Green University of Bangladesh

Department of Computer Science and Engineering (CSE)

Semester: (Fall, Year: 2024), B.Sc. in CSE (Day)

Floor Networking

Course Title: Computer Networking Lab

Course Code: CSE-312

Section: D1

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Chapter 1

Introduction

1.1 Overview

The project involves designing a network for an office building, as represented by the provided network packet trace file (Office Building Network Design.pkt). This design likely includes the layout of network devices, connections, and configurations to support the communication needs of the office environment. The file contains the detailed network architecture and specifications necessary to implement and maintain efficient network operations within the building.

1.2 Motivation

The goal of this floor networking project using Cisco Packet Tracer is to design an efficient, scalable, and secure network infrastructure for an office building. By utilizing Cisco Packet Tracer, we can simulate and visualize the network topology, allowing us to optimize the placement of network devices, ensure robust connectivity, and implement best practices in network management. This project aims to enhance the overall productivity and communication within the office by providing reliable and high-speed network access to all employees, thus supporting the growing demands of modern business operations.

1.3 Problem Definition

The goal of this project is to design and implement a robust network for an office building floor using Cisco Packet Tracer. The following steps outline the problem definition:

1. Requirement Analysis:
    - Identify the number of offices, workstations, and devices that need network connectivity.
    - Determine the network requirements including bandwidth, security, and redundancy.
2. Network Topology Design:

- Design a logical network topology that ensures efficient data flow and minimizes latency.
- Choose appropriate network devices (routers, switches, access points) and their placement.

3. IP Addressing Scheme:

   - Develop an IP addressing scheme using IPv4 or IPv6 that accommodates all devices with room for future expansion.
   - Implement subnetting to optimize network performance and management.

4. Network Configuration:

   - Configure the network devices using Cisco Packet Tracer to establish connectivity.
   - Implement VLANs to segment network traffic and enhance security.
   - Set up routing protocols to ensure reliable communication between different network segments.

5. Testing and Validation:

   - Conduct connectivity tests to ensure all devices can communicate as intended.
   - Perform stress testing to verify network stability and performance under load.

6. Documentation:

   - Document the network design, configuration steps, and testing results.
   - Provide a maintenance plan for future network updates and troubleshooting.

Table 1.1: Summary of the attributes touched by the mentioned projects

Name of the P Attributess	Explain how to address
P1: Depth of knowledge required	understanding of network design principles, Cisco Packet Tracer usage, and practical experience in configuring and troubleshooting Cisco network devices is required.
P2: Range of conflicting requirements	alancing security, scalability, and costefficiency while designing a robust and high-performance office building network using Cisco Packet Tracer.

P3: Depth of analysis required	floor networking design, including detailed configuration and simulation using Cisco Packet Tracer.
P4: Familiarity of issues	A brief overview of Cisco Packet Tracer's floor networking project, addressing connectivity, configuration, and troubleshooting challenges.

1.4 Design Goals/Objectives

1. Network Scalability: Design a network that can accommodate future growth in terms of devices and users on the floor without compromising performance.

2. HighAvailability: Ensure minimal downtime by implementing redundancy mechanisms such as redundant links, devices, and protocols like Spanning Tree Protocol (STP) or Rapid Spanning Tree Protocol (RSTP).

3. Security: Implement robust security measures to protect sensitive data and prevent unauthorized access. This includes access control lists (ACLs), VLAN segmentation, and encryption protocols.

4. Quality of Service (QoS): Prioritize network traffic to guarantee optimal performance for critical applications such as VoIP or video conferencing, while also ensuring a good user experience for other services.

5. Ease of Management: Design the network with simplicity and manageability in mind, utilizing features like VLANs, subnetting, and centralized management tools for easier troubleshooting and maintenance.

6. Cost-effectiveness: Strive to achieve the desired network functionality within the allocated budget, considering factors such as equipment costs, licensing fees, and ongoing operational expenses.

1.5 Application

Our floor networking project aims to design and implement a robust network infrastructure for a multi-story office building using Cisco Packet Tracer. This involves configuring routers, switches, access points, and ensuring seamless connectivity across floors. VLANs are utilized to segment network traffic, ensuring security and optimizing network performance. The project also includes implementing Quality of Service (QoS) policies to prioritize critical applications. Additionally, redundant links and devices are set up to enhance network reliability and minimize downtime.