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

**Network Design Overview:**

* **Router1** connected to **Switch1**, which has **PC1** and **PC2**.
* **Router2** connected to **Switch2**, which has **PC3** and **PC4**.
* **Router1** and **Router2** are connected via a serial connection.
* Both routers will be configured with **RIP** to route traffic between networks.

**Step 1: Initial Physical Setup**

1. **Connect the devices physically:**
   * **PC1** to **Switch1** (FastEthernet 0/1).
   * **PC2** to **Switch1** (FastEthernet 0/2).
   * **PC3** to **Switch2** (FastEthernet 0/1).
   * **PC4** to **Switch2** (FastEthernet 0/2).
   * **Switch1** to **Router1** (FastEthernet 0/1).
   * **Switch2** to **Router2** (FastEthernet 0/1).
   * **Router1** to **Router2** using a serial cable (Serial0/0/0).

**Step 2: Assign IP Addresses**

We'll assign IP addresses to each PC and network interface. The setup will use the following networks:

* **Network 1 (PC1 & PC2)**: 192.168.1.0/24
* **Network 2 (PC3 & PC4)**: 192.168.2.0/24
* **Network 3 (between Router1 and Router2)**: 192.168.3.0/30

**PC IP Configuration:**

* **PC1**: 192.168.1.2 /24, Gateway: 192.168.1.1
* **PC2**: 192.168.1.3 /24, Gateway: 192.168.1.1
* **PC3**: 192.168.2.2 /24, Gateway: 192.168.2.1
* **PC4**: 192.168.2.3 /24, Gateway: 192.168.2.1

**Router1 IP Addresses:**

* **FastEthernet 0/1**: 192.168.1.1 /24 (connects to Switch1)
* **Serial 0/0/0**: 192.168.3.1 /30 (connects to Router2)

**Router2 IP Addresses:**

* **FastEthernet 0/1**: 192.168.2.1 /24 (connects to Switch2)
* **Serial 0/0/0**: 192.168.3.2 /30 (connects to Router1)

**Step 3: Configure Switches**

Switches don’t require IP addresses but should be configured as Layer 2 devices to handle basic switching.

1. **Switch1 Configuration**:

Switch1# configure terminal

Switch1(config)# interface range fastethernet 0/1 - 2

Switch1(config-if-range)# switchport mode access

Switch1(config-if-range)# no shutdown

Switch1(config-if-range)# exit

Switch1(config)# exit

1. **Switch2 Configuration**:

Switch2# configure terminal

Switch2(config)# interface range fastethernet 0/1 - 2

Switch2(config-if-range)# switchport mode access

Switch2(config-if-range)# no shutdown

Switch2(config-if-range)# exit

Switch2(config)# exit

**Step 4: Configure the Routers**

**Router1 Configuration:**

1. **Configure interfaces**:

Router1# configure terminal

Router1(config)# interface fastethernet 0/1

Router1(config-if)# ip address 192.168.1.1 255.255.255.0

Router1(config-if)# no shutdown

Router1(config-if)# exit

Router1(config)# interface serial 0/0/0

Router1(config-if)# ip address 192.168.3.1 255.255.255.252

Router1(config-if)# clock rate 64000

Router1(config-if)# no shutdown

Router1(config-if)# exit

1. **Enable RIP routing**:

Router1(config)# router rip

Router1(config-router)# version 2

Router1(config-router)# network 192.168.1.0

Router1(config-router)# network 192.168.3.0

Router1(config-router)# no auto-summary

Router1(config-router)# exit

**Router2 Configuration:**

1. **Configure interfaces**:

Router2# configure terminal

Router2(config)# interface fastethernet 0/1

Router2(config-if)# ip address 192.168.2.1 255.255.255.0

Router2(config-if)# no shutdown

Router2(config-if)# exit

Router2(config)# interface serial 0/0/0

Router2(config-if)# ip address 192.168.3.2 255.255.255.252

Router2(config-if)# no shutdown

Router2(config-if)# exit

1. **Enable RIP routing**:

Router2(config)# router rip

Router2(config-router)# version 2

Router2(config-router)# network 192.168.2.0

Router2(config-router)# network 192.168.3.0

Router2(config-router)# no auto-summary

Router2(config-router)# exit

**Step 5: Verify Connectivity**

1. **Ping between routers**: Test the connection between **Router1** and **Router2**.

Router1# ping 192.168.3.2

1. **Ping between PCs on different networks**: From **PC1**, try to ping **PC3**:

PC1> ping 192.168.2.2

1. **Check routing tables**: On each router, check the routing table to verify that routes learned via RIP are present:

Router1# show ip route

Router2# show ip route

**Step 6: Debugging (If Necessary)**

If there are issues, you can debug the RIP configuration:

Router1# debug ip rip

Router2# debug ip rip