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Checkpoint 1

Topic: Design & Simulation of a Secure Multi-Tier Network for a Small Educational Institution

For our project, we will design a secure and scalable hierarchical network for a small school campus using Cisco Packet Tracer. The network will support administrative offices, faculty, student labs, and guest Wi-Fi zones, with layered security and efficient routing.

Motivation

The motivation behind this project is to simulate a realistic enterprise-style campus network that supports multiple departments while ensuring security and performance. Educational institutions require secure segmentation between administrative data and student traffic, reliable connectivity for online learning tools, and scalable infrastructure to support future expansion. Our project allows us to apply hierarchical network design, access control, and redundancy concepts discussed in our lectures.

Major Areas

The network will be divided into three major functional areas:

1. Core Layer - Central Routing and inter-VLAN communication for all departments.
2. Distribution Layer - Departmental LAN aggregation, inter-area routing, and ACL enforcement.
3. Access Layer - End-user device connectivity, wireless access, and endpoint security.

Type & Number of Devices

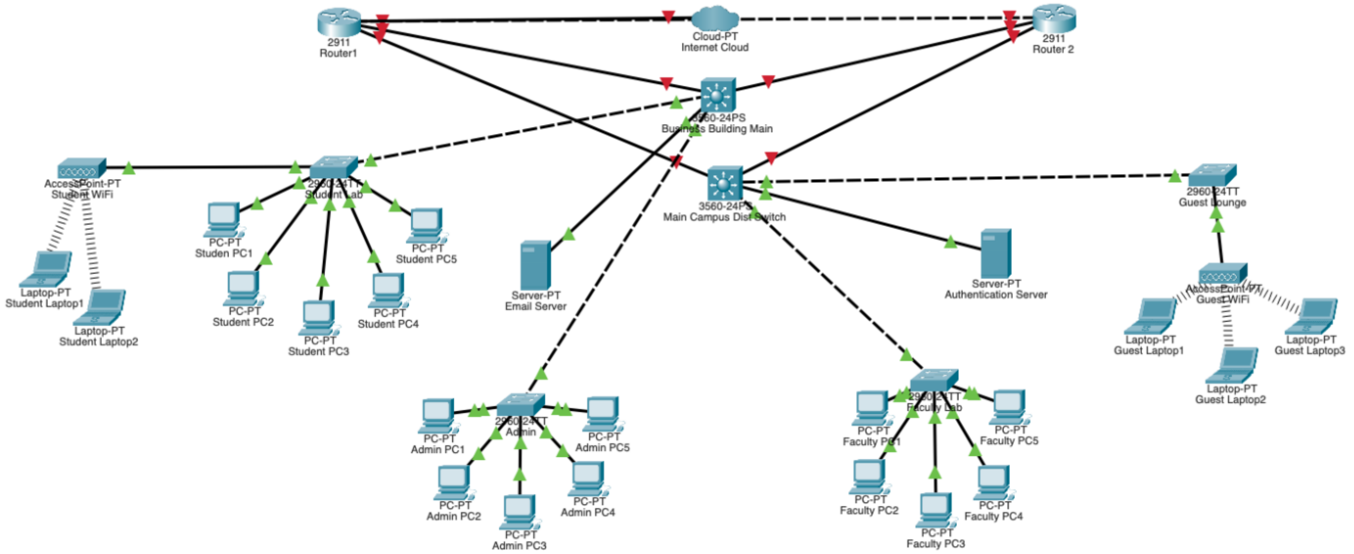
Device Type	Quantity	Purpose
Core Routers	2	Redundant central routing & inter-VLAN
Layer 3 Switches	2	Distribution for Admin & Faculty
Layer 2 Switches	4	Access for Labs, Admin, & Guest
Wireless Access Points	2	Student & Guest Wi-Fi
PCs/Laptops	~20	End hosts (Admin, Faculty, Students)
Servers	2	Web/Email Server & Authentication Server
Firewall/ACLs	Configured on routers/switches	Perimeter & internal segmentation

Security Measures

For security, we will implement several measures: ACLs will be at the distribution layer to restrict access between VLANs; VLAN segmentation to separate admin, faculty, student, and guest traffic; DHCP snooping, port security, and MAC address filtering at access switches; Strong password and SSH configurations on all networking devices; Server authentication for device and Wi-Fi access; Firewall rules on edge routers to protect internal resources from external threats.

Overall Plan

For our topology design, we will create physical and logical topology using Cisco Packet Tracer. For IP addressing and VLAN design, we will assign IP subnets and configure VLANs for each area. For routing configuration, we will implement static or dynamic routing between VLANs. For device configuration, we will configure switches, routers, servers, and security measures. For testing and validation, we will verify connectivity, security policies, redundancy, and scalability. For our documentation, we will prepare our three-page report and ten-minute video presentation.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Router1
Cloud-PT
Internet Cloud
2911
Router 2
3560-24PS
Business Building Main
AccessPoint-PT
Student WiFi
2960-24TT
Student Lab
3560-24PS
Main Campus Dist Switch
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Guest Lounge
PC-PT
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Student PC5
PC-PT
Student PC2
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Student PC3
PC-PT
Student PC4
Laptop-PT
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Server-PT
Email Server
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Authentication Server
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Admin
PC-PT
Admin PC1
PC-PT
Admin PC5
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Faculty Lab
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