EX.NO:07

Date :

OSPF Configuration

Aim:

To configure and analyze the performance of the OSPF routing protocol in Cisco Packet Tracer using a multi-router topology, enabling communication between two networks (192.168.1.0 and 155.165.1.0) through dynamic routing.

Theory: OSPF

OSPF is a link-state Interior Gateway Protocol (IGP) that uses Dijkstra's Shortest Path First (SPF) algorithm to compute the best routes. It exchanges Link-State Advertisements (LSAs) to build a complete network topology, ensuring quick convergence and scalability.

Key Points:

1. **Dynamic Routing:** Automatically updates routing tables if topology changes.
2. **Metric:** Selects paths based on cost (inversely proportional to bandwidth).
3. **Areas:** Supports hierarchical routing with Area 0 as the backbone.
4. **Fast Convergence:** Ensures reliable and quick recovery after failures.

Required Equipment:

1. 3 Routers (Router0, Router1, Router2).
2. 2 Switches (Switch0, Switch1).
3. 2 PCs (PC0, PC1).
4. Serial/FastEthernet connections between routers.
5. Cisco Packet Tracer Software.

Procedure: OSPF Configuration in Cisco Packet Tracer

1. Build the Topology

- Connect Router0 ↔ Router2 ↔ Router1 using Serial links.
- Add a direct link between Router0 and Router1.
- Connect PC0 to Router0 via Switch0 (Network A: 192.168.1.0).
- Connect PC1 to Router1 via Switch1 (Network B: 155.165.1.0).

2. Assign IP Addresses

- **Network A:** PC0 = 192.168.1.2 /24, Gateway (Router0) = 192.168.1.1.
- **Network B:** PC1 = 155.165.1.2 /24, Gateway (Router1) = 155.165.1.1.
- Inter-router links:
  - Router0–Router2: 10.0.0.0/30.
  - Router2–Router1: 30.0.0.0/30.
  - Router0–Router1: 20.0.0.0/30.

3. Configure OSPF on Routers

On each router, enable OSPF process ID 1 and advertise connected networks.
Example for Router0:

```
Router0(config)# router ospf 1

Router0(config-router)# network 192.168.1.0 0.0.0.255 area 0

Router0(config-router)# network 10.0.0.0 0.0.0.3 area 0

Router0(config-router)# network 20.0.0.0 0.0.0.3 area 0
```

Similarly configure Router1 and Router2 for their networks.

4. Verify OSPF

- Check neighbor relationships:

```
Router0# show ip ospf neighbor
```

- Check routing table:

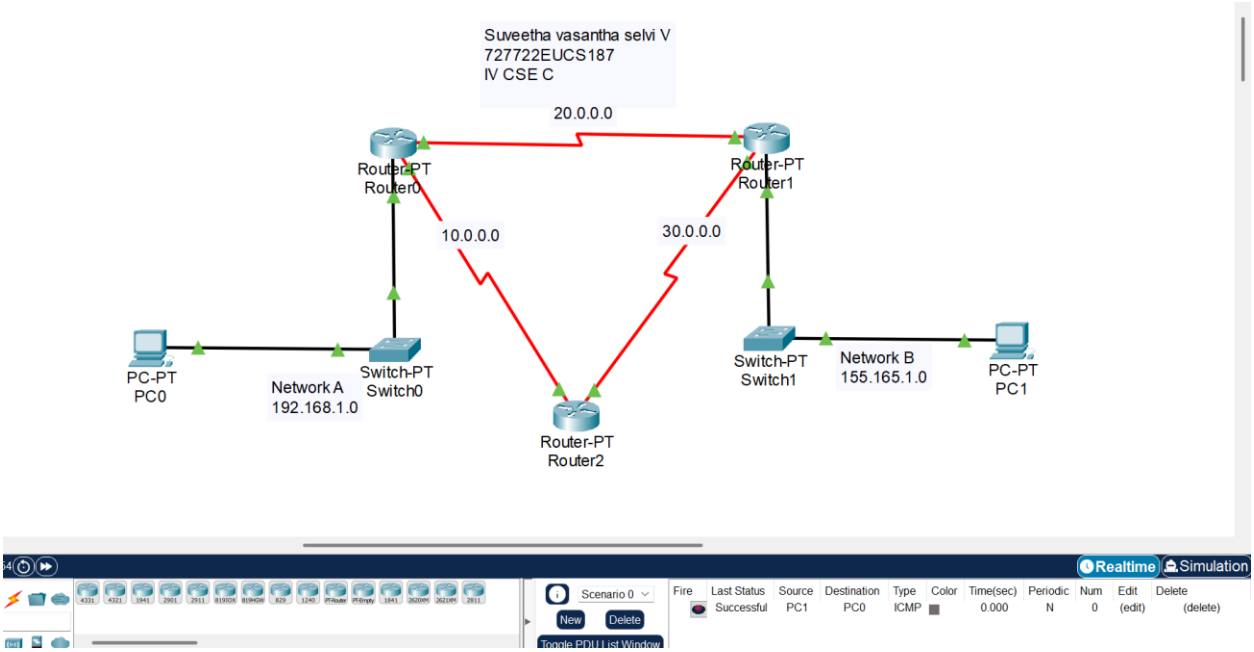
```
Router1# show ip route
```

- Routes learned via OSPF are marked with O.

5. Test Connectivity

- From PC0 → ping PC1 (192.168.1.2 → 155.165.1.2).
- Verify replies are received.
- Check alternate paths by shutting down one router link and observing OSPF rerouting.

MODEL OUTPUT:



RESULTS:

The OSPF routing protocol was successfully configured and simulated. Routers dynamically exchanged link-state information, built routing tables, and ensured communication between Network A (192.168.1.0) and Network B (155.165.1.0). The simulation also confirmed OSPF's ability to reroute traffic through alternate paths, verifying its efficiency and reliability.