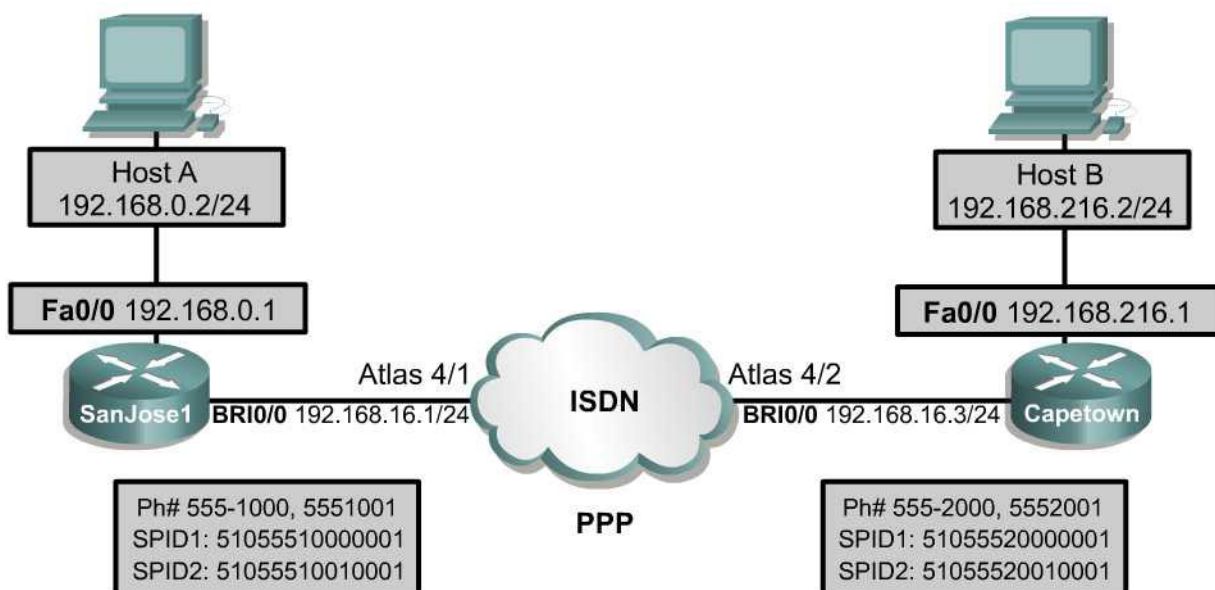


## Lab 4.9.2 Configuring Snapshot Routing



### Objective

In this lab, the student will configure two Cisco routers for DDR and snapshot routing using ISDN BRI.

### Scenario

The International Travel Agency wants an ISDN DDR connection configured between its Capetown regional headquarters and the corporate network SanJose1 core router. Instead of configuring static routes, configure snapshot routing so that routing updates are exchanged between the routers without keeping the link up continuously. The company has also asked that PPP encapsulation and CHAP authentication be configured over this link.

### Step 1

Before beginning this lab, it is recommended that the routers be reloaded after erasing their startup configuration. This will prevent problems that may be caused by residual configurations. Build and configure the network according to the diagram, but do not configure the BRI interfaces on either router yet. Use the Adtran Atlas 550 or similar device to simulate the ISDN cloud. If the Atlas 550 is used, be sure to use straight-through cables and connect both routers to the respective BRI module ports of the Atlas 550 as labeled in the diagram. Be sure to configure both workstations with the correct IP address and default gateway. Configure the Fa0/0 interfaces of the routers to match the diagram.

### Step 2

Configure SanJose1 and Capetown for ISDN. Refer to the following commands to guide the configuration:

```

SanJose1(config)#username Capetown password cisco
SanJose1(config)#enable password cisco
SanJose1(config)#line vty 0 4
SanJose1(config-line)#password cisco
SanJose1(config-line)#login
SanJose1(config-line)#exit
SanJose1(config)#isdn switch-type basic-ni
SanJose1(config)#dialer-list 1 protocol ip permit
SanJose1(config)#interface bri0/0
SanJose1(config-if)#ip address 192.168.16.1 255.255.255.0
SanJose1(config-if)#encapsulation ppp
SanJose1(config-if)#ppp authentication chap
SanJose1(config-if)#isdn spid1 51055510000001 5551000
SanJose1(config-if)#isdn spid2 51055510010001 5551001
SanJose1(config-if)#dialer-group 1
SanJose1(config-if)#dialer map ip 192.168.16.3 name Capetown 5552000
SanJose1(config-if)#no shutdown

```

```

Capetown(config)#username SanJose1 password cisco
Capetown(config)#enable password cisco
Capetown(config)#line vty 0 4
Capetown(config-line)#password cisco
Capetown(config-line)#login
Capetown(config-line)#exit
Capetown(config)#isdn switch-type basic-ni
Capetown(config)#dialer-list 1 protocol ip permit
Capetown(config)#interface bri0/0
Capetown(config-if)#ip address 192.168.16.3 255.255.255.0
Capetown(config-if)#encapsulation ppp
Capetown(config-if)#ppp authentication chap
Capetown(config-if)#isdn spid1 51055520000001 5552000
Capetown(config-if)#isdn spid2 51055520010001 5552001
Capetown(config-if)#dialer-group 1
Capetown(config-if)#dialer map ip 192.168.16.1 name SanJose1 5551000
Capetown(config-if)#no shutdown

```

1. What does the keyword, **broadcast**, do when used with the **dialer map** command?

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Use the **show isdn status** command to verify that the routers have established communication with the ISDN switch.

If either of the routers has not established communication with the ISDN switch, verify the running configuration file to verify that the configurations have been entered correctly. The **clear interface bri0/0** command can also be used multiple times if necessary to enable a valid and established SPID status.

### Step 3

Once both routers have been properly configured for ISDN, issue the **debug dialer** command on both SanJose1 and Capetown. Then verify that DDR works by pinging SanJose1, 192.168.16.1, from Capetown. The **show isdn active** command may also be used to verify an active connection. Troubleshoot as necessary.

Leave **debug dialer** enabled. The output of this command will be used in Step 4.

### Step 4

In this lab, static routes will not be used. The International Travel Agency has asked that dynamic routing be configured. This will allow routing table updates to occur automatically as new networks are added.

1. How often does IGRP send updates by default?

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2. Are IGRP updates unicast, multicast, or broadcast?

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3. What is the default setting of the `dialer idle-timeout`?

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Starting with SanJose1, configure IGRP for AS 100 on both SanJose1 and Capetown. The following are commands for SanJose1:

```
SanJose1(config)#router igrp 100
SanJose1(config-router)#network 192.168.0.0
SanJose1(config-router)#network 192.168.16.0
```

The following are commands for Capetown:

```
Capetown(config)#router igrp 100
Capetown(config-router)#network 192.168.16.0
Capetown(config-router)#network 192.168.216.0
```

Issue the `show ip route` command on Capetown to verify its routing table as follows:

```
Capetown#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route
Gateway of last resort is not set
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
```

Notice that IGRP has not detected the Ethernet network of SanJose1. The reason for this is because of the dialer map statements that were entered on each router. IGRP builds its routing table based on broadcasts received by a peer. By default, the dialer map statements entered do not allow broadcasts traffic to leave the interface.

For this reason, the `dialer map` command has to include the optional `broadcast` keyword. On the BRI 0/0 interface of each router, enter the respective `dialer map` statements as follows:

```
SanJose1(config-if)#dialer map ip 192.168.16.3 name Capetown broadcast 5552000
Capetown(config-if)#dialer map ip 192.168.16.1 name SanJose1 broadcast 5551000
```

Once the dialer maps are configured, DDR activity should be seen as generated by the `debug dialer` command. The output from this command should be similar to the following:

```
BRI0/0 DDR: Dialing cause ip (s=192.168.16.3, d=255.255.255.255)
BRI0/0 DDR: Attempting to dial 5551000
```

1. According to the debug output, what is the destination of the packet that caused the attempt to dial?

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2. What process on the router is causing this broadcast packet to be generated?

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3. Under the current configuration, this DDR link should never go down, why?

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With IGRP, the router broadcasts routing updates out every interface configured with IGRP. Therefore, IGRP broadcast routing updates will consistently keep the DDR link active.

Since IGRP routing process is initiating a DDR call, it could be assumed that IGRP routing updates are being exchanged between SanJose1 and Capetown. To verify this assumption, issue the `show ip route` command again as follows:

```
Capetown#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route
Gateway of last resort is not set
C    192.168.216.0/24 is directly connected, FastEthernet0/0
I    192.168.0.0/24 [100/158260] via 192.168.16.1, 00:00:10, BRI0/0
     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
```

Notice that the routers have now converged and that Capetown now knows about the SanJose1 Ethernet network.

## Step 5

Configure snapshot routing. As the core router, SanJose1 will act as the server and Capetown will be the client. Issue the following commands on SanJose1:

```
SanJose1(config)#interface bri0/0
SanJose1(config-if)#snapshot server 5
```

The **snapshot server 5** command tells the server that the active period is five minutes long.

1. What is the maximum interval that can be assigned using the snapshot server command?

**Note:** The help feature can be used to find this.

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Now use the following to configure Capetown as a snapshot routing client:

```
Capetown(config)#interface bri0/0
Capetown(config-if)#dialer map snapshot 1 name SanJose1 broadcast 5551000
Capetown(config-if)#snapshot client 5 10 suppress-statechange-update dialer
```

The **dialer map snapshot** command establishes a map that Capetown uses to connect for the exchange of routing updates with SanJose1. The **snapshot client** command configures the length of the active and quiet periods. In the previous command, the active period is set to five minutes. This value must match the value set in the configuration for the snapshot server. The length of the quiet period is set to ten minutes. Notice that the active period timer value must match the value that was set in the configuration for the snapshot server.

By default, snapshot routing takes advantage of each new connection that enters into an active window and will start the active interval every time. This could be problem in situations where the WAN link is often accessed and where some applications only require a short connection time of less than a minute.

The **suppress-statechange-update** keyword prevents the routers from exchanging updates during connections that are established to transfer user data. This allows snapshot routing to initiate the DDR link thereby starting an active period at the expiration of the quiet period.

The **dialer** keyword allows the client router to dial up the server router in the absence of regular traffic. Also, it is required when the **suppress-statechange-update** keyword is used.

Observe the result of this configuration. If the routers are still connected, use the **show dialer** command to determine how long the routers will wait until disconnecting an idle link.

Let the link remain idle for 120 seconds. After that time, the routers should disconnect.

Check the routing tables of SanJose1 and Capetown. Verify that routing is working within this network by pinging SanJose1, 192.168.16.1, from Capetown.

Issue the **show snapshot** command on both routers. Notice that the output of SanJose1 differs significantly from the output of Capetown, as the following shows:

```
SanJose1#show snapshot
BRI0/0 is up, line protocol is upSnapshot server line state down
  Length of active period:          5 minutes
  For ip address: 192.168.16.3
  Current state: active, remaining time: 5 minutes
```

```
Capetown#show snapshot
BRI0/0 is up, line protocol is upSnapshot client
  Options: dialer support, stay asleep on carrier up
  Length of active period:          5 minutes
  Length of quiet period:           10 minutes
  Length of retry period:           8 minutes
  For dialer address 1
  Current state: active, remaining/exchange time: 5/0 minutes
  Connected dialer interface:
    BRI0/0:1
```

2. According to the output of this command, what is the retry period set to?
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After allowing the connection to time out, wait five minutes with `debug dialer` running on each router. The following are sample outputs for SanJose1 and Capetown when snapshot routing is activated:

```
SanJose1#debug dialer
01:21:49: %LINK-3-UPDOWN: Interface BRI0/0:1, changed state to up
01:21:49: %ISDN-6-CONNECT: Interface BRI0/0:1 is now connected to unknown
01:21:49: isdn_call_connect: Calling lineaction of BRI0/0:1
01:21:49: BRI0/0:1 DDR: Authenticated host Capetown with no matching dialer map
01:21:49: BR0/0:1 DDR: Dialer protocol up
01:21:49: BRI0/0:1 DDR: dialer protocol up
01:21:4w9: BRI0/0: dialer_ckt_swt_client_connect: incoming circuit switched
call
01:21:50: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0/0:1, changed
state to up
01:21:55: %ISDN-6-CONNECT: Interface BRI0/0:1 is now connected to Capetown

Capetown#debug dialer
00:29:27282767: isdn_call_connect: Calling lineaction of BRI0/0:1
00:29:00: BRI0/0:1 DDR: Authenticated host SanJose1 with no matching dialer map
00:29:00: BR0/0:1 DDR: Dialer protocol up
00:29:00: BRI0/0:1 DDR: dialer protocol up
00:29:00: BRI0/0: dialer_ckt_swt_client_connect: incoming circuit switched call
00:29:01: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0/0:1, changed
state to up
00:29:06: %ISDN-6-CONNECT: Interface BRI0/0:1 is now connected to 5551000
SanJose1
```

3. Which router dials the other to receive snapshot routing information?
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