CORPORATION SYSTEM NETWORK DESIGN

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Introduction

In the modern corporate environment, a robust, scalable, and secure network infrastructure is essential for operational efficiency. This project proposes a comprehensive network design for a multi-story corporate building. The design utilizes a **Hierarchical Network Model** (Core, Distribution, and Access layers) to ensure high availability, fault tolerance, and efficient traffic management. The simulation is conducted using Cisco Packet Tracer.

Problem Statement

The corporation requires a network infrastructure that supports multiple departments spread across three floors. The existing lack of segmentation poses security risks, and a single point of failure could disrupt business operations. Therefore, a new design is needed to:

- Provide logical separation between departments (Sales, HR, Finance, etc.).
- Ensure redundant internet connectivity.
- Centralize network services (DHCP, DNS, Email).
- Support both wired and wireless users.

Project Objectives

The primary objectives of this network design are:

1. **Redundancy:** To implement dual ISPs and dual Core routers to prevent network downtime.
2. **Segmentation:** To utilize VLANs (Virtual Local Area Networks) to isolate departmental traffic for security and broadcast control.
3. **Scalability:** To design an IP addressing scheme that allows for future growth.
4. **Accessibility:** To provide wireless connectivity (WLAN) for mobile devices (Laptops/Tablets) in all departments.
5. **Service Integration:** To deploy a dedicated Server Room for centralized management.

Network Design & Methodology

Topology Overview

The network follows the Three-Layer Hierarchical Model:

- **Core Layer:** Connects to the Internet via two ISPs (ISP-1 and ISP-2) using high-speed routers (Core-R1, Core-R2).
- **Distribution Layer:** Utilizes two Multilayer Switches (L3) to handle inter-VLAN routing and link aggregation.

•**Access Layer:** Consists of switches on each floor connecting end devices (PCs, Printers, Access Points).

Departmental Layout & VLAN Configuration

The building is divided into three floors with specific subnets:

1st Floor:

•**Sales & Marketing:** VLAN 10 | Network: 192.168.10.0/24

•**Human Resources (HR):** VLAN 20 | Network: 192.168.20.0/24

2nd Floor:

•**Finance:** VLAN 30 | Network: 192.168.30.0/24

•**Admin & Public Relations:** VLAN 40 | Network: 192.168.40.0/24

3rd Floor:

•**ICT:** VLAN 50 | Network: 192.168.50.0/24

•**Server Room:** VLAN 60 | Network: 192.168.60.0/24

Connectivity Details (From Diagram)

•**WAN / ISP Links:** Public IP ranges 103.133.254.x/30 are used for router-to-router connections.

•**Internal Routing:** Private IP ranges 10.10.10.x/30 connect the Core Routers to the Distribution Switches.

•**Redundancy:** Cross-cable connections are established between the Core Routers and the Distribution Switches to ensure that if one link fails, traffic automatically reroutes.

Implementation Plan

1.**Physical Design:** Cabling and placement of Routers, Switches, PCs, and Access Points in Packet Tracer.

2.**VLAN Configuration:** Creating VLANs 10, 20, 30, 40, 50, and 60 on switches.

3.**IP Addressing:** Configuring Static IPs for servers and Routers, and DHCP for end devices.

4.**Routing Protocols:** Implementing OSPF or Static Routing to enable communication between the internal network and the ISPs.

5.**Server Configuration:**

•**DHCP Server:** To automatically assign IPs to PCs and Tablets.

•**DNS Server:** For domain name resolution.

- **Email Server:** For internal communication.

6. **Wireless Setup:** Configuring Access Points (APs) with SSIDs for each department.

Expected Outcomes

Upon completion, the project will demonstrate:

- Successful ping connectivity between different departments (Inter-VLAN routing).
- Access to simulated Internet servers via the ISP routers.
- Automatic IP assignment for clients via the DHCP server.
- Network resilience where removing one core cable does not stop connectivity.

Tools Required

- **Software:** Cisco Packet Tracer (Latest Version).
- **Hardware (Simulated):** Cisco 2911 Routers, 3560 Multilayer Switches, 2960 Switches, Generic Servers, Wireless Access Points.

Conclusion

This project aims to simulate a real-world enterprise network environment. By implementing this design, the Corporation will benefit from a secure, organized, and reliable network infrastructure capable of supporting its daily operations and future expansion.