“ ENTERPRISE NETWORK SIMULATION SYSTEM”

A Mini Project Submitted to Thiagarajar College (Autonomous)

Affiliated to Madurai Kamaraj University

In partial fulfilment of the requirement for the award of the degree

BACHELOR OF COMPUTER APPLICATION

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Under the guidance of

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DEPARTMENT OF COMPUTER APPLICATION

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THIAGARAJAR COLLEGE (AUTONOMOUS)

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INTRODUCTION:

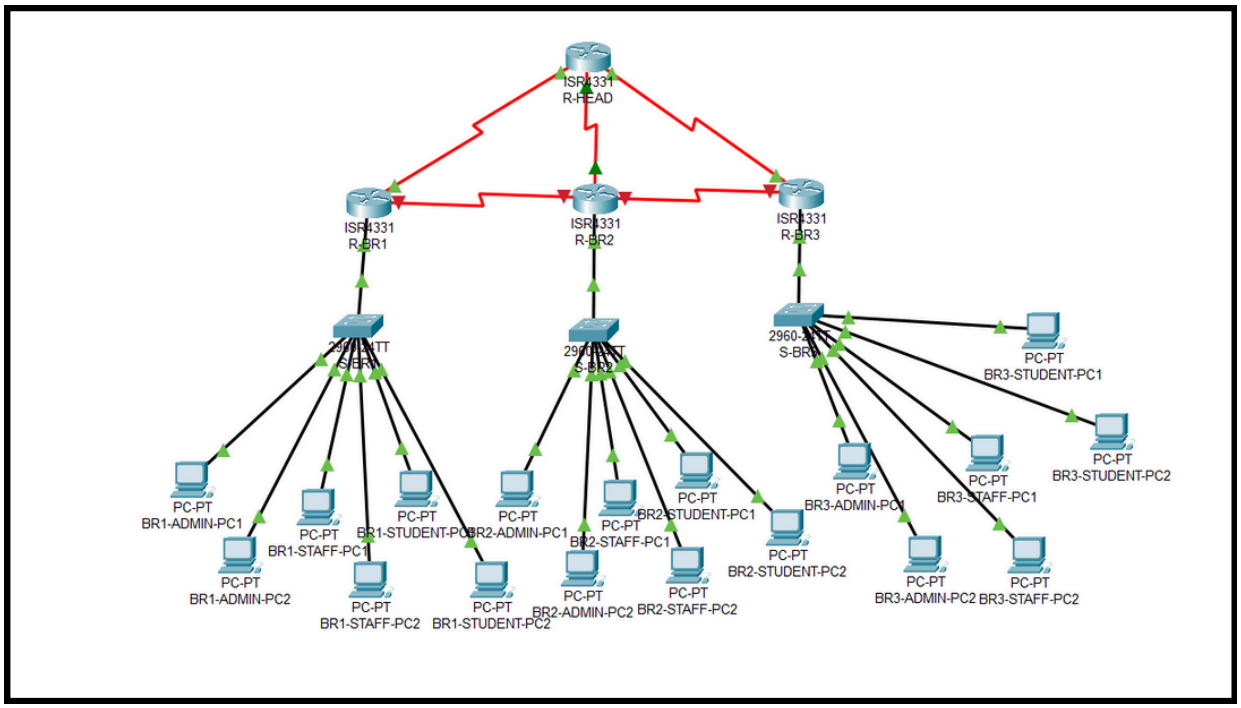
In today's enterprise environment, a reliable and secure computer network is necessary for effective communication between different branches and departments. Proper network design helps in organizing users, improving security, and ensuring smooth data transmission.This project involves the design and simulation of an Enterprise Network using Cisco Packet Tracer. The network consists of a Head Office and multiple Branch Offices, where departments are separated using VLANs. Dynamic routing using OSPF is implemented to enable communication between all branches. DHCP is used for automatic IP address assignment, and Telnet is configured for remote router access.

The project helps in understanding basic enterprise networking concepts and their practical implementation.

Abstract :

This project designs and implements an Enterprise Branch Network using Cisco Packet Tracer, consisting of a Head Router, multiple Branch Routers, and Access Switches to represent an enterprise head office and its branches. VLANs are configured at the access layer to logically separate departments within each branch, and VLAN trunking is used to enable inter-VLAN communication. Dynamic routing is implemented using the OSPF protocol to provide efficient and scalable routing between all branch networks. DHCP is used to dynamically assign IP addresses to end devices, reducing manual configuration. Telnet is configured on the Head Router to allow remote network administration. This project demonstrates a secure, scalable, and well-managed enterprise network suitable for real-world applications.

Project Topology :



Software Used :

Cisco Packet Tracer was used to design, configure, and simulate the enterprise network topology for this project. It provides a virtual environment to implement VLAN configuration, trunking, inter-VLAN routing, dynamic routing using OSPF, DHCP, and Telnet without the need for physical networking devices. The software also enables verification of network connectivity and troubleshooting through built-in simulation and testing tools.

Technologies Used:

1. **VLAN (Virtual Local Area Network):**

VLANs are used to logically divide the network into smaller broadcast domains. In this project, VLANs are created at the access switch level to separate different departments and teams. This improves security and reduces unnecessary network traffic.

2. **VLAN Trunking:**

Inter-VLAN routing is configured using router sub-interfaces. Each sub-interface is assigned an IP address that acts as the default gateway for its respective VLAN, allowing communication between different VLANs.

3. **Inter-VLAN Routing (Router-on-a-Stick):**

Inter-VLAN routing is configured using router sub-interfaces. Each sub-interface is assigned an IP address that acts as the default gateway for its respective VLAN, allowing communication between different VLANs.

4. **Dynamic Routing using OSPF(single area):**

Open Shortest Path First (OSPF) is used as the dynamic routing protocol between the head router and branch routers. OSPF enables automatic route discovery, faster convergence, and efficient routing across the entire network.

5. **DHCP (Dynamic Host Configuration Protocol):**

DHCP is configured on branch routers to automatically assign IP addresses to end devices. This reduces manual configuration and ensures proper IP address management.

6. **Telnet for Remote Management:**

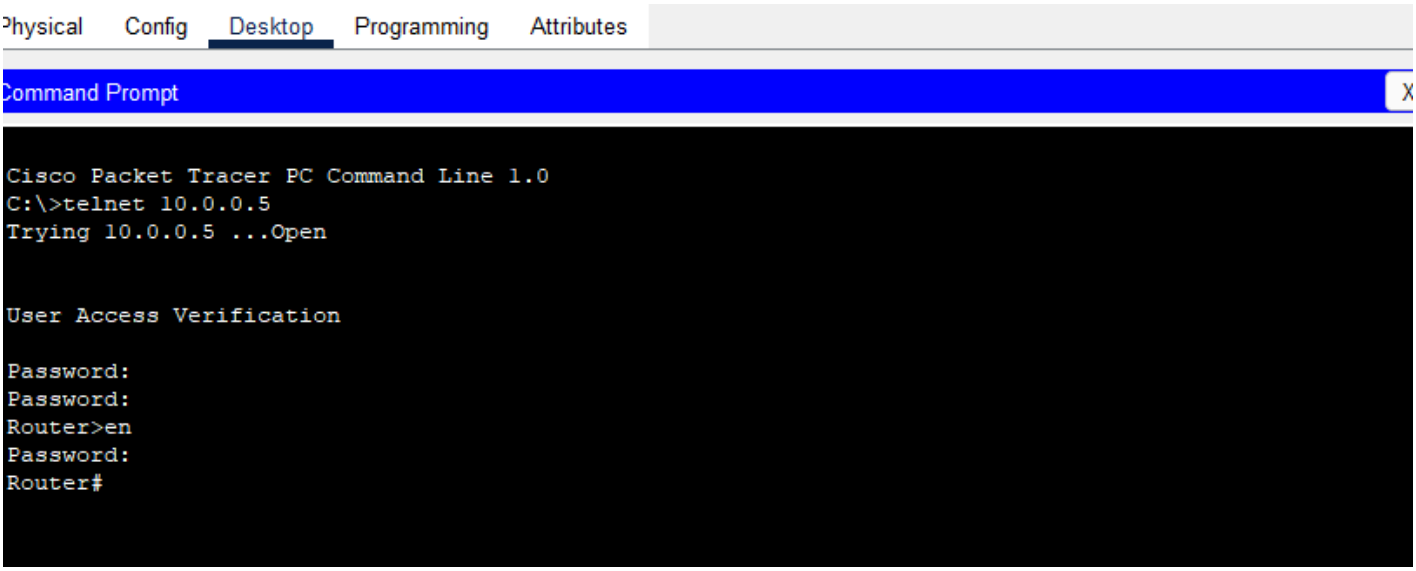
Telnet is configured on the head router to allow remote administrative access from authorized PCs. This enables centralized management and monitoring of the network.

4. Network Architecture Overview :

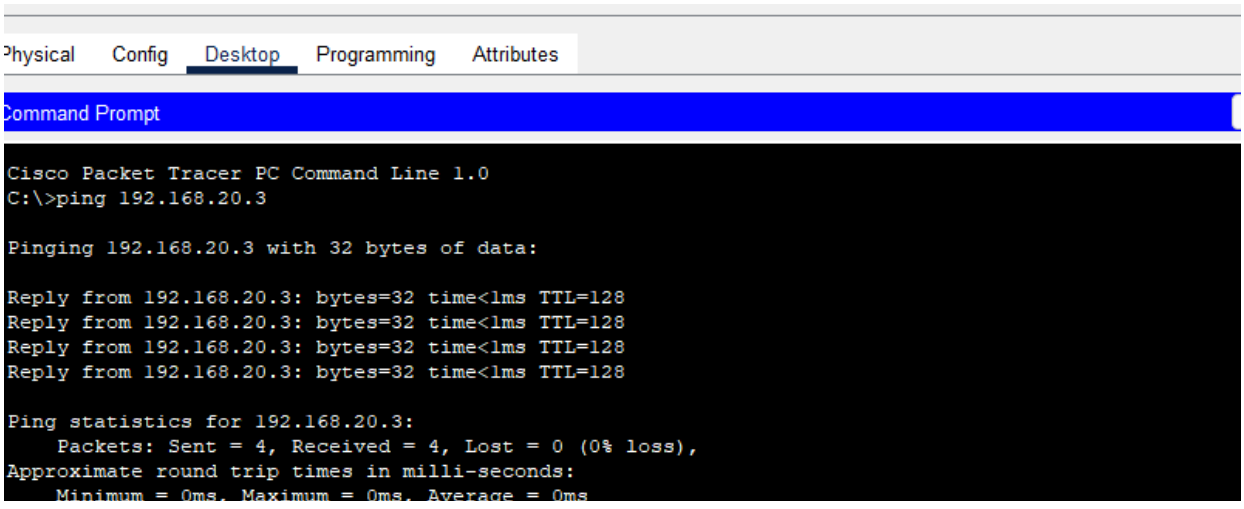
- Head (Central) Router: Acts as the core router and connects all branch routers
- Branch Routers: Represent different departments or locations
- Access Switches: Connect end devices and enforce VLAN segmentation
- End Devices: PCs assigned to different VLANs based on department
- Serial Links: Used for WAN communication between head and branch routers

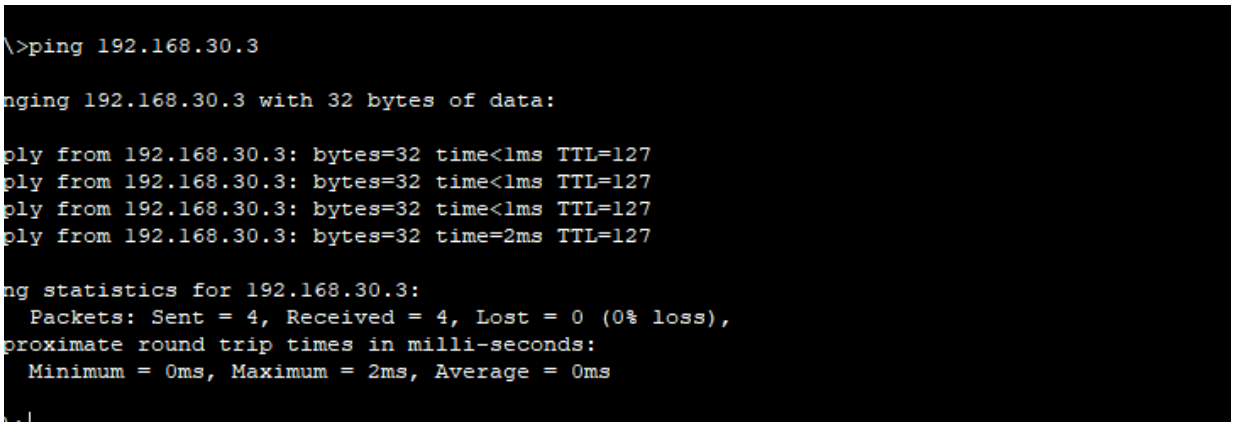
Screenshots for verification:

Telnet:



Vlan and Inter-Vlan:





OSPF:

```
Router>en
Password:
Router#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 10.0.0.9
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    10.0.0.0 0.0.0.15 area 0
    10.0.0.4 0.0.0.3 area 0
    192.168.0.0 0.0.255.255 area 0
    10.0.0.0 0.0.0.3 area 0
    192.168.10.0 0.0.0.255 area 0
    192.168.20.0 0.0.0.255 area 0
    192.168.30.0 0.0.0.255 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    10.0.0.9             110      00:03:17
    192.168.30.1         110      00:03:16
    192.168.130.1        110      00:03:17
    192.168.230.1        110      00:03:16
  Distance: (default is 110)
```

```
Router#show ip ospf neighbor

Neighbor ID     Pri   State           Dead Time   Address         Interface
192.168.30.1      0   FULL/  -        00:00:35    10.0.0.2        Serial0/1/0
192.168.130.1     0   FULL/  -        00:00:38    10.0.0.6        Serial0/1/1
192.168.230.1     0   FULL/  -        00:00:38    10.0.0.10       Serial0/2/0
```

Future Enhancements:

- Implement SSH for secure remote access
- Add gateway redundancy using HSRP/VRRP
- Introduce firewalls and ACLs for enhanced security
- Expand the network to support additional departments

Conclusion:

This project successfully implements a departmental-based government office network using Cisco Packet Tracer. VLANs, inter-VLAN routing, and OSPF ensure efficient communication and scalability, while DHCP and Telnet provide easy management. The network design is secure, organized, and suitable for real-world enterprise environments.