Computer Networks Project Report

1. Introduction

This report documents a Computer Networks project created using Cisco Packet Tracer. The project focuses on the practical implementation of networking concepts by designing and simulating a functional computer network. Emphasis is placed on understanding how real-world networks operate through logical design, configuration, and testing.

2. Project Objectives

- To design a structured and efficient network topology
- To implement subnetting for proper IP address management
- To configure DHCP for automatic IP allocation
- To implement Router-on-a-Stick for inter-VLAN communication
- To verify network connectivity through simulation and testing

3. Tools and Technologies Used

• Cisco Packet Tracer
• TCP/IP Networking Model
• Routing and Switching Concepts
• DHCP and VLAN Configuration

4. Network Topology and Design

The network topology was designed in Cisco Packet Tracer using routers, switches, and multiple end devices. The design follows a hierarchical approach to ensure scalability, manageability, and efficient data communication across the network.

5. Subnetting Implementation

Subnetting was applied to divide a single network into multiple smaller sub-networks. This approach improves network performance, enhances security, and ensures efficient utilization of IP addresses. Each VLAN or network segment was assigned a unique subnet based on its requirements.

6. DHCP Server Configuration

A DHCP (Dynamic Host Configuration Protocol) server was configured to automatically assign IP addresses to network devices. DHCP reduces manual configuration errors and simplifies network management by dynamically providing IP addresses, subnet masks, default gateways, and DNS information to connected hosts.

7. Router-on-a-Stick (Inter-VLAN Routing)

Router-on-a-Stick was implemented to enable communication between different VLANs. A single router interface was divided into multiple sub-interfaces, each configured with an IP

address corresponding to a specific VLAN. This method allows inter-VLAN routing while minimizing hardware requirements.

8. Configuration and Implementation

Network devices were configured step by step according to the design plan. Switches were configured with VLANs, routers were set up for inter-VLAN routing, and DHCP services were enabled to automate IP assignment. All configurations were validated through simulation.

9. Testing and Results

Network performance was tested using ping commands and simulation tools available in Cisco Packet Tracer. Successful communication between devices across different subnets and VLANs confirmed that the network was functioning correctly.

10. Learning Outcomes

This project provided hands-on experience with subnetting, DHCP configuration, and Router-on-a-Stick implementation. It enhanced practical understanding of how enterprise-level networks are designed and managed.

11. Conclusion

The Computer Networks project successfully demonstrates the implementation of key networking concepts using Cisco Packet Tracer. The use of subnetting, DHCP, and inter-VLAN routing reflects real-world networking practices and strengthens foundational networking skills.

12. Author Information

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