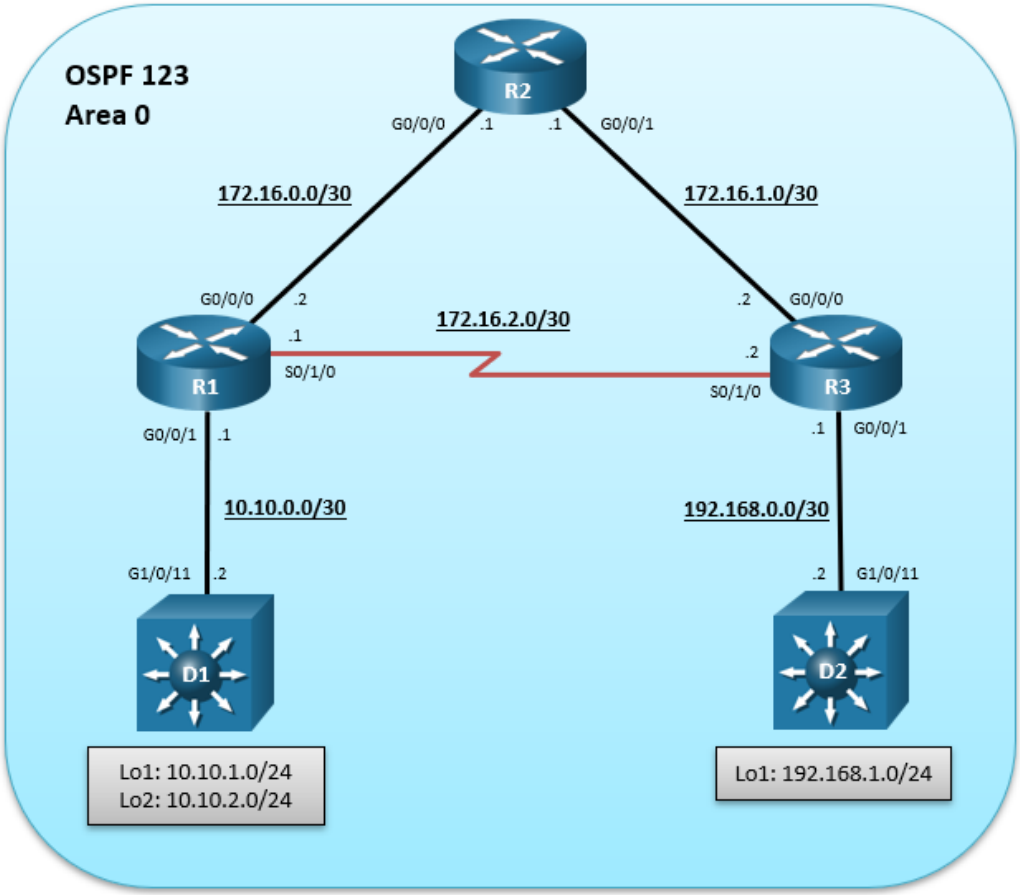
Lab - Troubleshoot Route Maps and PBR

Topology



Addressing Table

Device	Interface	IPv4 Address	Subnet Mask
D1	G0/0/11	10.10.0.2	255.255.255.252
	Loopback 1	10.10.1.1	255.255.255.0
	Loopback 2	10.10.2.1	255.255.255.0
R1	G0/0/0	172.16.0.2	255.255.255.252
	G0/0/1	10.10.0.1	255.255.255.252
	S0/1/0	172.16.2.1	255.255.255.252
R2	G0/0/0	172.16.0.1	255.255.255.252
	G0/0/1	172.16.1.1	255.255.255.252

Device	Interface	IPv4 Address	Subnet Mask
R3	G0/0/0	172.16.1.2	255.255.255.252
	G0/0/1	192.168.0.1	255.255.255.252
	S0/1/0	172.16.2.2	255.255.255.252
D2	G0/0/11	192.168.0.2	255.255.255.252
	Loopback 1	192.168.1.1	255.255.255.0

Objectives

Troubleshoot network issues related to the configuration and operation of PBR using route maps.

Background / Scenario

PBR was recently implemented on R1 and R3. However, there have been problems.

Although the topology has a limited number of routers, you should use the appropriate troubleshooting commands to help find and solve the problems in the three trouble tickets as if this were a much more complex topology with many more routers and networks.

You will be loading configurations with intentional errors onto the network. Your tasks are to FIND the error(s), document your findings and the command(s) or method(s) used to fix them, FIX the issue(s) presented here, and then test the network to ensure both of the following conditions are met:

1) the complaint received in the ticket is resolved
2) full reachability is restored

Note: The routers used with CCNP hands-on labs are Cisco 4221 with Cisco IOS XE Release 16.9.4 (universalk9 image). The switches used in the labs are Cisco Catalyst 3650 with Cisco IOS XE Release 16.9.4 (universalk9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of the lab for the correct interface identifiers.

Note: Make sure that the devices have been erased and have no startup configurations. If you are unsure, contact your instructor.

Required Resources

- 3 Routers (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 2 Switches (Cisco 3560 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

Instructions

Part 1: Trouble Ticket 15.1.4.1

Scenario:

The routing table in the OSPF area 0 topology forwards traffic between R1 and R3 via R2 because of the faster Gigabit Ethernet links between R1 and R2 and between R2 and R3. However, corporate policy states that all traffic from the D1 loopback 2 network (i.e., 10.10.2.0/24) should be policy-based routed (PBR) directly

to R3 using the R1 to R3 serial link. It was assumed that the policy was working correctly but a recent traceroute from the D1 loopback 2 interface to the D2 loopback 1 (i.e., 192.168.1.0/24) network has revealed otherwise.

```
D1# traceroute 192.168.1.1 source lo2
Type escape sequence to abort.
Tracing the route to 192.168.1.1
VRF info: (vrf in name/id, vrf out name/id)
  1 10.10.0.1 2 msec 2 msec 2 msec
  2 172.16.0.1 2 msec 2 msec 2 msec
  3 172.16.1.2 2 msec 2 msec 2 msec
  4 192.168.0.2 3 msec *  3 msec
```

Use the commands listed below to load the configuration files for this trouble ticket:

Device	Command
R1	**copy flash:/enarsi/15.1.4.1-r1-config.txt run**
R2	**copy flash:/enarsi/15.1.4.1-r2-config.txt run**
R3	**copy flash:/enarsi/15.1.4.1-r3-config.txt run**
D1	**copy flash:/enarsi/15.1.4.1-d1-config.txt run**
D2	**copy flash:/enarsi/15.1.4.1-d2-config.txt run**

- Traffic from 10.10.2.0/24 going to 192.168.1.0/24 should be routed directly to R3 from R1.
- All other traffic from D1 should be propagated according to the routing table.
- When you have fixed the ticket, change the MOTD on EACH DEVICE using the following command:

  banner motd # This is $(hostname) FIXED from ticket <ticket number> #
- Then save the configuration by issuing the **wri** command (on each device).
- Inform your instructor that you are ready for the next ticket.
- After the instructor approves your solution for this ticket, issue the **reset.now** privileged EXEC command This script will clear your configurations and reload the devices.

Part 2: Trouble Ticket 15.1.4.2

Scenario:

The routing table in the OSPF area 0 topology forwards traffic between R1 and R3 via R2 because of the faster Gigabit Ethernet links between R1 and R2 and between R2 and R3. However, corporate policy states that all traffic from the D1 loopback 2 network (i.e., 10.10.2.0/24) should be policy-based routed (PBR) directly to R3 using the R1 to R3 serial link.

However, a traceroute from the D1 loopback 2 interface to the D2 loopback 1 (i.e., 192.168.1.0/24) network has revealed that traffic is not policy-based routed.

```
D1# traceroute 192.168.1.1 source lo2
Type escape sequence to abort.
Tracing the route to 192.168.1.1
VRF info: (vrf in name/id, vrf out name/id)
  1 10.10.0.1 2 msec 2 msec 2 msec
```

```
2 172.16.0.1 2 msec 2 msec 2 msec
3 172.16.1.2 2 msec 2 msec 2 msec
4 192.168.0.2 3 msec *  3 msec
```

Note: This is the same issue as the previous ticket. However, the cause(s) and solution(s) are different.

Use the commands listed below to load the configuration files for this trouble ticket:

Device	Command
R1	**copy flash:/enarsi/15.1.4.2-r1-config.txt run**
R2	**copy flash:/enarsi/15.1.4.2-r2-config.txt run**
R3	**copy flash:/enarsi/15.1.4.2-r3-config.txt run**
D1	**copy flash:/enarsi/15.1.4.2-d1-config.txt run**
D2	**copy flash:/enarsi/15.1.4.2-d2-config.txt run**

- Traffic from 10.10.2.0/24 going to 192.168.1.0/24 should be routed directly to R3 from R1.
- All other traffic from D1 should be propagated according to the routing table.
- When you have fixed the ticket, change the MOTD on EACH DEVICE using the following command:

  banner motd # This is $(hostname) FIXED from ticket <ticket number> #
- Then save the configuration by issuing the **wri** command (on each device).
- Inform your instructor that you are ready for the next ticket.
- After the instructor approves your solution for this ticket, issue the **reset.now** privileged EXEC command This script will clear your configurations and reload the devices.

Part 3: Trouble Ticket 15.1.4.3

Scenario:

In this scenario, a local PBR policy was implemented on R3 to route traffic generated for the 10.10.0.0/16 directly to R1. However, a traceroute to 10.10.1.1 displays that it is being forwarded to R2 instead of R1.

```
R3# traceroute 10.10.1.1
Type escape sequence to abort.
Tracing the route to 10.10.1.1
VRF info: (vrf in name/id, vrf out name/id)
  1 172.16.1.1 2 msec 1 msec 1 msec
  2 172.16.0.2 2 msec 1 msec 1 msec
  3 10.10.0.2 4 msec *  2 msec
```

Use the commands listed below to load the configuration files for this trouble ticket:

Device	Command
R1	**copy flash:/enarsi/15.1.4.3-r1-config.txt run**
R2	**copy flash:/enarsi/15.1.4.3-r2-config.txt run**
R3	**copy flash:/enarsi/15.1.4.3-r3-config.txt run**
D1	**copy flash:/enarsi/15.1.4.3-d1-config.txt run**

Device	Command
D2	`copy flash:/enarsi/15.1.4.3-d2-config.txt run`

- Traffic generated by R3 going to the 10.10.0.0/16 networks should be sent directly to R1 as identified in the local PBR.
- When you have fixed the ticket, change the MOTD on EACH DEVICE using the following command:

  banner motd # This is $(hostname) FIXED from ticket <ticket number> #
- Then save the configuration by issuing the **wri** command (on each device).
- Inform your instructor that you are ready for the next ticket.
- After the instructor approves your solution for this ticket, issue the **reset.now** privileged EXEC command. This script will clear your configurations and reload the devices.

Router Interface Summary Table

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
4221	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
4300	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)

Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table 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 Cisco IOS commands to represent the interface.