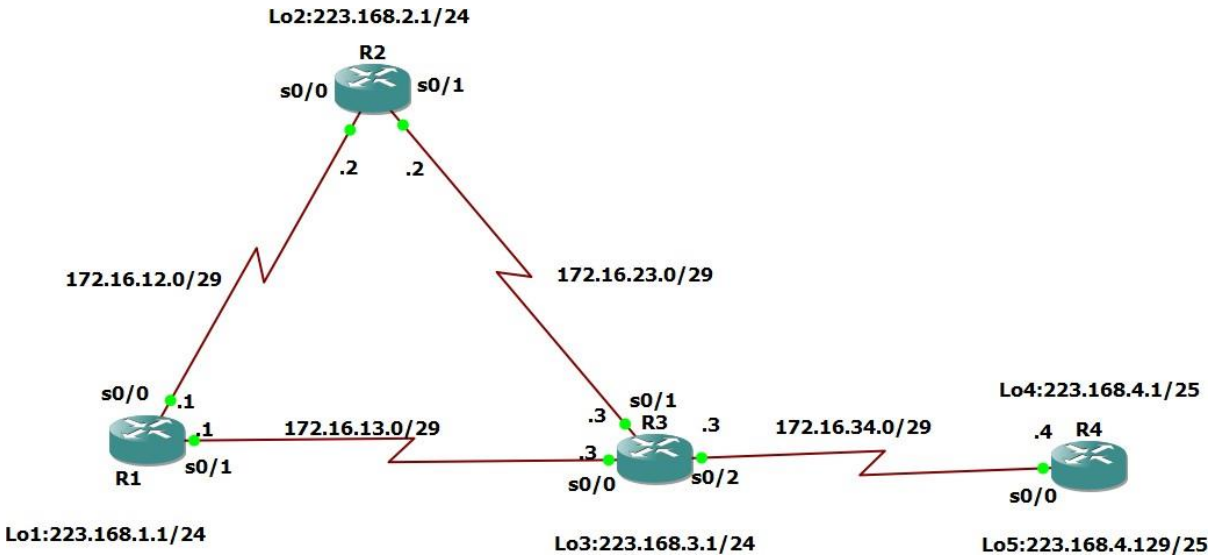
Practical No-5

Aim: Configure and Verify Path Control Using PBR

Topology:



Objectives:

− Configure and verify policy-based routing.

− Select the required tools and commands to configure policy-based routing operations.

− Verify the configuration and operation by using the proper show and debug commands.

Step 1: Configure loopbacks and assign addresses.

x. Cable the network as shown in the topology diagram. Erase the startup configuration, and reload each router to clear previous configurations.

y. Using the addressing scheme in the diagram, create the loopback interfaces and apply IP addresses to these and the serial interfaces on R1, R2, R3, and R4. On the serial interfaces connecting R1 to R3 and R3 to R4, specify the bandwidth as 64 Kb/s and set a clock rate on the DCE using the clock rate 64000 command. On the serial interfaces connecting R1 to R2 and R2 to R3, specify the bandwidth as 128 Kb/s and set a clock rate on the DCE using the clock rate 128000 command.

Note: Depending on the router model, interfaces might be numbered differently than those listed. You might need to alter them accordingly.

Router R1

Interface Lo1

ip address 223.168.1.1 255.255.255.0

interface Serial 0/0/0

ip address 172.16.12.1 255.255.255.248

no shutdown

interface Serial 0/0/1

ip address 172.16.13.1 255.255.255.248

no shutdown

end

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#int Lo1
R1(config-if)#ip addre
*Mar  1 00:02:18.311: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
 changed state to up
R1(config-if)#ip address 223.168.1.1 255.255.255.0
R1(config-if)#int s0/0
R1(config-if)#ip address 172.16.12.1 255.255.255.248
R1(config-if)#no shutdown
R1(config-if)#exit
```

```
R1(config)#int s0/1
R1(config-if)#ip address 172.16.13.1
*Mar  1 00:04:03.931: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0,
 changed state to down
R1(config-if)#ip address 172.16.13.1 255.255.255.248
R1(config-if)#no shutdown
```

Router R2

Interface Lo2

ip address 223.168.2.1 255.255.255.0

interface Serial 0/0/0

ip address 172.16.12.2 255.255.255.248

no shutdown

interface Serial 0/0/1

ip address 172.16.23.2 255.255.255.248

no shutdown

end

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#int Lo2
R2(config-if)#i
*Mar  1 00:03:50.395: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2,
 changed state to up
R2(config-if)#ip address 223.168.2.1 255.255.255.0
R2(config-if)#int s0/0
R2(config-if)#ip address 172.16.12.2 255.255.255.248
R2(config-if)#no shutdown
```

```
R2(config)#int s0/1
R2(config-if)#ip address 172.16.23.2 255.255.255.248
R2(config-if)#no shutdown
```

Router R3

Interface Lo3

ip address 223.168.3.1 255.255.255.0

interface Serial 0/0/0

ip address 172.16.13.3 255.255.255.248

no shutdown

interface Serial 0/0/1

ip address 172.16.23.3 255.255.255.248

interface Serial 0/1/0

ip address 172.16.34.3 255.255.255.248

no shutdown

end

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#int Lo3
R3(config-if)#
*Mar  1 00:05:14.415: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback3,
 changed state to up
R3(config-if)#ip address 223.168.3.1 255.255.255.0
R3(config-if)#int s0/0
R3(config-if)#ip address 172.16.13.3 255.255.255.248
R3(config-if)#no shutdown
```

```
R3(config-if)#int s0/1
R3(config-if)#ip address 172.16.23.3 255.255.255.248
R3(config-if)#no shutdown
```

```
R3(config)#int s0/2
R3(config-if)#ip address 172.16.34.3 255.255.255.248
R3(config-if)#no shutdown
R3(config-if)#exit
```

Router R4

Interface Lo4

ip address 223.168.4.1 255.255.255.128

interface Lo5

ip address 223.168.4.129 255.255.255.128

interface Serial 0/0/0

ip address 172.16.34.4 255.255.255.248

no shutdown

end

```
R4#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R4(config)#int Lo4
R4(config-if)#
*Mar  1 00:06:45.787: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4,
 changed state to up
R4(config-if)#ip address 223.168.4.1 255.255.255.128
R4(config-if)#exit
```

```
R4(config)#interface Lo5
R4(config-if)#
*Mar  1 00:07:23.355: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback5,
 changed state to up
R4(config-if)#ip address 223.168.4.129 255.255.255.128
R4(config-if)#exit
R4(config)#int s0/0
R4(config-if)#ip address 172.16.34.4 255.255.255.248
R4(config-if)#no shutdown
```

z. Verify the configuration with the show ip interface brief, show protocols, and show interfaces description commands. The output from router R3 is shown here as an example.

R3# show ip interface brief

```
R3#show ip interface brief
Interface                  IP-Address      OK? Method Status                Prot
ocol
FastEthernet0/0            unassigned      YES unset  administratively down down

Serial0/0                  172.16.13.3     YES manual up                    up

FastEthernet0/1            unassigned      YES unset  administratively down down

Serial0/1                  172.16.23.3     YES manual up                    up

Serial0/2                  172.16.34.3     YES manual up                    up

FastEthernet1/0            unassigned      YES unset  administratively down down

Loopback3                  223.168.3.1     YES manual up                    up
```

R3# show protocols

```
R3#show protocols
Global values:
  Internet Protocol routing is enabled
FastEthernet0/0 is administratively down, line protocol is down
Serial0/0 is up, line protocol is up
  Internet address is 172.16.13.3/29
FastEthernet0/1 is administratively down, line protocol is down
Serial0/1 is up, line protocol is up
  Internet address is 172.16.23.3/29
Serial0/2 is up, line protocol is up
  Internet address is 172.16.34.3/29
FastEthernet1/0 is administratively down, line protocol is down
Loopback3 is up, line protocol is up
  Internet address is 223.168.3.1/24
```

R3# show interface description

```
R3#show interfaces description
Interface                      Status         Protocol Description
Fa0/0                          admin down     down
Se0/0                          up             up
Fa0/1                          admin down     down
Se0/1                          up             up
Se0/2                          up             up
Fa1/0                          admin down     down
Lo3                            up             up
```

Step 3: Configure basic EIGRP.

a. Implement EIGRP AS 1 over the serial and loopback interfaces as you have configured it for the other EIGRP labs.

b. Advertise networks 172.16.12.0/29, 172.16.13.0/29, 172.16.23.0/29, 172.16.34.0/29, 223.168.1.0/24, 223.168.2.0/24, 223.168.3.0/24, and 223.168.4.0/24 from their respective routers.

Router R1

Router eigrp 1

network 223.168.1.0

network 172.16.12.0 0.0.0.7

network 172.16.13.0 0.0.0.7

no auto-summary

```
R1(config)#router eigrp 1
R1(config-router)#network 223.168.1.0
R1(config-router)#network 172.16.12.0 0.0
% Incomplete command.

R1(config-router)#network 172.16.12.0 0.0.0.7
R1(config-router)#network 172.16.13.0 0.0.0.7
R1(config-router)#no auto-summary
R1(config-router)#
```

Router R2

Router eigrp 1

network 223.168.2.0

network 172.16.12.0 0.0.0.7

network 172.16.23.0 0.0.07

no auto-summary

```
R2(config)#router eigrp 1
R2(config-router)#network 223.168.2.0
R2(config-router)#network 172.16.12.0 0.0.0.7
R2(config-router)#n
*Mar  1 00:16:16.539: %DUAL-5-NBRCHANGE: IP-EIGRP(0)
rial0/0) is up: new adjacency
R2(config-router)#network 172.16.23.0 0.0.0.7
R2(config-router)#no auto-summary
R2(config-router)#
```

Router R3

Router eigrp 1

network 223.168.3.0

network 172.16.13.0 0.0.0.7

network 172.16.23.0 0.0.0.7

network 172.16.34.0 0.0.0.7

no auto-summary

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router eigrp 1
R3(config-router)#network 223.168.3.0
R3(config-router)#network 172.16.13.0 0.0.0.7
R3(config-router)#
*Mar  1 00:16:38.731: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighb
rial0/0) is up: new adjacency
R3(config-router)#network 172.16.23.0 0.0.0.7
R3(config-router)#ne
*Mar  1 00:17:16.239: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighb
rial0/1) is up: new adjacency
R3(config-router)#network 172.16.34.0 0.0.0.7
R3(config-router)#no auto-summary
```

Router R4

router eigrp 1

network 223.168.4.0

network 172.16.34.0 0.0.07

no auto-summary

```
R4(config)#router eigrp 1
R4(config-router)#network 223.168.4.0
R4(config-router)#network 172.16.34.0 0.0.0.7
R4(config-router)#no
*Mar  1 00:16:41.287: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 172.16.34.3 (Se
rial0/0) is up: new adjacency
R4(config-router)#no auto-summary
R4(config-router)#
```

Step 4: Verify EIGRP connectivity.

c. Verify the configuration by using the show ip eigrp neighbors command to check which routers have EIGRP adjacencies.

R1# show ip eigrp neighbors

```
R1#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address                 Interface       Hold Uptime   SRTT   RTO  Q  Seq
                                            (sec)         (ms)       Cnt Num
1   172.16.13.3             Se0/1             10 00:02:47   45   270  0  27
0   172.16.12.2             Se0/0             12 00:04:11   41   246  0  24
R1#
```

R2# show ip eigrp neighbors

```
R2#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address                 Interface       Hold Uptime   SRTT   RTO  Q  Seq
                                            (sec)         (ms)       Cnt Num
1   172.16.23.3             Se0/1             11 00:03:03   44   264  0  28
0   172.16.12.1             Se0/0             13 00:05:03   34   204  0  26
R2#
```

R3# show ip eigrp neighbors

```
R3#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address                 Interface       Hold Uptime   SRTT   RTO  Q  Seq
                                            (sec)         (ms)       Cnt Num
2   172.16.34.4             Se0/2             11 00:02:04   55   330  0  7
1   172.16.23.2             Se0/1             10 00:03:26   42   252  0  25
0   172.16.13.1             Se0/0             14 00:04:03   36   216  0  27
R3#
```

R4# show ip eigrp neighbors

```
R4#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address                 Interface       Hold Uptime   SRTT   RTO  Q  Seq
                                            (sec)         (ms)       Cnt Num
0   172.16.34.3             Se0/0             10 00:02:30   30   200  0  32
R4#
```

d. Run the following TCL Scripts on all routers to verify full connectivity.

```
R1#tclsh
R1(tcl)#foreach address {
+>(tcl)#
+>(tcl)#172.16.12.1
+>(tcl)#172.16.12.2
+>(tcl)#172.16.13.1
+>(tcl)#172.16.13.3
+>(tcl)#172.16.23.2
+>(tcl)#172.16.23.3
+>(tcl)#172.16.34.3
+>(tcl)#172.16.34.4
+>(tcl)#223.168.1.1
+>(tcl)#223.168.2.1
+>(tcl)#223.168.3.1
+>(tcl)#223.168.4.1
+>(tcl)#223.168.4.129
+>(tcl)#} { ping $address }
```

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.12.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.12.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/8/20 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.13.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/9/32 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.13.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.23.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/12 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.23.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.34.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/20 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.34.4, timeout is 2 seconds:
```

Step 5: Verify the current path.

Before you configure PBR, verify the routing table on R1.

e. On R1, use the show ip route command. Notice the next-hop IP address for all networks discovered by EIGRP.

```
R1#show ip route
Codes: C - connected, S - static, 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
       i - IS-IS, su - IS-IS summary, 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

D    223.168.2.0/24 [90/2297856] via 172.16.12.2, 00:43:23, Serial0/0
D    223.168.3.0/24 [90/2297856] via 172.16.13.3, 00:43:23, Serial0/1
C    223.168.1.0/24 is directly connected, Loopback1
     223.168.4.0/25 is subnetted, 2 subnets
D       223.168.4.0 [90/2809856] via 172.16.13.3, 00:41:54, Serial0/1
D       223.168.4.128 [90/2809856] via 172.16.13.3, 00:41:54, Serial0/1
     172.16.0.0/29 is subnetted, 4 subnets
D       172.16.34.0 [90/2681856] via 172.16.13.3, 00:43:06, Serial0/1
D       172.16.23.0 [90/2681856] via 172.16.13.3, 00:43:25, Serial0/1
                    [90/2681856] via 172.16.12.2, 00:43:25, Serial0/0
C       172.16.12.0 is directly connected, Serial0/0
C       172.16.13.0 is directly connected, Serial0/1
```

R4# traceroute 223.168.1.1 source 223.168.4.1

```
R4#traceroute 223.168.1.1 source 223.168.4.1

Type escape sequence to abort.
Tracing the route to 223.168.1.1

  1 172.16.34.3 0 msec 0 msec 0 msec
  2 172.16.13.1 0 msec 0 msec 0 msec
```

R4# traceroute 223.168.1.1 source 223.168.4.129

```
R4#traceroute 223.168.1.1 source 223.168.4.129

Type escape sequence to abort.
Tracing the route to 223.168.1.1

  1 172.16.34.3 0 msec 0 msec 0 msec
  2 172.16.13.1 0 msec 0 msec 0 msec
```

On R3, use the show ip route command and note that the preferred route from R3 to R1 LAN 223.168.1.0/24 is via R2 using the R3 exit interface S0/0/1

R3# show ip route

```
R3#show ip route
Codes: C - connected, S - static, 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
       i - IS-IS, su - IS-IS summary, 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

D    223.168.2.0/24 [90/2297856] via 172.16.23.2, 00:47:21, Serial0/1
C    223.168.3.0/24 is directly connected, Loopback3
D    223.168.1.0/24 [90/2297856] via 172.16.13.1, 00:47:21, Serial0/0
     223.168.4.0/25 is subnetted, 2 subnets
D       223.168.4.0 [90/2297856] via 172.16.34.4, 00:45:50, Serial0/2
D       223.168.4.128 [90/2297856] via 172.16.34.4, 00:45:50, Serial0/2
     172.16.0.0/29 is subnetted, 4 subnets
C       172.16.34.0 is directly connected, Serial0/2
C       172.16.23.0 is directly connected, Serial0/1
D       172.16.12.0 [90/2681856] via 172.16.23.2, 00:47:23, Serial0/1
                    [90/2681856] via 172.16.13.1, 00:47:23, Serial0/0
C       172.16.13.0 is directly connected, Serial0/0
```

f. On R3, use the **show interfaces serial 0/0/0** and show **interfaces s0/0/1** command.

```
R3#show int s0/0
Serial0/0 is up, line protocol is up
  Hardware is GT96K Serial
  Internet address is 172.16.13.3/29
  MTU 1500 bytes, BW 1544 Kbit/sec, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, loopback not set
  Keepalive set (10 sec)
  CRC checking enabled
  Last input 00:00:01, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/1/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
     Available Bandwidth 1158 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     1189 packets input, 79137 bytes, 0 no buffer
     Received 445 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     1132 packets output, 75981 bytes, 0 underruns
     0 output errors, 0 collisions, 6 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
```

g. Confirm that R3 has a valid route to reach R1 from its serial 0/0/0 interface using the **show ip eigrp topology** 223.168.1.0 command.

R3# **show ip eigrp topology 223.168.1.0**

```
R3#show ip eigrp topology 223.168.1.0
IP-EIGRP (AS 1): Topology entry for 223.168.1.0/24
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 2297856
  Routing Descriptor Blocks:
  172.16.13.1 (Serial0/0), from 172.16.13.1, Send flag is 0x0
      Composite metric is (2297856/128256), Route is Internal
      Vector metric:
        Minimum bandwidth is 1544 Kbit
        Total delay is 25000 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 1
  172.16.23.2 (Serial0/1), from 172.16.23.2, Send flag is 0x0
      Composite metric is (2809856/2297856), Route is Internal
      Vector metric:
        Minimum bandwidth is 1544 Kbit
        Total delay is 45000 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 2
```

Step 6: Configure PBR to provide path control

The steps required to implement path control include the following:

− Choose the path control tool to use. Path control tools manipulate or bypass the IP routing table. For PBR, route-map commands are used.

− Implement the traffic-matching configuration, specifying which traffic will be manipulated. The match commands are used within route maps

. − Define the action for the matched traffic using set commands within route maps.

− Apply the route map to incoming traffic.

As a test, you will configure the following policy on router R3:

− All traffic sourced from R4 LAN A must take the R3 --> R2 --> R1 path.

− All traffic sourced from R4 LAN B must take the R3 --> R1 path.

h. On router R3, create a standard access list called PBR-ACL to identify the R4 LAN B network.

R3(config) #**ip access-list standard PBR-ACL**

R3(config-std-nacl) #**remark ACL matches R4 LAN B traffic**

R3(config-std-nacl) #**permit 223.168.4.128 0.0.0.127**

R3(config-std-nacl) #**exit**

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ip access-list standard PBR-ACL
R3(config-std-nacl)#remark ACL matches R4 LAN B traffic
R3(config-std-nacl)#permit 223.168.4.128 0.0.0.127
R3(config-std-nacl)#exit
```

i. Create a route map called R3-to-R1 that matches PBR-ACL and sets the next-hop interface to the R1 serial 0/0/1 interface.

R3(config)# **route-map R3-to-R1 permit**

R3(config-route-map) # **description RM to forward LAN B traffic to R1**

R3(config-route-map) # **match ip address PBR-ACL**

R3(config-route-map) # **set ip next-hop 172.16.13.1**

R3(config-route-map) # **exit**

```
R3(config)#route-map R3-to-R1 permit
R3(config-route-map)#match ip address PBR-ACL
R3(config-route-map)#set ip next-hop 172.16.13.1
R3(config-route-map)#exit
```

j. Apply the R3-to-R1 route map to the serial interface on R3 that receives the traffic from R4. Use the ip policy route-map command on interface S0/1/0.

R3(config)# **interface s0/1/0**

R3(config-if) #**ip policy route-map R3-to-R1**

R3(config-if) # **end**

```
R3(config)#int s0/2
R3(config-if)#ip policy route-map R3-to-R1
R3(config-if)#end
```

k. On R3, display the policy and matches using the show route-map command.

```
R3#show route-map
route-map R3-to-R1, permit, sequence 10
  Match clauses:
    ip address (access-lists): PBR-ACL
  Set clauses:
    ip next-hop 172.16.13.1
  Policy routing matches: 0 packets, 0 bytes
```

Step 7: Test the Policy

1. On R3, create a standard ACL which identifies all of the R4 LANs.

R3# **conf t**

Enter configuration commands, one per line. End with CNTL/Z.

R3(config)# **access-list 1 permit 223.168.4.0 0.0.0.255**

R3(config)# **exit**

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#access-list 1 permit 223.168.4.0 0.0.0.255
R3(config)#exit
```

2. Enable PBR debugging only for traffic that matches the R4 LANs.

R3# debug ip policy?

```
R3#debug ip policy ?
  dynamic  dynamic PBR
```

R3# debug ip policy 1

```
R3#debug ip policy 1
Policy routing debugging is on for access list 1
R3#
```

3. Test the policy from R4 with the traceroute command, using R4 LAN A as the source network.

R4# traceroute 223.168.1.1 source 223.168.4.1

```
R4#traceroute 223.168.1.1 source 223.168.4.1

Type escape sequence to abort.
Tracing the route to 223.168.1.1

  1 172.16.34.3 16 msec 8 msec 4 msec
  2 172.16.13.1 0 msec 0 msec 0 msec
```

```
*Mar  1 01:17:11.243: IP: s=223.168.4.1 (Serial0/2), d=223.168.1.1, len 28, FIB
policy rejected(no match) - normal forwarding
*Mar  1 01:17:11.243: IP: s=223.168.4.1 (Serial0/2), d=223.168.1.1, len 28, FIB
policy rejected(no match) - normal forwarding
*Mar  1 01:17:11.243: IP: s=223.168.4.1 (Serial0/2), d=223.168.1.1, len 28, FIB
policy rejected(no match) - normal forwarding
```

4. Test the policy from R4 with the traceroute command, using R4 LAN B as the source network.

R4# traceroute 223.168.1.1 source 223.168.4.129

```
R4#traceroute 223.168.1.1 source 223.168.4.129

Type escape sequence to abort.
Tracing the route to 223.168.1.1

  1 172.16.34.3 28 msec 0 msec 0 msec
  2 172.16.13.1 0 msec 16 msec 0 msec
```

```
*Mar  1 01:19:54.267: IP: s=223.168.4.129 (Serial0/2), d=223.168.1.1, len 28, FI
B policy match
*Mar  1 01:19:54.267: IP: s=223.168.4.129 (Serial0/2), d=223.168.1.1, g=172.16.1
3.1, len 28, FIB policy routed
*Mar  1 01:19:54.267: IP: s=223.168.4.129 (Serial0/2), d=223.168.1.1, len 28, FI
B policy match
*Mar  1 01:19:54.267: IP: s=223.168.4.129 (Serial0/2), d=223.168.1.1, g=172.16.1
3.1, len 28, FIB policy routed
*Mar  1 01:19:54.283: IP: s=223.168.4.129 (Serial0/2), d=223.168.1.1, len 28, FI
B policy match
*Mar  1 01:19:54.283: IP: s=223.168.4.129 (Serial0/2), d=223.168.1.1, g=172.16.1
3.1, len 28, FIB policy routed
```

5. On R3, display the policy and matches using the show route-map command.

```
R3#show route-map
route-map R3-to-R1, permit, sequence 10
  Match clauses:
    ip address (access-lists): PBR-ACL
  Set clauses:
    ip next-hop 172.16.13.1
  Policy routing matches: 3 packets, 96 bytes
```