CHAPTER 7

Console Configuration

This chapter explains how to set up and modify the configuration of the Catalyst 3200 using a directly-attached console.

This chapter covers the following topics:

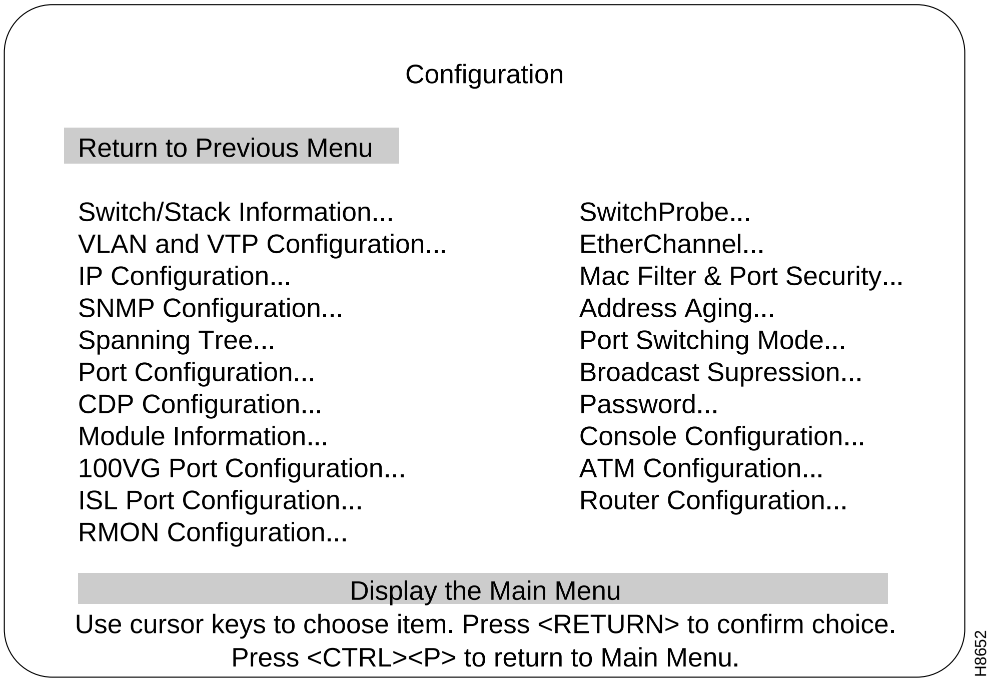
- The Configuration Menu
    - — Switch/Stack Information
    - — Port Duplex Control
- VLAN Trunk Protocol (VTP)
- Spanning Tree Protocol
- ISL Console Configuration
- EtherChannel
- Address Filtering
- Address Aging
- Spanning Tree Protocol
- CDP (Cisco Discovery Protocol) Configuration

The Configuration Menu

The Configuration menu enables you to view and set the Catalyst 3200 configuration parameters. The following section describes the Configuration menu and its sub-menus.

Configuration Screen

The following screen is displayed when the Configuration heading is selected from the Main menu.



```
                         Configuration

  Return to Previous Menu

  Switch/Stack Information...          SwitchProbe...
  VLAN and VTP Configuration...        EtherChannel...
  IP Configuration...                  Mac Filter & Port Security...
  SNMP Configuration...                Address Aging...
  Spanning Tree...                     Port Switching Mode...
  Port Configuration...                Broadcast Supression...
  CDP Configuration...                 Password...
  Module Information...                Console Configuration...
  100VG Port Configuration...          ATM Configuration...
  ISL Port Configuration...            Router Configuration...
  RMON Configuration...

                       Display the Main Menu
 Use cursor keys to choose item. Press <RETURN> to confirm choice.
               Press <CTRL><P> to return to Main Menu.
```

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Note Certain menus are options available only with enhanced software. If the menus are accessible, your system has enhanced software.

The following is a list of the headings in the Configuration menu. Detailed descriptions and views of the menu screens for these headings appear after this list.

Switch/Stack Information

Displays System Information screen for a switch or Stack.

Use the Switch Information screen to access software control of duplex functions.

Catalyst VLAN Configuration

Displays options for configuring VLAN. (Enhanced version only.)

IP Configuration

Displays screen for changing IP addresses and subnet masks and for sending a PING.

SNMP Configuration

Displays selections for setting attributes related to SNMP.

Spanning Tree

Displays selections for configuring Spanning-Tree Protocol.

Port Configuration

Displays screen for changing port configuration.

Module Information

Displays information regarding optional Expansion Modules.

SwitchProbe

Displays the screen for selecting a port to monitor.

EtherChannel

Displays options for creating an EtherChannel. (Enhanced version only.)

Mac Filter and Port Security

Menu for configuring address filtering.

Address Aging

Displays a screen for setting a different aging time for the addresses in memory for the system and ports.

Port Switching Mode

Displays the options available for setting the error handling modes for each port.

Broadcast Suppression

Displays a screen used to set up the control Broadcast packet traffic.

Password

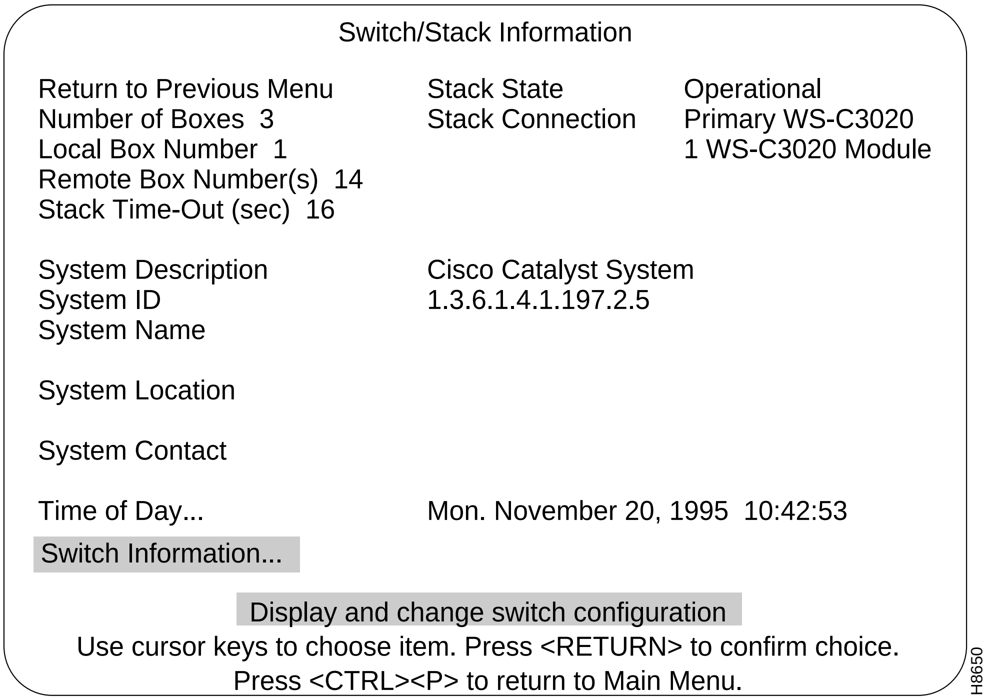
Displays screen for setting up and changing the password for access to the console.

Console Configuration

Displays choices for setting-up console or Telnet sessions with the Catalyst 3200.

Switch/Stack Information

Use the Switch/Stack Information screen to view system information and to view or change the system name, location, contact, and time of day. To add or change the system name, location, contact or time of day, use the arrow keys to move the highlight to the selection and press the RETURN key. A prompt appears near the bottom of the screen for entering text for that selection. Pressing RETURN again enters that text.



```
                         Switch/Stack Information

Return to Previous Menu         Stack State          Operational
Number of Boxes  3              Stack Connection     Primary WS-C3020
Local Box Number  1                                  1 WS-C3020 Module
Remote Box Number(s)  14
Stack Time-Out (sec)  16

System Description              Cisco Catalyst System
System ID                       1.3.6.1.4.1.197.2.5
System Name

System Location

System Contact

Time of Day...                  Mon. November 20, 1995  10:42:53
Switch Information...

                  Display and change switch configuration
   Use cursor keys to choose item. Press <RETURN> to confirm choice.
                  Press <CTRL><P> to return to Main Menu.
```

Number of Boxes

The number of boxes within this Stack.

Local Box Number

The box number of the (local) Catalyst 3200 to which the console is connected. The local box is also the source of the information displayed in these screens.

Remote Box Number(s)

The number of boxes that are in the Stack besides the one displaying this information.

Stack Timeout (sec.)

If a box goes off-line, the length of time during which the Stack tries to re-establish communication with the box.

Default: 16 seconds

Stack State

Displays whether or not the Stack is operational.

Stack Connection

The type of unit connected to the Stack.

The following headings pertain to the information in the local Catalyst 3200 as part of a network system.

System Description

Name and model of this unit.

System ID

Unique identification code for this Catalyst 3200, assigned at the factory.

System Name

Any name you choose to assign to the switch (on a TCP/IP network, it could be the IP hostname).

System Location

Location of the switch.

System Contact

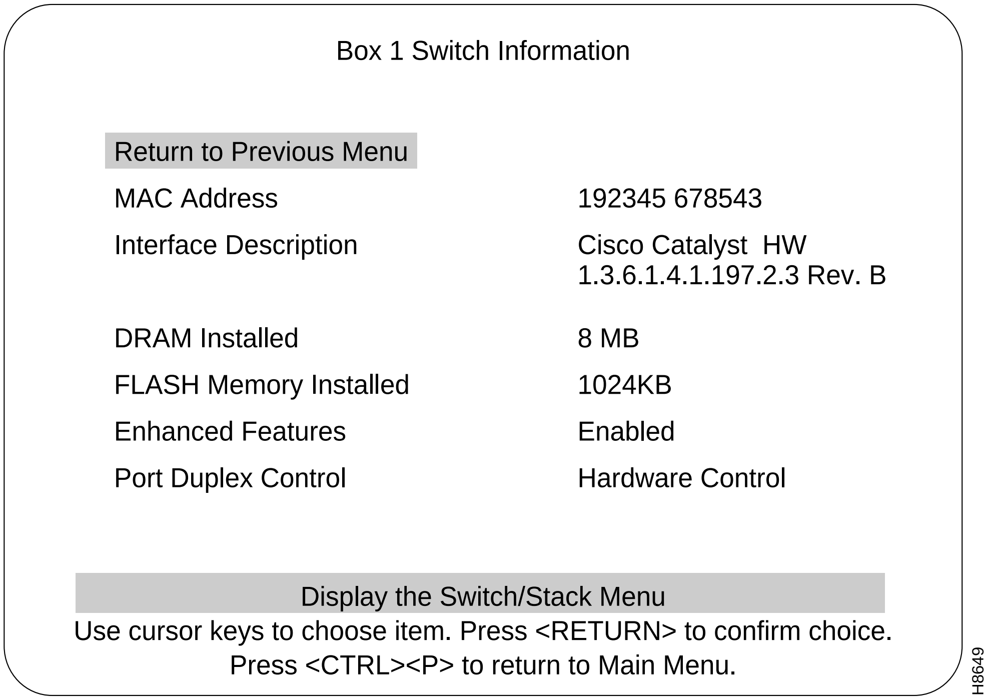
Person to contact if questions should arise.

Time of Day

An internal clock is used to calculate total time of operation and time of day. To adjust the time, select this item, press RETURN, then enter the month, day, hour, or minute.

Note If you cannot set the Time of Day, the lithium battery may need replacing. If this is the case, contact your local reseller.

The following section describes the Switch Information menu from the Switch/Stack information menu.



```
                    Box 1 Switch Information

   Return to Previous Menu
   MAC Address                          192345 678543
   Interface Description                Cisco Catalyst  HW
                                        1.3.6.1.4.1.197.2.3 Rev. B

   DRAM Installed                       8 MB
   FLASH Memory Installed               1024KB
   Enhanced Features                    Enabled
   Port Duplex Control                  Hardware Control


                  Display the Switch/Stack Menu
 Use cursor keys to choose item. Press <RETURN> to confirm choice.
             Press <CTRL><P> to return to Main Menu.
```

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MAC Address

The MAC address of this unit.

Interface Description

The type of hardware and software and their version levels.

DRAM Installed

Number of megabytes of dynamic random-access memory in the Catalyst 3200. If a 4MB SIMM is installed, (standard configuration) the user sees “DRAM Installed 4MB.” In the standard 4MB configuration, 6,000 addresses are allowed in each switch. With the 8MB SIMM installed, 10,000 addresses are allowed. The maximum number of addresses allowed is displayed under Main menu: “Statistics,” then under “Switch Statistics” as Maximum Number of Stations.

Flash Memory Installed

Amount of flash memory installed on the Catalyst 3200. If a single flash is installed the number on the screen is 512KB. If two flashes are installed the number on the screen is 1024KB.

Enhanced Features

“Enabled” indicates that the optional Catalyst 3200 Enhanced feature set is enabled. To enable the feature set, call Cisco Support to obtain the key code. Highlight the field, enter the key (code), and press RETURN. If you purchased the Catalyst 3200 with the Enhanced feature set and you need to re-enter the code, the code is on the bottom of the unit.

Port Duplex Control

Controls port duplex functions from hardware (switches) or from software.

Note The software selection takes precedence over the hardware switches.

In hardware mode, the duplexing is controlled by the duplex switches on the switch unit. In software mode, the duplexing is controlled at this menu. To switch between hardware and software mode, select the Port Duplex Control heading and press RETURN. The choice of Hardware or Software will appear. Select your choice and press RETURN. Selecting software will allow you to select the duplex mode for a specific port.

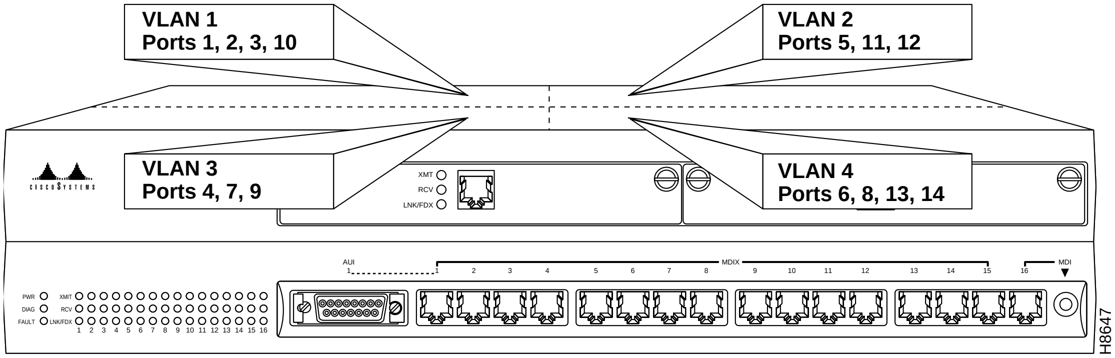
Virtual LAN (VLAN)

This section describes VLAN, the next selection on the Configuration menu. The optional VLAN and VTP feature is available on the Enhanced version of the Catalyst 3000 series (contact your Cisco sales representative for information). Using the VLAN feature, you can partition a single Catalyst 3200 into multiple VLANs, each containing its own set of ports. Packets are forwarded only between ports belonging to the same VLAN.

Note Trunk ports normally forward packets on all VLANs.

The benefit of VLAN partitioning is to restrict access from one segment to another, either for security purposes or to reduce intersegment traffic. Figure 7-1 illustrates a Catalyst with four VLANs.

Figure 7-1 Catalyst with Four VLANs



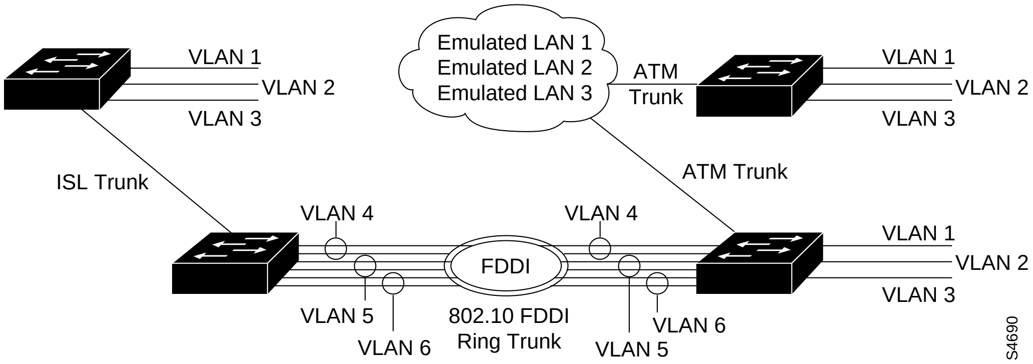
VLAN Trunk Protocol (VTP)

Use VLAN Trunk Protocol to set up and manage VLANs across an entire management domain. When new VLANs are added to a Catalyst switch in a management domain, VTP can be used to automatically distribute the information to other trunks of all of the devices in the management domain. This allows VLAN naming consistency, and connectivity between all devices in the domain. The VTP is transmitted on all trunk connections, including Interswitch Link (ISL) and 802.10, and ATM LAN emulation (LANE).

On boot-up, a Catalyst switch sends out periodic requests for VTP configuration on all of its trunks until it receives a summary advertisement from a neighbor. It uses that summary advertisement to determine whether its currently stored configuration is obsolete and if it is, it requests all VTP information from the neighbor.

Figure 7-2 shows a diagram of the established VLANs, illustrating how VTP can traverse trunk connections using the ISL and 802.10 protocols and ATM LAN emulation (LANE).

Figure 7-2 VLAN Network Example



The Catalyst switch transmits VTP frames on its trunk ports, advertising its management domain name, configuration revision number, and VLAN information that it has learned. Other Catalyst switches in the domain use these advertisements to learn about any new VLANs that are configured in the transmitting switch. This process of advertising and learning allows a new VLAN to be created and configured on only one switch in the management domain. This information is then learned automatically by all of the other devices in the domain.

A Catalyst switch can operate in three different VTP modes: Server, Client, or Transparent.

- Server mode permits changes to the administrative domain’s global VLAN configuration from the local device. Redundancy in a network domain can be created by using multiple VTP servers.
- Client mode accepts configuration changes from other devices in the administrative domain but will not permit local changes to the data base.
- Transparent mode will accept and store changes to the local VLAN configuration database but will never propagate them anywhere. Transparent mode will pass through any VTP packets received on the default VLANs of any trunk onto the default VLANs of all other trunks.

VTP No-domain Mode

By using no-domain mode, VTP can operate with minimal configuration procedures. When a Catalyst switch is booted for the first time (and when it is rebooted after an NV RAM reset), it comes up in no-domain mode. The no-domain mode means there is no domain name configured into the box. While in no-domain mode, a switch will not attempt to advertise its own current configuration. If and when it receives an advertisement from any neighbor on any trunk, it will immediately accept the management domain name from the neighbor's advertisement as its own. After receiving all of the neighbor’s configuration data, it will begin advertising this data regularly (after a reboot) on all of its trunks.

Transparent VTP Devices

Use VTP transparent mode to have a Catalyst switch not participate in VTP and yet not have it cut off VTP configuration from propagating beyond it. In transparent mode, VTP packets received on one trunk are automatically propagated unchanged to all other trunks on the device but are ignored on the device itself.

Caution VTP packets circumvent spanning tree on the Catalyst switches. Transparent mode may cause loops on trunk ports.

Security

A checksum is calculated using an arbitrary security value that is appended to the front end and the back end of the data in a VTP configuration. Whenever a VTP device has received all of the parts of the VTP configuration, it recalculates the checksum using it's own security value derived from the password that has been configured locally. The device will not accept the new configuration if the checksums do not match.

On all Cisco VTP devices, the default initial configuration of the security value is all zeroes. Therefore, VTP devices will always accept one another's VLAN configurations as long as none of the security values on any of the devices have been modified. In order to make use of the security feature, a password needs to be set. The password must be the same for the management domain on all devices in the domain. Neither the password nor the security value itself is ever advertised over the network.

By default, the management domain is set to nonsecure mode, without a password. Adding a password sets the management domain to secure mode. The same password must be configured on each Catalyst switch in the management domain when in secure mode.

Caution If a passwords are set, a management domain does not function properly if the same management domain password is not assigned to each Catalyst switch in the domain.

VTP and the ISL Trunk

ISL trunks multiplex packets from different VLANs by way of their ISL VLAN number in the ISL packet header. The ISL VLAN number is synonymous with the VTP VLAN ID. Packets received on non-transit VLANs on ISL links on VLANS that are not local transit VLANS on the switch, will be dropped.

VTP and the LANE Trunk

LANE VLANs are identified by their 32 character name, which is synonymous with the VTP VLAN name. For this reason, VTP VLAN names are unique within an administrative domain. The Catalyst switch domain name has been expanded from 16 characters to 32 in order to match the size of the VTP/LANE VLAN name.

Setting Virtual LANs (VLANs)

VLANs allow ports to be grouped so that traffic is confined to members of that group only. The group can contain the same or different switches. This feature restricts broadcast, unicast, and multicast traffic (flooding) to ports only included in a certain VLAN. VLANs can be set for an entire management domain from any VTP server device.

Setting up VLANs for a management domain requires two tasks, as follows:

- Creating VLANs in a Management Domain
- Grouping switchports by VLANs by using the configuration menus

Creating VLANs in a Management Domain

Use the VTP VLAN Configuration menu to configure the following parameters for a VLAN in the management domain:

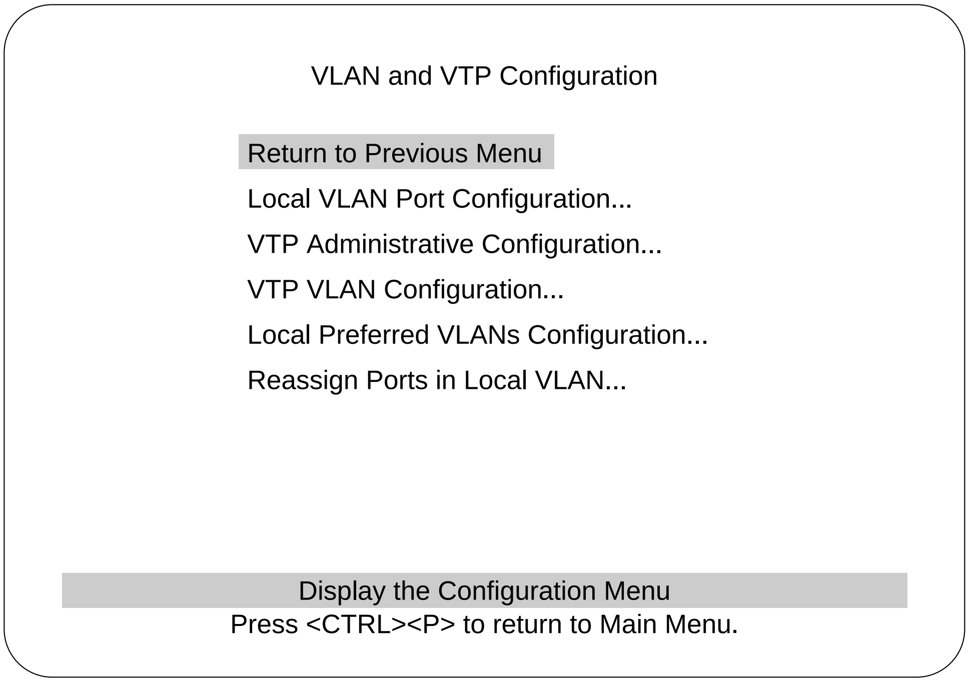
- VLAN number
- VLAN name
- VLAN type (Ethernet, FDDI, Token Ring, FDDI NET, or TR NET)
- Maximum transmission unit (packet size, in bytes) that the VLAN can use
- Security association identifier (SAID)
- State of the VLAN (active or suspended)
- Ring number for FDDI and Token Ring VLANs
- Bridge identification number
- Parent VLAN number
- Spanning-Tree Protocol (STP) type
- VLAN number to use for translation when translating from one VLAN type to another
    - When translating from one VLAN type (Ethernet, FDDI, Token Ring, FDDI NET, or TR NET) to another, the Catalyst switch requires a different VLAN number for each of the media types.

VTP and VLAN Configuration Screens

VTP Configuration screens consist of a main VLAN and VTP configuration menu. This menu allows access to:

- Local VLAN Port Configuration.
- VTP Administrative Configuration menu, which lists the parameters of the domain.
- VTP VLAN Configuration menu (after selecting a VLAN). This menu is described in the Server Mode VLAN Configurations Menu section.
- Local Preferred VLANs menu (explained in the Preferred VLANs Menu section)
- Reassign Ports in a VLAN menu is used to change VLAN port assignments.

VLAN and VTP Configuration menu:



```
                VLAN and VTP Configuration

            Return to Previous Menu
            Local VLAN Port Configuration...
            VTP Administrative Configuration...
            VTP VLAN Configuration...
            Local Preferred VLANs Configuration...
            Reassign Ports in Local VLAN...




                Display the Configuration Menu
           Press <CTRL><P> to return to Main Menu.
```

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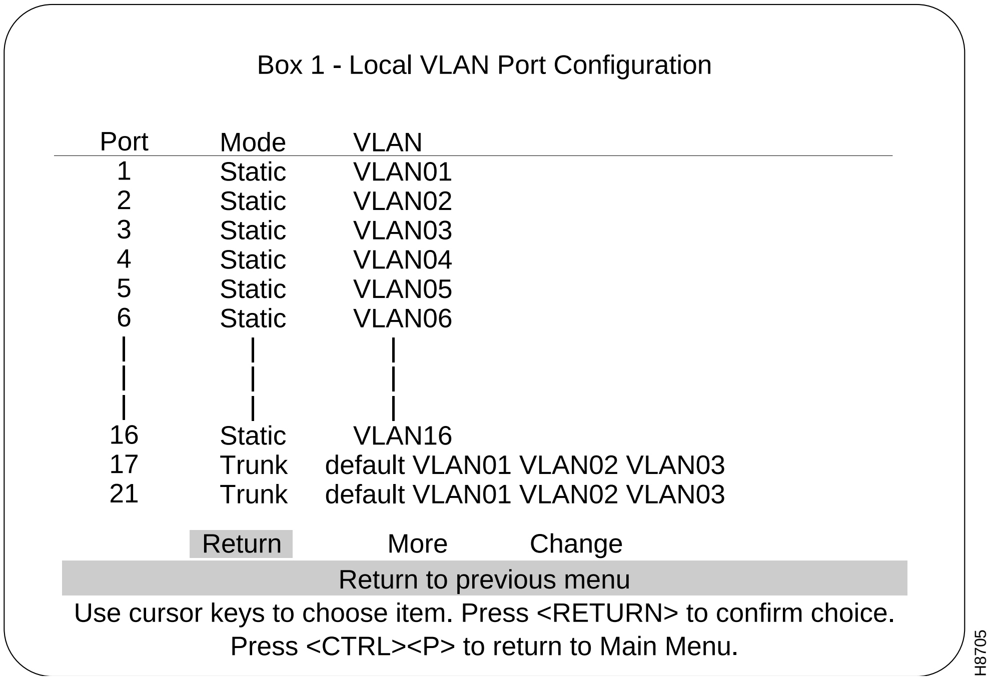
Local VLAN Port Configuration menu:



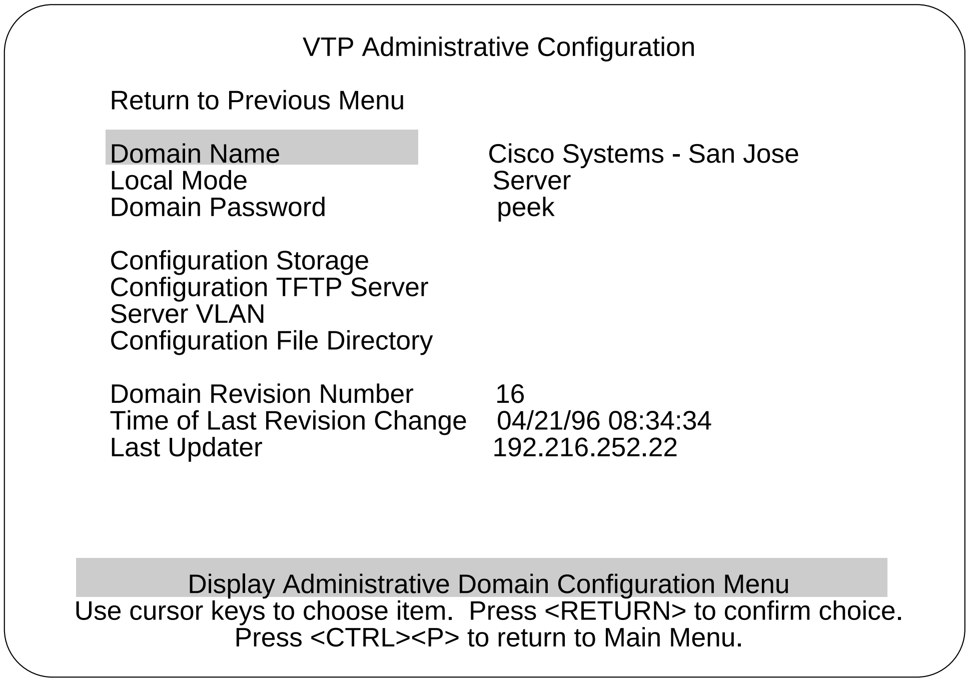
```
                 Box 1 - Local VLAN Port Configuration

     Port        Mode        VLAN
       1         Static      VLAN01
       2         Static      VLAN02
       3         Static      VLAN03
       4         Static      VLAN04
       5         Static      VLAN05
       6         Static      VLAN06
       |           |            |
       |           |            |
       |           |            |
      16         Static      VLAN16
      17         Trunk     default VLAN01 VLAN02 VLAN03
      21         Trunk     default VLAN01 VLAN02 VLAN03
```

Return to previous menu

Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

VTP Administrative Configuration menu:



```
                    VTP Administrative Configuration

    Return to Previous Menu

    Domain Name                     Cisco Systems - San Jose
    Local Mode                      Server
    Domain Password                 peek

    Configuration Storage
    Configuration TFTP Server
    Server VLAN
    Configuration File Directory

    Domain Revision Number          16
    Time of Last Revision Change    04/21/96 08:34:34
    Last Updater                    192.216.252.22



          Display Administrative Domain Configuration Menu
  Use cursor keys to choose item.  Press <RETURN> to confirm choice.
              Press <CTRL><P> to return to Main Menu.
```

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The following sections describe the terms used in the VTP Administrative Configuration menu.

Domain Name

The name of the administrative domain the device is participating in (accepting updates from, and propagating configuration changes to).

Local Mode

Server, Client, or Transparent:

- Server mode permits configuration changes from the local device.
  - All devices in Server mode must be capable of storing configurations for all the VLANs in the administrative domain. The switch will not allow the user to configure VLANs in excess of 68. If this number is exceeded, the switch will automatically enter Client mode.
- Client mode accepts configuration changes only from other devices.
- Transparent mode will pass through any VTP packets received. Transparent mode will also accept and store changes to the local VLAN configuration database but will not propagate the changes to other devices.

Domain Password

Password of up to 64 characters common to all devices in the administrative domain. A configuration will not pass between two devices with different passwords even if they are configured with the same administrative domain name.

Configuration Storage

NV Ram or TFTP server. This parameter is not configurable in Release 2.0.

Configuration TFTP Server

TFTP server on which configuration storage file is located. This parameter is not configurable in Release 2.0.

Server VLAN

VLAN where the TFTP server containing the configuration storage file is located. This parameter is not configurable in Release 2.0.

Configuration File Directory

Directory on TFTP server on which configuration storage file is located. This parameter is not configurable in Release 2.0.

Domain Revision Number

The revision number of the current configuration database implemented on this device.

Time of Last Revision Change

The time the revision of the current configuration database implement on this device was created.

Last Updater

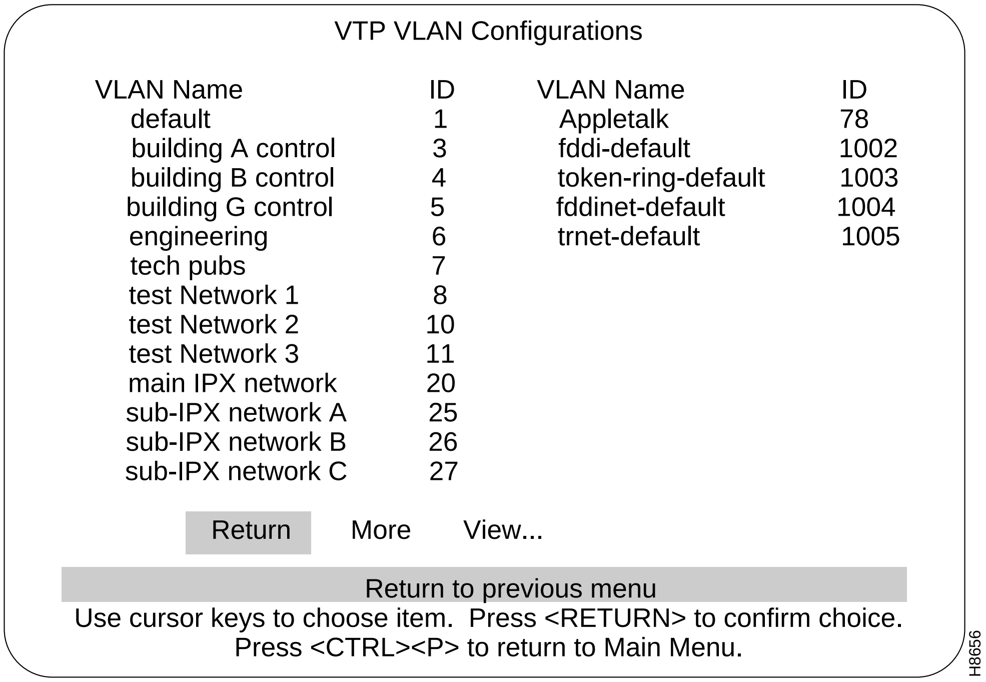
The IP address of the server where the revision of the current configuration database implemented on this device was created.

Server Mode VLAN Configurations Menu

The following menu, VTP VLAN Configuration, is accessed from the VLAN and VTP Configuration menu. When the switch is in the *Server* mode, the menu displayed below is presented. The line after the VLAN Name parameters will read “Return More Change... Add... Delete.”

When the switch is in the *Client* mode, that line will read “Return More Examine...” (the Client mode menu and explanation are presented after the Server mode menu).

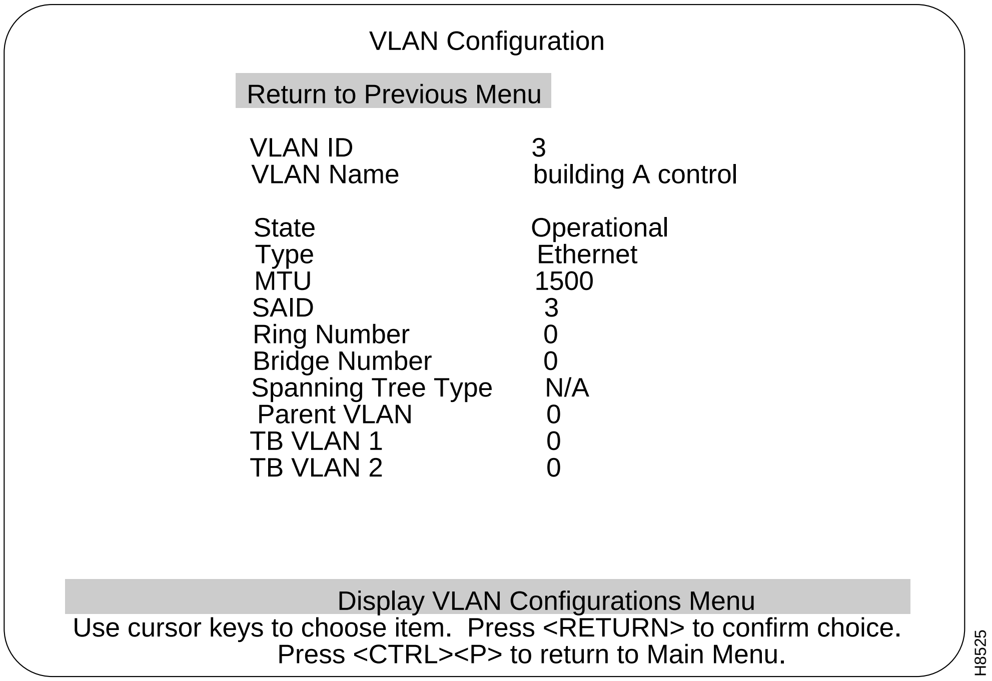
The Server mode VTP VLAN Configurations menu:



```
                    VTP VLAN Configurations

   VLAN Name               ID      VLAN Name               ID
      default               1        Appletalk             78
      building A control    3        fddi-default          1002
      building B control    4        token-ring-default    1003
      building G control    5        fddinet-default       1004
      engineering           6        trnet-default         1005
      tech pubs             7
      test Network 1        8
      test Network 2       10
      test Network 3       11
      main IPX network     20
      sub-IPX network A    25
      sub-IPX network B    26
      sub-IPX network C    27

          Return     More     View...

                  Return to previous menu
  Use cursor keys to choose item.  Press <RETURN> to confirm choice.
              Press <CTRL><P> to return to Main Menu.
```

Selecting Add or Change at the VLAN Configurations menu presents the following statement: “Enter VLAN ID for the VLAN to be added (or changed).” Entering a VLAN ID and pressing RETURN presents the following menu. This menu is used for the configuration of an individual VLAN.

The Server version of the VTP VLAN Configuration menu:



```
                    VLAN Configuration

            Return to Previous Menu

             VLAN ID                3
             VLAN Name              building A control

             State                  Operational
             Type                   Ethernet
             MTU                    1500
             SAID                   3
             Ring Number            0
             Bridge Number          0
             Spanning Tree Type     N/A
             Parent VLAN            0
             TB VLAN 1              0
             TB VLAN 2              0




              Display VLAN Configurations Menu
  Use cursor keys to choose item.  Press <RETURN> to confirm choice.
             Press <CTRL><P> to return to Main Menu.
```

VLAN ID

The numeric VTP ID, which is synonymous with the VLAN’s ISL ID associated with the VLANs packets on ISL trunks. The allowable range is from 1 to 1005.

VLAN Name

The ASCII name associated with the VLAN, which is synonymous with the VLAN's ELAN name on LANE trunks. Up to 32 characters are allowed.

State

VLANs in *Operational* state are functional. VLANs do not pass packets when *Suspended*.

Type

VLAN type: Ethernet, FDDI, Token Ring, FDDI-net, and Token Ring-net.

MTU

The maximum transmission unit of the VLAN.

SAID

The SAID associated with the VLAN, which is the same as the VLAN's ID on FDDI trunks.

Ring Number

The ring number of the VLAN. (Only settable for FDDI and Token Ring VLANs.)

Bridge Number

The bridge number of the VLAN. (Only settable for FDDI-net and Token Ring-net VLANs.)

Spanning Tree Type

The spanning tree type of the VLAN: IEEE 802.1 or IBM. (Only settable for FDDI-net and Token Ring-net VLANs.)

Parent VLAN

The VLAN ID of the parent ring associated with the VLAN. (Only settable for FDDI and Token Ring VLANs.)

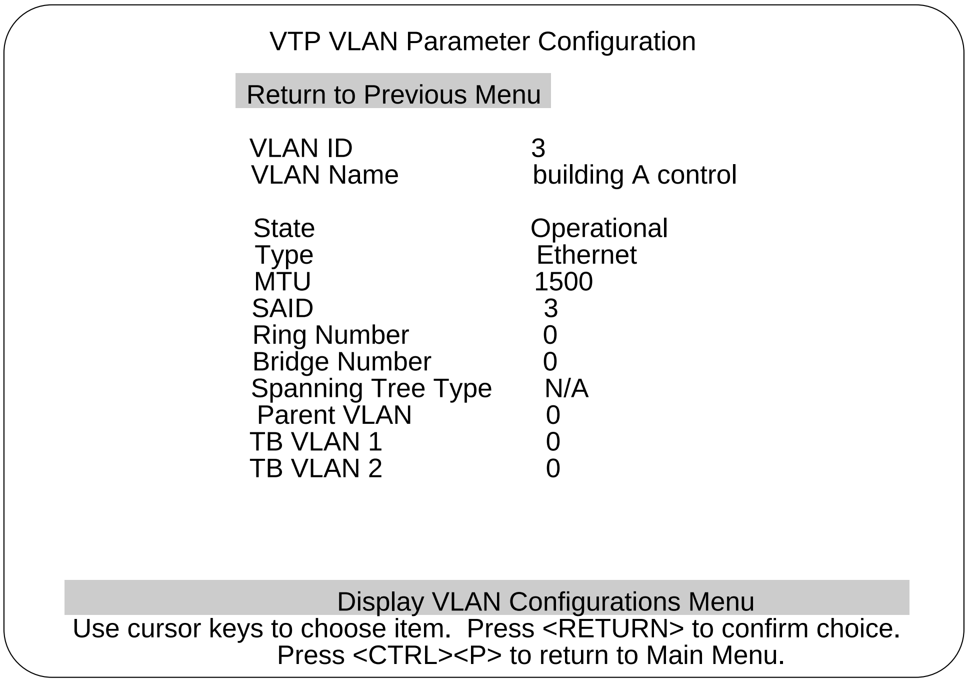
TB VLAN 1 and 2

The VLAN ID of VLAN(s) which are translationally bridged to this VLAN.

Client Mode VLAN Configurations Menu

When the switch is in the *Client* mode the following menu is displayed when selected from the VLAN/VTP Configuration menu.

The Client version of the VLAN Configurations menu from the VLAN/VTP Configurations menu:



```
                VTP VLAN Parameter Configuration

               Return to Previous Menu

                VLAN ID                 3
                VLAN Name               building A control

                State                   Operational
                Type                    Ethernet
                MTU                     1500
                SAID                    3
                Ring Number             0
                Bridge Number           0
                Spanning Tree Type      N/A
                Parent VLAN             0
                TB VLAN 1               0
                TB VLAN 2               0



                     Display VLAN Configurations Menu
   Use cursor keys to choose item.  Press <RETURN> to confirm choice.
                Press <CTRL><P> to return to Main Menu.
```

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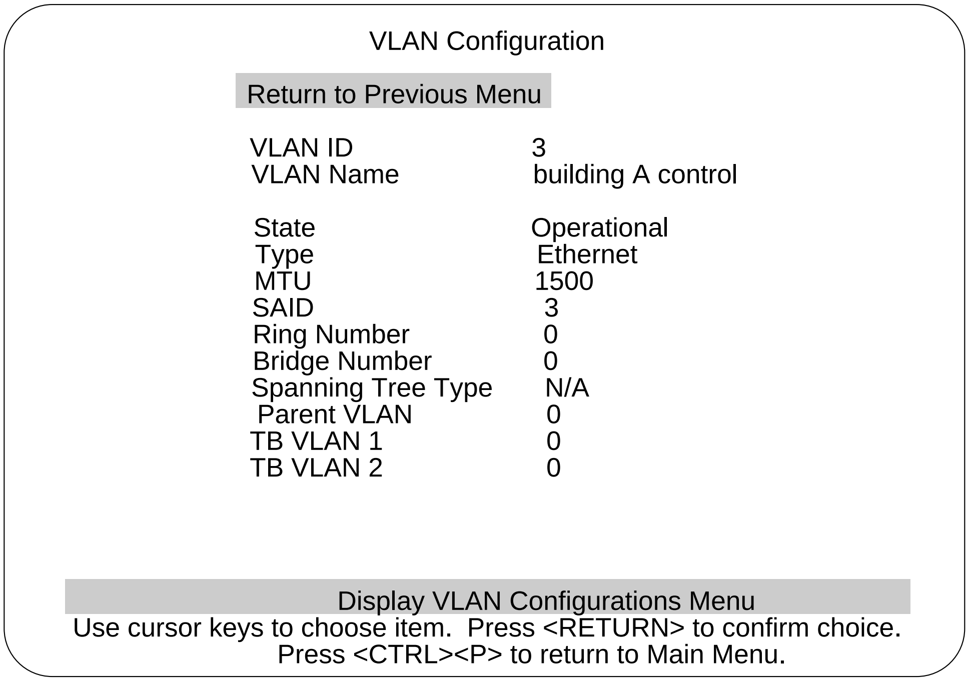
Selecting Examine... presents the line: “Enter VLAN ID for the VLAN to be examined.” Entering a VLAN ID and pressing RETURN presents a menu with a description of that VLAN.

The VLAN Configuration menu from the VLAN Configurations menu:



```
                 VLAN Configuration

         Return to Previous Menu

          VLAN ID                 3
          VLAN Name               building A control

          State                   Operational
          Type                    Ethernet
          MTU                     1500
          SAID                    3
          Ring Number             0
          Bridge Number           0
          Spanning Tree Type      N/A
          Parent VLAN             0
          TB VLAN 1               0
          TB VLAN 2               0




            Display VLAN Configurations Menu
 Use cursor keys to choose item.  Press <RETURN> to confirm choice.
            Press <CTRL><P> to return to Main Menu.
```

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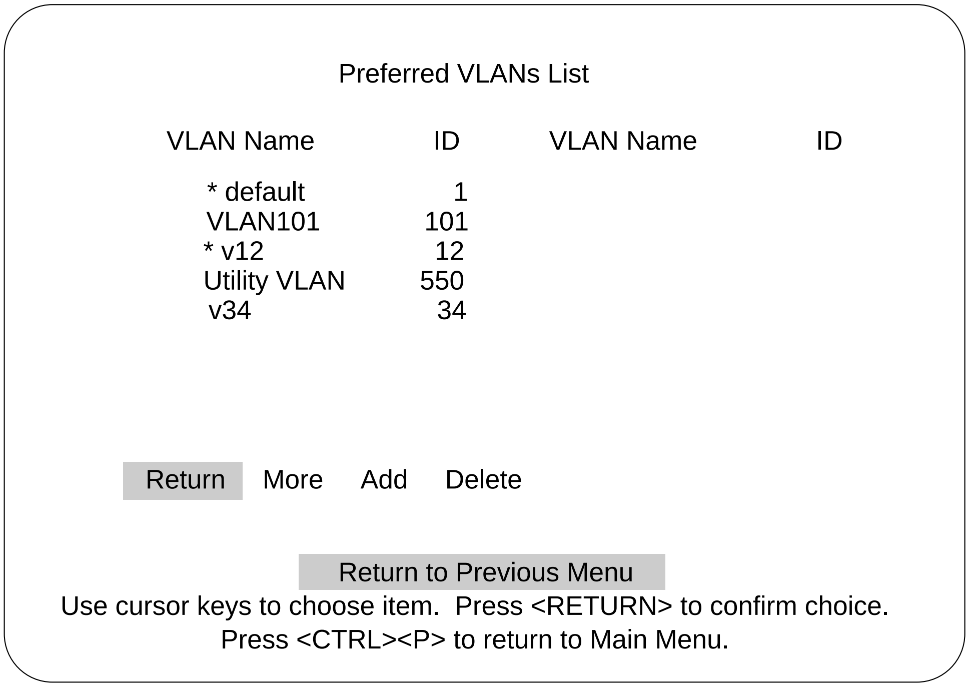
The explanations of the terms in the Client version of the VLAN Configuration menu appear in the previous section, “Server Mode VLAN Configurations Menu.”

Preferred VLANs Menu

This menu shows all of the VLANs in the system which currently transit the Stack (select More to scroll through multi-page lists). There is a maximum of 64 Preferred VLANS. VLANS denoted by an asterisks are VLANs selected as Preferred VLANs. VLANs in this display that are not denoted with asterisks are VLANs that were automatically selected for transit because they were the lowest-numbered Ethernet VLANs in the global VTP configuration.

Preferred VLANs menu:



```
                    Preferred VLANs List

     VLAN Name            ID        VLAN Name          ID

       * default             1
       VLAN101             101
       * v12                12
       Utility VLAN        550
       v34                  34



   Return   More   Add   Delete


                  Return to Previous Menu
Use cursor keys to choose item.  Press <RETURN> to confirm choice.
           Press <CTRL><P> to return to Main Menu.
```

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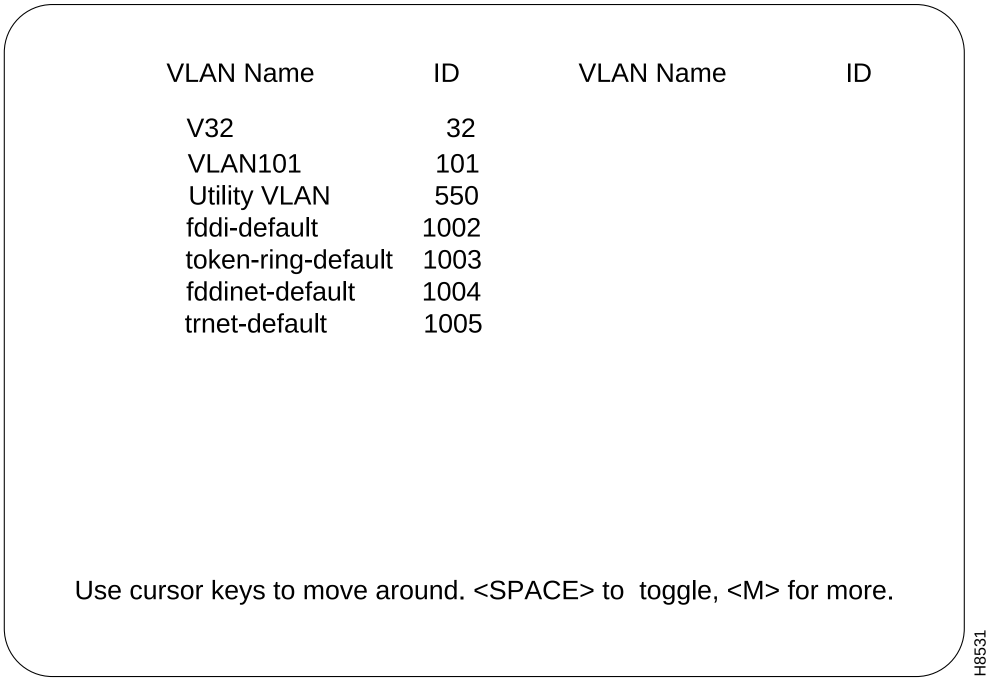
If *Delete* is selected, a prompt for a VLAN ID is displayed. Entering an ID and pressing RETURN will delete the selected VLAN from the Preferred VLAN list.

Selecting *Add* presents the next menu, the Preferred VLANs List menu, which is discussed in the next section.

Preferred VLANs List menu:



```
VLAN Name            ID            VLAN Name            ID

V32                  32
VLAN101             101
Utility VLAN        550
fddi-default       1002
token-ring-default 1003
fddinet-default    1004
trnet-default      1005



Use cursor keys to move around. <SPACE> to  toggle, <M> for more.
```

This list shows all currently non-preferred Ethernet VLANs in the global VTP configuration. Use the following steps to enter VLANs into the preferred list.

Step 1 Use the letter M key to page through a multi-page list.

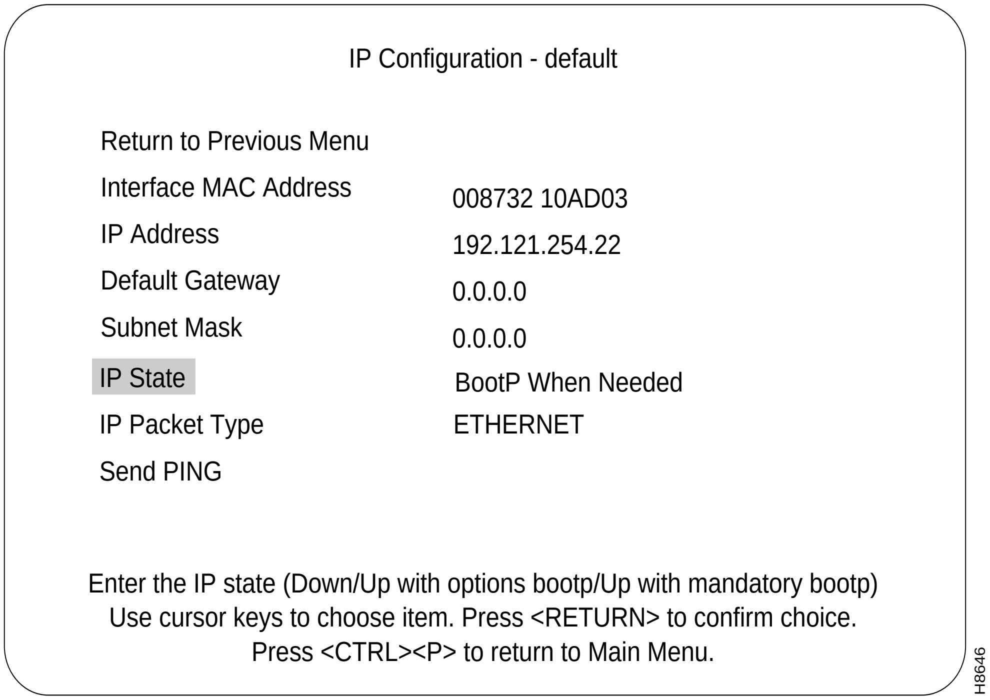
Step 2 Use the ARROW keys to highlight and choose VLAN names.

Step 3 Press the SPACE key to toggle an asterisk on and off at the selected VLAN name (there is a limit of 64 VLANs that can be added to a preferred list).

When the RETURN key is pressed, VLANs with the asterisk toggled on are added to the preferred list.

IP Configuration from the Configuration Menu

Select this menu from the Configuration menu. Use this menu to view or change the IP configuration information.



```
                    IP Configuration - default

   Return to Previous Menu
   Interface MAC Address          008732 10AD03
   IP Address                     192.121.254.22
   Default Gateway                0.0.0.0
   Subnet Mask                    0.0.0.0
   IP State                       BootP When Needed
   IP Packet Type                 ETHERNET
   Send PING


 Enter the IP state (Down/Up with options bootp/Up with mandatory bootp)
     Use cursor keys to choose item. Press <RETURN> to confirm choice.
               Press <CTRL><P> to return to Main Menu.
```

IP Address

Displays the current IP address. To change it, highlight the selection and press RETURN.

Default: 0.0.0.0

Default Gateway

Displays current gateway address. The default is the IP address of the gateway or router through which information must pass to get to the NMS application.

Default: 0.0.0.0

Subnet Mask

Displays the current subnet mask.

Default: 0.0.0.0

IP State

Select choices of IP Disabled, BootP When Needed or BootP Always by highlighting IP State and pressing RETURN, then highlighting one of the choices and pressing RETURN.

Default: BootP when Needed

IP Packet Type

Display type of Ethernet packet being presented.

Send PING

Prompts for entering an IP address, then sends a PING to that address.

IP Disabled

When a VLAN is IP-disabled, it does not process any IP or ARP packets it receives. This means that no SNMP, Ping, Telnet, or ARP Packets will be responded to when received.

Note Sending a PING from an IP-disabled VLAN or a VLAN whose IP address is 0.0.0.0 may cause system problems.

BootP When Needed

In this state, IP is enabled for the VLAN and will function immediately if a non-zero IP address has been stored in NVRAM when the Catalyst 3200 initializes. In each VLAN that an IP address of 0.0.0.0 and a state of BootP When Needed are stored in NVRAM on boot (or NVRAM is not initialized on boot), the Catalyst will broadcast BootP requests in an attempt to determine its own IP address. Until it receives a reply, this is the only IP function the Catalyst will support (in the VLAN).

BootP When Needed is the factory-set default. A Catalyst for which NVRAM is not initialized (for instance, a new Catalyst out of the box or on a bootup after NVRAM is cleared), or one whose NVRAM is corrupted and unreadable, will therefore always attempt to use BootP the first time.

BootP Always

In this state, IP is enabled for the VLAN but will not function fully on boot until a BootP reply has been received. If a non-zero IP address is stored in NVRAM for a given VLAN in this state when booted, it is cleared to 0.0.0.0 since it would never be used.

BootP Requests and Parameters

When using BootP to determine its IP address, the Catalyst repeats BootP requests at regular intervals, beginning at 1 second each and eventually decreasing to every 5 minutes over time until it receives a valid reply. If the IP display for the VLAN is accessed from the console (or via Telnet from another VLAN) during that time, the Catalyst may cease using BootP if the parameters are set (on display exit) in such a way that BootP would no longer be necessary. For instance, if the IP state is switched from BootP Always to IP-disabled or if a non-zero IP address is specified in any IP state.

Once the Catalyst has ceased sending BootP requests on a VLAN, it does not restart sending requests on that VLAN for any reason other than an entire Catalyst reset. It also ceases to recognize BootP responses on that VLAN.

Besides the IP address, several other parameters in a BootP response are also recognized and recorded in NVRAM, when received in the same response:

- Default Gateway (see note below)
- Subnet Mask
- TFTP Bootfile Name
- TFTP Server Address (only recognized if the Bootfile name is present)

One other parameter, the TFTP VLAN, is inferred whenever a TFTP Bootfile name is present in the BootP response. That is, if the Catalyst receives a BootP response that specifies a TFTP Bootfile name, the Catalyst automatically records the VLAN on which the response was received as the TFTP VLAN number. Therefore, the bootfile name should not be specified on a VLAN from which the TFTP server cannot be accessed, either directly or through the VLANs default gateway (if one exists). More information on TFTP is available under the section "TFTP" within this chapter.

Note The default gateway accepted is the first one in the list of routers whose net/subnet address is the same as that of the IP address specified. If no routers are specified or if none qualify, the gateway address for the VLAN will be zeroed out and recorded as such in NVRAM when the IP screen is exited.

SNMP Configuration from the Configuration Menu

The next selection of the Configuration Menu is the SNMP Configuration menu.

Screen displays and explanations of this menu and its sub-menus are presented in Chapter 9, "Console Configuration."

The next section describes spanning tree and the spanning tree menus from the Configuration menu.

Spanning Tree Protocol

The Spanning Tree Protocol (STP) is a bridge-to-bridge link management protocol that provides path redundancy while preventing undesirable loops. To provide path redundancy, the Spanning Tree Protocol defines a tree that spans all switches and bridges in the extended network; if one of the network segments in the tree becomes inaccessible, the spanning tree reconfigures itself to re-establish the links.

To prevent loops, the spanning tree selects one port as the designated path to the root, assigning it the Forwarding (or active) state. Ports that also have paths leading to the root will be assigned to the Blocking (or standby) state. Any remaining ports will be assigned to the Forwarding state.

A port in the Blocking state will not forward a received packet and, except for VTP and CDP packets, will not transmit a packet.

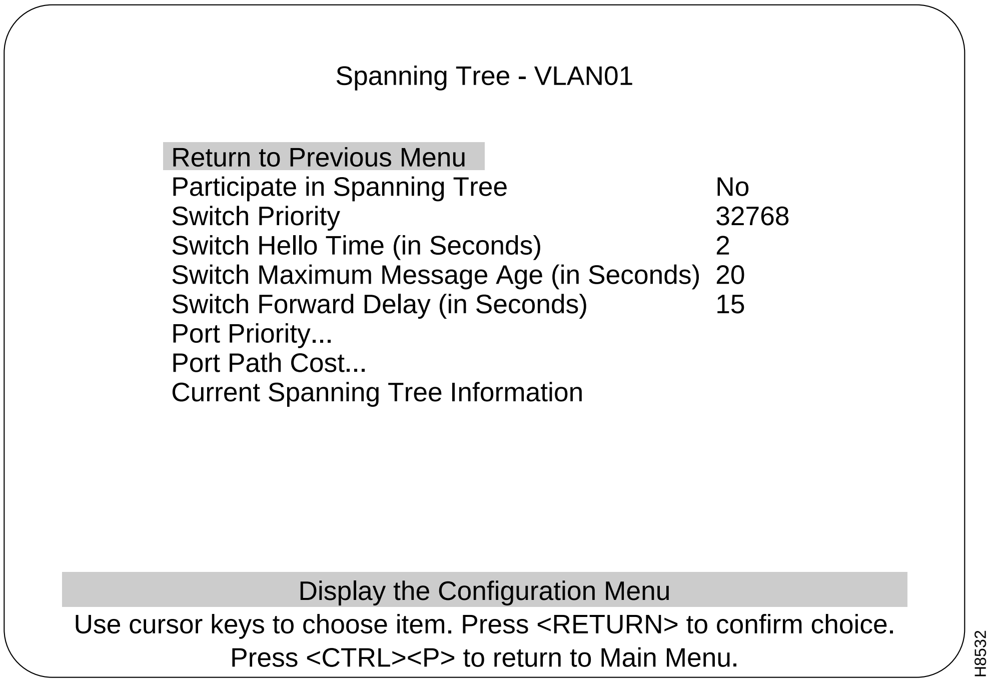
Note With this 2.0 version of software, Spanning Tree Protocol will be ON by default. When the Catalyst 3200 is first powered on, the Spanning Tree Protocol will be active. Use the console configuration menus to enter the Spanning Tree menu and then enter “no” after the line “Participate in Spanning Tree” if you wish to turn spanning tree off.

If more than one ATM expansion module interface is installed anywhere within a Stack environment, STP must be on for the VLANs that will be supported by those ATM trunk interfaces.

By default, all VLANs are enabled on the (allowed) trunk.

Spanning Tree Menu

Select the Spanning Tree menu for the VLAN you wish to view, from the Configuration menu. Use the Spanning Tree menu to specify whether the VLAN is participating in spanning tree and, if so, to configure spanning tree bridge and port parameters.



```
                    Spanning Tree - VLAN01

         Return to Previous Menu
         Participate in Spanning Tree                No
         Switch Priority                             32768
         Switch Hello Time (in Seconds)              2
         Switch Maximum Message Age (in Seconds)     20
         Switch Forward Delay (in Seconds)           15
         Port Priority...
         Port Path Cost...
         Current Spanning Tree Information




                Display the Configuration Menu
 Use cursor keys to choose item. Press <RETURN> to confirm choice.
           Press <CTRL><P> to return to Main Menu.
```

Participate in Spanning Tree

Select Yes or No by moving the highlight to the Participate in Spanning Tree heading and press RETURN. Then move the highlight to Yes or No and press RETURN. If you select No, the remaining values on the menu will be saved, but will have no effect. Selecting Yes will enable spanning tree for this VLAN upon exiting this screen.

Default: Yes

Note Telnet user-sessions are terminated when any changes are made to spanning tree parameters.

Switch Priority

Enter a priority value for this bridge (switch). The bridge with the lowest priority value in a spanning tree becomes the root. This is also known as the bridge ID. The bridge ID consists of the combination of the bridge priority field and the bridge MAC address.

(To change individual Port Priorities, select *Port Priority Menu*.)

Range: 0–65535

Default: 32768

Switch Hello Time (in Seconds)

Enter a time to determine how often configuration messages are sent when this switch is root. The minimum value may not be less than 1. The maximum may not be more than the lower of 10 or *Switch Maximum Message Age*/2 - 1. The upper range limit that appears reflects the value currently selected for *Switch Maximum Message Age*.

Default: 2

Switch Maximum Message Age (in Seconds)

Enter the maximum message age for configuration messages when this switch is root. The minimum value may not be less than the higher of 6 or (2 x (*Switch Hello Time* + 1)). The maximum may not be more than the lower of 40 or (2 x (*Switch Forward Delay* - 1)). The range limits that appear reflect the values currently selected for *Switch Hello Time* and *Switch Forward Delay.*

Default: 20

Switch Forward Delay (in Seconds)

Enter the time the switch waits between transitions from listening to learning, and from learning to forwarding. The minimum may not be less than the larger of 4 or (2 x (*Switch Maximum Message Ag*e/2 +1)). The maximum may not be higher than 30. The lower range limit that appears reflects the value currently selected for *Switch Maximum Age*.

Default: 15

Port Priority Menu

Displays a list of the port priorities of user selectable values. For more information on this menu, see the following section, Port Priority Screen.

Port Path Cost Menu

Displays a list of port path costs of user selectable values. For more information on this menu, see the following section, Port Path Cost Menu

Current Spanning Tree Information

This selection displays the current status of spanning tree for this bridge. The Current Spanning Tree menu is presented if this heading is selected and if spanning tree is enabled ("Yes" is selected under "Participate in Spanning Tree" prompt).

When the spanning tree is turned off—that is, you have selected "No" for the "Participate in Spanning Tree" prompt—this menu cannot be selected.

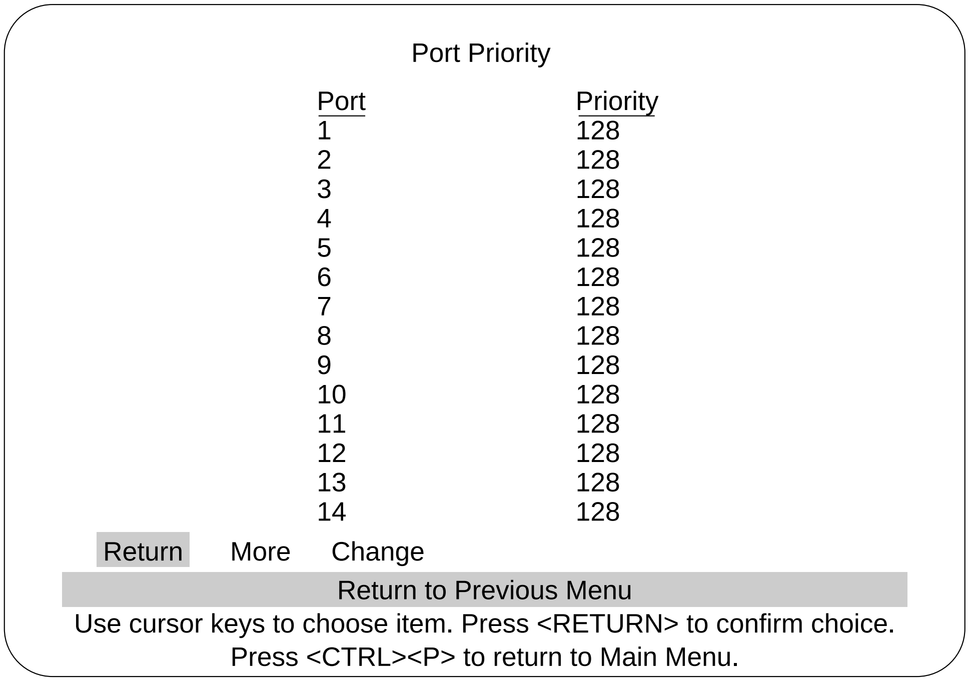
Setting STP Port Priority and Port Path Cost

To set up the Catalyst 3200 to use the Spanning Tree Protocol, you may assign a *port priority* and a *port path cost* value (other than the default value) to each VLAN on a trunk. Different values can be set for each VLAN on a trunk. Refer to the following sections for the appropriate console menus and descriptions of assigning port priority and port path cost.

Port priority and port path cost are used in conjunction with each other to try to even out the VLANs over the ATM trunks. Spreading the VLANs evenly over all of the available ATM trunks may increase the efficiency of the VLANs.

Port Priority Screen

View the Port Priority Menu to set up spanning tree priorities for each port.



```
                         Port Priority

                  Port                  Priority
                  1                     128
                  2                     128
                  3                     128
                  4                     128
                  5                     128
                  6                     128
                  7                     128
                  8                     128
                  9                     128
                  10                    128
                  11                    128
                  12                    128
                  13                    128
                  14                    128
     Return    More    Change
                   Return to Previous Menu
  Use cursor keys to choose item. Press <RETURN> to confirm choice.
              Press <CTRL><P> to return to Main Menu.
```

H4686

Port

The number of the port.

Priority

If two ports to the same LAN have the same path cost, the spanning tree device selects the one with the highest priority (lowest value). To block traffic on a particular segment, assign it a lower port priority (higher value).

Select the port whose priority value you want to change, highlight “Change” and then press the RETURN key, enter the port number, then enter the new value. The port with the lowest number has the highest priority. New values take effect when you return to the previous menu.

Range: 0–255. (Default: 128)

More

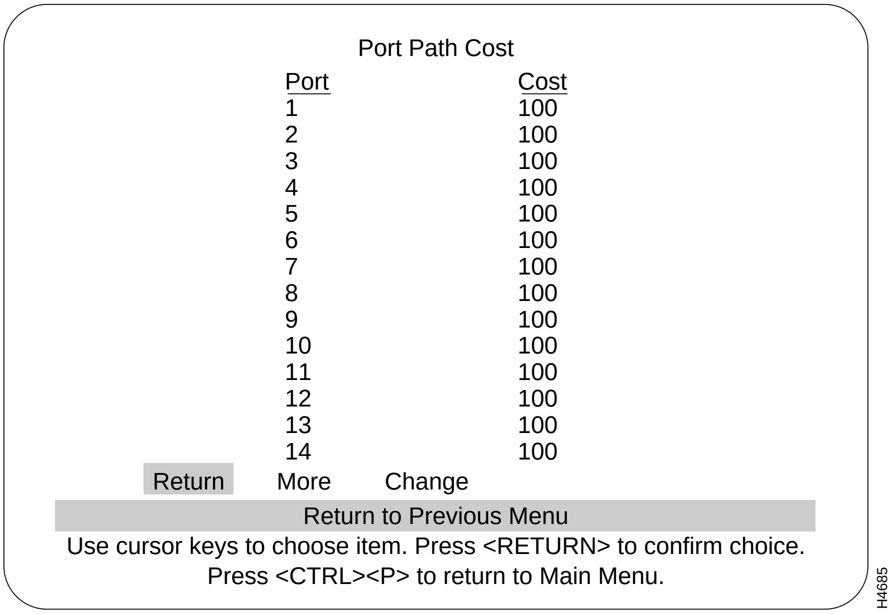
To view more ports in the table.

Change

To change or add values to specific ports.

Port Path Cost Menu

Use the Port Path Cost Menu to view and change the spanning tree path cost associated with each port. Spanning tree uses port path costs to determine which port to select as a forwarding port. The path cost indicates the relative speed of the segment: The higher the speed of the segment, the lower the path cost. Switches and bridges in the network attempt to determine the path to the route with the lowest path cost.



```
                         Port Path Cost
                  Port                  Cost
                  1                     100
                  2                     100
                  3                     100
                  4                     100
                  5                     100
                  6                     100
                  7                     100
                  8                     100
                  9                     100
                  10                    100
                  11                    100
                  12                    100
                  13                    100
                  14                    100
          Return     More     Change
                    Return to Previous Menu
  Use cursor keys to choose item. Press <RETURN> to confirm choice.
              Press <CTRL><P> to return to Main Menu.
```

Port

Select the port whose cost you want to change, press RETURN.

Cost

After selecting the port, enter a new value. When the spanning tree reconfigures itself, it selects forwarding ports based on the port cost. Therefore, assign lower numbers to ports attached to faster media (such as Full-Duplex Ethernet, Fast Ethernet or EtherChannel), and higher numbers to ports attached to lower-bandwidth media, such as Half-Duplex Ethernet. New values take effect when exiting this screen by choosing *Return to Previous Menu*.

IEEE 802.1D recommends that you assign path costs using the following formula:

Path cost = 1000/LAN speed in Mbps

Range: 0–65535.

Default: 10Mbsec Ethernet - 100
100Mbsec Ethernet - 10
155Mbsec ATM - 6

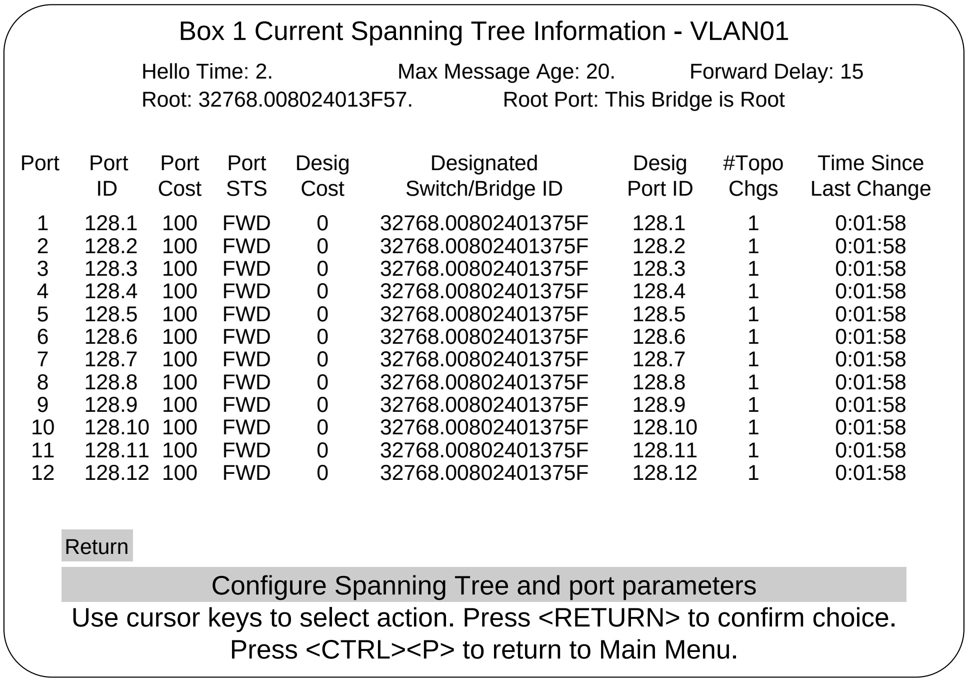
Change

To change or add values to specific ports.

Current Spanning Tree Information Screen

Use the Current Spanning Tree Information screen to view a summary of all spanning tree information for each port; the information is updated every second. You cannot change any information on this screen. When the spanning tree is turned off—that is, you have selected No for the Participate in Spanning Tree prompt—this menu cannot be selected.

The following sections describe the titles used on this screen. All of the terms across the heading of this screen are explained first and then the heading above each column is explained.



```
                 Box 1 Current Spanning Tree Information - VLAN01

            Hello Time: 2.            Max Message Age: 20.       Forward Delay: 15
            Root: 32768.008024013F57.          Root Port: This Bridge is Root

Port   Port    Port   Port   Desig       Designated          Desig    #Topo    Time Since
        ID     Cost   STS    Cost     Switch/Bridge ID      Port ID   Chgs    Last Change

  1   128.1    100    FWD     0     32768.00802401375F     128.1      1        0:01:58
  2   128.2    100    FWD     0     32768.00802401375F     128.2      1        0:01:58
  3   128.3    100    FWD     0     32768.00802401375F     128.3      1        0:01:58
  4   128.4    100    FWD     0     32768.00802401375F     128.4      1        0:01:58
  5   128.5    100    FWD     0     32768.00802401375F     128.5      1        0:01:58
  6   128.6    100    FWD     0     32768.00802401375F     128.6      1        0:01:58
  7   128.7    100    FWD     0     32768.00802401375F     128.7      1        0:01:58
  8   128.8    100    FWD     0     32768.00802401375F     128.8      1        0:01:58
  9   128.9    100    FWD     0     32768.00802401375F     128.9      1        0:01:58
 10   128.10   100    FWD     0     32768.00802401375F     128.10     1        0:01:58
 11   128.11   100    FWD     0     32768.00802401375F     128.11     1        0:01:58
 12   128.12   100    FWD     0     32768.00802401375F     128.12     1        0:01:58


    Return
               Configure Spanning Tree and port parameters
    Use cursor keys to select action. Press <RETURN> to confirm choice.
                  Press <CTRL><P> to return to Main Menu.
```

H7342

Hello Time

The Hello Time, in seconds, advertised by the root and used by all bridges and switches in the active topology of the spanning tree network.

Max Message Age

The Maximum Message Age, in seconds, advertised by the root and used by all bridges and switches in the spanning tree network.

Forward Delay

The Forward Delay Time, in seconds, advertised by the root and used by all bridges and switches in the spanning tree network.

Root

The bridge ID of the switch in the spanning tree that this switch has accepted as the root device.

Root Port

The number of the port on this switch that is closest to the root. This switch communicates with the root through this port. If this switch is the root, “This Bridge is Root” is displayed.

The following describes the information in each column.

Port

The number of the port that this line of information pertains to. For a unit within a Stack, the number will be the box number of that switch, followed by a comma, and then the port number of that switch.

Port ID

The port ID, used to determine the role of the port in the spanning tree. The port ID is expressed in the form <*port priority*>.<*port number*>. All ports in an EtherChannel have the same ID number.

Port (Path) Cost

The *Port Path Cost* for each port on the switch. The Port Path Cost helps determine the role of the port in the spanning tree network.

Port STS

Current state of this port within the spanning tree: DSB (disabled), BLK (blocked), LSN (listening), LRN (learning), or FWD (forwarding). The rules that define the state of the port are as follows:

- A port on a network segment with no other bridge or switch is always forwarding.
- If two ports of the switch are connected to the same network segment and there is no other bridge or switch, the port with the smaller ID is forwarding and the other is blocked.
- When the switch is booted, all ports are blocked initially, then some may change to a different state: listening, learning, or forwarding, in that order. All ports that are going to change states from blocking to forwarding will do so after:

  MaxMessAge + (2 * Switch Forward Delay)

Designated Cost

The cost for a packet to travel from this port to the root in the current spanning tree configuration. The slower the media, the higher the cost.

Designated Switch/Bridge ID

Priority and MAC address of the device through which this port has determined it must communicate with the root of the spanning tree.

Designated Port ID

Port on the designated device through which this switch will communicate with the root of the spanning tree. This information is useful if the Catalyst 3200 is the designated switch on one or more network segments.

# Topo Changes

Number of topology changes, which is the number of times the port has entered the Forwarding state plus the number of times the port has made the transition from Forwarding to Blocking. The counter is reset when the switch is reset or the spanning tree is turned on, whichever is most recent.

Note The # Topo Changes is not displayed for the ATM ports.

Time Since Last Change

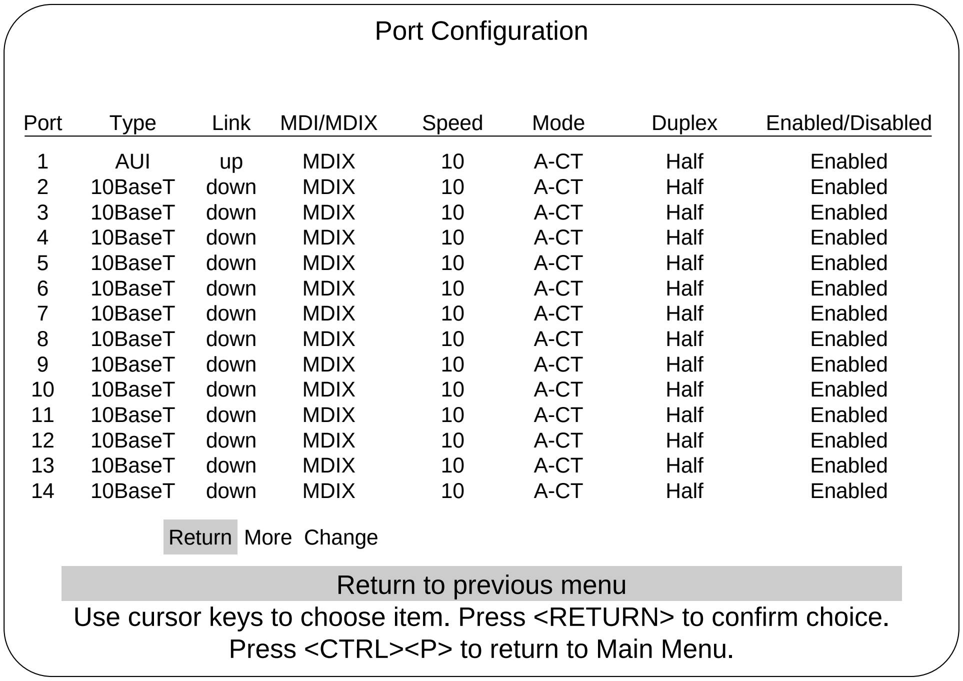
The time since the last time the port entered the Forwarding state or made the transition from Forwarding to Blocking.

Note The Time Since Last Change is not displayed for the ATM ports.

Port Configuration Screen from Configuration Menu

Use the Port Configuration Menu to enable or disable a port or change the port's duplex mode setting. This menu also reports other port status information.

Note To change the duplex mode, you can either change the hardware Duplex DIP switch settings or you can change the duplex mode using software and the Port Configuration menu.



```
                              Port Configuration


Port    Type     Link   MDI/MDIX    Speed    Mode      Duplex   Enabled/Disabled

 1      AUI       up      MDIX       10      A-CT       Half        Enabled
 2    10BaseT    down     MDIX       10      A-CT       Half        Enabled
 3    10BaseT    down     MDIX       10      A-CT       Half        Enabled
 4    10BaseT    down     MDIX       10      A-CT       Half        Enabled
 5    10BaseT    down     MDIX       10      A-CT       Half        Enabled
 6    10BaseT    down     MDIX       10      A-CT       Half        Enabled
 7    10BaseT    down     MDIX       10      A-CT       Half        Enabled
 8    10BaseT    down     MDIX       10      A-CT       Half        Enabled
 9    10BaseT    down     MDIX       10      A-CT       Half        Enabled
10    10BaseT    down     MDIX       10      A-CT       Half        Enabled
11    10BaseT    down     MDIX       10      A-CT       Half        Enabled
12    10BaseT    down     MDIX       10      A-CT       Half        Enabled
13    10BaseT    down     MDIX       10      A-CT       Half        Enabled
14    10BaseT    down     MDIX       10      A-CT       Half        Enabled

              Return  More  Change

                        Return to previous menu
     Use cursor keys to choose item. Press <RETURN> to confirm choice.
                   Press <CTRL><P> to return to Main Menu.
```

H4683

Port

The port number.

Type

Type of interface associated with this port

Link

Whether a valid link status signal is associated with the port. “Up” means a device is connected to the port, “down” means that a device is not connected.

Note If port 1(one) is used as an AUI port, the Link status is unknown. With AUI, the Link status always shows the status as up, but since it can not sense if an AUI link is communicating, the link is actually unknown (because of this, the use of the AUI port is not recommended). If a 10BaseT device is connected to port one, the link status operates normally and does show if the link is up or down. See the section "Connecting the AUI Port" in Chapter 5, "Installation," for more information on the use of port one as an AUI port or a 10BaseT port.

MDI/MDIX

The MDI setting for 10BaseT ports.

Speed

The Ethernet speed for that port.

Mode

Shows error handling mode, such as Cut-Through or Store and Forward.

Duplex

Shows the current duplex communication mode for this port. To change the duplex mode, you can either change the hardware Duplex DIP switch settings or you can change the duplex mode using software and the Port Configuration menu (software takes precedence).

Step 1 Select Change to select a port.

Step 2 Select duplex to select the duplex mode.

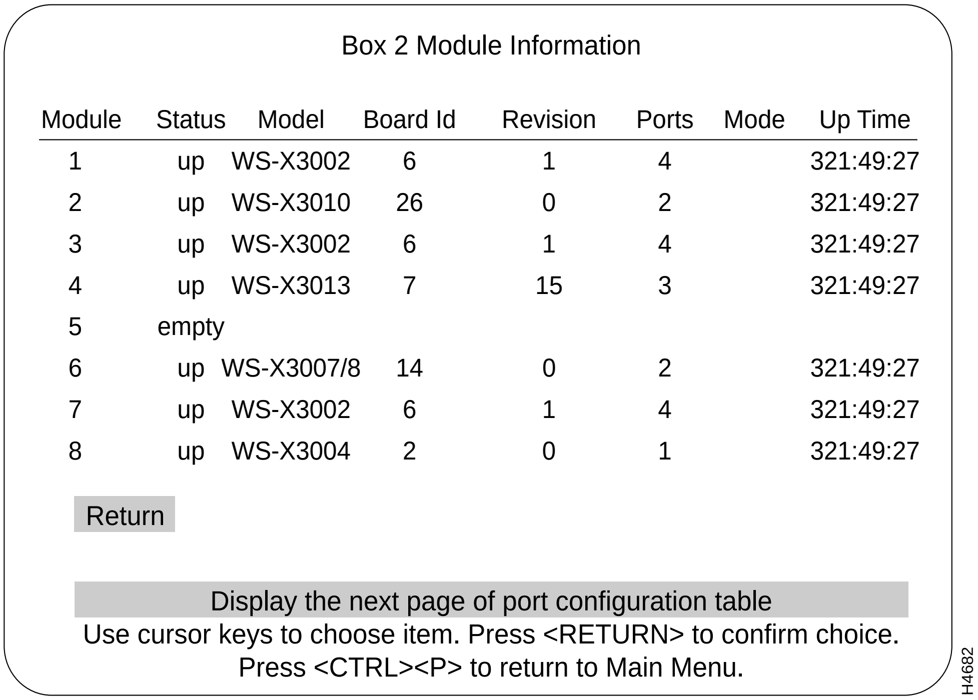
Enabled/Disabled

Operational status of ports. Toggle between enabled and disabled by selecting the port and pressing RETURN. The new status takes effect immediately.

Default: Enabled

Module Information Screen from the Configuration Menu

This menu provides information on any expansion modules that were installed. The Catalyst 3200 is listed as the first module.



```
                       Box 2 Module Information

Module   Status   Model     Board Id   Revision   Ports   Mode   Up Time
--------------------------------------------------------------------------
  1        up   WS-X3002       6          1         4            321:49:27
  2        up   WS-X3010      26          0         2            321:49:27
  3        up   WS-X3002       6          1         4            321:49:27
  4        up   WS-X3013       7         15         3            321:49:27
  5      empty
  6        up  WS-X3007/8     14          0         2            321:49:27
  7        up   WS-X3002       6          1         4            321:49:27
  8        up   WS-X3004       2          0         1            321:49:27

   Return


            Display the next page of port configuration table
   Use cursor keys to choose item. Press <RETURN> to confirm choice.
                Press <CTRL><P> to return to Main Menu.
```

Status

Lists whether the module slot is populated and if so, if it is enabled (up/down).

Type

Lists the type of module.

Revision

Lists the revision level of the module.

Ports

Lists how many ports are on the module.

Up Time

Lists how long the module has been active.

SwitchProbe Menu from the Configuration Menu

The screen displays and explanations of this menu and its sub-menus are presented in Chapter 9, “Monitoring Port Activity with Application Software.”

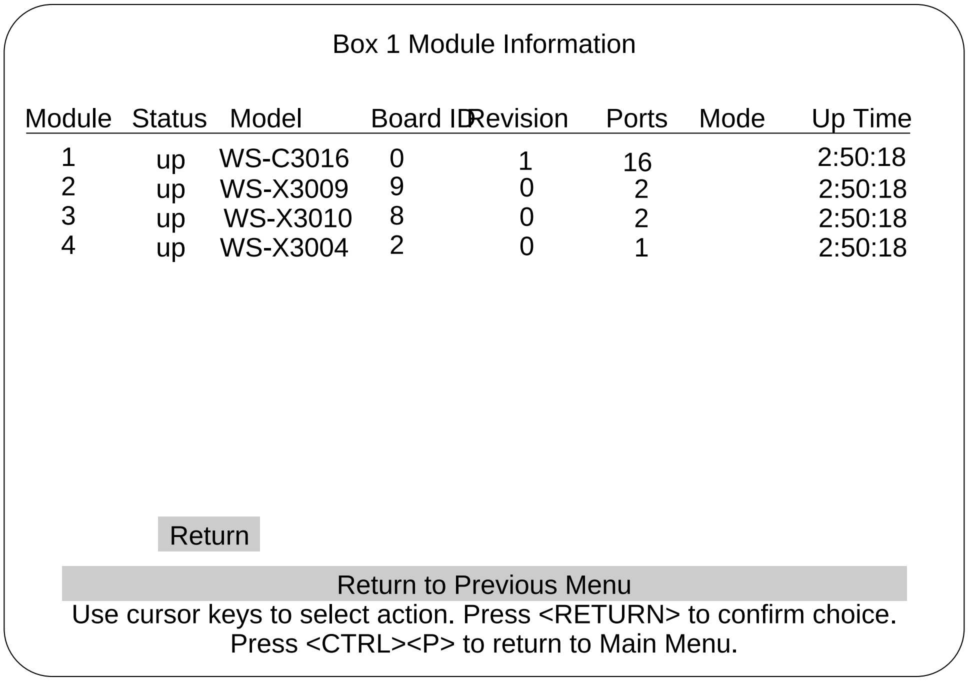
The following section is a description of EtherChannel and how it is used with the Catalyst 3200.

ISL Console Configuration

Step 1 From the Configuration menu, select the Module Information sub-menu and press RETURN. The Module Information screen is displayed. Verify that “WS-X3009” or “WS-X3010” is displayed and that the status fields associated with it are similar to the example screen shown below (except for revision level).

The value in the Revision field may vary with subsequent hardware updates.

Module Information Menu



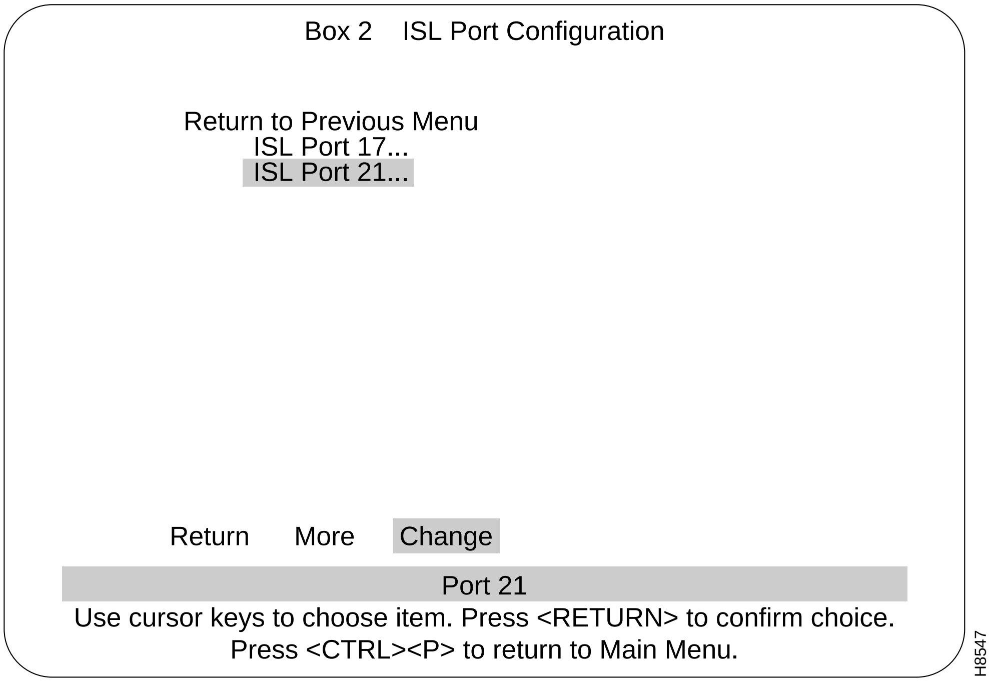
```
                           Box 1 Module Information

Module  Status  Model      Board ID Revision   Ports   Mode     Up Time
  1      up    WS-C3016     0         1         16              2:50:18
  2      up    WS-X3009     9         0          2              2:50:18
  3      up    WS-X3010     8         0          2              2:50:18
  4      up    WS-X3004     2         0          1              2:50:18
```

Use cursor keys to select action. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

H8549

Step 2 Return to the Configuration menu and choose ISL Port Configuration. From the ISL Port Configuration menu, select a port to display ISL information about that port (see example in the following menu, ISL Port Configuration).

ISL Port Configuration Menu



Box 2 ISL Port Configuration

Return to Previous Menu
ISL Port 17...
ISL Port 21...

Return More Change

Port 21

Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

Step 3 In the selected ISL Port menu (see menu below) check or change ISL port information:

- ISL Mode

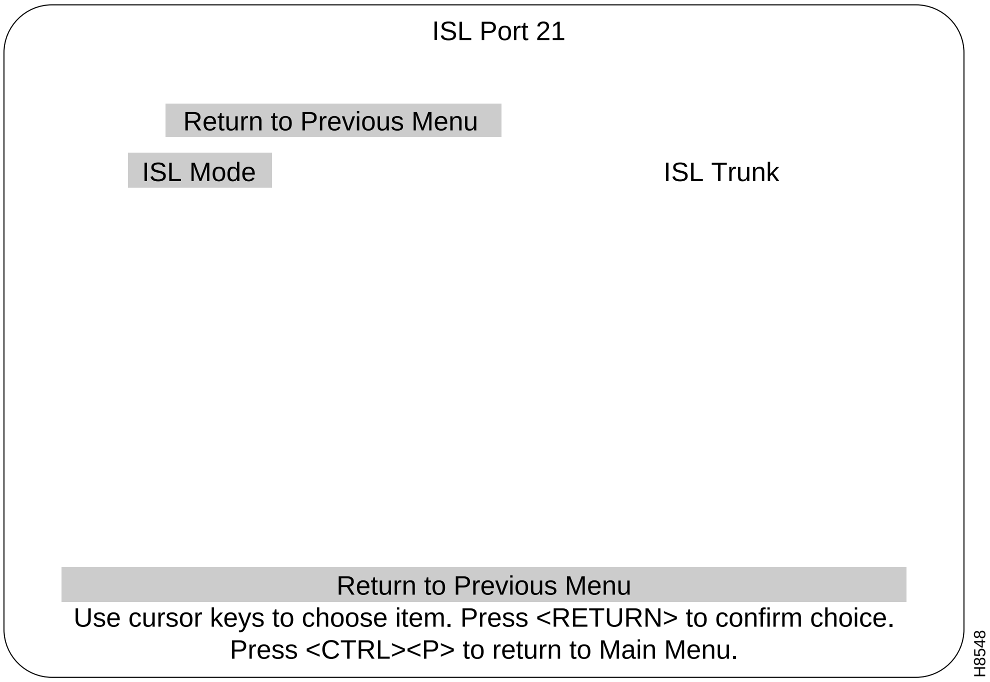
  The type of ISL mode that the selected port is in. The two possible modes are:

- ISL Trunk

  ISL Trunk indicates that this port is running as an ISL trunk.

- Non-ISL

  This indicates that this port is configured as a100Mbps port.

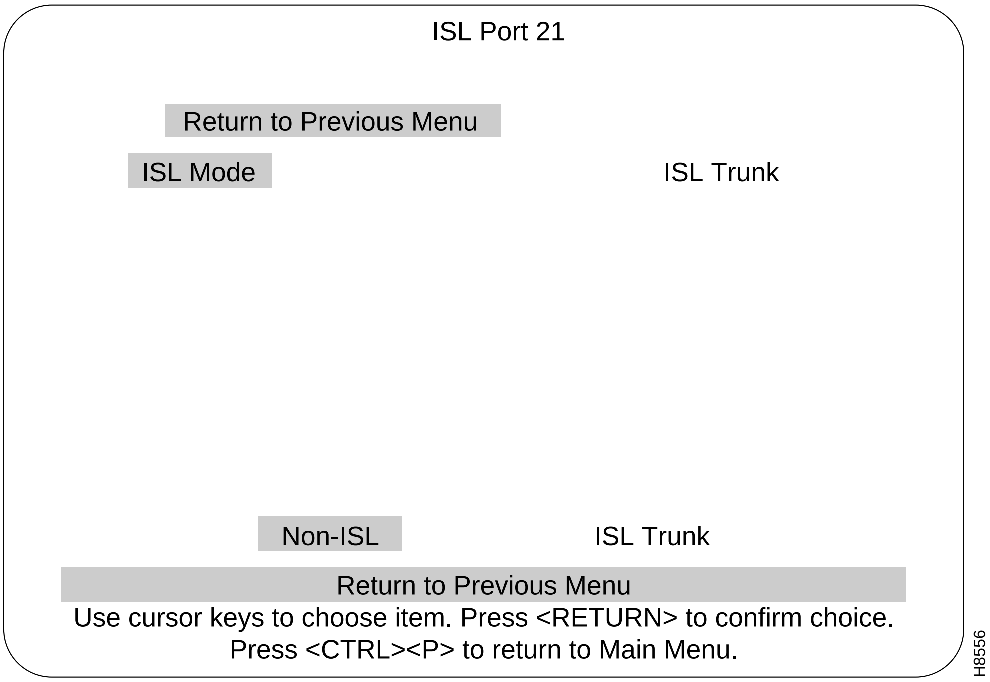


ISL Port 21

Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

Step 4 To change the present mode of the ISL port, highlight the ISL Mode heading and press RETURN. New headings appear at the lower portion of the screen (see the following screen).

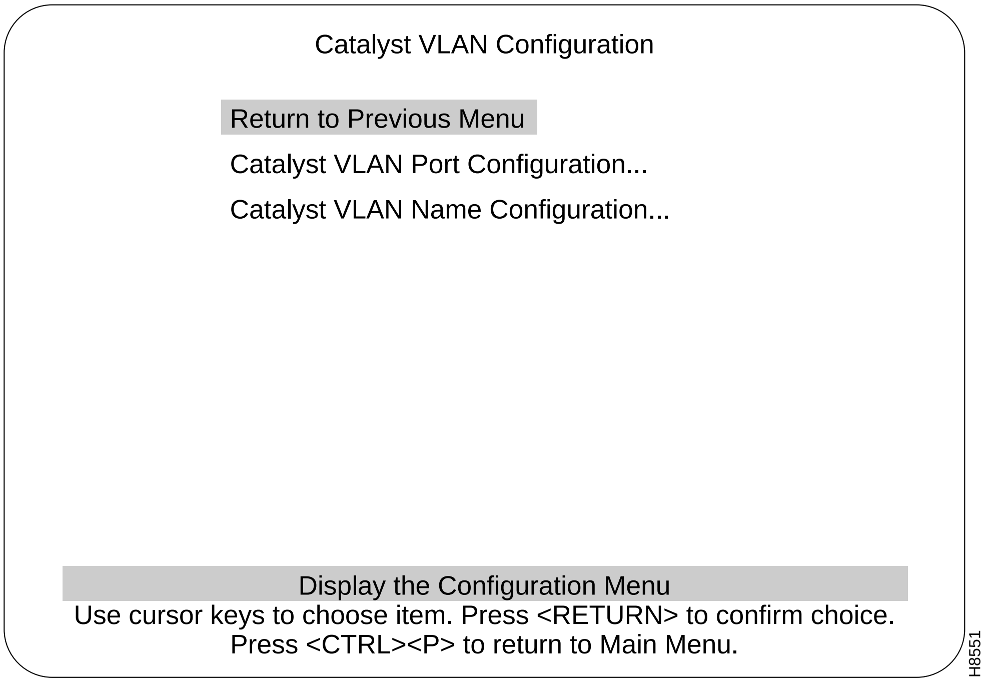
Note Do not put an ISL port into Trunk mode unless Enhanced mode is turned on in the Switch/Stack Information menu.



Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

Step 5 Using the left or right arrow keys, move the “highlight” over either Non-ISL or ISL Trunk and press RETURN for your selection (or press ESCAPE to cancel the selection). The heading at the upper right of the screen will toggle from Non-ISL to ISL Trunk depending upon your selection. That selection is the mode for that port.

Step 6 To check the status of ISL ports in relation to VLAN configuration, return to the Configuration menu and select VLAN Configuration and then select VLAN Port Configuration (see the following menus).



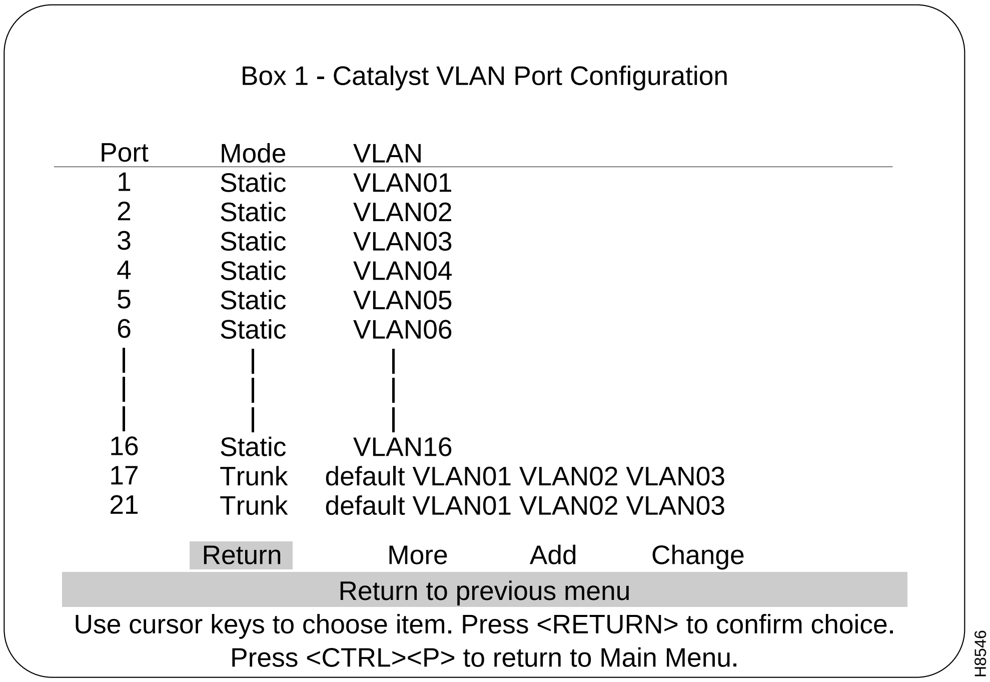
Catalyst VLAN Configuration

Return to Previous Menu
Catalyst VLAN Port Configuration...
Catalyst VLAN Name Configuration...

Display the Configuration Menu
Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

Step 7 The ports that were configured to ISL at the ISL Port Configuration menu will show on the VLAN Configuration menu as “Trunk” ports. Non-ISL ports (in that VLAN) will show as Static.

Step 8 If that VLAN does have ISL Trunk ports listed, all of the VLANs that are carried by that trunk will be listed to the right of that trunk port number (see example in the following menu, VLAN Port Configuration).



```
                Box 1 - Catalyst VLAN Port Configuration

  Port      Mode       VLAN
 ---------------------------------------------------------------------
   1        Static     VLAN01
   2        Static     VLAN02
   3        Static     VLAN03
   4        Static     VLAN04
   5        Static     VLAN05
   6        Static     VLAN06
   |          |          |
   |          |          |
   |          |          |
  16        Static     VLAN16
  17        Trunk    default VLAN01 VLAN02 VLAN03
  21        Trunk    default VLAN01 VLAN02 VLAN03

          Return          More       Add       Change
                      Return to previous menu
 Use cursor keys to choose item. Press <RETURN> to confirm choice.
            Press <CTRL><P> to return to Main Menu.
```

Step 9 To check a port's statistics, return to the Configuration menu, choose the Main menu and then choose the Statistics menu. Display the message log information for the switch. Pay special attention to ISL type messages recorded in the log. If possible, screen-capture the message log or make note of ISL-related messages for future references.

Step 10 Check your network health monitoring equipment (if available) to ensure that the network is running cleanly. Check attached network devices for any obvious signs that the flow of data is being impeded.

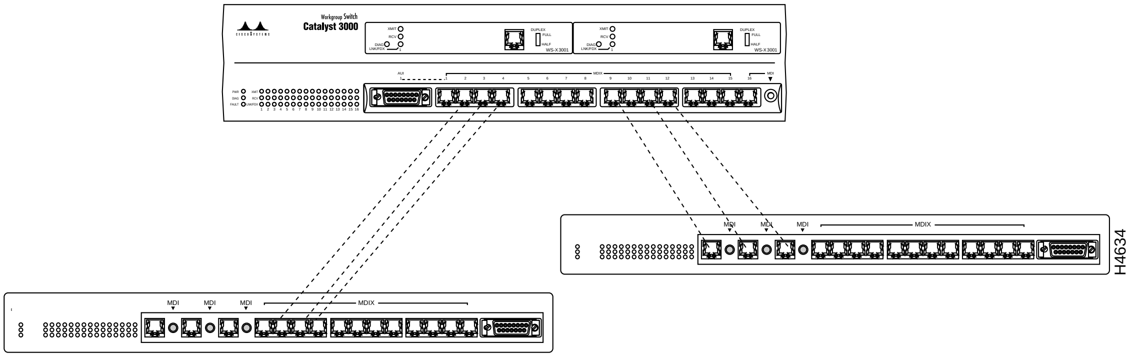
Step 11 After checking any monitoring equipment, log back into the console, go to the Statistics menu, and display the message log. Pay special attention to ISL specific messages. Compare the ISL specific messages present in the log to the messages previously recorded. If needed, consult with Cisco support for an explanation of the different messages and their importance. Select RETURN to exit the display and return to the Statistics menu. If necessary, repeat this for each switch that contains an ISL configuration.

Periodically check the health of the network and the message log on each of the Catalyst switches involved. If you detect any irregularities, investigate them immediately and, if needed, contact Cisco support.

EtherChannel

To improve interswitch bandwidth, you can create an EtherChannel by connecting two EtherChannel devices (see Figure 7-3) that have two to seven links. An EtherChannel provides bandwidth of from 20-80 Mbps in Half-Duplex mode, or from 40-160 Mbps in Full-Duplex mode. You can create an EtherChannel only between two Catalyst 3200 devices or between a Catalyst 3200 and a CiscoPro unit, and not between a Catalyst 3200 and a workstation.

Figure 7-3 Setting up EtherChannels



The EtherChannel feature affects other Catalyst 3200 features in the following ways:

- *Half-duplex and Full-duplex.* A single EtherChannel can include a combination of half-duplex and full-duplex connections—for example, an EtherChannel containing three ports can have two full-duplex and one half-duplex connection. However, each pair of interconnected ports must both be either half duplex or full duplex.
- *Statistics reporting*. Statistics for the EtherChannel are displayed for individual ports, not for the EtherChannel as a whole. Station addresses are distributed among the ports in the EtherChannel. See Chapter 8, "Monitoring the Network With Out-of-Band Management."
- *Address Filtering.* Address filters are automatically added to every port in an EtherChannel.

EtherChannel software learns addresses differently than regular ports, as follows:

- *New source address.* When a packet arrives at an EtherChannel port with an unknown source address, the system module creates an entry in the master table and the port table for the EtherChannel. The system module assigns the primary port in the EtherChannel as the port of entry.

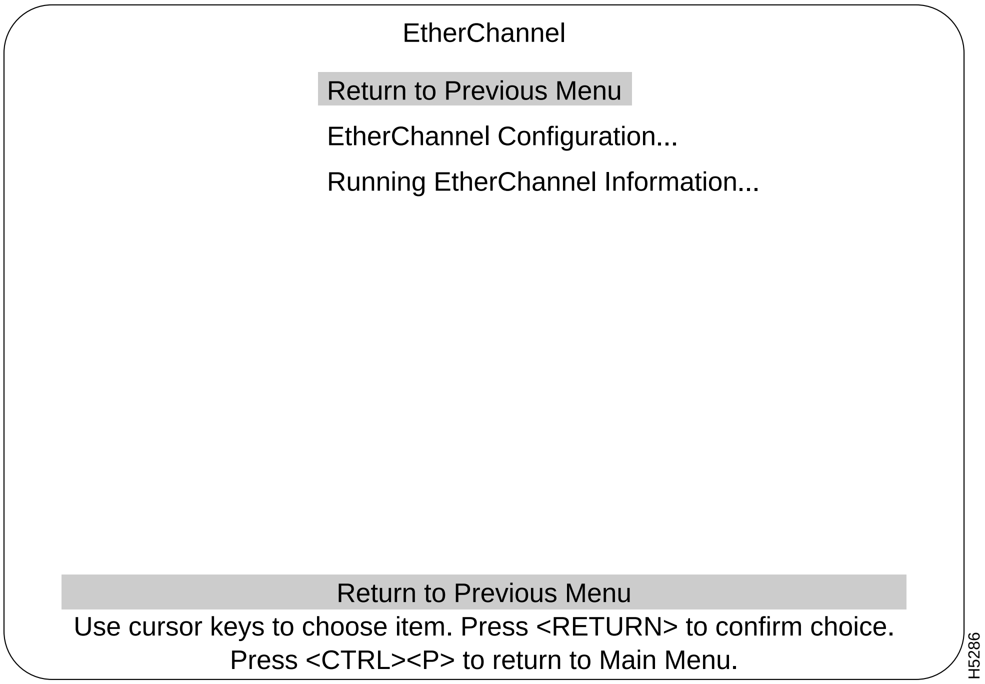
  For additional source addresses, the system module assigns ports of entries alternately to other ports in the EtherChannel. When all ports in the EtherChannel have at least one address assigned, the system module starts assigning from the primary port again.

Note When using EtherChannel, set the Address Aging Time (System Information Menu) to 60 minutes or more. More frequent aging is undesirable because the time it takes to remove inactive addresses may affect Catalyst 3200 performance.

- *New destination address.* An unknown destination address packet is sent out the primary ports of the EtherChannel, but entries are not made in port tables until a reply packet comes back. Entries in port tables depend upon the destination.
- *Broadcast and multicast packets.* Broadcast and multicast packets go to the primary port of each EtherChannel.

- *Link Failure*. If one link in an EtherChannel fails, a trap is sent and the entire EtherChannel is disabled.

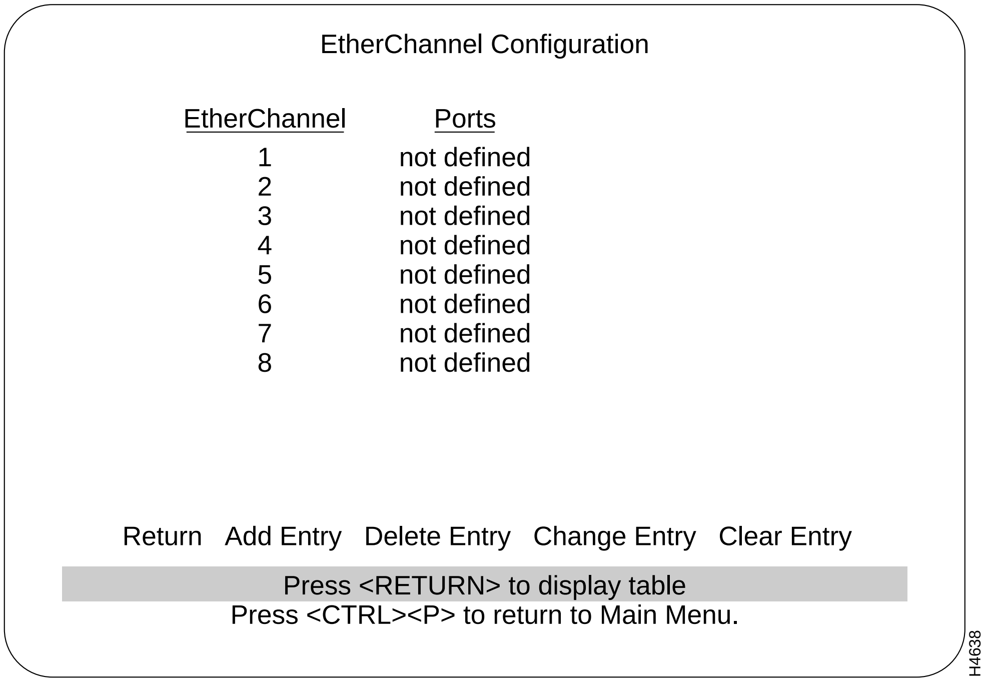
EtherChannel Screen from the Configuration Menu


EtherChannel
Return to Previous Menu
EtherChannel Configuration...
Running EtherChannel Information...
Return to Previous Menu
H5286

Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

EtherChannel Configuration Menu

Use the EtherChannel Configuration menu to add, delete, and change EtherChannels. A description of creating an EtherChannel follows this menu.



```
                    EtherChannel Configuration

        EtherChannel        Ports
             1           not defined
             2           not defined
             3           not defined
             4           not defined
             5           not defined
             6           not defined
             7           not defined
             8           not defined



  Return   Add Entry   Delete Entry   Change Entry   Clear Entry

                 Press <RETURN> to display table
              Press <CTRL><P> to return to Main Menu.
```

EtherChannel

List of different EtherChannel setups.

Ports

The ports within that specific EtherChannel.

Add Entry

Prompts you to enter port numbers in the EtherChannel. Enter at least 2 ports, but no more than 7 ports, from lowest number to highest, separated by spaces. Don’t use 10BaseT port 1 for EtherChannel.

Delete Entry

Asks whether you want to remove the entry, then deletes the selected EtherChannel.

Change Entry

Prompts you to re-enter the port numbers in the selected EtherChannel, from lowest to highest, separated by spaces.

Clear Entry

Deletes all EtherChannels.

Setting up an EtherChannel

To add an EtherChannel between two Catalyst 3000 series devices, determine which ports to use for the EtherChannel. Use at least 2 ports, but no more than 7 ports (port 1 is not recommended for EtherChannel use).

The Catalyst 3000 series switch treats the port with the lowest number as the primary port. For example, if an EtherChannel consists of ports 8,11, and 13, the primary port is 8. Broadcast, multicast, and unknown destination packets are forwarded first to the primary port in an EtherChannel. The primary ports of both EtherChannels must be connected to each other. For example, if an EtherChannel links ports 8, 11, and 13 of one device and ports 3,6,and 9 of another device, ports 8 and 3 must connect to each other.

Observe the following precautions and use the following steps to set up an EtherChannel:

Step 1 Disconnect the ports you want to add to the EtherChannel, or disable them using the Port Configuration menu.

Step 2 For one Catalyst, select the EtherChannel menu (shown later in this section), then choose Add Entry from the menu bar at the bottom on the screen.

Step 3 Enter the ports (port 1 is not recommended for EtherChannel use) for the EtherChannel column, separated by spaces.

Step 4 Choose Exit.

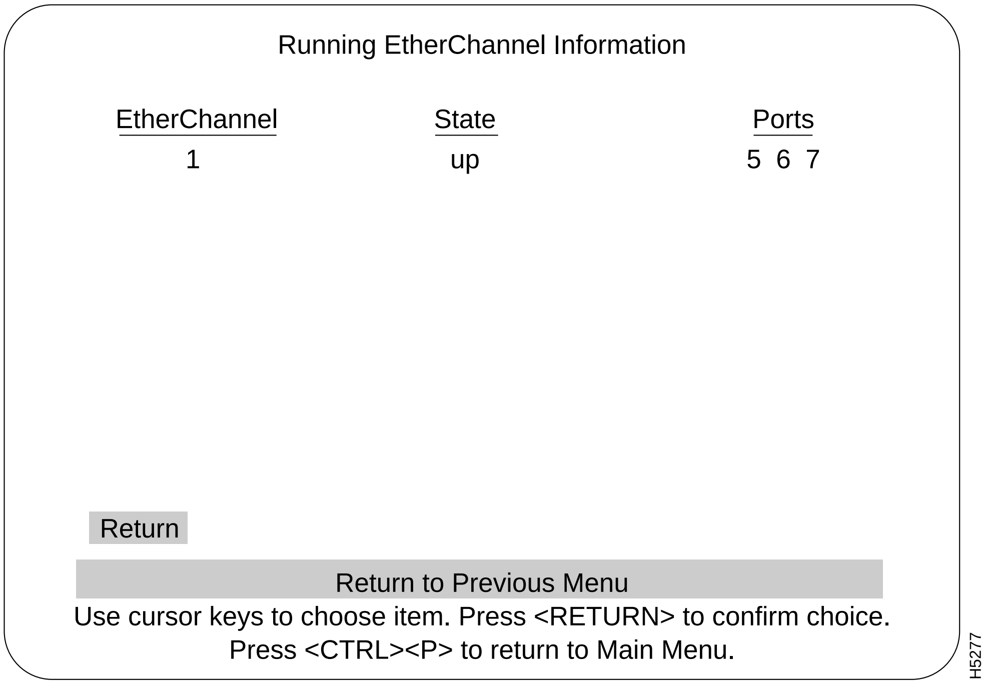
Step 5 Repeat steps 1–4 for the other Catalyst devices.

Step 6 Set the *Address Aging Time* to the same value for the Catalyst devices.

Step 7 If you disconnected the ports in the EtherChannel, reconnect them. If you disabled them using the Port Configuration menu, use the menu to re-enable them.

Running EtherChannel Information Menu

Use the Running EtherChannel Configuration menu to display the status of the EtherChannel.



```
                 Running EtherChannel Information

    EtherChannel            State                  Ports
         1                   up                    5  6  7
```

Return
Return to Previous Menu
Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.
H5277

EtherChannel

The number of the EtherChannel referring to the information displayed on the present screen.

State

Whether the specified EtherChannel is active or not.

Ports

What ports are in that EtherChannel.

Address Filtering

The Address Filtering feature enables you to restrict certain users from communicating with other users. To do this, you can specify source and destination MAC-layer Ethernet addresses to be filtered at the source port. Ethernet addresses can be unicast, multicast, or broadcast.

The advantage of address filtering is increased access control and network segmentation. For example, suppose one port is connected to a server containing confidential information from the engineering workgroup. You can prevent access to the server by setting up filters for the addresses of connections from workgroups other than engineering. This is an example of two types of filters, “allowing a source address” (engineering) or “blocking a source address(es)” (other workgroups). Examples of different types of filters are allowing, forcing, or blocking packets from a source address, or allowing, forcing, or blocking packets to a destination address. A detailed explanation of filter types is in the section “Configure Filters Screen from the MAC Filter and Port Security Menu” in this chapter.

Observe the following guidelines when setting up address filters:

- Use the Port Configuration menu to create port filters.
- Filters are port specific and applied to a Catalyst 3200 incoming port only.
- Up to 100 filters can be created for each Catalyst 3200 (the filters must be applied to specific ports at a specified Catalyst 3200). A “filter” is a combination of a MAC address *and* the “type” of filter it is. For example, if the MAC address 0000A3 C00021 is configured as source type at a port and also configured as a destination type, that would count as two different filters (toward the maximum of 100 filters).
- You can apply these filters to any combination of ports as long as there is a maximum of 100 *filters* (not 100 ports, because more than one port can be part of a filter). For example:
    - Filter A (MAC address 0000A3 C00021, source type) can be applied to ports 1, 5, 7, 14 (or to all 16 ports)
    - Filter B (MAC address 0000A3 C00021, destination type) can be applied to the same ports, or different ports, or once again, to all the ports
    - Filter C (MAC address 0340B7 A02026, source type) can be applied to any combination of ports; until a maximum of 100 *filters* are created.

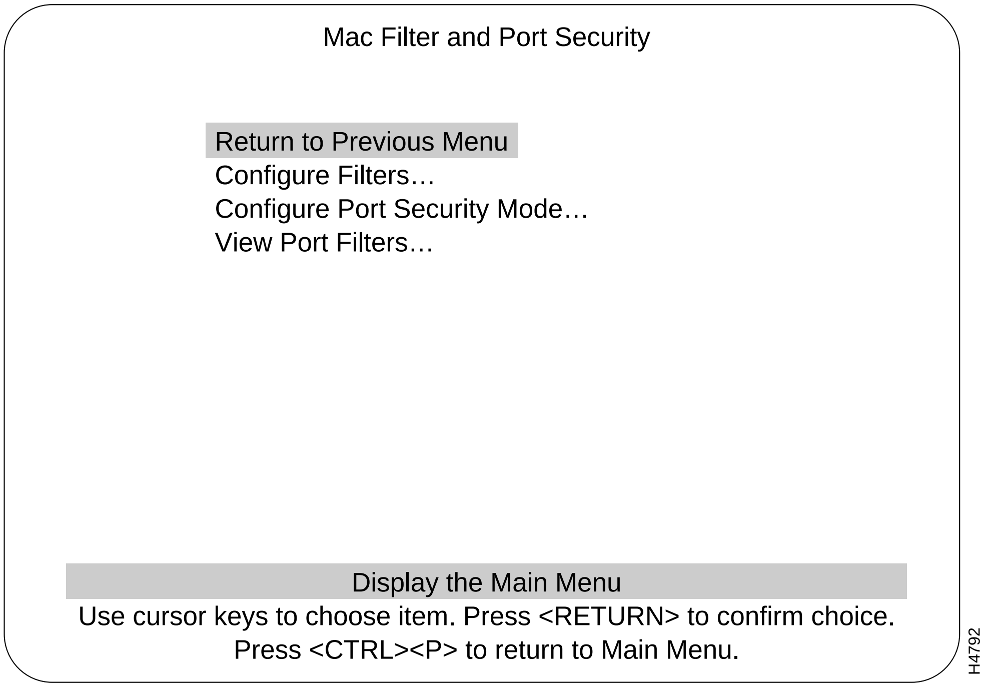
- If you set up a filter for broadcast packets, hosts on the other side of the Catalyst 3200 may not see ARP broadcast packets. To prevent this, let the Catalyst 3200 learn the host addresses before implementing the filter. Most hosts time out their local address entries and attempt to relearn with a broadcast ARP.

Note To restrict access from one segment to an entire segment—not just an address—see "Virtual LAN (VLAN)."

The following menus, in this Address Filtering section, are used to set up address filtering. More explanations of address filtering are presented when functions within these menus are described.

MAC Filter and Port Security Screen from the Configuration Menu

The MAC Filter and Port Security Screen:



Display the Main Menu
Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

Configure Filters

Used to establish specific filtering of addresses.

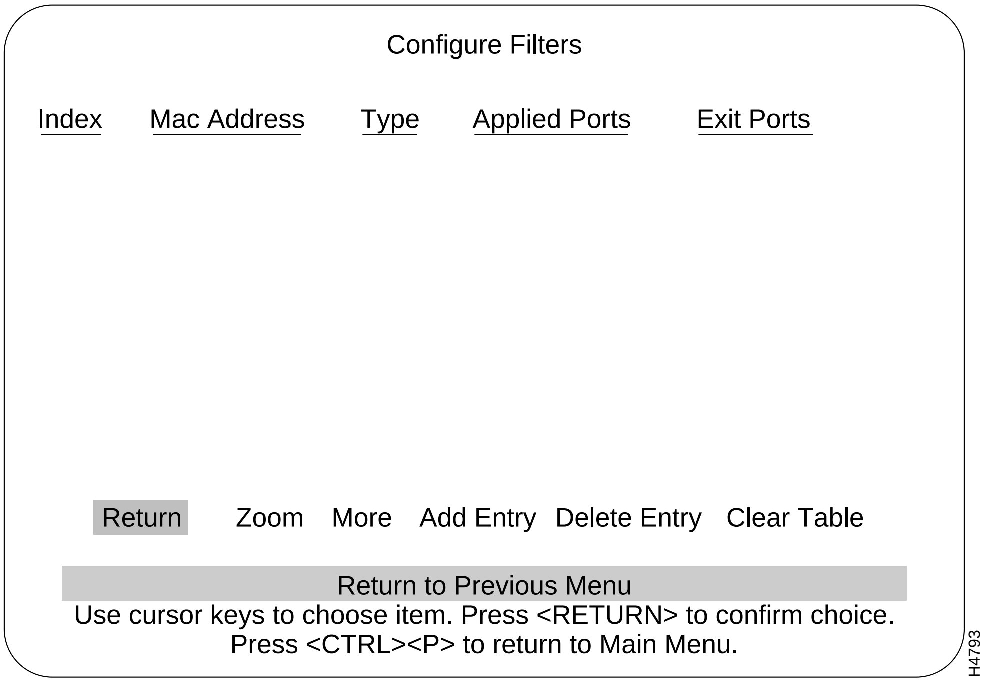
Configure Port Security Mode

Establishes address security at specific ports.

View Port Filters

Displays filtering set up for specific ports.

Configure Filters Screen from the MAC Filter and Port Security Menu



Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

Configuring Filters

When the Add Entry is selected, a list of the available filter functions is displayed. Use the highlight to select a function. After you make a choice, the program prompts you for the necessary parameters.

There are four filter functions options:

- Block a packet with a source address

  That is, any packet from that specific address is blocked from entering the specified port(s)

- Block a packet with a destination address

  Any packet with the specified destination address is blocked at the specified port(s)
- Allow a packet with the source address to be sent to certain ports

  If a packet is received from a specific address it is allowed to go to specific port(s)
- Force a packet with the destination address to certain ports

  When a packet with a specific address must go to specified port(s)

The table displayed in the filter screen is updated whenever a filter is added.

For a stack configuration, you cannot enter more than one port on any remote box. You can, however, enter more than one port on the local box.

Block A Packet With a Source Address

The purpose of this filter is to block all packets from a specific source address at the incoming port(s) you select. If you select this filter, the following parameter fields appear for you to enter data:

```
Please enter the MAC address (xx  xx  xx  xx  xx  xx)
Please enter the port(s) to apply this filter:
```

Block A Packet With a Destination Address

The purpose of this filter is to prevent certain port(s) from receiving any packets to a specific address. If you select this filter, the following parameter fields appear for you to enter data:

```
Please enter the MAC address (xx  xx  xx  xx  xx  xx)
Please enter the port(s) to apply this filter:
```

Allow a Packet with the Source Address To be Sent To Certain Ports

The purpose of this filter is to allow packets that have a specified source address to enter the specified filtered port(s), so it can send those packets only to specific port(s). If you select this filter, the following parameter fields appear for you to enter data:

```
Please enter the MAC address (xx  xx  xx  xx  xx  xx)
Please enter the port(s) where a matching packet is allowed to go:
Please enter the port(s) to apply this filter:
```

Force A Packet with the Destination Address To Certain Ports

The purpose of this filter is to take packets with a specified address, on an incoming filtered port(s), and force those packets to specific outgoing ports. If you select this filter, the following parameter fields appear for you to enter data:

```
Please enter the MAC address (xx  xx  xx  xx  xx  xx)
Please enter the port(s) where a matching packet must go:
Please enter the port(s) to apply this filter:
```

The information in each column of the Configure Filters menu is described as follows:

MAC Address

The address to which the filter is applied.

Type

The type is determined by the filter function selected. The type functions are:

- Src (Source) applies to the source address in a packet.

  The two types of source address filters are:

  — Block a packet with a source address

  — Allow a packet with the source address to be sent to certain ports

- Dst (Destination) applies to the destination address in a packet.

  The two types of destination address filters are:

  — Block a packet with a destination address

  — Force a packet with the destination address to certain ports.

Applied Ports

The port(s) where this filter entry is applied for that specified MAC address.

Exit Ports

The specified port(s) where a packet is allowed to go, or forced to go (for that specific MAC address).

The types of filter functions that would *not* have an exit port are:

- Block a packet with a source address, or
- Block a packet with a destination address:

  Value is 0 when either of the above two entries are selected, since any matching packet is blocked and has no exit port

The types of filter functions that would have an exit port are:

- Allow a packet with the source address to be sent to certain ports

  At this entry, it is the only port(s) where a matching packet is allowed to go

- Force a packet with the destination address to certain ports

  At this entry, it is exactly the port(s) where a matching packet is forced to go

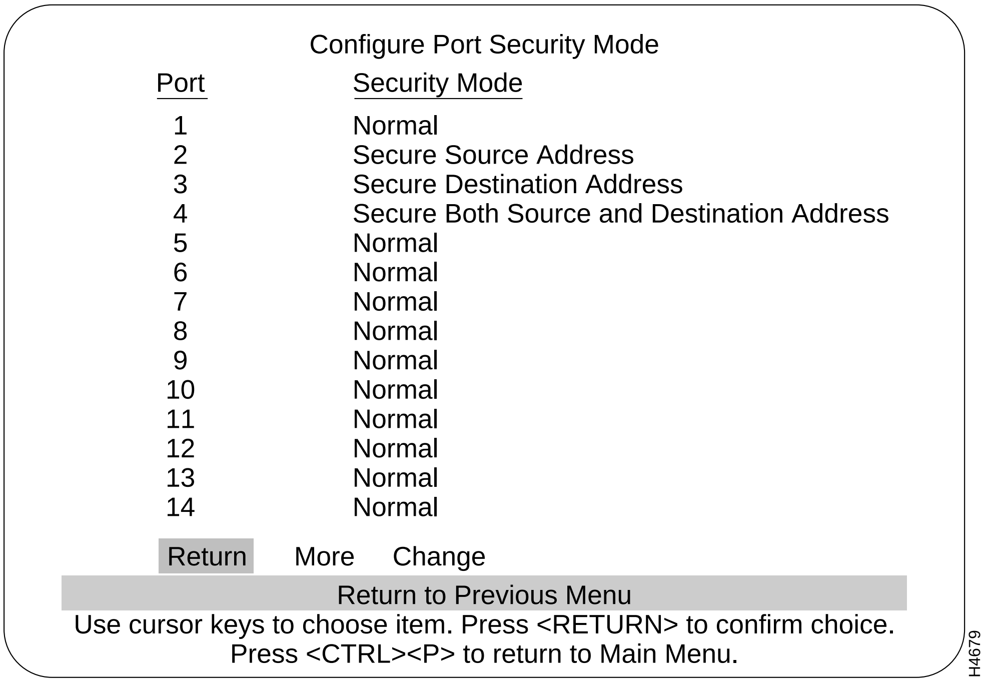
Configure Port Security Mode

This mode establishes secure address levels for specific ports. Select this heading at the MAC Filter and Port Security screen.

Note This function disables the address learning capability of the Catalyst 3200 and totally blocks (secures) specific addresses at selected ports.

There are four address security choices:

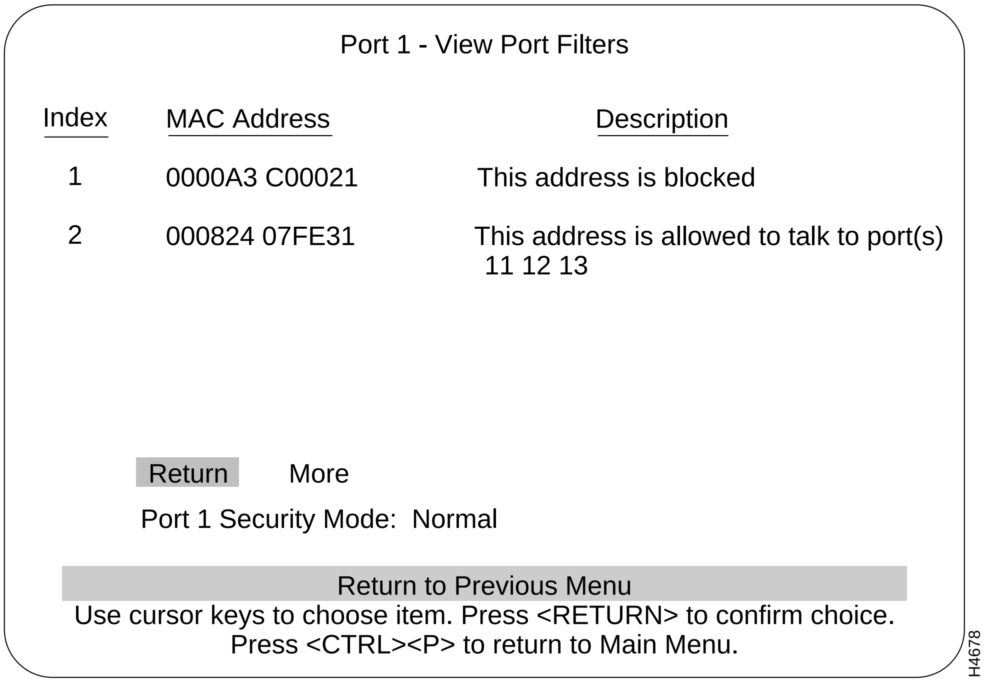
- Normal
- Secure source address (this blocks all source addresses at this port)
- Secure destination address (this blocks all destination addresses at this port)
- Secure source and destination addresses (this blocks all addresses at this port)



```
                  Configure Port Security Mode
          Port             Security Mode

            1              Normal
            2              Secure Source Address
            3              Secure Destination Address
            4              Secure Both Source and Destination Address
            5              Normal
            6              Normal
            7              Normal
            8              Normal
            9              Normal
           10              Normal
           11              Normal
           12              Normal
           13              Normal
           14              Normal

          Return    More    Change
                    Return to Previous Menu
 Use cursor keys to choose item. Press <RETURN> to confirm choice.
              Press <CTRL><P> to return to Main Menu.
```

View Port Filters Screen

The following screen is an example of ports using the MAC address filters and port security.



Port 1 - View Port Filters

```
Index    MAC Address              Description

  1      0000A3 C00021      This address is blocked

  2      000824 07FE31      This address is allowed to talk to port(s)
                             11 12 13
```

Port 1 Security Mode: Normal

Return to Previous Menu

Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

Index

Numerical order of entries.

MAC Address

Filter Address

Description

List of descriptions of security modes as assigned at Configure Port Security Mode menu:

- This address is blocked
- This address is allowed to talk to ports (as specified)
- This address cannot be reached from this port
- Traffic to this address will be forced to ports (as specified)

Return

Return to main menu.

More

Displays additional entries in the filter table if the table contains multiple pages.

Port (number) Security Mode

The type of security mode applied to this port.

Address Aging

You can set the per-port aging value using the Address Aging menu. The following describes the types of address aging.

There are two types of aging:

- Port aging
    - Any address in a port’s address table that has not been active for a port’s configured aging time will be removed from the port’s table
    - Set at the Port Address Table Aging menu
- System aging
    - Addresses that are local to a port but did not fit in its address table will be removed from the master table and all port address tables after the system aging time
    - Set at the Master Address Table Aging menu

There are two levels to set for the port and master aging tables:

Time Interval Aging is a time limit, in minutes, which will drop “older” addresses after the selected time.

Automatic On-Demand Aging stores addresses until reaching maximum capacity of the table, then deletes addresses, (in the following specific order) down to a selected percentage level and continues to cycle in the same manner.

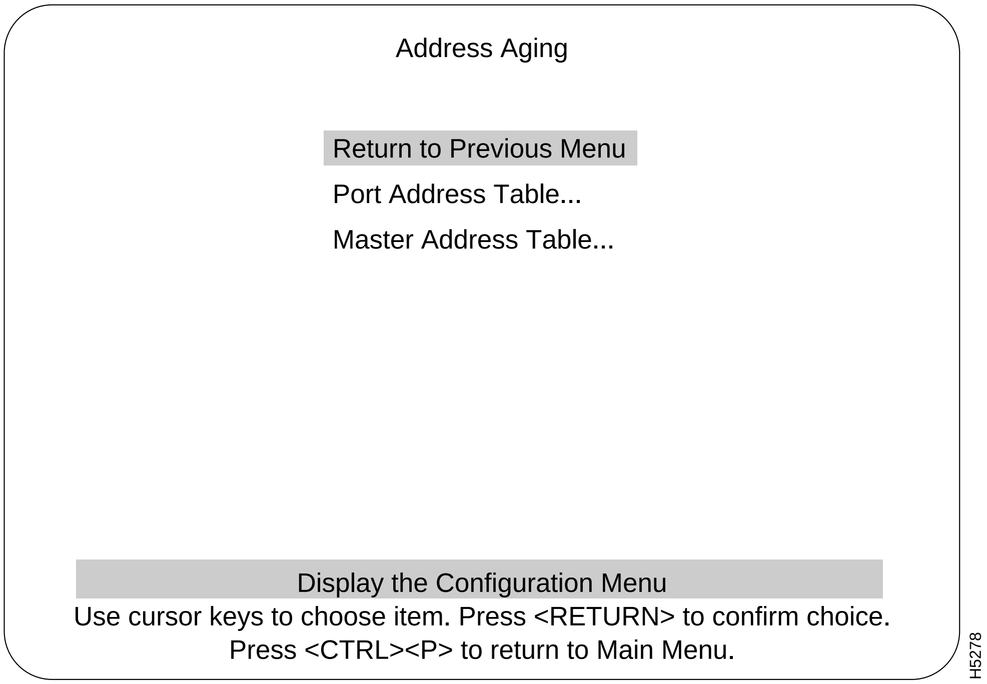
- Random remote addresses
- Sequential remote addresses

  (Sequentially aged from the top of the Address Aging table to the bottom of the table)
- Random local addresses
- Sequential local addresses

More information on address aging and the address aging screens is presented in the following sections.

Address Aging Menu from the Configuration Menu

Address aging is accessed through the Address Aging heading from the Configuration Menu.



Display the Configuration Menu
Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

Port Address Table...

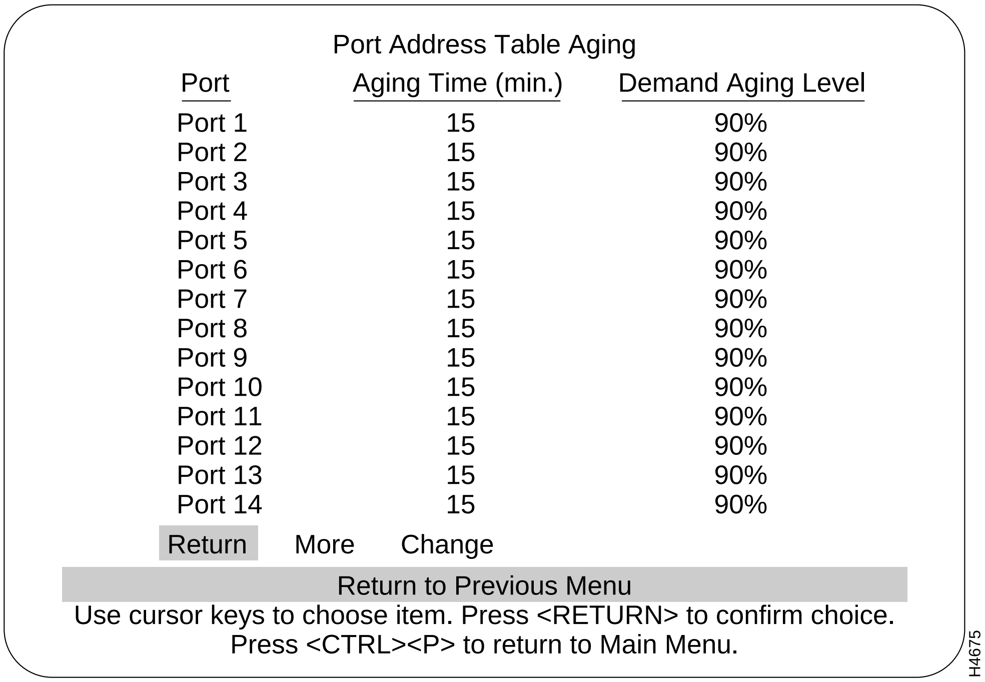
Highlighting this selection and pressing RETURN will display the Port Address Table Aging menu. Use this menu is to set each port on the Catalyst 3200 to the aging time, in minutes, and to the demand aging level percentage you want.

Master Address Table...

This screen shows the Master Aging Time and Demand Aging Level. An example of that selection is shown after the Port Address Table Aging screen.

The following displays a view of the Port and Master Address Table Aging screens and describes the information within them.

Port Address Table Aging Menu



```
                    Port Address Table Aging
        Port          Aging Time (min.)    Demand Aging Level
        Port 1              15                   90%
        Port 2              15                   90%
        Port 3              15                   90%
        Port 4              15                   90%
        Port 5              15                   90%
        Port 6              15                   90%
        Port 7              15                   90%
        Port 8              15                   90%
        Port 9              15                   90%
        Port 10             15                   90%
        Port 11             15                   90%
        Port 12             15                   90%
        Port 13             15                   90%
        Port 14             15                   90%
       Return    More    Change
                   Return to Previous Menu
  Use cursor keys to choose item. Press <RETURN> to confirm choice.
             Press <CTRL><P> to return to Main Menu.
```

Port

The port to which you want to assign an aging time.

Aging Time

A valid port aging time associated with the port. Addresses will be discarded after reaching the set time limit. The default setting for this parameter is 15 minutes. The maximum time for this value is 9999 minutes.

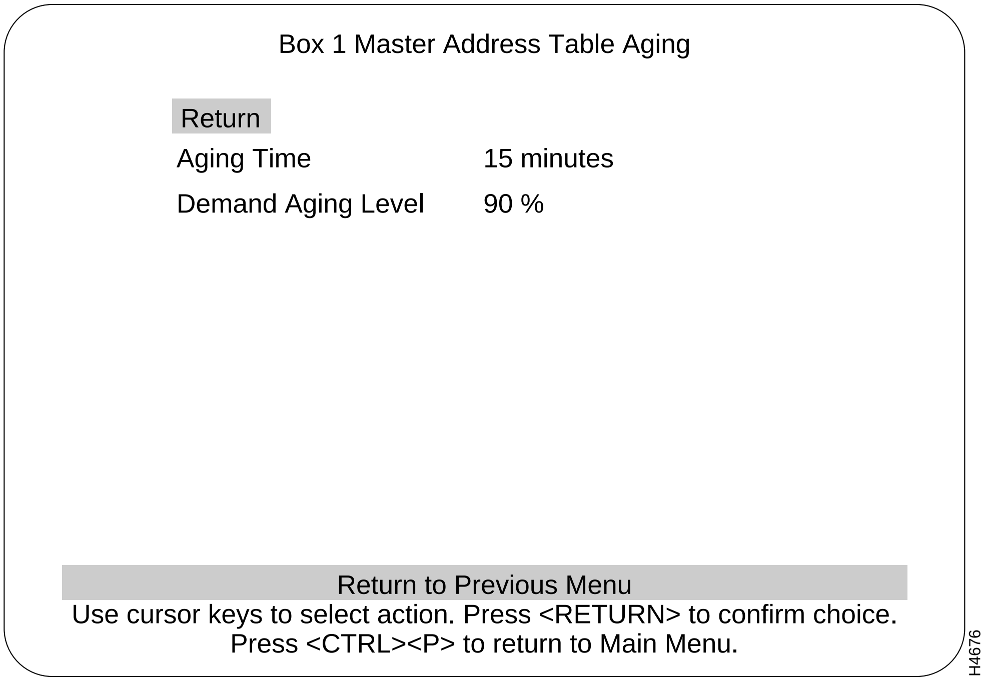
Demand Aging Level

Sets a percentage threshold of address table capacity to ensure that the port's address table is populated only by the most frequently used addresses. Addresses are stored until reaching the maximum capacity of the table, then discarded in a specific order until the set percentage of table capacity is reached and then cycles in the same manner.

Master Address Table Aging

The Master Address Table Aging is the aging value of a set time, in minutes, and a set percentage level after which unused addresses are removed from its table. Addresses that are local to a port but did not fit in its address table ("orphans") will be removed from the master table and all port address tables after the master aging time, regardless of whether the address has been seen within that time period. This is to ensure that no unused address will remain in memory for an indefinite time.

Master Address Table Aging screen:



```
                 Box 1 Master Address Table Aging

        Return
        Aging Time                15 minutes
        Demand Aging Level        90 %

                    Return to Previous Menu
 Use cursor keys to select action. Press <RETURN> to confirm choice.
             Press <CTRL><P> to return to Main Menu.
```

The Master Address Table Aging screen contains two main headings. (If there is a box number it is the number of the switch that this screen is referencing.)

Aging Time

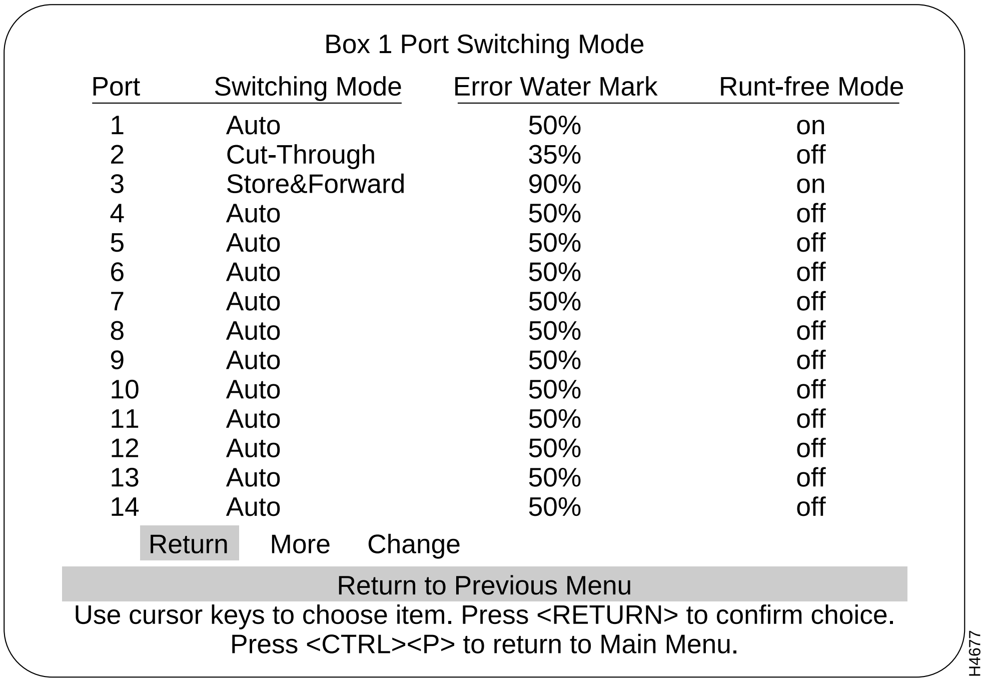
Master table addresses will be discarded after reaching the set time limit. The default setting for this parameter is 15 minutes. The maximum time for this value is 9999 minutes.

Demand Aging Level

This parameter works in the same way as Port Demand Aging Level, only using the system address table.

Port Switching Mode from the Configuration Menu

This screen shows the status of the packet switching modes available on the Catalyst 3200.



```
                        Box 1 Port Switching Mode
  Port      Switching Mode    Error Water Mark     Runt-free Mode
   1          Auto                  50%                 on
   2          Cut-Through           35%                 off
   3          Store&Forward         90%                 on
   4          Auto                  50%                 off
   5          Auto                  50%                 off
   6          Auto                  50%                 off
   7          Auto                  50%                 off
   8          Auto                  50%                 off
   9          Auto                  50%                 off
   10         Auto                  50%                 off
   11         Auto                  50%                 off
   12         Auto                  50%                 off
   13         Auto                  50%                 off
   14         Auto                  50%                 off
        Return    More    Change
                       Return to Previous Menu
  Use cursor keys to choose item. Press <RETURN> to confirm choice.
                Press <CTRL><P> to return to Main Menu.
```

Switching Mode

Displays three configurable modes of packet switching:

- *Automatic*. Automatically converts error-handling from Cut-Through to Store-and-Forward. The user sets a percentage threshold, which is called an "error water mark," at the Port Switching Mode screen. When set to automatic switching, the error handling is normally in cut-through mode, but if the error rate exceeds the error water mark, error-handling is automatically converted to store and forward. If the error rate once again falls below the error water mark, the error-handling automatically reverts back to cut-through. This process continues under automatic control as long as this mode is selected.
- *Cut-Through.* (Forced) error-handling only in the cut-through mode. Cut-Through mode reduces latency times by not reading the whole incoming packet. Only the beginning of the packet is read and immediately routed to its destination.
- *Store-and-Forward*. (Forced) error-handling only in the store and forward mode. The complete incoming packet is read, stored, and then forwarded to its destination.

To change the mode, highlight "Change" and press RETURN. You are prompted to select mode, then the high water percentage (if Auto mode selected) and finally the setting for Runt-free mode.

Note To monitor the number of error mode changes that occur when the switch is configured in the Automatic mode, use a Network Management System SNMOP Trap. Refer to the appropriate NMS application software manual.

Error Water Mark

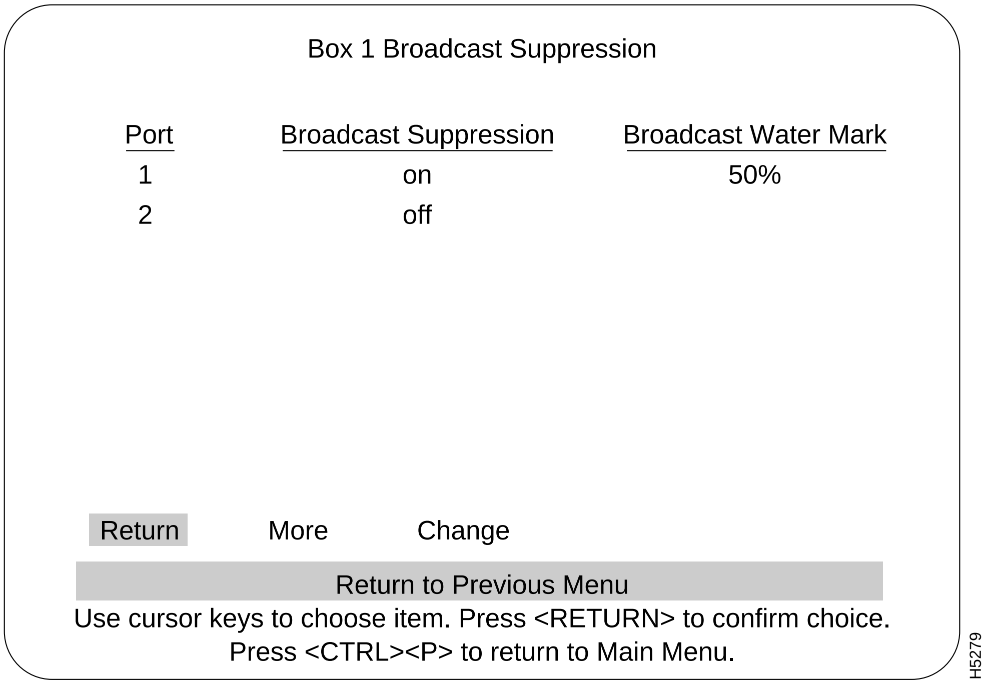
At what percentage level of errors the Catalyst 3200 will switch from cut-through to store-and-forward mode (if Auto mode is selected for that port).

Runt-free Mode

This mode is set to either on or off. If set to on, an incomplete packet (less than 64 bytes) will be discarded, and a runt packet error is logged and displayed under the Statistics menus. If set to off, runt packets will be forwarded through the switch.

Broadcast Suppression from the Configuration Menu

As the name implies, this feature is to suppress broadcast packets. This function is set on a per-port basis at the Broadcast Suppression screen. If set to on (enable), that port is set to a percentage threshold level (Broadcast Water Mark) at which broadcast packets are suppressed (percentage is based on total traffic). If the broadcast level on a specific port exceeds the set threshold, all broadcasts originating from that port are blocked until the broadcast level drops below that mark.



```
                    Box 1 Broadcast Suppression

   Port     Broadcast Suppression     Broadcast Water Mark
    1                on                        50%
    2                off
```

Return to Previous Menu
Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

Broadcast Suppression

Displays whether broadcast suppression is enabled or disabled for that specific port.

Broadcast Water Mark

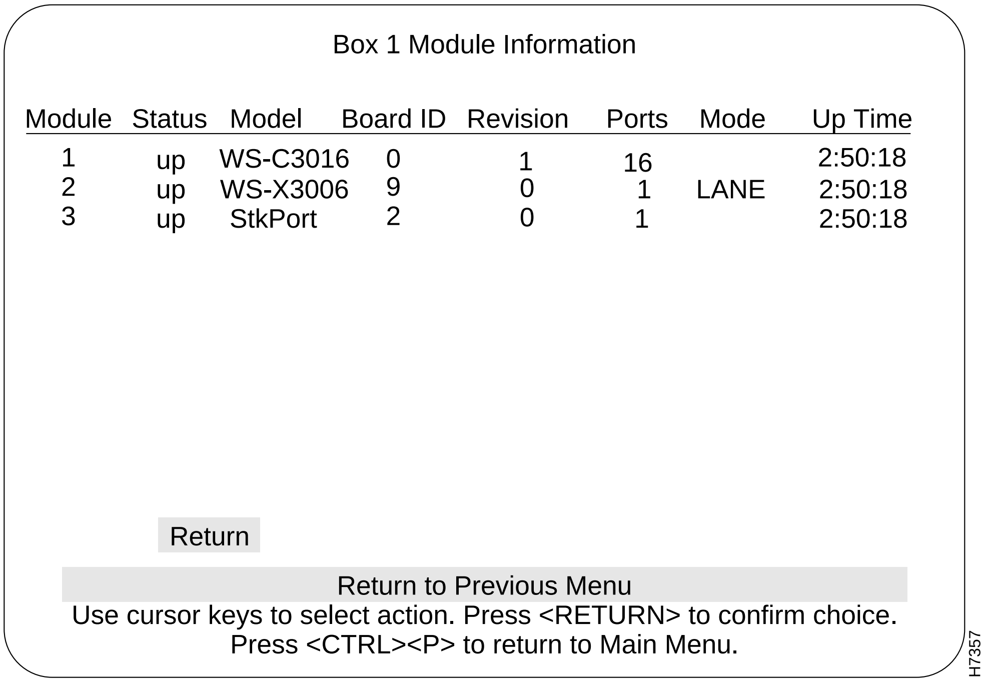
A user-defined percentage level based on broadcast traffic compared to the total traffic on that port. If broadcast traffic exceeds this level, packets are suppressed until they fall below that level.

ATM Configuration

Use the following steps to confirm that the installation has been completed correctly.

Step 1 From the Configuration menu, select the Module Information sub-menu and press RETURN. The Module Information screen is displayed. Verify that "WS-X3006A" is displayed and that the status fields associated with it are similar to the following example screen (except for revision level).

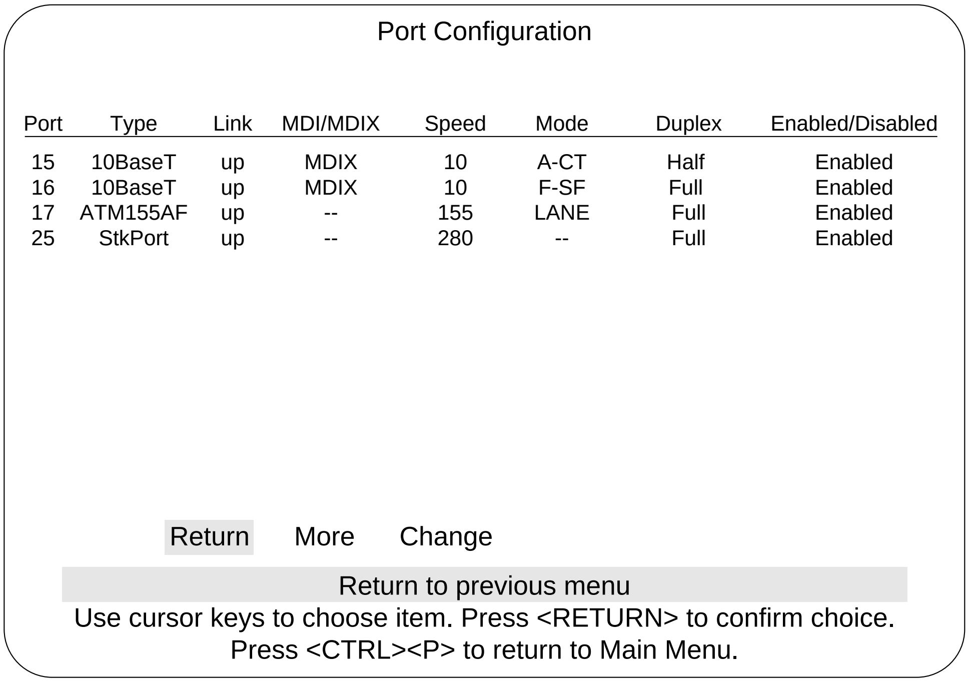
Note The value in the Revision field may vary with subsequent hardware updates.



```
                         Box 1 Module Information

Module  Status  Model      Board ID  Revision   Ports   Mode    Up Time
  1       up    WS-C3016     0          1        16             2:50:18
  2       up    WS-X3006     9          0         1     LANE    2:50:18
  3       up     StkPort     2          0         1             2:50:18
```

```
                         Return to Previous Menu
     Use cursor keys to select action. Press <RETURN> to confirm choice.
                 Press <CTRL><P> to return to Main Menu.
```

Step 2 From the Configuration main menu, choose Port Configuration. From this menu display, choose "More" to display information for ports 17 and 21. Verify that the status fields associated with it are similar to the example screen shown below (except for MDI/MDIX).



```
                              Port Configuration


Port     Type      Link   MDI/MDIX    Speed    Mode      Duplex    Enabled/Disabled

 15     10BaseT     up     MDIX        10      A-CT       Half         Enabled
 16     10BaseT     up     MDIX        10      F-SF       Full         Enabled
 17    ATM155AF     up      --        155      LANE       Full         Enabled
 25     StkPort     up      --        280       --        Full         Enabled
```

Return to previous menu

Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

H7356

Step 3 In the Port Configuration menu check the following headings to verify ATM port information:

- Port number
- Type: ATM155AF
- Link: Up (confirms that an ATM link has been established)
- Speed: 155 (Mbps)
- Mode: LANE
- Enabled/Disabled: Enabled (if Disabled, select “Change” and press RETURN)

Step 4 From the Configuration menu, choose the "ATM Configuration" menu. From that menu, choose the "Lane Client Configuration" menu and enter the appropriate ATM port number. Verify the ATM address information in the ATM LANE Client Configuration menu that is displayed and then from that menu, select the ELAN Table sub-menu and verify information on configured ELANs.

Step 5 Return to the Main menu. Choose the Statistics menu. Display the message log information for the switch. Pay special attention to ATM type messages recorded in the log. If possible, screen capture the message log or make note of ATM related messages for future references.

Step 6 Clear the message log buffer using the Clear Logs command at the bottom of the message display log screen.

Step 7 If necessary, reconnect the Catalyst 3200 switches back into your network topology and channel the normal data flow back to them. If reconnecting the switches into your network, be sure that the link LEDs are lit for each of the connected 10BaseT ports.

Step 8 Check your network health monitoring equipment (if available) to ensure that the network is running cleanly. Check attached network devices for any obvious signs that the flow of data is being impeded.

Step 9 From each Catalyst 3200 switch containing ATM modules, log back into the console, go to the Statistics menu, and display the message log. Pay special attention to ATM-specific messages. Compare the ATM-specific messages present in the log to the messages previously recorded. If needed, consult with Cisco support for an explanation of the different messages and their importance. Select RETURN to exit the display and return to the Statistics menu. Repeat this for each switch.

Step 10 Verify the address tables on each of the Catalyst 3200s by viewing the Address Table option from the Statistics menu. Check each of the menus for the following information:

Note This could be a very time-consuming process. If there are numerous addresses, it may be more appropriate to check several random addresses using the search utility in this menu.

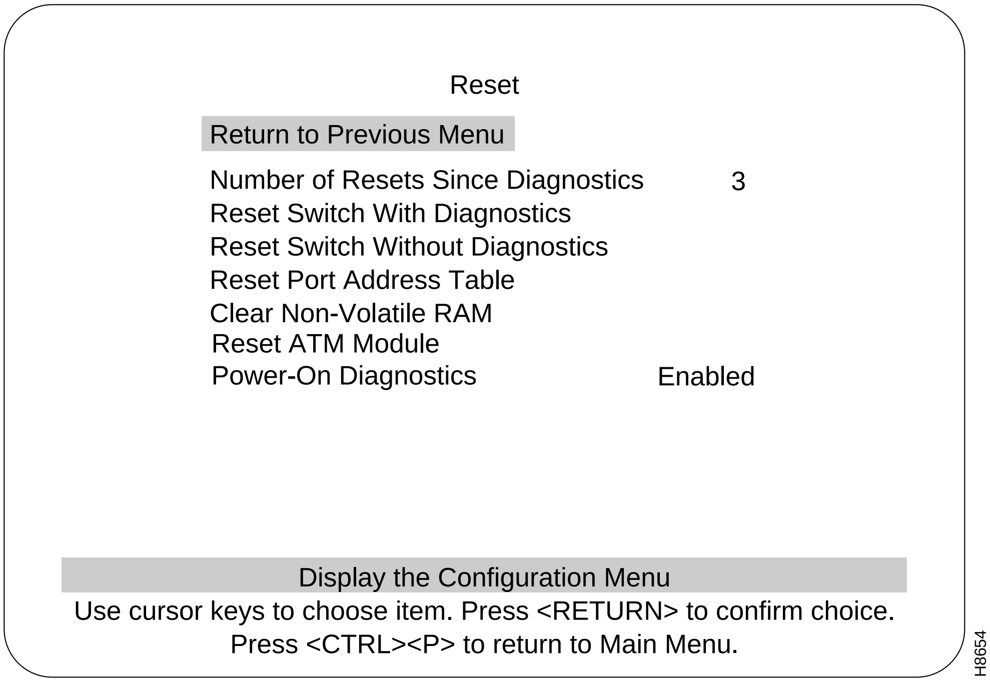
- Master Address Table: Confirm that the Master table contains a collective list of all addresses associated with each port on the Catalyst 3200 switch.
- Port Address Table: Verify that for each 10BaseT port connected to a network segment, the correct addresses of the stations on the segment are listed in this table.

Periodically check the health of the network and the message log on each of the Catalyst 3200 switches involved. If any irregularities are seen, investigate them immediately and, if needed, contact Cisco support.

ATM Console and Telnet Sessions

Configuration and statistical status menus for the Catalyst 3200 switch and the WS-X3006A ATM module are available through the Catalyst 3200's console port or by creating a Telnet session into the Catalyst 3200. For detailed information on creating Catalyst 3200 console and Telnet sessions, see Chapter 6, "Connecting a Console."

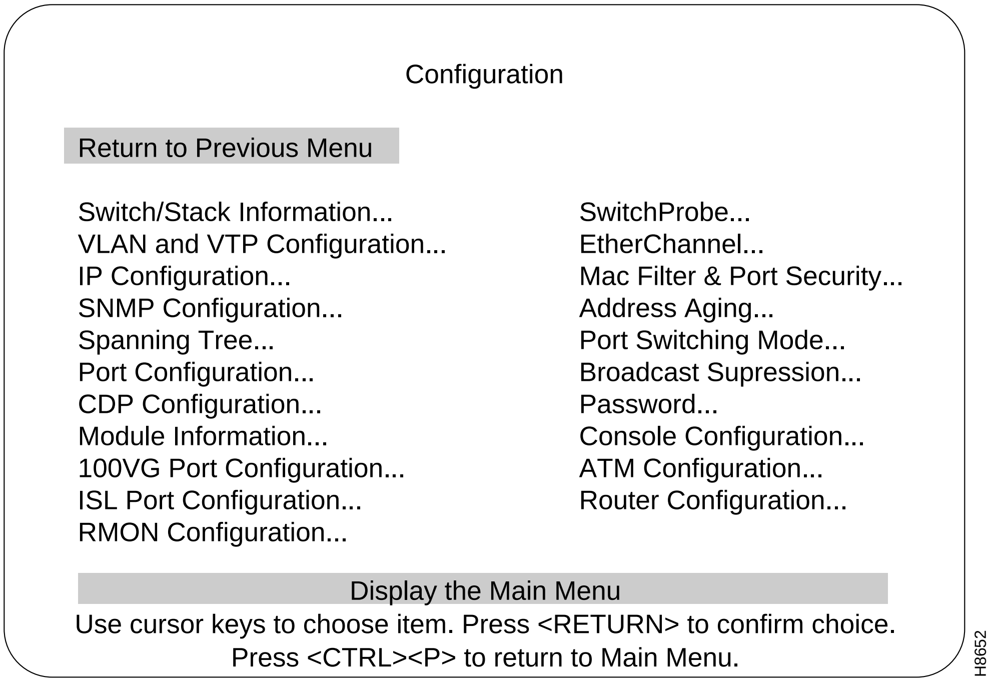
Reset Menu



```
                         Reset

         Return to Previous Menu

         Number of Resets Since Diagnostics        3
         Reset Switch With Diagnostics
         Reset Switch Without Diagnostics
         Reset Port Address Table
         Clear Non-Volatile RAM
         Reset ATM Module
         Power-On Diagnostics                  Enabled




               Display the Configuration Menu
 Use cursor keys to choose item. Press <RETURN> to confirm choice.
            Press <CTRL><P> to return to Main Menu.
```

Use the Reset menu if you need to reset the ATM module.

Configuration Menu and Sub-Menus



```
                          Configuration

 Return to Previous Menu

 Switch/Stack Information...          SwitchProbe...
 VLAN and VTP Configuration...        EtherChannel...
 IP Configuration...                  Mac Filter & Port Security...
 SNMP Configuration...                Address Aging...
 Spanning Tree...                     Port Switching Mode...
 Port Configuration...                Broadcast Supression...
 CDP Configuration...                 Password...
 Module Information...                Console Configuration...
 100VG Port Configuration...          ATM Configuration...
 ISL Port Configuration...            Router Configuration...
 RMON Configuration...

                      Display the Main Menu
 Use cursor keys to choose item. Press <RETURN> to confirm choice.
             Press <CTRL><P> to return to Main Menu.
```

The following menus (from the Configuration menu) are used to configure and to check the status of the ATM module. These menus are presented and described in subsequent sections.

- ATM LANEs
- CDP (Cisco Discovery Protocol)
- Address Aging

Implementation of LAN Emulation (LANE)

This section describes how ATM LANE (Local Area Network Emulation) is used with the Catalyst 3200. The next section describes how to configure the Catalyst 3200 ATM module interface using LAN emulation clients for LAN emulation.

Setting up LECs (LAN Emulation Clients) allows the Catalyst 3200 series switch to operate in an ATM LAN environment containing Cisco 7000 or 4500 series routers with ATM Interface Processors (AIP) connected to a LightStream 100 or 1010 ATM switch.

Cisco's implementation of LANE makes an ATM interface look like one or more Ethernet interfaces.

LANE is an ATM service defined by the ATM Forum specification "LAN Emulation over ATM," ATM_FORUM 94-0035. This service emulates the following LAN-specific characteristics:

- Connectionless services
- Multicast services
- LAN MAC driver services

LANE service provides connectivity between ATM-attached devices and LAN-attached devices. This includes connectivity between ATM-attached stations and LAN-attached stations as well as connectivity between LAN-attached stations across an ATM network.

Because LANE connectivity is defined at the MAC layer, upper protocol layer functions of LAN applications can continue unchanged when the devices join emulated LANs. This feature protects corporate investments in legacy LAN applications.

An ATM network can support multiple independent emulated LANs. Membership of an end system in any of the emulated LANs is independent of the physical location of the end system. The end systems can move easily from one emulated LAN to another, independent of whether or not the hardware moves.

Hardware Support

This release of LANE is supported on Catalyst 3200 series switches containing ATM modules and on Cisco 7000/4500 routers with AIPs installed; it requires an ATM switch that supports UNI 3.0 and point-to-multipoint signaling, for example the Cisco LightStream 100/1010 ATM switches.

LANE Components

Up to 256 emulated LANs can be set up in an ATM switch cloud. A Catalyst 3200 ATM module can participate in up to 64 of these emulated LANs.

LANE is defined on a client-server LAN model, as follows:

- LANE client (LEC)

A LANE client emulates a LAN interface to higher layer protocols and applications. It forwards data to other LANE components and performs LANE address resolution functions.

Each LANE client is a member of only one emulated LAN. However, a router or a Catalyst 3200 ATM module can include LANE clients for multiple emulated LANs: one LANE client for *each* emulated LAN of which it is a member.

If a router has clients for multiple emulated LANs, the router can route traffic between the emulated LANs.

Note If the Catalyst 3200 has multiple ATM modules and each has clients active for the same ELAN, the Catalyst 3200 will not bridge between the ELANs. The Catalyst 3200 acts as an edge-device on an ATM cloud.

- LANE server (LES)

The LANE server for an emulated LAN is the control center. It provides joining, address resolution, and address registration services to the LANE clients in that emulated LAN. Clients can register destination unicast and multicast MAC addresses with the LANE server. The LANE server also handles LANE ARP (LE ARP) requests and responses.

The current Cisco implementation has a limit of one LANE server per emulated LAN.

- LANE broadcast-and-unknown server (BUS)

The LANE broadcast-and-unknown server sequences and distributes multicast and broadcast packets and handles unicast flooding.

One combined LANE server and broadcast-and-unknown server is required per emulated LAN.

- LANE configuration server (LECS)

The LANE configuration server contains the database that determines which emulated LAN a device belongs to (each configuration server can have a different named database). Each LANE client consults the LANE configuration server just once, when it joins an emulated LAN, to determine which emulated LAN it should join. The LANE configuration server returns the ATM address of the LANE server for that emulated LAN.

One LANE configuration server is required per ATM LANE switch cloud.

The LANE configuration server's database can have the following four types of entries:

{Emulated LAN name, ATM address of LANE server} pairs

{LANE client MAC address, emulated LAN name} pairs

{LANE client ATM template, emulated LAN name} pairs

Default emulated LAN name

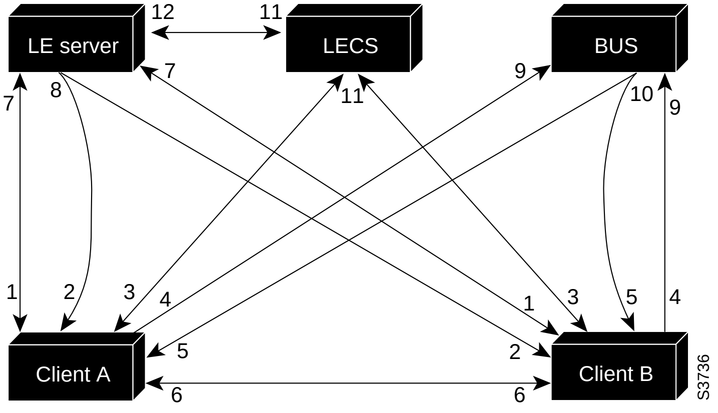
Note Emulated LAN names must be unique on an interface. If two interfaces participate in LANE, the second interface may be in a different switch cloud.

The Catalyst 3200 ATM module currently only supports the LANE client function. The Cisco 7000 router with AIP can supply all LANE functions.

LANE Operation and Communication

Communication among LANE components is ordinarily handled by several types of switched virtual circuits (SVCs). Some SVCs are unidirectional; others are bidirectional. Some are point-to-point and others are point-to-multipoint. Figure 7-4 illustrates the various types of SVCs. In this figure, *LECS* stands for the LANE configuration server, and *BUS* stands for the LANE broadcast-and-unknown server.

Figure 7-4 LANE VCC Types



1–7	Control Direct	4–9	Multicast Send
2–8	Control Distribute	5–10	Multicast Forward
3–11	Configure Direct (client)	6–6	Data Direct
		11-12	Configure Direct (server)

The following section describes various processes that occur, starting with a client requesting to join an emulated LAN.

Client Joining an Emulated LAN

The process illustrated in Figure 7-4 normally occurs after a LANE client has been enabled on the ATM module in a Catalyst 3200 switch:

1 Client requests to join an emulated LAN.

Client sets up a connection to the LANE configuration server to find the ATM address of the LANE server for its emulated LANE. See the bidirectional, point-to-point link, 1-7 in Figure 7-4).

A LANE client locates the LANE configuration server by using the following sources in the listed order:

- Locally configured ATM address
- Interim Local Management Interface (ILMI)
- Fixed address defined by the ATM Forum

2. Configuration server identifies the LANE server.

   Using the same VCC, the LANE configuration server returns the ATM address and the name of the LANE server for the client’s emulated LAN.

3. Client tears down Configure Direct VCC.

4. Client contacts the server for its LAN.

   The client sets up a connection to the LANE server for its emulated LAN (bidirectional point-to-point Control Direct VCC, link 1-7 in Figure 7-4) to exchange control traffic.

   Once a Control Direct VCC is established between a LANE client and a LANE server, it remains up.

5. Server verifies that the client is allowed to join the emulated LAN.

   The server for the emulated LAN sets up a connection to the LANE configuration server to verify that the client is allowed to join the emulated LAN (bidirectional point-to-point Server Configure VCC, link 11-12 in Figure 7-4). The server’s configuration request contains the client’s MAC address, its ATM address, and the name of the emulated LAN. The LANE configuration server checks its database to determine whether the client can join that LAN; then it uses the same VCC to inform the server whether or not the client is allowed to join.

6. LANE server allows or disallows the client to join the emulated LAN.

   If allowed, the LANE server adds the LANE client to the unidirectional point-to-multipoint Control Distribute VCC (link 2-8 in Figure 7-4) and confirms the join over the bidirectional point-to-point Control Direct VCC (link 1-7 in Figure 7-4). If disallowed, the LANE server rejects the join over the bidirectional point-to-point Control Direct VCC (link 1-7 in Figure 7-4).

7. LANE client sends LE ARP packets for the broadcast address, which is all 1s.

Sending LE ARP packets for the broadcast address returns the ATM address of the BUS. Then the client sets up the multicast send VCC (link 4-9 in Figure 7-4) and the BUS adds the client to the multicast forward VCC (link 5-10 in Figure 7-4) to and from the broadcast-and-unknown server.

Address Resolution

As communication occurs on the emulated LAN, each client dynamically builds a local LANE ARP (LE ARP) table. A client's LE ARP table can also have static, preconfigured entries. The LE ARP table maps MAC addresses to ATM addresses.

Note LE ARP is not the same as IP ARP. IP ARP maps IP addresses (Layer 3) to Ethernet MAC addresses (Layer 2); LE ARP maps emulated LAN MAC addresses (Layer 2) to ATM addresses (also Layer 2).

When a client first joins an emulated LAN, its LE ARP table has no dynamic entries and the client has no information about destinations on or behind its emulated LAN. To learn about a destination when a packet is to be sent, the client begins the following process to find the ATM address corresponding to the known MAC address:

1. The client sends an LE ARP request to the LANE server for this emulated LAN (point-to-point Control Direct VCC, link 1-7 in Figure 7-4).
2. If the MAC address is registered with the server, it returns the corresponding ATM address. If not, the LANE server forwards the LE ARP request to all clients on the emulated LAN (point-to-multipoint Control Distribute VCC, link 2-8 in Figure 7-4).
3. Any client that recognizes the MAC address responds with its ATM address (point-to-point Control Direct VCC, link 1-7 in Figure 7-4).
4. The LANE server forwards the response (point-to-multipoint Control Distribute VCC, link 2-8 in Figure 7-4).
5. The client adds the MAC address-ATM address pair to its LE ARP cache.

6 Then the client can establish a VCC to the desired destination and proceed to transmit packets to that ATM address (bidirectional point-to-point Data Direct VCC, link 6-6 in Figure 7-4).

For unknown destinations, the client sends a packet to the broadcast-and-unknown server, which forwards the packet to all clients. The broadcast-and-unknown server floods the packet because the destination might be behind a bridge that has not yet learned this particular address.

Multicast Traffic

When a LANE client has broadcast or multicast traffic, or unicast traffic with an unknown address to send, the following process occurs:

- The client sends the packet to the broadcast-and-unknown server (unidirectional point-to-point Multicast Send VCC, link 4-9 in Figure 7-4).
- The broadcast-and-unknown server forwards (floods) the packet to all clients (unidirectional point-to-multipoint Multicast Forward VCC, link 5-10 in Figure 7-4).

This VCC branches at each ATM switch. The switch forwards such packets to multiple outputs. (The switch does not examine the MAC addresses; it simply forwards all packets it receives.)

Addressing

On a LAN, packets are addressed by the MAC-layer address of the destination and the source stations. To provide similar functionality for LANE, MAC-layer addressing must be supported. Every LANE client must have a MAC address. In addition, every LANE component (server, client, broadcast-and-unknown server, and configuration server) must have a unique ATM address.

In this release, all LANE clients on the same interface have different, automatically assigned MAC address. That MAC address is also used as the end-system identifier (ESI) part of the ATM address, as explained in the following section.

LANE ATM Addresses

A LANE ATM address has the same syntax as an NSAP, but it is not a network-level address. It consists of the following:

- A 13-byte prefix that includes the following fields defined by the ATM Forum: AFI (Authority and Format Identifier) field (1 byte), DCC (Data Country Code) or ICD (International Code Designator) field (2 bytes), DFI field (Domain Specific Part Format Identifier) (1 byte), Administrative Authority field (3 bytes), Reserved field (2 bytes), Routing Domain field (2 bytes), and Area field (2 bytes)
- A 6-byte end-system identifier (ESI)
- A 1-byte selector field

ILMI Address Registration

The Catalyst 3200 ATM module uses ILMI registration to build its ATM address and to register this address with the ATM switch. To build its ATM address, the Catalyst 3200 obtains its ATM address prefix from the ATM switch. Then it combines the ATM address prefix with its own MAC address and the selector value of 0 (zero). Once the Catalyst ATM module has determined its ATM address, it uses ILMI registration to register this address with the ATM switch.

VLANs and ELANs

On the Catalyst 3200 series switch, a VLAN is a logical group of end stations, independent of physical location, with a common set of requirements. Currently, the Catalyst 3200 series switch supports a port-centric VLAN configuration. All end stations connected to ports belong to the same VLAN and are assigned to the same VLAN name. The VLAN name is only significant to the Catalyst 3200 series switch.

Typical LANE Scenarios

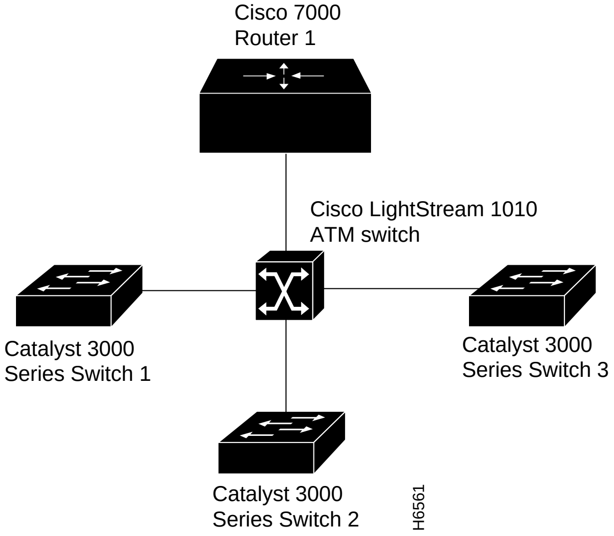
In typical LANE cases, one or more Catalyst 3200 series switches or Cisco 7000 routers are attached to a Cisco LightStream 100 ATM switch. The LightStream 100 switch provides connectivity to the broader ATM network switch cloud. The routers are configured to support one or more emulated LANs. One of the routers is configured to perform the

LANE configuration server functions. A router is configured to perform the server function and the broadcast-and-unknown server function for each emulated LAN. (One router can perform the server and the broadcast-and-unknown server functions for several emulated LANs.) Routers and Catalyst 3200 series switches can act as a LANE client for one or more emulated LANs.

This section presents two scenarios using Cisco 7000 routers, Catalyst 3200 series switches and Cisco LightStream 100 workgroup ATM switch. Figure 7-5 and Figure 7-6, respectively, illustrate example layouts of single and multiple emulated LANs.

The physical layout and the physical components of an emulated network might not differ for the single and the multiple emulated LAN cases. The differences are in the software configuration for the number of emulated LANs and the assignment of LANE components to the different physical components.

Figure 7-5 Typical Emulated LAN Layout

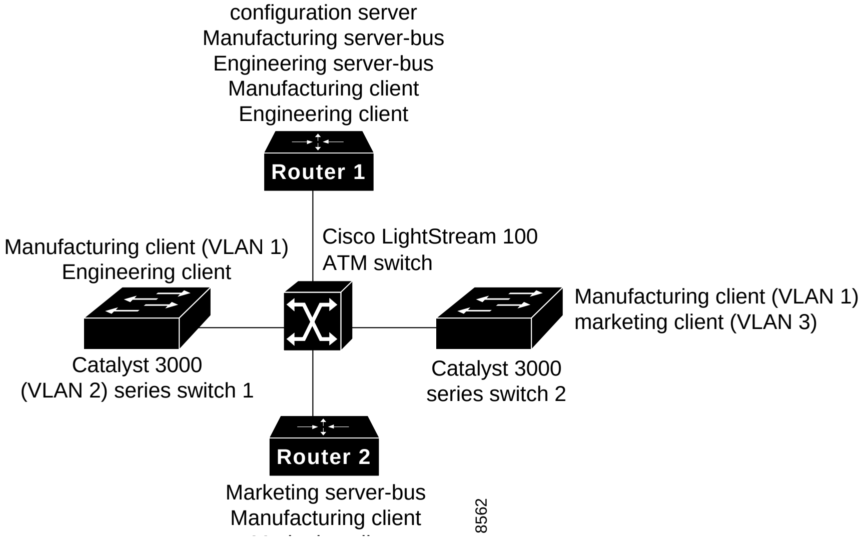


Single Emulated LAN Scenario

In a single emulated LAN configuration, the LANE components might be assigned to a particular department in a company. The Manufacturing department is used for the following scenario:

- Router 1 includes the following LANE components:
  - The LANE configuration server (one per LANE switch cloud)
  - The LANE server and broadcast-and-unknown server for the emulated LAN with a default name for Manufacturing
- Catalyst 3200 series switch 1 includes a LANE client for the Manufacturing department’s emulated LAN on VLAN 1.
- Catalyst 3200 series switch 2 includes a LANE client for the Manufacturing department’s emulated LAN on VLAN 1.
- Catalyst 3200 series switch 3 includes a LANE client for the Manufacturing department’s emulated LAN on VLAN 1.

Figure 7-6 Typical Multiple Emulated LAN Layout



Multiple Emulated LAN Scenario

In a multiple LAN scenario, one ATM switch, two routers, and two Catalyst 3200 series switches are used, but multiple emulated LANs are configured. In the following example, three emulated LANs are configured on two routers and two Catalyst 3200 series switches for three different departments in a company.

The LANE components are assigned as follows:

- Router 1 includes the following LANE components:
  - — The LANE configuration server (one per LANE switch cloud)
  - — The LANE server and broadcast-and-unknown server for the emulated LAN for Manufacturing
  - — The LANE server and broadcast-and-unknown server functions for the emulated LAN for Engineering
  - — A LANE client for the Manufacturing emulated LAN
  - — A LANE client for the Engineering emulated LAN

- Router 2 includes the following LANE components:
  - — The LANE server and broadcast-and-unknown server for the Marketing emulated LAN
  - — A LANE client for the Manufacturing emulated LAN
  - — A LANE client for the Marketing emulated LAN
- Catalyst 3200 series switch 1 includes only the LANE clients for (VLAN 1) Manufacturing emulated LAN and (VLAN 2) Engineering emulated LAN.
- Catalyst 3200 series switch 2 includes only the LANE clients for (VLAN 1) Manufacturing emulated LAN and (VLAN 3) Marketing emulated LAN.

LANE Configuration Task List

Before you begin to configure LANE, you must decide whether you want to set up one or multiple emulated LANs and, if multiple, where the servers and clients will be located, and whether to restrict the clients that can belong to each emulated LAN. Once you have made those basic decisions, you can proceed to configure LANE.

Some of the tasks required to configure LANE are performed on a Cisco router or a LightStream switch. For information on how to perform these tasks, refer to the appropriate *Cisco Router Products Configuration Guide* and the appropriate *Cisco LightStream User Guide*. Only the tasks pertaining to configuring the Catalyst 3200 series switch are provided in the following sections.

Note The order of tasks in this section makes maximal use of the routers' and the Catalyst 3200's ability to display ATM addresses. Displaying the ATM addresses of servers and clients as you configure them can save you the time and effort of computing the addresses. This savings can be considerable when you set up the configuration server's database—especially for emulated LANs with restricted membership.

You can configure some emulated LANs with unrestricted membership and some emulated LANs with restricted membership. You can also configure a default emulated LAN, which must have unrestricted membership.

Configuring a LANE

To configure LANE, complete the following tasks:

1. For LANE Configuration with a Catalyst 3200 ATM module, clients are automatically activated for configured VLANS.
2. Check the following sections, LANE Network Configuration Notes and LANE Configuration Notes for the ATM Module, for information on configuring a LANE.
3. To create a plan and a worksheet for your own LANE scenario. List the following information:

Note Leave space for noting the ATM address of each of the LANE components on each subinterface of each participating device.

- The router and interface where the LANE configuration server will be located
- The router interface and subinterface where the LANE server and broadcast-and-unknown server for each emulated LAN will be located
- The Catalyst 3200 ATM modules, subinterfaces, and VLANs where the clients for each emulated LAN will be located

Note The last three items in this list are very important; they determine how you set up each emulated LAN in the configuration server's database.

- The name of the default emulated LAN (optional)
- The names of the emulated LANs that will have unrestricted membership
- The names of the emulated LANs that will have restricted membership

LANE Network Configuration Notes

The following items may need to be performed before configuring a LANE on the Catalyst 3200.

- Configure the Prefix on the ATM Switch. (Refer to the *Cisco LightStream 100 User Guide* for details on how to perform this task.)
- Set Up LANE Servers and Display Their ATM Addresses. (Refer to the *Cisco Router Products Configuration Guide* for details on how to perform this task.)
- Set Up LANE Clients.
- Set Up the Configuration Server's Database. (Refer to the *Cisco Router Products Configuration Guide* for details on how to perform this task.)
- Enable the Configuration Server and Display Its ATM Address. (Refer to the *Cisco Router Products Configuration Guide* for details on how to perform this task.)
- Enter the Configuration Server's ATM Address on the LightStream Switch. (Refer to the appropriate *Cisco LightStream User Guide* for details on how to perform this task.)

LANE Configuration Notes for the ATM Module

The following configuration notes describe the configuration of a LANE on a Catalyst 3200.

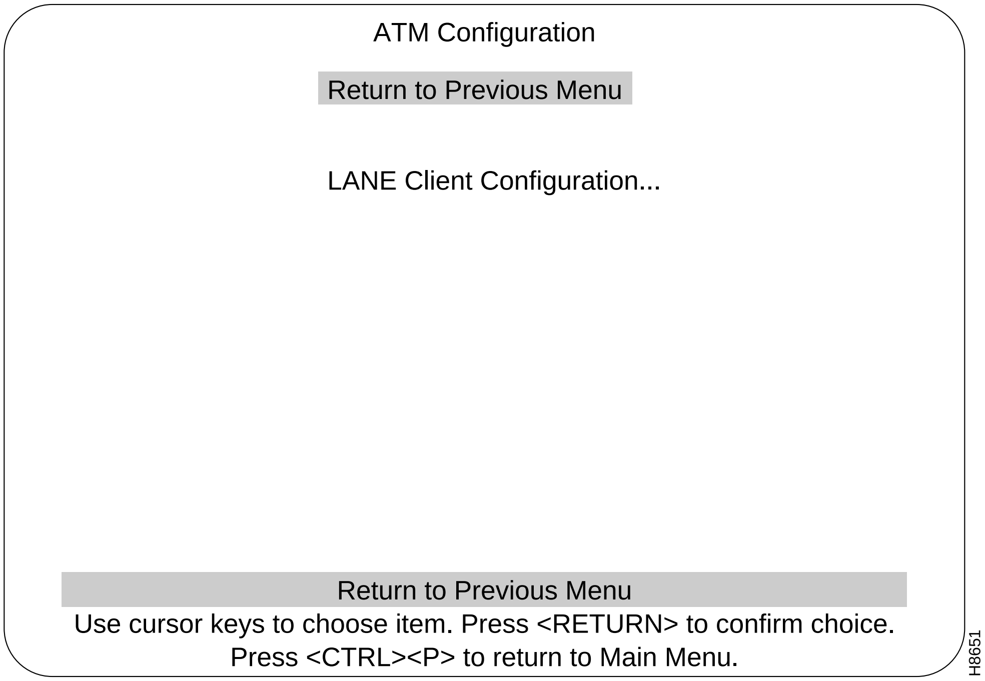
- For LANE Configuration with a Catalyst 3200 ATM module, clients are automatically activated for configured VLANS.
- The Catalyst 3200 uses ILMI to activate and configure the ATM module. If ILMI is enabled on the ATM module and on the connected equipment, a link is created automatically. If ILMI is not active, the LEC's address and the ATM address prefix for the module will have to be configured in the appropriate configuration menus.
- LECs are activated on an as-needed basis. For every VLAN in the Catalyst 3200 stack that has ports assigned to it, an LEC is activated on the Catalyst 3200 ATM module for that VLAN. The LEC joins that ELAN on the ATM cloud with the same name as the VLAN's name.

- By default, when a VLAN is assigned ports in the Catalyst 3200, the LEC for that VLAN is activated and then joined to the corresponding ELAN on the cloud. With a Catalyst 3200 ATM module, there is an option to allow or disallow the module from joining a particular ELAN. This process may be explicitly prohibited via the Configuration menus. To access this option from the Configuration menu, choose the Catalyst VLAN Configuration menu and select the Catalyst VLAN Port Configuration menu.
- The Catalyst 3200 ATM module establishes ATM channels on VPI=0 (zero) only. The port on the ATM unit that the Catalyst 3200 is connected to must be configured to use 0 (zero) bits for VPI usage and 11 bits for VCI usage.
- Naming convention: The VLAN name on the Catalyst 3200 must match exactly with the corresponding setup on a LANE Server or the Catalyst 3200 will failure to connect to the network.

ATM Console Menus

As a reference only, this section lists all of the console menus that pertain directly to the Catalyst 3200 ATM module.

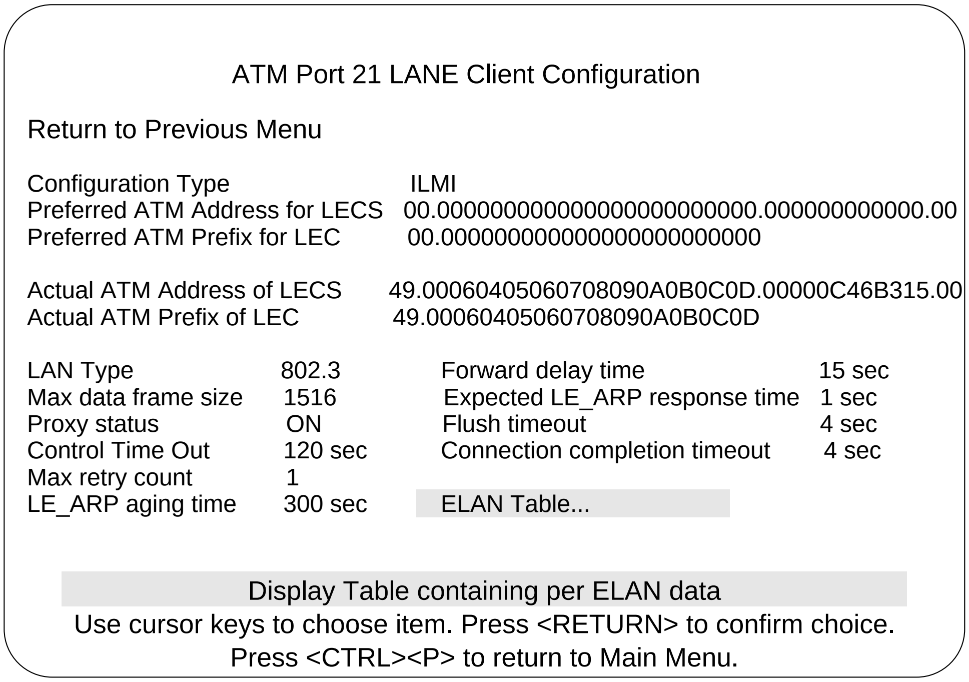
ATM Configuration



```
ATM Configuration

Return to Previous Menu

LANE Client Configuration...

Return to Previous Menu
Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.
```

ATM LANE Client Configuration

This menu is selected from the ATM Configuration menu. Use this menu to check the configuration information of the LANE Client.



```
                    ATM Port 21 LANE Client Configuration

Return to Previous Menu

Configuration Type                 ILMI
Preferred ATM Address for LECS   00.000000000000000000000000.000000000000.00
Preferred ATM Prefix for LEC       00.000000000000000000000000

Actual ATM Address of LECS      49.00060405060708090A0B0C0D.00000C46B315.00
Actual ATM Prefix of LEC          49.00060405060708090A0B0C0D

LAN Type               802.3          Forward delay time              15 sec
Max data frame size     1516           Expected LE_ARP response time   1 sec
Proxy status            ON             Flush timeout                   4 sec
Control Time Out        120 sec        Connection completion timeout   4 sec
Max retry count         1
LE_ARP aging time       300 sec        ELAN Table...

                  Display Table containing per ELAN data
      Use cursor keys to choose item. Press <RETURN> to confirm choice.
                   Press <CTRL><P> to return to Main Menu.
```

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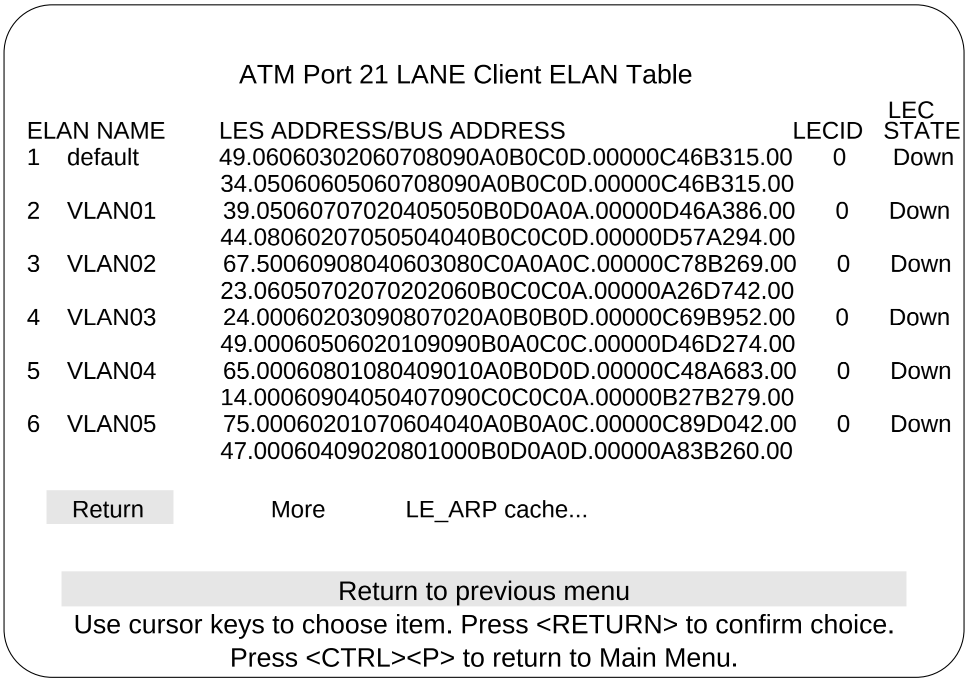
ATM LANE Client ELAN (EmulatedLAN) Table

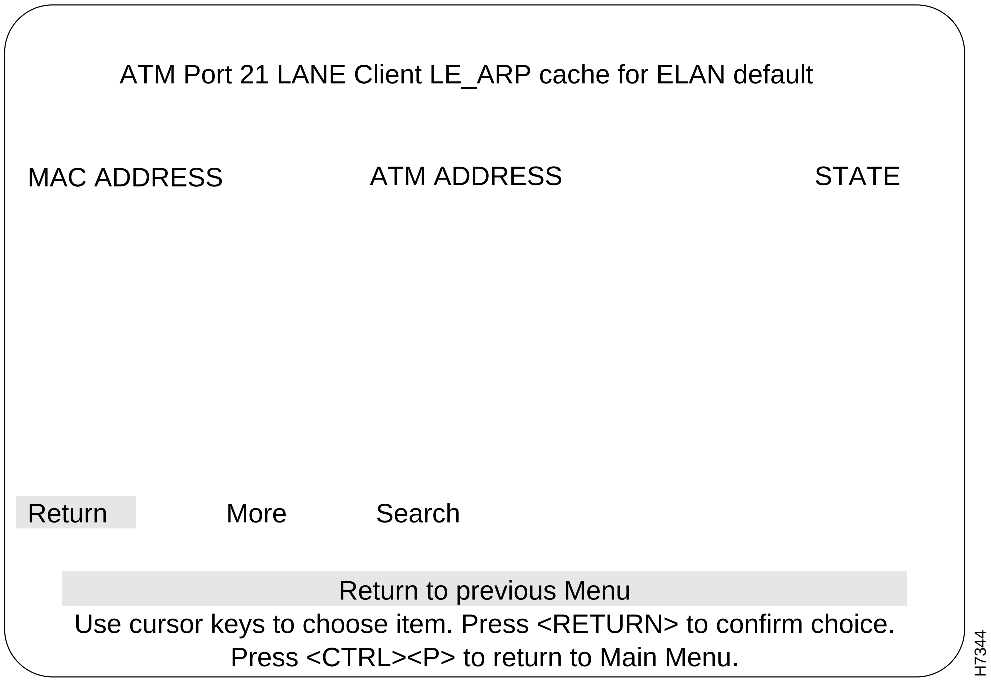
This menu is selected from the ATM LANE Client Configuration menu. This menu provides the LES/BUS addresses for each VLAN.



```
                  ATM Port 21 LANE Client ELAN Table
                                                                       LEC
ELAN NAME       LES ADDRESS/BUS ADDRESS                        LECID  STATE
1   default     49.06060302060708090A0B0C0D.00000C46B315.00      0     Down
                34.05060605060708090A0B0C0D.00000C46B315.00
2   VLAN01      39.0506070702040505 0B0D0A0A.00000D46A386.00      0     Down
                44.08060207050504040B0C0C0D.00000D57A294.00
3   VLAN02      67.50060908040603080C0A0A0C.00000C78B269.00      0     Down
                23.06050702070202060B0C0C0A.00000A26D742.00
4   VLAN03      24.00060203090807020A0B0B0D.00000C69B952.00      0     Down
                49.00060506020109090B0A0C0C.00000D46D274.00
5   VLAN04      65.00060801080409010A0B0D0D.00000C48A683.00      0     Down
                14.00060904050407090C0C0C0A.00000B27B279.00
6   VLAN05      75.00060201070604040A0B0A0C.00000C89D042.00      0     Down
                47.00060409020801000B0D0A0D.00000A83B260.00

  Return            More          LE_ARP cache...

                    Return to previous menu
   Use cursor keys to choose item. Press <RETURN> to confirm choice.
               Press <CTRL><P> to return to Main Menu.
```

ATM LANE Client LE_ARP Cache for ELAN Default

This menu is accessed from the ATM LANE Client ELAN Table menu. This menu provides information on the LE_ARP Cache for default ELAN.



ATM Port 21 LANE Client LE_ARP cache for ELAN default

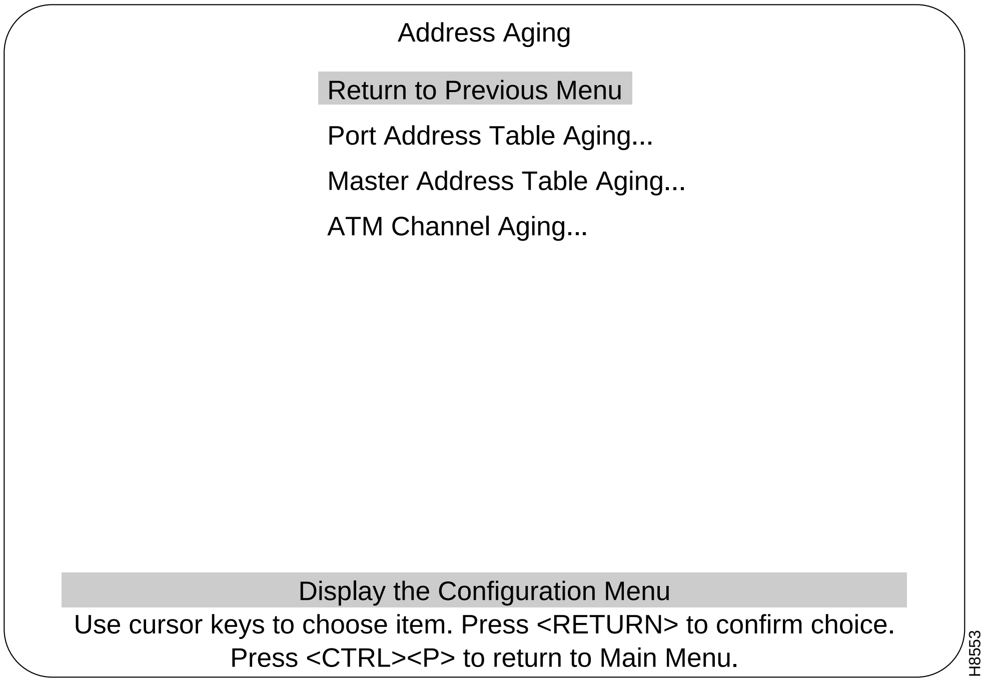
MAC ADDRESS	ATM ADDRESS	STATE

Return to previous Menu

Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

Address Aging

The ATM Channel Aging menu is used to age out less frequently used ATM channels. The concept of address aging and management is described in the Address Aging section. This menu is accessed from the Address Aging menu. At the Address Aging menu, select ATM Channel Aging and press RETURN.



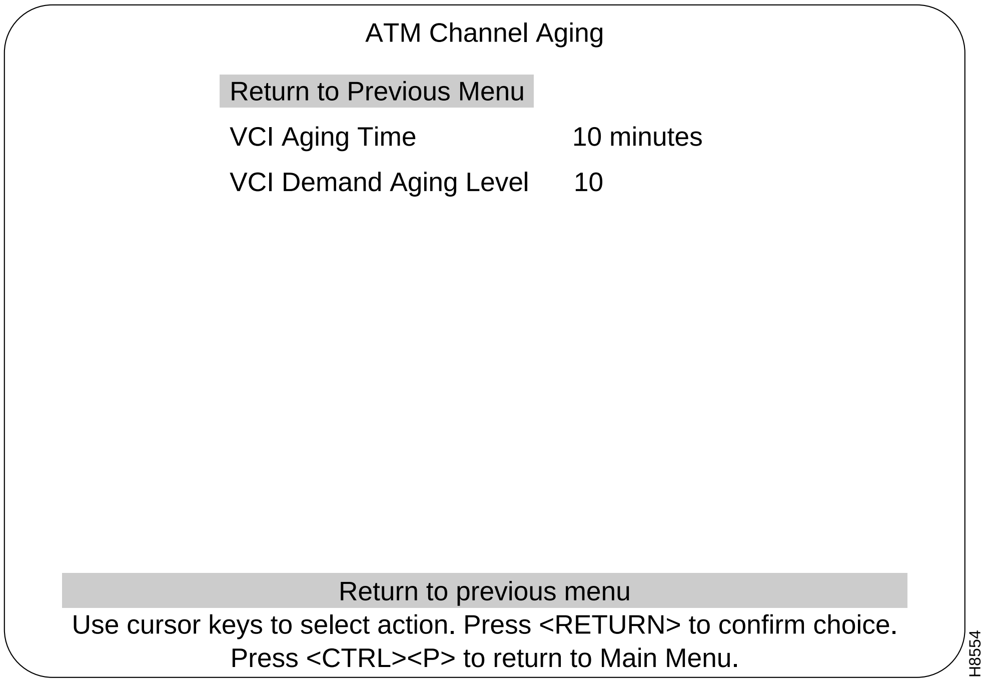
Address Aging

Return to Previous Menu
Port Address Table Aging...
Master Address Table Aging...
ATM Channel Aging...

Display the Configuration Menu
Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

ATM Channel Aging

Select this menu from the Address Aging menu. See the Address Aging section in this chapter for an explanation of the terms Aging Time and Demand Aging Levels.



ATM Channel Aging

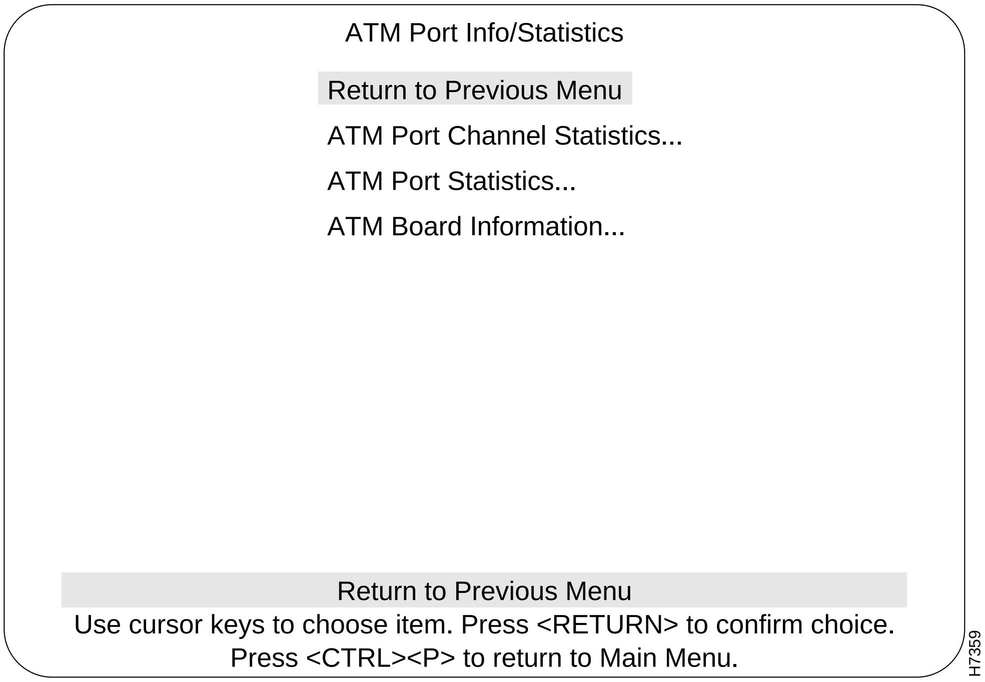
```
Return to Previous Menu
VCI Aging Time              10 minutes
VCI Demand Aging Level      10
```

Return to previous menu

Use cursor keys to select action. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

ATM Port/Info Statistics

The ATM Port Info/Statistics menu is used to access ATM Statistics and Board information menus. Access this menu from the Statistics menu.



ATM Port Info/Statistics

Return to Previous Menu

ATM Port Channel Statistics...

ATM Port Statistics...

ATM Board Information...

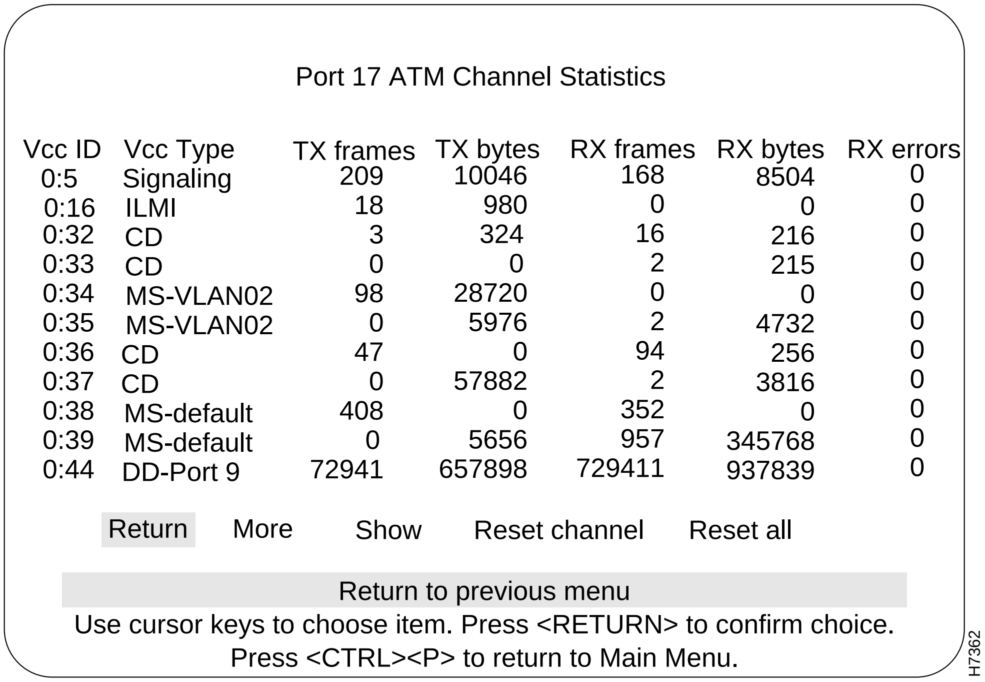
Return to Previous Menu

Use cursor keys to choose item. Press <RETURN> to confirm choice.

Press <CTRL><P> to return to Main Menu.

ATM Port Channel Statistics Menu

The ATM Port Channel Statistics menu lists the number of frames and bytes that were transmitted and received by the channels on the selected ATM port. The last column lists any receive errors.

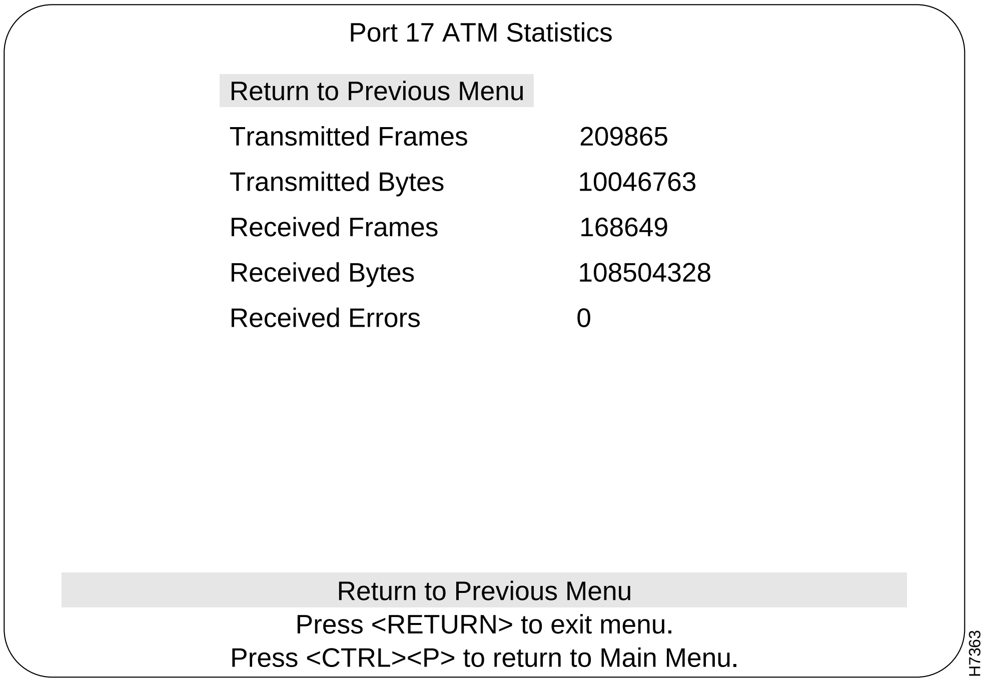


```
                    Port 17 ATM Channel Statistics

Vcc ID  Vcc Type     TX frames  TX bytes  RX frames  RX bytes  RX errors
 0:5    Signaling       209      10046       168       8504        0
 0:16   ILMI             18        980         0          0        0
 0:32   CD                3        324        16        216        0
 0:33   CD                0          0         2        215        0
 0:34   MS-VLAN02        98      28720         0          0        0
 0:35   MS-VLAN02         0       5976         2       4732        0
 0:36   CD               47          0        94        256        0
 0:37   CD                0      57882         2       3816        0
 0:38   MS-default      408          0       352          0        0
 0:39   MS-default        0       5656       957     345768        0
 0:44   DD-Port 9     72941     657898    729411     937839        0
```

Use cursor keys to choose item. Press <RETURN> to confirm choice.
Press <CTRL><P> to return to Main Menu.

ATM Port Statistics Menu

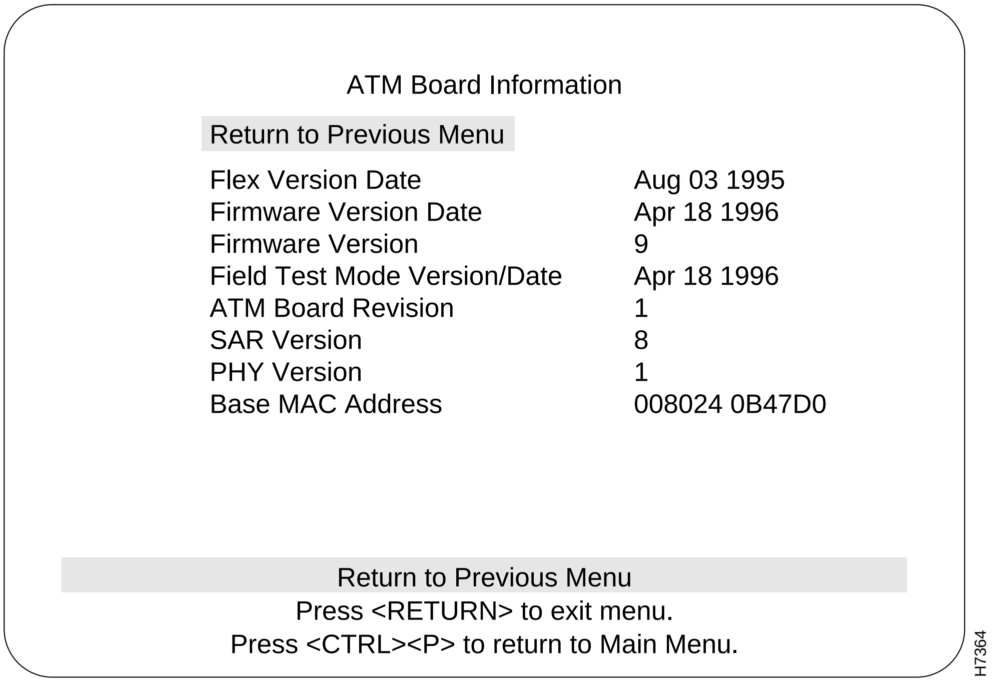
This menu lists the number of frames and bytes that have been transmitted and received per the selected ATM port (17 or 21). The last line displays the number of received errors for that port.



```
                    Port 17 ATM Statistics

          Return to Previous Menu
          Transmitted Frames          209865
          Transmitted Bytes           10046763
          Received Frames             168649
          Received Bytes              108504328
          Received Errors             0







                   Return to Previous Menu
                 Press <RETURN> to exit menu.
            Press <CTRL><P> to return to Main Menu.
```

ATM Board Information

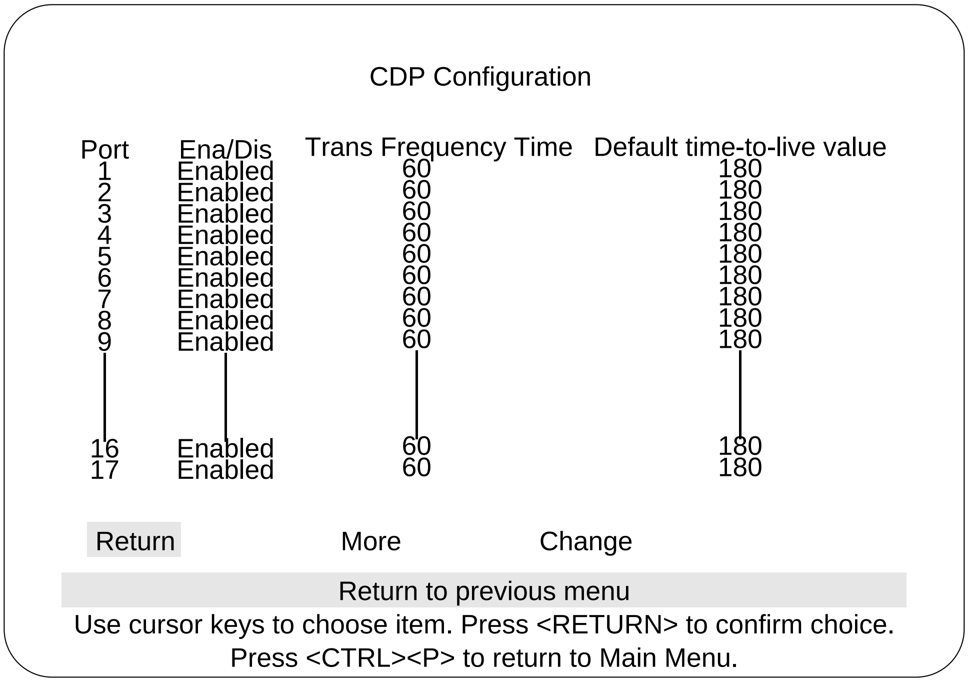
The ATM Board Information menu provides details about the selected ATM board.



```
                    ATM Board Information

        Return to Previous Menu

        Flex Version Date                Aug 03 1995
        Firmware Version Date            Apr 18 1996
        Firmware Version                 9
        Field Test Mode Version/Date     Apr 18 1996
        ATM Board Revision               1
        SAR Version                      8
        PHY Version                      1
        Base MAC Address                 008024 0B47D0




                   Return to Previous Menu
                Press <RETURN> to exit menu.
           Press <CTRL><P> to return to Main Menu.
```

CDP (Cisco Discovery Protocol) Configuration

Cisco Discovery Protocol is used with Cisco IOS software to establish communication between different models of Cisco equipment (such as with a Cisco Catalyst 3000 and a Cisco 7000 router).



```
                           CDP Configuration

Port    Ena/Dis    Trans Frequency Time   Default time-to-live value
 1      Enabled          60                        180
 2      Enabled          60                        180
 3      Enabled          60                        180
 4      Enabled          60                        180
 5      Enabled          60                        180
 6      Enabled          60                        180
 7      Enabled          60                        180
 8      Enabled          60                        180
 9      Enabled          60                        180



 16     Enabled          60                        180
 17     Enabled          60                        180

  Return              More             Change

                      Return to previous menu
   Use cursor keys to choose item. Press <RETURN> to confirm choice.
              Press <CTRL><P> to return to Main Menu.
```

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