailed information about devices in the same manner. Select a device and select **Map>Object>Describe** or select a device, press the right mouse button, and choose the Describe option from the popup menu. Figure 1-3 shows an example of this window.

Figure 1-1 AtmDirector Topology Map

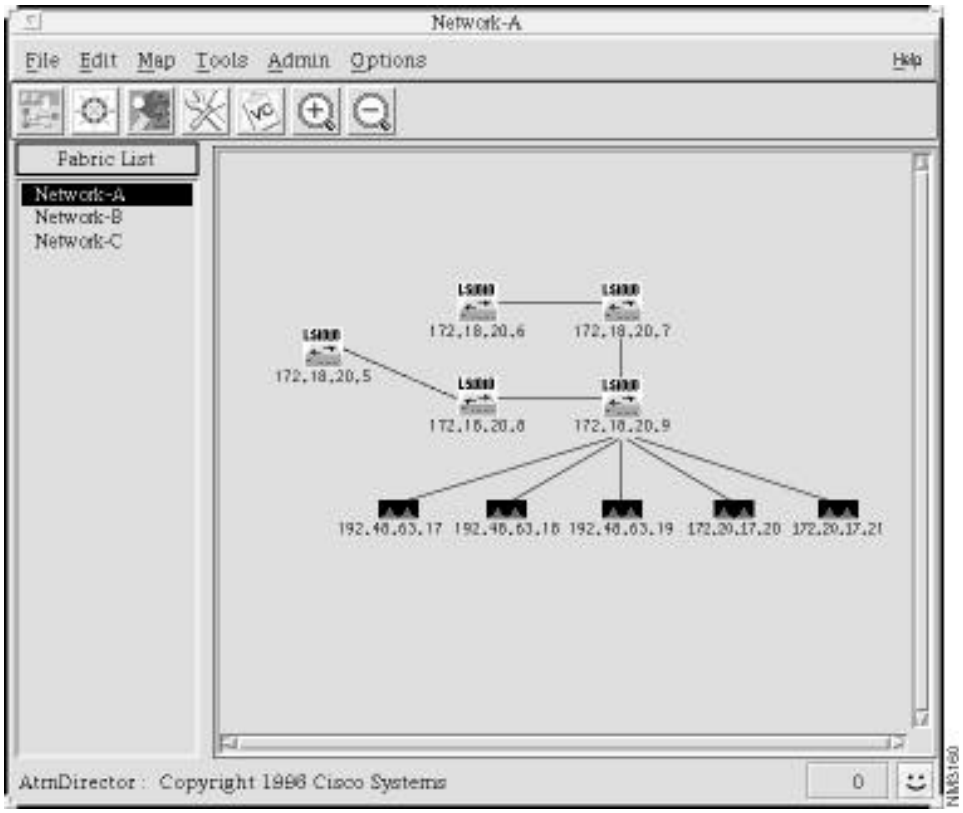


Figure 1-2 Describe Window for Links

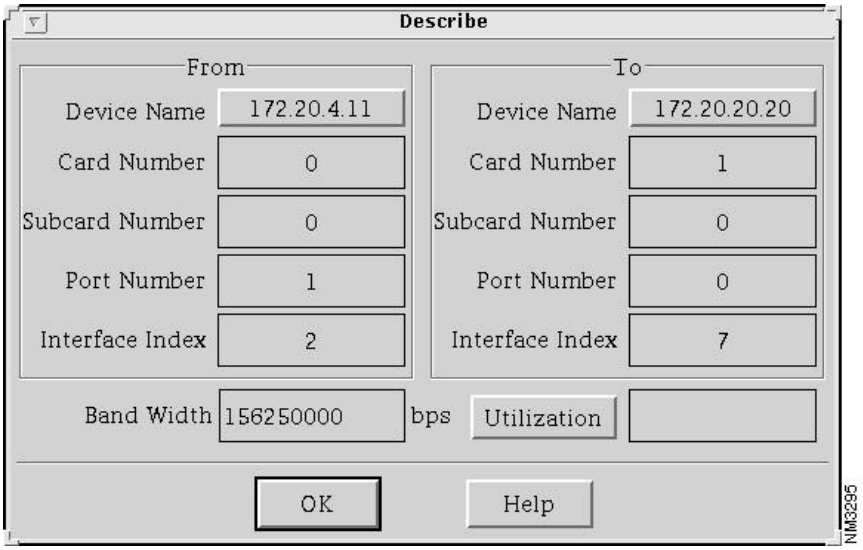


Figure 1-3 Describe Window for Devices

The discovery process can find all ATM devices that support the AtoM MIB (RFC 1695) and all ATM hosts that support Interim Local Management Interface (ILMI) protocol. The following Cisco devices support the AtoM MIB and/or ILMI:

- LightStream 1010 ATM switch
- Catalyst 5000 series switch equipped with an ATM Local Area Network Emulation (LANE) module
- Catalyst 4500 series switch equipped with an ATM LANE module
- Cisco 7000 router equipped with ATM Interface Processor (AIP)
- Cisco 4000 router equipped with Network Management Processor (NMP)

Note Throughout this manual, the Cisco LightStream 1010 ATM switch is referred to as the LS1010 switch.

Discovery Device Requirements

The discovery process requires the supported devices to be preconfigured as follows:

- Turn on ILMI for all links connecting LS1010 switches. If the LS1010 switch has Release 11.1(410), ILMI is on by default.
- Make sure that each end host has an ATM-IP address that is reachable through AtmDirector. If AtmDirector cannot reach the ATM-IP address of the end host, you must provide its ATM-IP address as a seed for the discovery process. Choose **Options>Global Options>Discovery**.

  AtmDirector polls the devices that are reachable from the end host and obtains their ATM-IP addresses. ATMDirector compares the ATM-IP addresses previously discovered through ILMI with those reachable from the end host. If AtmDirector finds that the the ATM-IP address of the previously discovered device matches the ATM-IP address of the device that is reachable from the end host, it places the end host on the map.

- Make sure that each LS1010 switch has connectivity to AtmDirector, either through Ethernet or through LANE. To check connectivity, perform an OAM ping to each LS1010 switch. Refer to “Send OAM Pings to Check the Connectivity of a VC.”
- Configure each device with the correct IP address and netmask assignment
- Configure each device with a valid SNMP community string
- Set up PVCs between routers and ATM switches configured for ILMI and qsaal.
- Enable the SNMP server on all devices.

For specific information about setting up any of these features, refer to the manual for the specific router or switch.

SPVC/SPVP Connection Configuration

To use AtmDirector for configuring SPVCs or SPVPs, you should have a basic understanding of the following terms:

- Virtual channel (VC)—A generic term used to describe bidirectional transport of ATM cells associated with a common unique identifier value.
- Virtual path (VP)—A generic term for a bundle of VC links; all the VC links in a bundle have the same endpoints.
- Virtual channel identifier (VCI)—A number identifying a particular VC link for a given VP.
- Virtual path identifier (VPI)—A number identifying a particular VP.
- Virtual path link (VPL)—A group of VP links, identified by a common value VPI, between a point where the VPI value is assigned and the point where that value is translated or terminated.
- Permanent virtual channel (PVC)—A virtual channel that remains allocated for communication between two points.
- Permanent virtual path (PVP)—A virtual path that remains allocated for communication between two points.
- Switched virtual channel (SVC)—A virtual channel that is set up on demand for communication between two points.

- Switched virtual path (SVP)—A virtual path that is set up on demand for communication between two points.
- Soft permanent virtual channel (SPVC)—A connection between two ATM end hosts. The connection consists of PVCs between the ATM end hosts and their respective switches and SVCs between the switches. Figure 1-4 is an illustration of a SPVC connection.
- Soft permanent virtual path (SPVP)—A connection between two ATM end hosts. The connection consists of PVPs between the ATM end hosts and their respective switches, and SVPs between the switches. Figure 1-5 is an illustration of a SPVP connection.

SPVC and SPVP connections provide the following features:

- Connection to another host or switch that does not support signaling
- Reroute or retry capabilities when a link fails

Using AtmDirector, you can set up a SPVC or a SPVP connection between end hosts. To display the Soft PVC/PVP Set Up window, click the link connected to the source ATM end host, hold down the shift key, and click the link connected to the destination ATM end host.

Note When you set up a SPVC, select the link connected to the source ATM end host first. The source ATM switch receives the configuration setup information.

Figure 1-4 SPVC Connection

Figure 1-5 SPVP Connection

Device Status Monitoring

AtmDirector monitors devices at defined intervals and shows their status on the topology map by changing the color of the affected icon. Refer to Table 1-1 for a list of colors and descriptions. Refer to Table 1-2 for a list of initial and resulting device colors and states.

Table 1-1 Device Status Conditions

Color	Description
Red	Device is down or unreachable.
Green	Device is up.
Orange	Device is up, but was previously down or unreachable.
Blue	Status of device is not known or the device is unmanaged.

Table 1-2 Device Status Changes

Device Color/ Initial State	Process	Result of Process	Device Color/ End State
Blue/Unknown or Unmanaged	Polling	Up	Green/Up
Blue/Unknown or unmanaged	Polling	Down or unreachable	Red/Down or unreachable
Green/Up	Unmanage	Unmanaged	Blue/Unknown or unmanaged
Green/Up	Polling	Down or unreachable	Red/Down or unreachable
Red/Down or unreachable	Unmanage	Unmanaged	Blue/Unknown or unmanaged
Red/Down or unreachable	Polling	Up	Orange/Previously down or unreachable
Orange/Previously down or unreachable	Unmanage	Unmanaged	Blue/Unknown or unmanaged
Orange/Previously down or unreachable	Polling	Down or unreachable	Red/Down or unreachable
Orange/Previously down or unreachable	Clear State	Up	Green/Up

Virtual Channel Management

AtmDirector provides the following information to help you manage the permanent virtual channels (PVCs) and switched virtual channels (SVCs) in your network:

- Link utilization
- VC utilization
- Utilization plotting
- Trace reports
- Trace displays

This information is available from the VC List window, shown in Figure 1-6. Select a link from the topology map. From the AtmDirector window (Figure 1-1), select **Tools**>**VC List** and **All Connections**, or **By SVC Addresses**.

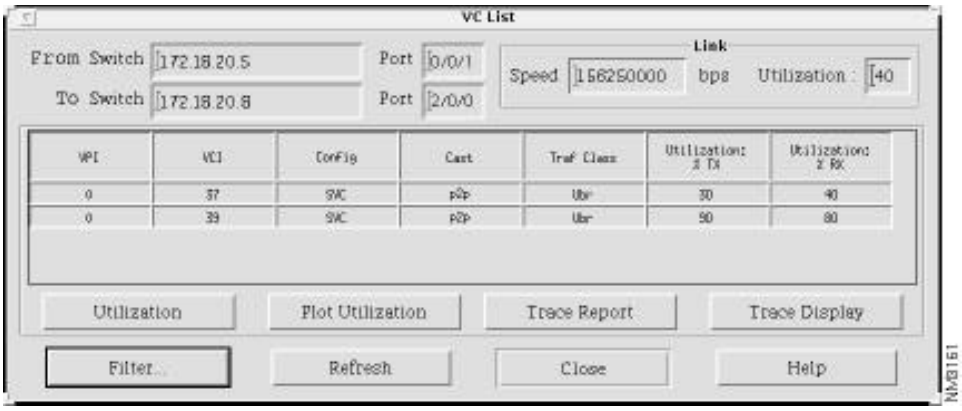
Link Utilization

You can obtain the percentage of available bandwidth used by a particular link. The linkutilization value is provided in the Utilization field, as shown in Figure 1-6.

VC Utilization

You can obtain the percentage of available bandwidth for the displayed virtual channels by clicking Utilization. The utilization values appear in the Transmit (Tx) column and in the Receive (Rx) column. These values represent the percentage of the available bandwidth that the source device (shown in the From Device field) used to transmit and receive data. For example, the connection for VPI 0 and VCI 37 in Figure 1-6 is using 30 percent of the available bandwidth to transmit data and 40 percent of the available bandwidth to receive data.

Figure 1-6 VC List Window

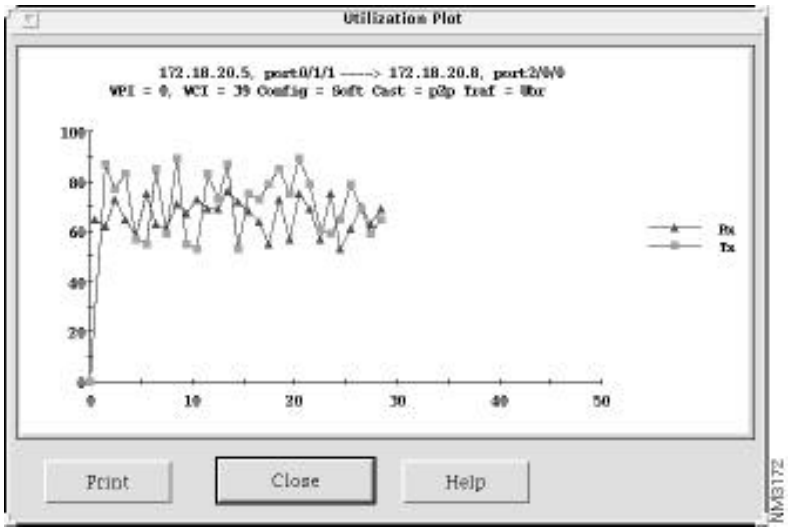


Utilization Graph

You can obtain a utilization trend graph by selecting one VC link in the VC List window, shown in Figure 1-6, and clicking Plot Utilization. The utilization graph appears, as shown in Figure 1-7.

The utilization graph is updated at each utilization polling interval. The utilization polling interval is configured by selecting **Options>Global Options>Polling**.

Figure 1-7 Utilization Graph

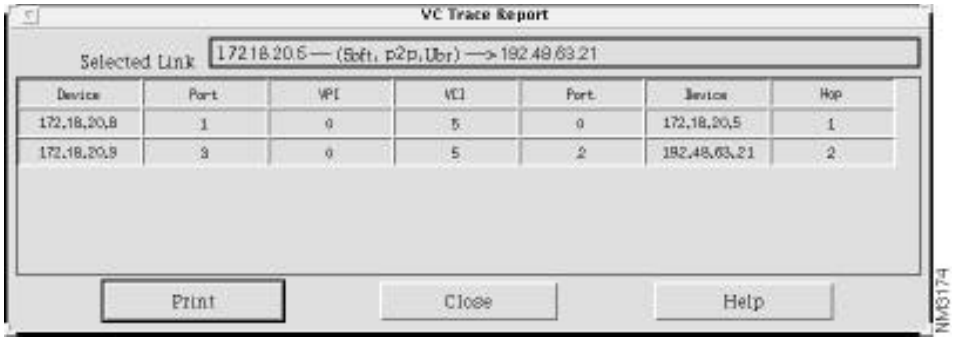


Trace Reports

A trace report for a selected VPI/VCI shows the starting device and port, the ending device and port, and the distance of the link segment to and from the root. The report includes the devices used to connect the two selected devices. Point-to-multipoint connections have an entry in the table for each connection.

You can use this information to identify the route of a particular VC by tracing the VC from one device to another. Figure 1-8 shows an example of a trace report.

Figure 1-8 Trace Report

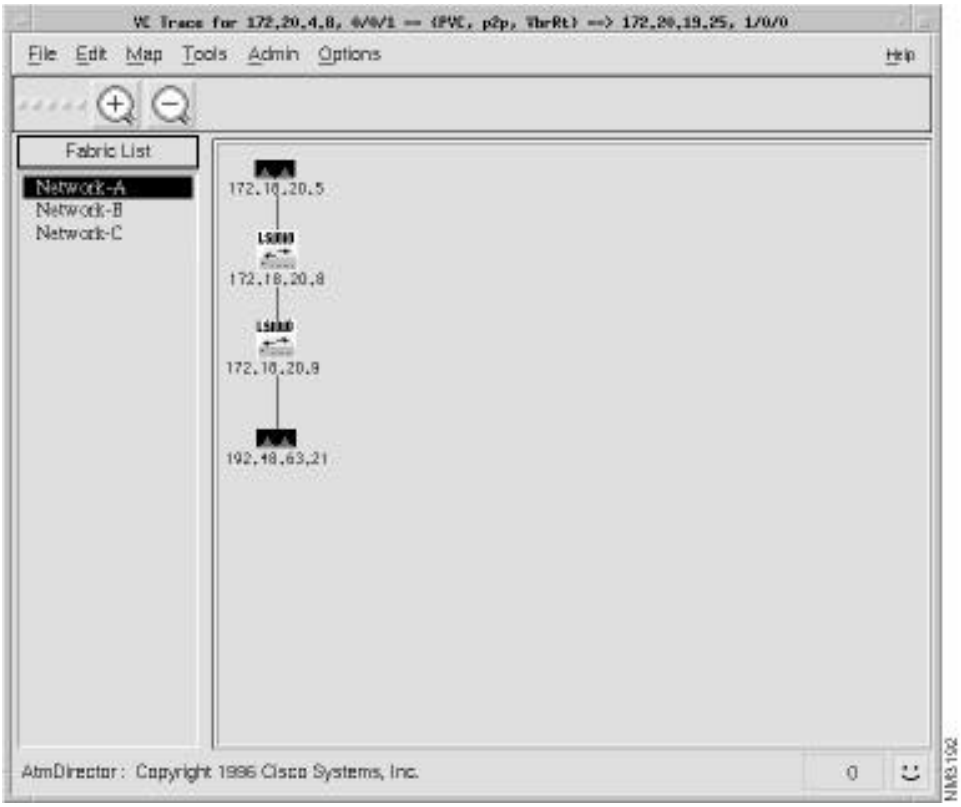


Trace Displays

A trace display for a selected VPI/VCI graphically shows the topology map with the starting and ending nodes and the switches used to connect these two nodes. You can view point-to-point connections or point-to-multipoint connections. This information can help you identify the path of a VPI/VCI, including all the hops and links. Figure 1-9 shows an example of a trace display.

The only options that you can select from the Trace Display window are Zoom In and Zoom Out. None of the other options are available from this window.

Figure 1-9 Trace Display



Fault and Performance Management

AtmDirector performs fault and performance management functions using ATM layer F5 Operation, Administration, and Maintenance (OAM) cells. OAM cells are used to perform standard loopback (end-to-end or segment) tests and to maintain a group of timers for OAM functions.

OAM F5 cells flow between network elements used in virtual connections and report degraded VC performance, such as late arriving cells, lost cells, and cell insertion problems.

AtmDirector can send OAM packet internet gropers (pings) to verify link and connection integrity. OAM pings are OAM cells containing the ATM node addresses or IP addresses of intermediate switches. Sending OAM pings allows you to determine the integrity of a specific connection at any intermediate point along the connection. You can send OAM pings for network connection debugging and troubleshooting.

CiscoView and AtmDirector

From AtmDirector, you can invoke CiscoView for a selected device. From the topology map, select an ATM switch or an ATM end host and either select **Map**>**Object**>**CiscoView** or click the right mouse button and select CiscoView from the popup menu. CiscoView is started for the selected device. Refer to the CiscoView documentation for details about using CiscoView.