

Connecting Catalyst Token Ring Switches via an ATM Backbone

The Catalyst 3900 and the Catalyst 5000 series provide ATM modules that allow you to connect the switches to an ATM backbone. This chapter provides an example of connecting a Catalyst 3900 and a Catalyst 5000 Token Ring module via an ATM backbone.

This chapter provides the following information:

- Initial Network Configuration
- Before Beginning
- Configuration Steps
- Resulting Network Configuration

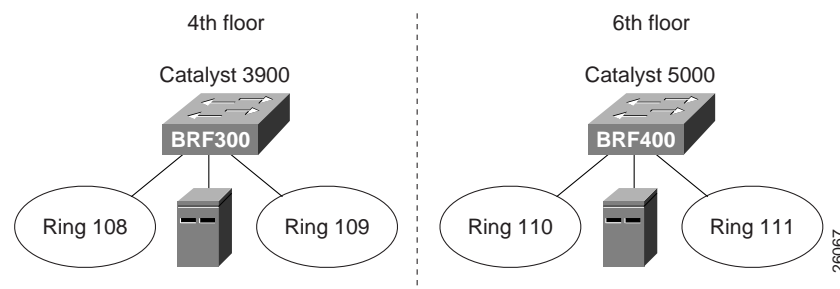
Initial Network Configuration

In your company, you have installed a Catalyst 3900 on the fourth floor and a Catalyst 5000 with a Token Ring module in slot 3 on the sixth floor.

There are servers attached to each switch. The users on these floors need to be able to access the servers on both floors. Because your company is in the medical industry (providing telephone support to emergency medical teams), response time is critical. You have decided to utilize the improved performance that ATM offers and to connect your Catalyst Token Ring switches through an ATM backbone.

Figure 9-1 illustrates the initial network configuration. The Catalyst 3900 on the fourth floor contains two TrCRFs (assigned ring numbers 108 and 109) that are joined by a TrBRF that you have named BRF300. The Catalyst 5000 on the sixth floor contains two TrCRFs (assigned ring numbers 110 and 111) that are joined by a TrBRF that you have named BRF400.

Figure 9-1 Initial Network Configuration



Before Beginning

For your ATM backbone, you have installed a Cisco ATM LS1010 switch. You will be using a Catalyst 5000 to provide the LECS, LES, and BUS. For connectivity between the switches, you have installed an Catalyst 3900 ATM module on the Catalyst 3900 and a Catalyst 5000 series ATM module in slot 4 of the Catalyst 5000. In addition, you downloaded the Token Ring LANE support for the Catalyst 5000 from CCO.

When you join the two switches via the ATM backbone, you need to create an ELAN on each switch. The ELAN is essentially a new TrCRF. You have decided to use 112 for the ELAN name as well as the VLAN ID.

Configuration Steps

To create an ELAN between the two switches, you must configure the ATM module and define an ELAN on both switches.

Configuring the Catalyst 3900

On the Catalyst 3900, you must configure a TrCRF and an LEC. Also, you must assign the port to the appropriate TrCRE.

Configuring the TrCRF

To create an ELAN that will span both switches, you must create a new TrCRF (which will also be defined on the Catalyst 5000) and associate it with the TrBRF.

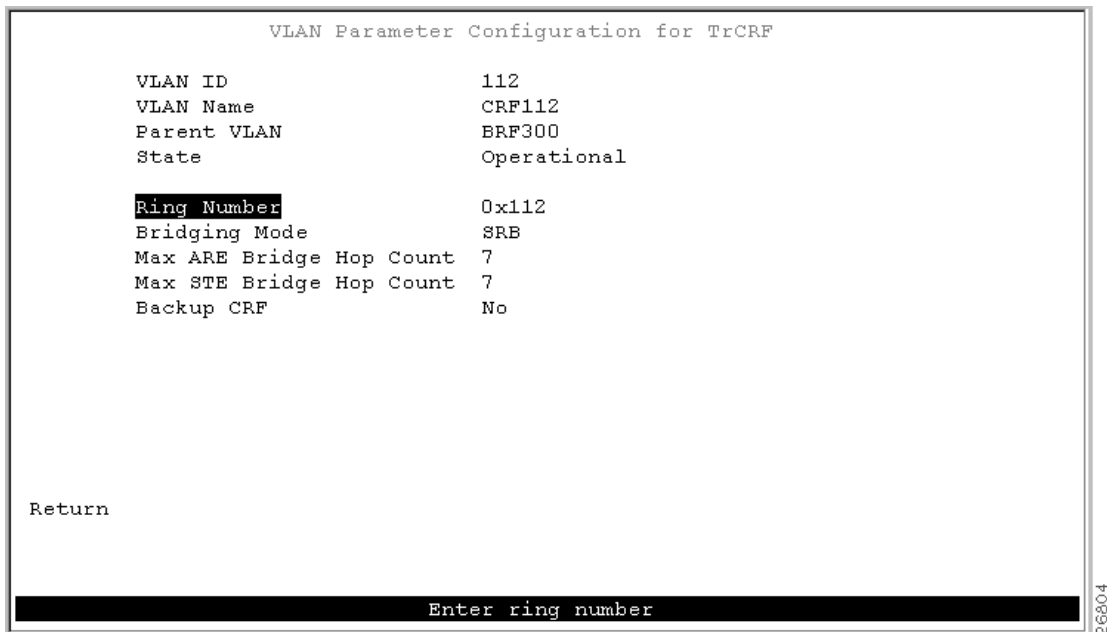
To define the TrCRF, complete the following tasks:

- Step 1. On the Catalyst 3900 Main Menu, select Configuration. The Configuration panel is displayed.
- Step 2. On the Configuration panel, select VLAN and VTP Configuration. The VLAN and VTP Configuration panel is displayed.
- Step 3. On the VLAN and VTP Configuration panel, select VTP VLAN Configuration. The VTP VLAN Configuration is displayed.
- Step 4. On the VTP VLAN Configuration panel, select Add.
- Step 5. At the prompt, enter a VLAN ID of 112.
- Step 6. At the prompt, select TrCRF. The VLAN Parameter Configuration for TrCRF panel (Figure 9-2) is displayed.

Step 7. On the VLAN Parameter Configuration for TrCRF panel, specify:

- VLAN Name of CRF112.
- Parent VLAN of BR300.
- Ring Number of 112.

Figure 9-2 VLAN Parameter Configuration for TrCRF Panel



Step 8. Select Return to save your changes.

Assigning the ATM Port to the TrCRF

Next, you must assign the ATM port to the new TrCRF. Before you can do that, the ATM module must be inserted into one of the expansion slots on the Catalyst 3900. If you insert the module into the left slot, the ATM port is assigned a port number of 21. If you insert the module into the right slot, the ATM port is assigned a port number of 25.

To assign the ATM port to TrCRF 112, complete the following tasks:

- Step 1. On the Configuration panel, select VLAN and VTP Configuration. The VLAN and VTP Configuration panel is displayed.
- Step 2. On the VLAN and VTP Configuration panel, select Local VLAN Port Configuration. The Local VLAN Port Configuration panel is displayed.
- Step 3. On the Local VLAN Port Configuration panel, select Change.
- Step 4. At the prompt, enter port number 25.

- Step 5. Select CRF112 from the list of possible TrCRFs. To select the TrCRF, use your arrow keys to highlight the desired TrCRF, press the space bar to select it, and press Enter to implement your change (Figure 9-3).

Figure 9-3 Local VLAN Port Configuration Panel

Local VLAN Port Configuration			
Port	Mode	TrCRF	TrBRF
16	Static	trcrf-default	trbrf-default
17	Static	trcrf-default	trbrf-default
18	Static	trcrf-default	trbrf-default
19	Static	trcrf-default	trbrf-default
20	Static	trcrf-default	trbrf-default
21	Trunk	all VLANs	
23	Trunk	all VLANs	
25	Trunk	CRF112	BRF300

Return **More** Change

Display the next page of VLAN port configuration table

- Step 6. Select Return to save your changes.

When you assign the ATM port to a TrCRF, an LEC is automatically created with an ELAN name that is the same as the VLAN name of the TrCRF.

Configuring the LEC

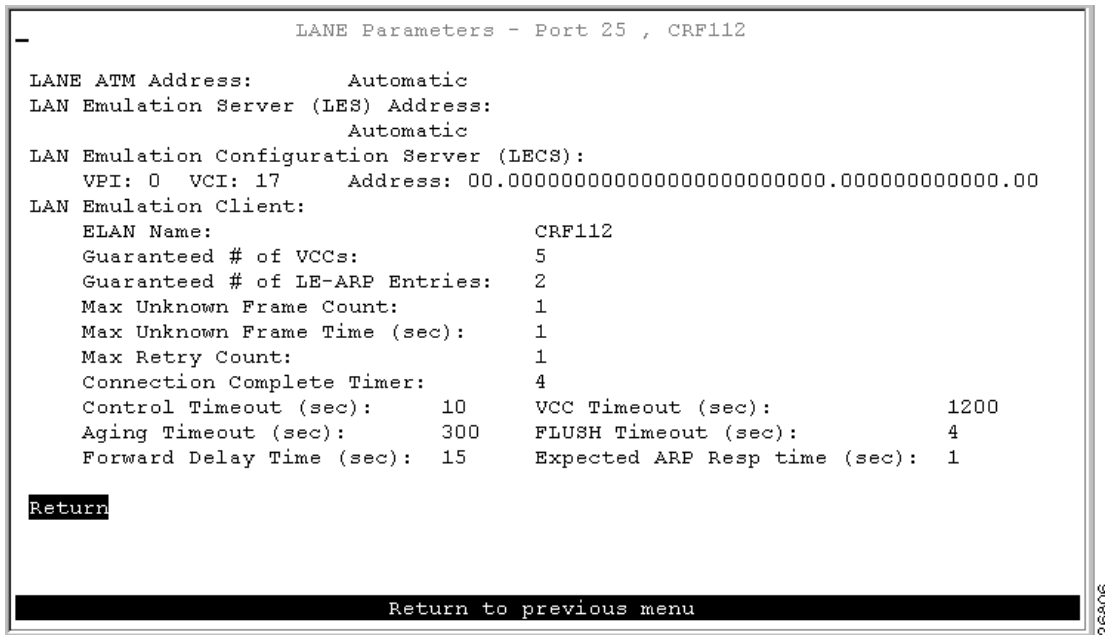
Because the LEC is automatically created and given an ELAN name, you do not need to configure anything for the LEC.

To view the configuration of the LEC, complete the following steps:

- Step 1. On the Configuration panel, select Port Configuration and specify the appropriate port number. Because you have installed the ATM module in the right slot, the port number is 25. The ATM Configuration panel is displayed.
- Step 2. On the ATM Configuration panel, select ATM LEC Setup. The ATM LEC Setup panel is displayed.

Step 3. On the ATM LEC Setup panel, select LANE Parameters. The LANE Parameters panel (Figure 9-4) is displayed.

Figure 9-4 LANE Parameters Panel



Step 4. Select Return to save your changes.

Configuring the Catalyst 5000

On the Catalyst 5000, you must configure a TrCRF and an LEC. Because the Catalyst 5000 ATM module provides a trunk port, you do not need to assign the port to the appropriate TrCRF. Trunk ports are automatically associated with LECs as they are configured.

You have decided to use the Catalyst 5000 for the LES and BUS. Therefore, you will also need to configure the ATM module for the LES/BUS support.

When configuring LECs on a Catalyst 5000, remember the following:

- The VLAN name must match the ELAN name.
- The ring number must match the local segment ID.

The `set vlan` command assumes that any ring number entered is in hexadecimal. Therefore `0x12` or `12` will be stored as the hexadecimal value `0x12`. The `name elan_name local-seg-id segment_number` command assumes that any value entered for the local-seg-id is in decimal unless it is entered explicitly in hexadecimal. For example, to define a TrCRF with a ring number of 12, you could enter:

```

set vlan 12 name crf12 type trcrf ring 12 parent 100
or
set vlan 12 name crf12 type trcrf ring 0x12 parent 100
  
```

When defining a corresponding LEC, you could enter:

```

name crf12 local-seg-id 0x12
or
name crf12 local-seg-id 18
  
```

as 18 is the decimal equivalent of 0x12.

Configuring the TrCRF

To define the TrCRF, complete the following steps:

- Step 1. At the enable prompt, enter `set vlan 112 name crf112 type trcrf ring 112 parent 400 mode srb`.
- Step 2. To verify the configuration of the new VLAN, enter `show vlan`.

The output (Figure 9-5) indicates that `crf112` has been added. It also shows that `brf400` is the parent of the VLAN with the ID of 112.

Figure 9-5 Output of `show vlan` Command

VLAN	Name	Status	Mod/Ports, Vlans							
1	default	active	1/1-2 2/1-48							
110	crf110	active	3/1-4							
111	crf111	active	3/5-8							
112	crf112	active								
400	brf400	active	110,111,112							
1002	fddi-default	active								
1003	trcrf-default	active	3/9-16							
1004	fddinet-default	active								
1005	trbrf-default	active	1003							

VLAN	Type	SAID	MTU	Parent	RingNo	BrdgNo	Stp	BrdgMode	Trans1	Trans2
1	enet	100001	1500	-	-	-	-	-	0	0
110	trcrf	100110	4472	300	0x110	-	-	srb	0	0
111	trcrf	100110	4472	300	0x111	-	-	srb	0	0
112	trcrf	100110	4472	300	0x112	-	-	srb	0	0
300	trbrf	100100	4472	-	-	0x3	ibm	-	0	0
400	trbrf	100100	4472	-	-	0x4	ibm	-	0	0
1002	fddi	101002	1500	-	0x0	-	-	-	0	0
1003	trcrf	101003	4472	1005	0xccc	-	-	srb	0	0
1004	fdnet	101004	1500	-	-	0x0	ieee	-	0	0
1005	trbrf	101005	4472	-	-	0xf	ibm	-	0	0

Configuring the LES, BUS, and LEC

To configure the LEC, BUS, and LEC, complete the following steps:

- Step 1. Set up the prefix of the ATM Network Service Access Point (NSAP) address for the switch.

Note: The LightStream 1010 ATM switch provides a default prefix.

- Step 2. Start a session to the ATM module that is in slot 4 by entering the `session 4` command. You see the following display:

```
Console> session 4
Trying ATM-4...
Connected to ATM-4.
Escape character is '^]'.
ATM>
```



- Step 3. Obtain the addresses of the LES and LES/BUS for later use by entering the enable command (to enable configuration mode) and the show lane default-atm-addresses command at the ATM prompt. You see the following display:

```
ATM> enable
ATM#
ATM# show lane default-atm-addresses interface atm0

interface ATM0:
LANE Client:      47.0091810000000061705b7701.00400BFF0010.**
LANE Server:     47.0091810000000061705b7701.00400BFF0011.**
LANE Bus:        47.0091810000000061705b7701.00400BFF0012.**
LANE Config Server: 47.0091810000000061705b7701.00400BFF0013.00
ATM#
```

Note: The two asterisks (**) represent the subinterface number byte in hexadecimal.

- Step 4. Using the LECS address obtained in Step 3, set the address of the default LECS in the LightStream 1010 switch by entering the configure terminal and atm lecs-address-default commands on the console of the LightStream 1010 switch. You see the following display:

```
Switch> enable
Switch#
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# atm lecs-address-default
47.0091810000000061705b7701.00400BFF0013.00 1
Switch(config)# end
Switch#
```

The commands shown in this step configure the address of the LECS in the switch. The LECS ATM NSAP address is 47.0091810000000061705b7701.00400BFF0013.00. The sequence number of this LECS address, which is 1, means it is the first LECS in this switch.

- Step 5. Save the configuration to NVRAM by entering the write memory command at the prompt.
- Step 6. Start up an LES/BUS pair on the Catalyst 5000 series switch by entering the interface atm0 and the lane server-bus tokenring commands in global configuration mode.

Enter the following commands:

```
config terminal
interface atm0
lane server-bus tokenring crf112
end
```

The commands shown in this step start an LES/BUS pair and assign the ATM 0 interface to crf112. The ELAN name is crf112, and the interface on which this LES/BUS pair is configured is atm0. The ELAN name must be the same as the VLAN name assigned to the TrCRF.

- Step 7. Save the configuration in NVRAM by entering the write memory command at the prompt.

Step 8. Set up the LECS database on the Catalyst 5000 series switch.

Enter the LES address obtained in Step 3 and replace the ** with the subinterface number of the interface in which the LES/BUS is to be configured. In this example, that number is 00. Enter the config terminal command, the lane database *database_name* command, the name *elan_name* server-atm-address *atm_address* command, the name *elan_name* local-seg-id *segment_number* command, and the default-name *elan_name* command at the ATM prompt. You see the following display:

```
ATM# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
ATM(config)# lane database test
ATM(lane-config-database)# name crf112 server-atm-address
                        47.009181000000061705b7701.00400BFF0011.00
ATM (lane-config-database) name crf112 local-seg-id 0x112
ATM(lane-config-database)# default-name crf112
ATM(lane-config-database)# exit
ATM#
```

The commands shown in this step create the LECS database. The database name is test. The ELAN name is crf112. The ELAN segment number is 112. The LES ATM NSAP address is 47.009181000000061705b7701.00400BFF0011.00.

Step 9. Save the configuration in NVRAM by entering the write memory command at the prompt.

Step 10. Start and bind the LECS on the Catalyst 5000 series switch by entering the config terminal command, the interface atm0 command, the lane config database *database_name* command, and the lane config auto-config-atm-address command at the ATM prompt. You see the following display:

```
ATM# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
ATM(config)# interface atm0
ATM(config-if)# lane config database test
ATM(config-if)# lane config auto-config-atm-address
ATM(config-if)# end
ATM#
```

The commands shown in this step start the LECS. The database to use is test. The interface on which the LECS is configured is atm0.

Step 11. Save the configuration in NVRAM by entering the write memory command at the prompt.

Step 12. Start the LEC on the Catalyst 5000 series Switch by entering the config terminal command, the interface atm0.1 command and the lane client tokenring 112 crf112 command in configuration mode. The interface on which the LEC is configured is atm0.1. The ELAN name is crf112, and it is configured to emulate Token Ring. You see this display:

```
ATM# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
ATM(config)# interface atm0.1
ATM(config-subif)# lane client tokenring 112 crf112
ATM(config-subif)# end
ATM#
```

Step 13. Save the configuration in NVRAM by entering the write memory command at the prompt.

Attaching the Cables

Finally, you must attach the cables to the ATM ports. Using 62.5/125-micron fiber-optic cables with subscriber connectors, attach one end of one cable to the ATM ports on the Catalyst 3900. Attach the other end of the cable to a port on the LightStream 1010. Using the appropriate cabling for the Catalyst 5000 ATM module, repeat this process to connect the ATM ports on the Catalyst 5000 to the LightStream 1010.

Resulting Network Configuration

Because you have bridged the rings across the high-speed ATM network, your users on the fourth and sixth floor are now joined and will be able to access resources on the different floors with improved response time. The resulting configuration is shown in Figure 9-6.

Figure 9-6 Resulting Network Configuration

