

Experiment#9

Lab 9.1- Configuring Single-Area OSPF

Topology

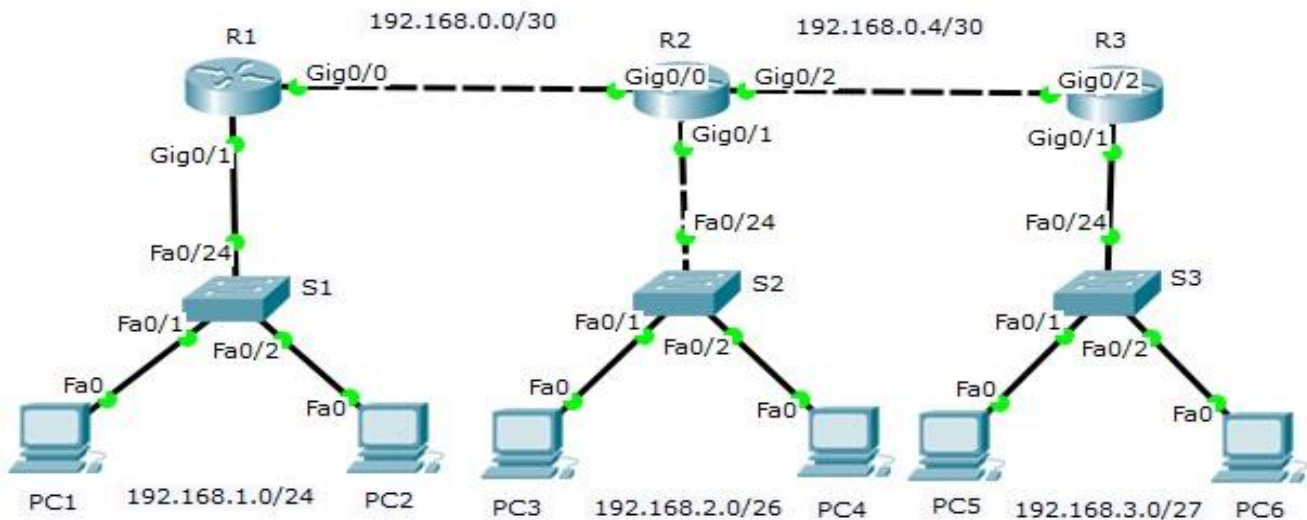


figure: 9.1.1

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.0.1	255.255.255.252	N/A
	G0/1	192.168.1.1	255.255.255.0	N/A
R2	G0/0	192.168.1.2	255.255.255.252	N/A
	G0/1	192.168.2.1	255.255.255.0	N/A
	G0/2	192.168.0.5	255.255.255.252	N/A
R3	G0/2	192.168.0.6	255.255.255.252	N/A
	G0/1	192.168.3.1	255.255.255.252	N/A
PC1	NIC	192.168.1.2	255.255.255.0	192.168.1.1
PC2	NIC	192.168.1.3	255.255.255.0	192.168.1.1
PC3	NIC	192.168.2.2	255.255.255.0	192.168.2.1
PC4	NIC	192.168.2.3	255.255.255.0	192.168.2.1
PC5	NIC	192.168.3.2	255.255.255.0	192.168.3.1
PC6	NIC	192.168.3.3	255.255.255.0	192.168.3.1

Table:9.1.1



Objectives

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Configure and Verify OSPF Routing

Background / Scenario

Open Shortest Path First (OSPF) is a link-state routing protocol for IP networks. OSPFv2 is defined for IPv4 networks. OSPF detects changes in the topology, such as link failures, and converges on a new loop-free routing structure very quickly. It computes each route using Dijkstra's algorithm, a shortest path first algorithm.

In this lab, you will configure the network topology with OSPFv2 routing and use a number of CLI commands to display and verify OSPF routing information.

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

Required Resources

- 3 Routers (Cisco 2911)
- 6 PCs (Windows 7, Vista, or XP with terminal emulation program, such as Tera Term)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet and serial cables as shown in the topology

Part 1: Build the Network and Configure Basic Device Settings

In Part 1, you set up the network topology and configure basic settings on the PC hosts and routers.

Step 1: Cable the network as shown in the topology.

Step 2: Initialize and reload the routers as necessary.

Step 3: Configure basic settings for each router.

- Disable DNS lookup.
- Configure device name as shown in the topology.
- Assign **class** as the privileged EXEC password.
- Assign **cisco** as the console and vty passwords.
- Configure a message of the day (MOTD) banner to warn users that unauthorized access is prohibited.
- Configure the IP address listed in the Addressing Table for all interfaces.
- Copy the running configuration to the startup configuration.

Step 4: Configure PC hosts.

Step 5: Test connectivity.

The routers should be able to ping one another, and each PC should be able to ping its default gateway. The PCs are unable to ping other PCs until OSPF routing is configured. Verify and troubleshoot if necessary.

Part 2: Configure and Verify OSPF Routing

In Part 2, you will configure OSPF routing on all routers in the network and then verify that routing tables are updated correctly. After OSPF has been verified, you will configure OSPF authentication on the links for added security.



Step 1: Configure OSPF on R1,R2 and R3.

- a. Use the **router ospf** command in global configuration mode to enable OSPF on R1.

R1(config)# **router ospf 1**

Note: The OSPF process id is kept locally and has no meaning to other routers on the network.

- b. Configure the **network** statements for the networks on R1. Use an area ID of 0.

R1(config)# **router ospf 1**

R1(config-router)# **network 192.168.1.0 0.0.0.255 area 0**

R1(config-router)# **network 192.168.0.0 0.0.0.3 area 0**

- c. Configure the **network** statements for the networks on R2. Use an area ID of 0.

R2(config)# **router ospf 1**

R2(config-router)# **network 192.168.2.0 0.0.0.63 area 0**

R2(config-router)# **network 192.168.0.0 0.0.0.3 area 0**

R2(config-router)# **network 192.168.0.4 0.0.0.3 area 0**

- d. Configure the **network** statements for the networks on R3. Use an area ID of 0.

R3(config)# **router ospf 1**

R3(config-router)# **network 192.168.3.0 0.0.0.31 area 0**

R3(config-router)# **network 192.168.0.4 0.0.0.3 area 0**

Step 2: Verify OSPF neighbors and routing information.

- a. Issue the **show ip ospf neighbor** command to verify that each router lists the other routers in the network as neighbors.

R1# **show ip ospf neighbor**

- b. Issue the **show ip route** command to verify that all networks display in the routing table on all routers.

R1# **show ip route**

Step 3: Verify OSPF protocol settings.

The **show ip protocols** command is a quick way to verify vital OSPF configuration information. This information includes the OSPF process ID, the router ID, networks the router is advertising, the neighbors the router is receiving updates from, and the default administrative distance, which is 110 for OSPF.

R1# **show ip protocols**

Step 4: Verify OSPF process information.

Use the **show ip ospf** command to examine the OSPF process ID and router ID. This command displays the OSPF area information, as well as the last time the SPF algorithm was calculated.

R1# **show ip ospf**

Step 5: Verify OSPF interface settings.

- a. Issue the **show ip ospf interface brief** command to display a summary of OSPF-enabled interfaces.

R1# **show ip ospf interface brief**

- b. For a more detailed list of every OSPF-enabled interface, issue the **show ip ospf interface** command.

R1# **show ip ospf interface**

Step 6: Verify end-to-end connectivity.

Each PC should be able to ping the other PCs in the topology. Verify and troubleshoot if necessary.

Lab 9.2– Home Activity for Configuring Single area OSPF

Topology:

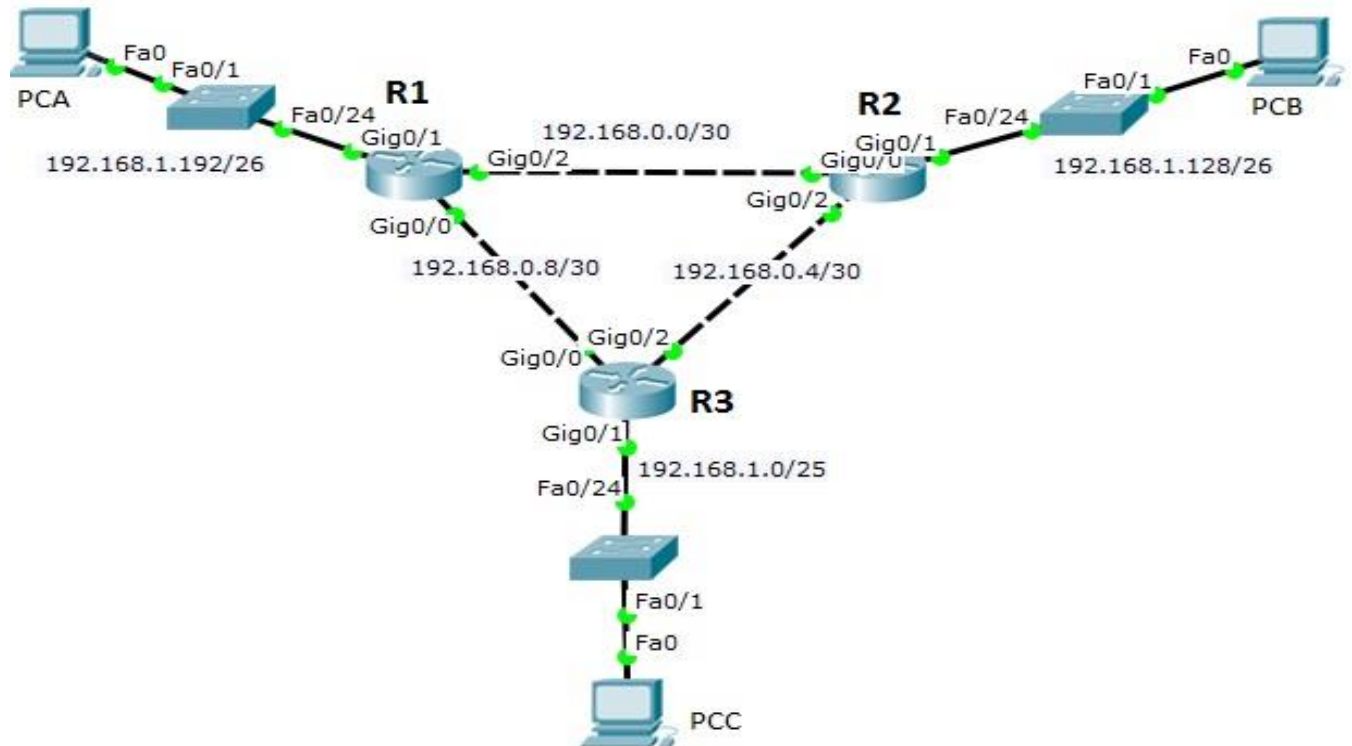


Figure: 9.2.1

Addressing Table:

Fill the addressing table as shown in the topology

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0			N/A
R1	G0/1			N/A
R1	G0/2			N/A
R2	G0/0			N/A
R2	G0/1			N/A
R2	G0/2			N/A
R3	G0/0			N/A
R3	G0/1			N/A
R3	G0/2			N/A
PC1	NIC			
PC2	NIC			
PC3	NIC			

Note:

- Put the screen shot of your designed topology at the end of this experiment.
- Also attach the printout of startup configurations, protocol information (#show ip protocol), interface information (#show ip interface brief), neighboring information (show ip ospf neighbor) and routing table of each router.



Lab's Evaluation Sheet

Students Registration No:	
Date Performed:	
Group No:	
Date of Submission:	

Sr. No.	Categories	Total Marks/Grade	Marks /Grade Obtained
1	Student's Behavior	2.5	
2	Lab Performance	2.5	
3	On Time Submission	5	
4	Home Activity	10	
	Net Result	20	

Examined By: (Instructor's Name & Initial's)

Date