

Team CGJ



FiberFortress

**Secure Network Infrastructure
for Telecommunications**

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Why we chose this project?

1. Addressing Critical Business Needs:

- IT industries are expanding rapidly, requiring a robust network infrastructure to handle increased demand and ensure seamless operations across multiple departments.

2. Opportunity to Apply Advanced Networking Solutions:

- The project provides an opportunity to leverage OSPF, a dynamic and efficient routing protocol, to enhance network performance, reliability, and scalability.

3. Real-World Impact and Relevance:

- The project emphasizes designing a network that meets real-world challenges, including redundancy, scalability, and high availability, which are crucial for any modern enterprise.



Introduction

The goal is to create a secure, scalable, and high-performance network for an MNC that meets the company's growing needs and supports critical business operations.

The company has its first floor hosting- HR and Finance(40), Product Brand and Marketing(45), and finally, Admin and Corporate departments(35). The second floor is designed for IT Network & Support(45), Software Engineering(36), and Cloud Engineering departments(32).



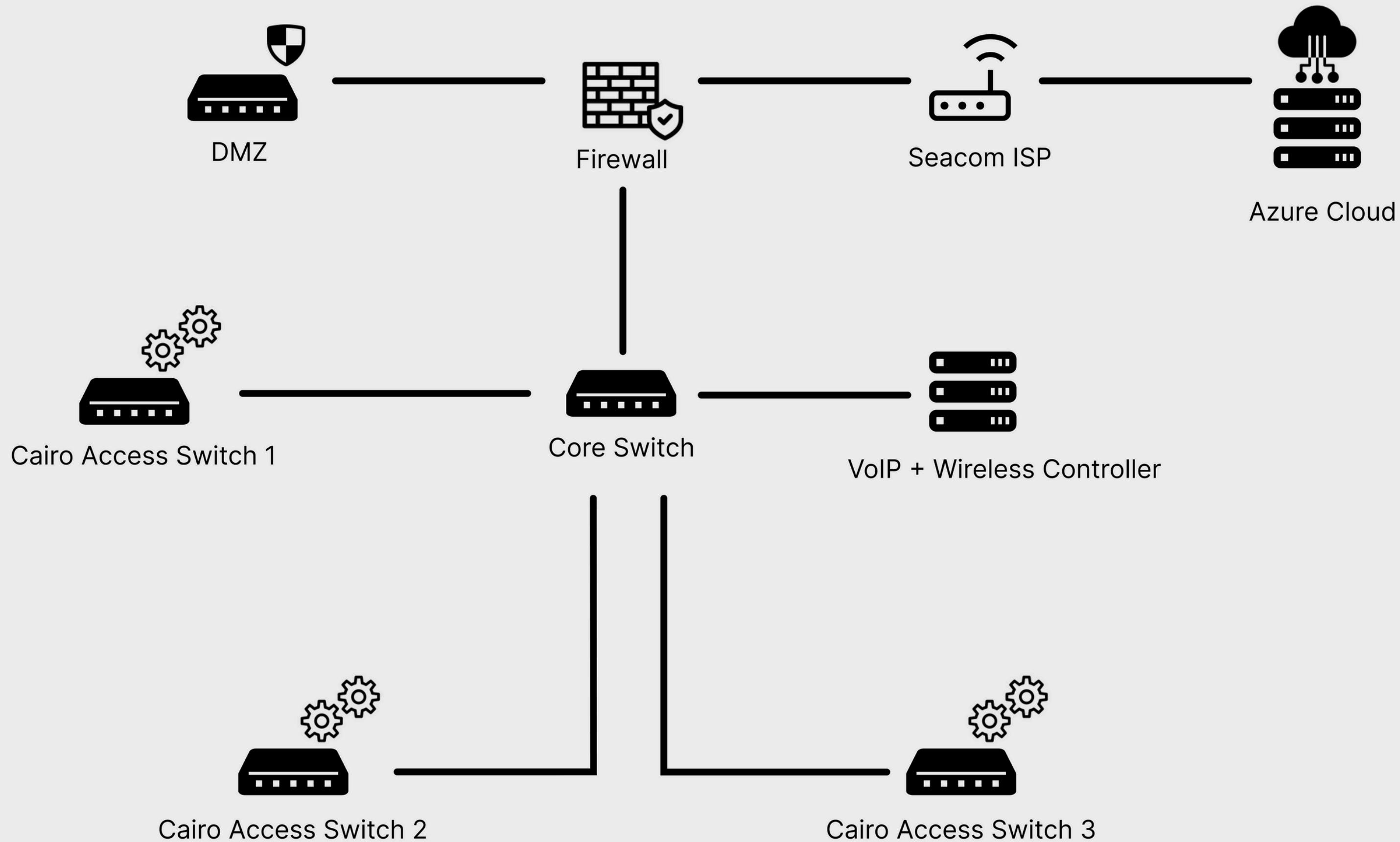
Methodology

Network Requirements:

- **Security, Reliability, and Scalability:** High performance, redundancy, and availability are critical.
- **Segmentation:** Separate LAN, WLAN, and VoIP segments for security.
- **Firewall:** Cisco ASA 5525-X to set security zones and filter traffic.
- **Active Directory (AD):** Managed with Windows Server 2022 for DNS and DHCP services.
- **Internet & Cloud Access:** Seacom ISP connection and use of Microsoft Azure cloud resources.



Concept Map



Key Technologies Implemented:

- **Hierarchical Network Design:** Core, Distribution, and Access layers to ensure redundancy and scalability.
- **Networking Equipment:** Cisco ASA Firewall, Catalyst 3850 Switch, Catalyst 2960 Switches, Cisco Voice Gateway, Cisco WLC, LAPs.
- **VLAN Configuration:** VLAN 50 for LAN, VLAN 60 for WLAN, and VLAN 101 for VoIP across all departments.
- **Subnetting:** Proper IP address allocation based on department sizes.
- **Link Aggregation & Spanning Tree Protocol (STP):**
 - EtherChannel (LACP) is used for link aggregation.
 - STP PortFast and BPDUguard configured for faster port transitions.
- **Routing and Inter-VLAN Communication:**
 - OSPF as the routing protocol for dynamic routing.
 - Multilayer switches for Inter-VLAN routing (SVI).

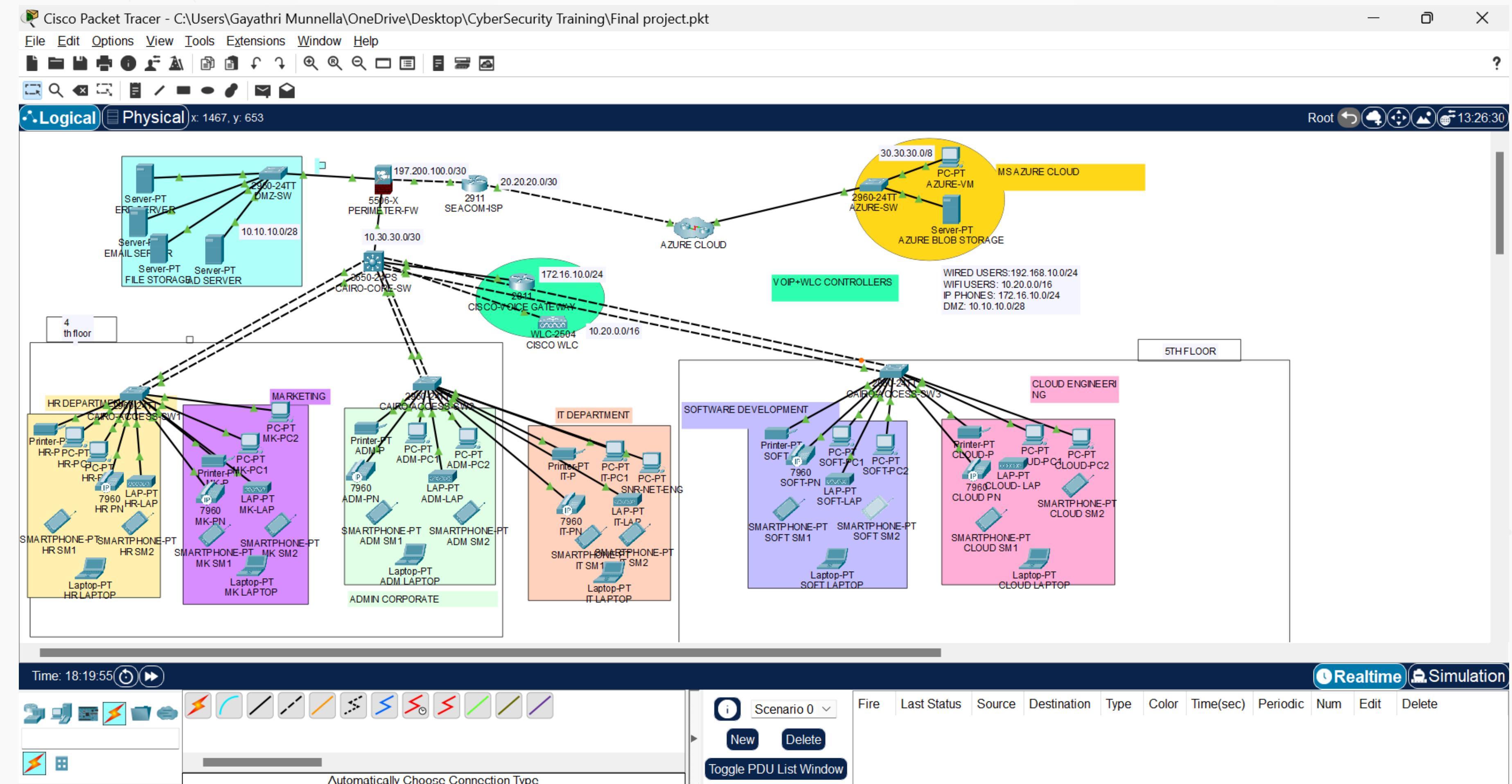


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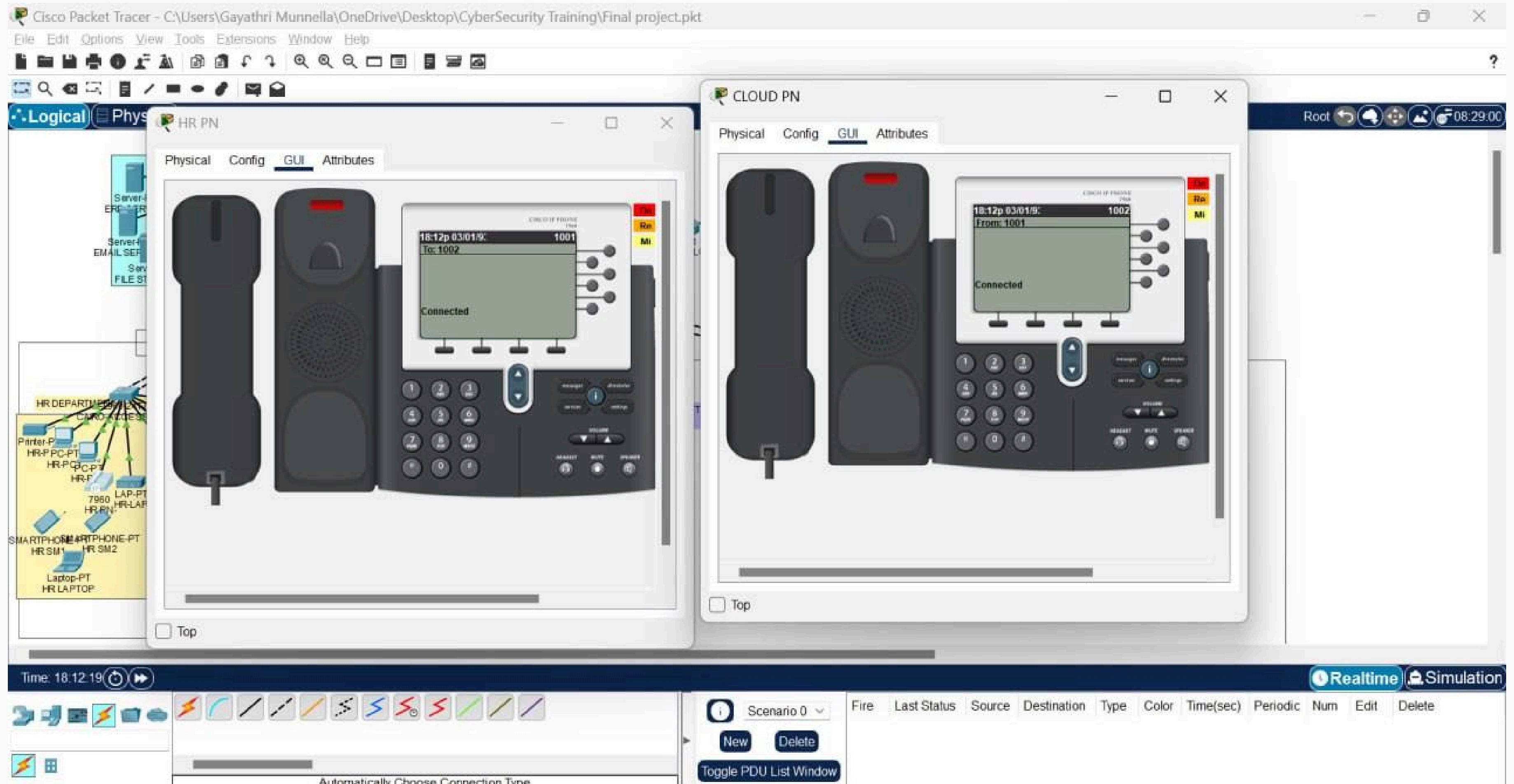
- **DHCP Configuration:**
 - AD server for LAN and WLAN devices.
 - Routers configured for DHCP service for VoIP.
- **Security Configurations:**
 - Cisco ASA Firewall with zones, security levels, and ACLs.
 - SSH access restricted via standard ACLs for secure remote management.
- **VoIP & Telephony Services:** Cisco Voice Gateway configured for VoIP with dial numbers.
- **Wireless Network Management:** Centralized management via Cisco WLC for employee and guest Wi-Fi.
- **Firewall and NAT Configurations:**
 - ASA Firewall for NAT, OSPF, and default routes.
 - Inspection policies to filter traffic based on ACLs.



Results:



Results:



What is OSPF?

- A crucial routing protocol for managing internal networks in telecom companies.
- Ensures reliable and efficient data routing across complex infrastructures.
- Uses Dijkstra's algorithm to dynamically calculate the shortest and most efficient paths.

Importance in Telecommunication Networks

- Scalability: Manages complex telecom network topologies efficiently.
- Flexibility: Integrates seamlessly with IPv4/IPv6 and various technologies (e.g., MPLS, Ethernet).
- Rapid Convergence : Quickly adapts to changes, ensuring continuous service quality.



Benefits of OSPF in Telecom Networks

- **Scalability:** Manages extensive networks by segmenting into areas.
- **Supports VLSM & Route Summarization:** Enables hierarchical network design.
- **Efficient Traffic Management:** Distributes data evenly across multiple routes.
- **Load Balancing:** Allows equal-cost route load balancing.
- **Vendor Neutral:** Compatible with diverse network hardware.
- **Security:** Protects routing data with authentication.
- **Cost Savings:** Lowers operational costs with automated routing.
- **Loop-Free Topology:** Utilizes the SPF algorithm to prevent loops.



CONCLUSION

In conclusion, the network design and implementation project for Cairo Telco successfully addresses the company's needs for a secure, scalable, and high-performance network infrastructure. By leveraging a robust hierarchical design, advanced Cisco networking devices, and comprehensive security measures, we have created a network that not only meets current requirements but is also prepared for future expansion.



Thank you

Questions and Feedback are welcome!



