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# **Department of Computer Science and Engineering Islamic University of Technology (IUT)** A subsidiary organ of OIC

# **Laboratory Report**

# CSE 4412: Data Communication and Networking Lab

## 

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**Date of Submission: 01/03/2024**

### **Title:** Configuring and Verifying of RIP and OSPF in a network topology.

### **Objective**:

1. Describe the concept of dynamic routing
2. Explain disadvantages of RIPv1 and improvement in RIPv2
3. Configure Routing Information Protocol (RIP) in a network topology following given specifications
4. Describe the concept of OSPF and related terminologies
5. Explain the advantages of OSPF over RIP
6. Configure OSPF in a network topology following the given specifications

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### **Devices/ software Used**:

* + - 1. Cisco Packet Tracker

### **Theory:**

*(Explain in brief the listed keywords)*

**Routing Information Protocol (RIP):** is a dynamic routing protocol that uses hop count as a routing metric to find the best path between the source and the destination network. It is a distance-vector routing protocol that has an AD value of 120 and works on the Network layer of the OSI model. RIP uses port number 520.

**Forwarding Table used in RIP:**

A table to make decisions about where to send received frames.

**Hop Count as cost**

* The hop count represents the number of routers between the source and destination networks.
* RIP aims to find the path with the fewest hops and places it in the routing table.
* The maximum hop count allowed in RIP is 15, and a hop count of 16 indicates network unreachability**.**

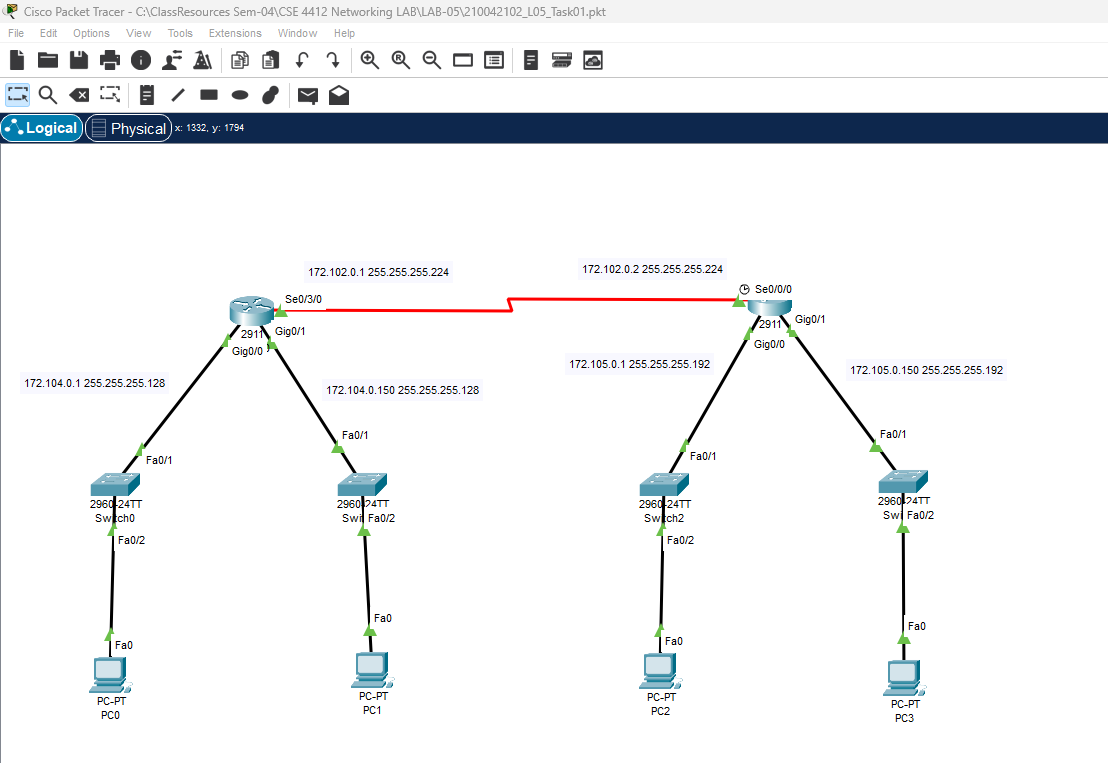
**Timers in RIP:**

* **Update timer:**The default timing for routing information being exchanged by the routers operating RIP is 30 seconds. Using an Update timer, the routers exchange their routing table periodically.
* **Invalid timer:**If no update comes until 180 seconds, then the destination router considers it invalid. In this scenario, the destination router mark hop counts as 16 for that router.
* **Hold down timer:**This is the time for which the router waits for a neighbor router to respond. If the router isn’t able to respond within a given time then it is declared dead. It is 180 seconds by default.
* **Flush time:**It is the time after which the entry of the route will be flushed if it doesn’t respond within the flush time. It is 60 seconds by default. This timer starts after the route has been declared invalid and after 60 seconds i.e time will be 180 + 60 = 240 seconds.

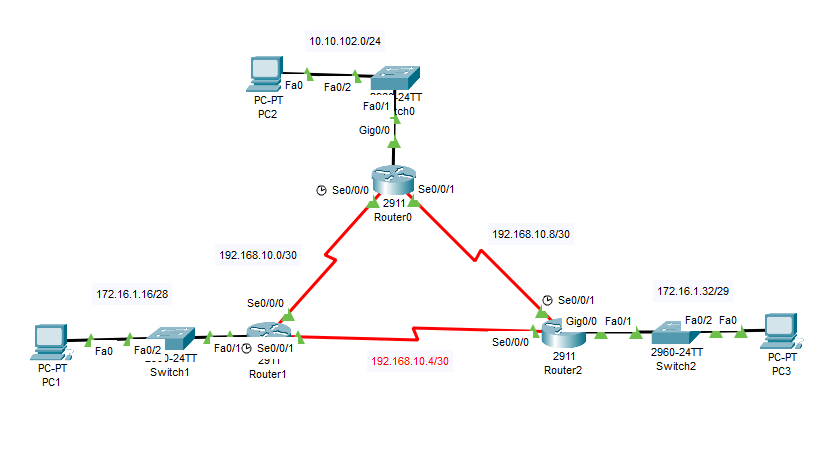
### **Diagram of the experiment:**

*(Provide screenshot of the final network topology. Make sure to label the network components.)*

**Task #01:**

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**Task #02:**



### **Working Procedure:**

***(****Explain in brief how you completed the tasks. Provide necessary screenshots of used commands for each task.)*

**Task #01:**

* 1. We have 2 routers. First of all we need to configure the interfaces of those 2 routers.
  2. Then we need to configure the pc.
  3. At last we need to configure RIP in both routers:

R1 (config)#router rip

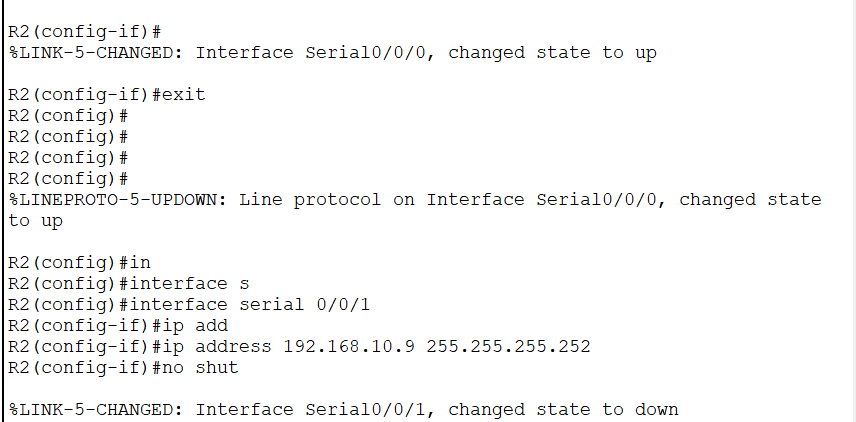
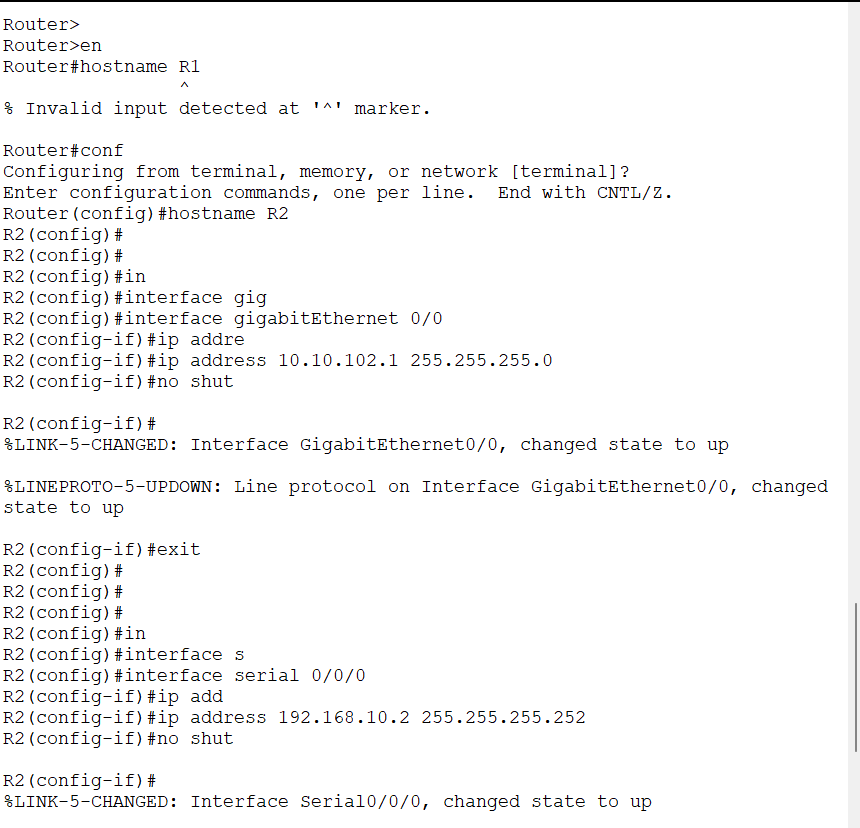
R1 (config-router)#version 2

R1 (config-router)#network 172.102.0.0

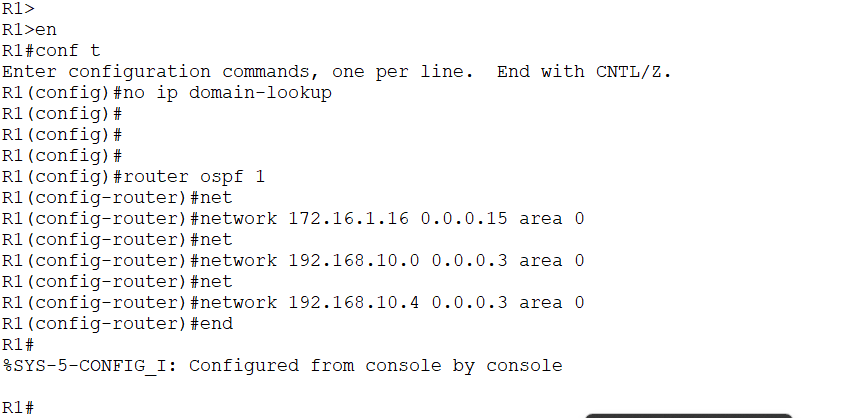
R1 (config-router)#network 172.104.0.0

**Task #02:**

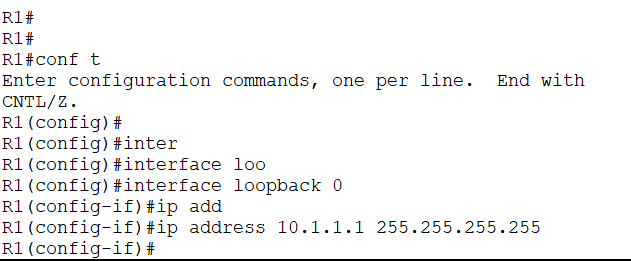
Step 1: Configure the routers

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Task: Configure OSPF on the R1 Router

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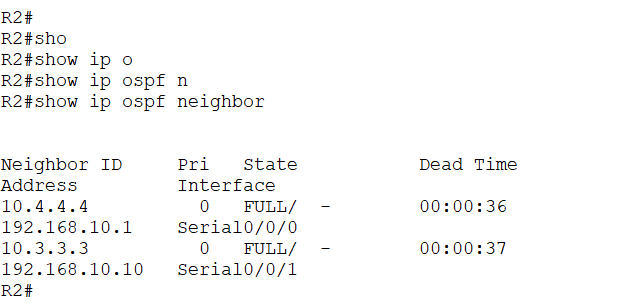
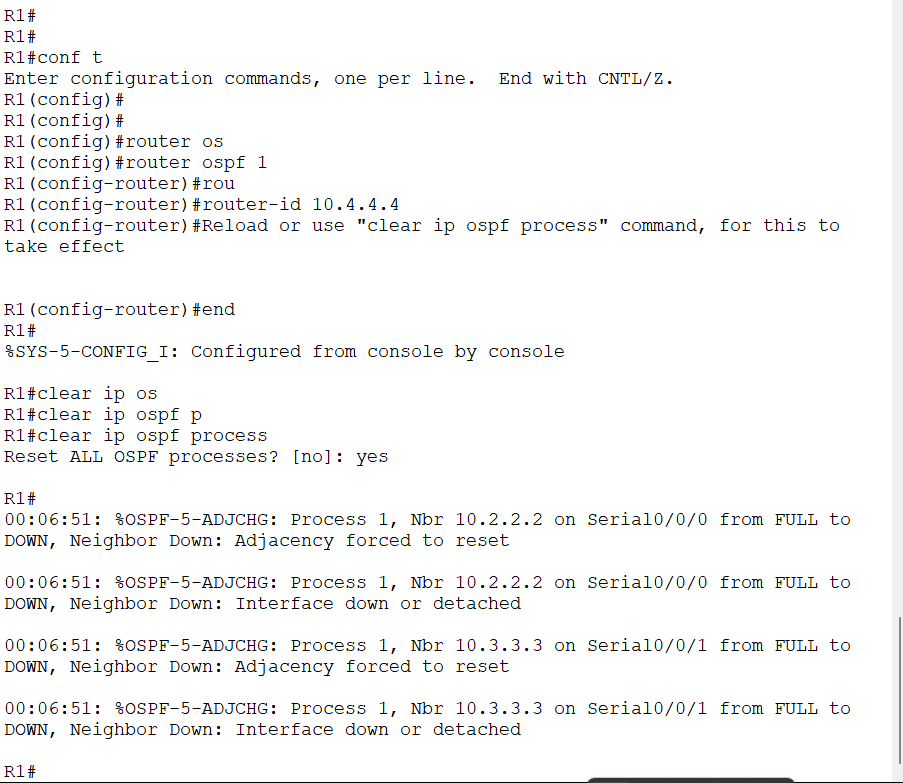
TASK : Use loopback addresses to change the router IDs of the routers in the topology.

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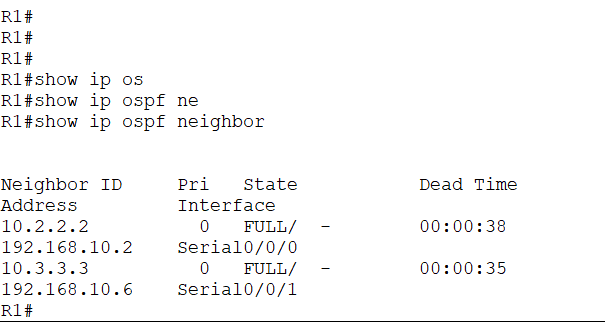
Step 3: Reload the routers to force the new Router IDs to be used.



Step 5: Use the router-id command to change the router ID on the R1 router.

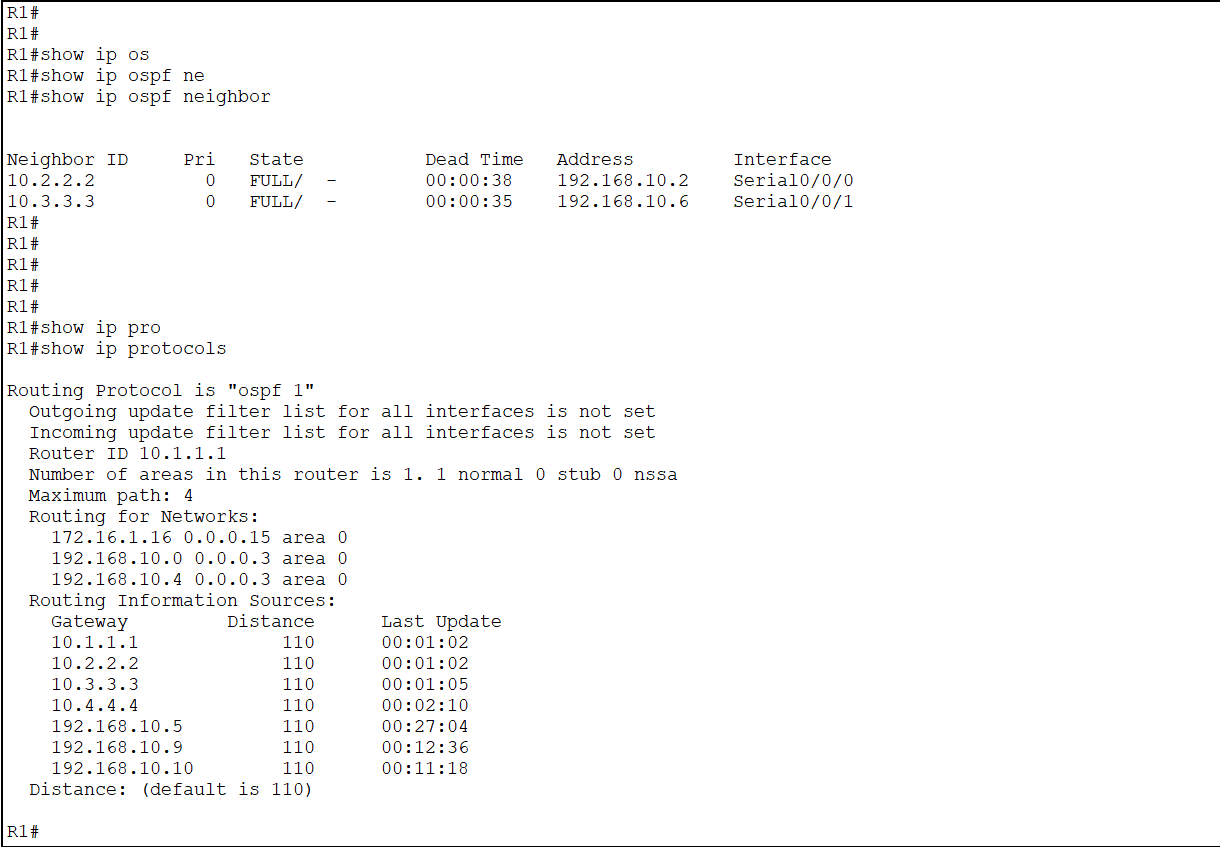


Step 6: Use the show ip ospf neighbor command on router R2 to verify that the router ID of R1 has been changed

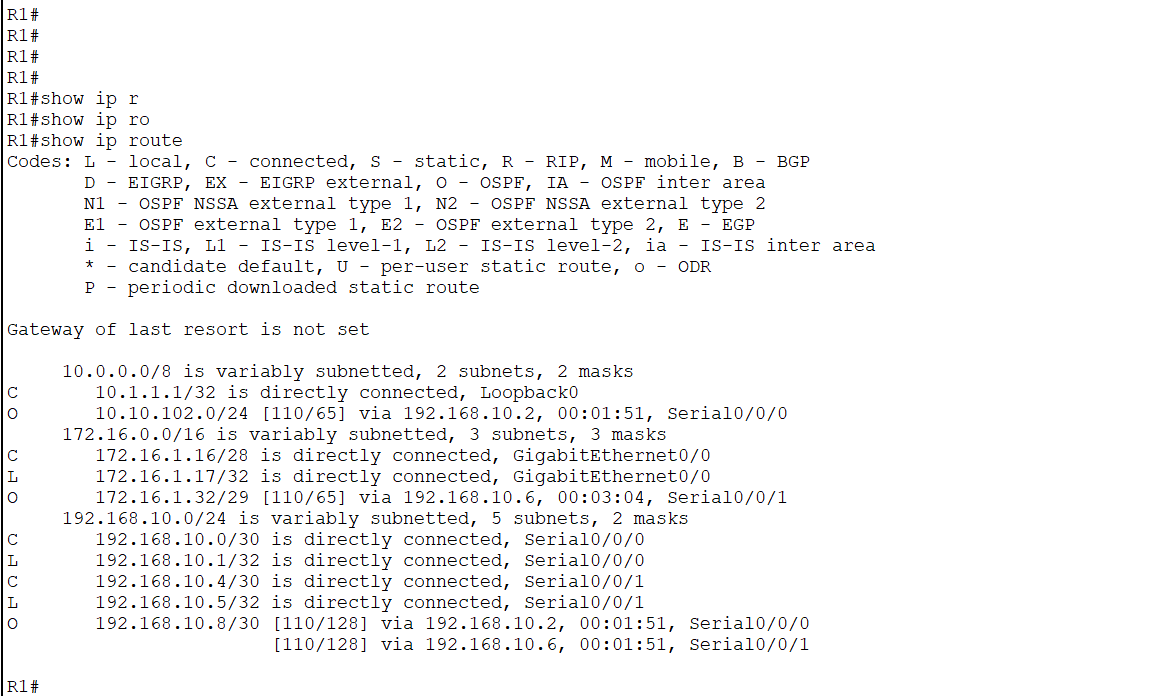


Task: Verify OSPF Operation

Step 2: On the R1 router, use the show ip protocols command to view information about the routing protocol operation.

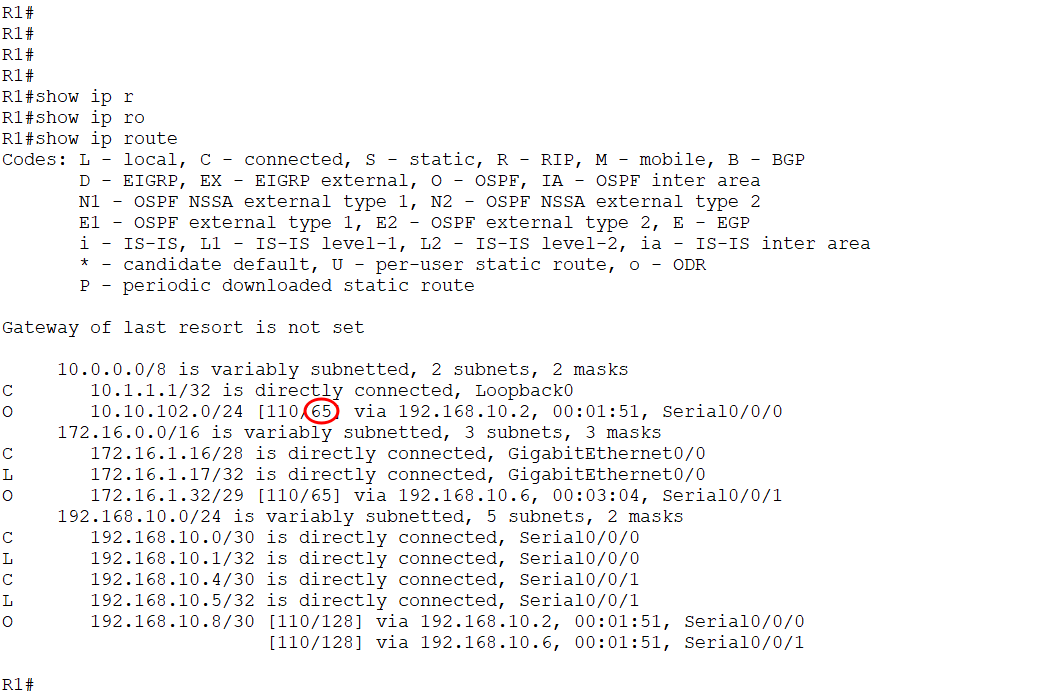


Task: Examine OSPF Routes in the Routing Tables

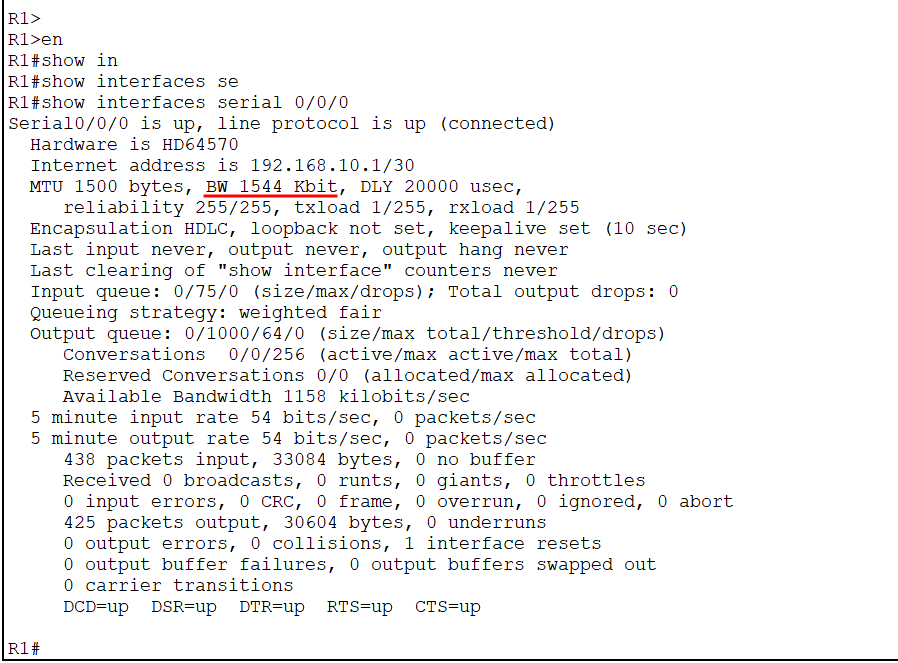


Task: Configure OSPF Cost

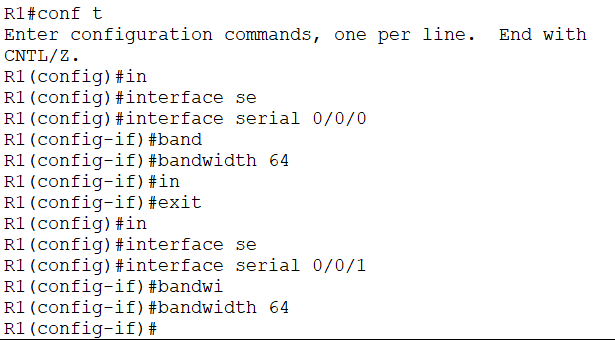
Step 1: Use the show ip route command on the R1 router to view the OSPF cost to reach the 10.10.102.0/24 network.



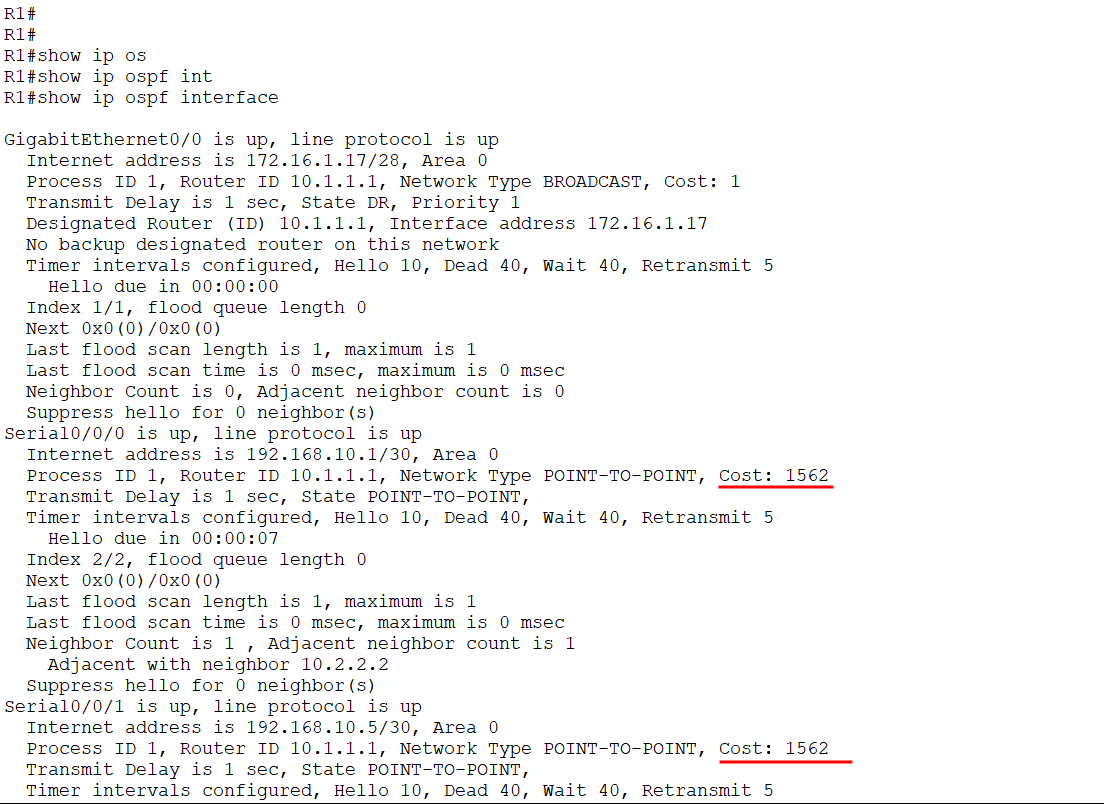
Step 2: Use the show interfaces serial0/0/0 command on the R1 router to view the bandwidth of the Serial 0/0/0 interface.



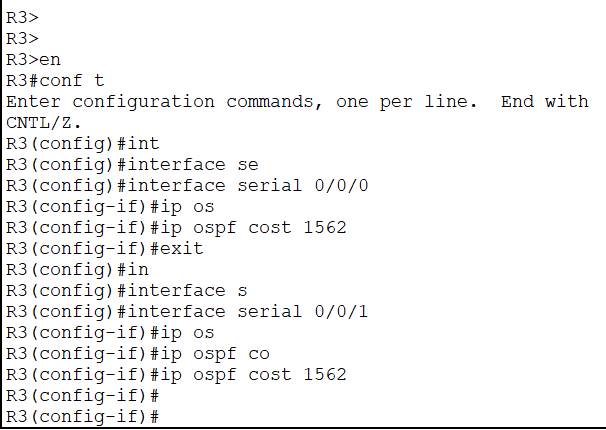
Step 3: Use the bandwidth command to change the bandwidth of the serial interfaces of the R1 and R2 routers to the actual bandwidth, 64 kbps.



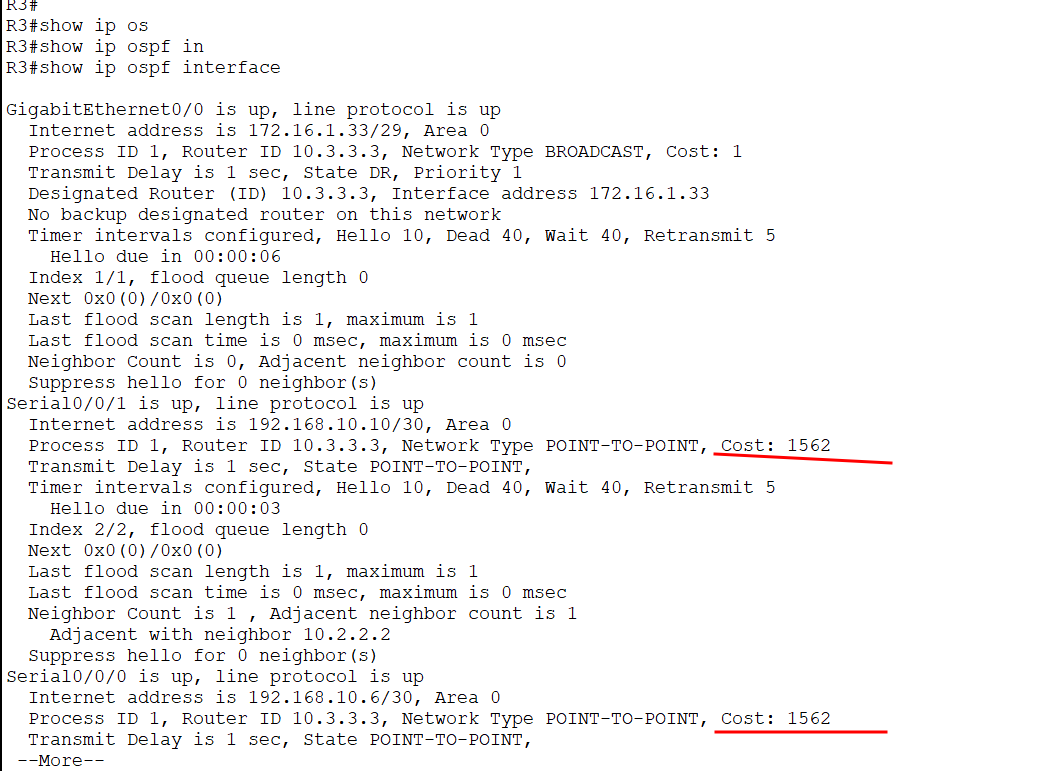
Step 4: Use the show ip ospf interface command on the R1 router to verify the cost of the serial links



Step 5: Use the ip ospf cost command to configure the OSPF cost on the R3 router.



Step 6: Use the show ip ospf interface command on the R3 router to verify that the cost of the link the cost of each of the Serial links is now 1562.



### **Q/A for the tasks:**

***(****There were many q/a sections inside the task pdfs. Copy the questions and your answers here.)*

**Task #02:**

1. What is the router ID for R1? **ANS: 192.168.10.5**
2. What is the router ID for R2? **ANS: 192.168.10.9**
3. What is the router ID for R3? **ANS: 192.168.10.10**

1. When the router is reloaded, what is the router ID for R1? **ANS: 10.1.1.1**
2. When the router is reloaded, what is the router ID for R2? **ANS: 10.2.2.2**
3. When the router is reloaded, what is the router ID for R3? **ANS: 10.3.3.3**

### **Observation**:

Task-02 was challenging but fun.

### **Challenges (if any):**

Took a long time to do task-2.

**References:**

1. [Routing Information Protocol (RIP) - GeeksforGeeks](https://www.geeksforgeeks.org/routing-information-protocol-rip/)