Packet Tracer - Verify Single-Area OSPFv2

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	172.16.1.1	255.255.255.0	N/A
	G0/1	64.100.54.6	255.255.255.252	
	S0/0/0	172.16.3.1	255.255.255.252	
	S0/0/1	192.168.10.5	255.255.255.252	
R2	G0/0	172.16.2.1	255.255.255.0	N/A
	S0/0/0	172.16.3.2	255.255.255.252	
	S0/0/1	192.168.10.9	255.255.255.252	
R3	G0/0	192.168.1.1	255.255.255.0	N/A
	G0/1	192.168.11.1	255.255.255.0	
	S0/0/0	192.168.10.6	255.255.255.252	
	S0/0/1	192.168.10.10	255.255.255.252	
R4	G0/0/0	192.168.1.2	255.255.255.0	N/A
	G0/0/1	192.168.11.1	255.255.255.0	
ISP Router	NIC	64.100.54.5	255.255.255.252	N/A
PC1	NIC	172.16.1.2	255.255.255.0	172.16.1.1
PC2	NIC	172.16.2.2	255.255.255.0	172.16.2.1
PC3	NIC	192.168.1.2	255.255.255.0	192.168.1.1
Laptop	NIC	DHCP	DHCP	DHCP

Objectives

In this lab, you will use the CLI commands to verify the operation of an existing OSPFv2 network. In Part 2, you will add a new LAN to the configuration and verify connectivity.

- Identify and verify the status of OSPF neighbors.
- Determine how the routes are being learned in the network.
- Explain how the neighbor state is determined.
- Examine the settings for the OSPF process ID.
- Add a new LAN into an existing OSPF network and verify connectivity.

Background / Scenario

You are the network administrator for a branch office of a larger organization. Your branch is adding a new wireless network into an existing branch office LAN. The existing network is configured to exchange routes using OSPFv2 in a single-area configuration. Your task is to verify the operation of the existing OSPFv2 network, before adding in the new LAN. When you are sure that the current OSPFv2 LAN is operating correctly, you will connect the new LAN and verify that OSPF routes are being propagated for the new LAN. As branch office network administrator, you have full access to the IOS on routers R3 and R4. You only have read access to the enterprise LAN routers R1 and R2, using the username **BranchAdmin**, and the password **Branch1234**.

Instructions

Part 1: Verify the existing OSPFv2 network operation.

The following commands will help you find the information needed to answer the questions:

show ip interface brief
show ip route
show ip route ospf
show ip ospf neighbor
show ip protocols
show ip ospf
show ip ospf interface

Step 1: Verify OSPFv2 operation.

Wait until STP has converged on the network. You can click the Packet Tracer Fast Forward Time button to speed up the process. Continue only when all link lights are green.

a. Log into router **R1** using the username **BranchAdmin** and the password **Branch1234**. Execute the **show ip route** command.

```
R1# show ip route
--- output omitted ----

Gateway of last resort is 172.16.3.2 to network 0.0.0.0

     172.16.0.0/16 is variably subnetted, 5 subnets, 3 masks
C       172.16.1.0/24 is directly connected, GigabitEthernet0/0
L       172.16.1.1/32 is directly connected, GigabitEthernet0/0
O       172.16.2.0/24 [110/65] via 172.16.3.2, 00:02:18, Serial0/0/0
C       172.16.3.0/30 is directly connected, Serial0/0/0
L       172.16.3.1/32 is directly connected, Serial0/0/0
O    192.168.1.0/24 [110/65] via 192.168.10.6, 00:02:18, Serial0/0/1
     192.168.10.0/24 is variably subnetted, 3 subnets, 2 masks
C       192.168.10.4/30 is directly connected, Serial0/0/1
L       192.168.10.5/32 is directly connected, Serial0/0/1
O       192.168.10.8/30 [110/128] via 172.16.3.2, 00:02:18, Serial0/0/0
                        [110/128] via 192.168.10.6, 00:02:18, Serial0/0/1
O*E2 0.0.0.0/0 [110/1] via 172.16.3.2, 00:02:18, Serial0/0/0
```

How did router **R1** receive the default route?

From which router did **R1** receive the default route?

How can you filter the output of **show ip route** to show only the routes learned through OSPF?

b. Execute the **show ip ospf neighbor** command on **R1**.

Which routers have formed adjacencies with router **R1**?

What are the router IDs and state of the routers shown in the command output?

Are all of the adjacent routers shown in the output?

c. Using the command prompt on **PC1**, ping the address of the **ISP Router** shown in the Address Table. Is it successful? If not, do a **clear ospf process** command on the routers and repeat the ping command.

Step 2: Verify OSPFv2 operation on R2.

a. Log into router **R2** using the username **BranchAdmin** and the password **Branch1234**. Execute the **show ip route** command. Verify that routes to all the networks in the topology are shown in the routing table.

How did router R2 learn the default route to the ISP?

b. Enter the **show ip ospf interface g0/0** on router **R2**.

What type of OSPF network is attached to this interface?

Are OSPF hello packets being sent out this interface? Explain.

c. Using the command prompt on **PC2**, ping the S0/0/1 address on router **R3**.

Is it successful?

Step 3: Verify OSPFv2 operation on R3.

a. Execute the **show ip protocols** command on router R3.

Router R3 is routing for which networks?

b. Execute the **show ip ospf neighbor detail** command on router **R3**.

What is the neighbor priority shown for the OSPF neighbor routers? This value is the default.

c. Using the command prompt on **PC3**, ping the address of the **ISP Router** shown in the Address Table.

Is it successful?

Part 2: Add the new Branch Office LAN to the OSPFv2 network.

You will now add the pre-configured Branch Office LAN to the OSPFv2 network.

Step 1: Verify the OSPFv2 configuration on router R4.

Execute a **show run | begin router ospf** command on router **R4**. Verify that the network statements are present for the networks that are configured on the router.

Which interface is configured to not send OSPF update packets?

Step 2: Connect the Branch Office router R4 to the OSPFv2 network.

a. Using the correct Ethernet cable, connect the G0/0/0 interface on router **R4** to the G0/1 interface on switch **S3**. Use the **show ip ospf neighbor** command to verify that router **R4** is now adjacent with router **R3.**

   What state is displayed for router **R3**?

b. Using the **show ip ospf neighbor** command on **R3**, determine the state of router **R4**. There may be a delay while OSPF converges.

   Why is the state of router R4 different than the state of R1 and R2?

c. Using the command prompt on Laptop, ping the address of PC2.

   Is it successful?