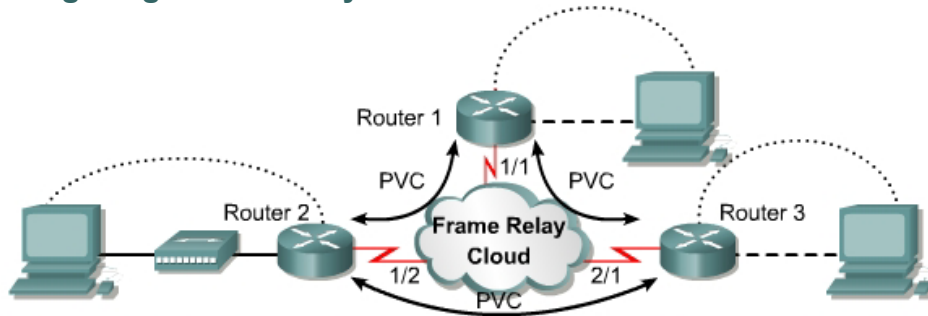


Lab 5.2.5 Configuring Frame Relay Subinterfaces



Router Designation	Router Name	Interface Type	Serial 0 Address	DLCI Number	FastEthernet 0 Address/Subnet Mask	Routing Protocol	Enable Secret Password	Enable/VTY/Console Passwords
Router 1	Amsterdam	DTE	192.168.4.1/24 192.168.5.1/24	102 103	192.168.1.1/24	IGRP 100	class	cisco
Router 2	Paris	DTE	192.168.4.2/24 192.168.6.1/24	201 203	192.168.2.1/24	IGRP 100	class	cisco
Router 3	Berlin	DTE	192.168.5.2/24 192.168.6.2/24	301 302	192.168.3.1/24	IGRP 100	class	cisco

Straight-through cable	—————
Serial cable	————— <del> </del>
Console (rollover)	
Crossover cable	- - - - -

Objective

- Configure three routers in a full-mesh Frame Relay network.

Background/Preparation

An Adtran Atlas550 Frame Relay emulator is used to simulate the Frame Relay switch/cloud.

Cable a network similar to the one in the diagram above. Any router that meets the interface requirements displayed on the above diagram may be used. This includes the following and any of their possible combinations:

- 800 series routers
- 1600 series routers
- 1700 series routers
- 2500 series routers
- 2600 series routers

Please refer to the chart at the end of the lab to correctly identify the interface identifiers to be used based on the equipment in the lab. The configuration output used in this lab is produced from 1721 series

routers. Any other router used may produce slightly different output. Conduct the following steps on each router unless specifically instructed otherwise.

Start a HyperTerminal session.

Note: Refer to the erase and reload instructions at the end of this lab. Perform those steps on all routers in this lab assignment before continuing.

Step 1 Configure the routers

Configure the following according to the chart:

- The hostname
- The console
- The virtual terminal
- The enable passwords
- The fastethernet interfaces according to the chart

If problems occur during this configuration, refer to Lab 1.1.4a Configuring NAT.

Step 2 Configure the Serial 0 Interfaces

- a. First, the Frame Relay encapsulation type to be used on this link must be defined using the following commands:

```
Amsterdam#configure terminal
Amsterdam(config)#interface serial 0
Amsterdam(config-if)#encapsulation frame-relay ietf
Amsterdam(config-if)#frame-relay lmi-type ansi
```

- b. Use a description field to store relevant information, such as the circuit number in case a line fault has to be reported:

```
Amsterdam(config-if)#description Circuit #KPN465555
Amsterdam(config-if)#no shutdown
```

- c. The same commands are used to configure the Berlin and Paris routers:

```
Paris(config)#interface serial 0
Paris(config-if)#encapsulation frame-relay ietf
Paris(config-if)#frame-relay lmi-type ansi
Paris(config-if)#description Circuit #FRT372826
Paris(config-if)#no shutdown
```

```
Berlin(config)#interface serial 0
Berlin(config-if)#encapsulation frame-relay ietf
Berlin(config-if)#frame-relay lmi-type ansi
Berlin(config-if)#description Circuit #DTK465866
Berlin(config-if)#no shutdown
```

Step 3 Create subinterfaces on the Amsterdam router

For each of the permanent virtual circuits (PVCs), create a subinterface on the serial port. This subinterface will be a point-to-point configuration. For consistency and future troubleshooting, use the data-link connection identifier (DLCI) number as the subinterface number. The commands to create a subinterface are as follows:

```
Amsterdam(config-if)#interface serial 0.102 point-to-point
Amsterdam(config-if)#description PVC to Paris, DLCI 102, Contact Rick
Voight(+33-1-5534-2234) Circuit #FRT372826
Amsterdam(config-if)#ip address 192.168.4.1 255.255.255.0
Amsterdam(config-if)#frame-relay interface-dlci 102
Amsterdam(config-if)#interface serial 0.103 point-to-point
Amsterdam(config-if)#description PVC to Berlin, DLCI 103, Contact P
Wills(+49- 61 03 / 7 65 72 00) Circuit #DTK465866
Amsterdam(config-if)#ip address 192.168.5.1 255.255.255.0
Amsterdam(config-if)#frame-relay interface-dlci 103
```

Step 4 Create subinterfaces on the Paris router

To configure the subinterfaces on the Paris router, use the following commands:

```
Paris(config-if)#interface Serial 0.201 point-to-point
Paris(config-if)#description PVC to Amsterdam, DLCI 201, Contact Peter
Muller (+31 20 623 32 67) Circuit #KPN465555
Paris(config-if)#ip address 192.168.4.2 255.255.255.0
Paris(config-if)#frame-relay interface-dlci 201
Paris(config-if)#interface Serial 0.203 point-to-point
Paris(config-if)#description PVC to Berlin, DLCI 203, Contact Peter Willis
(+49- 61 03 / 7 66 72 00) Circuit #DTK465866
Paris(config-if)#ip address 192.168.6.1 255.255.255.0
Paris(config-if)#frame-relay interface-dlci 203
```

Step 5 Create subinterfaces on the Berlin router

To configure the subinterfaces on the Berlin router, use the following commands:

```
Berlin(config-if)#interface Serial 0.301 point-to-point
Berlin(config-if)#description PVC to Amsterdam, DLCI 301, Contact Peter
Muller (+31 20 623 32 67) Circuit #KPN465555
Berlin(config-if)#ip address 192.168.5.2 255.255.255.0
Berlin(config-if)#frame-relay interface-dlci 301
Berlin(config-if)#interface Serial 0.302 point-to-point
Berlin(config-if)#description PVC to Paris, DLCI 302, Contact Rick Voight
(+33-1-5534-2234) Circuit #FRT372826
Berlin(config-if)#ip address 192.168.6.2 255.255.255.0
Berlin(config-if)#frame-relay interface-dlci 302
```

Step 6 Configure IGRP routing

To configure the routing protocol Interior Gateway Routing Protocol (IGRP) 100, use the following configuration syntax:

```
Amsterdam(config-if)#router igrp 100
Amsterdam(config-router)#network 192.168.1.0
Amsterdam(config-router)#network 192.168.4.0
Amsterdam(config-router)#network 192.168.5.0

Paris(config-if)#router igrp 100
Paris(config-router)#network 192.168.2.0
Paris(config-router)#network 192.168.4.0
Paris(config-router)#network 192.168.6.0

Berlin(config-if)#router igrp 100
Berlin(config-router)#network 192.168.3.0
Berlin(config-router)#network 192.168.5.0
Berlin(config-router)#network 192.168.6.0
```

Step 7 Verifying Frame Relay PVC

- On the Amsterdam router, issue the command `show frame-relay pvc`:

```
Amsterdam#show frame-relay pvc
```

- How many active local PVCs are there? _____
- What is the interface value? _____
- What is the PVC status? _____
- Which DLCI # is inactive? _____
- From this it can be seen that there are three DLCIs defined on this Frame Relay circuit, and only two of them are in use. This is the way the Adtran 550 emulator has been configured. It is useful output, as it shows what would be seen if a DLCI is defined on the Frame Relay switch, but not configured on the router. The other DLCIs, 102 and 103, are ACTIVE and associated with their respective subinterfaces. It also shows that some packets have actually passed across the PVC.

Step 8 Show the Frame Relay maps

- Look at the frame relay maps by typing the command `show frame-relay map` at the privileged EXEC mode prompt:

```
Amsterdam#show frame-relay map
```

- What is the status of the links? _____
- The DLCIs are defined as what type? _____
- Are the DLCIs the same on the Paris router? _____

Step 9 Show LMIs

- a. Look at the Local Management Interface (LMI) statistics using the `show frame-relay lmi` command:

```
Amsterdam#show frame-relay lmi
```

- b. Which fields have non-zero counter values? _____
- c. What is the LMI type? _____

Step 10 Check routing protocol

- a. Use the `show ip route` command to verify that the PVCs are up and active:

```
Amsterdam#show ip route
```

- b. Is the routing protocol working? _____
- c. If not, troubleshoot the routers configurations.
- d. List the IGRP routes _____

Step 11 Verify connectivity

- a. Ping the fastethernet interfaces.
- b. Were the pings successful? _____
- c. If the pings were not successful, troubleshoot the router configurations and repeat this step.

Upon completion of the previous steps, finish the lab by doing the following:

- Logoff by typing `exit`
- Turn the router off
- Remove and store the cables and adapter

Erasing and reloading the router

Enter into the privileged EXEC mode by typing **enable**.

If prompted for a password, enter **class** (if that does not work, ask the instructor).

```
Router>enable
```

At the privileged EXEC mode, enter the command **erase startup-config**.

```
Router#erase startup-config
```

The responding line prompt will be:

```
Erasing the nvram filesystem will remove all files! Continue? [confirm]
```

Press **Enter** to confirm.

The response should be:

```
Erase of nvram: complete
```

Now at the privileged EXEC mode, enter the command **reload**.

```
Router(config)#reload
```

The responding line prompt will be:

```
System configuration has been modified. Save? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Proceed with reload? [confirm]
```

Press **Enter** to confirm.

In the first line of the response will be:

```
Reload requested by console.
```

After the router has reloaded the line prompt will be:

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Press RETURN to get started!
```

Press **Enter**.

Now the router is ready for the assigned lab to be performed.

Router Interface Summary				
Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)		
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
1700	FastEthernet 0 (FA0)	FastEthernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
2600	FastEthernet 0/0 (FA0/0)	FastEthernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)
In order to find out exactly how the router is configured, look at the interfaces. This will identify what type and how many interfaces the router has. There is no way to effectively list all of the combinations of configurations for each router class. What is provided are the identifiers for the possible combinations of interfaces in the device. This interface chart does not include any other type of interface even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in an IOS command to represent the interface.				