



DCM User's Guide for ATMworks 950L Management

Part No. EK-DGLSL-UG, Rev A01

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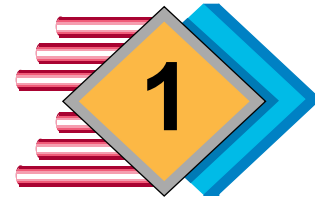
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Introduction

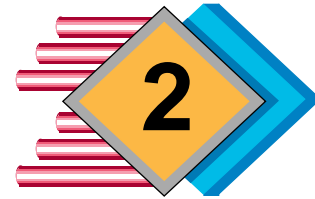
About this Guide

This manual provides information on managing ATMworks 950Ls using the **dcm** Configuration Management utility. The DCM utility is part of the standard **Aruba v3.2 software** that accompanies each ATMworks 950L. The DCM utility provides a command-line interface for ATMworks 950L configuration, network management and performance monitoring. Pertinent ATM concepts are also described as they relate to the use and management of ATMworks 950Ls.

Applicable Documents

For more information on ATM and related subjects, refer to the following documents:

Title	Reference No.
<i>ATM Forum User-Network Interface Specification, Version 3.0</i>	ISBN 0-13-225863-3
<i>ATM Forum User-Network Interface Specification, Version 3.1</i>	Reference unknown
<i>TCP/IP Network Administration; O'Reilly & Associates, Inc., March 1993</i>	ISBN 0-937175-82-X
<i>Multiprotocol Encapsulation over ATM Adaptation Layer 5; J. Heinanen; July 1993</i>	RFC 1483
<i>Classical IP and ARP over ATM; M. Laubach; January 1994</i>	RFC 1577
<i>ATM Signalling Support for IP Over ATM; February 1994</i>	RFC 1755



Using DCM

DCM Overview

The DCM Configuration Management command-line utility provides the user interface to configure and manage ATMworks 950Ls you have installed. If you performed the installation, then you may have already encountered the use of the DCM **create** command.

The operations that can be performed using the DCM utility are relative to the architecture of the ATMworks 950L software installed on your system(s). Figure 2-1 depicts this architecture.

Figure 2-1 ATMworks 950L Software Architecture

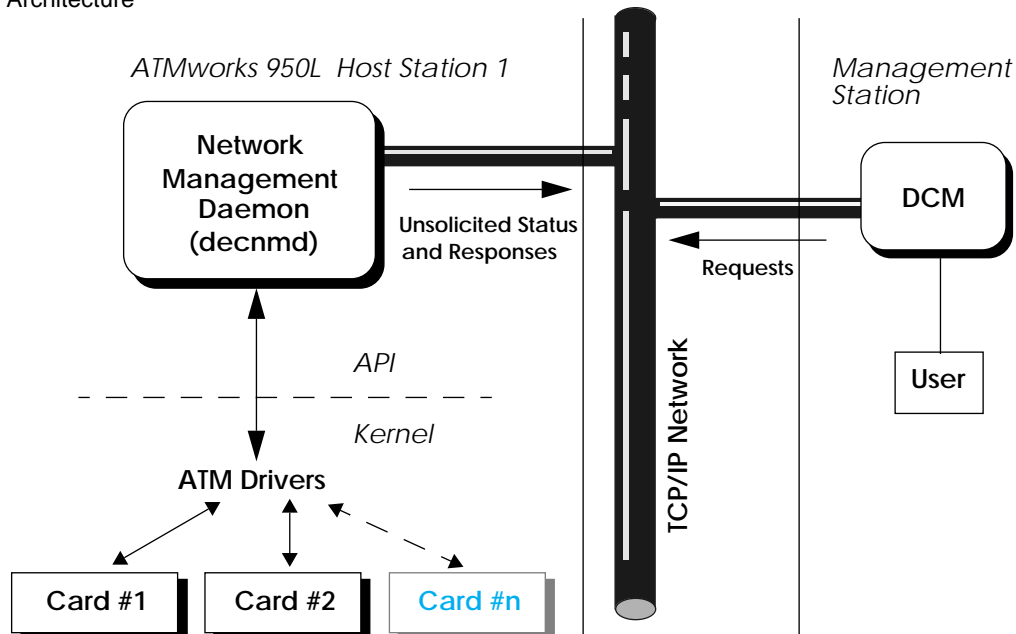


Figure 2-1 shows the DCM utility running on a management station or host. The utility requires a TCP/IP network connection to communicate with the network management daemon (**decnmd**). The **decnmd** daemon is resident on the same machine that contains the ATMworks 950L hardware, though the DCM utility does not have to be installed on the same machine.

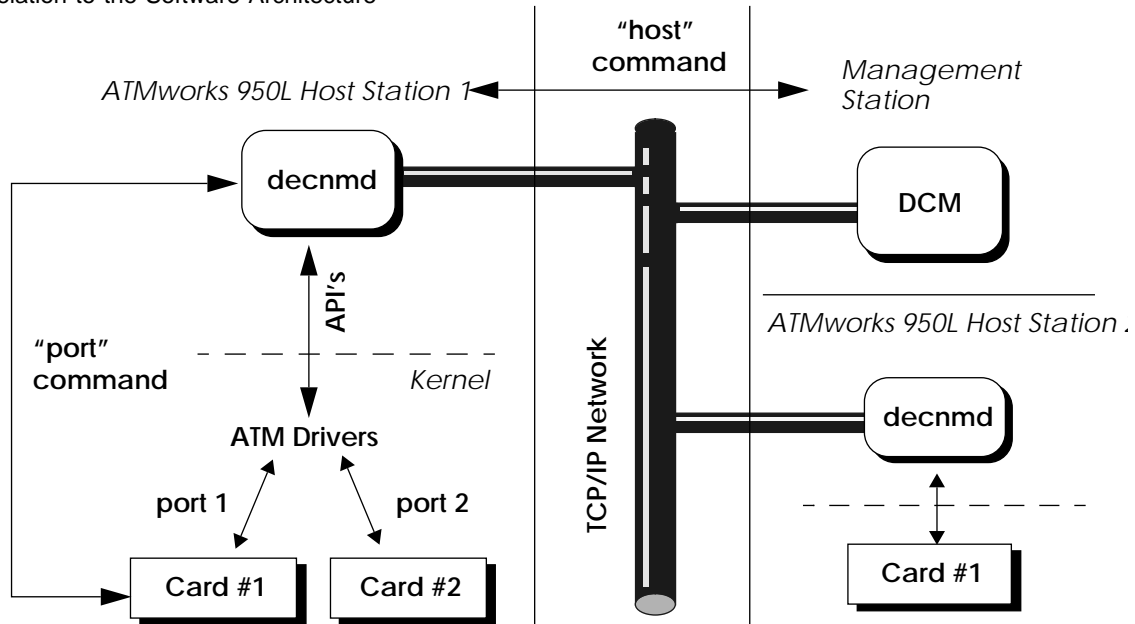
The **decnmd** daemon uses several application programming interfaces (APIs) to communicate with the driver software that controls the ATMworks 950L(s). The daemon identifies each installed ATMworks 950L by its “port” number. This port number is also used as an argument on the DCM commands to specify a specific ATMworks 950L on which to perform operations.

One DCM utility running on a central management station can communicate with the daemons on multiple hosts, provided they are connected to the management station by a TCP/IP network.

To send commands to an ATMworks 950L interface and receive status, the DCM utility must connect to the daemon on the ATMworks 950L’s host station. The DCM **host** command allows you to set up this connection for multiple hosts, as shown in Figure 2-2 on page 11.

The **port** command specifies which port on the connected host the daemon is currently communicating with.

Figure 2-2 DCM Commands in Relation to the Software Architecture



The following chapters provide procedures for using the DCM utility to:

- ❖ Set up host connections;
- ❖ Create and configure permanent virtual connections (PVCs);
- ❖ Configure the ATM address of the ATMworks 950L;
- ❖ Configure the Interim LAN Management Interface (ILMI);
- ❖ Monitor statistics about the network connections to evaluate performance.

All DCM commands and most of their arguments can be abbreviated to the least number of characters necessary to make the command unique. For example, you can enter "h" for **help**, or "sh" for the **show** command.

Startup and Setup

The DCM utility is designed to run on several different computer hardware platforms and operating systems. The utility's commands are the same across all platforms, though the startup procedure does differ slightly on different operating systems.

DCM Startup Command

The format of the command is as follows:

```
dcm [-a ATM_port] [-d log_level] [-l log_file] [-f filename]  
[-h hostname] [-p TCP_port] [-s] [command];[command]
```

where:

- | | |
|----------------------------|--|
| -a <i>ATM_port</i> | Sets the default ATM port number. Valid port numbers are from 1-16, with 1 as the default. |
| -d <i>log_level</i> | Specifies the types of messages to be displayed to the log file specified using the -l option. Possible values are:

0 Displays only error messages (default).
1 Displays error and warning messages.
2 Displays error, warning, and informational messages.
3 Echoes commands to <i>stdout</i> (i.e., the screen) as they are executed. |
| -l <i>log_file</i> | Specifies the default log file filename. If not specified, messages are only sent to <i>stdout</i> . |
| -f <i>filename</i> | Specifies a filename from which to read DCM commands. If not specified, command input is expected from standard input. |
| -h <i>hostname</i> | Connects to the management daemon that resides on the system specified by <i>hostname</i> . |
| -p <i>TCP_port</i> | Specifies another TCP port, if the default port is unavailable. If an alternate port is specified, then decnmd must have also been started specifying this alternate port number, or no connection to decnmd will be possible. This |

may be performed either by starting **decnmd** by hand using the **-p** option or by modifying the */etc/services* file.

-s Runs DCM in “silent mode”. No errors will be displayed when commands are issued for hosts that are not connected. This option is only valid when commands are being read in from a file such as the PVC Configuration file.

You do not have to be the *root* user to run DCM, though some of DCM commands require root access. If you do not have the software installation directory *usr/dec/bin* in your path, you must specify the entire path name to execute the **dcm** command.

The following example shows an execution of the **dcm** command on a system named “stingray” with no options specified, using the full path name. The system in this example has a 2 MB server ATMworks 950L installed.

Example: **dcm** startup command

```
stingray:/usr/dec/bin % dcm
ATM Port Information - Host : stingray                Port : 1
-----
Port State           - In Service
Switch Port Number   - Unknown
Factory ESI address  - 00:20:ea:00:0d:c7
Hardware Interface Name - DEC-ATMworks 950L: MMF
Hardware Interface Desc - 155 Mbps SONET/SDH Multi-Mode Fiber (2 MB)
Hardware Serial Number - 3527
dcm:stingray:1>
```

The fields shown in the information display for each port are defined below:

Port State

Possible values are:

- In Service** Port is operational and in use.
- Unknown** Port state is unknown.

Out of Service	Port is disabled.
Diag Mode	Diagnostic utility is currently being executed on this port.
Loopback	Port is being used for loopback testing.

Switch Port Number

If ILMI is running, and information is available from the switch, this indicates the switch port to which the ATMworks 950L is connected. Otherwise, it displays "Unknown".

Factory ESI Address

12-character hexadecimal End Station Identifier for the ATMworks 950L.

Hardware Interface Name

ATMworks 950L product name.

Hardware Interface Description

Textual description of the speed, protocol, and physical interface on the ATMworks 950L.

Hardware Serial Number

Serial number physically shown on the ATMworks 950L card.

This information (and more) can be redisplayed at any time for the default or a specified host and port via issuance of the **show** command.

Simply type **quit** or "**q**" at the prompt to exit the DCM utility.

Example: show command

```
dcm:perch:1> show
ATM Port Information - Host : stingray          Port : 1
-----
Port State           - In Service
Switch Port Number   - Unknown
Factory ESI address  - 00:20:ea:00:0d:c7
Hardware Interface Name - DEC-ATMworks 950L: MMF
Hardware Interface Desc - 155 Mbps SONET/SDH Multi-Mode Fiber (2 MB)
Hardware Serial Number - 3527
Hardware Revision Number - 00000030:1.12
Hardware Instance Number - 3
Driver Name          - decnic0
Driver Description    - Digital NIC Driver
Driver Serial Number  - None
Driver Revision Number - 3.46

IP Interface         - deccip1    3.0.0.7 (stingray_cip1)
IP Interface         - decle101   6.1.0.7 (stingray_lane101)
IP Interface         - decle102   6.2.0.7 (stingray_lane102)
IP Interface         - decle103   6.3.0.7 (stingray_lane103)
IP Interface         - decle104   6.4.0.7 (stingray_lane104)
dcm:stingray:1>
```

This display lists more information about the hardware, including the hardware revision number, hardware instance number (slot number) and the driver name, description and rev number. Following the hardware information are the “IP Interface” fields that show the IP addresses and hostnames of all of the interfaces on the ATMworks 950L.

Using On-line Help

On-line documentation for DCM is provided through a manual page and the **help** command. The **help** command displays a list of all available commands. You can also type in **help command [directed_out]**, where *command* is a DCM command, and receive specific help on the command. Use the *directed_out* option to send the command output to a file.

Example: help command

```
Digital Configuration Manager utility.

General commands supported :
<filename> - Reads commands from the filename specified.
host       - Allow commands to be directed to the remote host.
port       - Assign the specified ATM port number as the default.
create     - Create an ATM PVC connection associated with an IP address.
set        - Set an ATM address or ILMI parameters for a port.
modify     - Modify an existing ATM connection.
delete     - Delete (kill) one or all existing ATM connections.
save       - Save Classical IP PVC connection descriptions to a file.
show       - Show default settings, device/connection info and stats.
clear      - Clear statistical counters or an ATM address.
loglevel   - Display or set the current logging level.
loopback   - Perform OAM loopback test on an ATM connection.
start      - Start ILMI and Address Registration.
stop       - Stop ILMI and Address Registration.
reset      - Reset ILMI parameter to defaults.
quit       - Exit the program.

Commands and parameters may be abbreviated to the fewest characters
necessary to uniquely identify the keyword.

To get detailed help on a specific command, enter "help <command_name>."
Conventions used in the detailed help are:

[] - denotes optional parameters that, if omitted, will default to
    specific values.
() - denotes parameters that must be grouped together.
|  - indicates that one or the other parameter is to be specified.
<> - denotes a variable parameter.
```

Setting the Log Level

You can control the type and number of messages that are reported to the screen and/or the specified logfile by DCM. The **loglevel** command allows you to set four levels of logging, and has the following syntax:

loglevel [*level*]

where *level* is one of the following integer values:

- 0** Display only error messages (default).
- 1** Display error and warning messages.

- 2 Display error, warning and informational messages.
- 3 Echoes commands to *stdout* as they are executed. This is useful for seeing the commands being executed from a file.

The default level (0) allows only those messages that are critical to the operation to be issued. This prevents the log from being inundated by informational messages, which could obscure the time-critical messages. If no argument is specified, the current log level is displayed.

```
dcm:stingray:1# loglevel 1
dcm:stingray:1# loglevel
Default log level set to 1.
dcm:stingray:1#
```

DCM Macros

You can create your own “macro” language of DCM commands by putting DCM commands in a text file, then entering the file name as a command on the DCM command line. The file will be read and commands executed as if the file name were an DCM command.

Control is returned to the DCM command line when an end-of-file or “**exit**” command is encountered.

For example, suppose you want to quickly switch between connected hosts and view all connections on them without changing from the default host. You could create a file for each host that contains **dcm** commands:

File “perch”

(optional) →


```
host attach perch
show conn all host perch
exit
```

And the next host file:

File "guppy"

```
host attach guppy
show conn all host guppy
exit
```

And so on. Then, when you run **dcm**, you can enter these file names at any time to execute the commands in them.

 **Note:** If you create a file with the same name as an existing DCM command, it will still run the original DCM command and will not use the file you created.

Note that, in the following example, the default host is "stingray" and does not change when the macro files are executed. This is due to the use of the **"attach"** option on the **host** command in the file (described in more detail in "Establishing Host Connections" on page 20).

Example: Using macro files in DCM

```
dcm:stingray:1> perch

Connections                - Host : perch
-----
Pt/VPI/VCI  Type      Host                Tx-PCR      Rx-PCR
1/0/5       PVC                3830 be     3834 be
1/0/16      PVC                3488 be     3532 be
dcm:stingray:1> guppy

Connections                - Host : guppy
-----
Pt/VPI/VCI  Type      Host                Tx-PCR      Rx-PCR
1/0/5       PVC                3830 be     3834 be
1/0/16      PVC                3488 be     3532 be
1/0/32      SVC Out    353208 be    353208 be
1/0/34      SVC Out    353208 be    353208 be
dcm:stingray:1>
```

↑
Default host

Security Issues with DCM Macros

Extreme care must be taken with the permissions of any batch file that **dcm** would run as *root*. On Solaris machines, this includes the `/etc/opt/DEC-Aruba/cfg/hostname` file and the `/etc/opt/DEC-Aruba/cfg/hostname.boot` file. On SunOS, the files are in `/etc/DEC-Aruba/cfg`.

Since the contents of the file are interpreted as **dcm** commands, no one other than *root* should have write permissions to any **dcm** batch file which will be run as *root*. If there are erroneous commands in the batch files, results may run from simple syntax errors to inadvertent file loss to outright security breaches.

The **dcm** commands involving redirection and piping can be potential security breaches if the object of the redirection or pipe is not controlled or is subject to modification. The **dcm** utility will attempt to either direct output to the object of the redirection or attempt to open a pipe to the object executable of the pipe command. These executables would run as *root* if **dcm** is being executed with *root* privilege. If these executables have been aliased to some other programs or modified in other ways, potentially harmful results may occur.

Also, you need to ensure that the execute path for *root* is controlled and does not include directories that are modifiable by non-root users.

Establishing Host Connections

As described in “DCM Overview” on page 9, a TCP connection must be made between the DCM utility and a management daemon in order to issue DCM commands to the ATMworks 950L. When you start DCM without specifying a host, the utility will automatically try to connect to the daemon on the local workstation. If there is no daemon installed on the local host, you must specify which host to connect to as an argument on the command line.

By default, the utility uses port number one. Any DCM commands in which a host or port are not specifically indicated will operate on the “default” host and port.

Setting the Default Host

Using the **host** command, you can change the default host that will be acted on by the other DCM commands. The syntax of the host command is:

```
host ([attach | detach] hostname | ip_addr [TCP_port] | [show])
```

The **host** command establishes a connection to the management daemon on the host specified by one or the other required parameter, *hostname* or *ip_addr*. A connection must be made to a host prior to using its *hostname* or IP address in the “**host ip_host**” parameter in other DCM commands.

hostname Specifies the hostname (usually found in the */etc/hosts* file) for the system to be connected.

ip_addr Specifies the IP address in dot notation for the system to be connected.

attach Attaches the specified host and adds it to the Connected Host Table but does NOT make it the default host. If omitted, the host is attached and it becomes the default host.

detach Detaches the specified host and deletes it from the Connected Host Table.

show	Shows the default version number of the DCM and driver software, plus the default IP Host and ATM port and all connected hosts.
<i>TCP_port</i>	Optionally specifies a particular TCP port through which to make the connection. If an alternate port is specified, then decnmd on the specified host must have been started specifying the same port number, or no connection to decnmd will be possible. This may be performed either by starting decnmd by hand using the -p option or by modifying the <i>/etc/services</i> file.

Example: host command

```

dcm:stingray:1> host gourami
dcm:gourami:1> host show

Management Application Version 3.2.0

Default host connection :
  Host : gourami                IP Address : 198.201.94.104
  Daemon Version : 3.0.0.0      Default Port = 1

Connected Host Table :
  Host : stingray               IP Address : 127.0.0.10
  Daemon Version : 3.0.0.0      Number of Ports = 1

  Host : gourami                IP Address : 198.201.94.104
  Daemon Version : 3.0.0.0      Number of Ports = 1

dcm:gourami:1>

```

Note: the default host has changed

Setting the Default Port

You can also set the default ATM port to be used by the DCM commands using the **port** command:

port atmport

The *atmport* variable must be a non-negative integer from 1-16.

Example: port command

```
dcm:stingray:1> port 2
Error [stingray] : Unable to get info for port 2
Reason : Specified port index is invalid.
dcm : Warning : Port specified is out of range.
Port value set to current default.

dcm:stingray:1> host perch
dcm:perch:1> port 2

ATM Port Information - Host : perch                Port : 2
-----
Port State                - In Service
Switch Port Number        - Unknown
Factory ESI address       - 00:20:ea:00:05:a9
Hardware Interface Name   - DEC-ATMworks 950L: MMF
Hardware Interface Desc   - 155 Mbps SONET/SDH Multi-Mode Fiber (512 KB)
Hardware Serial Number    - 1449
Hardware Revision Number  - 00000042:1.2
Hardware Instance Number  - 1
Driver Name                - decnic1
Driver Description         - Digital ATM NIC Driver
Driver Serial Number       - None
Driver Revision Number     - 3.29

dcm:perch:2>
```



Configuration Management

Viewing Virtual Connections

Signalling allows switched virtual connections (SVCs) to be created and removed dynamically with little operator intervention. However, there may be situations where the equipment you are connected to does not yet support signalling and you have to configure your virtual connections manually. DCM allows you to easily create and manage PVCs, as well as monitor the status of the SVCs on the ATMworks 950Ls.

Using DCM, PVCs can be created, modified, deleted or saved into a text file. DCM also provides a command to perform an Operations and Maintenance (OAM) loopback test on the connections you have created. LANE and CIP PVCs and SVCs can be viewed using the **show connection** command.

Showing Current CIP and LANE Connections


To view the current connections on the default port, use the **show connection** command. To see all of the connections on all ports on the default host, specify **all** on the command.

The command output lists the VC number (Pt/VPI/VCI), where “Pt” stands for port. The connection type is displayed as “PVC”, “SVC in” or “SVC out”.

The “Remote Host/Hostname” field shows the IP address and hostname if it is an IP connection. If it is an ATM connection, the hostname is displayed if one has been defined in the *atm_hosts* file. Otherwise, the End Station Identifier (ESI) portion of the ATM address is displayed. If no hostname or address is displayed, it is probably a reserved connection that was created automatically by the signalling or ILMI function.

The “Tx-PCR” and “Rx-PCR” fields display the transmit and receive peak cell rates. These fields may also show a “be”, for Best Effort.

The system shown in this example has four LECs configured and is the ATM ARP server. For each LEC, there are two LES connections (SVC Out and SVC in) and two BUS connections. The ATM ARP server connections are named “stingray_arp”.

 **Note:** *The names shown for the LES and BUS connections were inserted manually into the /usr/dec/cfg/atm_hosts file to help show which connections were for the LES and BUS. This naming convention is highly recommended.*


Example: show connection command

```
dcm:stingray:1> sho conn

Connections                - Host : stingray
-----
Pt/VPI/VCI  Type      Remote Host/Address      Tx-PCR      Rx-PCR
1/0/5       PVC
1/0/16      PVC
1/0/149     SVC Out   gourami_les1             3488 be     3532 be
1/0/150     SVC Out   gourami_les2             3488 be     3532 be
1/0/151     SVC In    gourami_les1             0 be        3532 be
1/0/152     SVC Out   gourami_les3             3488 be     3532 be
1/0/153     SVC Out   gourami_les4             3488 be     3532 be
1/0/154     SVC In    gourami_les2             0 be        3532 be
1/0/155     SVC In    gourami_les3             0 be        3532 be
1/0/156     SVC In    gourami_les4             0 be        3532 be
1/0/157     SVC Out   gourami_bus4             3488 be     3532 be
1/0/158     SVC In    gourami_bus4             0 be        3532 be
1/0/159     SVC Out   gourami_bus1             3488 be     3532 be
1/0/160     SVC In    gourami_bus1             0 be        3532 be
1/0/161     SVC Out   gourami_bus2             3488 be     3532 be
1/0/162     SVC In    gourami_bus2             0 be        3532 be
1/0/163     SVC Out   gourami_bus3             3488 be     3532 be
1/0/164     SVC In    gourami_bus3             0 be        3532 be
1/0/181     SVC Out   stingray_arp             353208 be   353208 be
1/0/182     SVC In    stingray_arp             353208 be   353208 be
dcm:stingray:1>
```

You can also view the connections on a connected host and/or port that is not the default by adding **host ip_host** and/or **port portnum** to the command.

In the following example, “perch” has two ATMworks 950Ls installed, at ports 1 and 2. Only port 1 has any connections configured (as shown under “Pt/VPI/VCI”. The **all** option displayed the connections on both ports.

 **Note:** PVC’s “5” and “16” are reserved connections. PVC “5” is used by the signalling function; PVC “16” is used by ILMI.

Example: show conn host ip_host

```
dcm:stingray:1> sho conn host perch
dcm Error : Currently not connected to host.

dcm:stingray:1> host attach perch

ATM Port Information - Host : perch                Port : 1
-----
Port State           - In Service
Switch Port Number  - Unknown
Factory ESI address  - 00:20:ea:00:05:6e
Hardware Interface Name - DEC-ATMworks950L: MMF
Hardware Interface Desc - 155 Mbps SONET/SDH Multi-Mode Fiber (512 KB)
Hardware Serial Number - 1390

ATM Port Information - Host : perch                Port : 2
-----
Port State           - In Service
Switch Port Number  - Unknown
Factory ESI address  - 00:20:ea:00:05:a9
Hardware Interface Name - DEC-ATMworks950L: MMF
Hardware Interface Desc - 155 Mbps SONET/SDH Multi-Mode Fiber (512 KB)
Hardware Serial Number - 1449

dcm:stingray:1> sho conn all host perch

Connections          - Host : perch
-----
Pt/VPI/VCI Type      Remote Host/Address          Tx-PCR      Rx-PCR
1/0/5    PVC              3830 be     3834 be
1/0/16   PVC              3488 be     3532 be
dcm:stingray:1>
```

Note that in order to specify a host on the command, it must be attached previously. In this example, the first attempt to show the connections failed because the host was not attached.

Classical IP PVC Creation Overview

If you install signalling, you should not need to create permanent virtual connections. The DCM utility only supports creation of PVCs over classical IP. Therefore, whenever creation of PVCs is discussed in this guide, it refers to Classical IP PVCs.

Creating PVCs is not difficult, though it requires a good understanding of ATM and the network configuration. It may even help to sketch out the desired configuration on paper before setting up the connections.

The DCM utility provides a **create** command that allows you to create permanent virtual connections. The basic information that you will need to determine for each connection is:

- ❖ Port number, if there is more than one ATMworks 950L
- ❖ VPI/VCI number
- ❖ IP address or hostname of the Classical IP interface (encip) on the ATMworks 950L in the remote host to which you are connecting
- ❖ Transmit and receive rates
- ❖ Encapsulation method

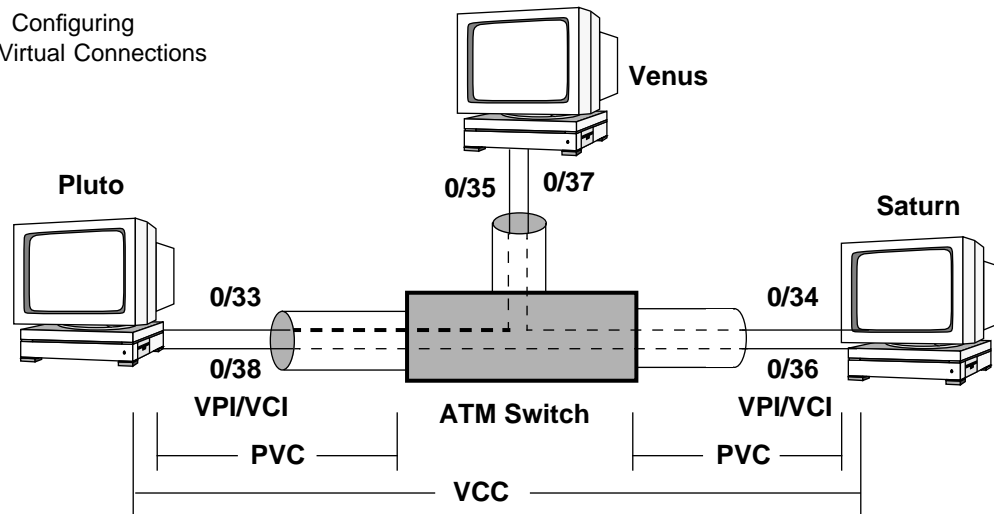
These concepts are described in the following sections. If you already have a basic understanding of the type of information required, you may want to skip to the procedure “To create a permanent virtual connection” on page 31.

Choosing VPI/VCI Numbers

When configuring PVCs, you will need to define Virtual Path Identifier/Virtual Path Identifier (VPI/VCI) pairs for each connection. A dedicated data transfer connection between two ATM endpoints is referred to as a Virtual Channel Connection (VCC).

A VCC is made up of PVCs that connect each device in the VCC; the connection between an ATMworks 950L and a switch would constitute a PVC. Each PVC is identified by a VPI/VCI pair. Note that the VPI/VCI for different PVCs that make up a channel connection do not have to be the same.

Figure 3-1 Configuring Permanent Virtual Connections



Currently, the VPI that the ATMworks 950L uses is fixed at 0. Therefore, only a VCI number has to be defined for each PVC that originates or that terminates at one of the end-stations containing one of these ATMworks 950Ls. The VCI must be between 32 and 1023 inclusive (0-31 are reserved for use by the ATM protocols).

Determining Data Transmission Rates

For each connection, you can specify a maximum peak data transmission rate or a Peak Cell Rate (PCR). This rate is commonly expressed in cells per second (cps), though it can be specified in Mbps or kbps. (Note that the ATMworks 950L software interprets kilobits as 1000 bits as opposed to 1024 bits. Megabits = 1,000,000 bits.)

The PCR that you specify for a connection only indicates the maximum rate and does not have to be exact. However, the sum of all of the transmit rates specified for an ATMworks 950L working with SONET must be less than 353,208 cps (~149 Mbps).

When creating connections, the minimum transmit rate that can be specified for an individual connection is 191 cps (~80 Kbps), though there is no minimum for receive rates. These rates are lower than the specified line rate of 155.52 Mbps because of framing overhead at the physical layer.

Traffic Shaping Concepts

The most important thing about specifying rates is to avoid cell losses caused by switch congestion. Some switches may even enforce a certain rate on the different VCCs – this is usually referred to as “policing” or Usage Parameter Control (UPC).

If UPC is in effect in a switch, and a VCC exceeds the configured rate, the switch may drop cells from that VCC. This will cause errors at the receiving end station and degraded performance.

If UPC is not in effect, the switch will only drop cells in case of congestion. For example, congestion will occur if two end-stations are sending data to another end-station and the sum of the rates of the two VCCs exceeds the line rate of the link to the end-station.

When creating PVCs through the ATM network, the rates of each VCC should be calculated so that all connections can be active simultaneously without congestion. The ATMworks 950L supports this by allowing a rate to be assigned to each active VCC. The transmit rate should be configured to be less than or equal to the rate of the connection through the switch. The transmit rate should also be less than or equal to the receive rate configured for the receiving endpoint.

However, you may wish to take advantage of the fact that connections are idle some of the time. You can “overbook” the bandwidth of the link by assigning rates that add up to greater than the maximum available bandwidth. The benefit is that the active connections get the best available bandwidth. However, you run the risk of congestion and subsequent cell loss. The ATMworks 950L supports overbooking through the use of the “best effort” option on each VCC.

The Traffic Shaping Scheme

To provide flexibility in configuring your connections, the software allows you specify the transmission rates in several ways:

- ❖ You can specify a single value to be used as both the receive and transmit rates for a connection. This may be

necessary for certain devices that require a particular bandwidth (e.g., bridges, routers);

- ❖ You can specify “**max**” as the rate for one or both rates. This allows the software to choose the maximum remaining available bandwidth when the connection is established;
- ❖ For transmit rates only, you can specify a “requested” and “acceptable” rate;
- ❖ Best effort can be specified to prevent the software from looking at the available bandwidth. That is, you are given the requested rate, regardless of how much bandwidth is left.

Requested and Acceptable Transmit Rates

When you specify a transmit rate for a connection, the device driver performs a calculation and assigns a rate based on cell boundaries. Therefore, your *requested* transmit rate for a connection may or may not be on one of these cell boundaries. By default, the DCM software will “round down” to the next closest boundary (or to the next cell boundary within the available bandwidth). For example, if you request a transmit rate of 10,000 cps, the driver may assign a rate of 9766 (depending on the ATMworks 950L version).

For most applications, rounding down for the transmit rate will be sufficient, particularly if this makes the transmit rate less than the receive rate on the other end of the connection. However, you can control whether the driver rounds up or down by specifying an *acceptable* rate.

The acceptable rate is used with the requested rate to specify that, if the requested rate is not available, this is the minimum (or maximum) rate that is acceptable. If the acceptable rate is greater than the requested, the software will round up when allocating bandwidth for a connection. If the acceptable rate is less than the requested, the software will round down.

For example, if you specify a requested rate of 100 Mbps and an acceptable rate of 50 Mbps, the rate selected will be between 50 and 100 Mbps, but it will be as close to 100 Mbps as possible.

You may get an “out of range” error message on the **create** command, if you happen to choose a requested rate and an acceptable rate that both fall within two cell boundaries. It is best to try and specify acceptable rates that are at least 1400 cps above or below the requested rates.

Also, you should not try to set the requested and acceptable rates to the same value (since there is no reason to do so). This will also cause an out of range message, unless you happen to select a rate that is exactly on a cell boundary.

Choosing Encapsulation Methods

Data encapsulation refers to methods of carrying connectionless interconnect traffic, such as bridged and routed Protocol Data Units (PDUs) over an ATM network. There are currently two methods supported:

- ❖ Multiplex multiple protocols over a single ATM virtual circuit
- ❖ Assumption that each protocol is carried over a separate ATM VC

To send multiple protocols over a single VC, a Logical Link Control (LLC) header is prefixed onto the PDU, which identifies the protocol of the PDU. This method is referred to as *LLC Encapsulation*. The alternative method performs higher-layer multiplexing implicitly by ATM VCs. This is referred to as *VC Based Multiplexing*.

The **create** command provides options that allow you to specify “**snap**” or “**nosnap**”. The “snap” terminology refers to an IEEE 802.1a SubNetwork Attachment Point (SNAP) header that follows the LLC header on the PDU. The “**snap**” option enables LLC Encapsulation, and “**nosnap**” disables it. If not specified, LLC encapsulation is enabled for each connection.



Note: *Changing the encapsulation type for one PVC changes it on all PVCs on that port. All connections on a port must use the same encapsulation type.*

CIP PVC Creation Procedure

The following procedure allows the creation of PVCs that will exist until they are deleted or the system is rebooted. In order to save these PVCs in a file to be recreated at boot

time, refer to the ATMworks 950L installation manual for instructions on the **decconfig** configuration utility.

The following procedure only describes the setup of a PVC *from* an end-station to a switch. The entire PVC connection will not be completed until it is configured through a switch and on the destination end-station. The VPI/VCI number of the connection to the source end-station will have to be specified in the switch. Then the destination end-station will have to have a VPI/VCI defined to connect to the switch.

If you are configuring PVCs in several end-stations, you may want to set up all of them first, then configure the corresponding PVCs in the switch.



To create a permanent virtual connection

- 1 Log on as the *root* user and issue the **dcm** command.
- 2 Determine the IP address (or IP hostname) of the ATM interface on the **destination** host. Be careful not use the IP address/hostname of the default host's ATM interface (which is "stingray_atm1" in the examples).



Note: *If you do not have an existing IP network connection to the other host (that is, there is no Ethernet, Token Ring, FDDI, or ATM network in place), you must run **dcm** on the destination host's console to create the connection.*

- a Make sure the destination host is attached:

```
dcm:stingray:1# host perch  
dcm:perch:1#
```

- b Use the DCM **show** command to view information on the destination host. The output of this command should list the IP address of the destination interface.



Note: *If the IP Interface field showing the CIP interface is not displayed, this indicates that the destination ATM interface does not have CIP support configured. Refer to "Troubleshooting PVC Creation" on page 35.*

```

dcm:perch:1# show

ATM Port Information - Host : perch                               Port : 1
-----
Port State                - In Service
Switch Port Number       - Unknown
Factory ESI address      - 00:20:ea:00:05:6e
Hardware Interface Name  - DEC-ATMworks950L: MMF
Hardware Interface Desc  - 155 Mbps SONET/SDH Multi-Mode Fiber (512 KB)
Hardware Serial Number   - 1390
Hardware Revision Number - 00000042:1.6
Hardware Instance Number - 0
Driver Name              - decnic0
Driver Description       - Digital ATM NIC Driver
Driver Serial Number     - None
Driver Revision Number   - 3.29

IP Interface             - deccipl    3.0.0.18 (perch_atm1)
IP Interface             - declel    192.94.73.18 (perch_atm2)

dcm:perch:1#

```

IP Address of
CIP interface

3 Determine the VCI number to assign to the connection. Be sure to use a VCI number that has not been used.

a Use the `show conn` command on the destination host to see what PVCs already exist.

```

Connections                - Host : perch
-----
Pt/VPI/VCI  Type      Host                Tx-PCR      Rx-PCR
  1/0/5      PVC                3830 be     3834 be
  1/0/16     PVC                3488 be     3532 be
dcm:perch:1#

```


- b Switch back to source host using the **host ip_host** command and check the existing PVC numbers.

```
dcm:perch:1# host stingray
dcm:stingray:1# show conn
```

Connections					- Host : stingray	
Pt/VPI/VCI	Type	Host	Tx-PCR	Rx-PCR		
1/0/5	PVC		3830 be	3834 be		
1/0/16	PVC		3488 be	3532 be		


```
dcm:stingray:1#
```

4 Issue the **create** command, which has the following syntax:

```
create vnum (hostname | ip_addr) (rate=rate_value [best]
| (tx rate=tx_rate [best] rx rate=rx_rate [best]))
[snap | nosnap] [host ip_host]
```

The following is a synopsis of the syntax of the arguments on the **create** command.

```
vnum           =    [[port/]VPI/]VCI
rate or rx_rate =    max or integer[unit]
tx_rate        =    {req_rate[unit],accpt_rate[unit]}
```

 **Note:** By default, the rates are in cells per second. If you want to specify Mbps or kbps, be sure to include “mbs” or “kbs”, respectively, after the rates.

For more detailed information on this command's arguments, refer to the **create** command in Chapter 5, “Command Reference.”

When you enter the **create** command, it should display information about the new connection. If you get an error message, refer to “Troubleshooting PVC Creation” on page 35 for information on the possible problems.

Example: create command

```
dcm:stingray:1# create 100 perch_atm1 rate=max
Connection Information      - Host : stingray          Port/VPI/VCI : 1/0/100
-----
Remote IP Address         : 3.0.0.18 perch_atm1
Connection Type           : PVC (Classical IP)
ATM Adaptation Layer     : 5
Encapsulation type       : LLC/SNAP
Max CPCS SDU Size        : 9188 (tx)   9188 (rx)

Rate Information           Transmit                Receive
Actual Mbps (cps)        149.760192 (353208)    149.760192 (353208)
Requested Mbps (cps)     149.760192 (353208)    149.760192 (353208)
Acceptable Mbps (cps)    0.000000 (0)
Best Effort Flag          False                    False

dcm:stingray:1#
```


5 Next, you need to configure the other end of the connection on the remote host.

a Switch to the destination host.

```
dcm:stingray:1# host perch
dcm:perch:1#
```

b Issue the **create** command to create the other end of the connection.

Be sure and check the “Actual Mbps” rates on both ends of the connection. The transmit rate on one end should match (or be less than) the receive rate on the other end and vice versa.

 **Note:** If you specify “requested” and “acceptable” rates, and you get an error message stating “out of range”, try adjusting your acceptable rate to at least 1400 cps (~600 Kbps) above or below your requested rate value. See the discussion on page 29.

Example: create command on the destination host

```
dcm:perch:1# create 100 stingray_atm1 rate=max

Connection Information      - Host : stingray          Port/VPI/VCI : 1/0/100
-----
Remote IP Address         : 3.0.0.18 perch_atm1
Connection Type           : PVC (Classical IP)
ATM Adaptation Layer     : 5
Encapsulation type       : LLC/SNAP
Max CPCS SDU Size        : 9188 (tx)   9188 (rx)

Rate Information           Transmit                Receive
Actual Mbps (cps)        149.760192 (353208)    149.760192 (353208)
Requested Mbps (cps)     149.760192 (353208)    149.760192 (353208)
Acceptable Mbps (cps)    0.000000 (0)
Best Effort Flag         False                    False

dcm:perch:1#
```

Troubleshooting PVC Creation

Creating a PVC can be complicated by the configuration of your ATM end-stations on the IP network. You may run into some hitches if your ATM interfaces have not been properly configured or connected. The following list describes some problems you may encounter and the actions to take to correct them.

❖ The **create** command “hangs” (no prompt comes back)

The example that follows shows the initial execution of **dcm** on host “stingray”. Then, an attempt is made to create a PVC to host “perch”, but the name is mistyped.

```
dcm:stingray:1# create 100 pirsch_atm1 rate=max
^C
^C^C^C
^D
quit
exit
.....
```

An attempt is being made by NIS to look up the hostname “pirsch_atm1” and it does not exist. The result

is an NIS timeout. The DCM prompt would have eventually returned after NIS timed out.

You should wait for NIS to time out instead of trying to exit the utility or shell. Check to make sure you typed in the hostname of the destination host correctly.

❖ **Create failed due to “Network number error”**

This could be a common error, because it has two possible causes. The possible causes of this message are illustrated in the following examples.

- Attempting to create a PVC from an ATM interface to itself

```
dcm:stingray:1# create 100 stingray_atm1 rate=max
Error [stingray] : CREATE failed for 1/0/100 (port/vpi/vci)
Reason : Network number error.
Unable to create IP connection to requested network.
dcm:stingray:1#
```

The problem here was that the default host was still “stingray” and a host cannot create an IP PVC to itself. The default host should have been changed before issuing the **create** command or the source host could have been specified on the **create** command. That is, the command “**host perch**” should have been executed to change the default host, then this create command would have worked.

- Attempting to create PVC to an ATM interface with no IP address

```
dcm:stingray:1# host perch
dcm:perch:1# create 100 stingray_atm1 rate=max
Error [perch] : CREATE failed for 1/0/100 (port/vpi/vci)
Reason : Network number error.
Unable to create IP connection to requested network.
dcm:perch:1# show conn

Connections                - Host : perch
-----
Pt/VPI/VCI  Type      Host                Tx-PCR      Rx-PCR
1/0/5       PVC       perch                3830 be     3834 be
1/0/16      PVC       perch                3488 be     3532 be
dcm:stingray:1#
```

This error occurred because no IP address had been configured for the interface “perch_atm1”. As described in the procedure on page 31, you can use the **show** command to display the IP address of the ATM interface you are trying to connect to. If no IP address is shown for the interface, you will need to assign one.

To assign an ATM address, you can use the **deconfig** utility on the host system that contains the ATMworks 950L to be configured. Refer to the *Software Installation Guide for SunOS/Solaris* for detailed **deconfig** procedures.

- Attempting to connect to an end-station on a different network

```
dcm:stingray:1# host perch
dcm:perch:1# create 100 sockeye_atm1 rate=max
Error [perch] : CREATE failed for 1/0/100 (port/vpi/vci)
Reason : Network number error.
Unable to create IP connection to requested network.
dcm:perch:1#
```

If you check the IP address of “sockeye_atm1” using the **show** command, you would see that it is on a different subnetwork than the end-station that is originating the PVC. You can only create PVCs to ATMworks 950L interfaces that are on the same subnetwork.

Modifying or Deleting PVCs

You can change the rates you have specified on a connection using the **modify** command. The syntax of the command is:

```
modify vnum rate=rate_value | (tx rate=tx_rate & | rx rate=rx_rate) [host ip_host]
```

The *vnum* parameter specifies the connection you want to change. The rate parameters on this command work the same as the those on the **create** command. In the following examples, the receive rate on both ends of the connection are changed. Note that, when you specify “**rx rate**”, you must also reenter the transmit rate (**tx rate**).

If a connection was created with an acceptable and requested rate, you must specify both the rates on the **modify** command to change them. In other words, if acceptable rate is other than zero, and you want it to be zero, just specifying “**rate=newrate**” will NOT set the acceptable rate to zero. You must specify both rates:

```
modify 100 rx rate=140mbs tx rate={140mbs,0}
```

When a **modify** command is issued, a full report of the current PVC configuration is displayed, as shown in the next example.

Example: modify command on the destination host

```
dcm:perch:1# modify 100 rate=100mbs

Connection Information      - Host : perch                Port/VPI/VCI : 1/0/100
-----
Remote IP Address         : 3.0.0.37 stingray_atml
Connection Type           : PVC (Classical IP)
ATM Adaptation Layer     : 5
Encapsulation type        : LLC/SNAP
Max CPCS SDU Size         : 9188 (tx)   9188 (rx)

Rate Information           Transmit                Receive
Actual Mbps (cps)         98.148368 (231482)      99.999976 (235849)
Requested Mbps (cps)      99.999976 (235849)      99.999976 (235849)
Acceptable Mbps (cps)     0.000000 (0)
Best Effort Flag           False                    False

Connection Stats          - Host : perch                Port/VPI/VCI : 1/0/100
-----
Connection Age            : 1 hrs. 25 mins. 17.73 secs.
Connection Tx Idle Time   : 51 mins. 1.67 secs.
Connection Rx Idle Time   : 1 hrs. 25 mins. 17.73 secs.
Time since last mod       : 1 hrs. 25 mins. 17.73 secs.

                                Transmit                Receive
SDUs                        2                    0
Cells                       0                    4
Octets                      100                 0
Errors                      0                    0
Discards                    0                    0
SAR timeouts                0                    0
CRC errors                  0                    0
Oversized SDUs              0                    0

dcm:perch:1#
```

After changing the connection on one end, you may need to change hosts and modify the rates on the other end.

Example: `modify` command on the source host

```
dcm:stingray:1# modify 100 rate=100mbs

Connection Information      - Host : stingray          Port/VPI/VCI : 1/0/100
-----
Remote IP Address         : 3.0.0.18 perch_atm1
Connection Type           : PVC (Classical IP)
ATM Adaptation Layer     : 5
Encapsulation type       : LLC/SNAP
Max CPCS SDU Size        : 9188 (tx)   9188 (rx)

Rate Information           Transmit                Receive
Actual Mbps (cps)        98.148368 (231482)    99.999976 (235849)
Requested Mbps (cps)     99.999976 (235849)    99.999976 (235849)
Acceptable Mbps (cps)    0.000000 (0)
Best Effort Flag          False                  False

Connection Stats          - Host : stingray          Port/VPI/VCI : 1/0/100
-----
Connection Age           :      1 hrs. 12 mins. 31.19 secs.
Connection Tx Idle Time :      1 hrs. 12 mins. 17.10 secs.
Connection Rx Idle Time :      1 hrs. 12 mins. 31.19 secs.
Time since last mod      :      1 hrs. 12 mins. 31.19 secs.

                                Transmit                Receive
SDUs                        1                    0
Cells                       0                    2
Octets                      48                   0
Errors                      0                    0
Discards                    0                    0
SAR timeouts                0                    0
CRC errors                  0                    0
Oversized SDUs              0                    0

dcm:stingray:1#
```

If you want to delete any connections you have created, you can issue the **delete** command, which has the format:

delete *vcnum* | **pvc** [*host ip_host*]

The **delete pvc** command allows all non-reserved PVCs to be deleted. You can also specify a particular PVC or SVC *vcnum* to be deleted using the format `[[port]/[VPI]/VCI`.

However, the PVCs used by the signalling function (PVC 5, by default) and the ILMI function (PVC 16 by default) can not be deleted using this command.

To delete the ILMI PVC, you must use the **stop ilmi** command described in “ILMI Startup and Termination” on page 50. To delete the signalling PVC, you must terminate (kill) the **decaccd** call control daemon. If you try to delete the signalling PVC without killing the daemon, it will regenerate itself.

Note that the “Specific” diagnostic test commands of the **decdiag** utility will only work if no connections are active. Once you have enabled signalling and ILMI, you must reboot the system to single user mode to execute the **decdiag** test functions. Refer to the **decdiag** on-line help or UNIX manual page for information on the “Specific” test commands.

To delete the connections on a specific connected host, add **host ip_host** to the command, where *ip_host* is the hostname or IP address.

Example: delete command

```
dcm:stingray:1# del 100
dcm:stingray:1# sho con

Connections                - Host : stingray
-----
Pt/VPI/VCI  Type      Host                Tx-PCR      Rx-PCR
1/0/5       PVC                3830 be     3834 be
1/0/16      PVC                3488 be     3532 be
dcm:stingray:1#
```

Saving Connections to a File

Any PVCs you create using DCM will be deleted if the system is rebooted, unless you save them in a file. The **save** command allows you to store the connection information in a file that can be read by DCM.

There is a PVC Configuration file that is created at installation and read in when the system is rebooted. If the default installation directories were used, the file is in */usr/dec/cfg*; the file has the same name as the local nodename.

The PVC Configuration file contains **create** commands that automatically set up the connections on the local host. You can append the connections you have created during an DCM session to this file and they will automatically be created on reboot.

The **create** command was designed specifically to create connections on the local host or any *attached host*. Therefore, when you reboot the system, only those **create** commands in the configuration file that are specific to the local host will be executed. This allows you to put **create** commands in the PVC Configuration file for other hosts by specifying the "**host ip_host**" option on the **create** command. Then you can distribute the file to remote hosts and the connections that are specific to those hosts will be created when those systems are rebooted.

To save the currently configured PVCs to a file, use the command:

```
save [port portnum] [host ip_host] directed_out
```

where: *directed_out*

Directs output to a file. Valid formats of directed output are:

- | | |
|--------------------|---|
| > <i>filename</i> | Creates or overwrites <i>filename</i> with the output of the command. |
| >> <i>filename</i> | Creates or appends to <i>filename</i> with the output of the command. |
| <i>command</i> | Pipes the output of the command to the specified UNIX command. |

If **port** and/or **host** are not specified, all connections on the default host are saved to the specified file.

Example: **save** command

```
dcm:stingray:1# save > cfgfile
dcm:stingray:1# quit
stingray# more cfgfile
create vc = 1/0/100 ip = 3.0.0.18 tx rate = {235849,0} rx rate = 235849
type cip snap host = stingray
stingray#
```

Testing Data Transmission

You can test the connections you have set up using standard UNIX data transfer commands. However, the DCM utility also provides a test command for checking the connection prior to transferring data.

The **loopback** command sends Operations and Maintenance (OAM) cells over a specified PVC or SVC and ensures that the information is being segmented, transferred and reassembled correctly. The syntax of the command is:

loopback *vnum* [**segment** | **end-to-end**]

The test can be run on a **segment** from the ATMworks 950L to a switch or on the entire connection from one end-point to another (**end-to-end**). If no option is specified, the end-to-end test is executed.

To transfer IP data over the connections you have made, you can use **ping**, **ftp**, or **telnet** applications while using the DCM utility to watch the data transfer. For more information about monitoring your ATM connections, refer to Chapter 4, "Performance Monitoring".

Example: **loopback** command

```
dcm:stingray:1# show conn

Connections          - Host : stingray
-----
Pt/VPI/VCI Type      Host                Tx-PCR      Rx-PCR
1/0/5      PVC                    3830 be     3834 be
1/0/16     PVC                    3488 be     3532 be
1/0/32     PVC      perch_atm1      3.0.0.18    353208 be   353208 be
dcm:stingray:1# loopback 32
OaM loopback complete - No errors.
dcm:stingray:1# loopback 32 end
OaM loopback complete - No errors.
dcm:stingray:1# loopback 32 segment
OaM loopback complete - No errors.
dcm:stingray:1#
```

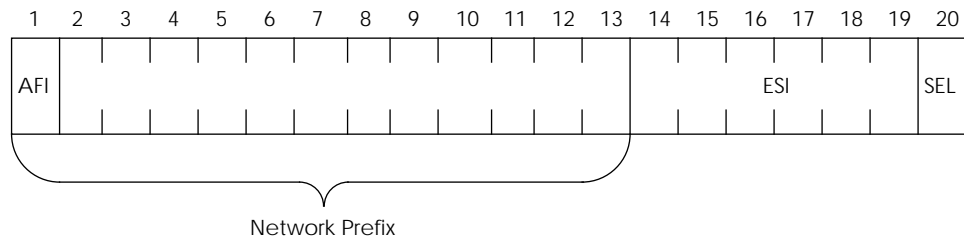
ATM Address Configuration

The signalling function that sets up SVCs requires that each ATM endpoint in your network have a unique private network address. Using DCM, you can set one or more ATM addresses for each ATMworks 950L. You can also display the current addresses or clear them.

ATM Address Formats

The Digital Equipment Corporation ATMworks 950L is identified by a unique 20-octet ATM address that has the following structure:

Figure 3-2 ATM Address Format



The UNI 3.0 Specification describes three different formats that may be used for an ATM address. The ATMworks 950L supports all of these types of addresses, which are described in detail in the UNI 3.0 Specification. The Authority and Format Identifier (AFI) at the beginning of the address distinguishes what format the address is in:

AFI	Format
39	DCC ATM Format
47	ICD ATM Format
45	E.164 ATM Format

The first 13 octets of each ATM address contains the “network prefix”. This prefix is assigned by the device (switch) on the network side of the user-to-network-interface (UNI). Therefore, all of the end-stations that a switch is communicating with and the switch itself must have the same network prefix in the address.

The unique address for each end station is created by adding a 48-bit (6 octet) End Station Identifier (ESI). The single octet Selector bits (SEL) at the end of the address are not used by the end-stations on the network.

Why Set the ATM Address?

If signalling has been configured on an ATMworks 950L, then the ATMworks 950L should already have an ATM address assigned. It can be assigned during installation or automatically via ILMI address registration.

However, you may want to assign multiple ATM addresses to an ATMworks 950L for use by applications that need to communicate with a certain address. Or, if you physically connect the ATMworks 950L to a different switch that has a different network prefix, you will need to add a new ATM address that includes the new network prefix.

Interaction of ILMI and “set address” Command

As previously mentioned, the ILMI function can be enabled when the software is installed. This function allows the ATMworks 950L's ATM address to be automatically configured via communication between the ATMworks 950L and a switch.

If ILMI is not configured or not running, you may set the complete ATM address using the **set address** command. If ILMI is configured and running, you can only set the ESI portion of the ATM address via the **set address** command.

Viewing Network Prefixes

The UNI 3.1 specification allows a switch to send more than one network prefix to an end-station. This capability is meant to accommodate future implementations of LAN Emulation. Currently, however, most switches only send one network prefix.

The Digital Equipment Corporation software will use the first network prefix sent by the switch to build the ATM address. Any other network prefixes sent are stored and can be viewed using the **show netprefix** command. The syntax of the command is:

```
show netprefix [port portnum] [host ip_host] [directed_out]
```

Viewing ATM Addresses

Before setting an address, you may want to display the currently configured addresses using the **show address** command. This command will display all currently configured ATM addresses for the default or specified host and port. The first address displayed is considered the primary ATM address. The command format is:

show address [**port** *portnum*] [**host** *ip_host*] [*directed_out*]

Example: **show address** command

```
dcm:perch:1# sho addr

ATM Address Information      - Host : perch                      Port : 1
-----
ATM address format - International Code Designator
Net Prefix         - 47-0079-00-000000-0000-0000-0000
End Station Id     - 00:20:af:cd:e4:18
Selector Bits      - 00

dcm:perch:1#
```


Note that the **show netprefix** command is different from the **show address** command in that **show netprefix** shows all network prefixes assigned to the ATMworks 950L whether they are used as part of an ATM address or not.

Setting ATM Addresses

You can create a new address for an ATMworks 950L using the command:

set address *atm_addr* [**port** *portnum*] [**host** *ip_host*]

where *atm_addr* consists of from 1 to 40 hexadecimal characters and a dash (-) after the first two characters of the input string. The first 26 hex characters (13 octets) represent the network prefix. The next 12 characters are the ESI and the last two characters represent the Selector Bits. A specific port or host other than the default may be specified on the command.

 **Note:** *If the port is connected to a switch and ILMI is running, the first 26 characters must match the network prefix of the*

To delete any existing addresses, you can use the following command:

clear address [**all**] *atm_addr* [**port** *portnum*] [**host** *ip_host*]

where *atm_addr* must match one of the addresses that are currently configured for the ATMworks 950L. All 40 characters of the address must be entered.

ILMI Configuration

The Interim Local Management Interface (ILMI) function may have been enabled when the software was initially configured using **deconfig**. If ILMI was enabled, you can disable it or restart it through **dcm**.

ILMI Startup and Termination

The **start ilmi** command starts the ILMI function. The syntax of the command is:

```
start ilmi [noregistration] [port portnum] [host ip_host]
```

The **noregistration** option will start ILMI without address registration. This should only be used in a test environment when two ATMworks 950Ls are connected directly to each other without an intervening switch connection.

The ILMI function can be disabled using the **stop ilmi** command. This command has no other options besides **port portnum** and **host ip_host**.

To view the current configuration, use the **show ilmi** command.

Setting ILMI Parameters

You can modify the parameters used by ILMI using the **set ilmi** command. After modifying these parameters, you can reset them to factory defaults using the **reset ilmi** command.

The syntax of these two commands are:

```
set ilmi ilmi_option [port portnum] [host ip_host]
```

```
reset ilmi [port portnum] [host ip_host]
```

where *ilmi_option* is one of the following:

vpi *vpi* VPI for the reserved ILMI PVC, which should always be set to 0.

vci *vci* VCI for ILMI PVC. The default VCI is 16.

rdv value	Rate Divisor - used to calculate the maximum bandwidth as a percentage of line rate for the ILMI PVC. Default is 100.
cst seconds	Coldstart Timeout - time, in seconds, between the sending of traps (alert messages). Default is 10.
gto seconds	Get Timeout - time in seconds to await a response to an SNMP <i>get</i> request. Default is 2.
grc retries	Get Retry Count - maximum number of retries for a <i>get</i> request. Default is 2.
sto seconds	Set Timeout - time in seconds to await a response to an SNMP <i>set</i> request. Default is 2.
src retries	Set Retry Count - maximum number of retries for a <i>set</i> request. Default is 2.

The ILMI address registration function uses the Simple Network Management Protocol (SNMP) as the communication medium between the switch and the ATMworks 950L. Thus, the parameters that can be configured include *get* and *set* request timeouts and retry counts and the timeout value used in the sending of SNMP “coldstart” traps when the ATMworks 950L host is cycled.

For more information, refer to the UNI 3.0 specification for the definition of how ILMI Address Registration works.

Example: set ilmi command

```
dcm:perch:1# sho ilmi
```

```
ILMI Information - Host : perch                               Port : 1
```

```
-----  
ILMI State           - Enabled  
Address Registration - Enabled  
VPI                  - 0  
VCI                  - 16  
Rate Divisor         - 100  
Cold Start Timeout   - 7  
Get TimeOut          - 2  
Get Retry Count      - 1  
Set TimeOut          - 2  
Set Retry Count      - 1
```

```
dcm:perch:1# set ilmi cst 15
```

```
dcm:perch:1# sho ilmi
```

```
ILMI Information - Host : perch                               Port : 1
```

```
-----  
ILMI State           - Enabled  
Address Registration - Enabled  
VPI                  - 0  
VCI                  - 16  
Rate Divisor         - 100  
Cold Start Timeout   - 15  
Get TimeOut          - 2  
Get Retry Count      - 1  
Set TimeOut          - 2  
Set Retry Count      - 1
```

```
dcm:perch:1#
```

Modifying the UNI Version

In order for the signalling protocol to operate correctly, the ATMworks 950L must implement the same User-Network Interface (UNI) specification as the switch and end-stations it is communicating with. There are two different UNI Specifications being implemented in various ATM products on the market today: UNI 3.0 and the most recent UNI 3.1.



CAUTION: *If an ATMworks 950L is connected to a switch that is running a different UNI, when the system is rebooted ILMI will not come up.*

When ILMI does not come up, neither will LANE or signalling because an ATM address has not been defined for the ATMworks 950L. It may appear that ILMI has not been configured properly and it cannot find the well-known ATM address for LANE. Signalling will attempt to restart every 60 seconds, but will continue to fail until the UNI is set to match that of the switch.

By default, the UNI version is set to 3.0, but it may have been modified via the **deconfig** utility when the ATMworks 950L is installed. You can also use the following command to modify the UNI version:

set uni (3.0 / 3.1)

To see what UNI is currently being implemented, you can issue the **show atm** command as shown in the following example.

Example: set uni command

```
dcm:perch:1# set uni 3.1
dcm:perch:1#show atm

ATM Layer Information      - Host : stingray          Port : 1
-----
UNI supported             - Private UNI
UNI version               - Version 3.1
AAL's supported          - AAL5

Time since last mod -    18 hrs. 25 mins. 23.89 secs.
Configured VCC          - 2
Max available           - 1024
VCI bits available     - 10

Bandwidth :  Allocated      Transmit      Receive
(cps)       Available      353208      353208
           Total          353208      353208

dcm:perch:1#
```



Performance Monitoring

Viewing Configuration Information

The DCM utility provides the unique capability to view statistics collected about the data traffic that is passing through the Digital Equipment Corporation ATMworks 950L. You can get static “snapshots” of the data flow, or you can set “timers” to regularly poll and display the statistics.

Besides statistics, you may want to view certain static information about the ATMworks 950L hardware or software configuration. The **show** command provides information on specific connections, on the ATM layer, or on the physical layer (hardware). The syntax of the command is:

show *vnum* | **atm** | **phy**

where: *vnum* Is expressed `[[port/]VPI/]VCI` and specifies a currently open connection on the default host.

atm Displays ATM layer information.

phy Displays information on the physical layer (i.e., the ATMworks 950L hardware).

Example: show command for a PVC

```
dcm:perch:1# sh 100

Connection Information      - Host : perch                Port/VPI/VCI : 1/0/100
-----
Remote IP Address         : 192.94.73.37 stingray_atm1
Connection Type           : PVC (Classical IP)
ATM Adaptation Layer     : 5
Encapsulation type       : LLC/SNAP
Max CPCS SDU Size        : 9188 (tx)   9188 (rx)

Rate Information           Transmit                               Receive
Actual Mbps (cps)        98.148368 (231482)                99.999976 (235849)
Requested Mbps (cps)     99.999976 (235849)                99.999976 (235849)
Acceptable Mbps (cps)   0.000000 (0)
Best Effort Flag         False                               False

dcm:perch:1#
```

Example: show command for the ATM layer

```
dcm:perch:1# sho atm

ATM Layer Information      - Host : perch                Port : 1
-----
UNI supported              - Private UNI
UNI version                - Version 3.0
AAL's supported           - AAL5

Time since last mod -    58 hrs.  9 mins. 56.95 secs.
Configured VCC            - 1
Max available              - 1024
VCI bits available        - 10

Bandwidth :   Allocated      Transmit      Receive
(cps)        Available      353208      353208

                Total        353208      353208

dcm:perch:1#
```


Example: show command for the PHY layer

```
dcm:perch:1# sho phy
Physical Layer Information - Host : perch          Port : 1
-----
-
Transmission Type      - SONET/STS-3c
Media Type             - Multi-mode fiber
Physical Media Speed   - 155520000 bit/sec
Factory ESI address    - 00:20:af:cd:e4:18

OCD Alarm State        - False

dcm:perch:1#
```

Viewing Statistics

Once your network is up and running, you will want to monitor the bandwidth performance across the various connections. The DCM utility provides two statistics commands that can be used to display static or dynamic statistical information.

Both forms of the **show stat** command described in the following paragraphs allow the output to be redirected to a file. To redirect the output from the **show** commands, add the following arguments to the command:

- > *filename* Creates or overwrites *filename* with the output of the DCM command;
- >> *filename* Creates or appends to *filename* with the output of the DCM command.
- | *command* Pipes the output of the DCM command to the specified UNIX command.

Keep in mind that when using FTP, you will not get the full line rate because it could be limited by the speed of the disk drive, the CPU and other factors.

Displaying ATM and AAL5 Statistics

The AAL5-level statistics show the totals for all connections on a port. The ATM layer statistics show the totals accumulated for all ATM adaptation layers, including any OAM cells transmitted.

To view the ATM or AAL5 statistics, issue the command:

```
show stat [atm | aal5] [timer] [port portnum] [host ip_host] [directed_out]
```

With no options, **show stat** displays all ATM, AAL5, and physical layer statistics on the default host. Specify “**atm**” or “**aal5**” to display specific statistics for those layers. You can also specify a specific port or host (other than the default) with this command.

If the optional *timer* argument is supplied, the statistics will be polled at regular intervals based on the *timer* and displayed repeatedly until stopped by <Control-c>. The value

entered for *timer* is assumed to be seconds, unless “**min**” or “**hr**” is specified after the value. The polled rates will be averaged over the collection period and displayed as per-second values.

Example: `show stat atm` command

```
dcm:perch:1# sho stat atm

ATM Layer Statistics          - Host : perch                Port : 1
-----
Received cells =              11740
Transmit cells  =              12717
Dropped cells   =                0
Invalid VC cells =              5

dcm:perch:1#
```

The ATM Layer statistics shown are described below:

Received cells

Number of cells received and passed through the ATM layer. This includes:

- All AAL cells (even if errors)
- CRC errors
- Oversized SDUs
- OAM cells
- Individual Connection cells

It does not include the following ATM layer cells:

- Dropped cells
- Invalid cells

Transmit cells

Number of cells transmitted thru the ATM layer to the wires. This includes all AAL cells and OAM cells.

Dropped cells

Number of received cells dropped that were associated with a valid connection and dropped before any AAL

processing (due to resource problems). These cells are not counted under "Received Cells". This includes OAM cells that could not be processed.

Invalid VC cells

Cells that are dropped because they are not associated with an existing/created connection. These cells are not counted under "Received Cells".

Example: `show stat aal5` command

```
dcm:perch:1# sho stat aal5

AAL5 Layer Statistics      - Host : perch                Port : 1
-----
                        Transmit                Receive
SDUs                      11795                11771
Cells                     12772                11792
Octets                    174834               115964
Errors                     0                    0
Discards                   0                    0
SAR timeouts              0                    0
CRC errors                 0                    0
Oversized SDUs            0                    0

dcm:perch:1#
```

The AAL5 Layer statistics are described below. Note that the values shown include all connections on the port specified.

SDUs Transmit

Number of SDUs output on the connection. It does not include any cells that were part of "Errors" or "Discards".

SDUs Receive

Number of SDUs received that are passed to upper layers. This is a count of SDUs for the given AAL of the connection. It does not include any cells that were part of "Errors" or "Discards".

Cells Transmit

Number of cells transmitted on this connection. It does not include any cells that were part of "Errors" or "Discards".

Cells Receive

Number of cells received on this connection passed to upper layers. It does not include any cells that were part of "Errors" or "Discards".

Octets Transmit

Number of octets (bytes) output on this connection. It does not include any bytes that were counted under "Errors" or "Discards". Gets incremented by 48 for every transmitted OAM cell.

Octets Receive

Number of octets (bytes) input on this connection passed to upper layers. It does not include any bytes that were part of errored/discarded SDUs.

Errors Transmit

Number of SDUs that could not be transmitted due to errors, which includes the following AAL5 Statistics:

- "Oversized SDUs" transmitted
- "Discards" transmitted

When this counter increments, the transmitted "Octet", "Cells", and "SDUs" are not incremented.

Errors Receive

Number of errored AAL5 SDUs received, which includes the following AAL5 Statistics:

- "CRC errors" received
- "SAR timeout" received
- "Oversized SDUs" received
- "Discards" received

When this counter increments, the received "Octet", "Cells", and "SDUs" are not incremented.

Discards Transmit

Number of SDUs discarded on output, which includes buffer overflow/shortages.

When this counter increments, the transmitted “Octet”, “Cells”, and “SDUs” are not incremented.

Discards Receive

Number of AAL5 SDUs discarded on input. These are considered errors, so when this statistic increments, the AAL5 “Errors Receive” is also incremented. This count includes:

- Input buffer overflows (host or ATMworks 950L)
- DMA errors
- Illegal AAL5 packets (bad trailers)

When this counter increments, the received “Octet”, “Cells”, and “SDUs” are not incremented.

SAR Timeouts

Number of received partially re-assembled AAL5 SDUs that were discarded. This is considered an error, so when this increments, the AAL5 “Errors Receive” is also incremented.

CRC Errors

Number of AAL5 SDUs that were received with CRC errors. This is considered an error, so when this increments, the AAL5 “Errors Receive” is also incremented.

Oversized SDUs Transmit

Number of AAL5 SDUs discarded because the SDU was too large (i.e., it exceeded the connection’s max transmit SDU size). When comparing only the user data, size is used but not the pad.

When this counter increments, the transmitted “Octet”, “Cells”, and “SDUs” are not incremented.

Oversized SDUs Receive

Number of SDUs discarded because the SDU was too large (i.e., it exceeded the connection’s max receive SDU size).

When comparing only the user data, size is used, NOT the pad. This is considered an error, so when this counter increments, the AAL5 “Errors Receive” is also incremented.

When this counter increments, the received “Octet”, “Cells”, and “SDUs” are not incremented.

The example below shows the polled output from the **show stats atm** command.

Example: **show stat atm** command with polling

```
dcm:perch:1# sho stat atm 5
Polling stats on on system : perch      Port : 1

Polled Statistics          - Host : perch                               Port : 1
-----
Averaged over      5.00 secs.
Total time         5.00 secs.

ATM layer
Received cells    =                1                0.000424 Mbps
Transmit cells    =                1                0.000424
Dropped cells     =                0
Invalid VC cells  =                0

Polled Statistics          - Host : perch                               Port : 1
-----
Averaged over      5.00 secs.
Total time         10.00 secs.

ATM layer
Received cells    =                1                0.000424 Mbps
Transmit cells    =                1                0.000424
Dropped cells     =                0
Invalid VC cells  =                0

^C dcm:perch:1#
```

Displaying Connection Statistics

You can view the data traffic across a connection using the **show stats connection** command. This command will display statistics for the all virtual connections on the default port and default host.

```
show stats conn[ection] [all] [vcnum [timer]] [port portnum]
[host ip_host] [directed_out]
```

Using the *vnum* parameter (syntax: `[[port/]VPI/]VCI`), you can specify a particular connection on which you want to view statistics. You can display all connections on the current port and host using the **all** option. To view the connections on other ports/hosts, use the **port** and/or **host** options. The output from this command can be redirected to a file or piped to another process using the *directed_out* parameter.

Example: show stat connection command

```
dcm:perch:1# show stat conn

Connection Stats          - Host : perch          Port/VPI/VCI : 1/0/5
-----
Connection Age           :    2 hrs. 10 mins. 21.78 secs.
Connection Tx Idle Time  :                               0.15 secs.
Connection Rx Idle Time  :                               0.15 secs.
Time since last mod     :    2 hrs. 10 mins. 21.78 secs.

                                Transmit                Receive
SDUs                       12120                12104
Cells                       13096                12104
Octets                      178580               118268
Errors                       0                    0
Discards                     0                    0
SAR timeouts                 0                    0
CRC errors                   0                    0
Oversized SDUs               0                    0

Connection Stats          - Host : perch          Port/VPI/VCI : 1/0/16
-----
Connection Age           :                9 mins.  7.41 secs.
Connection Tx Idle Time  :                8 mins. 37.32 secs.
Connection Rx Idle Time  :                8 mins. 37.30 secs.
Time since last mod     :                9 mins.  7.41 secs.

                                Transmit                Receive
SDUs                       11                    8
Cells                       22                    16
Octets                      543                   407
Errors                       0                    0
Discards                     0                    0
SAR timeouts                 0                    0
CRC errors                   0                    0
Oversized SDUs               0                    0
```

Continued, next page...

```

Connection Stats          - Host : perch          Port/VPI/VCI : 1/0/100
-----
Connection Age           :    1 hrs. 53 mins. 18.72 secs.
Connection Tx Idle Time :           17 mins. 40.17 secs.
Connection Rx Idle Time :    1 hrs. 53 mins. 18.72 secs.
Time since last mod      :           28 mins.  0.99 secs.

                                Transmit          Receive
SDUs                        2                      0
Cells                       5                      0
Octets                     148                     0
Errors                      0                      0
Discards                    0                      0
SAR timeouts                0                      0
CRC errors                  0                      0
Oversized SDUs              0                      0

```

The polling *timer* described in the previous section can also be used to perform dynamic polling and display of the connection statistics.

The following list describes the Connection statistics that are displayed on **show connection**:

Connection Age

This is the amount of time that has elapsed since the connection has been created.

Connection Tx Idle Time

This is the amount that has elapsed since any traffic has been received on this connection. This includes OAM traffic. This is updated even if cells are being dropped or SDUs being errored.

Connection Rx Idle Time

This is the amount of time that has elapsed since any traffic has been sent out on this connection. This

includes OAM traffic. This is updated even if cells are being dropped or SDUs being errored.

Time since last mod

This is the amount of time that has elapsed since any of the connection parameters have been modified.

All other statistics displayed are exactly the same as those shown in the AAL5 Statistics display, except they are on a per-connection basis. These statistics are described starting on page 59.

Clearing Statistical Counters

The ATMworks 950L provides statistical counters that collect information at the ATM and the AAL5 layer.

The **clear stats** command clears the “**aal5**” and/or “**atm**” statistics counters in the ATM device driver. These counters are cumulative and collect statistics continuously until cleared. The syntax of the command is:

```
clear stats (aal5 | atm | all) [port portnum]  
[host ip_host]
```

The “**all**” option clears all counters and ensures that they are synchronized when they resume counting.

The **host** and **port** options can be used to perform the operation on a specific host or port other than the default.



DCM Command Reference

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dcm

Digital Configuration Manager (DCM)

Synopsis

```
dcm [-a ATM_port] [-d log_level] [-l log_file] [-f filename] [-h ip_host]  
[-p TCP_port] [-s] [command\;command]
```

Availability

Digital Equipment Corporation ATM Standard Release Software

Description

The Digital Configuration Manager (**dcm**) is a command-line utility used to monitor and control the ATMworks 950L developed by Digital Equipment Corporation. The **dcm** utility is based on a client-server architecture that allows it to operate over a TCP/IP-based network. The user can use this utility to retrieve and display statistical information collected by the ATMworks 950L device driver and to display, modify, and delete existing ATM connections.

When the **dcm** utility is executed, it automatically connects to the Digital Equipment Corporation network management daemon (**decnmd**) on the local host or to a host specified using the **-h** option. The user can then execute DCM commands to send requests to the daemon to modify the configuration or request data from the ATMworks 950L driver.

The **decnmd** daemon does not have to reside on the same system on which **dcm** is running on as long as a TCP/IP connection can be established between **dcm** and **decnmd**. However, if there is no **decnmd** daemon on the local machine, the user must specify the **-h** option on the **dcm** command to establish a connection with a daemon on a remote host.

Options

The following invocation options are interpreted by **dcm**.

-a *ATM_port* Sets the default ATM port number to the integer specified in *ATM_port*. ATMworks 950L ports are numbered starting with “1” for the first ATMworks 950L installed in a Sun workstation. The second installed will be “2” and so on. This will only vary if an ATMworks 950L has been moved to another SBus slot after initial

installation. Refer to the on-line manual page for **dec_reset_instance**.

- d** *loglevel* Sets the startup logging level to the specified *log_level*.
- l** *log_file* Establishes the file identified by *log_file* as the default log file.
- f** *filename* Established the file identified by *filename* as the file from which the utility is to read DCM commands. You should ensure that the specified file is not a binary file, as that may cause **dcm** to exit.
- h** *ip_host* Establishes a connection to the **decnmd** daemon that resides on the system identified by *ip_host* (which is a hostname or IP address).
- p** *TCP_port* Uses the TCP/IP port number specified by *TCP_port* in connecting to the Digital Equipment Corporation Network Management daemon.
- s** Specifies that DCM is to operate in silent mode. This means that no errors will be displayed for systems that are not connected. This option is only valid when **dcm** is not running in interactive mode.

DCM commands can be abbreviated to the leading four characters, and most parameters can be abbreviated to the leading three characters. Conventions used in the command descriptions that follow are:

- [] Denotes optional parameters that, if omitted, will default to specific values.
- () Denotes the parameters that must be grouped together.
- | Indicates that one or the other parameter is to be specified.

clear address

Clears a given ATM address from the ATMworks 950L's address table.

Synopsis

clear address *atm_addr* / **all** [**port** *portnum*] [**host** *ip_host*]

Description

An ATMworks 950L (ATM port) will have one or more ATM addresses, assigned either via the **set address** command or automatically through ILMI address registration.

The **clear address** command clears the ATM address specified in *atm_addr* from the ATMworks 950L in the default host at the default port. If the "**all**" keyword is specified, all ATM addresses in the ATMworks 950L's address table will be cleared. The **host** or **port** command can be added to the command to specify a different host and/or ATMworks 950L besides the default.

Options

<i>atm_addr</i>	A series of hexadecimal digits, divided into fields separated by dashes for readability (at least one dash is required).
port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the " host " command.

See Also

set address

clear stats

Clears the AAL5 and/or ATM statistical counters.

Synopsis

clear stats (**aal5** | **atm** | **all**) [**port** *portnum*] [**host** *ip_host*]

Description

The **clear stats** command clears the “**aal5**” and/or “**atm**” statistics counters in the ATM device driver for the default host and port. The **host** or **port** option can be used to specify a different host and/or ATMworks 950L besides the default.

The AAL5-level statistics show the totals for all connections on a port on the ATM network. The ATM layer statistics show the totals accumulated for all ATM adaptation layers, including any OAM cells transmitted. These counters are cumulative and collect statistics continuously until cleared.

The **all** option clears all counters and ensures that they are synchronized when they resume counting.

Restrictions

To execute this command, the user must be logged in as *root* on the local host system.

Options

aal5	Clears the AAL5 statistics that have been collected since the last time they were cleared.
atm	Clears all ATM layer statistics that have been collected since the last time they were cleared.
all	Clears both AAL5 and ATM layer statistics.
port <i>portnum</i>	Optional ATM port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.

create

Creates a Classical IP PVC connection between ATM endpoints.

Synopsis

```
create [vc] vcnum ([ip] hostname | ip_addr) (rate=rate_value | (tx rate=tx_rate rx rate=rx_rate)) [[type] cip] [snap | nosnap] [host ip_host]
```

Description

The **create** command creates a Permanent Virtual Connection (PVC) associated with the IP protocol stack. You must specify rate information for the connection to be created. The default unit for specifying rates is cells per second. For more information about ATM over Classical IP, refer to RFC 1577.

Restrictions

To execute this command, the user must be logged in as *root* on the local host system.

Options

vcnum ATM Connection identifier, expressed as *[[port/]VPI/]VCI*. The port, VPI, and VCI values must be non-negative integers. **Note:** Currently, the only valid VPI value is 0. The optional identifier “**vc**” can be used in scripts for clarity.

hostname or *ip_addr*

Specifies the hostname or IP address of the node to which the ATM PVC connection is being made. The optional identifier “**ip**” can be used in scripts for clarity.

rate_value Has the format: *rate* [*unit*] | **max** [**best**]

rate Specifies the rate in cells per second.

unit Can be “**cps**” for cells per second, “**kbs**” for kilobits (1000 bits) per second, or “**mbs**” for megabits per second. Rates specified in Mbps cannot be greater than the line rate minus the physical layer overhead (149 or equivalent in kbps). This is because the rate is calculated at the ATM layer, which includes the entire 53 bytes of each cell but not the physical layer overhead.

- max** Specifies the maximum available connection rate.
- best** If specified, allows overbooking of the rate to use more than the available bandwidth. This prevents the software from looking at the available bandwidth, and you are given the requested rate, regardless of how much bandwidth is left.

tx rate=tx_rate rx rate=rx_rate

The “**tx**” or “**rx**” designates the specified value as a transmit or receive rate. If a “**tx**” rate is specified, the “**rx**” rate option must also be specified. Likewise, if “**rx**” is specified, “**tx**” must be specified.

tx_rate has the format:

rate | **max** | {*req_rate* [*unit*],*acctpt_rate* [*unit*]} [**best**]

- rate* Specifies the rate in cells per second.
- max** Specifies the maximum available connection rate.
- req_rate* Specifies a desired rate that might not be available.
- acctpt_rate* Specifies the upper or lower limit on the range of rates to try if the requested rate is not available. If *acctpt_rate* is higher than *req_rate*, the driver will select a rate that is equal to or greater than *req_rate*. If *acctpt_rate* is lower than *req_rate*, the selected rate will be equal to or less than *req_rate*. If the keyword “**best**” is specified, *acctpt_rate* is not used.

The minimum transmit rate that can be specified for an individual connection is 191 cps (~80 Kbps).

Both the requested and accepted rates must be less than the remaining available bandwidth, which is computed as 353,208 cps (~149 Mbps) minus the sum of all transmit rates on all connections on the ATMworks 950L.

Note: If *rate* is specified by itself, it is taken as the requested rate and the acceptable rate is assumed to be zero.

- unit* Can be “**cps**” for cells per second, “**kbs**” for kilobits (1000 bits) per second, or “**mbs**” for megabits per second. Rates specified in Mbps cannot be greater than the line rate minus the physical layer overhead (149 or equivalent in kbps). This is because the rate is calculated at the ATM layer, which includes the

	entire 53 bytes of each cell but not the physical layer overhead.
best	If specified, the connection will be made as close to the specified rate as possible.
<i>rx_rate</i>	Has the format: <i>rate</i> [<i>unit</i>] max [best]
<i>rate</i>	Specifies the rate in cells per second.
<i>unit</i>	Can be “ cps ” for cells per second, “ kbs ” for kilobits (1000 bits) per second, or “ mbs ” for megabits per second. Rates specified in Mbps cannot be greater than the line rate minus the physical layer overhead (149 or equivalent in kbps). This is because the rate is calculated at the ATM layer, which includes the entire 53 bytes of each cell but not the physical layer overhead.
max	Specifies the maximum available connection rate.
best	If specified, the connection will be made as close to the specified rate as possible.
[type] cip	Uses Classical IP connections, as opposed to LAN Emulation. Currently, only Classical IP is implemented and is used by default. The “ type ” identifier can be used in scripts for clarity.
snap nosnap	Specifies whether or not to use Logical Link Control (LLC)/SNAP encapsulation. By default, LLC encapsulation is enabled, allowing the multiplexing of several protocols over a single ATM virtual circuit. LLC encapsulation may be desirable when it is not practical to have a separate VC for each carried protocol, e.g., when the ATM network only supports PVCs, or when connection fees charged depend heavily on the number of simultaneous VCs.
host ip_host	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.

delete

Deletes (kills) the specified ATM connection(s).

Synopsis

delete *vcnum* | **pvcs** [**host** *ip_host*]

Description

The user can use the **delete** command to delete a specified connection or all non-reserved permanent virtual connections on the default port, unless another port is specified. This command will **not** delete “reserved” PVCs (0-31). You can only delete a reserved PVC or SVC VCI by specifying it explicitly.

With a couple of exceptions, you can specify a particular PVC or SVC VCI to be deleted, using the format `[[port]/[VPI]/VCI`. The exceptions to this are the signalling and ILMI PVCs. The PVCs used by the signalling function (PVC 5, by default) and the ILMI function (PVC 16, by default) cannot be deleted using this command.

To delete the ILMI PVC, you must use the **stop ilmi** command. To delete the signalling PVC, you must terminate (kill) the **decaccd** call control daemon.

Restrictions

To execute this command, the user must be logged in as *root* on the local host system.

Options

pvcs	Deletes all of the non-reserved PVCs on the default or specified port on the default or specified host.
vcnum	ATM connection to be modified, expressed as <code>[[port]/[VPI]/VCI</code> . The port, VPI, and VCI values must be non-negative integers. Note: Currently, the only valid VPI value is 0.
host ip_host	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.

help

Displays on-line help for DCM

Synopsis

help [*dcm_command*] [*directed_out*]

Description

Provides detailed on-line help for DCM sub-commands. Enter just **help** for a list of all commands, or **help** followed by an EDCM command name for specific information on that command.

Options

<i>dcm_command</i>	Any valid DCM command name. The DCM commands can be abbreviated when used in conjunction with help .
<i>directed_out</i>	This parameter is required and directs output to a file. Formats of directed output are: <ul style="list-style-type: none">> <i>filename</i> Creates or overwrites <i>filename</i> with the output of the DCM command.>> <i>filename</i> Creates or appends to <i>filename</i> with the output of the DCM command. <i>command</i> Pipes the output of the DCM command to the specified UNIX command.

host

Establishes a connection with a management daemon on an ATMworks 950L host system.

Synopsis

host ([**attach** | **detach**] *hostname* | *ip_addr* [*TCP_port*]) | [**show**]

Description

When you specify just one required parameter, *hostname* or *ip_addr*, on this command, it establishes a connection to the Digital Equipment Corporation management daemon (**decnmd**) on the specified. This also causes the specified host to become the “default host” that subsequent DCM commands operate on. You can connect another host without changing the default host, by specifying **attach**. To disconnect hosts, you can specify the **detach** option. A connection must be established to a host prior to using its hostname or IP address in the **host** parameter on other DCM commands.

Options

attach	Attaches the specified host and adds it to the Connected Host Table, but does NOT make it the default host. If omitted, dcm attaches the host and assigns it to be the default host. The DCM utility uses in DCM commands when no host is specified.
detach	Detaches the specified host and deletes it from the Connected Host Table.
show	Shows the default version number of the DCM and driver software, plus the default IP Host and ATM port and all connected hosts.
<i>hostname</i>	Specifies the hostname (usually found in the <i>/etc/hosts</i> file) for the system to be connected.
<i>ip_addr</i>	Specifies the IP address (in dot notation) for the system to be connected.
<i>TCP_port</i>	This optional integer value is the TCP port number to use for the connection. This is only used if no IP connection to the specified host exists.

loglevel

Specifies the level of DCM messages to be sent to standard output.

Synopsis

loglevel [0 | 1 | 2 | 3]

Description

Within the **dcm** utility, this command will set or display the current logging level. If no options are specified, the current log level is displayed.

Options

- 0** Displays only error messages (default).
- 1** Displays error and warning messages.
- 2** Displays error, warning and informational messages.
- 3** Displays error, warning and informational messages and echoes the commands to *stdout* as they are executed. This log level is useful to see commands that are being executed from command files.

loopback

Performs a data transmission test on a PVC.

Synopsis

loopback *vnum* [**segment** | **end[-to-end]**]

Description

This command initiates an OAM loopback test on the specified ATM connection. The test can be run on a “**segment**” from the ATMworks 950L to a switch, or on the entire connection from one end-point to another (“**end-to-end**”). Unless otherwise specified, the end-to-end test is executed. F5 cells are the only supported cell type for OAM loopback.

This command requires that a loopback cable be connected to the ATMworks 950L, or that the ATMworks 950L be physically connected to another host or switch.

Options

vnum	ATM connection to be tested, expressed as <code>[[port/]VPI/]VCI</code> . The port, VPI, and VCI values must be non-negative integers. Note: Currently, the only valid VPI value is 0. The identifier “ vc ” is not allowed on this command.
segment	Executes a test from a host to a switch.
end-to-end	Executes a test of the entire connection from one end-point to another.

modify

Modifies the receive and transmit rates of a configured PVC.

Synopsis

```
modify [vc] vnum rate=rate_value | (tx rate=tx_rate & | rx rate=rx_rate)  
      [host ip_host]
```

Description

Modifies the ATM connection rates for an existing ATM connection. Only the specified rate parameters are changed. On the **modify** command, you can change the transmit rate and/or the receive rate.

Restrictions

To execute this command, the user must be logged in as *root* on the local host system.

Options

<i>vnum</i>	Specifies the connection to be modified, expressed as <code>[[port/]VPI/]VCI</code> . The port, VPI, and VCI values must be non-negative integers. Note: Currently, the only valid VPI value is 0. The optional identifier “ vc ” can be used in scripts for clarity.
<i>rate_value</i>	Has the format: <code>rate [unit] max [best]</code>
<i>rate</i>	Specifies the rate in cells per second.
<i>unit</i>	Can be “ cps ” for cells per second, “ kbs ” for kilobits (1000 bits) per second, or “ mbs ” for megabits (1,000,000 bits) per second. Rates specified in Mbps cannot be greater than the line rate minus the physical layer overhead (149 or equivalent in kbps). This is because the rate is calculated at the ATM layer, which includes the entire 53 bytes of each cell but not the physical layer overhead.
max	Specifies the maximum available connection rate.
best	If specified, the connection will be made as close to the specified rate as possible.

tx rate=tx_rate rx rate=rx_rate

The “**tx**” or “**rx**” designates the specified value as a transmit or receive rate.

tx_rate has the format:

rate | **max** | {*req_rate* [*unit*],*accpt_rate* [*unit*]} [**best**]

rate Specifies the rate in cells per second.

max Specifies the maximum available connection rate.

req_rate Specifies a desired rate that might not be available.

accpt_rate Specifies the upper or lower limit on the range of rates to try if the requested rate is not available. If *accpt_rate* is higher than *req_rate*, the driver will select a rate that is equal to or greater than *req_rate*. If *accpt_rate* is lower than *req_rate*, the selected rate will be equal to or less than *req_rate*. If the keyword “**best**” is specified, *accpt_rate* is not used.

unit Can be “**cps**” for cells per second, “**kbs**” for kilobits (1,000 bits) per second, or “**mbs**” for megabits (1,000,000 bits) per second. Rates specified in Mbps cannot be greater than the line rate minus the physical layer overhead (149 or equivalent in kbps). This is because the rate is calculated at the ATM layer, which includes the entire 53 bytes of each cell but not the physical layer overhead.

best If specified, the connection will be made as close to the specified rate as possible.

Both the requested and accepted rates must be less than the remaining available bandwidth, which is computed as. 353,208 cps (~149 Mbps) minus the sum of all transmit rates on all connections on the ATMworks 950L.

On the **modify** command, the minimum transmit rate that can be specified is zero. Also, when modifying rates, all rates must be specified explicitly. If the acceptable rate is other than zero, you must specify an acceptable rate of zero to reset it to zero.

rx_rate Has the format: *rate* [*unit*] | **max** [**best**]

rate Specifies the rate in cells per second.

unit Can be “**cps**” for cells per second, “**kbs**” for kilobits per second, or “**mbs**” for megabits per second. Rates specified in Mbps cannot be greater than the line rate minus the physical layer overhead (149 or equivalent in kbps). This is because the rate is calculated at the ATM layer, which includes the entire 53 bytes of each cell but not the physical layer overhead.

max Specifies the maximum available connection rate.

best If specified, the connection will be made as close to the specified rate as possible.

host *ip_host* Optional IP address or hostname (usually found in the */etc/hosts* file) to which the specified command is to be directed. The host must first be connected via the “**host**” command.

port

Sets the global default ATM port number to be used in all DCM commands.

Synopsis

port *portnum*

Description

Sets the default port to the number specified by *portnum*. The port number is a logical identifier that tells a **dcm** command which ATMworks 950L the command is being executed on. The “port” can be thought of as the “ATM port” on the host machine, similar to an “Ethernet port” or “Token Ring port.”

Options

<i>portnum</i>	The port to be operated on with DCM commands. Valid port numbers are from 1-16.
----------------	---

reset ilmi

Sets the Interim Local Management Interface (ILMI) parameters to their factory default values.

Synopsis

reset ilmi [**port** *portnum*] [**host** *ip_host*]

Description

The **reset ilmi** command resets all of the ILMI parameters back to the factory defaults, which are:

VPI = 0

VCI = 16

Rate Divisor = 100

Cold Start Timeout = 10

Get Timeout = 2

Get Retry Count = 2

Set Timeout = 2

Set Retry Count = 2

Restrictions

To execute this command, the user must be logged in as *root* on the local host system.

Options

port *portnum* Optional port to which the specified command is to be directed. The port can be an integer from 1-16.

host *ip_host* Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “**host**” command.

See Also

set ilmi, start ilmi, stop ilmi, show ilmi

save

Saves the currently configured connections to a file.

Synopsis

save [**port** *portnum*] [**host** *ip_host*] *directed_out*

Description

This command saves all currently configured Classical IP PVC connections to the specified output file in DCM command format. This output file can be used as input to DCM in recreating the connections contained in the file.

Options

port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.
<i>directed_out</i>	This parameter is required and directs output to a file. Formats of directed output are: <ul style="list-style-type: none">> <i>filename</i> Creates or overwrites the file identified by <i>filename</i> with the output of the DCM command.>> <i>filename</i> Creates or appends to <i>filename</i> with the output of the DCM command. <i>command</i> Pipes the output of the DCM command to the specified UNIX command.

set address

Configures one or more ATM addresses for an ATMworks 950L.

Synopsis

set address *atm_addr* [**port** *portnum*] [**host** *ip_host*]

Description

This command allows the setting of the ATM address for the default or specified ATM port. The ATM address uniquely identifies the ATM end-point (ATMworks 950L).

The first 13 octets of the address represents a network prefix defined by a connected switch. The next-to-last six octets represent the end station identifier (ESI) that is unique to the end-station. The last octet contains the Selector Bits, which are currently undefined in the latest UNI specification.

If ILMI is running, the network prefix portion of the address specified on this command must match the network in the switch, or else the command will fail.

Restrictions

To execute this command, the user must be logged in as *root* on the local host system.

Options

atm_addr	A series of hexadecimal digits, divided into fields separated by dashes for readability (at least one dash is required).
port portnum	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host ip_host	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.

set ilmi

Sets the Interim Local Management Interface (ILMI) parameters.

Synopsis

set ilmi *ilmi_options* [**port** *portnum*] [**host** *ip_host*]

Description

The **set ilmi** command allows the setting of various ILMI parameters. ILMI automatically performs address registration between an end-station and a switch. When the ATMworks 950L or the switch is initialized, SNMP messages are exchanged between the switch and the end-station to create a unique ATM address for the end-station.

The ATM address consists of the network prefix provided by the switch and an end station identifier (ESI). The switch's network prefix is prepended to the end-station to create a unique ATM address for the end-station that is known by the switch. The ATM address is used by the switch to route data to the end-station via switched virtual connections.

Restrictions

To execute this command, the user must be logged in as *root* on the local host system.

Options

<i>ilmi_options</i>	Consists of one or more of the following options:
vpi <i>vpi</i>	VPI for the reserved ILMI PVC. This should always be 0.
vci <i>vci</i>	VCI for ILMI PVC. The default is 16.
rdv <i>value</i>	Rate Divisor - used in calculating the maximum bandwidth as a percentage of the line rate for the ILMI PVC. The default is 100.
cst <i>seconds</i>	Coldstart Timeout - time in seconds between trap intervals. The default is 10.
gto <i>seconds</i>	Get Timeout - time in seconds to await a response to an SNMP <i>get</i> request. The default is 2.

grc <i>retries</i>	Get Retry Count - maximum number of retries for a <i>get</i> request. The default is 2.
sto <i>seconds</i>	Set Timeout - time in seconds to await a response to an SNMP <i>set</i> request. The default is 2.
src <i>retries</i>	Set Retry Count - maximum number of retries for a <i>set</i> request. The default is 2.
port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.

See Also

reset ilmi, start ilmi, stop ilmi, show

set uni

Sets the User-Network Interface implementation for the ATMworks 950L.

Synopsis

set uni (3.0 | 3.1)

Description

This form of the **set** command allows configuration of the User-Network Interface (UNI) version that is implemented by the ATMworks 950L software.

In order for the signalling protocol to operate correctly, the ATMworks 950L must implement the same UNI specification as the switch or end-station with which it is communicating. There are two different UNI Specifications being implemented in various ATM products on the market today: UNI 3.0 and the most recent UNI 3.1. By default, when the ATMworks 950L software is first installed, the UNI is set to 3.0. Check the documentation for the switch to determine which UNI is being implemented.

If an ATMworks 950L is connected to a switch that is running a different UNI, and the system is rebooted, ILMI will not come up. When ILMI does not come up, neither will LANE or signalling. It may appear that ILMI has not been configured properly and it cannot find the well-known ATM address for LANE.

Restrictions

To execute this command, the user must be logged in as *root* on the local host system.

show

Displays general information about the ATMworks 950L or information on a virtual connection.

Synopsis

show [*vcnum* / **all**] [**port** *portnum*] [**host** *ip_host*] [*directed_out*]

Description

With no options, the **show** command displays basic information about the ATMworks 950L card with the default port number that is installed on the default host. The **all** option can be specified to show all ATMworks 950Ls in the host. If *vcnum* is specified, this command displays information on the virtual connection specified, which is expressed as `[[port/]VPI/VCI]`.

Options

all	Shows information for all ATMworks 950Ls in the default host.
vcnum	Specified as <code>[[<i>port</i>/]<i>VPI</i>/<i>VCI</i>]</code> . The <i>port</i> , <i>VPI</i> , and <i>VCI</i> values must be non-negative integers. Note: Currently, the only valid <i>VPI</i> value is 0.
port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.
directed_out	Directs output to a file. If no file is specified, output is directed to <i>stdout</i> (the screen). Formats of directed output are: <ul style="list-style-type: none">> <i>filename</i> Creates or overwrites the file identified by <i>filename</i> with the output of the DCM command.>> <i>filename</i> Creates or appends to <i>filename</i> with the output of the DCM command. <i>command</i> Pipes the output of the DCM command to the specified UNIX command.

show address

Displays the ATM addresses that have been configured for an ATMworks 950L.

Synopsis

show address [**port** *portnum*] [**host** *ip_host*] [*directed_out*]

Description

With no options, this command displays all ATM address for the ATMworks 950L with the default port number that is installed on the default host. The **host** or **port** options can be specified to specify a different ATMworks 950L and/or host system.

Options

port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.
<i>directed_out</i>	Directs output to a file. If no file is specified, output is directed to standard out (the screen). Formats of directed output are: <ul style="list-style-type: none">> <i>filename</i> Creates or overwrites the file identified by <i>filename</i> with the output of the DCM command.>> <i>filename</i> Creates or appends to <i>filename</i> with the output of the DCM command. <i>command</i> Pipes the output of the DCM command to the specified UNIX command.

show atm

Displays general information about the ATM layer.

Synopsis

show atm [**port** *portnum*] [**host** *ip_host*] [*directed_out*]

Description

The **show atm** command displays static configuration information about the ATM layer for the ATMworks 950L with the default port number that is installed on the default host. The **host** or **port** options can be specified to specify a different host system and/or ATMworks 950L.

Options

port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.
<i>directed_out</i>	Directs output to a file. If no file is specified, output is directed to <i>stdout</i> (the screen). Formats of directed output are: <ul style="list-style-type: none">> <i>filename</i> Creates or overwrites the file identified by <i>filename</i> with the output of the DCM command.>> <i>filename</i> Creates or appends to <i>filename</i> with the output of the DCM command. <i>command</i> Pipes the output of the DCM command to the specified UNIX command.

show connection

Displays information about all active virtual connections in which the ATMworks 950L is involved.

Synopsis

show conn[ection] [all] [port portnum] [host ip_host] [directed_out]

Description

With no options, this command displays a list of all open switched and permanent virtual connections on the default host and default port.

Options

all	Displays all connections on all ports in the default host.
port portnum	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host ip_host	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.
directed_out	Directs output to a file. If no file is specified, output is directed to standard out (the screen). Formats of directed output are: <ul style="list-style-type: none">> <i>filename</i> Creates or overwrites the file identified by <i>filename</i> with the output of the DCM command.>> <i>filename</i> Creates or appends to <i>filename</i> with the output of the DCM command. <i>command</i> Pipes the output of the DCM command to the specified UNIX command.

show ilmi

Displays the current settings of the Interim Local Management Interface (ILMI) parameters.

Synopsis

show ilmi *ilmi_option* [**port** *portnum*] [**host** *ip_host*] [*directed_out*]

Description

The **show ilmi** command displays the current settings of various ILMI parameters. ILMI automatically performs address registration between an end-station and a switch. When the ATMworks 950L or the switch is initialized, SNMP messages are exchanged between the switch and the end-station to create a unique ATM address for the end-station.

The parameters that are displayed by this command include:

ILMI State	Current state of ILMI - “Enabled” or “Disabled”, which can be set using the start ilmi or stop ilmi command, respectively.
Address Registration	Current state of the Address Registration function of ILMI. States are “Enabled” or “Disabled” (the latter as set using the noregistration option on the start ilmi command).
VPI	VPI for the reserved ILMI PVC.
VCI	VCI for ILMI PVC.
Rate Divisor	Value used in calculating the maximum bandwidth as a percentage of line rate for the ILMI PVC.
Cold Start Timeout	Time, in seconds, between the sending of <i>coldstart</i> traps.
Get Timeout	Time in seconds to await a response to an SNMP <i>get</i> request.
Get Retry Count	Maximum number of retries for a <i>get</i> request.
Set Timeout	Time in seconds to await a response to an SNMP <i>set</i> request.
Set Retry Count	Maximum number of retries for a <i>set</i> request.

Options

port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.
<i>directed_out</i>	Directs output to a file. If no file is specified, output is directed to standard out (the screen). Formats of directed output are: <ul style="list-style-type: none">> <i>filename</i> Creates or overwrites the file identified by <i>filename</i> with the output of the DCM command.>> <i>filename</i> Creates or appends to <i>filename</i> with the output of the DCM command. <i>command</i> Pipes the output of the DCM command to the specified UNIX command.

show netprefix

Displays all network prefixes stored for an ATMworks 950L at a certain host/port.

Synopsis

show netprefix [**port** *portnum*] [**host** *ip_host*] [*directed_out*]

Description

The UNI specification allows a switch to send more than one network prefix to an end-station. This capability is meant to accommodate future implementations of LAN Emulation. Currently, however, most switches only support one network prefix.

The Digital Equipment Corporation software will use the first network prefix sent by the switch to build the ATM address. Any other network prefixes sent are stored and can be viewed using the **show netprefix** command.

Options

port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.
<i>directed_out</i>	Directs output to a file. If no file is specified, output is directed to standard out (the screen). Formats of directed output are: <ul style="list-style-type: none">> <i>filename</i> Creates or overwrites the file identified by <i>filename</i> with the output of the DCM command.>> <i>filename</i> Creates or appends to <i>filename</i> with the output of the DCM command. <i>command</i> Pipes the output of the DCM command to the specified UNIX command.

show phy

Displays general information about the physical layer (ATMworks 950L hardware).

Synopsis

show phy [**port** *portnum*] [**host** *ip_host*] [*directed_out*]

Description

The **show phy** command displays physical layer information about the ATMworks 950L hardware.

Options

port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.
<i>directed_out</i>	Directs output to a file. If no file is specified, output is directed to standard out (the screen). Formats of directed output are: <ul style="list-style-type: none">> <i>filename</i> Creates or overwrites the file identified by <i>filename</i> with the output of the DCM command.>> <i>filename</i> Creates or appends to <i>filename</i> with the output of the DCM command. <i>command</i> Pipes the output of the DCM command to the specified UNIX command.

show stat

Displays ATM and AAL5 layer statistics.

Synopsis

```
show stat [atm | aal5] [timer] [port portnum] [host hostname] [directed_out]  
show stat conn[ection] [vcnum [timer]] [host hostname] [directed_out]
```

Description

With no options, **show stat** displays all ATM, AAL5, and physical layer statistics on the default host and default port. Specify “**atm**” or “**aal5**” to display specific statistics for one of those layers. A different port can be specified on this command using the syntax: **port** *portnum*.

If the optional *timer* is supplied, the statistics will be polled based on the *timer*. The polled rates will be averaged over the collection period and displayed as per-second values.

The **show stat conn** command specifies the “**connection**” option to display statistics for all virtual connections on the default port and default or specified host.

Options

atm	Presents statistics about the ATM layer.
aal5	Presents information about the AAL5 layer.
<i>vcnum</i>	Displays information on the specified connection, that is expressed as [[<i>port</i> /] <i>VPI</i> /] <i>VCI</i> . The port, VPI, and VCI values must be non-negative integers. Note: Currently, the only valid VPI value is 0.
<i>timer</i>	If specified, causes the stats to be averaged over the <i>timer</i> polling period and displayed repeatedly until the user stops the process by pressing <Control-c>. The value entered for <i>timer</i> is assumed to be seconds, unless “ min ” or “ hr ” is specified after the value.
host <i>hostname</i>	Optional hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.
port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.

directed_out Directs output to a file. If no file is specified, output is directed to standard out (the screen). Formats of directed output are:

- > *filename* Creates or overwrites the file identified by *filename* with the output of the DCM command.
- >> *filename* Creates or appends to *filename* with the output of the DCM command.
- | *command* Pipes the output of the DCM command to the specified UNIX command.

start ilmi

Starts the Interim Local Management Interface (ILMI) function.

Synopsis

start ilmi [**noregistration**] [**port** *portnum*] [**host** *ip_host*]

Description

The **start ilmi** command enables the ILMI function, which automatically performs address registration between an end-station and a switch. When the ATMworks 950L port or the switch is initialized, SNMP messages are exchanged between the switch and the end-station to create a unique ATM address for the end-station.

The ATM address consists of the network prefix provided by the switch and an end station identifier (ESI). The switch's network prefix is prepended to the end-station to create a unique ATM address for the end-station that is known by the switch. The ATM address is used by the switch to route data to the end-station via switched virtual channels.

Restrictions

To execute this command, the user must be logged in as *root* on the local host system.

Options

- | | |
|----------------------------|---|
| noregistration | If specified, this enables ILMI without enabling the address registration function. ILMI will still provide a communication interface between the switch and end-station, but the ATM address for the end-station will have to be defined manually. |
| port <i>portnum</i> | Optional port to which the specified command is to be directed. The port can be an integer from 1-16. |
| host <i>ip_host</i> | Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the " host " command. |

See Also

stop ilmi, set ilmi, show ilmi, set address, show netprefix

stop ilmi

Starts the Interim Local Management Interface (ILMI) function.

Synopsis

stop ilmi [**port** *portnum*] [**host** *ip_host*]

Description

The **stop ilmi** command disables the entire ILMI function, which automatically performs address registration between an end-station and a switch.

Restrictions

To execute this command, the user must be logged in as *root* on the local host system.

Options

port <i>portnum</i>	Optional port to which the specified command is to be directed. The port can be an integer from 1-16.
host <i>ip_host</i>	Optional IP address or hostname to which the specified command is to be directed. The host must first be connected via the “ host ” command.

See Also

start ilmi, set ilmi, show ilmi, set address, show netprefix

quit

Exits the DCM utility.

Synopsis

quit | **exit**

Description

The **quit** (or **exit**) command exits the DCM utility and deletes all currently open connections to the decnmd daemon. This command can be abbreviated to “**q**” or “**ex**”.

A

AAL – ATM Adaptation Layer: one of the three layers that make up the OSI model for ATM.

AAL1 – Supports connection-oriented services that require constant bit rates.

AAL2 – Supports connection-oriented services that do not require constant bit rates.

AAL3/4 – Intended for both connection-oriented and connectionless variable bit rate services.

AAL5 – Supports connection-oriented variable bit rates.

ABR – Available Bit Rate

AFI – Authority and Format Identifier: identifies the authority allocating the ATM address. Specified in the first octet of the ATM address.

AIS – Alarm Indication Signal (UNI Fault Management)

AII – Active Input Interface (Used in UNI PMD specs for Copper/Fiber)

AMS – Audiovisual Multimedia Service

AOI – Active Output Interface (Used in UNI PMD specs for Copper/Fiber)

Area – Part of a standard ATM Address that identifies a unique area within a Routing Domain.

ARP – Address Resolution Protocol

ASN.1 – Abstract Syntax Notation One

Asynchronous – Signals that are sourced from independent clocks. These signals generally have no relation to each other and so have different frequencies and phase relationships. Compare to “plesiochronous” signals.

ATE – ATM Terminating Equipment (SONET)

ATM – Asynchronous Transfer Mode: a cell-relay based networking protocol.

ATM Address – A 20-byte address that uniquely identifies an ATM endpoint. Three formats are specified in UNI 3.0: DCC, ICD, and E.164.

B

BCD – Binary Coded Decimal

BECCN – Backward Explicit Congestion Notification

BER – Basic Encoding Rules (ASN.1) or Bit Error Rate (link quality specification/testing)

BIP – Bit Interleaved Parity (e.g., SONET BIP-8 for path error monitoring)

BIPV – Bit Interleaved Parity Violation

B-HLI – Broadband High Layer Information

B-ICI – Broadband Intercarrier Interface

B-ISDN – Broadband Integrated Services Digital Network

B-ISSI – Broadband Inter-Switching System Interface

B-LLI – Broadband Low Layer Information

BOM – Beginning of Message

BSS – Broadband Switching System

BUS – Broadcast Unknown Server

C

CAC – Connection Admission Control
CBR – Constant Bit Rate
CDV – Cell Delay Variation
CEI – Connection Endpoint Identifier (UNI 3.0)
CES – Circuit Emulation Service
CIP – Classical IP: describes the typical LAN-based network paradigm where wires and local LAN segments connect IP end-stations and routers.
CIR – Committed Information Rate
CLP – Cell Loss Priority
CMISE – Common Management Information Service Element
CNM – Customer Network Management
CPCS – Common Part Convergence Sublayer
CPE – Customer Premise Equipment
CPI – Common Part Indicator
CRF(VC) – Virtual Channel Connection Related Function (related to UPC/UNI 3.0)
CRF(VP) – Virtual Path Connection Related Function (related to UPC/UNI 3.0)
CRS – Cell Relay Service
CS – Convergence Sublayer (as in CS_PDU)

D – F

DCC – Data Country Code: a type of ATM Address format whose AFI is 39. The DCC is a two-octet field after the first octet in a DCC ATM address. The DCC is expressed in BCD and identifies the country in which an address is registered per ISO 3166.
DSX – Digital Signal Cross-Connect
DXI – Data Exchange Interface
E.164 – a type of ATM Address format whose AFI is 45. The E.164 field takes up eight octets

of an E.164 ATM address and is expressed in BCD and hex. This field specifies ISDN numbers, which include telephone numbers.

EFCI – Explicit Forward Congestion Indication
EOM – End of Message
ESI – End Station Identifier: a 6-octet field in the ATM Network Address that uniquely identifies an ATM endpoint within an Area in a Routing Domain.
FEA – Functional Entity Action (UNI 3.0, C.3.2.3)
FEBE – Far End Block Error (SONET)
FECN – Forward Explicit Congestion Notification

G – I

GCRA – Generic Cell Rate Algorithm
GFC – Generic Flow Control
HEC – Header Error Control
ICD – International Code Designator: a type of ATM Address format whose AFI is 47. The ICD is a two-octet field following the AFI field in a DCC ATM address. This field, expressed in BCD, identifies an international organization registered by the British Standards Institute.
IETF – Internet Engineering Task Force
ILMI – Interim LAN Management Interface: currently implemented using SNMP.
IPX – Internetwork Packet Exchange
Isochronous – Signals which are dependent on some uniform timing or carry their own timing information embedded as part of the signal.

L

LAN – Local Area Network
LCD – Loss of Cell Delineation (also seen as OCD).

LCT – Last Compliance Time (used in GCRA definition)

Leaky bucket – A method of data traffic flow regulation using a buffer (bucket) and a regulator to present the data to the network at a specific rate.

LEC – LAN Emulation Client

LES – LAN Emulation Server

LECS – LAN Emulation Configuration Server

LIS – Logical IP Subnetwork: used to refer to an ATM network environment implemented using Classical IP and ARP.

LLC Encapsulation – Logical Link Control Encapsulation: a method of adding headers to AAL5 CPCS-PDUs to allow several protocols to be carried over the same VC. The header allows the receiver to identify the protocol of the routed or bridged PDU.

LOF – Loss of Frame (UNI Fault Management)

LOP – Loss of Pointer (UNI Fault Management)

LOS – Loss of Signal (UNI Fault Management)

LTE – Line Terminating Equipment (SONET)

M – N

MAC – Media Access Control

MBS – Maximum Burst Size

MID – Message Identifier

MTU – Maximum Transmission Unit: maximum allowable size of a PDU on an ATM network. The MTU size for IP stations operating over ATM is 9180 octets. With an LLC/SNAP header (8 octets), the default ATM AAL5 PDU size is 9188 octets.

NBMA– Non-Broadcast Multiple Access

NEXT– Near End Crosstalk (adverse phenomenon associated with high frequencies over twisted-pair wiring, measured in decibels)

NIU – Network Interface Unit

NLPID – Network Layer Protocol Identifier

NMS– Network Management Station

NNI – Network Node Interface

NSAPA – Network Service Access Point Address: OSI address format used as the model for the ATM Address defined in UNI 3.0.

O – R

OAM – Operations and Management

OCD – Out-of-Cell Delineation (UNI 3.0 Section 2.1.2.2.2)

ODI – Open Data-link Interface (Novell)

PCR – Peak Cell Rate (UNI 3.0)

PDU – Protocol Data Unit: the common term for the frames sent in frame-relay networking protocols.

PLCP – Physical Layer Convergence Procedure/Protocol

PL-OU – Physical Layer Overhead Unit (UNI physical layer frame definition)

PMD – Physical Media Dependent

PMP – Point to MultiPoint (UNI 3.0)

POH – Path Overhead (SONET)

POI – Path Overhead Indicator

PTE – Path Terminating Equipment (SONET)

PTI – Payload Type Identifier

PVC – Permanent Virtual Connection

QoS – Quality of Service

RDI – Remote Defect Indicator (UNI Fault Management)

RIP – Routing Information Protocol

S

SAAL – Signalling ATM Adaptation Layer
SAR – Segmentation and Reassembly (as in SAR_PDU)
SCR – Sustainable Cell Rate (UNI 3.0)
SDH – Synchronous Digital Hierarchy
SDU – Service Data Unit (as in AAL_SDU)
SEAL – Simple and Efficient Adaptation Layer
SECB – Severely Errored Cell Block
Selector – The last octet of the ATM Address (currently undefined in the UNI 3.0 specification).
SIR – Sustained Information Rate
SMDS – Switched Multi-Megabit Data Service
SNAP – SubNetwork Attachment Point (see IEEE 802.1a)
SNMP – Simple Network Management Protocol
SONET – Synchronous Optical Network
SSCF – Service Specific Coordination Function
SSCS – Service Specific Convergence Sublayer
SSCOP – Service Specific Connection Oriented Protocol
STE – Section Terminating Equipment (SONET)
SVC – Switched Virtual Connection
Synchronous – Signals that are sourced from the same timing reference. These may have the same frequency.

T

TAT – Theoretical Arrival Time (used in GCRA definition)
TAXI – Transparent asynchronous

transmitter/receiver interface

TC – Transmission Convergence

Traffic shaping – forcing data traffic to conform to a certain specified behavior. Usually this is a worst case or worst case plus average rate.

TUC – Total User Cell count

TUCD – Total User Cell Difference

UME – UNI Management Entity (used in ILMI definition)

UNI – User-Network Interface

UPC – Usage Parameter Control

V

VBR – Variable Bit Rate

VC – Virtual Channel

VCC – Virtual Channel Connection

VCI – Virtual Channel Identifier

VCL – Virtual Channel Link (UNI 3.0)

VINCE – Vendor Independent Network Control Entity

VP – Virtual Path

VPC – Virtual Path Connection

VPI – Virtual Path Identifier

VPCI – Virtual Path Connection Identifier

VPL – Virtual Path Link (UNI 3.0)

VPT – Virtual Path Terminator (UNI 3.0)

W

well-known address – ATM address that is commonly used for a LAN Emulation Configuration Server (LECS):

47-0079:0000:0000:0000:0000-00a
0:3e00:0001-00

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