RIP Routing and Subnet Communication – Simulation Report

1. Introduction

This project demonstrates the configuration and behavior of the Routing Information Protocol (RIP) in a simulated network environment using Cisco Packet Tracer. The objective is to establish connectivity between multiple PCs across different subnets using dynamic routing and to analyze how routers determine packet forwarding paths.

2. Tools Used

- Cisco Packet Tracer (for simulation and testing)
- ICMP Ping (for connectivity verification)
- Traceroute (for path analysis)
- RIP (Routing Information Protocol) (for dynamic route sharing)

3. Network Topology Overview

The network consists of:

- Four PCs (PC1, PC2, PC3, PC4)
- Each PC connected to their respective switch's
- Four routers connected in a squarely fashion
- Each PC is placed in a different subnet, connected to the network via respective routers

4. Key Tasks Performed

4.1. Topology Setup

- Designed a network topology with 4 routers, 4 switches and 4 end devices
- Assigned IP addresses to each device using subnetting
- Configured interfaces and ensured inter-router connections

4.2. RIP Configuration

- Enabled RIP version 2 on all routers
- Added relevant networks using the network command
- Verified that routers exchanged routing tables dynamically

4.3.Connectivity Tests

Successfully pinged:

- PC1 → PC2
- PC1 → PC3
- PC1 → PC4

4.4.Routing Table Verification

Used show ip route and rip route print on Router 3 to verify RIP-learned routes

4.5.Traceroute Analysis

Ran tracert commands from PC1 to PC3 and PC4 to observe hop-by-hop routing behavior

5. Explanation: How a Router Determines if a Destination IP is in a Subnet

A router determines whether a destination IP address is within a particular subnet by performing a bitwise AND operation between the destination IP and the subnet mask. The result is then compared to the known network address in the routing table. If a match is found, the router forwards the packet through the corresponding interface; otherwise, it checks the routing table for alternate routes or default routes.

6. Traceroute Results

➤ **PC1 to PC3:**
- Hop 1: Router 1 internal IP
- Hop 2: Router 3 internal IP
- Destination: PC3 IP

➤ PC1 to PC4:
- Hop 1: Router 1 internal IP
- Hop 2: Router 2 internal IP
- Destination

7. Learning Outcomes

- Understood the role of dynamic routing protocols like RIP.
- Practiced subnetting and IP planning in simulated networks.
- Gained hands-on experience with network diagnostics tools.
- Learned how to verify and troubleshoot routing behavior.

8. Conclusion

This simulation demonstrated the successful application of RIP routing in a multi-router, multi-subnet environment. Using Cisco Packet Tracer, we validated connectivity and routing logic through pings, routing tables, and traceroute analysis, strengthening our understanding of dynamic routing in real-world networks.

9. Attachments

- RIP-Routing-Simulation.pkt
- 7 Screenshots (Topology, Pings, Routing Table, Traceroutes)