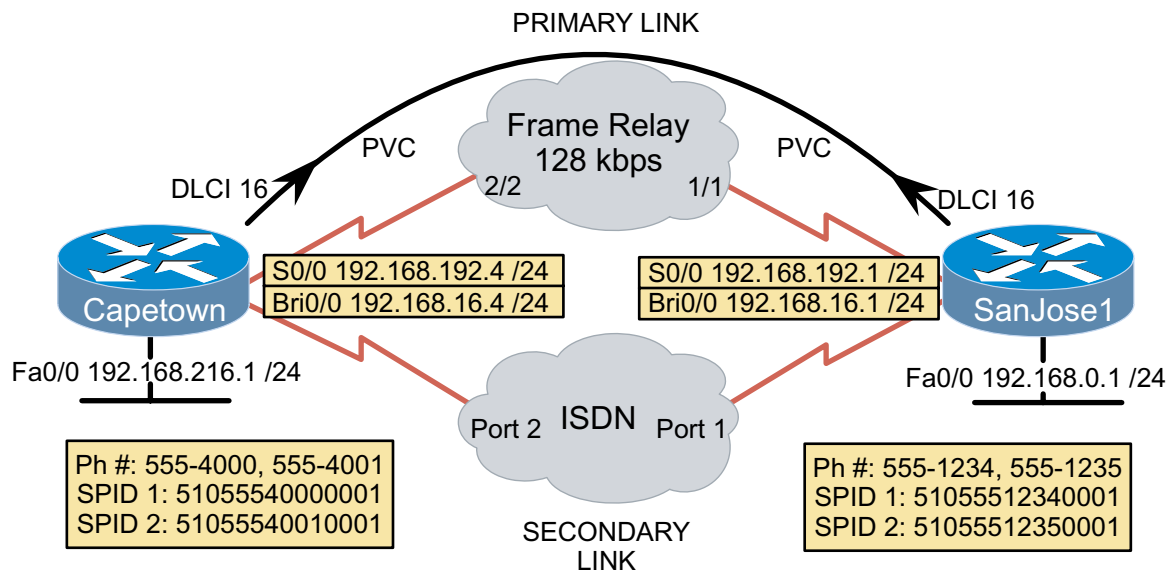


Lab 9.5.2: Using Secondary Links for On-Demand Bandwidth



Objective

Configure ISDN dial-on-demand bandwidth supporting overload traffic from the primary Frame Relay link.

Scenario

The International Travel Agency has expanded, increasing traffic between Capetown and SanJose1. While waiting for your service provider to provision greater bandwidth on your Frame Relay link, you configure ISDN to carry traffic in case the Frame Relay link becomes saturated.

Step 1

Build the network as shown in the diagram. If you are using the Atlas 550 as a WAN emulator, be sure to use the ports as indicated in the diagram.

Step 2

Load your saved configuration files from the completion of the previous lab. If you have not done the previous lab (Lab 9-1), do so now.

Step 3

As configured in the previous lab, ISDN will become active only if the Frame Relay link fails. Instead, you want ISDN to become active as the Frame Relay link reaches a predefined traffic threshold. Configure Capetown with the following syntax:

```
Capetown(config)#interface serial 0/0
Capetown(config-if)#no backup delay 6 8
Capetown(config-if)#backup load 2 1
```

The first number in the **backup load** command is the percentage of bandwidth utilization necessary on Serial 0/0 to trigger the activation of backup interface BRI 0/0. The second number is the percentage of bandwidth utilization on Serial 0/0 required to deactivate BRI 0/0. Due to the sporadic nature of data communications, percentages are evaluated, by default, during a sliding five-second window.

Note: The **backup load** values configured in this lab are ridiculously low to demonstrate functionality. In a production network, load values would be defined to avoid saturation of the Frame Relay link. Example: **backup load 60 20**.

Confirm backup configuration using the following command:

```
Capetown#show interface serial 0/0
Serial0/0 is up, line protocol is up
  Hardware is PowerQUICC Serial
  Internet address is 192.168.192.4/24
  Backup interface BRI0/0, failure delay 0 sec, secondary disable
    delay 0 sec,
    kickin load 2%, kickout load 1%
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation FRAME-RELAY, loopback not set
```

Step 4

View the routing tables of both routers:

```
SanJose1#show ip route
```

```
Gateway of last resort is not set
```

```
C   192.168.192.0/24 is directly connected, Serial0/0
S   192.168.216.0/24 [1/0] via 192.168.192.4
C   192.168.16.0/24 is directly connected, BRI0/0
C   192.168.0.0/24 is directly connected, FastEthernet0/0
```

```
Capetown#show ip route
```

```
Gateway of last resort is 192.168.192.1 to network 0.0.0.0
```

```
C   192.168.192.0/24 is directly connected, Serial0/0
C   192.168.216.0/24 is directly connected, FastEthernet0/0
S*  0.0.0.0/0 [1/0] via 192.168.192.1
```

1. Which route will Capetown use to reach SanJose1 over the ISDN cloud?

When the ISDN link only provided fault tolerance, floating static routes appeared in the routing table when a Frame Relay link failed and the route via Serial 0/0 was removed from the routing table. Only one route at a time was available; now both routes need to be available during times of excessive traffic. This can be accomplished with equal administrative distances. Modify the administrative distance for static routes associated with BRI 0/0 interfaces on **both** routers, as shown here:

```
Capetown(config)#no ip route 0.0.0.0 0.0.0.0 192.168.16.1 222
Capetown(config)#ip route 0.0.0.0 0.0.0.0 192.168.16.1

SanJose1(config)#no ip route 192.168.216.0 255.255.255.0 192.168.16.4
                222
SanJose1(config)#ip route 192.168.216.0 255.255.255.0 192.168.16.4
```

As the backup interface is activated, both routes can coexist in the routing table, which allows load balancing between the two equal cost paths.

Step 5

Test the dial-on-demand bandwidth by loading the Frame Relay link over 2 percent with an extended ping from Capetown to SanJose1. Watch the BRI router interface while you are pinging. You should see one channel light activate when ISDN is triggered. As soon as the ping is complete, issue the **show backup** and **show ip route** commands, as shown here:

```
Capetown#ping
Protocol [ip]:
Target IP address: 192.168.0.1
Repeat count [5]: 55
Datagram size [100]: 1500
Timeout in seconds [2]: 1
Extended commands [n]: y
Source address or interface: 192.168.216.1
Type of service [0]:
Set DF bit in IP header? [no]:
Validate reply data? [no]:
Data pattern [0xABCD]:
Loose, Strict, Record, Timestamp, Verbose[none]:
Sweep range of sizes [n]:
Type escape sequence to abort.
Sending 55, 1500-byte ICMP Echos to 192.168.0.1, timeout is 1
seconds:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Success rate is 96 percent (53/55), round-trip min/avg/max =
380/418/444 ms
```

```
Capetown#show backup
Primary Interface      Secondary Interface    Status
-----
Serial0/0              BRI0/0                 overload mode
```

```
Capetown#show ip route

Gateway of last resort is 192.168.192.1 to network 0.0.0.0

C    192.168.192.0/24 is directly connected, Serial0/0
C    192.168.216.0/24 is directly connected, FastEthernet0/0
     192.168.16.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.16.0/24 is directly connected, BRI0/0
C        192.168.16.1/32 is directly connected, BRI0/0
S*    0.0.0.0/0 [1/0] via 192.168.192.1
        [1/0] via 192.168.16.1
```

There are two parallel routes to SanJose1 while the BRI 0/0 interface is up. ISDN activated at about the same time the two packets were dropped due to congestion.

Issue **show backup** after one minute, or after the BRI 0/0 channel light turns off:

```
Capetown#show backup
Primary Interface      Secondary Interface    Status
-----
Serial0/0              BRI0/0                 normal operation
```

The BRI 0/0 interface has deactivated and returned to standby. Another command you can use to check interface status is **show ip interface brief**, as shown here:

```
Capetown#show ip interface brief
Interface      IP-Address      OK? Method Status      Protocol
FastEthernet0/0 192.168.216.1  YES NVRAM  up          up
```

Serial0/0	192.168.192.4	YES	NVRAM	up	up
BRI0/0	192.168.16.4	YES	NVRAM	standby mode	down
BRI0/0:1	unassigned	YES	unset	administratively	down down
BRI0/0:2	unassigned	YES	unset	administratively	down down
Serial0/1	unassigned	YES	NVRAM	administratively	down down

You have successfully configured dial-on-demand bandwidth.