OSPF Network Simulation Project

Author: Hatim Mushtaq Khan – Network Engineer

1. Introduction

This project demonstrates the implementation and verification of the Open Shortest Path First (OSPF) routing protocol using Cisco Packet Tracer. The purpose of this project is to recall and strengthen OSPF configuration and troubleshooting skills through practical simulation.

2. Project Objectives

- Design and configure a multi-area OSPF network.

- Ensure communication between routers and end devices.

- Optimize routing through hierarchical OSPF area design.

- Verify OSPF operation using appropriate Cisco IOS commands.

3. Network Topology

The topology consists of four routers interconnected across multiple OSPF areas. Each router participates in OSPF routing and exchanges link-state information to build a complete network topology.

Areas used in the topology:

- Area 0: Backbone area

- Area 1: Branch or distribution area

- Area 2: Edge or access area

4. Tools and Technologies Used

- Cisco Packet Tracer (Version 8.x or higher)

- Cisco IOS Router CLI

- Windows/Linux/MacOS operating systems

- OSPF Routing Protocol (Open Shortest Path First)

5. Configuration Overview

Each router in the topology is configured with a unique Router ID, OSPF process ID, and network statements to enable OSPF on specific interfaces. The configuration also includes area assignments to create a hierarchical routing design.

Example configuration snippet:

Router(config)# router ospf 1 Router(config-router)# router-id 1.1.1.1 Router(config-router)# network 192.168.1.0 0.0.0.255 area 0 Router(config-router)# network 10.0.0.0 0.0.0.255 area 1

6. Verification and Testing

The following commands were used to verify OSPF operations and ensure successful neighbor relationships between routers:

- show ip ospf neighbor

- show ip route ospf

- show ip protocols

- ping

7. Results and Observations

The routers successfully established OSPF adjacencies, exchanged LSAs, and computed optimal routes based on link-state information. End-to-end connectivity was achieved across all routers and end devices.

8. Learning Outcomes

- Reinforced understanding of OSPF configuration and verification.

- Enhanced ability to troubleshoot routing issues.

- Improved knowledge of multi-area OSPF design principles.

9. Conclusion

This project provided practical experience in configuring and verifying OSPF routing in a simulated environment. The hands-on approach helped refresh technical routing skills and deepened understanding of OSPF operations and hierarchical design.

Appendix A – Network Diagram Placeholder

Insert your network topology diagram or screenshots from Cisco Packet Tracer here.