Cisco Packet Tracer Network Implementation for Smart Software House

Final Project – Computer Networks (4th Semester)

1. Introduction

This project demonstrates the design and implementation of a Smart Software House Network using Cisco Packet Tracer. The objective was to integrate traditional enterprise networking concepts (VLANs, RIP routing, DHCP, NAT, Servers) with modern technologies such as IoT integration and wireless connectivity. The network was designed for scalability, security, and real-world functionality.

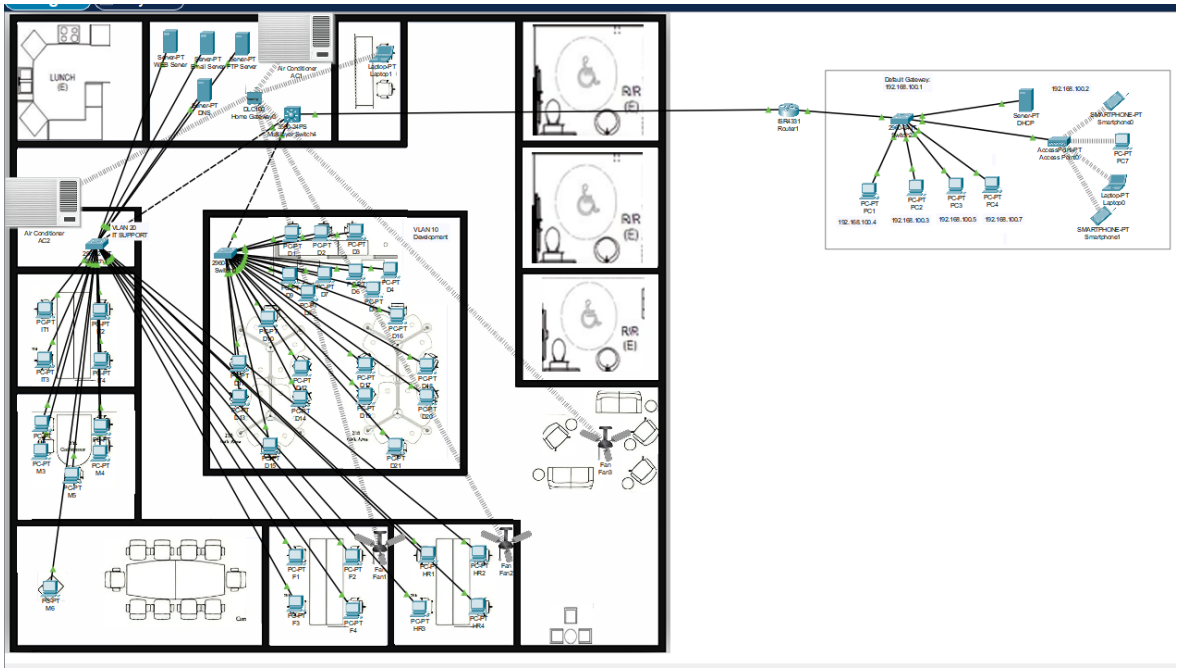
2. Tools Used

- **Cisco Packet Tracer 8.x** – for network design and simulation
- **Routers & Multilayer Switches** – for routing and inter-VLAN communication
- **Servers** – DNS, FTP, Email, HTTP, DHCP
- **IoT Gateway & Devices** – Smart appliances like fans, ACs, controlled wirelessly
- **Wireless Access Point (WAP)** – for mobile and laptop connectivity
- **CLI Tools** – ping, traceroute, show commands

3. Network Topology Overview

The Smart Software House consists of:

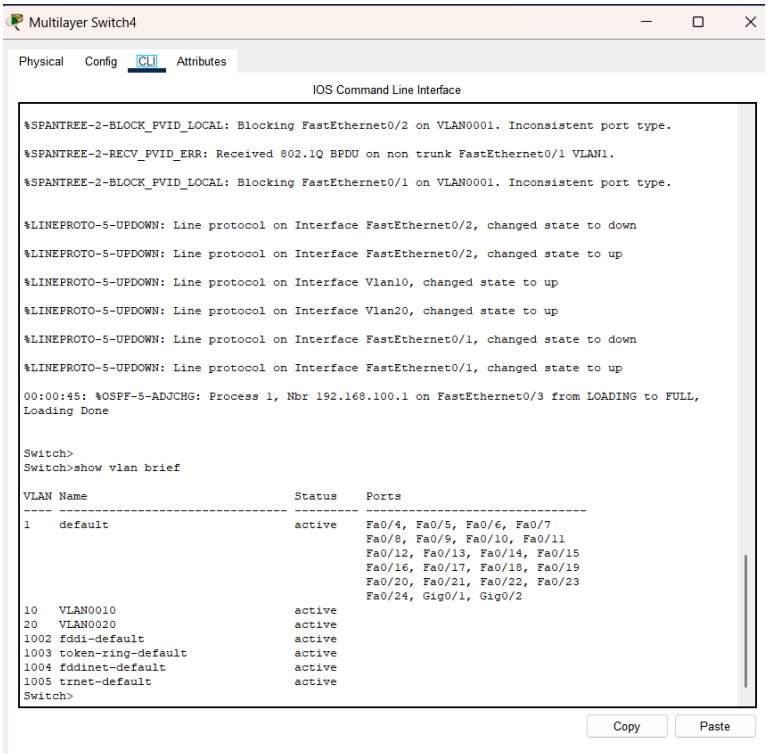
- **Enterprise Core**: Router, Multilayer Switch, DHCP, DNS, Email, HTTP, FTP Servers
- **Departmental VLANs**: Segmented LANs for structured communication
- **Routing**: Implemented via RIP (dynamic routing protocol)
- **Dynamic NAT**: Provides internet-style access for internal hosts
- **IoT Integration**: Smart appliances connected via IoT Gateway
- **Wireless Devices**: Laptops and mobiles connected via WAP



4. Key Features & Configurations

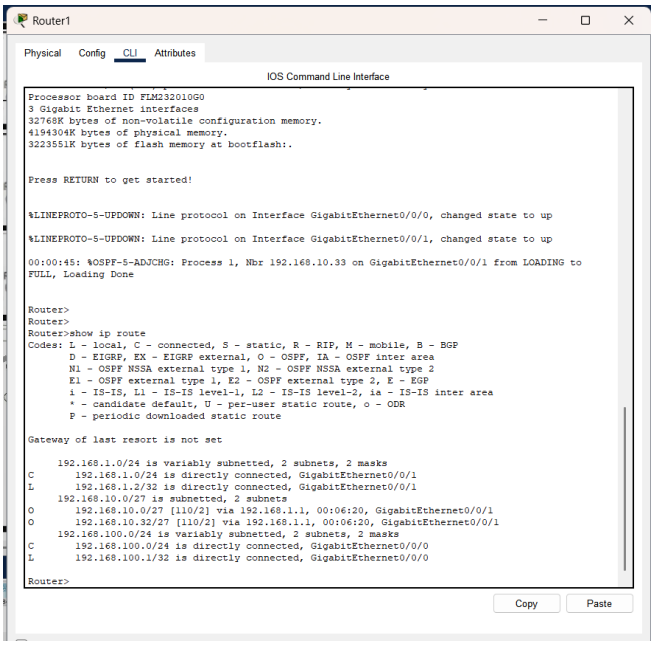
4.1. VLANs & Inter-VLAN Routing

- Created VLANs for each department in the software house.
- Configured **inter-VLAN routing** on the multilayer switch.



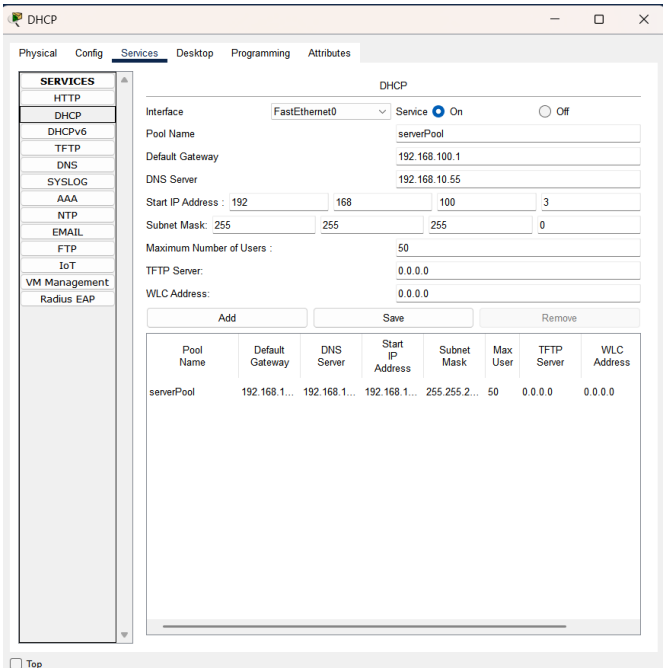
4.2. RIP Routing

- Configured **RIPv2** on routers for dynamic route exchange.
- Verified learned routes using show ip route.



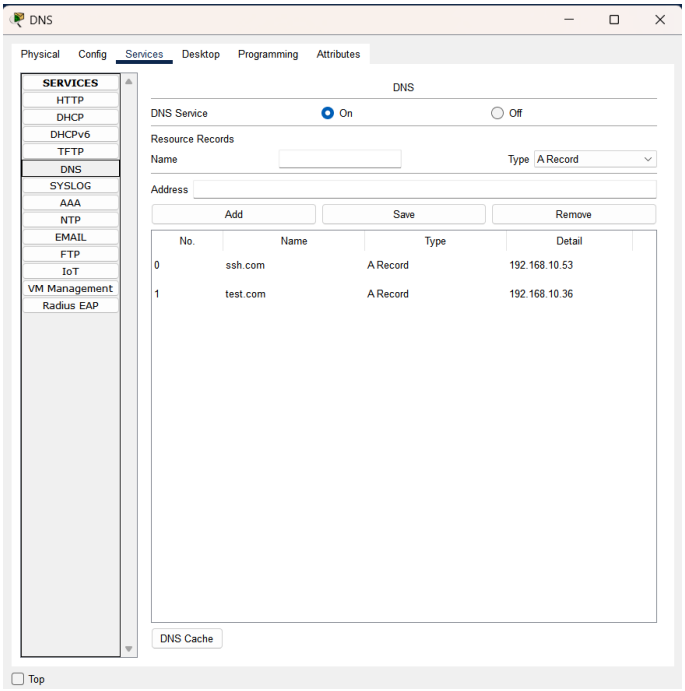
4.3. DHCP Server

- Configured **DHCP** to assign IPs dynamically to hosts.
- Verified PC obtained IP from correct scope.

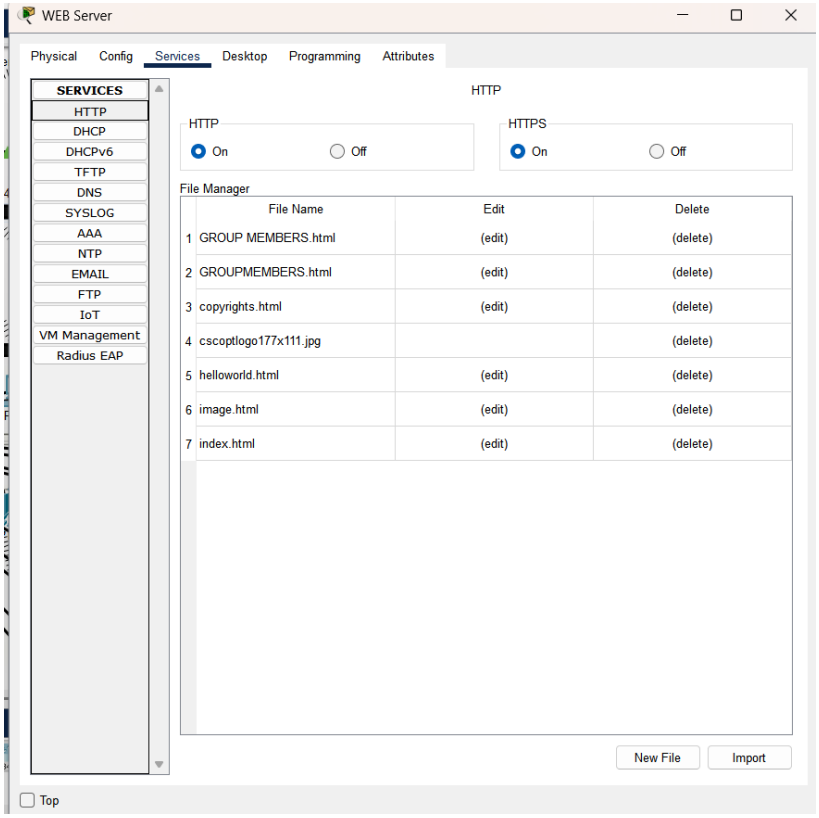


4.4. Core Servers

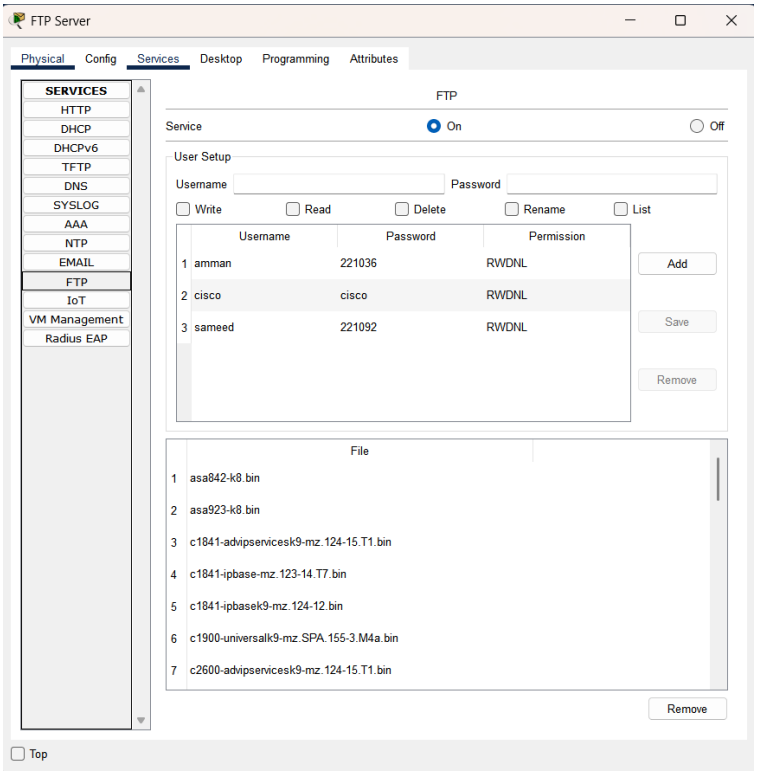
- **DNS Server**: Configured domain name resolution.



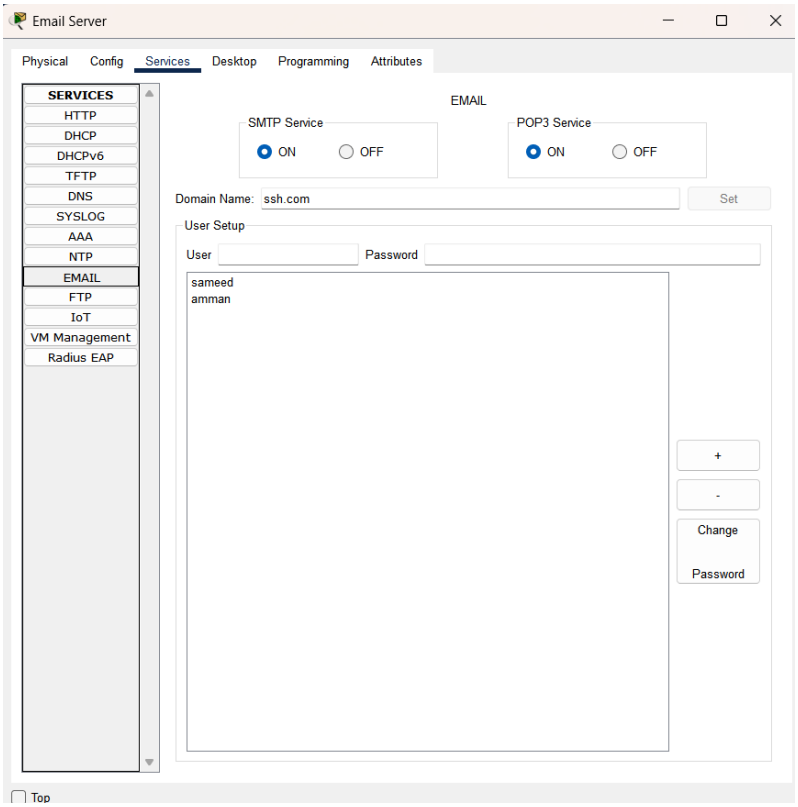
- **HTTP Server**: Hosted a sample webpage accessible from client PCs.



- **FTP Server**: Enabled file upload/download with authentication.

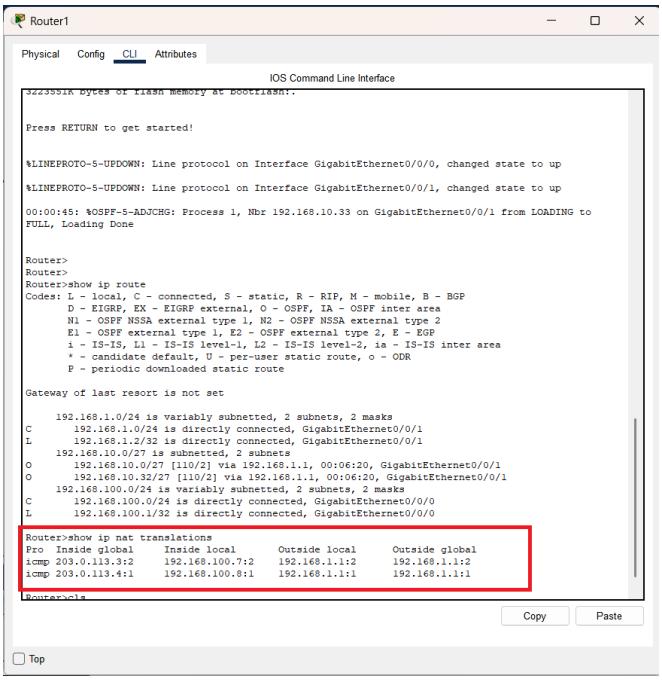


- **Email Server**: Configured SMTP/POP; email sent from one client to another.



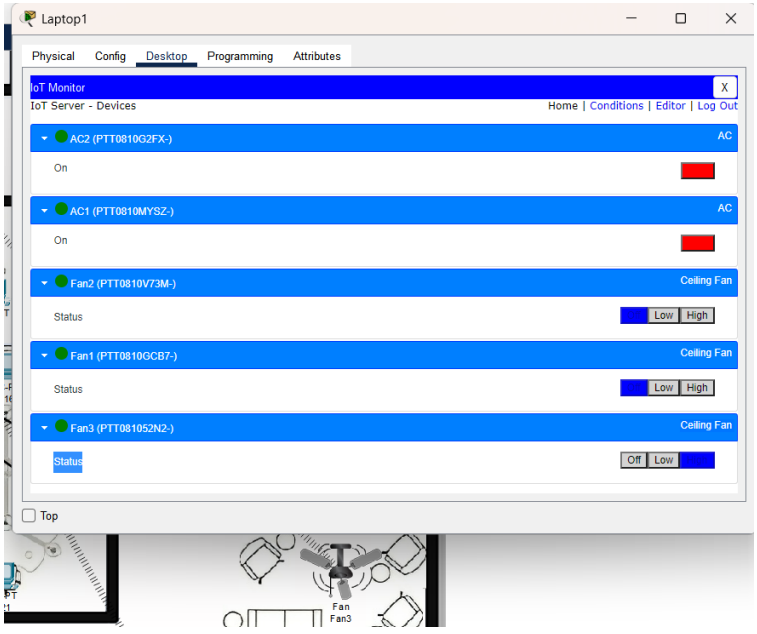
4.5. Dynamic NAT

- Configured NAT on the router to translate private IPs to public addresses.
- Verified active translations using show ip nat translations.



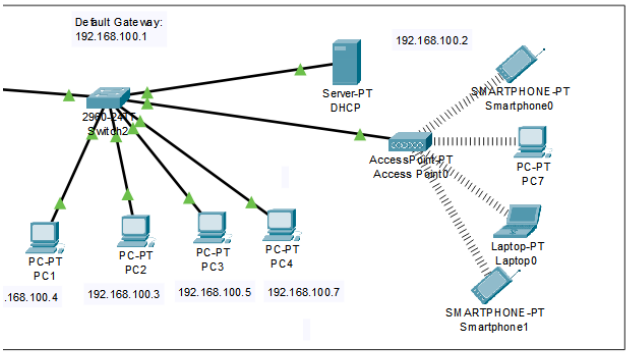
4.6. IoT Integration

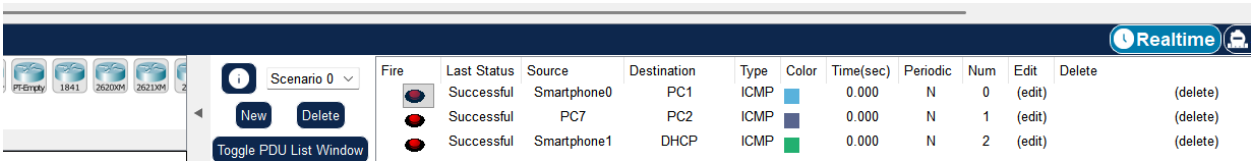
- Configured an **IoT Gateway** connecting smart devices (fans, ACs).
- Controlled devices wirelessly from a laptop.



4.7. Wireless Connectivity

- Configured a **Wireless Access Point (WAP)**.
- Laptops and mobiles connected successfully.
- Verified reachability with ping to servers.





5. Learning Outcomes

Through this project, I learned how to:

- Design and configure a complete enterprise + IoT-enabled network
- Implement VLAN segmentation with inter-VLAN routing on multilayer switches
- Use RIPv2 for dynamic routing across subnets
- Deploy and test DHCP, DNS, HTTP, FTP, and Email servers in a lab environment
- Configure and verify Dynamic NAT for external communication
- Integrate IoT devices into enterprise networks with centralized control
- Provide wireless access for mobile clients

6. Conclusion

This project successfully demonstrates how an enterprise-level network can integrate both traditional networking services and modern IoT features. Using Cisco Packet Tracer, a **Smart Software House Network** was built with VLAN segmentation, routing, NAT, and core servers, alongside IoT device management and wireless access. The design highlights scalability, practicality, and readiness for real-world adaptation.

7. Attachments

- **Packet Tracer File:** Smart-Software-House.pkt
- **Screenshots:** Located in /assets/screenshots/
- **Report (this document):** Smart-Software-House-Report.pdf