Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	[@KLWKS_BOT] THANOS

Lab 8: Configuration of RIP and OSPF using Cisco network switch and verify the connectivity

Date of the Session:_____/___/_____   **Session Time:_____to_____**

Learning outcome:

- Understanding OSPF Basics and its role in dynamic routing protocols.
- Demonstrate an understanding of basic Cisco switch configuration, including accessing the command-line interface (CLI) and configuring interfaces.
- Identify and specify the OSPF router ID and Choose the OSPF network type (point-to-point, broadcast, etc.) and configure it accordingly.
- Understand the concept of hierarchical OSPF and area design**.**

Pre-Lab Task:

1. Mention the purpose and benefits of dynamic routing protocols such as RIP (Routing Information Protocol) and OSPF (Open Shortest Path First) in a network environment?

- **Purpose:** Automates route learning and updates, adapting to topology changes.

- **RIP:** Simple, hop-based metric, best for small networks.

- **OSPF:** Faster, uses cost-based metric, supports large networks with hierarchical design.

2. Ensure you have access to the required Cisco network switch (real or simulated) and a terminal emulator tool like PuTTY or SecureCRT for accessing the switch's command-line interface?

- Cisco Router/Switch (Physical or Simulated - Packet Tracer, GNS3, EVE-NG).

- Terminal Emulator (PuTTY, SecureCRT, or CLI in simulators).

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3. Clearly define the objectives of your lab, specifying what OSPF configurations you intend to implement and what outcomes you expect to achieve.

- **Objectives:** Configure OSPF, establish neighbor relationships, verify routing.

- **Outcomes:** Successful OSPF adjacency, automatic route propagation, optimized routing.

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In Lab Task: Configuration of RIP and OSPF using Cisco network switch.

Configuring OSPF (Open Shortest Path First) on a Cisco network switch involves several steps. Here's a basic guide to help you configure OSPF and verify connectivity on a Cisco switch:

Note: OSPF is typically configured on routers rather than switches. If you are working with a Layer 3 switch, you can configure OSPF on the switch. If you are using a Layer 2 switch, you would configure OSPF on a connected router.

1. Access Switch CLI:

- Access the command-line interface (CLI) of your Cisco switch using a console cable, Telnet, or SSH.

2. Enter Global Configuration Mode:

- Enter global configuration mode by typing:

switch> enable switch# configure terminal

3. Configure OSPF:

- Enter OSPF configuration mode and specify an OSPF process ID (e.g., 1):

switch(config)# router ospf 1

4. Assign Router ID:

- Assign a router ID to the switch. This can be done manually or left to the system to choose. For manual assignment:

switch(config-router)# router-id <router_id>

5. Enable OSPF on Interfaces:

- Enable OSPF on the interfaces participating in OSPF. For each interface, use:

switch(config-router)# network <network_address> <wildcard_mask> area <area_id>

6. Verify OSPF Configuration:

- Verify OSPF configuration using the following commands:

switch# show ip ospf switch# show ip ospf interface

7. Exit Configuration Mode:

- Exit OSPF configuration mode and return to global configuration mode:

switch(config-router)# exit

8. Save Configuration:

- Save the configuration to ensure it persists after a reboot:

switch# write memory

9. Verify Connectivity:

- Verify OSPF connectivity by checking OSPF neighbor relationships and routing tables. Use commands such as:

switch# show ip ospf neighbor switch# show ip route

10. Test Connectivity:

- Test connectivity between devices in different OSPF areas to ensure that OSPF is routing traffic correctly.

11. Troubleshoot if Necessary:

- If there are issues with OSPF adjacency or routing, use troubleshooting commands like:

switch# show ip ospf interface switch# show ip ospf database

12. Monitor OSPF:

- Continuously monitor OSPF using commands such as:

switch# debug ip ospf events switch# debug ip ospf adj

13. Disable Debugging:

- Once troubleshooting is complete, disable debugging:

switch# undebug all

14. Save Final Configuration:

- Save the final configuration to ensure that it is persistent:

switch# write memory

By following these steps, you can configure OSPF on a Cisco switch, verify the OSPF configuration, and ensure proper connectivity.

Writing space for the Problem: (For Student's use only)

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Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address
PC0	FastEthrenet0	10.0.0.2	255.0.0.0	10.0.0.1
PC1	FastEthrenet0	10.0.0.3	255.0.0.0	10.0.0.1
PC2	FastEthrenet0	12.0.0.2	255.0.0.0	12.0.0.1
PC3	FastEthrenet0	12.0.0.3	255.0.0.0	12.0.0.1
Router - A	g0/0	10.0.01	255.0.0.0	
Router - A	s0/0/0	11.0.01	255.0.0.0	
Router - B	g0/0	12.0.01	255.0.0.0	
Router - B	s0/0/0	11.0.0.2	255.0.0.0	

Configuration for Routers
Fast Ethernet Port Configuration & Serial Port Configuration

Fast Ethernet Port Configuration	Fast Ethernet Port Configuration
Router – 8	**Router – 9**
Router>en Router#config t Router(config)# int g0/0 Router(config-if)# ip address 10.0.0.1 255.0.0.0 Router(config-if)# no shut	Router>en Router#config t Router(config)# int g0/0 Router(config-if)# ip address 12.0.0.1 255.0.0.0 Router(config-if)# no shut
Serial Port Configuration	**Serial Port Configuration**
Router – 8	**Router – 9**
Router#config t Router(config)# int s0/0/0 Router(config-if)# ip address 11.0.0.1 255.0.0.0 Router(config-if)# no shut	Router#config t Router(config)# int s0/0/0 Router(config-if)# ip address 11.0.0.2 255.0.0.0 Router(config-if)# no shut

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<table>
<tr><td colspan="2" align="center">Configuration for Routers</td></tr>
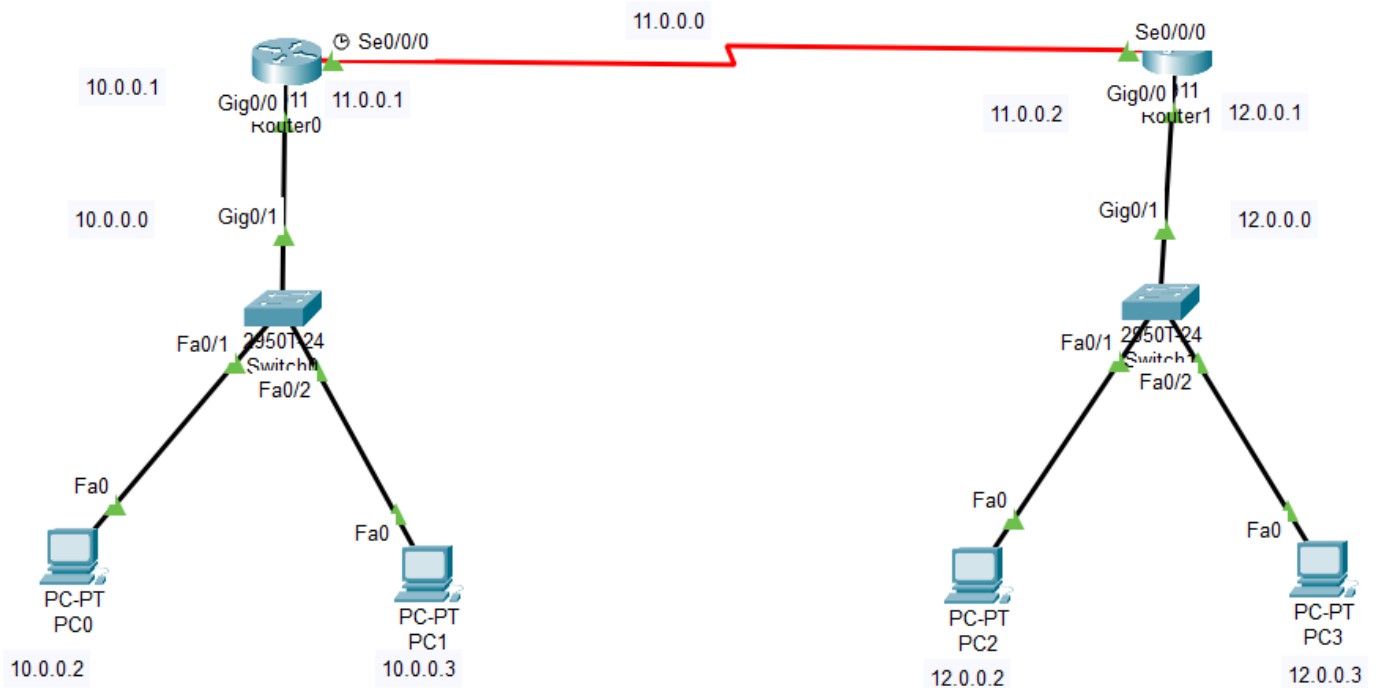<tr><td colspan="2" align="center">RIP Configuration</td></tr>
<tr>
<td align="center">Router – 8</td>
<td align="center">Router – 9</td>
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Router#config t
Router(config)# router rip
Router(config-router)# network 10.0.0.0
Router(config-router)# network 11.0.0.0

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<td>

Router#config t
Router(config)# router rip
Router(config-router)# network 11.0.0.0
Router(config-router)# network 12.0.0.0

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<tr><td colspan="2" align="center">Configuration for Routers</td></tr>
<tr><td colspan="2" align="center">OSPF Configuration</td></tr>
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<td align="center">Router – 8</td>
<td align="center">Router – 9</td>
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Router#config t
Router(config)# router ospf 1
Router(config-router)# network 10.0.0.0 0.255.255.255 area 0
Router(config-router)# network 11.0.0.0 0.255.255.255 area 0

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Router#config t
Router(config)# router ospf 1
Router(config-router)# network 11.0.0.0 0.255.255.255 area 0
Router(config-router)# network 12.0.0.0 0.255.255.255 area 0

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DIAGRAM

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VIVA-VOCE Questions (In-Lab):

1. Explain what OSPF stands for and its primary purpose in networking.
2. How does OSPF differ from other routing protocols, such as RIP or EIGRP?
3. Describe the basic steps to configure OSPF on a Cisco network switch.
4. What is the OSPF router ID, and how is it determined?
5. What are OSPF areas, and why are they used in OSPF network design??

1. **OSPF** stands for Open Shortest Path First, a **link-state routing protocol** that finds the best path for data based on network topology.

2. **OSPF vs RIP/EIGRP:**
   - OSPF is **link-state**, RIP is **distance-vector**, and EIGRP is a **hybrid** protocol.
   - OSPF uses **Dijkstra's algorithm**, RIP uses **hop count**, and EIGRP uses **composite metrics**.
   - OSPF supports **areas**; RIP does not.

3. **OSPF configuration steps:**
   - Enter configuration mode: `configure terminal`
   - Enable OSPF: `router ospf 1`
   - Add network: `network <IP> <mask> area <area>`
   - Set router ID (optional): `router-id <ID>`
   - Save: `write memory`

4. **OSPF Router ID:** A unique 32-bit identifier for the router, determined by the **highest IP address of a loopback interface**, or if none, the **highest active interface IP**.

5. **OSPF Areas:** Logical groupings to reduce overhead. **Area 0** is the backbone. Areas improve **scalability** and reduce **routing table size**.

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Post Lab Task:

1. Verify the OSPF configurations to ensure that routing is functioning as expected. Use show commands to check OSPF neighbour relationships, routing tables, and routing information. Confirm that OSPF is redistributing routes correctly?

- Check OSPF neighbors: `show ip ospf neighbor`
- Verify OSPF routes: `show ip route ospf`
- Check OSPF process: `show ip ospf`
- Confirm route redistribution: `show running-config | include redistribute`

2. Differentiate the RIP and OSPF configuration by sending traffic between devices in the network to ensure that routing is working as expected?

- Verify RIP routes: `show ip route rip`
- Verify OSPF routes: `show ip route ospf`
- Test connectivity: `ping <IP>`
- Check path selection: `traceroute <IP>`

3. Use show commands (e.g., **show ip route**) to verify that the switch's routing table includes RIP and OSPF-learned routes and that they are correct?

- Show full routing table: `show ip route`

- Check specific protocol routes: `show ip route rip` / `show ip route ospf`

- Confirm protocol settings: `show ip protocols`

Evaluator Remark (if Any):	
	Marks Secured _____ out of 50
	Signature of the Evaluator with Date