21 Managing Token Ring Modules

This chapter describes User Interface (UI) commands for token ring switching modules. Beginning with Release 3.4, a new generation of token ring modules are used in the OmniSwitch and Omni Switch/Router. These modules have many advanced features, including full-duplex mode and auto-sensing capabilities.

Two Generations of Modules

The two generation of token ring switching modules are described in *Bigfoot and Early-Generation Token Ring Modules* on page 21-2.

Source Routing

A basic overview of source routing on token ring networks is provided in *Source Routing* on page 21-4.

Virtual Rings

A basic overview of virtual token rings is provided in *Source Routing* on page 21-4.

User Interface Commands

Documentation for UI commands used to configure and display parameters on token ring modules begins on page 21-12.

Bigfoot and Early-Generation Token Ring Modules

Alcatel's token ring switching modules come in two basic families: the original early-generation modules and a new generation of modules containing advanced-technology Mammoth II and Bigfoot ASICs.

The newer modules (Bigfoot modules) support new features, such as auto-sensing and full-duplex mode, which are not available in the early-generation modules. The subsections below provide additional information on the differences between the early-generation and Bigfoot modules.

Early-Generation Modules

Early-generation token ring modes consist of the TSM-C-6, TSM-CD-6, and TSM-F-6 for the OmniSwitch (see the table below). All of these modules support connections to Multistation Access Units (MAUs). The TSM-CD-6 and TSM-F-6 modules also support connections to desktop devices. Hardware documentation for these modules can be found in Chapter 7, "OmniSwitch Switching Modules."

Token Ring Module	Chassis Type	Configuration Commands	Port Types	Auto Sensing Supported?	Full Duplex Supported?
TSM-C-6	OmniSwitch	tpcfg	Station	No	No
TSM-CD-6	OmniSwitch	tsc, tpcfg	Station, Lobe	No	No
TSM-F-6	OmniSwitch	tsc, tpcfg	Station, Lobe, Ring Out Only, Ring In/Ring Out (RI/RO)	No	No

Bigfoot Modules

Bigfoot token ring modules consist of the TSX-CD-16W and TSX-C-32W for the Omni Switch/Router and the TSM-CD-16W for the OmniSwitch (see the table below). All of these modules support Station connections to desktop devices. The TSM-CD-16W and TSX-CD-16W also support Lobe connections to Multistation Access Units (MAUs).

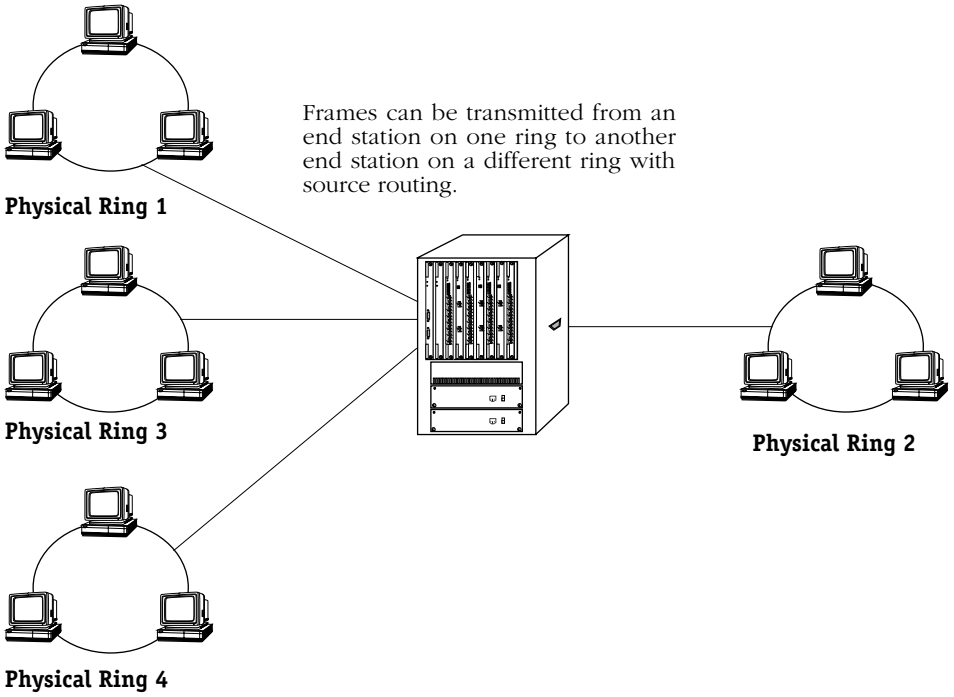
Token Ring Module	Chassis Type	Configuration Commands	Port Types	Auto Sensing Supported?	Full Duplex Supported?
TSM-CD-16W	OmniSwitch	tpcfg, tsmcfg	Station, Lobe	Yes	Yes
TSX-CD-16W	Omni Switch/Router	tpcfg, tsmcfg	Station, Lobe	Yes	Yes
TSX-C-32W	Omni Switch/Router	tpcfg, tsmcfg	Lobe	Yes	Yes

Hardware documentation for the OmniSwitch TSM-CD-16W can be found in Chapter 7, "OmniSwitch Switching Modules." Hardware documentation on the Omni Switch/Router TSX-CD-16 and TSX-C-32W modules can be found in Chapter 3, "Omni Switch/Router Switching Modules."

Source Routing

Traditional (Layer 2) source routing is the practice of including routing information in the packet header. This serves to supply the route that the frame should take from the source to the destination. Alcatel switches support traditional source routing on token ring, FDDI, and ATM interfaces.

In the figure below, the switch operates as a source route bridge between the four physical token rings. Each ring must have a unique ring number.



Source Routing on Token Ring Networks

Hop Counts

Hop counts are split into inbound and outbound hop counts. This is due to the fact that a hop count is validated when an All Routes Explorer (ARE) or Spanning Tree Explorer (STE) explorer is received from a station. When a station starts communicating, it sends out either an STE or an ARE explorer. This packet contains a Route Information Field (RIF) without any source routing information (Null-RIF). The switch examines this explorer. If the inbound hop count is not exceeded, an STE is forwarded to all the ports that are in a forwarding state; and an ARE is forwarded to all ports.

The switch adds the destination bridge and ring ID to the RIF. (The first switch on the hop will also add the source ring ID.) Then, the hop count of this RIF is checked against the outbound hop count of the outbound port. If it exceeds the outbound hop count, the explorer frame is discarded. Each succeeding bridge performs the same inboard and outboard check. You should configure the inbound and outbound check to the lowest possible setting. See *Configuring Source Routing/Virtual Rings* on page 21-14 to configure the inbound and outbound hop counts. This will dramatically reduce the number of broadcasts in a network.

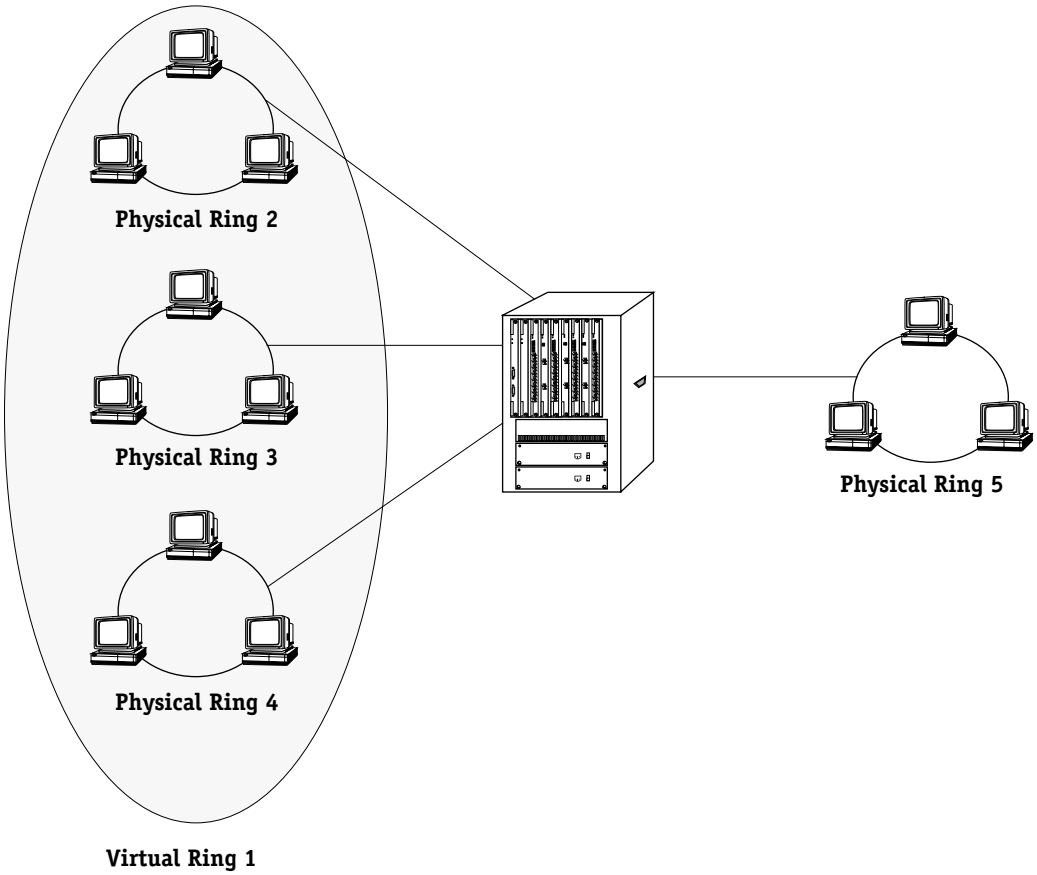
Virtual Rings

With AutoTracker, you can create virtual rings that combine multiple physical token ring LANs into one logical token ring LAN. Virtual rings allow you to maintain the same number of rings and bridges without increasing the amount of management required. They also provide high speed switching between token ring LANs with the same ring number and while at the same time providing source route bridging of traffic between token rings with different ring numbers. With virtual rings, additional ring numbers are not used, devices do not have to be configured, and additional hops are conserved.

The Route Information Field (RIF) limits the number of hops you can have. This limit is costly in a switched network if a bridge forwards frames strictly according the RIF. With AutoTracker, a virtual ring network forwards source route traffic without using RIF information, and therefore without using any hops.

Local Virtual Rings

With virtual rings, you can micro-segment an existing token ring network which increases bandwidth by transparently connecting multiple physical rings into one logical token ring network. Traffic is switched between rings with the same ring number and source route bridged to rings with a different ring number. In the figure on the following page, all end stations attached to the three physical token rings identified as virtual ring Number 1 will appear to the end stations as being on the same ring. The three physical rings will be treated as one logical ring. The switch will also operate as a standard source route bridge to allow end stations on virtual Ring 1 to communicate with end stations on Ring 5.



Local Virtual Rings

Spanning Tree Leaf Rings

Any physical token ring that is part of a virtual ring must be a leaf of the spanning tree. The only exception is a source route bridge that is attached to a token ring, not participating in a virtual ring or a token ring that *is* participating but does not cause a loop.

Any source route bridges attached to a physical token ring that is part of a virtual ring, cannot create a lop back to another physical token ring that is part of the same virtual ring.

Setting Up Virtual Rings

First, create a group and assign multiple physical ports to it. Assign the same ring number to each physical port that you want to be in the Virtual Ring. Assign the other ports a unique ring number if standard source route bridging is required between rings. You may have one or more source route bridges as part of a virtual ring, but you must ensure that no loop is introduced into the network; any source route bridge added to the ring must not have a path through it that leads back to the ring.

Source Route Traffic Across a Backbone

If you assign a ring number to the backbone, then the backbone can be used as a single hop in the source route network. If the number of hops used is a concern, this may not be the best method for you.

Alcatel switches support standard Source Routing for token ring and FDDI networks. In addition, a network of switches can support source routing over FDDI or ATM backbones.

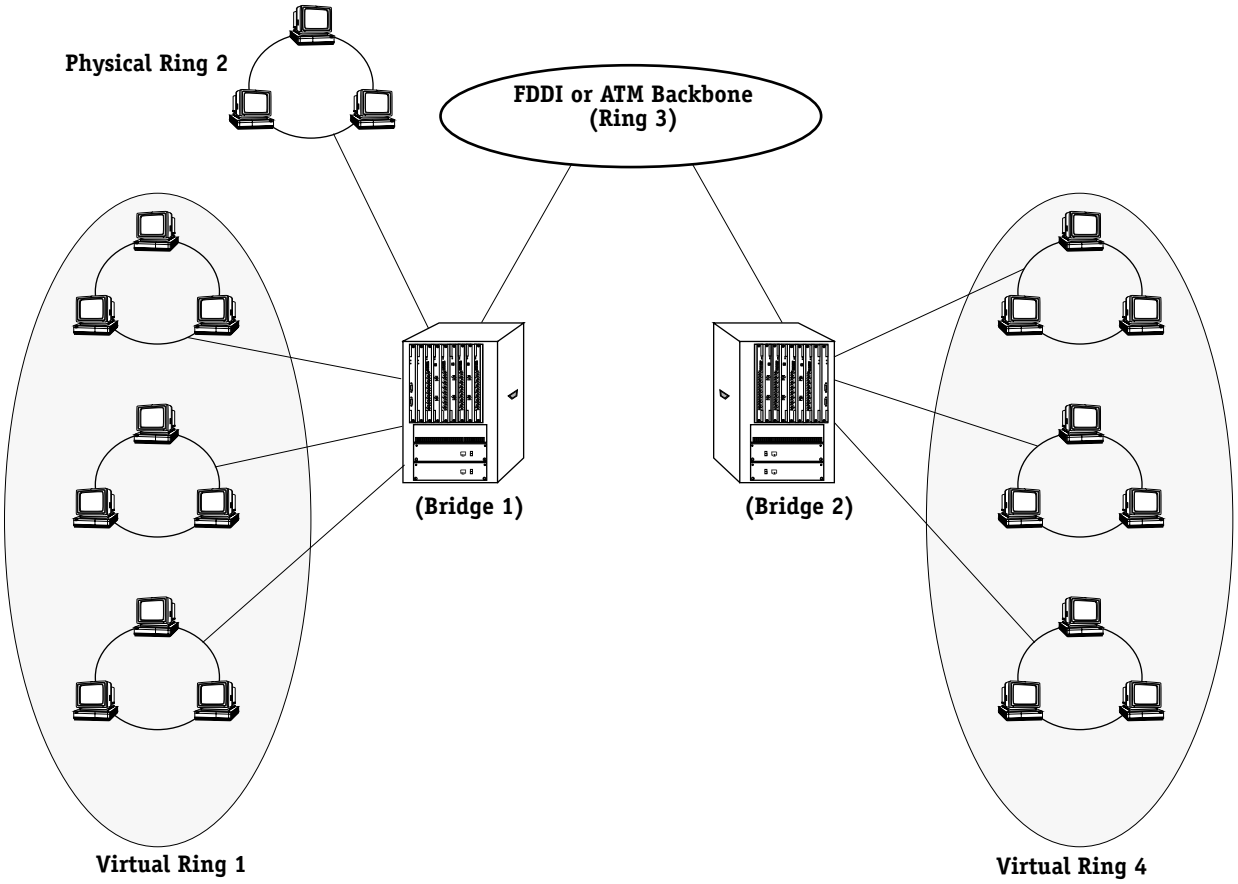
With standard source route bridging, the bridge forwards frames according to the routing information field contained within each frame. An explicit route designated by the RIF is as follows:

RIF:LAN Identifier, Bridge Number:LANIdentifier,Bridge Number:..LAN Identifier

where the LAN Identifier (Ring number) is locally administered and unique for the network.

Because the RIF contains necessary information, source route bridges do not need to examine either the source or destination MAC addresses except to monitor for their own address in the destination field for management frames. Instead, they monitor all traffic on their ports and search for the ring number, and Bridge number assigned for that port. Because the route is explicit, source routing has the advantage that it allows for routing across blocked spanning tree ports without concern for the frame replication that can occur through looping. Two switches connected by a backbone with an assigned ring number cannot have virtual rings extended across that backbone simultaneously.

In the figure on the following page, two switches are used to interconnect two logical rings. A route discovered from Ring 1 to Ring 4 would include Ring 1, Bridge 1, Ring 3, Bridge 2, and Ring 4 in the RIF.

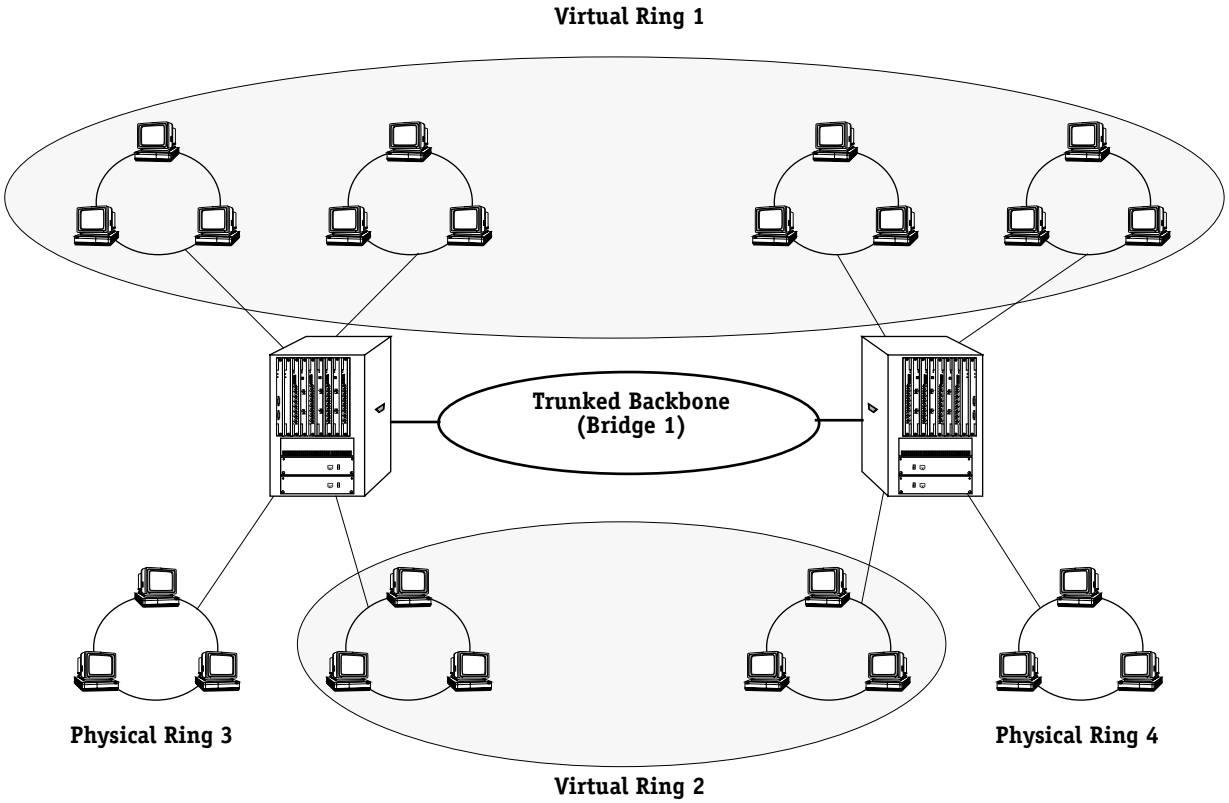


Source Routing Across a Backbone

Virtual Rings Using Trunks

Virtual rings can be extended across an ATM or FDDI backbone to a remote switch or switches which are part of the same virtual LAN by assigning all switches connected to the backbone the same bridge number, and trunking that virtual ring. Any connected switches with different numbers will simply not be part of that virtual ring. Thus, two or more switches will act as a single source route bridge hop. A frame received on a token ring on one switch will travel across the backbone to remote token ring networks with the same ring number, and will be viewed by the end stations as if they were on that same physical token ring. If you do not assign a ring number to the backbone, it will be considered by the rest of the virtual ring to be part of it. Thus multiple virtual rings could share the same backbone transparently.

Traffic between the stations on the same logical ring would have a null RIF field and the stations would appear to each other as if on the same ring. Traffic is transparently switched within the extended switch network and between the segments within a virtual ring.



Virtual Rings Using Trunks

Token Ring Copy Bit Stamping

Token ring frames contain a bit called Frame Copied Bit that is normally set when a frame is bridged from one ring to another. By default, the switch sets this bit for all token ring frames that it processes, even frames with source and destination addresses on the same ring. In some cases, when a token ring frame reaches its destination workstation, the adapter on that workstation generates 802.5-defined soft errors because it does not support local frames that have already had their Frame Copy Bit set.

You can configure the switch to stop setting the Frame Copy bit on token ring frames on a per-port basis. If you turn off Frame Copy bit stamping, then no frames received on the specified token ring port will be stamped.

If you are receiving soft errors on a token ring workstation that is attached to an switch, then you may want to consider turning off Frame Copy Bit stamping.

When Copy Bit Stamping is enabled (the default), the switch knows it has looked at a frame by looking at the Copy Bit. When you turn off Copy Bit Stamping, the switch builds a pseudo-CAM of frame addresses it has already seen. Otherwise, it will not know if it has seen a frame before. The building of this pseudo-CAM may cause some performance degradation.

To turn off Copy Bit stamping, use the **tpcfg** command, which is described in *Configuring Port Parameters for Early-Generation Token Ring Modules* on page 21-23. You will need to reset the switch for the new Copy Bit stamping status to take effect.

Source Routing to Transparent Bridging (SRTB)

Source-routed frames generated by token ring workstations contain a 2-byte Routing Information Field (RIF). Normally, when an Ethernet port on the switch sees a source-route frame with a RIF field, it discards that frame. The frame never reaches the Ethernet network.

In Release 4.1 and later, Source Routing to Transparent Bridging (SRTB) provides connectivity between transparently-bridged Ethernet and a source-routed token ring. The RIF is stripped from frames that are switched from token ring networks to Ethernet networks. Conversely, the RIF is added to frames that are switched from Ethernet networks to token ring networks. See Chapter 23, "Configuring Bridging Parameters," for documentation on the SRTB feature.

Token Ring UI Commands

User Interface (UI) commands are available to configure and display token ring parameters. These commands are grouped into the token ring (**tok**) submenu, which is described below. In addition, UI commands are available to configure source routing and display source routing parameters on token ring networks. These commands are group into the bridging (**br**) submenu, which is described in *Bridging Submenu* on page 21-13.

Token Ring Submenu

The **tok** submenu contains commands to configure and display parameters for token ring switching modules. To enter the **tok** submenu, enter

```
tok
```

at the system prompt. Enter a question mark (**?**) to display the list of commands, as shown below.

```
Command         Token Ring Menu
--------------- ----------------------------------------------------------------------------
tsc             View/Configure the Token Ring Interface Type
tsmvc           View Token Ring Base MAC addressed settings
tsmcfg          Configure the Token Ring Base MAC addresses
tpvc            View the Token Ring Port Configuration Table
tpcfg           Configure Token Ring Port Parameters
tperrs          View Token Ring Port Error Statistics
tprs            View Token Ring Port Ring Status
```

Descriptions of the **tok** submenu commands begin on page 21-20.

Bridging Submenu

Commands for configuring and displaying source routing parameters are contained in the bridging (**br**) submenu. You create and modify source routing with the **src** command and you display source routing parameters with the **srs** command.

To enter the **br** submenu, enter

```
br
```

at the system prompt. Enter a question mark (**?**) to display the list of commands, as shown below.

```
Command         Bridge Management Menu
--------------- ------------------------------------------------------------------------
fls             Display Flood Limit of selected Group
flc             Configure Flood Limit on selected Group
sts             Display Spanning Tree parameters on selected Group
stc             Configure Spanning Tree parameters on selected Group
stps            Display Spanning Tree Port parameters on selected VLAN
stpc            Configure Spanning Tree Port parameters on selected VLAN
srs             Display Source Routing parameters on selected Group
src             Configure Source Routing parameters on selected Group
srsf            Enable or disable Source Routing SAP Filter Support
srtbcfg         View and Configure Source Route to Transparent Bridging
srtbrif         View learned RIF from Source Route to Transparent Bridging table
srtbclrrif      View and Clear learned RIF from Source Route to Transparent
                  Bridging table
fwt             Display Bridge Forward table on selected VLAN
fs              Display Bridge Static Address
fc              Configure Bridge Static Address
bps             Display Bridge Port Statistics on selected VLAN
macinfo         Locate learned Bridge MAC address in this chassis
macstat         Show statistics of Bridge MAC address
macclrstat      Clear statistics of Bridge MAC address
selgp           A Group can be selected for the bridge operations
                  or to generate MIB reports
rts             Display remote Trunking Stations discovered
dbrmap          View the Domain Bridge Mapping table
+ / -           Select next / previous VLAN
```

The **src** command is described in *Configuring Source Routing/Virtual Rings* on page 21-14. The **srs** command is described in *Displaying Source Routing Parameters* on page 21-17. See Chapter 23, “Configuring Bridging Parameters,” for documentation on all other **br** submenu commands.

Configuring Source Routing/Virtual Rings

The **src** command allows you to set the parameters for source routing. In addition, it also displays current source routing parameters for your switch. The syntax for the **src** command is as follows:

src <group number>

If you do not enter a group number, then Group No. 1 (the default group) will be entered. For example, to configure the source routing parameters on Group No. 1, enter

src

at the system prompt. A screen similar to the following is displayed.

Source Routing Parameters for Group 1 (Default GROUP (#1))

	Slot Intf	Type/ Inst/Srvc	Ring Number	Bridge Number	Largest frame	HopCnt In	HopCnt Out	Port Type	Block ARE
1.	2/ 1	Brg/ 1/ na	1 (0x001)	10 (0xA)	590	6	6	SRT	n
2.	3/ 1	Brg/ 1/ na (V)	2 (0x002)	10 (0xA)	4472	7	7	SRT	n
3.	3/ 2	Brg/ 1/ na	4 (0x004)	10 (0xA)	4472	7	7	SRT	n
4.	3/ 3	Brg/ 1/ na	5 (0x005)	10 (0xA)	4472	6	6	SRT	n
5.	3/ 4	Brg/ 1/ na	3 (0x003)	10 (0xA)	4472	7	7	SRT	n
6.	3/ 5	Brg/ 1/ na (V)	2 (0x002)	10 (0xA)	4472	7	7	SRT	n
7.	3/ 6	Brg/ 1/ na (V)	3 (0x003)	10 (0xA)	4472	7	7	SRT	n

Enter index of the entry to configure (e.g. 1) <RETURN> to exit :

The fields displayed by the **src** command are described in the subsection below. To set parameters, enter the index entry (the left-most number) in the row with the port you want to configure. See *Source Routing/Virtual Ring Configuration Steps* on page 21-15 to configure source routing and virtual token rings.

♦ Note ♦

The **src** command operates differently if you have turned on SAP filtering on with the **srsf** command. For documentation on using the **src** command with SAP filtering turned on, see Chapter 23, "Configuring Bridging Parameters."

Source Routing/Virtual Ring Parameters

Slot Intf. The slot and interface (port) for this token ring.

Type. The type of service of this token ring. The type of service can be one of the following.

Brg. Indicates that bridging has been configured on this ring.

Lne. Indicates that an 802.5 LANE client service is configured on this ring.

Inst. This field is used to identify the instance of the service if there is more than one service for the **Slot/Intf** field.

Srvc. This field indicates the service number. If a port has more than one service configured on it, then each service will be identified by a different service number.

Ring Number. The ring number assigned to the token ring for participation in source routing. If a **(V)** appears in front of this field, then a virtual ring is configured.

Bridge Number. A unique number to identify the source routing bridge number used to participate in source routing. This number will be the same for each port on the same group.

Largest frame. The maximum size of the INFO field that this virtual port can send and receive.

Hop Cnt In. The maximum inbound hop count for Spanning Tree Explorer (STE) and All Routes Explorer (ARE) frames (the default is **7**). This value is checked on all inbound STE or ARE frames. If the hop count is exceeded, the frame will be dropped. See *Hop Counts* on page 21-4 for more information on hop counts.

Hop Cnt Out. The maximum outbound hop count for Spanning Tree Explorer (STE) and All Routes Explorer (ARE) frames (the default is **7**). This value is checked on outbound STE or ARE frames. If the hop count is exceeded, the frame will be dropped. See *Hop Counts* on page 21-4 for more information on hop counts.

Port Type. This can be either source route (**SR**) or source route transparent (**SRT**) bridge port.

Block ARE. Indicates whether the All Routes Explorer (ARE) will be treated as Spanning Tree Explorer (STE). Normally ARE does not acknowledge blocked ports the way STE does. This behavior can cause unnecessary congestion.

Source Routing/Virtual Ring Configuration Steps

Perform the steps below to configure source routing parameters.

1. At the system prompt, enter

src

A screen similar to the following displays. (See *Source Routing/Virtual Ring Parameters* on page 21-14 for descriptions of these fields.)

Source Routing Parameters for Group 1 (Default GROUP (#1))

	Slot Intf	Type/ Inst/Srvc	Ring Number	Bridge Number	Largest frame	HopCnt In	HopCnt Out	Port Type	Block ARE
1.	2/ 1	Brg/ 1/ na	1 (0x001)	10 (0xA)	590	6	6	SRT	n
2.	3/ 1	Brg/ 1/ na (V)	2 (0x002)	10 (0xA)	4472	7	7	SRT	n
3.	3/ 2	Brg/ 1/ na	4 (0x004)	10 (0xA)	4472	7	7	SRT	n
4.	3/ 3	Brg/ 1/ na	5 (0x005)	10 (0xA)	4472	6	6	SRT	n
5.	3/ 4	Brg/ 1/ na	3 (0x003)	10 (0xA)	4472	7	7	SRT	n
6.	3/ 5	Brg/ 1/ na (V)	2 (0x002)	10 (0xA)	4472	7	7	SRT	n
7.	3/ 6	Brg/ 1/ na (V)	3 (0x003)	10 (0xA)	4472	7	7	SRT	n

Enter index of the entry to configure (e.g. 1) <RETURN> to exit :

2. Enter the index entry (the left-most number) of the ring you want to configure. A screen similar to the following displays.

Ring Number (1 - 4095, 0 to disable) (0x004) :

3. Enter a ring number from **1** to **4095** or enter **0** to remove the port from all rings. The current ring (in hexadecimal) is displayed in parentheses. The following screen displays.

Virtual Ring (y/n) (n) :

4. Enter **y** to configure the port for a virtual token ring or **n** to configure the port for a physical ring. (The default is **n**.) A screen similar to the following displays.

```
Bridge Number (1 - 15, 0 to disable)      (0xA) :
```

5. Enter a bridge number from **1** to **15** or enter **0** to remove the port from all bridges. The current bridge (in hexadecimal) is displayed in parentheses. A screen similar to the following displays.

```
Max Outbound Hop Count                    ( 7) :
```

6. Enter the maximum number of outbound hop counts, which can be from 0 to 14, for this port. (The current number is displayed in parentheses.) A screen similar to the following displays.

```
Max Inbound Hop Count                     ( 7) :
```

7. Enter the maximum number of inbound hop counts, which can be from 0 to 14, for this port. (The current number is displayed in parentheses.) A screen similar to the following displays.

```
Largest Frame size                        (4472) :
```

8. Enter the largest frame size (in bytes) allowed on this port. On early-generation modules, the largest possible value is 4472. On Bigfoot modules, the largest possible value is 17800. The following screen displays.

```
Turn Transparent Bridging ON (y/n)        (y) :
```

9. Enter **n** for pure source routing or **y** for source route transparent bridging (SRTB). (The default is **y**.) The following screen displays.

```
Block ARE on non-forward state (y/n)      (n) :
```

10. If you answer **Yes** to this option, blocked ports will be treated in a non-forwarding state by ARE. (The default is **n**.) The following screen displays.

```
Save the new configuration? (y/n)         (n) :
```

11. Enter **y** to save the new settings or **n** to discard them. (The default is **n**.) The following screen displays.

```
Enter index of the entry to configure (e.g. 1) <RETURN> to exit :
```

12. Enter the index entry (the left-most number) to configure another ring or press **<Return>** to exit.

Displaying Source Routing Parameters

The **srs** command displays the current parameters for source routing. To use this command, enter

```
srs
```

at the system prompt. A screen similar to the following will be displayed.

```
Source Routing Parameters for Group 1 (Default GROUP (#1))

    Slot   Type/          Ring        Bridge      Largest   HopCnt     Port     Block
    Intf   Inst/Srvc      Number      Number       frame    In  Out    Type      ARE
    ----   ------------  ----------  ----------  ---------  --- -----  -------  ---------
1.  2/ 1   Brg/ 1/ na      1 (0x001)  10 (0xA)      590     6    6     SRT        n
2.  3/ 1   Brg/ 1/ na (V)  2 (0x002)  10 (0xA)     4472     7    7     SRT        n
3.  3/ 2   Brg/ 1/ na      4 (0x004)  10 (0xA)     4472     7    7     SRT        n
4.  3/ 3   Brg/ 1/ na      5 (0x005)  10 (0xA)     4472     6    6     SRT        n
5.  3/ 4   Brg/ 1/ na      3 (0x003)  10 (0xA)     4472     7    7     SRT        n
6.  3/ 5   Brg/ 1/ na (V)  2 (0x002)  10 (0xA)     4472     7    7     SRT        n
7.  3/ 6   Brg/ 1/ na (V)  3 (0x003)  10 (0xA)     4472     7    7     SRT        n

Enter index of the entry to see details (e.g. 1) <RETURN> to exit :
```

To display detailed information for a particular port, enter the index entry (the left-most number) of the row with the port you want to display. If you entered an index number, a screen similar to the following will be displayed.

```
Selected entry is attached to Group 1 (Default GROUP (#1)) )

Bridge Num:          0xa                 Ring Num:                  0x4
Hop Count In/Out:    7 / 7               Max Frame:                 4472
LF Mode:             3 bits              Span Mode:                 Auto-Span

SRFs In/Out:         4532/    3048       Invalid RI field:                0
AREs In/Out:        21078/    3262       Dup Segments:                    0
STEs In/Out:         3242/    1056
Dup LAN IDs:            0               LAN ID Mismatches:               0
Hop Count Exceeded - Inbound/Outbound:                  0/               0

Enter index of the entry to see details (e.g. 1) <RETURN> to exit :
```

♦ Note ♦

The **srs** command operates differently if you have turned on SAP filtering on with the **srsf** command. For documentation on using the **srs** command with SAP filtering turned on, see Chapter 23, "Configuring Bridging Parameters."

Enter an index number to display detailed parameters for another port or press **<Return>** to exit. The fields displayed by the **srs** command are described below.

Slot Intf. The slot and interface (port) for this token ring.

Type. The type of service of this token ring. The type of service can be one of the following.

Brg. Indicates that bridging has been configured on this ring.

Lne. Indicates that an 802.5 LANE client service is configured on this ring.

Inst. This field is used to identify the instance of the service if there is more than one service for the **Slot/Intf** field.

Srvc. This field indicates the service number. If a port has more than one service configured on it, then each service will be identified by a different service number.

Ring Number. The ring number assigned to the token ring for participation in source routing. If a **(V)** appears in front of this field, then a virtual ring is configured.

Bridge Number. A unique number to identify the source routing bridge number used to participate in source routing. This number will be the same for each port on the same group.

Largest frame. The maximum size of the INFO field that this virtual port can send and receive.

Hop Cnt In. The maximum inbound hop count for Spanning Tree Explorer (STE) and All Routes Explorer (ARE) frames (the default is **7**). This value is checked on all inbound STE or ARE frames. If the hop count is exceeded, the frame will be dropped. See *Hop Counts* on page 21-4 for more information on hop counts.

Hop Cnt Out. The maximum outbound hop count for Spanning Tree Explorer (STE) and All Routes Explorer (ARE) frames (the default is **7**). This value is checked on outbound STE or ARE frames. If the hop count is exceeded, the frame will be dropped. See *Hop Counts* on page 21-4 for more information on hop counts.

Port Type. This can be either source route (**SR**) or source route transparent (**SRT**) bridge port.

Block ARE. Indicates whether the All Routes Explorer (ARE) will be treated as Spanning Tree Explorer (STE). Normally ARE does not acknowledge blocked ports the way STE does. This behavior can cause unnecessary congestion.

♦ Note ♦

The fields listed below are only displayed if you selected to display detailed information for a single port.

Bridge Num. See the description for the **Bridge Number** field above.

Ring Num. See the description for the **Ring Number** field on the previous page.

Hop Count In/Out. See the description for the **Hop Cnt In** and **Hop Cnt Out** fields above

Ring Num. See the description for the **Ring Number** field on the previous page.

LF Mode. The length of the frame size negotiation field. Currently set to 3 bits.

Max Frame. See the description for the **Largest frame** field above.

Span Mode. Determines how this virtual port will handle a Spanning Tree Explorer (STE) frames. Values include the following:

Auto-span. Can only be returned by a bridge that both implements the Spanning Tree Protocol and has use of the protocol enabled on this virtual port. If the virtual port is in the forwarding state, the frame will be accepted or propagated. Otherwise it will be silently discarded. [Any others?]

SRFs In/Out. The number of Specifically Routed Frames that have been received/transmitted.

AREs In/Out. The number of All Route Explorer (ARE) frames that have been received/transmitted.

STEs In/Out. The number of Spanning Tree Explorer (STE) frames that have been received/transmitted.

Dup LAN IDs. The number of frames discarded due to Duplicate LAN IDs.

Invalid RI field. The number of explorer frames that have been discarded because the routing information field contained an invalid value.

Dup Segments. The number of frames that have been discarded by this virtual port because routing descriptor field contained a duplicate segment identifier.

LAN ID Mismatches. The number of ARE and STE frames that were discarded because of a LAN ID mismatch.

Hop Count Exceeded - Inbound/Outbound. The total inbound and outbound hop count for source router STE and ARE frames. See *Configuring Source Routing/Virtual Rings* on page 21-14 to configure the inbound and outbound hop counts.

Configuring the Interface Type on Early-Generation Modules

You can use the **tsc** command to modify the interface type on early-generation modules with configurable ports (i.e., the TSM-F-6 and the TSM-CD-6). You cannot use the **tsc** command to configure the TSM-C-6 or Bigfoot token ring modules.

♦ Note ♦

You can use the **tsc** command to display the interface type on all token ring modules. See *Displaying the Token Ring Interface Type* on page 21-30 for documentation on using the **tsc** command to display the interface type.

See the subsection below to configure the interface type on a TSM-F-6 and see *Configuring the Interface Type on a TSM-CD-6* on page 21-22 to configure a TSM-CD-6.

Configuring the Interface Type on a TSM-F-6

Perform the steps below to configure the interface type for a TSM-F-6.

1. Enter **tsc** at the system prompt. A screen similar to the following will be displayed.

```
Token Ring slot interface table
Slot    Interface Type
----    ------------------------------
3       C-RJ45
4       C-6PORT-XYLAN
Enter Slot Number [<ret> to exit] :
```

2. Enter the slot number of the TSM-F-6 module. A screen similar to the following is displayed.

```
Available Interface Types
(1) F-STATION-802.5j
(2) F-LOBE-802.5j
(3) F-RIRO-BYTEX
(4) F-RO-6PORT-BYTEX
(5) F-RIRO-SYNOPTICS
(6) F-RO-6PORT-SYNOPTICS
(7) F-RIRO-XYLAN
(8) F-6PORT-XYLAN/IBM
(9) F-OPTION-3PORT
(10) F-OPTION-6PORT

Enter interface type [<ret> to exit] :
```

3. Enter the number of the interface type you want to configure. Each of the supported configurations, 1-8, require a separate configuration file (options 9 and 10 are for future use). The default interface type is **6PORT-XYLAN/IBM**. These files are stored in the MPM in a compressed form. If a file cannot be found you will receive an error message.

♦ Note ♦

Initially all fiber configuration files are archived into the one file **tsm.pga**.

Synoptics/Bytex Hubs. If you are interfacing with a Synoptics (Bay Networks) hub, select option 5 or 6. If interfacing with a Bytex hub, select option 3 or 4.

IBM 8230 and 8272. If interfacing with an IBM 8230 or IBM 8272, select the **6PORT-XYLAN/IBM** option. Connect either the RI or the RO port on the IBM hub to one of the six ports on the TSM-F-6 — do not connect both IBM ports (RI and RO) to the same OmniSwitch. For example, you could connect the RI port on an IBM hub to a TSM-F-6 port on one OmniSwitch and connect the RO port on the same IBM hub to a TSM-F-6 port in another OmniSwitch. Both TSM-F-6 ports in the two OmniSwitches and all ports in the IBM hub form one ring.

ODS 836J. If interfacing with an ODS 836J token ring fiber optic transceiver, select the **6PORT-XYLAN/IBM** option. When connecting the ODS 836J to a twisted-pair MAU, set the ODS 836J switch to position 2 and connect its fiber port to the TSM-F-6. When connecting the ODS 836J to a station (twisted-wire adapter card), set the ODS 836J switch to position 0 and connect its fiber port to the TSM-F-6.

Ring In/Ring Out (RI/RO) Configurations. The RI/RO interface options provide fiber redundancy by using two fiber ports as a pair. See Chapter 7, "OmniSwitch Switching Modules," for an explanation of the RI/RO configuration.

Token ring fiber optic RI/RO is not an IEEE standard. Different vendors provide their proprietary RI/RO interface. Options are provided for Synoptics, Bytex, and Xylan RI/RO interfaces.

After you select an interface type, the following will be displayed.

```
(The new value is saved in configuration and will be
activated after reboot.
Reload board with new interface now? [y/n] :
```

4. Enter **y** to save your changes or press **<Return>** to cancel. If you entered **y**, the following will be displayed.

```
Loading new interface...
System must now be REBOOTED.
```

5. You must reboot the switch for any changes to take effect.

Configuring the Interface Type on a TSM-CD-6

Perform the steps below to configure the interface type for a TSM-CD-6.

1. Enter **tsc** at the system prompt. A screen similar to the following will be displayed.

```
Token Ring slot interface table
Slot    Interface Type
----    ------------------------------
3       C-RJ45
4       C-6PORT-XYLAN
Enter Slot Number [<ret> to exit] :
```

2. Enter the slot number of the TSM-CD-6 module. A screen similar to the following is displayed.

```
Port          Mode
-------------------------------
1             Lobe
2             Lobe
3             Lobe
4             Lobe
5             Lobe
6             Lobe
Note: this is the configured mode. 'tpvc' displays the active mode.
Ports may be in either Lobe or Station mode.
Select port to change:
```

   Each port is set to either Lobe or Station mode. You toggle a port between these modes by entering the port number at this prompt. After you enter the port number, a screen similar to the following will be displayed.

```
Port 6 configuration has been saved as Station mode.
Activate the configuration now? [y/n] :
```

3. Enter **y** to change the interface type or press **<Return>** to cancel. Any changes to the interface type will take place immediately; you do not need to reboot the switch.

   If you entered **y**, a screen similar to the following will be displayed.

```
Port 6 activated in Station mode.
```

   A screen similar to the following will be displayed showing the current interface type configurations.

```
Port          Mode
-------------------------------
1             Lobe
2             Lobe
3             Lobe
4             Lobe
5             Lobe
6             Station
Note: this is the configured mode. 'tpvc' displays the active mode.
Ports may be in either Lobe or Station mode.
Select port to change:
```

4. Enter a slot number to configure another port or press **<Return>** to exit.

Configuring Port Parameters for Early-Generation Token Ring Modules

You can use the **tpcfg** command to set port parameters for early-generation token ring modules.

1. Enter **tpcfg** at the system prompt. The following screen will be displayed.

   ```
   Enter Slot/Interface :
   ```

2. Enter the slot and interface that you want to configure. A screen similar to the following will be displayed.

   ```
   New Ring Speed (16 or 4 mps) (current speed is 16) :
   ```

3. Enter **4** to set the ring speed to 4 Mbps or **16** to set it to 16 Mbps. A screen similar to the following will be displayed.

   ```
   Active Monitor Participation (currently No) :
   ```

4. The active monitor performs certain functions (e.g., ensuring that frames do not circulate endlessly on the ring, ensuring that there is a valid token on the ring) to ensure that the ring functions properly. Enter **n** (the default) to turn off active monitor participation or **y** to turn it on. A screen similar to the following will be displayed.

   ```
   Frame-Copied Bit Always Set (currently Yes):
   ```

5. Enter **yes** to disable Copy Bit stamping or **no** to disable it. (See *Token Ring Copy Bit Stamping* on page 21-10 for more information on Copy Bit stamping.) A screen similar to the following will be displayed.

   ```
   The new value is saved into configuration and will be
   activated on next Reset command after reboot.
   New Frame-Copied Mode is saved in configuration.

   Immediate Command (Open, Reset, Close, <ret>No action) :
   ```

6. The **Ring Speed**, **Active Monitor Participation**, and **Frame-Copied Bit** settings are saved in memory until you close or reset the ring, or reboot the switch. If you want the settings to take effect immediately, enter **reset**. The system will close the ring and reopen it with the new settings.

   Enter **open** to open a closed ring, enter **close** to close an open ring, or press **<Return>** to exit to take no action at this time.

Configuring Auto-Sensing Ports for Bigfoot Modules

You can use the **tpcfg** command to configure token ring ports on Bigfoot modules (which are described in *Bigfoot Modules* on page 21-3) that will simultaneously auto-sense ring speed (4 and 16 Mbps), duplex mode (full- and half-duplex), and port mode (Station and Lobe ports).

♦ Note ♦

The Omni Switch/Router TSX-C-32W only supports Lobe ports.

To use the **tpcfg** command to configure auto-sensing ports, follow the steps below.

1. At the system prompt, enter

   tpcfg

   The following prompt will be displayed.

   Enter Slot/Interface [<ret> to exit] :

2. Enter the slot and port number. If you want to set Port 1 on Slot 5 to auto-configuration mode, for example, enter

   5/1

   at the prompt. A prompt similar to the following will be displayed.

   ```
   Current Configuration:
     OpenStat=Closed, CfgType=Auto  , Speed=  ?  , Duplex=  ? , Mode= ?
     ARI/FCI= Nonlocal, ActiveMon=No

   Change Port's Configuration? (Y/N) [Y] :
   ```

3. Enter **y** (the default) to configure this port or **n** to leave this port's configuration "as is" and proceed to Step 7. A prompt similar to the following will be displayed.

   New Config Type ((A)uto or (F)ixed).....[currently Auto] :

4. Enter **a** (the default) to set the port to auto configuration mode. (If you want to set any of these parameters individually, please see *Manually Configuring Token Ring Ports on Bigfoot Modules* on page 21-26.) A prompt similar to the following will be displayed.

   New ARI/FCI Bit ((N)on-local, (R)epeat or (A)lways)..[currently Nonlocal] :

5. This field sets the control mode for handling Address Recognized Indicator (ARI)/Frame Copied Indicator (FCI) bits. There are three possible ways for handling the ARI/FCI bits:

   - **Nonlocal**. Set the ARI/FCI bits on remote LLC frames repeated by the port and for local LLC frames repeat the ARI/FCI bits just as they are received.
   - **Repeat**. The ARI/FCI bits on all LLC frames are repeated just as they are received.
   - **Always**. Set the ARI/FCI bits on all LLC frames repeated by the port.

   Enter **n** to set the control method to non-local, **r** for repeat, or **a** for always. A prompt similar to the following will be displayed.

   Active Monitor Participation? (Y/N).....[currently No] :

6. The active monitor performs certain functions (e.g., ensuring that frames do not circulate endlessly on the ring, ensuring that there is a valid token on the ring) to ensure that the ring functions properly.

   Enter **n** to turn off active monitor participation or **y** to turn it on.

7. All of the changes you have made will take effect when you reboot the switch or reset the module. Therefore, the **tpcfg** command gives you the option to reset the port now and displays the following prompt.

   ```
   Would you like to reset the port now? (Y/N) [N] :
   ```

8. Enter **y** to reset the token ring port or enter **n** (the default) to skip the reset. If you answered **n**, then go to Step 9. If you answered **y**, then a confirmation prompt similar to the following will be displayed.

   ```
   Reset the Token Ring port 4/5 may cause disruption to the ring.
   Are you sure you want to do this ?  (Y/N) [N] :
   ```

   Enter **n** (the default) to skip the reset or **y** to implement it immediately.

9. The following prompt will be displayed.

   ```
   Enter Slot/Interface [<ret> to exit] :
   ```

10. Enter the slot and port number to configure another port or press the **<Return>** key to exit.

♦ Note ♦

You can confirm your changes with the **tpvc** command, which is described in *Displaying Token Ring Port Status* on page 21-33.

Manually Configuring Token Ring Ports on Bigfoot Modules

You can use the **tpcfg** command to manually configure token ring ports on Bigfoot modules (which are described in *Bigfoot Modules* on page 21-3) on any or all of the following parameters:

- Ring speed (4 Mbps or 16 Mbps)
- Duplex mode (full duplex, half duplex, or half/full auto-sensing)
- Port mode (Lobe, Station, and auto-sensing Lobe/Station) on the OmniSwitch TSM-CD-16W and the Omni Switch/Router TSX-CD-16W (the Omni Switch/Router TSX-C-32W only supports Lobe port mode).

To use the **tpcfg** command to manually configure token ring ports, follow the steps below.

1. At the system prompt, enter

   tpcfg

   The following prompt will be displayed.

   Enter Slot/Interface [<ret> to exit] :

2. Enter the slot and port number. If you want to set Port 1 on Slot 5 to fixed-configuration mode, for example, enter

   5/1

   at the prompt. A prompt similar to the following will be displayed.

   ```
   Current Configuration:
     OpenStat=Closed, CfgType=Auto  , Speed=  ?  , Duplex=  ? ,  Mode= ?
     ARI/FCI= Nonlocal, ActiveMon=No

   Change Port's Configuration? (Y/N) [Y] :
   ```

3. Enter **y** (the default) to configure this port or **n** to leave this port's configuration "as is" and proceed to Step 11. A prompt similar to the following will be displayed.

   New Config Type ((A)uto or (F)ixed).....[currently Auto] :

4. Enter **f** to set the port to fixed-configuration mode. (If you want to configure auto-sensing ring speed, duplex mode, and port mode simultaneously, please see *Configuring Auto-Sensing Ports for Bigfoot Modules* on page 21-24.) The following prompt will be displayed.

   New Duplex ((H)DX or (F)DX).....[currently HDX] :

5. Enter **h** to set the port's duplex mode to half duplex or **f** to set it to full duplex. A prompt similar to the following will be displayed.

   New Ring Speed ((1)6 Mbps, (4) Mbps).....[currently 16 Mbps] :

6. Enter **1** to set the port's ring speed to 16 Mbps or **4** to set it to 4 Mbps. If you are configuring an Omni Switch/Router TSX-C-32W, go to Step 8 on page 21-27. Otherwise, the following prompt will be displayed.

   New Mode ((L)obe or (S)tation).....[currently Station] :

7. Enter **l** to configure the port as a Lobe port or **s** to configure the port as a Station port.

8. A prompt similar to the following will be displayed.

```
New ARI/FCI Bit ((N)on-local, (R)epeat or (A)lways)..[currently  Nonlocal] :
```

9. This field sets the control mode for handling Address Recognized Indicator (ARI)/Frame Copied Indicator (FCI) bits. There are three possible ways for handling the ARI/FCI bits:

- **Nonlocal**. Set the ARI/FCI bits on remote LLC frames repeated by the port and for local LLC frames repeat the ARI/FCI bits just as they are received.
- **Repeat**. The ARI/FCI bits on all LLC frames are repeated just as they are received.
- **Always**. Set the ARI/FCI bits on all LLC frames repeated by the port.

Enter **n** to set the control method to non-local, **r** for repeat, or **a** for always. A prompt similar to the following will be displayed.

```
Active Monitor Participation? (Y/N).....[currently No ] :
```

10. The active monitor performs certain functions (e.g., ensuring that frames do not circulate endlessly on the ring, ensuring that there is a valid token on the ring) to ensure that the ring functions properly.

Enter **n** to turn off active monitor participation or **y** to turn it on.

11. All of the changes you have made will take effect when you reboot the switch or reset the module. Therefore, the **tpcfg** command gives you the option to reset the port now and displays the following prompt.

```
Would you like to reset the port now? (Y/N) [N] :
```

12. Enter **y** to reset the token ring port or enter **n** (the default) to skip the reset. If you answered **n**, then go to step 13. If you answered **y**, then a confirmation prompt similar to the following will be displayed.

```
Reset the Token Ring port 4/5 may cause disruption to the ring.
Are you sure you want to do this ?   (Y/N) [N] :
```

Enter **n** (the default) to skip the reset or **y** to implement it immediately.

13. The following prompt will be displayed.

```
Enter Slot/Interface [<ret> to exit] :
```

14. Enter the slot and port number to configure another port or press the **<Return>** key to exit.

♦ Note ♦

You can confirm your changes with the **tpvc** command, which is described in *Displaying Token Ring Port Status* on page 21-33.

Configuring the Locally-Administered Token Ring Base MAC Address for Bigfoot Modules

You can use the **tsmcfg** command to create or modify a locally-administered (i.e., user-configured) base MAC address for Bigfoot token ring modules (which are described in *Bigfoot Modules* on page 21-3) . You can use a locally administered MAC to uniquely-identify the token ring module on the network.

To use the **tsmcfg** command to configure a locally-administered MAC address f, follow the steps below.

1. At the system prompt, enter

   tsmcfg

   The following prompt will be displayed.

   Enter Slot to change the Configured Base MAC Address [<ret> to exit] :

2. Enter the slot number of the token ring module you want to create or modify a locally-administered MAC address. For example, if the token ring module is in Slot 5, enter

   5

   at the prompt. The following prompt is displayed.

   Choose entry format ((N)on-canonical or (C)anonical
   or (D)isable Locally Administered MAC Addresses) :

   Enter **c** to use the canonical format or **n** to use the non-canonical format. (If you want to disable the locally-administered MAC address, see *Disabling the Locally-Administered Token Ring Base MAC Address for Bigfoot Modules* on page 21-29). The following prompt is displayed.

   Enter New Base MAC Address (current value is 000000:000000) :

3. Enter a unique MAC address in canonical format if you answered **c** in Step 2 or non-canonical format if you answered **n** in Step 2. (The current MAC address displayed in the parentheses will be in canonical format if you answered **c** in Step 2 or non-canonical format if you answered **n** in Step 2.) A prompt similar to the following will be displayed.

   The new value is saved in the configuration and will be
   activated on next Reset command or after reboot.
   Would you like to reset slot 5 now? (y/n) [n] :

4. Enter **y** to reset the token ring module or enter **n** (the default) to skip the reset.

♦ Note ♦

You can confirm your changes with the **tsmvc** command, which is described in *Displaying Token Ring Base MAC Addresses* on page 21-31.

Disabling the Locally-Administered Token Ring Base MAC Address for Bigfoot Modules

You can use the **tsmcfg** command to disable a locally-administered (i.e., user-configured) base MAC address for Bigfoot token ring modules. This will ensure that the firmware-based MAC address is used instead of a user-defined address.

To use the **tsmcfg** command to disable the locally-configured MAC address, follow the steps below.

1. At the system prompt, enter

   tsmcfg

   The following prompt will be displayed.

   Enter Slot to change the Configured Base MAC Address [<ret> to exit] :

2. Enter the slot number of the token ring module you want to disable a locally-administered MAC address. For example, if the token ring module is in Slot 5, enter

   5

   at the prompt. The following prompt is displayed.

   Choose entry format ((N)on-canonical or (C)anonical
   or (D)isable Locally Administered MAC Addresses) :

   Enter **d** to disable the locally-administered base MAC address. (If you want to configure the locally-administered MAC address, see *Configuring the Locally-Administered Token Ring Base MAC Address for Bigfoot Modules* on page 21-28). A prompt similar to the following will be displayed.

   Locally administered MAC address has been disabled on slot 5.
   Universally Administered MAC address will take
   effect on next Reset command or after reboot.
   Would you like to reset slot 5 now? (y/n) [n] :

3. Enter **y** to reset the token ring module or enter **n** (the default) to skip the reset.

♦ Note ♦

You can confirm your changes with the **tsmvc** command, which is described in *Displaying Token Ring Base MAC Addresses* on page 21-31.

Displaying the Token Ring Interface Type

You can display the interface types for all token ring modules in a chassis with the **tsc** command. You can use the **tsc** command in display mode on early-generation and Bigfoot modules. To use this command to display the interface type, follow the steps below.

♦ Note ♦

See *Configuring the Interface Type on Early-Generation Modules* on page 21-20 for documentation on using the **tsc** command to configure the interface type on certain (e.g., TSM-CD-6 or TSM-F-6) early-generation token ring modules.

1. At the system prompt, enter

   tsc

   A screen similar to the following will be displayed.

```
Token Ring slot interface table
Slot    Interface Type
----    ------------------------------
3       C32-RJ45
5       C16-RJ45 DUAL MODE
Enter Slot Number [<ret> to exit] :
```

2. Press the **<Return>** key to exit. An error message will be displayed if you enter the slot number of a Bigfoot token ring module or a TSM-C-6.

The fields displayed by the **tsc** command (when used to display the interface type) are described below.

Slot. The slot number of the token ring module.

Interface Type. The port type on the token ring module. The words **DUAL MODE** in this field indicates the module supports dual Station/Lobe mode.

Displaying Token Ring Base MAC Addresses

You can display the locally-administered (i.e., user-configured) and the firmware-based base MAC addresses in canonical and non-canonical formats for Bigfoot token ring modules with the **tsmvc** command. (The locally-administered MAC address can be created and modified with the **tsmcfg** command, which is described in *Configuring Auto-Sensing Ports for Bigfoot Modules* on page 21-24.) See the subsection below for information on using the **tsmvc** command with Bigfoot modules.

For early-generation token ring modules, the **tsmvc** displays the firmware-based MAC address in canonical and non-canonical format only since you cannot configure a locally-administered MAC address on these modules. See *Displaying the Base MAC Address for Early-Generation Modules* on page 21-32 for information on using the **tsmvc** command with early-generation modules.

Displaying Base MAC Addresses for Bigfoot Modules

To use the **tsmvc** command with Bigfoot token ring modules, enter

```
tsmvc
```

at the system prompt. A screen similar to the following will be displayed.

```
                    The Token Ring Base MAC Address for all slots
                      Local             Local             Universal         Universal
                    MAC Address       MAC Address       MAC Address       MAC Address
Slot                (Canonical)       (Non-canonical)   (Canonical)       (Non-canonical)
-----               -----------------------------------------------------------------------
5                   000000:000000     000000:000000     0020DA:B07D50     00045B:0DBE0A
```

The fields displayed by the **tsmvc** command for Bigfoot modules are described below.

Slot. The chassis slot number of the token ring module.

Local MAC Address (Canonical). The locally-administered MAC address of the token ring module in canonical format.

Local MAC Address (Non-canonical). The locally-administered MAC address of the token ring module in non-canonical format.

Universal MAC Address (Canonical). The firmware-based MAC address of the token ring module in canonical format.

Universal MAC Address (Non-canonical). The firmware-based MAC address of the token ring module in non-canonical format.

Displaying the Base MAC Address for Early-Generation Modules

To use the **tsmvc** command with early-generation token ring modules, enter

```
tsmvc
```

at the system prompt. A screen similar to the following will be displayed.

```
                    The Token Ring Base MAC Address for all slots
                          Local              Local              Universal          Universal
                      MAC Address        MAC Address        MAC Address        MAC Address
Slot                  (Canonical)        (Non-canonical)    (Canonical)        (Non-canonical)
-----                 -----------------  -------------------------------------------------
3                     ** Function not supported **          0020DA:022F50      00045B:40F40A
                                                            0020DA:06A490      00045B:602509
```

The fields displayed by the **tsmvc** command for early-generation modules are described in *Displaying Base MAC Addresses for Bigfoot Modules* on page 21-31. Please note that the **Local MAC Address (Canonical)** and **Local MAC Address (Non-canonical)** fields will always display **** Function not supported **** since you cannot configure a locally-administered MAC address on these modules.

Displaying Token Ring Port Status

You can use the **tpvc** command to display the status for all token ring ports in a switch. This command is supported on Bigfoot and early-generation token ring modules. To use this command, enter

```
tpvc
```

at the system prompt. A screen similar to the following will be displayed.

The Token Ring Port Status Table for all slots

Slot/ Intf	Open Status	Cfg Type	Ring Speed	Duplex Mode	Port Mode	ARI/FCI Bit Set	Active Monitor	Up Stream Neighbor
3/ 1	Open	Auto	16 M	FDX	Station	Nonlocal	No	00045B:0D3E09
3/ 2	Open	Auto	16 M	HDX	Lobe	Repeat	No	00045B:0D3E89
3/ 3	Open	Auto	4 M	HDX	Station	Always	Yes	00045B:0D3E49
3/ 4	Open	Fixed	16 M	HDX	Lobe	Nonlocal	No	0000F6:8889BD
3/ 5	----------	Fixed	16 M	FDX	Station	Repeat	No	000000:000000
3/ 6	----------	Fixed	4 M	HDX	Lobe	Always	No	000000:000000
3/ 7	----------	Auto	?	?	?	Nonlocal	No	000000:000000
3/ 8	----------	Auto	?	?	?	Nonlocal	No	000000:000000
3/ 9	----------	Auto	?	?	?	Nonlocal	No	000000:000000
3/10	----------	Auto	?	?	?	Nonlocal	No	000000:000000
3/11	----------	Auto	?	?	?	Nonlocal	No	000000:000000
3/12	----------	Auto	?	?	?	Nonlocal	No	000000:000000
3/13	----------	Auto	?	?	?	Nonlocal	No	000000:000000
3/14	----------	Auto	?	?	?	Nonlocal	No	000000:000000
3/15	----------	Auto	?	?	?	Nonlocal	No	000000:000000
3/16	----------	Auto	?	?	?	Nonlocal	No	000000:000000

The fields displayed by the **tpvc** command are described below. The display format for the **tpvc** command is the same for early-generation token ring modules and Bigfoot modules, although some fields (e.g., **Duplex Mode**) are only meaningful for Bigfoot modules.

Slot/Intf. The slot and port number of the token ring port.

Open Status. The result of the last attempt to enter the ring. Possible values include **Open**, (the default), **noOpen**, **badParam**, **Lobe Fail**, **signalLoss**, **insertion Timeout**, **ringFailed**, **beaconing**, **duplicateMAC**, **requestFailed** and **Down**. Dashes will be displayed if this port is on a Bigfoot token ring module and the configuration type has not been sensed yet.

Cfg Type. This field displays if the port is auto-sensing (**Auto**) or has a fixed configuration (**Fixed**). Early-generation token ring modules will always display **Fixed** since auto-sensing is not available on those modules.

Ring Speed. This field displays the ring speed (4 or 16 Mbps) of the port. A question mark (**?**) will be displayed if this port is on a Bigfoot token ring module and the ring speed has not been sensed yet.

Duplex Mode. This field displays the duplex mode, which can be full duplex (**FDX**) or half duplex (**HDX**) on Bigfoot token ring modules and half duplex (**HDX**) only on early-generation token ring modules. A question mark (**?**) will be displayed if this port is on a Bigfoot token ring module and the duplex mode has not been sensed yet.

Port Mode. The field displays the port mode, which can be Station or Lobe on dual-mode modules (e.g., the Omni Switch/Router TSX-CD-16W and the OmniSwitch TSM-CD-16W) or Lobe only on single-mode Omni Switch/Router TSX-C-32W and Station only on the single-mode OmniSwitch TSM-C-6.

ARI/FCI Bit Set. This field shows the control mode for handling ARI/FCI bits. (The default is **Nonlocal**.) The following are possible values.

Nonlocal. Set the ARI/FCI bits on remote LLC frames repeated by the port and for local LLC frames repeat the ARI/FCI bits just as they are received.

Repeat. The ARI/FCI bits on all LLC frames are repeated just as they are received.

Always. Set the ARI/FCI bits on all LLC frames repeated by the port.

Active Monitor. This field shows if the port participates in the active monitor selection.

Upstream Neighbor. The MAC address of the upstream neighbor (i.e., next port on the ring) for this port.

Displaying Token Ring Port Error Statistics

You can use the **tperrs** command to display error statistics for all the token ring ports in your switch. This command is supported on Bigfoot and early-generation token ring modules. To use this command, enter

```
tperrs
```

A screen similar to the following will be displayed.

```
                    Token Ring Error Statistics Table for all slots
Slot/  Line   Burst  ARI/FCI  Lost_Fm  Rcv_Cng  Token  DMA_Bus  DMA_Par
Intf   Error  Error  Error    Error    Error    Error  Error    Error
-----  -------  -------- --------  -------- ---------- --------- ---------- ---------
 5/ 1  0      0        0         0        0          0         0          0
 5/ 2  0      0        0         0        0          0         0          0
 5/ 3  0      0        0         0        0          0         0          0
 5/ 4  0      0        0         0        0          0         0          0
 5/ 5  0      0        0         0        0          0         0          0
 5/ 6  0      0        0         0        0          0         0          0
 5/ 7  0      0        0         0        0          0         0          0
 5/ 8  0      0        0         0        0          0         0          0
 5/ 9  0      0        0         0        0          0         0          0
 5/10  0      0        0         0        0          0         0          0
 5/11  0      0        0         0        0          0         0          0
 5/12  0      0        0         0        0          0         0          0
 5/13  0      0        0         0        0          0         0          0
 5/14  0      0        0         0        0          0         0          0
 5/15  0      0        0         0        0          0         0          0
 5/16  0      0        0         0        0          0         0          0
```

The fields displayed by the **tperrs** command are described below. The display format is the same for early-generation modules and Bigfoot modules.

Slot/Intf. The slot and port number of the token ring port.

Line Error. The number of times a frame or token with an error has been copied or repeated by this port.

Burst Error. The number of times this port has detected an absence of transitions for five (5) half-bit times (burst-five error).

ARI/FCI Error. The number of times this port has received an AMP or SMP frame with improperly-set AC bits.

Lost_Fm Error. Lost Frame Error. The number of times this port failed to receive an end of its transmit frame.

Rcv_Cng Error. Receive Congestions. The number of times this port received a frame but no buffer space was available.

Token Error. The number times this port, when acting as the active monitor, recognized an error in the token protocol.

DMA_Bus Error. The number of DMA bus errors on this port that did not exceed the abort threshold.

DMA_Par Error. The number of DMA bus errors on this port that did not exceed the abort threshold.

Displaying the Status Table for Token Ring Modules

You can use the **tprs** command to display the status of every token ring port in your switch. This command is supported on Bigfoot and early-generation token ring modules. To use this command, enter

```
tprs
```

at the system prompt. A screen similar to the following will be displayed.

```
                    Token Ring Status Table for all slots
Slot/  Signal  Hard  Soft   Trans  LobeWir  Auto   Remove   Cntr   Single  Ring   FDX
Intf    Loss  Error Error  Beacon  Fault  Remove Receve  Ovflow  Statn  Recov Error
-----  ------- ------ ------ ------ ------ ------ ------ ------ ------ ------ ------
 5/ 1      0      0      0      0      0      0      0      0      0      0      0
 5/ 2      0      0      0      0      0      0      0      0      0      0      0
 5/ 3      0      0      0      0      0      0      0      0      0      0      0
 5/ 4      0      0      0      0      0      0      0      0      0      0      0
 5/ 5      0      0      0      0      0      0      0      0      0      0      0
 5/ 6      0      0      0      0      0      0      0      0      0      0      0
 5/ 7      0      0      0      0      0      0      0      0      0      0      0
 5/ 8      0      0      0      0      0      0      0      0      0      0      0
 5/ 9      0      0      0      0      0      0      0      0      0      0      0
 5/10      0      0      0      0      0      0      0      0      0      0      0
 5/11      0      0      0      0      0      0      0      0      0      0      0
 5/12      0      0      0      0      0      0      0      0      1      1      0
 5/13      0      0      0      0      0      0      0      0      0      0      0
 5/14      0      0      0      0      0      0      0      0      0      0      0
 5/15      0      0      0      0      0      0      0      0      0      0      0
 5/16      0      0      0      0      0      0      0      0      0      0      0
```

♦ Note ♦

The **FDX Error** column will not be displayed for early-generation (e.g., TSM-CD-6, TSM-F-6) token ring modules because they do not support full-duplex token ring mode.

The fields displayed by the **tprs** command are described below.

Slot/Intf. The slot and port number of the token ring port.

Signal Loss. The number of times this port has detected a loss of signal from the ring.

Hard Error. The number of hard errors detected by this port and the number of times this port has transmitted or received a beacon MAC frame.

Soft Error. The number of soft errors detected by this port and the number of times this port has transmitted or received a report error MAC frame.

Trans Beacon. The number of times this port has transmitted a beacon frame.

LobeWir Fault. The number of times this port has detected an open or short circuit in the lobe data path.

Auto Remove. The number of times an auto remove process has taken place on this port.

Remove Receve. The number of times this port has received a Remove Ring Station MAC frame request.

Cntr Ovflow. The number of times a counter overflow has taken place on this port.

Single Statn. The number of times that this port has it is the only station on the ring.

Ring Recov. The number of times the ring has been purged and brought back to an operating state.

FDX Error. The number of times a full-duplex protocol error has been detected by this port. This field will not be displayed on early-generation token ring modules.