

# Monitoring the Network With Out-of-Band Management

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This chapter explains how to monitor the Catalyst 3000 using Out-of-band (“outside” of the network) management, through a directly connected console. To use SNMP (in-band, “through the network” management), see Chapter 9, “Monitoring the Network with SNMP.”

This chapter covers the following topics:

- Navigating within the Menu
- Statistics Menu
  - Switch Statistics
  - Port Statistics
  - Address Tables
  - Spanning Tree Bridge Information
  - Current Spanning Tree Information
  - Virtual LAN (VLAN) Statistics
  - IEEE 802.3 Statistics

The information on the screens in this chapter is typically for monitoring purposes only. This information is usually the result of input data from the configuration menus (see Chapter 7, “Console Configuration.” The specifications presented on the Statistic Screens normally can not be modified.

Information within the Statistics menus are updated (screens are refreshed) every 5 seconds.

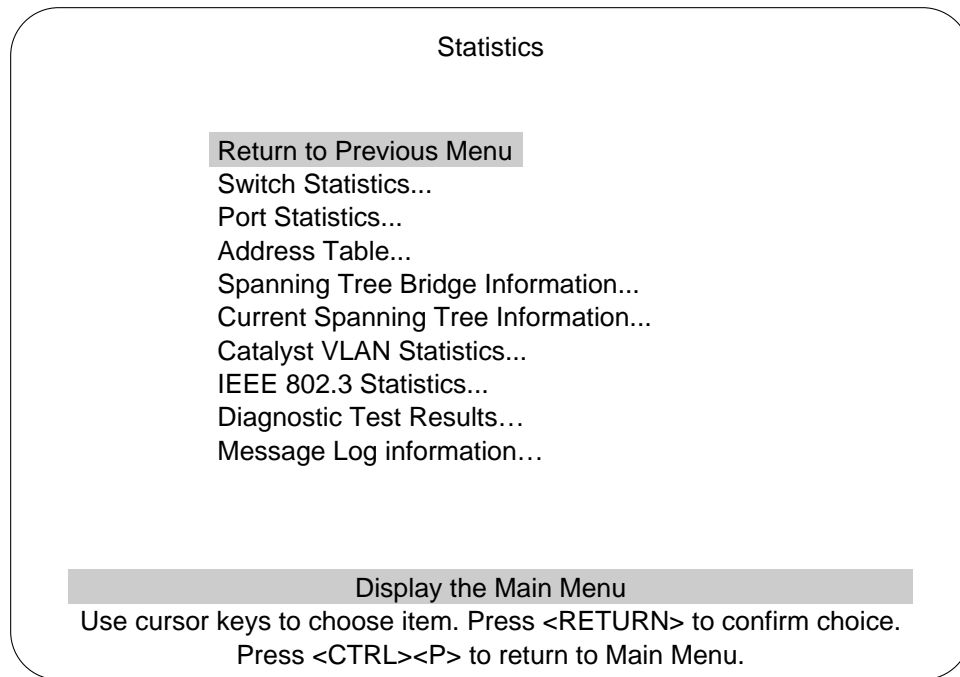
## Navigating Within the Menus

This section explains how to access the menus and the following section describes the information and sub-menus of the Statistics Menu.

Unless specified differently, all the screens or menus are accessed in the following way; use the “ARROW” keys (also referred to as cursor keys) to move the highlight over selections that can be accessed, and then by pressing the RETURN key:

- A new screen of information is presented if the heading has three dots after it.
- A function is performed if the selection is a command, such as a “Reset”.

## Statistics Menu



Statistics

Return to Previous Menu  
Switch Statistics...  
Port Statistics...  
Address Table...  
Spanning Tree Bridge Information...  
Current Spanning Tree Information...  
Catalyst VLAN Statistics...  
IEEE 802.3 Statistics...  
Diagnostic Test Results...  
Message Log information...

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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The following list is a brief explanation of the menus for the Statistics screen. More information on each of these menus, their screens, and sub-menus follows this list.

**Switch Statistics**

Displays information about switch utilization.

**Port Statistics**

Displays information about a particular port.

**Address Table**

Port and system address tables.

**Spanning Tree Bridge Information**

Displays information about the current Spanning Tree configuration.

**Current Spanning Tree Information**

Displays the current Spanning Tree port information.

## **Statistics Menu**

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### **VLAN Statistics Menu**

Displays the VLAN Statistics menu.

### **IEEE 802.3 Statistics**

Displays transmission error information for individual ports.

### **Diagnostic Test Results**

Displays a screen showing results of diagnostic tests and any errors that might have occurred during diagnostics.

### **Message Log Information**

Displays any messages recorded by the system.

## Switch Statistics Screen

The Switch Statistics screen shows the statistics and information about stations connected to the Catalyst 3000.

Switch Statistics

**Return to Previous Menu**

System Up Time	0 Hr, 6 Min, 52 Sec
Board Temperature	Normal
Currently Active Stations	64
Largest Number of Stations	64
Maximum Number of Stations	10000
Frames Transmitted	0
Frames Received	0
Error Frames Received	0
Frames Lost	0
Short Frames	0
Oversize Frames	0
Buffer Overruns	0
Pending Send Requests	0
Dropped Frames	0
Maximum Hash Chain	0
Hash Table Full	0
Reset Statistics	0

**Display statistics for switch and for ports**

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

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### System Up Time

Length of time since the last reset or power cycle.

### Board Temperature

Indicates whether the Catalyst 3000 is operating at normal or unacceptably high (over 122 F or 50 C) temperatures.

## Statistics Menu

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### Currently Active Stations

Number of entries in the address table, representing the number of currently active stations (MAC addresses), or nodes, on all ports of the Catalyst 3000.

### Largest Number of Stations

The most stations (MAC addresses) ever active on all ports at one time since the last reset or power cycle.

### Maximum Number of Stations

This is the most stations (MAC addresses) the Catalyst 3000 can support simultaneously. This is different from the Maximum Number of Stations value that appears in the Port Statistics Menu, which is the number of addresses for a specific port. The amount of DRAM memory installed determines the maximum amount:

- 4MB DRAM = 10,000 stations
- 8MB DRAM = 20,000 stations

Each of the following headings have an associated numerical value that is presented on the same line and to right of the heading on the screen. This value is the number of times there has been an occurrence of that particular heading within the CPU of the Catalyst 3000.

### Frames Transmitted

Number of frames transmitted by the Catalyst 3000.

### Software Frames

Number of frames received.

**Error Frames Received**

Number of frames received that were corrupted or have CRC errors

**Frames Lost**

Number of frames dropped due to exceeding capacity of software buffers.

**Short Frames**

Number of frames less than 64 bytes.

**Oversize Frames**

Number of frames greater than 1518 bytes.

**Buffer Overruns**

Number of frames dropped by the CPU hardware due to exceeding the processing capacity.

**Pending Send Requests**

Number of software transmitted packets that are waiting for queues to hardware.

## **Statistics Menu**

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### **Dropped Frames**

Number of frames that were dropped due to exceeding CPU hardware processing limits.

### **Maximum Hash Chain**

Largest number of MAC addresses that have hashed to same location in look-up tables. Used for technical system evaluation and troubleshooting. (The hashing function is a technical procedure used by qualified persons to evaluate system performance.)

### **Hash Table Full**

Number of times the hash table reached capacity. Used for technical system evaluation and troubleshooting.

### **Reset Statistics**

Resets the switch statistics on this screen.



## Port Statistics Screen

Use the Port Statistics screen to view detailed information about a particular port.

Port 1 Statistics Table	
Return to Previous Menu	
Local Frames Received	
Frames Switched by Hardware	350
All Forwarded Frames	200
Number of Learned Stations	213
Frames Delivered For Learning	5
Broadcast Frames Received	11
Local Address Entries	97
Remote Address Entries	30
Currently Active Stations	20
Largest Number of Stations	50
Maximum Number of Stations	1790
Hash Bucket Overflows	0
Hash Table Overflows	0
Octets Received	68784
Octets Transmitted	5460
Time Since Last Reset	1 Hr. 56 Min, 5 Sec
Reset Statistics	
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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### Local Frames Received

Number of frames that are local to this segment (not forwarded).

### Frames Switched by Hardware

Number of frames received on this port and forwarded by the Catalyst 3000 hardware to another port.

## Statistics Menu

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### All Forwarded Frames

Number of broadcast, multicast, and unicast frames switched by the hardware or forwarded by the software.

### Number of Learned Stations

Number of stations that frames were received for and forwarded to the system module for processing because the source or destination station address was not in the ports forwarding table.

### Frames Delivered for Learning

Number of frames received on this port and forwarded to the system module for processing for example, frames for which the address was unknown, PING frames, and SNMP traffic.

### Broadcast Frames Received

Number of Broadcast frames received on this port.

### Local Address Entries

Number of MAC address on this port that belong to the local segment.

### Remote Address Entries

Number of MAC addresses on this port that belong to another segment.

### Currently Active Stations

Sum of local and remote MAC address on this port.

### Largest Number of Stations

Largest number of MAC address active since the last reset of the Catalyst 3000 or port.

**Maximum Number of Stations**

Maximum number of MAC address that the port can support simultaneously.

**Hash Bucket/Table Overflows**

Informational results of hashing. Used for technical system evaluation and troubleshooting.

**Octets Received/Transmitted**

Informational results of octet handling. Used for technical system evaluation and troubleshooting.

**Time Since Last Reset**

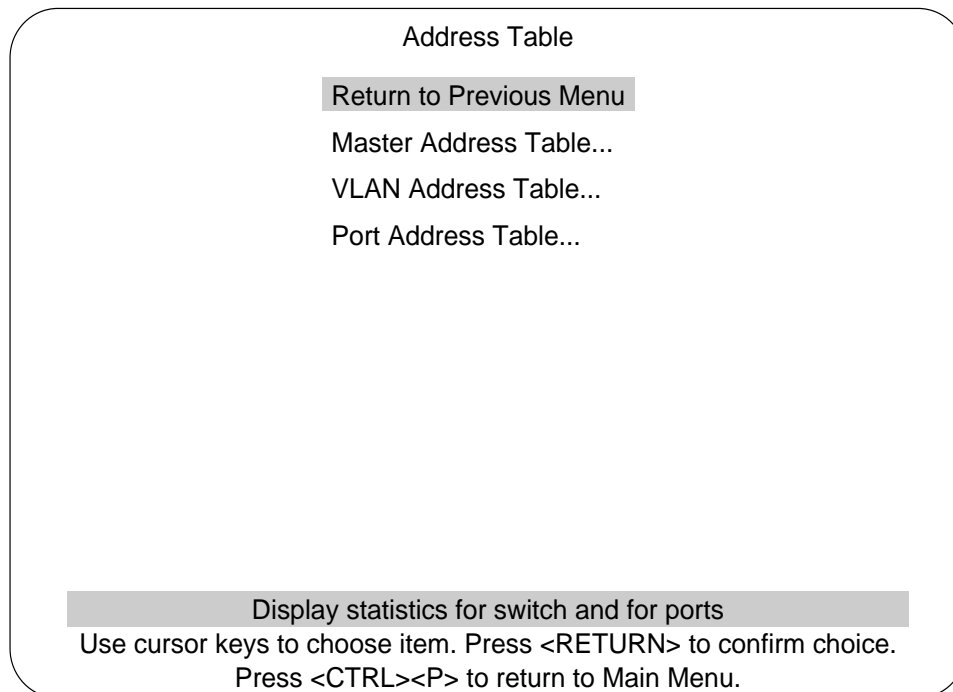
Hours, minutes, and seconds since the port traffic counters were last reset.

**Reset Statistics**

Resets the traffic counters for this port.

## Address Tables Menu

Use the Address Table menu to select which address table statistics you want to view.



The following list contains brief explanations of the menus for the Address Table screen. More information on each of these menus, their screens, and submenus follows this list.

**Master Address Table**

Displays a table of station addresses from all ports known to the Catalyst 3000.

**VLAN Address Table**

Displays the VLAN address table for all ports in a VLAN.

**Port Address Table**

Displays the address table for a selected port.

## Statistics Menu

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### Master Address Table

The Master Address Table contains MAC addresses of all ports known to the Catalyst 3000. The table can contain up to 6,000 entries with standard memory or up to 10,000 with optional expanded memory.

Master Address Table		
<u>Address</u>	<u>Local Port</u>	<u>Ports (filtered/secured ports highlighted)</u>
008024 017020	Switch Base Adr	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21
0180C2 000001	VLAN 0	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21
0180C2 000000	STP	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21
008024 017021	Multicast	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21
008024 017022	Multicast	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21
008024 017023	Multicast	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21
008024 017024	Multicast	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21
<b>Return</b>	More	Search
<b>Return to Previous Menu</b>		
Use cursor keys to choose item. Press <RETURN> to confirm choice. Press <CTRL><P> to return to Main Menu.		

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### Address

MAC address of a node.

## Local Port

Describes the type of address or association of the address with the listed port:

This Switch: Systems own MAC Address

- Multicast: General multicast packet
- Broadcast: General broadcast packet
- Filtered: Filtered packet address
- STP Reserved: Spanning tree address reserved for future 802.1d standardization
- Spanning Tree STP Multicast: BPDU (Bridge Protocol Data Units - "Hello Packets") multicast packet reserved for the port
- STP Port xx: Spanning tree address reserved for the port
- Switch Base Adr: MAC address for the Catalyst 3000
- Domain Adrs: MAC address for that VLAN

## Ports

The ports whose address tables include this MAC address; filtered ports are highlighted.

## More

Refreshes a one-page table or displays subsequent entries on a larger table.

## Search

Prompts you to enter the MAC address of a node and the ports whose address tables you want to search, then displays the ports whose address tables contain the MAC address.

## Statistics Menu

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### VLAN Address Table

The VLAN Address Table contains MAC addresses of all ports known to the Catalyst 3000 within a selected VLAN.

VLAN Address Table - default		
Address	Local Port	Ports (filtered/secured ports highlighted)
008024 017020	3	5 6 7
0180C2 000007	STP Multicast	5 6 7
0180C2 000056	STP Reserved	8 9 10
008024 0423A0	3	1 2 3 4 5 6 7 8 9 10 11 12 13 14
008024 017021	VLAN	1 2 3 4
008024 017022	2	2
008024 017023	unknown	3
008024 017024	STP Port 4	4
0180C2 000000	unknown	5 6 7
0180C2 000006	1	8 9 10
0180C2 000001	Swch Base Adr	1 2 3 4 5 6 7 8 9 10 11 12 13

     More      Search

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

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### Address

MAC address of a node.



## Local Port

Describes the type of address or association of the address with the listed port:

- Multicast: General multicast packet
- Broadcast: General broadcast packet
- Filtered: Filtered packet address
- STP Reserved: Spanning Tree address reserved for future 802.1d standardization
- STP Multicast: BPDU multicast packet reserved for the port (Hello packet)
- STP Port xx: Spanning Tree address reserved for the port
- Switch Base Adr: MAC address for the Catalyst 3000
- VLAN Adrs: MAC address for that VLAN

## Ports

The ports whose address tables include this MAC address; filtered ports are highlighted.

## More

Refreshes a one-page table or displays subsequent entries on a larger table.

## Search

Prompts you to enter the MAC address of a node you want to search. The address table display is refreshed starting from the matching address entry.

## Statistics Menu

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### Port Address Table

The Port Address Table displays the MAC addresses of nodes connected to a specific port. The table includes MAC addresses that this port has received packets or octets from or sent to. It can contain up to 1,700 entries.

<u>Address</u>	<u>Local Port</u>	<u>SrcPkt</u>	<u>DstPkt</u>	<u>SrcOctet</u>	<u>DstOctet</u>
008024 017020	Switch Base Adr	0	0	0	0
0180C2 000000	STP Multicast	0	0	0	0
0180C2 000002	filtered	0	0	0	0
0180C2 000004	1	0	0	0	0
0180C2 000006	VLAN 1	0	0	0	0
0180C2 000008	unknown	0	0	0	0
0180C2 00000A	STP Reserved	0	0	0	0
0180C2 00000C	STP Reserved	0	0	0	0
0180C2 00000E	Multicast	0	0	0	0
FFFFFF FFFFFFFF	Broadcast	0	0	0	0

**Return**      More      Search

**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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### Address

MAC address of a node. Ports that belong to an EtherChannel are designated as either primary or secondary.

## Local Port

Describes the association of the address with the listed port or the type of address:

- Multicast: General multicast packet
- Broadcast: General broadcast packet
- Filtered: Filtered packet address
- STP Reserved: Spanning Tree address reserved for future 802.1d standardization
- STP Multicast: BPDU multicast packet reserved for the port (Hello packet)
- STP Port xx: Spanning Tree address reserved for the port
- Switch Base Adr: MAC address for the Catalyst 3000
- VLAN Adrs: MAC address for that VLAN

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**Note** The following statistics, Source packets and octets, and Destination packets and octets may change values when Catalyst 3000 units join or leave a stack. The amount will vary depending on the relationship between the single unit's, as compared to the Stack's, contents of these registers.

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The Source (coming from a node on the network) packet/octetets are counted as they are received on a Catalyst 3000 port.

The Destination (going to a node on the network) packet/octetets are counted as they are sent from a Catalyst 3000 port

## Src/Dst Pkt

Number of packets received and transmitted.

## Src/Dst Octet

Number of octets received and transmitted.

## Statistics Menu

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### More

Refreshes a one-page table or displays subsequent entries on a larger table.

### Search

Prompts you to enter the MAC address of a node you want to search. The address table display is then refreshed starting from the matching address entry.

## Spanning Tree Bridge Information

The Spanning Tree Bridge Information screen is displayed from the main Statistics menu. Its information relates to the Spanning tree configuration. The settings on this screen cannot be changed.

Spanning Tree - default

**Return**

Participate in Spanning Tree	No
Switch Priority	32768
Switch Hello Time	2
Switch Maximum Message Age	20
Switch Forward Delay	15

**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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### Participate in Spanning Tree

Whether the Catalyst 3000 is participating in the Spanning Tree.

## Statistics Menu

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### Switch Priority

The priority value for this Catalyst 3000. The Catalyst 3000 with the lowest priority value in a Spanning Tree becomes the root bridge.

### Switch Hello Time

The time, in seconds, between configuration messages when this switch is root.

### Switch Maximum Message Age

The maximum message age advertised when this switch is root.

### Switch Forward Delay

The time, in seconds, the switch waits between transitions from listening to learning, and from learning to forwarding.

## Current Spanning Tree Information Screen

Use the Current Spanning Tree Information screen to view a summary of all Spanning Tree information for each port. Information cannot be changed on this screen. When the Spanning Tree is turned off—that is, you have selected No for the “Participate in Spanning Tree” prompt (at the Configuration menus)—this menu will only display the headers with no information below them.

When the Catalyst 3000 is configured with EtherChannels, Spanning Tree Hello packets use the primary port of the EtherChannel.

Current Spanning Tree Information - default

Port ID	Port Cost	Port STS	Desig Cost	Designated Switch/Bridge ID	Desig Port ID	#Topo Chgs	Time Since Last Change
128.1	100	FWD	0	32768.00802401375F	128.1	1	0:01:58
128.2	100	FWD	0	32768.00802401375F	128.2	1	0:01:58
128.3	100	FWD	0	32768.00802401375F	128.3	1	0:01:58
128.4	100	FWD	0	32768.00802401375F	128.4	1	0:01:58
128.5	100	FWD	0	32768.00802401375F	128.5	1	0:01:58
128.6	100	FWD	0	32768.00802401375F	128.6	1	0:01:58
128.7	100	FWD	0	32768.00802401375F	128.7	1	0:01:58
128.8	100	FWD	0	32768.00802401375F	128.8	1	0:01:58
128.9	100	FWD	0	32768.00802401375F	128.9	1	0:01:58
128.10	100	FWD	0	32768.00802401375F	128.10	1	0:01:58
128.11	100	FWD	0	32768.00802401375F	128.11	1	0:01:58
128.12	100	FWD	0	32768.00802401375F	128.12	1	0:01:58
128.13	100	FWD	0	32768.00802401375F	128.13	1	0:01:58
128.14	100	FWD	0	32768.00802401375F	128.14	1	0:01:58
128.15	100	FWD	0	32768.00802401375F	128.15	1	0:01:58

Return

Return to Previous Menu

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

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## Statistics Menu

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### 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 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), FWD (forwarding), or Link Down.

DSB - the port has been manually disabled or failed to pass diagnostics.

BLK - the port receives STP BPDUs, but will not forward any packets.

LSN - STP perceives that the port should no longer be blocked because of some topology change. It transmits BPDUs, but forwards no packets.

LRN - if after transmitting BPDUs for a set amount of Forward Delay seconds, no contradictory information is learned, the port address table is cleared and addresses begin to be learned and then forwarding begins. All ports that are going to change states from blocking to forwarding will have done so after:

$\text{MaxMessAge} + (2 * \text{Switch Forward Delay})$

FWD - port begins forwarding packets normally.

Link Down - see the next section, "Virtual Switch Statistics Menu," for Link Down information.



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 on a 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 of them change to a different state: listening, learning, and forwarding, in order. To see the change in states you must repeatedly exit from this menu, then select it again.

#### 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.

## Statistics Menu

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### 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 3000 is the designated bridge on one or more network segments. (Port ID is *<port priority>.<port number>*.)

### # 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.

### Time Since Last Change

The time since the last time the port entered the forwarding state or made the transition from forwarding to blocking.

## Virtual Switch Statistics Menu

Use the Virtual Switch Statistics menu to view the current number, largest number, and maximum number of MAC address entries in the master address table for the selected VLAN.

This screen shows the default VLAN when no other VLANs are selected.

Virtual Switch Statistics - default

Return to Previous Menu	
Currently Active Stations	25
Largest Number of Stations	27
Maximum Number of Stations	10000

Return to Previous Menu

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

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## Statistics Menu

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### Currently Active Stations

Number of MAC addresses currently in the master address table that are recognized as ports belonging to this VLAN.

### Largest Number of Stations

Largest number of MAC addresses in the master address table—since the last reset or power cycle—that are recognized by ports belonging to this VLAN.

### Maximum Number of Stations

Maximum number of MAC addresses available in the Master Address Table.

## IEEE 802.3 Statistics Screen

The IEEE 802.3 Statistics screen displays the statistics associated with the Ethernet MIB (RFC1643).

The IEEE 802.3 Statistics Screen is a list showing specific errors that have occurred at a specified port. The port is selected by highlighting the IEEE 802.3 heading at the main Statistics menu and pressing RETURN. At the prompt; *Enter a port number:*, enter the port number you want to view. The IEEE 802.3 Statistics screen, as shown above, appears.

The data shown on this screen is for monitoring statistical information only, and is meant for network personnel experienced with this type of information. The explanation of this information is extensive and therefore would not be appropriate for a user guide. However, the instructions on how to access this information is provided so that the user can view the data to provide information for problem solving. If excessive errors are being reported and you can not find a cause, contact the Cisco Technical Assistance Center (TAC).

## Statistics Menu

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Port 1 IEEE 802.3 Statistics	
Return to Previous Menu	
Alignment Errors	0
FCS Errors	0
Single Collision Frames	0
Multiple Collision Frames	0
SQE Test Errors	0
Deferred Transmissions	0
Late Collisions	0
Excessive Collisions	0
Internal MAC Transmit Errors	0
Carrier Sense Errors	0
Oversize Frames	0
Internal MAC Receive Errors	0
Reset Statistics	

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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The Diagnostic Test Results screen is a list showing whether errors or a specific diagnostic test has failed at a specified Box (Catalyst 3000). This display is selected by highlighting the Diagnostic Test Result heading at the main Statistics menu and pressing RETURN. At the prompt, enter the box number you want to view.

The data that is shown on this screen is for monitoring information only, and is meant for network personnel experienced with this type of information. The explanation of this information is extensive and therefore would not be appropriate for a user guide. However, the instructions on how to access this information is provided so that the user can view the data to provide information for problem solving. If this menu is reporting errors and you can not find a cause, Cisco Technical Assistance Center (TAC)

Box 1 Diagnostic Test Results

<u>Diagnostic Test Results</u>	<u>Result</u>
CPU Loopback	Passed
CPU Broadcast	Passed
CPU Transmitt Buffers	Passed
CPU Receive Buffers	Passed
Serial Port	Passed
Real-time Clock	Passed
Port Memory	Passed
Port Registers	Passed
Low Speed Loopback	Passed
High Speed Loopback (Xmt)	Passed
High Speed Loopback (Rcv)	Passed
Cross Board Traffic	Passed
Broadcast Traffic	Passed

Return

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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## Statistics Menu

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