VISHWAKARMA UNIVERSITY
Maximising Human Potential

Activity based

Project Report on

Computer Network Laboratory

Project Module - IV

Submitted to Vishwakarma University, Pune

Under the Initiative of

Contemporary Curriculum, Pedagogy, and Practice (C2P2)

By

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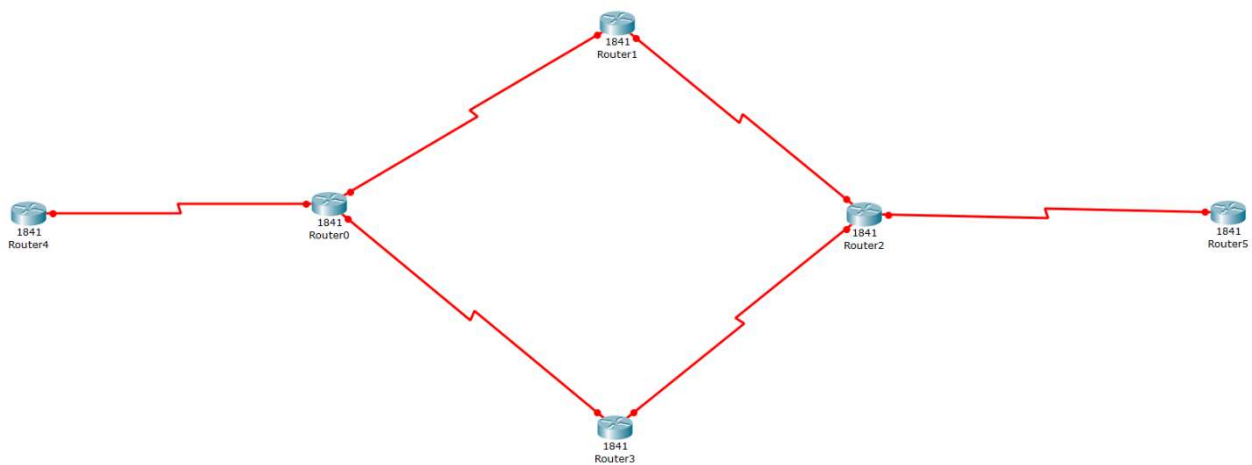**Faculty of Science and Technology**

Academic Year

2023-2024

Design and develop a LAN & WAN network and implement OSPF protocol

Project Statement:

Implement OSPF Routing with single area for following network.
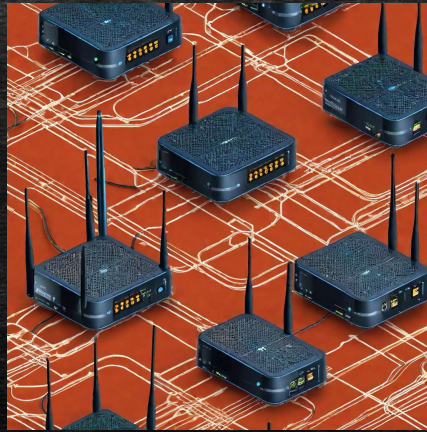
Select Class A IP addresses.

Problem Description:

    I.   Develop a LAN and WAN network for above mentioned diagram.

   II.   Implement OSPF routing.

 III.   Show successful communication in between different Network.

Project Module IV

Implementing OSPF Routing with Single Area

Introduction to OSPF

OSPF (Open Shortest Path First) is a popular routing protocol used in large enterprise networks. It is an interior gateway protocol (IGP) that is designed to efficiently distribute routing information within a single autonomous system (AS). OSPF is a link-state protocol that uses Dijkstra's algorithm to calculate the shortest path between two nodes on a network.

Advantages of OSPF

•Fast convergence time

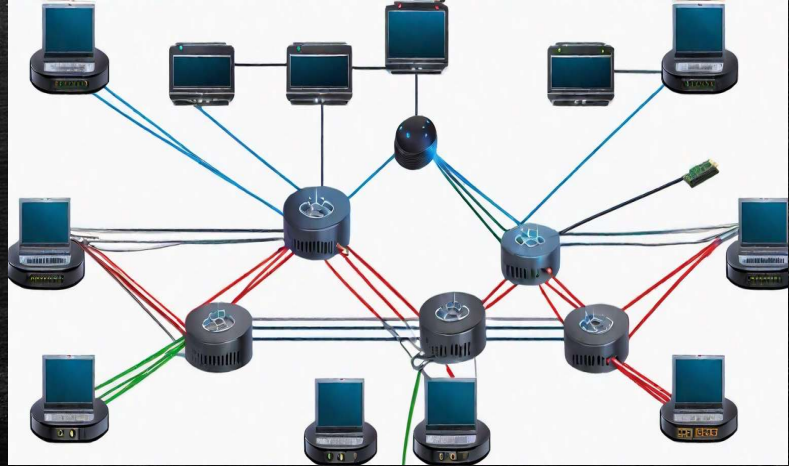•Scalability

•Support for variable-length subnet masks (VLSMs)
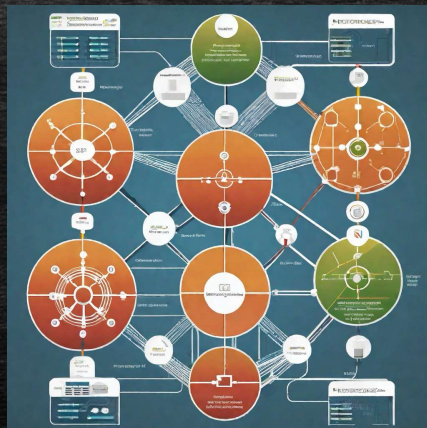
IP Addressing Scheme

Each router in the network has a unique class A IP address, with the first octet ranging from 1 to 6. The IP addresses are assigned as follows:
1. Router 1: 10.0.0.1
2. Router 2: 10.0.0.2
3. Router 3: 10.0.0.3
4. Router 4: 10.0.0.4
5. Router 5: 10.0.0.5
6. Router 6: 10.0.0.6

Configuring OSPF

Step 1: Assign IP Addresses

▪ Before configuring OSPF, you must assign IP addresses to each interface on your routers. Make sure to use class A IP addresses for your network.

Step 2: Enable OSPF

▪ Once your IP addresses are assigned, you can enable OSPF on each router using the 'router ospf' command in global configuration mode. You will also need to specify the process ID for OSPF.

Configuring OSPF

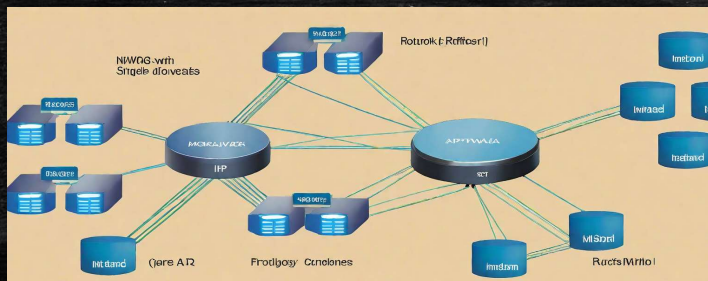### Step 3: Configure Interfaces

- Next, you will need to configure the interfaces on each router that will participate in OSPF. Use the 'network' command in router configuration mode to specify which interfaces will be part of the OSPF network.

Step 4: Verify OSPF Configuration

- After configuring OSPF on your routers, use the 'show ip ospf neighbor' command to verify that OSPF is running correctly and that all routers are communicating with each other.

Verifying OSPF Configuration

- **Checking OSPF Neighbors**

- Use the following command to check if OSPF neighbors are established:

- show ip ospf neighbor

- **Checking OSPF Routing Table**

- Use the following command to check the OSPF routing table:

- show ip route ospf

Troubleshooting OSPF

- **Verify Network Connectivity**

- Check that all routers are powered on and connected to the network. Verify that interfaces are up and have the correct IP addresses assigned.

- **Check OSPF Configuration**

- Verify that the OSPF configuration is correct on all routers. Check that the network statements match the network topology and that the router IDs are unique.

- **Check OSPF Neighbors**

- Verify that all routers have formed OSPF adjacencies with their neighbors. Check that the neighbor IDs and IP addresses match on both sides of the adjacency.

Conclusion

- In conclusion, this network project has been a valuable learning experience in configuring and managing a complex network infrastructure. Through the setup of six interconnected routers, we have gained practical insights into network design, configuration, and routing. The implementation of OSPF routing protocol allowed us to establish efficient communication between the routers, ensuring data packets are delivered optimally across the network.

- We have also explored the importance of IP subnetting, which aids in efficient IP address allocation and management within the network. Understanding the roles and functions of hardware components, such as routers, switches, cables, and interfaces, is essential for building a resilient network infrastructure. Overall, OSPF is a powerful routing protocol that can greatly benefit a network. By carefully planning, designing, and configuring

- OSPF, we can create a robust and efficient network that meets the needs of our organization.