



# Configuring Token Ring Switching

This chapter describes how to configure Token Ring switching on the Catalyst 5000 family switch. The Token Ring modules have 16 shielded RJ-45 (copper) or Volition (fiber) ports for Token Ring connections. These ports allow full- or half-duplex connections to other switches, hubs, or end nodes.



**Note**

For complete information on installing Catalyst 5000 family Token Ring switching modules, refer to the *Catalyst 5000 Family Module Installation Guide*.



**Note**

For complete syntax and usage information for the commands used in this chapter, refer to the *Command Reference* publication for your switch.

This chapter consists of these sections:

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- Configuring Token Ring Ports, page 41-5

## Understanding How Token Ring Switching Works

These sections describe how Token Ring switching works:

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- Source-Route Switching, page 41-3
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## Supported Features

The Catalyst 5000 family Token Ring modules provide these features:

- 16 shielded RJ-45 or Volition Token Ring ports, individually programmable and capable of running in 4- or 16-Mbps, full- or half duplex, and functioning as either a concentrator or end station

- Frame forwarding between ports and modules
- Concentrator and bridge relay functions that enable switching between ports
- Switching features
  - Source-route bridging (SRB), source-route switching, or source-route transparent (SRT) bridging
  - Store-and-forward frame-forwarding mode
  - 4-Mbps, 16-Mbps, and automatic speed adaptation
  - Dedicated Token Ring (DTR) support
  - Priority queues for multimedia traffic
  - Address and protocol filters
  - All-Routes Explorer reduction
  - Spanning-Tree Protocol support: IBM, IEEE 802.1d, Cisco
- VLAN support
- Management utilities and support
  - SNMP-based management
  - CiscoView graphical monitoring
  - TrafficDirector for Remote Monitoring (RMON)

In addition to the standard Management Information Base (MIB) objects supported by the Catalyst 5000 family switch, the Token Ring modules support these MIBs:

- Token Ring Extensions to the Managed Objects for Bridges (RFC 1525)
- IEEE 802.5 Token Ring MIB (RFC 1748)
- RMON MIB/Token Ring Extensions (RFC 1513) partial support

The following proprietary MIBs are supported:

- Cisco Workgroup MIB (CISCO-STACK-MIB)
- VLAN Trunk Protocol (VTP) pruning (CISCO-VTP-MIB)
- Cisco VLAN Bridging (CISCO-VLAN-BRIDGING-MIB)

Most user-configurable variables are supported in either the standard MIBs or private MIBs such as the following:

- Ability to monitor port traffic with Switch Port Analyzer (SPAN)
- Ability to monitor soft error conditions occurring in your network and to receive notification of the stations that are exceeding user-defined error thresholds on a port (requires Token Ring software Release 3.3(1) or later)
- Ability to issue a Remove Ring Station MAC frame to remove a station from a ring (requires Token Ring software Release 3.3(1) or later)



**Note**

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The Catalyst 5000 Family Token Ring module requires supervisor engine module software, Release 3.1 or later. Soft error monitoring and remove adapter support requires Token Ring software Release 3.3(1) or later and supervisor engine module software Release 5.1(1) or later.

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## Source-Route Bridging

A source-route bridge makes all forwarding decisions based on data in the Routing Information Field (RIF). It does not learn or look up Media Access Control (MAC) addresses; SRB frames without a RIF are not forwarded.

Typically, clients or servers that support source routing send an explorer frame to determine the path to a given destination. There are two types of explorer frames: All-Routes Explorer and Spanning-Tree Explorer. All SRB bridges copy All-Routes Explorer frames and add their own routing information. For frames that are received from or sent to ports that are in the spanning-tree forwarding state, bridges copy Spanning-Tree Explorer frames and add their own routing information. Because All-Routes Explorer frames will traverse all paths between two devices, they are used in path determination. Spanning-Tree Explorer frames are used to send datagrams because the spanning tree ensures that only one copy of a Spanning-Tree Explorer frame is sent to each ring.

**Note**

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The spanning tree used with source-routing is different from the IEEE spanning tree used in transparent bridges. The Catalyst 5000 family Token Ring modules support both types of spanning-tree algorithms.

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## Source-Route Transparent Bridging

SRT bridging is an IEEE standard that combines source-route bridging and transparent bridging. An SRT bridge forwards frames that do not contain a RIF based on the destination MAC address. Frames that contain a RIF are forwarded based upon source routing. The SRT bridge only runs the IEEE Spanning-Tree Protocol. SRT does not support the IBM Spanning-Tree Protocol.

## Source-Route Switching

The Token Ring modules can forward broadcast, multicast, and unicast frames based on MAC addresses. If you have source-route bridges in your network, the Token Ring modules can forward frames based on the RIF. This dual frame-forwarding technology is called source-route switching.

In source-route switching, the switch learns and forwards frames based on source-route descriptors for stations that are one or more source-route bridge hops away. A route descriptor is a portion of a RIF that indicates a single hop. It is defined as a ring number and a bridge number. When a source-routed frame enters the switch, the switch learns the route descriptor for the hop closest to the switch. Frames received from other ports with the same next-hop route descriptor as their destination are forwarded to that port.

The key difference between SRB and source-route switching is that while a source-route switch looks at the RIF, it never updates the RIF. Therefore, all ports in a source-route switch group have the same ring number.

Source-route switching provides the following benefits:

- The switch does not need to learn the MAC addresses of the devices on the other side of a source-route bridge. Therefore, the number of MAC addresses that the switch must learn and maintain is significantly reduced.
- The switch can support parallel source-routing paths.
- An existing ring can be partitioned into several segments without requiring a change in the existing ring numbers or the source-route bridges.

- The switch can support duplicate MAC addresses if the stations reside on LAN segments with different LAN IDs (ring numbers).

To set the bridging mode of a Token Ring Concentrator Relay Function (TrCRF), perform this task in privileged mode:

Task	Command
Set the bridging mode.	<code>set vlan <i>vlan_num</i> [mode {srt   srb}]</code>

## Dedicated Token Ring

The Token Ring modules support a new token-passing standard called Dedicated Token Ring (DTR). DTR provides the following functions:

- Enables a switch port to act as a concentrator port so that you can connect the port of the switch directly to an end station.
- Transmits in Transmit Immediate (TXI) mode (also referred to as full-duplex mode), increasing the aggregate bandwidth to 32 Mbps.

DTR provides improved access to central resources such as network servers. The server can use the full 16 Mbps available for sending and receiving, which results in an aggregate bandwidth of 32 Mbps.

## Default Token Ring Configuration

Table 41-1 shows the Token Ring default configuration.

**Table 41-1** Token Ring Default Configuration

Feature	Default Value
Port enable state	All ports are enabled
Port name	None
Port priority	Normal
Port speed	Auto-detect
Duplex mode	Autonegotiate half- or full-duplex mode
Transmission threshold	3
Minimum transmit setting	4
VLAN	All ports assigned to default TrCRF
Spanning-Tree Protocol	Enabled for all ports
All-Routes Explorer reduction	Enabled
Soft Error Monitoring	Disabled

# Configuring Token Ring Ports

These sections describe how to configure Token Ring switching:

- Setting the Port Name, page 41-5
- Setting Frame Priority Levels, page 41-6
- Setting the Port Speed, page 41-6
- Setting the Port Transmission Mode, page 41-7
- Setting Early Token Release, page 41-8
- Setting Address-Recognized and Frame-Copied Bits, page 41-9
- Setting Configuration Loss Thresholds, page 41-10
- Enabling and Disabling All-Routes Explorer Reduction, page 41-10
- Configuring Soft Error Monitoring, page 41-11
- Handling Frames Transmitted with Invalid Source MAC Addresses, page 41-13



## Caution

Changing certain configuration parameters of a connected port will cause the port to close and reopen. You will lose all address information and statistics for that port.

## Setting the Port Name

To assign a name to a port on the Token Ring module, perform this task in privileged mode:

	Task	Command
Step 1	Assign a name to a port.	<b>set port name</b> <i>mod_num/port_num name</i>
Step 2	Verify that the port name is configured.	<b>show port</b> [ <i>mod_num/port_num</i> ]

This example shows how to set the name for a port and how to verify the name assignment:

```

Console> (enable) set port name 3/2 Print-1st Floor
Port 3/2 name set.
Console> (enable) show port 3/2
Port  Name                Status    Vlan      Level Duplex Speed Type
-----
3/2  Print-1st Floor        inactive  1003      normal fdx   16   TokenRing

Last-Time-Cleared
-----
Wed May 6 1998, 18:09:47
Console> (enable)

```

## Setting Frame Priority Levels

To address the needs of delay-sensitive data, each port on a Token Ring module has two data queues: high-priority and low-priority queues.

The queue is determined by the value of the priority field in the frame control (FC) byte of the frame. If the FC priority is above the user-defined priority level, the frame is put in the high-priority queue and is transmitted using the frame priority. If the FC priority is at or below the user-defined priority level, the frame is sent to the low-priority queue.

You can set two types of frame priorities for a port:

- Priority threshold—Highest Token Ring frame priority in the Frame Control Field of the frame that the switch should place in the low-priority transmit queue. The default priority queue threshold is 3.
- Minimum transmit priority—Minimum reservation priority used when requesting a token on a busy ring. The default minimum frame priority is 4.



### Note

The defaults for the priority queue are compatible with current source-route bridges and provide a high-priority queue for Token Ring multimedia traffic (priorities 5 and 6).

To set the frame priority levels for a port, perform this task in privileged mode:

	Task	Command
Step 1	Set the frame priority levels for a port.	<b>set tokenring priority</b> <i>mod_num/port_num</i> { <b>threshold</b> 0-7   <b>minxmit</b> 0-6}
Step 2	Verify the priority configuration.	<b>show tokenring</b> [ <i>mod_num[/port_num]</i> ]

This example shows how to set the Token Ring priority threshold to 6 on a port:

```

Console> (enable) set tokenring priority 3/2 threshold 6
Port 2 priority threshold set to 6.
Console> (enable) show tokenring 3/2
Ports  Crf/Brf      Ring#  Port-Mode      Early-Token  AC-bits
-----  -----  -----  -----  -----
3/2    1003/1005    3276    fdx-cport      enabled      disabled

Ports  Prior-Thresh  Min-Xmit  MAC-Address
-----  -----  -----  -----
3/2    6             5         00:40:0b:01:bc:65

Ports  Cfg-Loss-Thresh  Cfg-Loss-Intvl  Cfg-Loss-Count  Cfg-Loss-Reason
-----  -----  -----  -----  -----
3/2    50             20           0              none
Console> (enable)

```

## Setting the Port Speed

The Token Ring modules support 4- and 16-Mbps Token Ring transmission speeds. You can configure ports on the Token Ring modules to operate at one of these speeds or to automatically sense the speed of the ring to which it is connected (the default setting). However, with Token Ring technology, you cannot change the transmission speed without closing and reopening the port.

These rules apply for changing the transmission speed:

- If the port is open and running at a transmission speed that is the same as the speed you specify when entering the **set port speed** command, no action is performed.
- If the port is open and running at a speed different from a speed you specify when entering the **set port speed** command, the port closes and reopens at the new transmission speed.
- If the port is closed, you can change the speed without any restrictions.

**Note**

If the ports on the Token Ring modules are configured to automatically sense the speed of the ring, the first port inserted on the ring does not set the speed, because it cannot detect the speed.

**Note**

Closing and opening the port on an existing ring at a different transmission speed from which the ring is currently operating causes the port to issue a beacon on that ring.

To set the transmission speed for a port on the Token Ring module, perform this task in privileged mode:

	Task	Command
Step 1	Set the transmission speed for a Token Ring module port.	<b>set port speed</b> <i>mod_num/port_num</i> {4   16   auto}
Step 2	Verify the port speed.	<b>show port</b> [ <i>mod_num[/port_num]</i> ]

This example shows how to set the ring speed for a port and verify the configuration:

```

Console> (enable) set port speed 3/2 16
Port 3/2 speed set to 16Mbps.
Console> (enable) show port 3/2
Port  Name           Status      Vlan      Level Duplex Speed Type
-----
 3/2  Print-1st Floor  inactive   1003      normal fdx   16   TokenRing

Last-Time-Cleared
-----
Wed May 6 1998, 18:09:47
Console> (enable)

```

## Setting the Port Transmission Mode

Each port on the Token Ring module can operate in one of these modes:

- Half-duplex concentrator port—Port is connected to a single station in half-duplex (HDX) mode. In this case, the port behaves like an active multistation access unit (MSAU) port for classic Token Ring.
- Half-duplex station emulation—Port is connected to a port on a MSAU. In this case, the port functions like a station connected to a classic Token Ring segment that contains multiple stations.
- Full-duplex concentrator port—Port is connected to a single station in full-duplex (FDX) mode.
- Full-duplex station emulation—Port is connected to another Token Ring switch in FDX mode.

The default mode, **auto**, enables the port to detect the transmission mode it needs to use. However, you can configure the mode if necessary.

To set the transmission mode for a port, perform this task in privileged mode:

	Task	Command
Step 1	Set the transmission mode for a port.	<b>set tokenring portmode</b> <i>mod_num/port_num</i> { <b>auto</b>   <b>fdxcport</b>   <b>hdxcpport</b>   <b>fdxstation</b>   <b>hdxstation</b>   <b>riro</b> }
Step 2	Verify the transmission mode setting.	<b>show tokenring</b> [ <i>mod_num[/port_num]</i> ]



**Note** The **riro** value applies to the ports on a fiber Token Ring module only.

This example shows how to set the transmission mode for a port and verify the configuration:

```

Console> (enable) set tokenring portmode 3/2 fdxcport
Port 3/2 mode set to fdxcport
Console> (enable) show tokenring 3/2
Ports  Crf/Brf      Ring#   Port-Mode      Early-Token    AC-bits
-----  -----
 3/2   1003/1005      3276     fdx-cport      enabled        disabled

Ports  Prior-Thresh    Min-Xmit    MAC-Address
-----  -----
 3/2     6                5           00:40:0b:01:bc:65

Ports  Cfg-Loss-Thresh  Cfg-Loss-Intvl  Cfg-Loss-Count  Cfg-Loss-Reason
-----  -----
 3/2    50                20             0                none

```

## Setting Early Token Release

The interface ports on the Token Ring modules support early token release. Early token release allows a station to release a new token onto the ring immediately after transmitting, instead of waiting for the first frame to return. Early token release increases the total bandwidth on the ring. All ports, by default, are enabled to use early token release.



**Note** Early token release is valid for 16-Mbps media only. If early token release is enabled and the media speed is 4 Mbps, the switch disables this feature.

To enable the early token release feature on a Token Ring module port, perform this task in privileged mode:

	Task	Command
Step 1	Enable the early token release feature on a Token Ring module port.	<b>set tokenring etr</b> <i>mod_num/port_num</i> <b>enable</b>
Step 2	Verify the early token release configuration.	<b>show tokenring</b> [ <i>mod_num[/port_num]</i> ]

This example shows how to enable early token release and verify the configuration:

```

Console> (enable) set tokenring etr 3/2 enable
Port 3/2 Early Token Release enabled.
Console> (enable) show tokenring 3/2
Ports  Crf/Brf      Ring#    Port-Mode    Early-Token    AC-bits
-----  -----
  3/2   1003/1005      3276     fdx-cport     enabled        disabled

Ports  Prior-Thresh    Min-Xmit    MAC-Address
-----  -----
  3/2    6                5           00:40:0b:01:bc:65

Ports  Cfg-Loss-Thresh  Cfg-Loss-Intvl  Cfg-Loss-Count  Cfg-Loss-Reason
-----  -----
  3/2    50                20             0                none
Console> (enable)

```

To disable the early token release feature on a Token Ring module port, perform this task in privileged mode:

	Task	Command
Step 1	Disable early token release on a Token Ring module port.	<b>set tokenring etr <i>mod_num/port_num</i> disable</b>
Step 2	Verify the early token release configuration.	<b>show tokenring [<i>mod_num[/port_num]</i>]</b>

## Setting Address-Recognized and Frame-Copied Bits

Using the **set tokenring acbits** command, you can specify if and how the AC bits should be set on LLC frames. When local address learning is enabled on a Token Ring port, the default is **disable**. When local address learning is disabled on a Token Ring port, the default is **always**.

For information on setting AC bits and enabling and disabling local address learning, see the “Handling Frames Transmitted with Invalid Source MAC Addresses” section on page 41-13.

To configure how the AC bits will be set for a port, perform the following task in privileged mode:

Task	Command
Set AC bits on LLC frames.	<b>set tokenring acbits <i>mod_num/port_num</i> {enable   disable   sronly   never   always}</b>

After entering the **set tokenring acbits** command, a display similar to the following appears:

```

Console> (enable) set tokenring acbits 3/2 always
Warning: Disable Local learning: 3/2
Port 3/2 acbits always

```

## Setting Configuration Loss Thresholds

Configuration loss occurs when a port completes a connection, allows data traffic to flow, and subsequently closes. The configuration loss threshold controls the number of configuration losses that can occur within a specified time. When the threshold is exceeded, the port is disabled and you must enable it by entering the **set port enable** command or an SNMP manager. The valid range for the configuration loss threshold is 1 through 100. The default is 8.

To set and verify the configuration loss threshold for a port, perform this task in privileged mode:

	Task	Command
Step 1	Set the configuration loss threshold for a port.	<b>set tokenring configloss</b> <i>mod_num/port_num</i> { <b>threshold</b> <1..100>   <b>interval</b> <1..9999>}
Step 2	Verify the configuration loss threshold setting.	<b>show tokenring</b> [ <i>mod_num[/port_num]</i> ]

This example shows how to set the configuration loss threshold for a port and verify the configuration:

```

Console> (enable) set tokenring configloss 3/2 threshold 50
Port 3/2 configloss threshold set to 50.
Console> (enable) set tokenring configloss 3/2 interval 20
Port 3/2 configloss interval set to 20.
Console> (enable) show tokenring 3/2
Ports   Crf/Brf      Ring#   Port-Mode      Early-Token    AC-bits
-----
3/2     1003/1005    3276    fdx-cport      enabled        enabled

Ports   Prior-Thresh  Min-Xmit  MAC-Address
-----
3/2     6             5         00:40:0b:01:bc:65

Ports   Cfg-Loss-Thresh  Cfg-Loss-Intvl  Cfg-Loss-Count  Cfg-Loss-Reason
-----
3/2     50              20             0               none
Console> (enable)

```

## Enabling and Disabling All-Routes Explorer Reduction

For parallel SRB or SRT backbones, All-Routes Explorer reduction ensures that the number of All-Routes Explorer frames generated by the switch does not overwhelm the network.

In accordance with the IEEE 802.1d SRT standard, the Token Ring module discards any All-Routes Explorer frames that have already been on a ring attached to the switch. This ensures that only one All-Routes Explorer frame is received on each ring within each VLAN (Token Ring Bridge Relay Function [TrBRF] and Token Ring Concentrator Relay Function [TrCRF]). The number of frames is equal to the number of external parallel paths between the rings. If a port on the switch fails or is disabled, the switch no longer checks for this ring number in the RIF. This bypass allows frames to travel on alternate paths.

By default, All-Routes Explorer reduction is enabled.

To enable All-Routes Explorer reduction, perform this task in privileged mode:

Task	Command
Enable All-Routes Explorer reduction.	<b>set tokenring reduction enable</b>

To disable All-Routes Explorer reduction, perform this task in privileged mode:

Task	Command
Disable All-Routes Explorer reduction.	<b>set tokenring reduction disable</b>

## Configuring Soft Error Monitoring

The Catalyst 5000 Family Token Ring module software Release 3.3(1) and later performs error detection and isolation by monitoring the Report Soft Error MAC frames generated by stations on each port. Soft errors occur during normal ring operation and do not typically disrupt traffic on the ring. However, soft errors can occur at a rate that could potentially degrade the performance of the ring.

Using the **set station softerror** command, you can enable or disable soft error monitoring on a Token Ring port and you can configure soft error thresholds and sampling intervals for a port. During the interval you define, the Catalyst 5000 Family Token Ring module monitors the stations on the port and, if the threshold is exceeded, can be configured to generate a trap indicating the port number and station on which the threshold was exceeded. If necessary, you can issue a Remove Ring Station MAC frame to remove the station from the ring.

The Catalyst 5000 Family Token Ring module performs the following tasks:

- Monitors the Report Soft Error MAC frames generated by stations on each port, collects the data from each soft error frame, and generates a trap containing the port number and station where the user-defined soft error threshold is exceeded.
- Reports the soft error monitoring statistics through the console and SNMP.
- Provides the ability to issue a Remove Ring Station MAC frame to remove a station that is reporting a high level of errors or is not authorized to be on a ring.

### Enabling or Disabling Soft Error Monitoring on a Port

To enable or disable soft error monitoring on a Token Ring port, perform the following task in privileged mode:

Task	Command
Enable soft error monitoring on a port.	<b>set station softerror</b> <i>mod_num</i>   <i>mod_num/port_num</i> <b>disable</b>   <b>enable</b>



#### Note

To enable soft error monitoring on all the ports of the Token Ring module, use the **set station softerror** command and specify the module number of the Token Ring module.

After enabling soft error monitoring on a port using the **set station softerror** command, you see a display similar to the following:

```
Console> (enable) set station softerror 3/10 enable
Port 3/10 soft error monitoring enabled.
Console> (enable)
```

## Configuring Soft Error Monitoring Error Thresholds and Sampling Intervals

A soft error monitoring error threshold is the number of soft errors reported from a station connected to a port that if exceeded causes a soft error exceeded trap to be issued. To configure a soft error monitoring threshold and to define a sampling interval (the period, in seconds, during which the number of soft errors is monitored for each station connected to this port) perform the following task in privileged mode:

Task	Command
Configure soft error monitoring thresholds and sampling intervals on a port.	<b>set station softerror</b> <i>mod_num</i> [/ <i>port_num</i> ] <b>threshold</b> <i>threshold_num</i> <b>interval</b> <i>int_num</i>

The possible values for the error threshold are 1 to 255. The default is 100. The possible values for the sampling interval are 0 to 65534. The default is 60. Setting the interval to zero disables the soft error exceeded traps. Without these traps, soft errors can still be monitored through the console.



### Note

To set the error threshold and sampling interval for all the ports of the Token Ring module, enter the **set station softerror** command and specify the module number of the Token Ring module.

The following example shows how to configuring the error threshold and sampling interval using the **set station softerror** command:

```
Console> (enable) set station softerror 3/10 threshold 100 interval 200
Port 3/10 station soft error threshold set to 100, interval set to 200
Console> (enable)
```

## Verifying the Soft Error Monitoring Configuration

To verify your soft error monitoring configuration on a port, perform the following task in privileged mode:

Task	Command
Display the soft error monitoring configuration on a port.	<b>show station softerror config</b> <i>mod_num</i> [/ <i>port_num</i> ]



### Note

To view the soft error monitoring configuration for all the ports of the Token Ring module, enter the **show station softerror config** command and specify the module number of the Token Ring module.

The following example shows how to verify the configuration on a port:

```
Console> (enable) show station softerror config 3/10
Ports  Threshold Interval Status
-----
 3/10   100      200      enabled
Console> (enable)
```

## Removing an Adapter from the Network

If a station is exceeding soft error thresholds, you can issue a Remove Ring Station MAC frame to remove the station from the ring. When entering the **clear station** command, enter the MAC address in non-canonical format (00:11:22:33:44:55).

To remove the station from the ring, perform this task in privileged mode:

Task	Command
Clear a station from a ring.	<b>clear station</b> <i>mod_num/port_num mac_addr</i>



### Caution

Entering the **clear station** command and specifying the MAC address or ID of a station issues a Remove Station MAC frame to that station and removes the station from the ring. Use this procedure with extreme caution.

## Handling Frames Transmitted with Invalid Source MAC Addresses

In some rare circumstances, certain devices (such as a faulty protocol analyzer) might transmit a frame that contains the source MAC address of another device. Because MAC addresses are used by the switch to determine where to forward a frame, an invalid frame (one that contains the source MAC address of another device) can cause the valid frames to be forwarded to the wrong port. If this situation occurs, communication to the device to which the MAC address actually belongs can be disrupted for as long as the invalid address entry is in the Token Ring port address table.

If you are experiencing network communication problems due to a device erroneously sending frames with the source MAC address of another device, you can either choose to rapidly age the entries out of the Token Ring module port address tables using the **set tokenring portaging** command or you can ensure that the Token Ring module port address tables do not contain erroneous entries by disabling address learning entirely on the Token Ring module using the **set tokenring locallearning** command.



### Caution

We recommend that you use the **set tokenring portaging** and **set tokenring locallearning** commands only in those rare circumstances in which network communications are disrupted because of invalid frames.

## Configuring Token Ring Port Table Address Aging

When in a network environment in which a device is sending invalid frames, you can ensure that the Token Ring module port address tables contain correct MAC address entries by rapidly aging out the erroneous entries using the **set tokenring portaging** command. Rapidly aging out the Token Ring module port address table ensures that the Token Ring module port address tables do not contain invalid entries that might affect the Catalyst 5000 family switch and network communication.

The aging limit you define determines when inactive MAC addresses are removed from a port address table. The aging limit is the time (in seconds) a MAC address remains in the port's address table. Possible values are 0 and 5 through 65535 seconds. The default is 0. Zero indicates the Token Ring module port address table entries are aged out using the CAM aging time for the corresponding VLAN that has been configured using the **set cam agingtime** command. For more information about the **set cam agingtime** command, see the *Command Reference* for your switch.

**Note**

To use the fast-port aging feature effectively, we recommend that you configure an aging limit of 10.

To define the address aging limits for a Token Ring port, perform the following task in privileged mode:

Task	Command
Define the address aging limits for a port.	<b>set tokenring portaging</b> <i>mod_num/port_num</i> <i>agingtime</i>

This example shows how to define the address aging limit for a Token Ring port:

```
Console> (enable) set tokenring portaging 3/2 10
Agingtime set to 10 sec for port 3/2
Console> (enable)
```

## Configuring Local Address Learning

The **set tokenring locallearning** command allows you to enable or disable local MAC address learning on a Token Ring port. The default is for local address learning to be enabled.

When local address learning is enabled, the value of the address recognized (A) bit and the frame copied (C) bit in LLC frames is set by the ports on the Token Ring module based on whether the frame was actually forwarded. However, when local address learning is disabled, the AC bits cannot be set by the ports on the Token Ring module based on whether the frame was forwarded because all frames are forwarded to the Catalyst 5000 Family switching backplane.

When local address learning is disabled on a Token Ring port, the AC bits must be set based on the type of frame that has been received. When you disable local address learning on a Token Ring port, the default is for the AC bits to always be set on LLC frames. You can configure how the AC bits are to be set using the **set tokenring acbits** command. For more information on configuring for the setting of AC bits on frames, see the “Setting Address-Recognized and Frame-Copied Bits” section on page 41-9.

**Note**

When local address learning is disabled on a port, the port aging limits that are configured using the **set tokenring portaging** command are not used.

To enable or disable local address learning, perform the following task in privileged mode:

Task	Command
Enable or disable local address learning on a port.	<b>set tokenring locallearning</b> <i>mod_num/port_num</i> <b>enable   disable</b>

This example shows how to disable local address learning using the **set tokenring locallearning** command:

```
Console> (enable) set tokenring locallearning 3/2 disable
Warning: Resetting acbit value to ALWAYS: 3/2
Local learning disabled for port 3/2
Console> (enable)
```