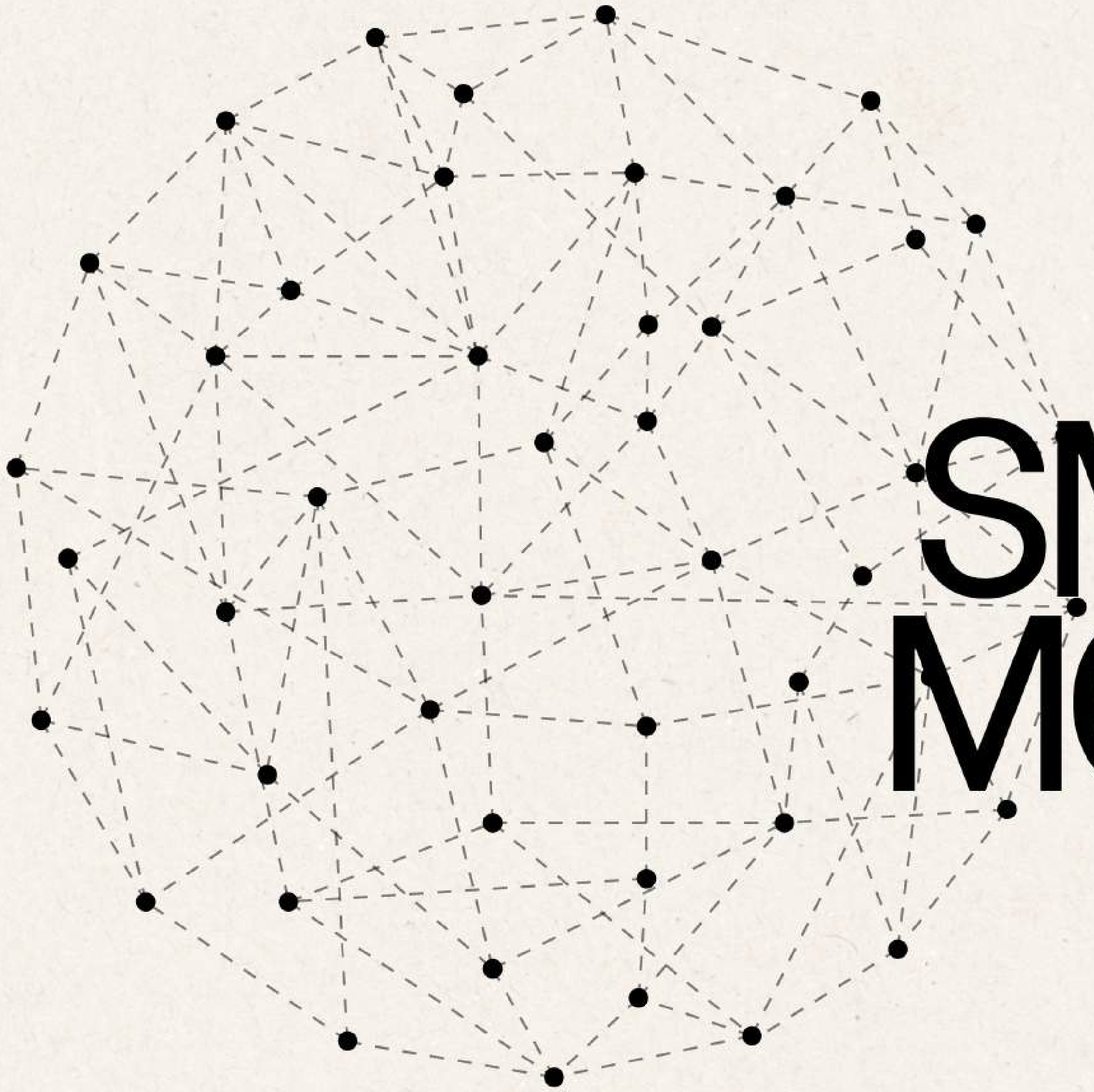


SMART PARKING AND MONITORING SYSTEM

Network Design with RIP & OSPF Protocols

Introduction

This project aims to design a smart system for managing and monitoring parking areas using modern networking technologies. The system leverages the RIP (Routing Information Protocol) to connect devices and enable seamless communication between different network segments. The solution is intended to enhance parking efficiency and simplify monitoring and control operations.

Methodology

To assess the routing protocols, we designed two network scenarios—one using RIP and the other using OSPF. Each configuration was tested by transmitting ICMP echo requests (ping) across the network.

Packet loss was used as the main performance metric, calculated using the formula:

Packet Loss (%) = (Sent − Received) ÷ Sent × 100

All simulations were conducted in Cisco Packet Tracer under realistic enterprise conditions.

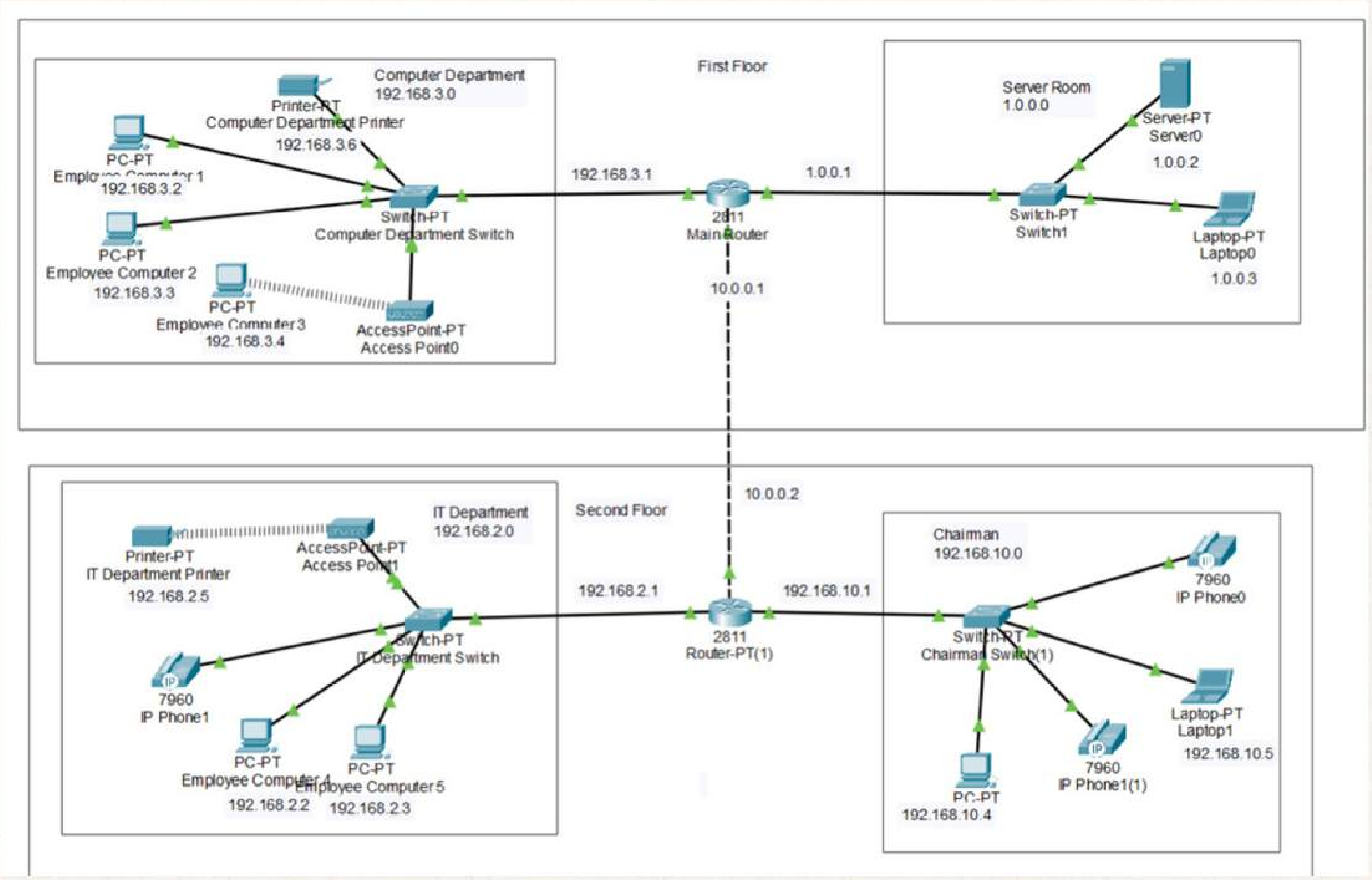
Network Design Overview

The proposed topology integrates:

Star topology within each department to connect local devices to switches.

Bus topology to link all routers across different departments.

This hybrid approach ensures both local efficiency and overall structural stability.



Addressing & Devices

THE NETWORK IS DIVIDED BY DEPARTMENT (IT, CHAIRMAN, COMPUTER, SERVER ROOM).
EACH DEPARTMENT HAS:

- PCS AND LAPTOPS
- IP PHONES
- PRINTERS
- WIRELESS ACCESS POINTS
- CENTRAL SWITCHES AND ROUTERS

RIP vs OSPF – Performance Analysis

RIP:
Distance-vector protocol
Calculates routes based on hop count
Simpler but less efficient in large networks

OSPF:
Link-state protocol
Calculates routes based on bandwidth and cost
Offers faster convergence and more stable performance

Result: Both achieved 0% packet loss, but OSPF showed superior response time and reliability.

Packet Loss Results

In both RIP and OSPF simulations, all transmitted packets were successfully received:

100% packet delivery across all departments

0% packet loss in all test cases

OSPF had better round-trip time, confirming more efficient routing

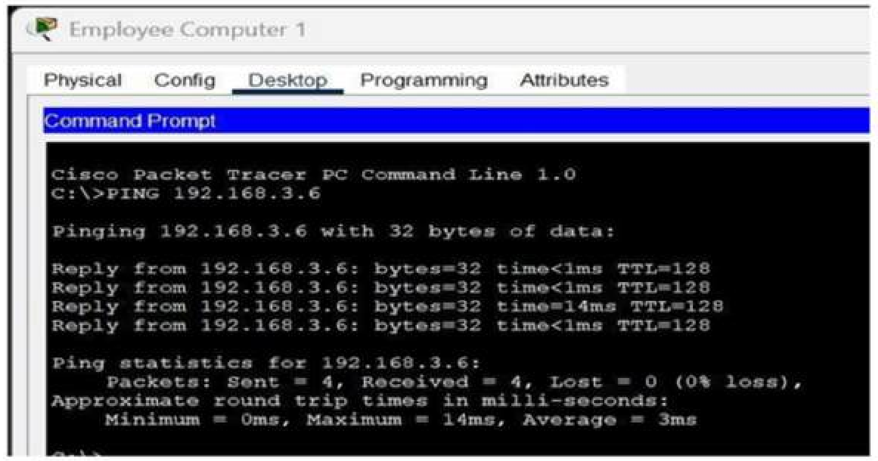


Figure 3 -RIP Checking Connectivity from Computer Department PC

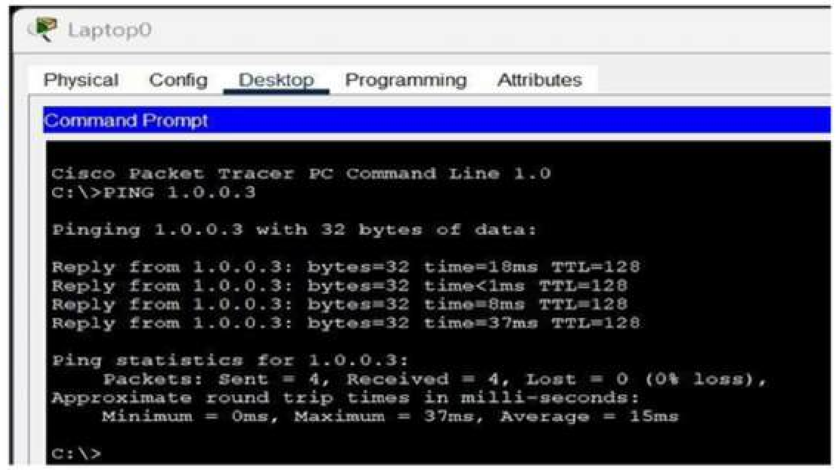


Figure 2 - RIP Checking Connectivity from server Laptop

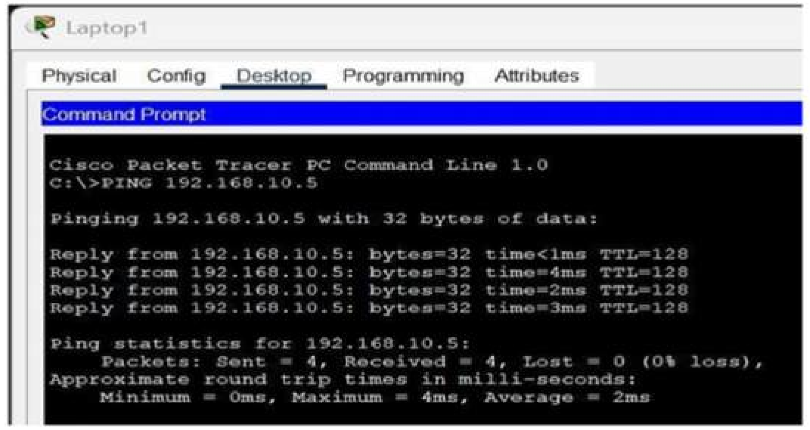


Figure 5 - RIP Checking Connectivity from chairman Room Laptop

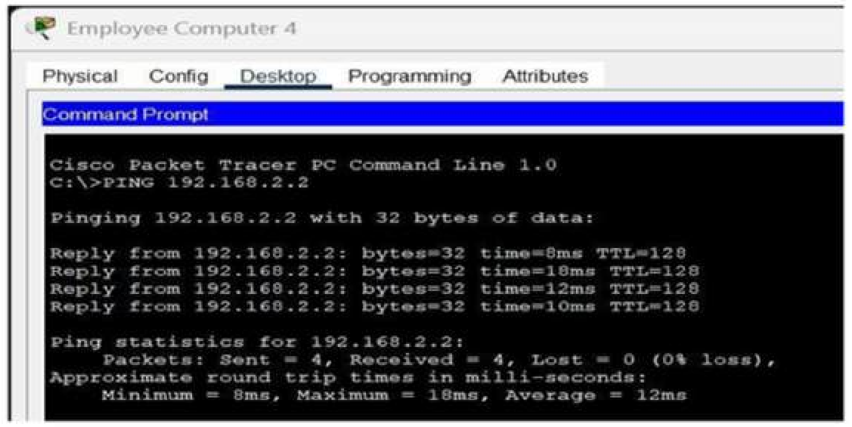


Figure 4 - RIP Checking Connectivity from IT Department PC

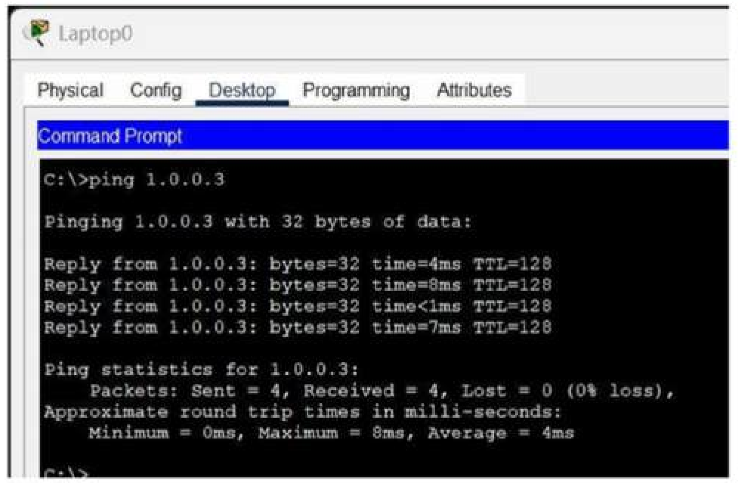


Figure 8 -OSPF Checking Connectivity from Computer Department PC

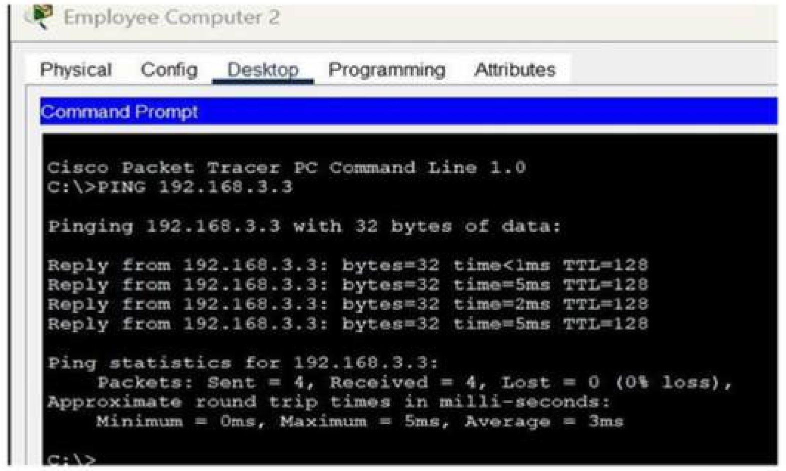


Figure 7 -OSPF Checking Connectivity from Server Room Laptop

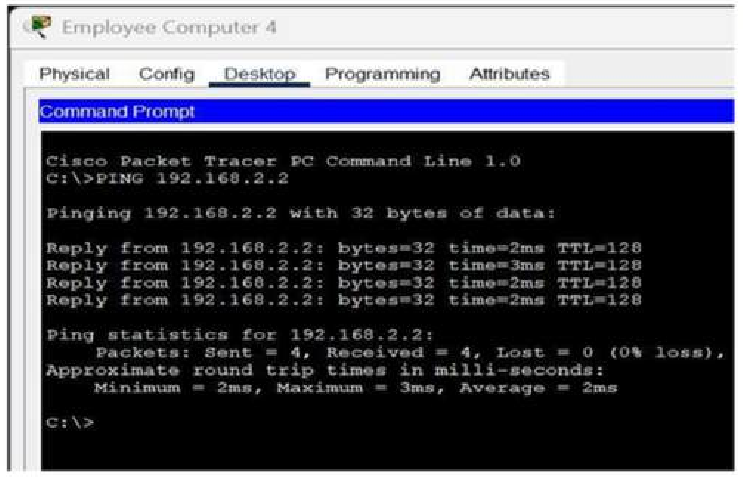


Figure 9 -OSPF Checking Connectivity from IT Department PC

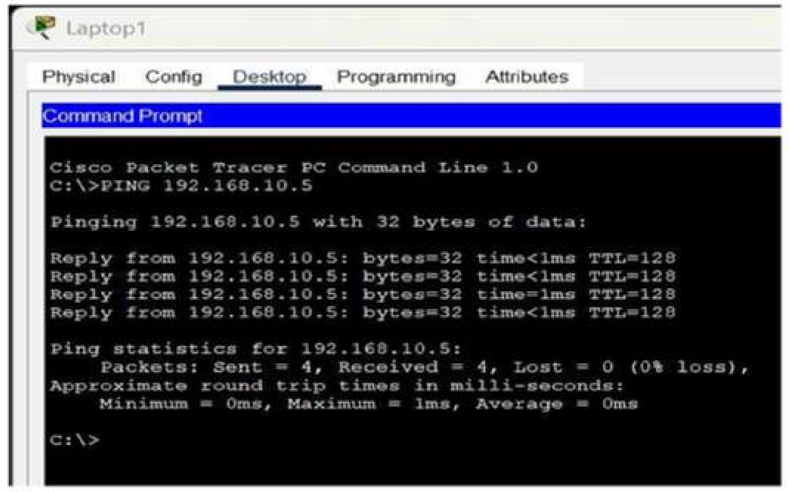


Figure 10- OSPF Checking Connectivity from Chairman Laptop

Challenges and Solutions

Challenge: IP conflicts

Solution: Reassigned and organized IP addressing

Challenge: RIP misconfiguration

Solution: Verified settings and synchronized routers

Challenge: Data delay and routing loops

Solution: Optimized topology and tested routing paths

Challenge: Network scalability

Solution: Designed a clean, modular network layout

Conclusion

This project demonstrated the successful deployment of a smart network system using RIP and OSPF.
While both protocols ensured connectivity, OSPF outperformed RIP in terms of convergence speed and path optimization.
As a result, OSPF is more suitable for dynamic, large-scale, and real-time smart environments.

Thank you