

Project Title:

# Network Design for a Multi-Floor Company

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## Overview

This report outlines the design and implementation of a hierarchical network topology to support a new three-floor building. The network will ensure redundancy, scalability, and efficient communication across departments while maintaining robust security. The design also includes integration with two ISPs for internet connectivity and redundancy.

## Objectives

The objectives of this network design are to:

- Provide seamless and secure communication across all departments.
- Ensure redundancy at every network layer using two routers and two multilayer switches.
- Enable dynamic IP address allocation for all devices except for those in the server room, which will use static IP addresses.
- Support inter-VLAN communication through multilayer switches configured for routing and switching functionalities.
- Facilitate wireless connectivity for users in each department.
- Maintain continuous internet access through dual ISP connections.

## Implementation Plan

### Network Topology and Redundancy

- **Core Layer:**

- Two routers will be deployed to connect the internal network to the internet via two ISPs. Each router will connect to one ISP using the following public IP subnets:
  - ISP1: 195.136.17.0/30 and 195.136.17.4/30
  - ISP2: 195.136.17.8/30 and 195.136.17.12/30
- Static routes will be configured for external connectivity.
- **Distribution Layer:**
  - Two multilayer switches will provide redundancy and handle inter-VLAN routing. Both switches will be interconnected and configured for High Availability (HA).
  - The switches will connect to the core routers and the access switches for each floor.
- **Access Layer:**
  - Each floor will have access switches to connect end-user devices and wireless access points.

## Department and Floor Configuration

### First Floor

- **Departments:** Sales and Marketing, Human Resources, and Logistics.
- **Users:** 120 per department.
- **VLANs:**
  - VLAN 10: Sales and Marketing
  - VLAN 20: Human Resources and Logistics
- **IP Subnets:**
  - VLAN 10: 172.16.1.0/25
  - VLAN 20: 172.16.1.128/25

### Second Floor

- **Departments:** Finance and Accounts, Administrator, and Public Relations.
- **Users:** 120 per department.
- **VLANs:**
  - VLAN 30: Finance and Accounts
  - VLAN 40: Administrator and Public Relations
- **IP Subnets:**
  - VLAN 30: 172.16.2.0/25
  - VLAN 40: 172.16.2.128/25

### Third Floor

- **Departments:** ICT, Server Room.
- **Users:**
  - ICT: 120 users
  - Server Room: 12 devices (static IPs)
- **VLANs:**

- VLAN 50: ICT
  - VLAN 60: Server Room
- **IP Subnets:**
  - VLAN 50: 172.16.3.0/25
  - VLAN 60: 172.16.3.128/28 (for static IP allocation)

### **Wireless Network Configuration**

- Each department will have a dedicated wireless network (SSID) mapped to its VLAN.
- Access points will be configured to broadcast department-specific SSIDs and support secure authentication.

### **DHCP and Static IP Allocation**

- **DHCP Servers:**
  - Located in the server room.
  - Configured to provide dynamic IP addresses for devices in all VLANs except VLAN 60.
- **Static IP Allocation:**
  - Devices in VLAN 60 (Server Room) will have statically assigned IP addresses.

### **Device Settings**

- Basic device settings will be configured on all routers and switches:
  - Hostnames for identification.
  - Console and enable passwords for secure access.
  - Banner messages for unauthorized access warnings.
  - `ip domain-lookup` will be disabled to prevent DNS resolution delays.

### **Inter-VLAN Routing**

- Multilayer switches will handle inter-VLAN routing by being assigned IP addresses on each VLAN interface.
- Inter-VLAN communication will be verified through proper route configurations and testing.

### **Redundancy for Internet Access**

- Each router will connect to both ISPs using static routes.
- Failover mechanisms will be configured to ensure uninterrupted internet access.

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### **Testing and Verification**

- Verify redundancy by simulating link failures at the core and distribution layers.

- Test inter-VLAN communication using ping tests between devices in different VLANs.
  - Ensure dynamic IP address allocation through DHCP for all VLANs.
  - Verify static IP assignments and connectivity for devices in VLAN 60.
  - Test internet connectivity and failover between ISPs.
  - Validate wireless network functionality by connecting devices to the department-specific SSIDs.
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## **Conclusion**

This hierarchical network design ensures redundancy, scalability, and secure communication across all departments in the new building. By integrating VLANs, DHCP, inter-VLAN routing, and dual ISP connectivity, the network meets the requirements for performance and reliability. Proper testing and verification will ensure the network functions as expected, supporting current and future needs.