CHAPTER 5

Out-of-Band Management

This chapter describes how to configure and manage your network with the management console. Table 5-1 shows the default settings for many parameters and the menus you use to set them. The sections listed under the Management Console Menu column in Figure 5-1 appear in this chapter.

Table 5-1 Default Settings and Their Management Menus

Catalyst 2800 Feature	Default Setting	Management Console Menu
Switching mode	FastForward	"System Configuration"
Spanning-Tree Protocol	Enabled	"Spanning-Tree Configuration"
Addressing security	Disabled	"Port Addressing"
VLAN configuration	All ports belong to VLAN1	"VLAN Configuration"
Port monitoring	Disabled	"Monitoring Configuration"
Flooding unknown unicast packets	Enabled	"Port Addressing"
Flooding unregistered multicast packets	Enabled	"Port Addressing"
Full duplex for Catalyst 2800 1-port 100Base-T modules	Disabled	"Port Configuration"
Assign IP address to Catalyst 2800	0.0.0.0	"IP Configuration"
Define trap manager	0.0.0.0	"Network Management (SNMP) Configuration"
Action on address violation	Suspend	"System Configuration"

Connecting the Catalyst 2800 to a Terminal

When connected to a terminal or modem, the Catalyst 2800 must be configured to the same baud rate and character format as the terminal or modem. Although the Match Baud Rate option (autobaud) matches the baud rate when the Catalyst 2800 is answering an incoming call, the Catalyst 2800 does not change from its configured rate when it is dialing out. Also, the Catalyst 2800 only matches a rate lower than its configured rate. When it completes a call and disconnects, the Catalyst 2800 always returns to the last configured baud rate.

Following are the default RS-232 characteristics for the Catalyst 2800:

- 9600 baud
- Eight data bits
- One stop bit
- Parity: none

These characteristics can be changed using the RS-232 Port Configuration Menu. If you are using SNMP, they can be changed with the objects listed in the "RS-232 MIB (RFC1317)" section in the "In-Band Management" chapter.

Using the Catalyst 2800 Management Console

The management console is a simple menu-driven system with the following characteristics:

- To select a menu, type the letter in square brackets that precedes or follows the selection. The selected menu is displayed immediately and there is no need to press **Return.**
- Pressing **Return** is required after entry of all parameters. When pressed at the beginning of a parameter entry, **Return** causes the attempt to be canceled and the menu redisplayed.
- Certain menus, such as the RS-232 Interface Configuration Menu, allow activation of the given parameters as a group.
- The values and statistics displayed are the current values in use by the Catalyst 2800, except when parameters are activated as a group.

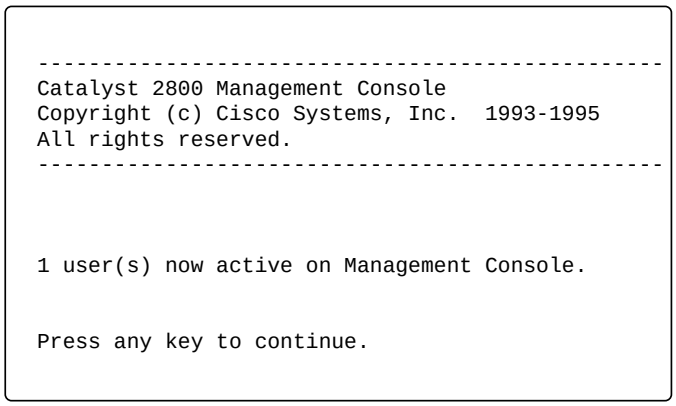
- The information you type is not case sensitive, except when entered as a descriptive string that preserves case.
- The **Backspace** key works as expected; it erases the character previously typed. When pressed at the beginning of a parameter entry, **Backspace** causes the entry to be cleared.
- Type **X** to return to the previous panel. Type an **X** at the Main Menu to exit the management console and return to the command prompt.

You can use the management console locally or with a modem. The Catalyst 2800's autobaud function can automatically match your modem settings. See the "Connecting the Catalyst 2800 to a Terminal" section in this chapter for a description of this feature.

Logging on to the Catalyst 2800

Although you can assign a password to limit access to the management console, it is not required. Press **Return** to display the Main Menu.

Figure 5-1 Management Console Logon Screen

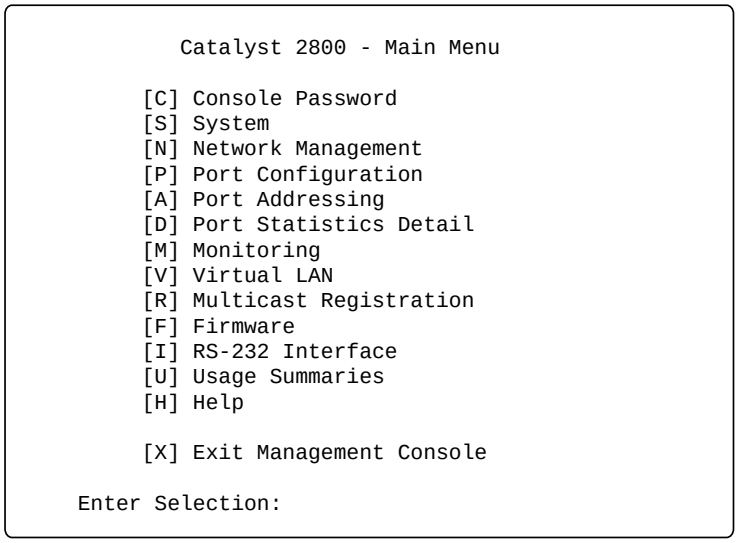


1 user(s) now active on Management Console. There can be up to seven simultaneous Telnet sessions. Changes made by one Telnet user are reflected in all other Telnet sessions. The current number of users is displayed here.

Main Menu

Select an option from the Main Menu by typing the letter in brackets next to it. You do not need to press **Return.**

Figure 5-2 Management Console Main Menu



Use the **H** key to display the online Help and to change the expertise level for online prompts. Type an **X** to return to the Logon Security Menu. The other options of this menu are presented sequentially in the following sections.

Configuration Menus

The first eleven options on the Main Menu are for configuring the Catalyst 2800.

Console Password

Display this panel by typing **C** on the Main Menu. Use it to change your password, set the number of password intrusions allowed, and define how long the management console remains silent after an intrusion.

Figure 5-3 Logon Password Menu

```
        Catalyst 2800 - Console Password

     --------------------Settings------------------
     [P] Password intrusion threshold               3 attempt(s)
     [S] Silent time upon intrusion detection       None

     --------------------Actions-------------------
     [M] Modify password

     [X] Exit to Main Menu

Enter Selection:
```

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[P] Password intrusion threshold. Enter the number of failed password attempts allowed. After this number is reached, the management console becomes quiet for a user-defined amount of time before allowing the next logon. To change the threshold value, type the new setting next to the prompt and press **Return.**

[S] Silent time upon intrusion detection. Enter the number of minutes this management console is to wait before allowing logon after a password intrusion. You can specify from zero to 65,500 minutes. Enter **zero** for no silent time.

[M] Modify password. Enter a new password of four to eight characters. You can use any character found on the keyboard but case is not considered. If you have a current password, you'll have to enter it before it can be changed. Enter the new password. Verify the password by typing it a second time and then press **Return.**

System Configuration

Use the System Configuration Menu to define the Catalyst 2800 system-wide parameters and to reset the system. See the "Concepts" chapter for more details on switching modes and address violations.

Display this menu by typing **S** on the Main Menu.

Figure 5-4 System Configuration Menu

```
       Catalyst 2800 - System Configuration

       System Revision:  1   Address Capacity:  8192
       System Last Reset:   Fri Aug 04 16:51:02 1995

    --------------------Settings------------------
    [N] Name of system                            CS31
    [C] Contact name                              T.W.
    [L] Location                                  Fremont, California
    [D] Date/time                                 Mon Aug 07 15:32:24 1995
    [S] Switching mode                            FastForward
    [U] Use of store-and-forward for multicast    Disabled
    [A] Action upon address violation             Suspend
    [G] Generate alert on address violation       Enabled
    [M] Management Console inactivity timeout     None

    --------------------Actions-------------------
    [R] Reset system
    [F] Reset system with factory defaults
    [X] Exit to Main Menu

Enter Selection:
```

S4153

[N] Name of system. Enter a name for the system of up to 255 characters and press **Return.**

[C] Contact name. Use this option to enter the name of the person or organization responsible for managing the system. You can type up to 255 characters; press **Return** when finished.

[L] Location. The system location is an informal indication of where the Catalyst 2800 is located. You can type up to 255 characters. Type the location and press **Return.**

[D] Date/time. First change the date by typing new values at the prompt and pressing **Return:**

```
Current date/time ===> Fri Sep 24 07:21:05 1995
New date (mm-dd-yy) ===>
```

After you press **Return,** you'll be prompted to enter a new time. Type the time in the given format and press **Return:**

```
Current date/time ===> Fri Sep 24 07:21:05 1995
New date (mm-dd-yy) ===> Sat Sep 25 09:35:23 1995
New time (hh:mm:ss) ===>
```

[S] Switching mode. Set the Catalyst 2800 switching mode to one of the three available options. Read the "Switching Modes" section in the "Concepts" chapter for a complete description of their characteristics. Type the appropriate number and press **Return.**

[U] Use of store-and-forward for multicast. The store-and-forward switching mode is always used for broadcast frames. Enable this option to force store-and-forward mode for multicast frames. With this option set to disabled, multicast frames adhere to the Catalyst 2800 configured switching mode. Press **Return** when finished.

[A] Action upon address violation. Use this option to define how the Catalyst 2800 will respond to address violations. Address violations occur when a secured port receives a source address statically assigned to another port, or when a secured port tries to learn an address that will exceed its defined maximum number of addresses. Type one of the following values at the prompt and press **Return:**

[S]uspend	The port stops forwarding until a packet with a valid source address is received.
[D]isable	The port is disabled until its status is returned to enabled by an administrator.

[I]gnore The port status remains unchanged.

[G] Generate alert on address violation. Whether or not the Catalyst 2800 changes the port status when an address violation occurs, it can also send an SNMP alert to a management station. Select this option to enable or disable this feature. Type **E** or **D** at the prompt and press **Return.**

Note Traps are sent to the IP addresses defined for the trap manager with the SNMP Management Menu.

[M] Management console inactivity time-out. Use this option to define the length of time the management console can remain idle before it times out. After a time-out, you'll need to re-enter the password to use the application. The time-out period is set in seconds; a time-out of zero means the management console will never time-out. Enter **zero** or a number between 30 and 65,500 and press **Return.**

[R] Reset system. Use this command to reset the Catalyst 2800. All configured system parameters and static addresses will be retained; all dynamic addresses will be removed. Enter **Y** or **N** and press **Return.**

[F] Reset with factory defaults. Use this option to reset the Catalyst 2800 and return it to its factory settings. All static and dynamic addresses are removed, as is the IP address and all other configurations. Type a **Y** or **N** and press **Return.**

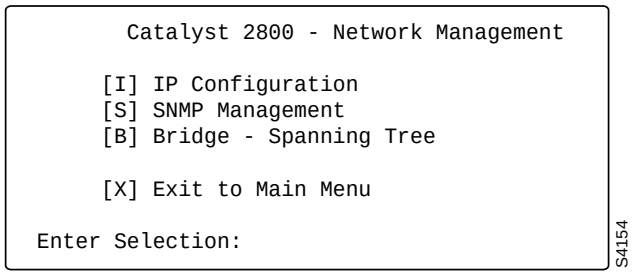
Network Management

This menu leads to menus for the following:

- IP Configuration
- SNMP Management
- Bridge and Spanning-Tree Protocol configuration.

Display this menu by typing **N** on the Main Menu.

Figure 5-5 Network Management Menu



[I] IP Configuration. Select this option to assign IP addresses, subnet masks, and a default gateway.

[S] SNMP Management. This option displays the SNMP Management Menu you use to define SNMP parameters.

[B] Bridge–Spanning-Tree. This option displays the Bridge–Spanning-Tree Menu.

IP Configuration

Before the Catalyst 2800 can be managed in-band, it must be configured with an IP address. Use the IP Configuration Menu to assign an IP address or use the BOOTP to assign one. You can also use this menu to assign subnet masks and to define a default gateway for the Catalyst 2800. When multiple VLANs are defined in the system, the IP Configuration Menu displays IP address and subnet mask settings for all defined VLANs. Examples of both situations are shown in Figure 5-6 and Figure 5-7.

Display this menu by typing **N** on the Main Menu and **I** on the IP Configuration Menu.

Figure 5-6 IP Configuration Menu without VLANs

```
        Catalyst 2800 - IP Configuration

        Ethernet Address:  00-C0-1D-80-05-DB

     --------------------Settings------------------
     [I] IP address  VLAN 1                          192.9.200.31
     [S] Subnet mask VLAN 1                          255.255.255.0
     [G] Default gateway                             192.9.202.4

     [X] Exit to previous menu

Enter Selection:
```

S4155

Figure 5-7 IP Configuration Menu with VLANs

```
         Catalyst 2800 - IP Configuration

         Ethernet Address:  00-C0-1D-80-05-DB

      --------------------Settings------------------
      [I] IP address  VLAN 1                          192.9.200.31
                      VLAN 2                          192.9.202.233
                      VLAN 3                          0.0.0.0
                      VLAN 4                          0.0.0.0
      [S] Subnet mask VLAN 1                          255.255.255.0
                      VLAN 2                          0.0.0.0
                      VLAN 3                          0.0.0.0
                      VLAN 4                          0.0.0.0
      [G] Default gateway                             192.9.202.4

      [X] Exit to previous menu

 Enter Selection:
```

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[I] IP address. Select this option to assign the Catalyst 2800 an IP address for in-band management. The first time you assign an IP address, it takes effect immediately, and in-band management becomes available. If you subsequently change the IP address, you must reset the Catalyst 2800 before the new IP address takes effect. If VLAN1 does not contain all ports as member ports, the following prompt is issued:

```
Identify VLAN: [1-4]:
Select [1-4]
```

After selecting a VLAN, or if VLAN1 contains all ports as member ports, the next prompt is displayed. Type the IP address and press **Return:**

```
Enter administrative IP address in dotted quad format
(nnn.nnn.nnn.nnn):
Current setting ===> 0.  0.  0.  0
New setting ===>
```

[S] Subnet mask. If IP subnetting is used, use this option to enter a subnet mask for the system or current VLAN. The new value takes effect immediately. If subnetting is not in use, the subnet mask is the same as the network mask. If VLAN1 does not contain all ports as member ports, you are prompted for the VLAN number and then the subnet mask. Type the IP address and press **Return:**

```
Enter IP subnet mask in dotted quad format (nnn.nnn.nnn.nnn):
Current setting ===> 0.  0.  0.  0
New setting ===>
```

[G] Default gateway. Use this option to enter a default gateway address for SNMP management. Type the new gateway address at the prompt and press **Return:**

```
Type the address in dotted quad format(nnn.nnn.nnn.nnn):
Current setting ===> 0.  0.  0.  0
New setting ===>
```

Network Management (SNMP) Configuration

SNMP management, based on the Catalyst 2800 Management Information Base, or MIB, allows you to define management stations authorized to set configuration parameters and receive certain traps. If you have set up virtual LANs, each VLAN, acting as a discrete bridge, contains its own bridge MIB information.

Up to four management stations can be defined to set MIB objects, and up to three stations can receive traps. If no management station is explicitly defined, any SNMP station can perform sets if the correct WRITE community string accompanies the request. Once a WRITE manager IP address is defined, however, only explicitly defined management stations can issue set operations on the switch.

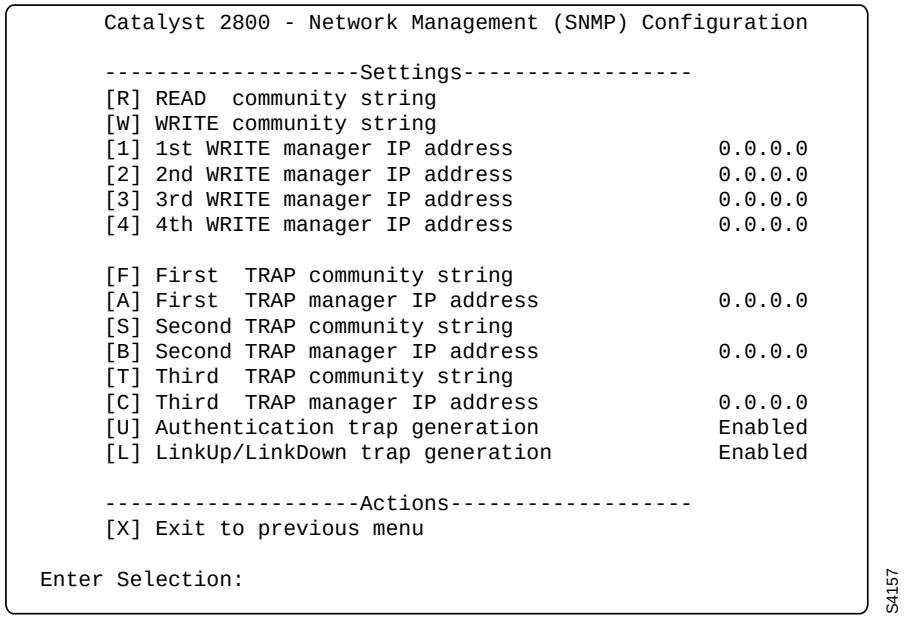
You can use this panel to enable two traps and assign the management stations to receive them. Once a management station has been assigned, the Catalyst 2800 generates several other traps documented in the "Trap Clients and Traps" section in the "In-Band Management" chapter. All objects in the Catalyst 2800 MIB are documented in the *Catalyst 2000 MIB Reference Manual*. Catalyst 2800 SNMP support is described in the "In-Band Management" chapter.

Use the SNMP Management Menu to define the following:

- Which management stations can set Catalyst 2800 MIB objects
- The READ and WRITE community strings
- Which SNMP traps are enabled and which stations are to receive them
- The community strings that accompany traps sent by the Catalyst 2800

Display this menu by typing **N** on the Main Menu and **S** on the Network Management Menu.

Figure 5-8 Network Management (SNMP) Configuration Menu



[R] READ community string. Select this option to change the SNMP agent's Get community string. The Catalyst 2800 will automatically attach a number to the string you enter to create a unique string for each of the four possible VLANs. For example, if you enter the string FINANCE, it becomes the READ community string for VLAN1, and FINANCE2, FINANCE3, and FINANCE4 become the READ community strings for VLAN2, VLAN3, and VLAN4, respectively. Enter a string of up to 32 characters and press **Return.**

[W] WRITE community string. Select this option to define a WRITE community string for the Catalyst 2800. The Catalyst 2800 will automatically attach a number to the string you enter to create a unique string for each of the four possible VLANs. The example for entering a READ community string applies equally here. Enter a string of up to 32 characters and press **Return.**

[1] 1st WRITE manager IP address

[2] 2nd WRITE manager IP address

[3] 3rd WRITE manager IP address

[4] 4th WRITE manager IP address

Select one of these options to define the IP address of a station authorized to issue WRITE requests to the Catalyst 2800. To remove an entry, type **0.0.0.0** . Type the IP address at the following prompt and press **Return:**

```
Enter First Write Manager IP address in dotted quad format
(nnn.nnn.nnn.nnn):
Current setting ===> 0.  0.  0.  0
New setting ===>
```

[F] First TRAP community string

[A] First manager IP address

[S] Second TRAP community string

[B] Second manager IP address

[T] Third TRAP community string

[C] Third TRAP manager IP address

A trap manager, or trap client, is a management workstation configured to receive and process traps. If a trap manager has not been defined, the Catalyst 2800 does not send any traps. Use these options to define up to three trap clients and their accompanying community strings. See the “Trap Clients and Traps” section in the ”In-Band Management” chapter for more information.

Type **F** and a trap manager community string of up to thirty-two characters and press **Return.**

Type **A** to define the IP address for the first trap manager. Type the IP address of the station and press **Return** at the next prompt:

```
Enter First Trap Manager IP address in dotted quad format nnn.nnn.nnn.nnn:
Current setting ===> 0.  0.  0.  0
New setting ===>
```

Continue with further definitions as needed.

[U] Authentication trap generation. Select this option to enable or disable authentication traps that alert a management station of SNMP requests not accompanied by a valid community string. Even if this parameter is set, no trap can be generated if no trap manager addresses have been defined. Type **E** or **D** at the prompt and press **Return.**

[L] LinkUp/LinkDown trap generation. The Catalyst 2800 generates the LinkDown trap whenever a port changes to a suspended or disabled state due to the following:

- Spanning-Tree Protocol
- Secure address violation (address mismatch or duplication)
- Network connection error (loss of linkbeat or jabber error)
- Management intervention

The LinkUp trap is generated whenever a port changes to enabled state due to the following:

- Presence of linkbeat
- Spanning-Tree Protocol
- Management intervention

Note No more than one trap of each type is sent every five seconds per port. The last trap in the five-second interval is the one sent.

Select this option to enable or disable the LinkUp/LinkDown trap. Type an **E** or **D** at the prompt and press **Return.**

Once you have defined a management workstation to receive traps, the Catalyst 2800 will generate the traps in the following list by default. These traps are described in more detail in the “Trap Clients and Traps” section in the ”In-Band Management” chapter.

- coldStart
- warmStart
- logonIntruder

- switchDiagnostic
- newRoot
- TopologyChange
- addressViolation

Spanning-Tree Configuration

Use this menu to display and configure the Spanning-Tree Protocol parameters defined for the Catalyst 2800. The menu consists of an Information section that represents parameters controlled by Spanning-Tree Protocol operation as influenced by other bridges on the network, and a Settings section that defines Spanning-Tree Protocol parameters that are global to this bridge. There is also an Actions section that allows you to scroll through the virtual LANs that are each considered a separate bridge by Spanning-Tree Protocol. For more information, read the “Spanning-Tree Protocol” section in the “Concepts” chapter.

Display this menu by typing **N** on the Main Menu and **B** on the Network Management Menu. The following prompt appears if all ports do not belong to VLAN1:

```
An 802.1d Bridge is associated with a VLAN. Identify VLAN [1-4], to which
Bridge configuration applies.

Select [1-4]:
```

Type a VLAN to display the menu shown in Figure 5-9. If no VLANs have been configured, all ports belong to VLAN1.

Figure 5-9 Bridge–Spanning-Tree Configuration

```
    Catalyst 2800 - VLAN 1 Spanning-Tree Configuration
        Bridge ID: 8000 00-C0-1D-80-05-DB

      --------------------Information----------------
      Designated root 8000 00-C0-1D-80-05-DB
      Number of member ports    27   Root port               N/A
      Max age (sec)             20   Root path cost            0
      Forward Delay (sec)       15   Hello time (sec)          2
      Topology changes         846   Last TopChange   0d00h00m16s

      --------------------Settings-----------------
      [S] Spanning-Tree Algorithm & Protocol          Enabled
      [B] Bridge priority                             32768 (8000 hex)
      [M] Max age when operating as root              20 second(s)
      [H] Hello time when operating as root           2 second(s)
      [F] Forward delay when operating as root        15 second(s)
      [A] Address aging time                          300 second(s)

      --------------------Actions------------------
      [N] Next VLAN bridge          [G] Goto VLAN bridge
      [P] Previous VLAN bridge      [X] Exit to previous menu

  Enter Selection:
```

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The use of this menu requires an understanding of the following terms, some of which are displayed on the menu:

Bridge ID	A unique identifier assigned to this bridge. This hexadecimal number is comprised of a bridge priority and a unique MAC address. You can change the bridge priority from this menu.
Designated root	The bridge ID of the bridge assumed to be the root by Spanning-Tree Protocol.

Root path cost	The cost of the path from this bridge to the root bridge shown in `Designated root`. It equals the path cost parameters held for the `root port`. When this Catalyst 2800 is the root, the root path cost will be zero.
Root port	The port on this bridge with the lowest cost path to the root bridge. It identifies the port through which the path to the root bridge is established. N/A is displayed when Spanning-Tree Protocol is disabled or when this bridge is the root bridge.
Max age	The maximum time in seconds a bridge waits without receiving Spanning-Tree Protocol configuration messages before attempting a reconfiguration. This parameter takes effect when a bridge is operating as the root bridge. Bridges not acting as the root use the root bridge's Max Age parameter.
Hello time	The current time interval in seconds between the transmission of Spanning-Tree Protocol configuration messages. All bridges send configuration messages during reconfiguration to elect the designated root bridge. Bridges not acting as a root bridge use the root bridge hello-time value. After the topology is stabilized, only designated bridges send configuration messages.
Forward delay	The time interval in seconds spent waiting to change a port from its Spanning-Tree Protocol preforwarding state to a forwarding state. This is necessary because every bridge on the network should ensure no loop is formed before allowing the port to forward packets.

Number of TopChanges	The number of bridge topology changes experienced by this bridge. A topology change occurs as ports on this bridge change from a nonforwarding state to forwarding. A topology change also occurs when a new root is selected.
Time since last TopChange	The time measured in days (d), hours (h), minutes (m), and seconds (s), since the last topology change.

[S] Spanning-Tree Algorithm and Protocol. Select this option to enable or disable the Spanning-Tree Protocol, an industry standard way to ensure a loop-free configuration in the bridge topology. When Spanning-Tree Protocol is enabled, redundant ports are kept in a standby (suspended) status and are automatically enabled when needed.

This parameter applies to all VLANs.

Type **E** or **D** at this prompt and press **Return.**

[B] Bridge priority. Select this option to force a bridge to be selected as the root bridge, or as a designated bridge. The bridge priority is a value used in determining the identity of the root bridge. The bridge with the lowest value has the highest priority and will be selected as the root. Type a value at the prompt and press **Return:**

```
Enter bridge priority value (0 to 65535)
Current setting ===> 32768 (8000 hex)
New setting ===>
```

[M] Max age when operating as root. Use this option to define the time in seconds to be used as the max age interval when this Catalyst 2800 becomes the root bridge. After this period expires, other bridges will notice that the root has not sent a configuration message and a new root will be selected. The default value is 20 seconds. Type the new number at the prompt and press **Return:**

```
Enter Max Age value (6 to 40 seconds):
Current setting ===> 20 second(s)
New setting ===>
```

[H] Hello time when operating as root. Select this option to define the hello-time interval when this Catalyst 2800 becomes the root bridge. Valid values range from one to ten seconds; the default is two seconds. Type the new value at the prompt and press **Return:**

```
Enter Hello time value (1 to 10 seconds):
Current setting ===> 2 second(s)
New setting ===>
```

[F] Forward delay when operating as root. Select this option to define the time in seconds to be used as the forward delay interval when this Catalyst 2800 becomes the root bridge. Possible values are four to thirty seconds; the default value is fifteen seconds.

Note Spanning-Tree Protocol also uses this value to accelerate address aging when the spanning tree is reconfigured. See the "Spanning-Tree Protocol and Accelerated Address Aging" section in the "Concepts" chapter for more information.

Type a number at the prompt and press **Return.**

```
Enter forward delay value (4 to 30 seconds):
Current setting ===> 15 second(s)
New setting ===>
```

[A] Address aging time. Use this option to define the time, in seconds, after which an unused dynamic address is automatically removed. During a topology change, ports are aged more quickly by using the forward-delay parameter. When the topology stabilizes, this value again takes effect.

Possible values range from 10 to 1,000,000 seconds (about eleven and one-half days). The default is 300 seconds or five minutes. This value applies for all dynamic addresses in the Catalyst 2800 address table. Enter a value at the prompt and press **Return:**

```
Enter aging time (10 to 1000000 seconds):
Current setting ===> 300 second(s)
New setting ===>
```

[N] Next bridge [P] Previous bridge. Use these options to scroll through the virtual LANs on the Catalyst 2800.

[G] Goto bridge. Use this option to enter the number of the VLAN whose parameters you want to display. Type a number at the prompt and press **Return.**

Monitoring Configuration

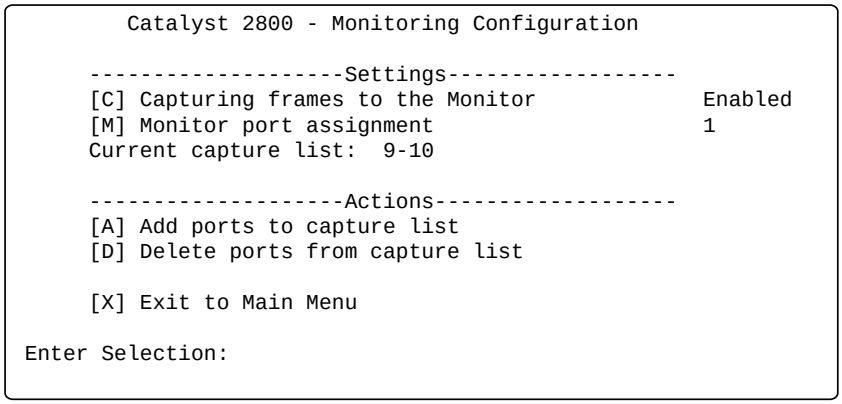
The Catalyst 2800 allows you to route a copy of the incoming and outgoing traffic on a port to a monitor port for analysis and troubleshooting. Use this menu to do the following:

- Turn frame-capturing on and off
- Define those ports whose frames are to be captured
- Define the port the captured frames are to be sent to.

Frame capturing cannot take place until all three of these parameters have been set.

Display this panel by typing **M** on the Main Menu.

Figure 5-10 Monitoring Configuration Menu



[C] Capturing frames to the monitor. Select this option to enable/disable frame capturing. Type a letter at the prompt and press **Return.**

[M] Monitor port assignment. Use this option to define the port where captured frames are to be sent. Type a port number at the prompt and press **Return.**

[A] Add ports to capture list. Use this option to add ports to the capture list. Enter the numbers according to the example in the prompt and press **Return.**

[D] Delete ports from the capture list. Use this option to delete port numbers from the capture list. Enter the numbers in the list you want to delete and press **Return.**

Virtual LAN Configuration

This menu displays the virtual LANs defined for this Catalyst 2800. You can use it to enable overlapping VLANs and display the VLAN Configuration Menu. See the "Virtual LANs" section in the "Concepts" chapter for more information and some sample configurations.

Caution Spanning-Tree may not prevent network loops in overlapping VLANs.

Display this panel by typing **V** on the Main Menu.

Figure 5-11 Virtual LAN Menu

```
            Catalyst 2800 - Virtual LAN Configuration

     --------------------Settings------------------
     [O] Overlapping of VLANs permitted              Enabled

     VLAN  Name                         Member ports
     ----  ---------------------------- ------------
       1                                1-16, B
       2                                17-25, A

     --------------------Actions-------------------
     [C] Configure VLAN
     [X] Exit to Main Menu

Enter Selection:
```

S4160

[O] Overlapping of VLANs permitted. Select this option to allow membership of a port in more than one VLAN. Type a letter at the prompt and press **Return.**

[C] Configure VLAN. This option displays the VLAN Configuration Menu shown in Figure 5-12.

VLAN Configuration

Use this menu to define up to four separate VLANs. Every port must belong to at least one VLAN. The Catalyst 2800 is shipped with all ports belonging to VLAN1; all other VLANs are empty. For more details about the nature of Catalyst 2800 VLANs, see the "Virtual LANs" section in the "Concepts" chapter.

Display this menu by typing **V** on the Main Menu and **C**, Configure VLAN, on the Virtual LAN Configuration Menu. Before the menu is displayed, you are prompted for which VLAN to display:

```
Identify VLAN: [1 - 4]
Select [1 - 4]:
```

Type the number of the VLAN you want to display and press **Return.** Note that options **[A]** and **[D]** of this menu are displayed only if overlapping of ports is permitted.

Figure 5-12 VLAN Configuration Menu

```
            Catalyst 2800 - VLAN 1  Configuration

            Current member ports:  1-16, B

     --------------------Settings-----------------
     [V] VLAN name

     --------------------Actions------------------
     [M] Move member ports from other VLANs
     [A] Add member ports
     [D] Delete member ports

     [N] Next VLAN                [G] Goto VLAN
     [P] Previous VLAN            [X] Exit to previous  Menu

Enter Selection:
```

S4161

Note Certain conventions are used when moving, adding, or deleting ports from VLANs. Use number 26 or A for port A and 27 or B for port B; 1 to 25 are entered as 1 to 25. Separate port numbers by a comma or a space. You can also enter ranges of ports such as 5-10.

[V] VLAN name. Select this option to enter a VLAN name of up to 60 characters. Type the name and press **Return.**

[M] Move member ports from other VLANs. Select this option to add ports to this VLAN and remove them from their previously configured VLAN. The Catalyst 2800 is shipped with all ports belonging to VLAN1. Type the numbers according to the conventions described above and press **Return:**

```
Example: 1, 2, 3, 8-15, 26

Enter port numbers:
```

[A] Add member ports. Use this option to add a port to this VLAN. This feature does not remove the port from a VLAN to which it previously belonged. Use **M**, Move, to add a port and remove it from its previous VLAN. If overlapping membership is disabled, this option will not be available. Type the numbers according to the conventions and press **Return:**

```
Example: 1, 2, 3, 8-15, 26

Enter port numbers:
```

[D] Delete member ports. Use this option to delete member ports from this VLAN. Note that if a port belongs to only one VLAN, it should be moved rather than deleted. If you try to delete the port from its VLAN, the Catalyst 2800 will abort the deletion and issue an error message. If overlapping membership is disabled, this option will not be available.

Type the numbers according to the conventions and press **Return:**

```
Example: 1, 2, 3, 8-15, 26

Enter port numbers:
```

[N] Next VLAN [P] Previous VLAN. Use these options to scroll through the available VLANs.

[G] Goto VLAN. Select this option to enter a VLAN to display. Type a number at the prompt and press **Return.**

Multicast Registration

By default, all multicast frames are forwarded to all ports in a VLAN. You can, however, register multicast addresses so they are sent to only the ports you define. As these packets are then *not* forwarded to other ports, this reduces the amount of flooding performed by the Catalyst 2800. It also opens up the possibility of using multicast packets for dedicated groupcast applications such as broadcast video. For more information on this feature, see the "Flooding Controls" section in the "Concepts" chapter.

Display this panel by typing **R** on the Main Menu. The first line of the menu, shown in Figure 5-13, displays the number of registered multicast addresses.

Figure 5-13 Multicast Registration Menu

```
          Catalyst 2800 - Multicast Registration

          Registered multicast addresses:  1

       --------------------Actions-------------------
       [R] Register a multicast address
       [L] List all multicast addresses
       [U] Unregister a multicast address
       [E] Erase all multicast addresses

       [X] Exit to Main Menu

  Enter Selection:
```

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[R] Register a multicast address. Select this option to register a multicast address. You are prompted for both the address and the ports to which frames destined for this address are to be forwarded.

If you enter an invalid multicast address, the prompt will refresh itself so you can try again. Invalid addresses include nonmulticast addresses, the broadcast address, and reserved multicast addresses such as those used for Scanning-Tree Protocol.

When you enter a valid address, the following prompt is displayed:

```
Enter the destination port numbers (separated by commas or spaces)
e.g. 2,3,6,7,19,22

Default ports ===> All ports

    New ports ===>
```

Type the port numbers and press **Return.** Typing errors will cause the prompt to be refreshed.

[L] List all registered multicast addresses. Use this option to list all registered multicast addresses that exist in the Catalyst 2800. Addresses are listed with the port or ports to which they are assigned. Addresses with an asterisk are subject to source port filtering. See the "Forwarding, Filtering, and Flooding" section in the "Concepts" chapter for more information.

[U] Unregister a multicast address. Select this option to delete registered multicast addresses. You cannot delete those multicast addresses that are not considered registered. Type the address at the prompt and press **Return.**

[E] Erase all registered multicast addresses. Select this option to remove all registered multicast addresses. Press **Y** at the prompt.

Port Configuration

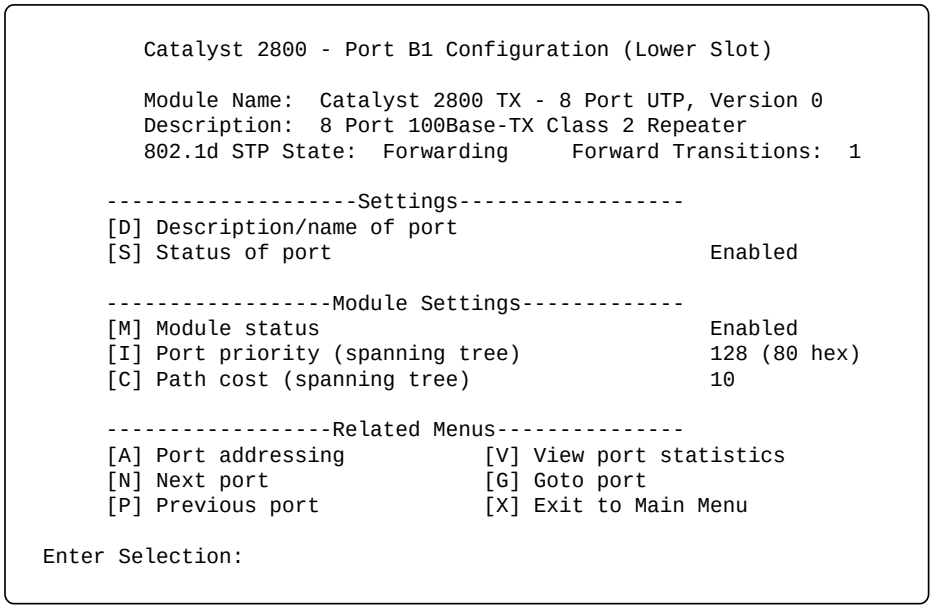
Use this menu to display the status of a port or module, enter a port description, change the port's status, and define various Spanning-Tree Protocol parameters.

Display this menu by typing **P** on the Main Menu. The following prompt is displayed:

```
Identify port: 1 to 25,[A1],[B1]
Select [1 - 25, A1, B1]:
```

The menu displayed will vary depending on whether it is a 10Base-T port or an expansion slot with a 100Base-TX, 100Base-FX, or FDDI module installed.

Figure 5-14 Port Configuration Menu for Expansion Slots



The following terms are used to describe the status of the port:

802.1d Spanning-Tree Protocol state	The current Spanning-Tree Protocol state. This could be:
Blocking	Port is not participating in the frame forwarding process and is not learning new addresses.
Listening	The same as Blocking but the Catalyst 2800 is actively trying to bring the port into the forwarding state. The port is not learning addresses.
Learning	Port is not forwarding frames but is learning addresses. The Catalyst 2800 is actively trying to bring the port into the forwarding state.

Forwarding	Port is forwarding frames and learning addresses.
Disabled	Port has been removed from operation. Administrative intervention is required to enable the port.
Forward Transitions	The number of times the Spanning-Tree Protocol state for this port has changed from listening or learning to forwarding.

[D] Description/name of port. Use this option to assign a name to the port. This could be **Engineering Segment** or any 60-character string. Type the port name at the prompt and press **Return.**

[T] Type of connector (port 25 only). Select this option to define the connector type for port 25. Type one of the following values and press **Return:**

S Self-sense: The Catalyst 2800 determines which connector to use

R RJ-45 connector

A AUI connector

[S] Status of port. Use this option to enable a disabled port or disable a port in an operational state. If the port is an expansion slot with a multiport repeater, you can use this option to enable or disable one repeater port while leaving the others unaffected. To enable or disable all ports of a module, use the module status parameter. The operational states a port can have are listed under the next menu option, Module status. Type **E** or **D** at the prompt and press **Return.**

[M] Module status. Use this option to enable a module that has been disabled, or disable a module that is currently in an enabled operational state. If the module is a multiport repeater, this parameter affects all the repeater ports. Attempts to enable a module which is disabled due to a hardware failure will not succeed, and the module will automatically return to a disabled state. Type **E** or **D** at the prompt and press **Return.**

The status indication shown on this panel will be one of the following:

Enabled	Normal operation. Port can transmit and receive.
Disabled-mgmt	Disabled by explicit management action
Suspended-linkbeat	Suspended due to the absence of a linkbeat. This is usually due to the attached station being disconnected or powered-down.
Suspended-jabber	Suspended because attached station is jabbering
Suspended-violation	Suspended due to address violation
Suspended-ring-down	Port is not connected to a ring or the ring is in the process of configuring (FDDI only)
Suspended-Spanning-Tree Protocol	Spanning-Tree Protocol not forwarding
Suspended-not-present	There is no module in the expansion slot
Suspended-not-recognized	There is an unrecognized module inserted in the expansion slot
Disabled-self-test	Disabled because port failed self-test
Disabled-violation	Disabled due to address violation
Reset	The port is currently in the reset state

[F] Full duplex. Select this option to enable or disable full-duplex transmission on 100-Mbps ports. Full duplex is simultaneous transmission in both directions yielding an aggregate bandwidth of 200 Mbps. As both ends must be configured for full duplex, the port cannot be connected to a repeater. A likely scenario would be to connect a 1-port 100Base-TX or 100Base-FX module to a server with a 100Base-TX adapter2 configured for full-duplex. You could also connect it to another Catalyst 2800 or other 100Base-T switch or router configured for full-duplex operation. Type an **E** or a **D** at the prompt and press **Return.**

Note Full-duplex operation can only be enabled for a one-port 100Base-TX or 100Base-FX module.

[I] Port priority. Use this option to define which port is to remain enabled by Scanning-Tree Protocol if two ports form a loop. Type a number from 0 to 255 and press **Return** at the prompt.

[C] Path cost. Use this option to define the Scanning-Tree Protocol path cost of the port. It is inversely proportional to the LAN speed of the network interface at the port. A high path cost means the port has low bandwidth and should not be used if possible.The default is 1000/LAN-speed-in-Mbps. The path cost of 100-Mbps ports is thus 10, and 10-Mbps ports is 100. Enter a value at the prompt and press Return. This option also affects which port is to remain enabled by Spanning-Tree Protocol if two Catalyst 2800 connections form a loop.

[A] Port addressing. Select this option to display the Port Addressing Menu.

[V] View port statistics. Select this option to display the Detailed Port Statistics Menu.

[N] Next port [P] Previous port. Use these options to scroll back and forth between ports, displaying each port's characteristics.

[G] Goto port. Select this option to display the prompt. Type one of the values and press **Return.**

FDDI Port Configuration

The following options are available for FDDI modules and are in addition to the other port configuration menu options discussed in the "Port Configuration" section in this chapter.

Display this panel by typing **P** on the Main Menu and the letter of an expansion slot containing a Catalyst 2800 FDDI module.

Ring Status. This field indicates whether the module is successfully attached to the ring or not. The two possible values are *operational* and *non-operational.*

[L] Novell SNAP frame translation. Use this option to define how you want to translate Novell SNAP FDDI frames. For more information about the translation options, refer to the *Catalyst 2800 Modules User Guide*. Type the number associated with your choice at the prompt and press **Return.**

Figure 5-15 Port Configuration for FDDI

```
         Catalyst 2800 - Port A1 Configuration (Upper Slot)

         Module Name:  Catalyst 2800 FDDI (Fiber DAS Model), Version 00
         Description:  Dual Attach Station   Ring Status:  Operational
         802.1d STP State:  Forwarding     Forward Transitions:  1

      --------------------Settings------------------
      [D] Description/name of port                    backbone
      ------------------Module Settings-------------
      [M] Module status                               Enabled
      [I] Port priority (spanning tree)               128 (80 hex)
      [C] Path cost (spanning tree)                   10
      [L] Novell SNAP frame translation               Automatic
      [U] Unmatched SNAP frame destination            All

      --------------------Actions-------------------
      [R] Reset FDDI module         [F] Reset FDDI with factory defaults
      -----------------Related Menus---------------
      [1] Basic FDDI settin         [2] Secondary FDDI settings
      [A] Port addressing           [V] View port statistics
      [N] Next port                 [G] Goto port
      [P] Previous port             [X] Exit to Main Menu

Enter Selection:
```

S4164

[U] Unmatched SNAP frame destination. This option appears only when the user has selected Automatic as the SNAP translation format. You use it to select which FDDI-to-Ethernet translation to use for packets whose destinations cannot be determined from the Novell SNAP translation table. Type the number associated with your choice at the prompt and press **Return.**

[R] Reset FDDI module. Use this option to reset the Catalyst 2800 FDDI module. Type **Y** or **N** at the prompt and press **Return.**

[F] Reset FDDI with factory defaults. Select this option to restore the factory default settings on the Catalyst 2800 FDDI module. The module will be reset, and the new settings take effect immediately. Type **Y** or **N** at the prompt and press **Return.**

[1] Basic FDDI settings. Display the Basic FDDI Settings Menu described in the "Basic FDDI Settings" section in this chapter.

[2] Secondary FDDI settings. Display the Secondary FDDI Menu described in the "Secondary FDDI Settings" section in this chapter.

Port Addressing

Use this menu to configure address security of a port and define static unicast and multicast addresses. You can use this menu to specify how a port filters and forwards unmatched unicast addresses and non-registered multicast addresses. Although multicast address registrations are configured elsewhere, you can use this menu to specify additional source-port filtering on the multicast addresses. For more information on these features, see the "Flooding Controls" section in the "Concepts" chapter.

Display this menu by typing **A** on the Main Menu and responding to the prompt with the port number.

Figure 5-16 Port Addressing Menu

The top of the panel displays the current addressing situation:

Dynamic addresses	The current number of unicast addresses that have been automatically learned on this port. If this is a secured port, the dynamic addresses field is set to zero.
Static addresses	The current number of unicast addresses that have been assigned to this port.

[T] Address Table Size. Select this option to define the size of the address table for a secured port. Type a number between 1 and 132 and press **Return** at the prompt.

Note The size of the address table for an unsecure network port cannot be modified.

[S] Addressing security. Use this option to secure a port. Alerts may be generated when secured ports attempt to learn new addresses and its address table is full. The port may be disabled or suspended due to such address violations. See the "Securing Ports" section in the "Concepts" chapter for more information. Type an **E** or **D** at the prompt and press **Return.**

[U] Flood unknown unicasts. When a frame with an unrecognized unicast destination address is received on any port, the default action is to forward the packet to all enabled ports. Use this option to inhibit the forwarding of unknown unicasts to this port. Type **E** or **D** at the prompt and press **Return.**

[M] Flood unregistered multicasts. When a frame with an unregistered multicast destination address is received on any port, the default action is to forward the packet to all enabled ports. Use this option to inhibit the forwarding of unregistered multicast addresses to this port. Type **E** or **D** at the prompt and press **Return.**

[A] Add a static address. Use this option to add a static unicast address to the port's address table. If the address table is already full, an error message is generated. If there is room in the table, type a unicast address and press **Return.**

Note Only unicast addresses can be added. An attempt to add a multicast or broadcast address will not be added and will generate an error message.

[D] Define a restricted static address. Packets with static addresses are usually accepted from any source port. A restricted static address, which corresponds to source port filtering in 802.1d, is accompanied by a list of ports that are allowed to send frames to this address and port. Type the unicast or multicast address and press **Return.**

You are then prompted for the port numbers allowed to send to this address. Type the port numbers at the prompt and press **Return.** The Catalyst 2800 checks the list of ports for typing errors and, if there are any, redisplays the prompt.

[L] List addresses. Select this option to list all dynamic and static addresses that belong to this port. The Catalyst 2800 displays up to 15 addresses per screen; static addresses are listed first.

[E] Erase an address. Use this option to erase a dynamic or static address assigned to the current port. Type the address at the prompt and press **Return.**

[R] Remove all addresses. Select this option to remove all dynamic and static addresses currently associated with the port. Type **Y** or **N** at the confirmation prompt and press **Return.**

[C] Configure port. Select this option to display the Port Menu.

[V] View port statistics. Select this option to display the Detailed Port Statistics Menu.

[N] Next port [P] Previous port. Use these options to scroll back and forth between ports, displaying each port's characteristics.

[G] Goto port. Select this option to display the prompt:

```
Identify port: 1 to 25[1-25], [A1], [B1]
Select [1 - 25, A, B]:
```

Type one of the values and press **Return** to display the port.

Port Statistics Report

This display-only panel shows frame transmit and receive statistics captured by the Catalyst 2800. The statistics and errors are displayed on a per-port basis and vary according to the installed Catalyst 2800 module. Figure 5-17 is a statistics report for an installed 100Base-T module. Figure 5-18 is a statistics report for an installed FDDI module. Press the **Spacebar** to update the statistics.

Display the panel by typing **D** on the Main Menu, or **V** on the Port Menu or Port Addressing Menu.

Figure 5-17 Detailed Port Statistics Report

```
        Catalyst 2800 - Port B (Lower Slot)
    Receive Statistics                    Transmit Statistics
-----------------------------------  -----------------------------------
Total good frames            43089045  Total frames               1704572950
Total octets              > 988349394  Total octets              >2501285869
Broadcast/multicast frames       9057  Broadcast/multicast frames     196139
Broadcast/multicast octets     794398  Broadcast/multicast octets   20832472
Good frames forwarded        43089045  Deferrals                    10743278
Frames filtered                     0  Single collisions             1083305
Runt frames                       901  Multiple collisions           1085610
No buffer discards                  0  Excessive collisions                0
                                       Queue full discards                 0
Errors:                                Errors:
  FCS errors                        0    Late collisions                   0
  Alignment errors                  0    Excessive deferrals               0
  Giant frames                      0    Jabber errors                     0
  Address violations                0    Other transmit errors             0

Select [A] Port addressing, [C] Configure port,
       [N] Next port, [P] Previous port, [G] Goto port,
       [R] Reset port statistics, or [X] Exit to Main Menu:
```

S4166

Performance or connectivity problems could be evident in the port statistics, particularly those under the heading Errors. For example, FCS and alignment errors could be the result of cabling problems such as the following:

- Exceeding the cabling-distance specifications
- Split pairs
- Defective patch-panel ports
- Wrong cable type
- Misconfigured full-duplex connection

Figure 5-18 Detailed FDDI Port Statistics

```
        Catalyst 2800 - Port A (Upper Slot)

    Receive Statistics                    Transmit Statistics
-----------------------------------  -----------------------------------
Good FDDI frames           645529907  Good FDDI frames          2150222486
Good FDDI octets          1516009903  Good FDDI octets          3441674816
No buffer discards                 0  No buffer discards                 0
IP frames fragmented         2100144  Ring down discards                 0
Frames filtered             78801815  Queue full discards                0
Good frames forwarded      569907095

Errors:
  FCS Error                        0
  Invalid data length              0
  Error flag set                   0
  Bad IP header                    0
  Other receive errors             0
  Address violations               0

Select [A] Port addressing, [C] Configure port,
       [N] Next port, [P] Previous port, [G] Goto port,
       [R] Reset port statistics, or [X] Exit to Main Menu: N
```

S4167

For more information on responding to the errors found here, see the “Troubleshooting” chapter. The following definitions of the types of errors found on this panel are taken from RFC 1398:

FCS errors	A count of frames received on a particular interface that are an integral number of octets in length but do not pass the Frame Check Sequence (FCS) test.
Alignment errors	A count of frames received on a particular interface that are not an integral number of octets in length and do not pass the FCS check.
Invalid data length (FDDI)	FDDI packets that have not been completely received.
Error flag set (FDDI)	The E indicator of the FDDI frame status has been set.
Bad IP header (FDDI)	Bad data in the IP header.
Giant frames	A count of frames received on a particular interface that exceeds the maximum permitted frame size.
Address violations	Number of times a source address was seen on this secured port which duplicates a static address configured on another port, plus the number of times a source address was seen on this port which does not match any addresses secured for the port.
Late collisions	The number of times that a collision is detected on a particular interface later than 512 bit-times into the transmission of a packet.
Excessive deferrals	A count of frames for which transmission is deferred for an excessive period of time.

Jabber errors	The number of times the jabber function was invoked because a frame received from this port exceeded a certain time duration.

[A] Port addressing. Display the Port Addressing Menu.

[C] Port configuration. Display the Port Menu.

[R] Reset port statistics. Select this option if you want to clear this port's statistics. Type **Y** at the prompt and press **Return.**

To update the screen press the **Spacebar.** You can scroll through port statistics using the **Return** key or the following keys:

[N] Next port
[P] Previous port
[G] Goto port

Firmware Configuration

Use this menu to display the firmware version currently in use by the Catalyst 2800 and to perform firmware upgrades. You can also upgrade the firmware for Catalyst 2800 FDDI modules and download diagnostic software for use by customer support.

Upgrading Catalyst 2800 firmware is performed by downloading an upgrade file directly into Flash memory. When new firmware is downloaded, the Catalyst 2800 resets, and the new firmware begins executing immediately. To avoid writing over itself, the Catalyst 2800 must be executing out of EPROM for the firmware to be upgraded. Catalyst 2800 FDDI is always executing out of its own Flash memory, and this restriction does not apply.

Display this menu by typing **F** on the Main Menu.

Figure 5-19 Firmware Configuration Menu

```
       Catalyst 2800 - Firmware Configuration

    -----------------System Information------------
    EPROM:  512K bytes         Factory installed firmware V3.10
    FLASH:  512K bytes
    V3.10 written on Mon Aug 07 15:01:11 1995 from 192.009.200.068: valid

    -----------------Module Information------------
    Slot A  v1.08 written 08-03-1995 15:48:48 from 192.009.202.068: valid

    --------------------Settings------------------
    [C] Current system firmware source              EPROM
    [S] Server:  IP address of TFTP server          0.0.0.0
    [F] Filename for firmware upgrades              /tftpboot/fl32cs1.bi
    [A] Accept upgrade transfer from other hosts    Enabled

    --------------------Actions-------------------
    [1] FDDI (A) XMODEM upgrade   [2] FDDI (B) XMODEM upgrade
    [3] FDDI (A) TFTP upgrade     [4] FDDI (B) TFTP upgrade
    [U] System XMODEM upgrade     [D] Download test subsystem (XMODEM)
    [T] System TFTP upgrade       [X] Exit to Main Menu

Enter Selection:
```

S4168

How you upgrade the firmware depends on your installation. There are three possibilities:

- From a TFTP server

  Before the upgrade can be performed, enter the name of the TFTP server and the name of the file containing the upgrade. The actual upgrade can be initiated through the management console or with any SNMP-compatible management station. As a result, the switch retrieves the upgrade file from the server via TFTP.

- From a TFTP client

  A TFTP client can put the firmware upgrade into the switch.

- With the XMODEM protocol

  Use a terminal attached to the RS-232 port at the back of the Catalyst 2800 to transfer the firmware via the XMODEM protocol.The Catalyst 2800 checks to ensure that Flash memory is available.

Upgrading Catalyst 2800 Firmware with a TFTP Server

Step 1 Select option **S** and enter the IP address of the server where the upgrade file is located.

Step 2 Select option **F** and enter the name of the firmware-upgrade file.

Step 3 Make sure the Catalyst 2800 can reach the TFTP server. Select option **T** to initiate the TFTP transfer; the Catalyst 2800 contacts the server to get the upgrade file.

Note You can also initiate a TFTP transfer by setting the Catalyst 2800 MIB object `upgradeTFTPInitiate`.

Upgrading Catalyst 2800 Firmware with a TFTP Client

Step 1 On the TFTP client workstation, establish a TFTP session with the IP address assigned to the Catalyst 2800.

Step 2 Ensure that the TFTP client is in binary transfer mode.

Step 3 At the command line type **put** and the filename.

Step 4 Verify the upgrade is in progress by checking the System Information section of the Firmware Upgrade Menu. The status line should read: `in-progress`.

Step 5 When the transfer is complete, the Catalyst 2800 resets and begins using the new firmware.

Upgrading Catalyst 2800 Firmware with XMODEM

This procedure is largely dependent on the modem software you're using.

Step 1 Select option **U**. If the firmware is currently running from EPROM, you are prompted to continue.

Step 2 When the first XMODEM request appears, use the appropriate command to start the transfer.

Step 3 The Catalyst 2800 resets after a successful transfer, the newly downloaded firmware begins to reset, and the Logon Security Menu is displayed.

Identifying the Source of Catalyst 2800 Firmware

Under the heading System Information you can see the past and current state of the Catalyst 2800 firmware. The EPROM heading reflects the factory-installed firmware; the Flash heading shows the version number of the most recent Catalyst 2800 upgrade and when it was installed; option **[C]** displays the current firmware source; the station address displays the station used for the upgrade. If a terminal was used, it will say `serial terminal`. Also displayed is the status of the most recent upgrade: `valid`, `in-progress`, or `invalid`.

Note If you are upgrading the Catalyst 2800 firmware, ensure current system firmware source is EPROM. If it is Flash, press **C** to change the source of the firmware to EPROM. Changing the firmware source causes the switch to reset.

Upgrading FDDI Firmware with a TFTP Server

The options you use in this procedure depend on the expansion slot containing the Catalyst 2800 FDDI module.

Step 1 Select option **S** and enter the IP address of the server where the upgrade file is located.

Step 2 Select option **F** and enter the name of the firmware-upgrade file.

Step 3 Select option **3** (for the A slot) or **4** (for the B slot) to initiate the TFTP transfer; the Catalyst 2800 contacts the server to get the upgrade file.

Upgrading FDDI Firmware with a TFTP Client

Step 1 On the TFTP client workstation, establish a TFTP session with the IP address assigned to the Catalyst 2800.

Step 2 Ensure that the TFTP client is in binary transfer mode.

Step 3 At the command line type **put** and the filename. If there are two FDDI modules installed, the following rules are applied:

- If the firmware in one of the FDDI modules is invalid, it is upgraded.
- If the new firmware has a higher version number than the firmware in slot A, then upgrade slot A.
- If slot A already has the new firmware, or a higher version, then upgrade slot B.

Step 4 Verify the upgrade is in progress by checking the System Information section of the Firmware Upgrade Menu. The status line should read: `in-progress`.

Step 5 When the transfer is complete, the FDDI module resets and begins using the new firmware.

Upgrading FDDI Firmware with XMODEM

This procedure is dependent on the modem software you're using.

Step 1 Select option **1** for the expansion slot A or **2** for expansion slot B.

Step 2 When the first XMODEM request appears, use the appropriate command to start the transfer.

Step 3 FDDI resets after a successful transfer.

[C] Current system firmware source. The source of the currently executing Catalyst 2800 firmware, EPROM or Flash, is displayed at the top of the menu. The Catalyst 2800 must be executing out of EPROM for the Catalyst 2800 firmware to be upgraded. Type **E** or **F** at the prompt and **Return** to change the source. If you press **Return** without typing a letter, or after clearing an entry with **Backspace,** the setting is not changed and the previous menu is displayed.

[S] Server: IP address or TFTP server. Type the IP address of the TFTP server where a Catalyst 2800 upgrade file is located.

[F] Filename for firmware upgrades. Type the name of the firmware upgrade file to be downloaded and press **Return.** The file should be on a TFTP server.

[A] Accept upgrade transfer from other hosts. You have the option of accepting, or not, upgrades from TFTP clients on the network. Use this option to enable or disable this function and press **Return.**

[1] FDDI XMODEM upgrade

[2] FDDI TFTP upgrade

[U] System XMODEM upgrade. Select this option to upgrade the firmware using a modem. If the Catalyst 2800 firmware is currently running from EPROM, you are prompted to continue. Type **Y** to begin the transfer or **N** to return to the Firmware Upgrade Menu. The next prompt is:

```
Please initiate XMODEM transfer.
Awaiting transfer . . . C
```

C is the first XMODEM/CR protocol request. Use the appropriate application-specific command to start the transfer. Upon successful completion of the transfer, the Catalyst 2800 resets and the newly downloaded firmware begins to execute. The Logon Security Menu is displayed.

[T] System TFTP upgrade. Use this option to upgrade the firmware from a TFTP server. The address of the server and the name of the file must already be set.

[D] Download test subsystem (XMODEM). This option is reserved for use by the customer support group and is used to download diagnostic software.

RS-232 Interface Configuration

Use this menu to define the RS-232 port's physical characteristics—baud rate, stop bits and the like—and call-features such as the time delay between outgoing calls. Note that the changes you make to parameters under the heading Group Settings are not invoked until you press **G**. Press **C** to cancel the session and return to the previous settings.

Display this panel by typing **I** on the Main Menu.

Figure 5-20 RS-232 Port Configuration Menu

```
       Catalyst 2800 - RS-232 Interface Configuration

       ------------------Group Settings--------------
       [B] Baud rate                                  9600 baud
       [D] Data bits                                  8 bit(s)
       [S] Stop bits                                  1 bit(s)
       [P] Parity setting                             None

       --------------------Settings------------------
       [M] Match remote baud rate (auto baud)         Enabled
       [A] Auto answer                                Enabled
       [N] Number for dial-out connection
       [T] Time delay between dial attempts           300
       [I] Initialization string for modem            E0V1M1

       --------------------Actions-------------------
       [C] Cancel and restore previous group settings
       [G] Activate group settings

       [X] Exit to Main Menu

  Enter Selection:
```

S4169

[B] Baud rate. Type the baud rate for the Catalyst 2800 RS-232 serial port and press **Return.**

[D] Data bits. Type the data bits value for the serial port and press **Return.** Valid values are 7 and 8.

[S] Stop bits. Type the stop-bits value for the serial port and press **Return.**

[P] Parity settings. Change the parity settings for the serial port and press **Return.**

[M] Match remote baud rate. Select this feature to enable the RS-232 port to automatically match the baud rate of an incoming call. The Catalyst 2800 only matches a baud rate lower than its configured baud rate. After the call, the Catalyst 2800 reverts to its configured rate.

[A] Auto answer. Select this feature to enable the auto-answer feature. Type **E** or **D** at the prompt and press **Return.**

[N] Number for dial-out connection. Enter the phone number the Catalyst 2800 is configured to use when dialing out. This number is dialed when the Catalyst 2800 is configured to communicate with a remote terminal upon power-up or reset. If the dial-out is unsuccessful and auto-answer is enabled, the Catalyst 2800 will cease dialing and await incoming calls.

Up to 48 characters can be entered. Use the **Backspace** followed by **Return** to delete the number. Using the format required by your modem, type the number at the prompt and press **Return.**

[T] Time delay between attempts. Type the amount of time in seconds between dial-out attempts and press **Return.** Zero disables retry.

[I] Initialization string for modem. Change the initialization string to match your modem requirements. Up to forty-eight characters can be entered. A single **Backspace** followed by **Return** deletes the current string and restores the default string E0V1M1 for Hayes-compatible modems.

Note Do not specify an AT prefix or end-of-line suffix.

Type the new string at the prompt and press **Return.**

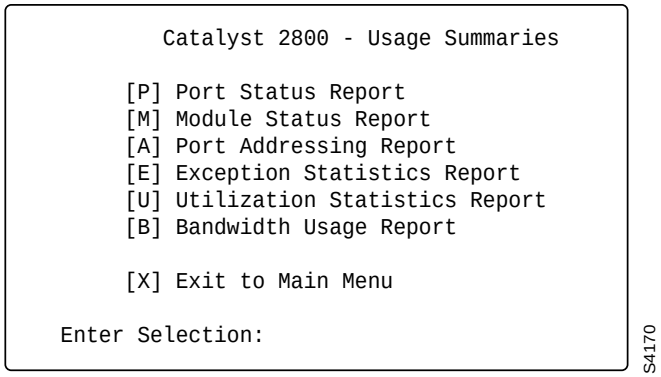
[C] Cancel and restore previous group settings. Select this option to undo any new values entered for the baud rate, data bits, stop bits and parity setting. Values are restored to those last saved.

[G] Activate group settings. This option activates the setting you have entered for baud rate, data bits, stops bits, and parity settings. After selecting this option, configure the attached terminal to match the new settings. Enter **Y** or **N** at the prompt.

Usage Summaries

Use this menu to display network statistics in the form of summary displays showing all ports. Press **U** on the Main Menu to display this menu. These statistics are read only; press the **Return** key or the **Spacebar** to refresh them at any time.

Figure 5-21 Usage Summary Menu



Port Status Report

This panel summarizes the status of all ports as defined on the Ports Menu. Definitions of these terms can be found under the “Port Configuration” section in this chapter.

Display this panel by typing **U** on the Main Menu and **P** on the Usage Summary Menu.

Figure 5-22 Port Status Report

```
        Catalyst 2800 - Port Status Report

 1 : Enabled                      13: Enabled
 2 : Enabled                      14: Enabled
 3 : Enabled                      15: Enabled
 4 : Enabled                      16: Enabled
 5 : Enabled                      17: Enabled
 6 : Enabled                      18: Enabled
 7 : Enabled                      19: Enabled
 8 : Enabled                      20: Enabled
 9 : Enabled                      21: Enabled
 10: Enabled                      22: Enabled
 11: Enabled                      23: Enabled
 12: Enabled                      24: Enabled
                                  25: Enabled
 A : Enabled
 B : Enabled

Select [M] Module status report, or [X] Exit to previous menu:
```

S4171

Module Status Report

This panel displays the status of the installed modules. Definitions of these terms can be found under the “Port Configuration” section in this chapter.

Display this panel by typing **U** on the Main Menu and **P** on the Usage Summary Menu.

Figure 5-23 Module Status Report

```
       Catalyst 2800 - Module Status Report

               Catalyst 2800 FDDI (Fiber DAS Model), Version 00 (Upper Slot)
 Module Status: Enabled
       Port A1: Enabled

               Catalyst 2800 TX - 8 Port UTP, Version 0   (Lower Slot)
 Module Status: Enabled
       Port B1: Enabled                  Port B5: Suspended-no-linkbeat
       Port B2: Enabled                  Port B6: Enabled
       Port B3: Suspended-no-linkbeat    Port B7: Suspended-no-linkbeat
       Port B4: Suspended-no-linkbeat    Port B8: Suspended-no-linkbeat

Select [P] Port status report, or [X] Exit to previous menu:
```

S4172

Port Addressing Report

This panel displays the port's address mode, dynamic or static, and how many addresses have been assigned to the port.

Display this panel by typing **U** on the Main Menu and **A** on the Usage Summary Menu.

Figure 5-24 Port Addressing Report

```
        Catalyst 2800 - Port Addressing Report

Port               Addresses           Port               Addresses
---------------------------------- ----------------------------------
 1 :               Unaddressed          13:               Unaddressed
 2 :Dynamic        00-20-AF-D4-83-14    14:Dynamic        00-60-8C-84-FF-5D
 3 :Dynamic        00-20-AF-D0-EA-90    15:Dynamic        00-20-AF-DA-E1-4C
 4 :Dynamic        00-20-AF-D0-E1-89    16:Dynamic        00-20-AF-DA-E2-15
 5 :Dynamic        00-20-AF-D0-EB-03    17:Dynamic        00-20-AF-DA-E1-49
 6 :Dynamic        00-20-AF-D0-E6-AF    18:Dynamic        02-60-8C-6A-BF-92
 7 :Dynamic        00-20-AF-D0-E6-A4    19:Dynamic        00-60-8C-ED-85-22
 8 :               Unaddressed          20:Dynamic        00-20-AF-D0-E6-62
 9 :               Unaddressed          21:               Unaddressed
 10:               Unaddressed          22:Dynamic        00-20-AF-E3-2E-98
 11:               Unaddressed          23:               Unaddressed
 12:Dynamic        00-60-8C-84-B9-A7    24:Dynamic        00-00-00-00-00-04
                                        25:Dynamic 4      Static 0
 A :Dynamic 2      Static 0
 B :Dynamic 2      Static 0

Select [X] Exit to previous menu:
```

S4173

The two columns on this panel can have the following values:

Port	Whether the port is enabled for dynamic learning or secured.
Addresses	If it is a single station, this field contains its address; if it is not a single station, this field shows the number of static and dynamic addresses associated with the port.

Exception Statistics Report

The Exception Statistics Report Menu displays the number of receive errors, transmit errors, and security violations for each port. Display this panel by typing **U** on the Main Menu and **E** on the Usage Summary Menu.

Figure 5-25 Exception Statistics Report

```
    Catalyst 2800 - Exception Statistics Report (Frame counts)

       Receive   Transmit   Security        Receive   Transmit   Security
       Errors    Errors   Violations       Errors    Errors   Violations
    ------------------------------     ------------------------------
 1 :         0          0          0  13:         0          0          0
 2 :         0          0          0  14:         0          0          0
 3 :         0          0          0  15:         0          0          0
 4 :         0          0          0  16:         0          0          0
 5 :         0          0          0  17:         0          0          0
 6 :         0          0          0  18:         0          0          0
 7 :         0          0          0  19:         0          0          0
 8 :         0          0          0  20:         0          0          0
 9 :         0          0          0  21:         0          0          0
 10:         0          0          0  22:         0          0          0
 11:         0          0          0  23:         0          0          0
 12:         0          0          0  24:         0          0          0
                                       25:         0          0          0
 A :      3133*         0*         0
 B :         1          0          0    *FDDI frame counts

Select [R] Reset all statistics, or [X] Exit to previous menu:
```

S4174

The figures displayed are actually totals of various kinds of errors:

Receive errors	The combined number of giants, FCS, and alignment errors.
Transmit errors	The combined number of excessive deferrals, late collisions, jabber errors and other transmit errors.

Security violations	The combined number of secure address violations caused by address mismatches or duplications.

[R] Reset all statistics. Select this option to reset all statistics to zero. Type a letter at the confirmation prompt and press **Return.**

Utilization Statistics Report

This panel displays the frame-count statistics generated by the Catalyst 2800. Display this panel by typing **U** on the Main Menu and **U** on the Usage Summary Menu.

Figure 5-26 Utilization Statistics Report

```
   Catalyst 2800 - Utilization Statistics Report (Frame counts)

       Receive    Forward   Transmit        Receive    Forward   Transmit
    ------------------------------     ------------------------------
 1 :         0          0 1682677381  13:         0          0 1682677405
 2 :   4604032    4604016 1689067012  14:  48940205   48940189 1746359488
 3 :  47627631   47627615 1744479107  15:   3097003    3097003 1687123073
 4 :  31948170   31948154 1723922094  16:  50112893   50112877 1747842528
 5 :   3109965    3109957 1687066213  17:   2852581    2852581 1686750907
 6 :  34092905   34092905 1726348874  18: 109115876  109115876 1765808903
 7 :  47719824   47719808 1744671714  19:  50095227   50095227 1747780548
 8 :         0          0 1682677395  20:   3357751    3357751 1687478746
 9 :         0          0 1682677397  21:         0          0 1682677421
 10:         0          0 1682677399  22:   9002434    9002434 1693466709
 11:  10708018   10708018 1693273412  23:         0          0 1682677425
 12:  49110581   49110561 1746922520  24:1682460439 1682460439     216988
                                      25: 107411017  107410970 1822051656
 A : 645883642* 570263344 2150868743*
 B :  43092122   43092122 1704947162    *FDDI frame counts

Select [R] Reset all statistics, or [X] Exit to previous menu:
```

S4175

Column headings have the following meanings:

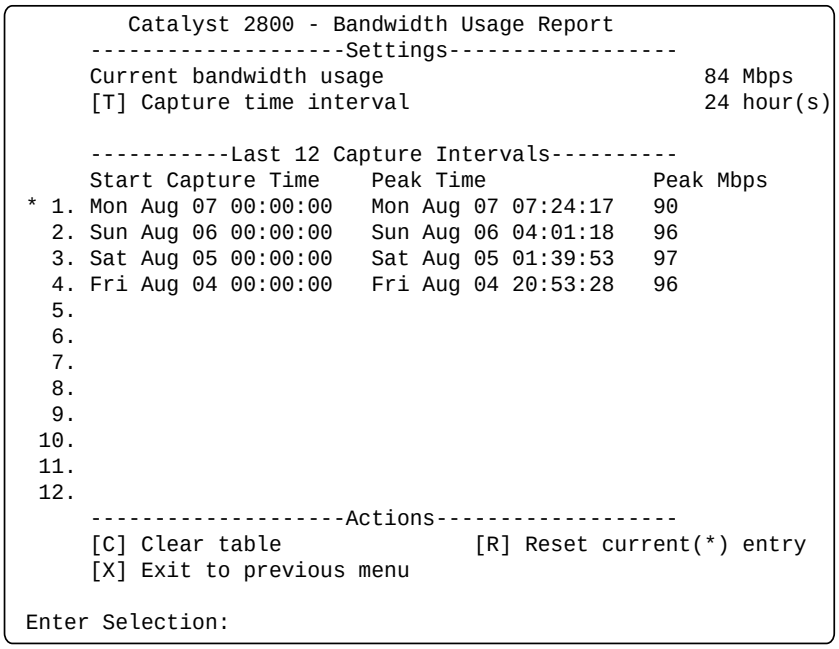
Receive	The number of received good unicast frames, good multicast frames, and good broadcast frames.
Forward	The number of good frames forwarded.
Transmit	The combined number of transmitted unicast frames, multicast frames, and broadcast frames.

[R] Reset all statistics. Select this option to reset all statistics to zero. Type a letter at the confirmation prompt and press **Return.**

Bandwidth Usage Report

Use this menu to display the peak bandwidth of the network during a given period of time. The Catalyst 2800 displays a list of the last twelve recordings of maximum bandwidth, in Mbps, according to a time interval you set. Display this panel by typing **U** on the Main Menu and **B** on the Usage Summary Menu.

Figure 5-27 Bandwidth Usage Report



[T] Capture time interval. Use this option to define the time interval during which data is collected to calculate bandwidth usage.

[C] Clear table. Select this option to clear the bandwidth table. Respond to the confirmation prompt and press **Return.**

[R] Reset current entry. This option sets the current table entry to zero and allows new information to be recorded. The current table entry is marked by an asterisk (*). Respond to the confirmation prompt and press **Return.**

Basic FDDI Settings

This screen displays most of the FDDI settings but does not allow you to set any parameters. Each parameter is described below.

Display this menu by entering **1** on the Port Configuration Menu.

Figure 5-28 Basic FDDI Settings

```
      Catalyst 2800 - Port A1 (Upper Slot) Basic FDDI Settings

 ------------------------ MAC and SMT Information --------------------------
 SMT version              2    Upstream neighbor     00-00-77-83-2C-65
 MIB version              1    Station address       00-00-00-C0-1D-F4-05-DB
 Number of MACs           1    Downstream neighbor   08-00-20-75-81-53
 Non master ports         2    Optical bypass        Not present
 ECM state               In    Attachment state      Thru

 ------Port Information------- ------A Port------    ------B Port------
 Connection policy (rejects)   None                  None
 Neighbor type                 B                     A
 Current path                  Thru                  Thru
 Available paths               Primary+Secondary     Primary+Secondary
 PMD class                     Multimode             Multimode
 PCM state                     Active                Active
 Link error alarm activated    False                 False
 Link confidence test failures 0                     0
 Link error monitor rejections 0                     0
 Aggregate link error count    0                     0

Select [2] Secondary FDDI settings, [A] Port addressing,
       [C] Configure port,          [V] View port statistics,
       [X] Exit to Main Menu:
```

S4177

[2] Secondary FDDI settings. Display the menu described in the "Secondary FDDI Settings" section in this chapter.

[C] Configure port. Display the menu described in the "Port Configuration" section in this chapter.

[A] Port addressing. Display the menu described in the "Port Addressing" section in this chapter.

[V] View port statistics. Display the port statistics report described in the "Port Statistics Report" section in this chapter.

[X] Exit to Main Menu.

MAC and SMT Information

SMT version	The version number of this particular SMT implementation.
MIB version	The version number of this FDDI MIB implementation.
Number of MACs	The number of MACs that this FDDI entity implements.
Non master ports	The number of *non master* ports residing on the FDDI module. Non master ports are any ports other than the M type.
Optical bypass	If an optical bypass device is attached to the Catalyst 2800 FDDI module, this item will display `Present`; otherwise the display will be `Not present`.
Upstream neighbor	Displays the station address of the upstream neighbor.
Station address	Displays the station address of the Catalyst 2800 FDDI module.
Downstream neighbor	Displays the station address of the downstream neighbor.

ECM state	Indicates the current status of the ECM (Entity Coordination Management) state machine. The ECM handles the management and coordination of all of the ports in the node. During normal operation, this will have the value `In`. The other possible values, `Out`, `Trace`, `Leave`, `Path_test`, `Insert`, `Check`, or `Deinsert`, may indicate that the ECM state machine has detected an error.
Attachment state	This item reflects the current attachment configuration for the module. The normal state, `Thru`, indicates that both ports are connected to the ring. The value `Isolated` indicates that both ports A and B are disconnected from the ring, `Wrap_A` indicates that only port A is connected to the ring, and `Wrap_B` indicates that only port B is connected to the ring.

Port Information

Connection policy (rejects)	The types of connections that are not allowed for each port. For example, if port types A and S are listed under port A, then port A of the Catalyst 2800 FDDI module cannot be connected to an A port or an S port on another station.
Neighbor type	The port type that each port is currently attached to. Possible values are `A`, `B`, `S`, and `M`.
Current path	The path into which each port is currently inserted. For Catalyst 2800 FDDI, the value will be either `Primary` or `Secondary`.

Available paths	The possible paths into which each port can theoretically be inserted. For Catalyst 2800 FDDI DAS, this value will always be `Primary+Secondary`; for FDDI SAS, the value will be `Primary`.
PMD class	The class of the PMD (Physical layer Media Dependent). The value is `multimode` or `Twisted-pair`.
PCM state	The current state of the PCM (Physical Connection Management) state machine. The PCM covers the management of the physical connection between the port and the connected port on the adjacent node. The possible values are `Off`, `Break`, `Trace`, `Connect`, `Next`, `Signal`, `Join`, `Verify`, `Active`, `Maint`.
Link error alarm activated	If this value gets set to `True`, it is an indication that the link error rate for the port has exceeded the alarm threshold.
Link confidence test failures	A count of the number of consecutive times the link confidence test has failed.
Link error monitor rejections	A link error monitoring count of the number of times that a link has been rejected.
Aggregate link error count	An aggregate count of link-error monitoring errors. This count is reset only at initialization.

Secondary FDDI Settings

This screen contains some of the less common FDDI settings. You can change three of the parameters; all others are display only.

Display this panel by entering **2** on the Port Configuration Menu.

Figure 5-29 Secondary FDDI Settings

```
           Catalyst 2800 - Port A1 (Upper Slot) Secondary FDDI Settings

      ------------MAC and SMT Information-----------
      Remote disconnect flag                          False
      Station path status                             Thru
      Requested token rotation time                   164986880 ns
      Negotiated token rotation time                  8007680 ns
      Old upstream neighbor                           00-00-F8-00-00-00
      Old downstream neighbor                         00-C0-1D-FC-05-DA
      MAC's downstream port type                      B
      Frame error flag                                False
      Frame processing functions                      fs_repeating
      MAC's available paths                           Primary+Secondary

      --------------------Settings-----------------
      [N] Notification timer value                    30 second(s)
      [U] Use authorization string                    Enabled
      [S] Authorization string                        kjhf

      [1] Basic FDDI settings      [A] Port addressing
      [C] Configure port           [V] View port statistics
      [X] Exit to Main Menu

  Enter Selection:
```

S4178

[N] Notification timer value. Use this option to assign a new value to `fddimibSMTTNotify`.

[U] Use authorization string. This selection allows the user to enable or disable authorization checking for the SMT entity. When this item is selected, the following prompt is displayed:

```
When the authorization string checking is enabled, the Catalyst 2800
FDDI module will use the current authorization string to verify SMT
requests from remote stations. This value is disabled by default.
Current ==> 30
    New ==>

Authorization string checking may be [E]nabled or [D]isabled

Current setting ==> Disabled
    New setting ==>
```

[S] Authorization string. This selection allows the user to assign a new authorization string value. The authorization string is from 0 to 32 bytes in length; the length must be a multiple of 4 bytes. When this item is selected, the following prompt is displayed:

```
The authorization string is used in the verification of SMT requests. The
length of the authorization string must be a multiple of 4 bytes.
Input the new authorization string.

Current ==> mgmtpswd
    New ==>
```

[1] Basic FDDI settings. Display the menu described in the "Basic FDDI Settings" section in this chapter.

[C] Configure port. Display the menu described in the "Port Configuration" section in this chapter.

[A] Port addressing. Display the menu described in the "Port Addressing" section in this chapter.

[V] View port statistics. Display the port statistics report described in the "Port Statistics Report" section in this chapter.

[X] Exit to Main Menu.

MAC and SMT Information

Remote disconnect flag	This flag is an indication as to whether the module was remotely disconnected from the network as a result of receiving a disconnect action in a Parameter Management Frame.
Station path status	The status of the primary and secondary paths within the module. The status is either `Concatenated`, `Separated`, or `Thru`.
Requested token rotation time	Displays the requested token rotation time in nanoseconds for the module.
Negotiated token rotation time	Displays the negotiated token rotation time in nanoseconds. Note that this value will be the same for all stations on the ring.
Old upstream neighbor	Displays the previous value of the MAC's upstream neighbor's MAC address.
Old downstream neighbor	Displays the previous value of the MAC's downstream neighbor's MAC address.
MAC's downstream port type	The type of the first port that is downstream of this MAC.
Valid transmission timer	Displays the value that the module is using for its valid transmission timer. If the module waits this amount of time without seeing a valid frame or unrestricted token, the module will begin the claim process to re-create the token.
Frame error flag	This flag is set when the MAC Frame Error Condition is present. This value is cleared when the condition clears and on station reset.
Frame processing functions	This is an indication of the module's handling of the Error, Address, and Copied frame status indicators.
MAC's available paths	This is an indication of the paths that are available to the MAC.