**Computer Networks Report**



**Session 2023 - 2027**

**Submitted by:**

Khadija Saeed 2023-CS-74

Ufaq Hafeez 2023-CS-75

Hira Sohail 2023-CS-76

**Supervised by:**

Ma’am Aroosh Fatima

**Course:**

CSC203L-Computer Network

Department of Computer Science

**University of Engineering and Technology**

**Lahore Pakistan**

**Table of Contents**

[ Overview of the Network Layout 3](#_Toc181821292)

[ Number of Departments and Subnets 3](#_Toc181821293)

[ 1st Floor: 3](#_Toc181821294)

[ 2nd Floor: 3](#_Toc181821295)

[ 3rd Floor: 3](#_Toc181821296)

[ IP Address and Network Address 3](#_Toc181821297)

[ Subnet Mask 4](#_Toc181821298)

[ Number of Routers, Switches, and Hubs 4](#_Toc181821299)

[ VLAN Usage 4](#_Toc181821300)

**Campus Management Network Design**

# **Overview of the Network Layout**

This network implements Modern Campus network. The campus has three building, Building A, Building B, Building C. Building A has departments of management, HR and finance. The admin staff PCs are distributed in the building offices and it is expected that they will share some networking equipment. The Faculty of Business is also situated in the building B. Building B has departments of Faculty of Engineering and Computing and Faculty of Art and Design. Building C has Students' labs and IT department. The IT department hosts the University Web server and other servers. There is also an email server hosted externally on the cloud. There is a smaller campus have department of Health and Sciences in which staff and students' labs are situated on separate floors. Each department is in a different network.

# **Technologies Used**

* VLANs
* Inter-VLAN Routing
* DHCP Server
* Port-Security
* SSH
* WLAN
* Host Configurations etc.

# **Subnetting**

In the staff floor of the H&S department within the branch campus network, we implemented 1-bit subnetting. For this purpose, we used Class C IP addresses, which have a default subnet mask of 255.255.255.0. However, when we applied 1-bit subnetting, the subnet mask changed to 255.255.255.128. This means that the network was divided into two smaller subnets.

Each of these subnets has its own range of IP addresses. For the first subnet, the IP range is from 192.168.x.0 to 192.168.x.127, and for the second subnet, the range is from 192.168.x.128 to 192.168.x.255. Here, the "x" represents the third octet, which depends on the specific network ID assigned.

In our setup, we assigned one IP address from the first subnet to the first PC and an IP address from the second subnet to the second PC. However, because these two PCs belong to different subnets, they cannot communicate directly with each other. This lack of communication occurs because devices in different subnets require a router or a similar device to facilitate communication between them. Without such a device, the message cannot be transferred between the two PCs.

# **IP Address and Network Address**

Each VLAN has its unique network address. Following are the assigned IPs and subnet ranges based on VLANs:

VLAN 10: Network 192.168.1.0/24

VLAN 20: Network 192.168.2.0/24

VLAN 30: Network 192.168.3.0/24

VLAN 40: Network 192.168.4.0/24

VLAN 50: Network 192.168.5.0/24

VLAN 60: Network 192.168.6.0/24

VLAN 70: Network 192.168.7.0/24

VLAN 80: Network 192.168.8.0/24

VLAN 90: Network 192.168.9.0/24

VLAN 100: Network 192.168.10.0/24

# **Number of Routers, Switches, and Hubs**

* **Routers**: 3 (main campus router, cloud router, branch campus router).
* **Switches**: 10 switches are used. Each department has its own switch. 2 Multilayer switches are also used.
* **Servers:** 3 servers have been used.
* **Hubs**: No hubs are used which is beneficial for handling VLAN traffic efficiently.

# **VLAN Usage**

VLANs are used for separating departments (like HR, Finance, IT, etc.) which improves security by isolating traffic and reduces unnecessary traffic. Each department gets its VLAN, ensuring that resources like printers are accessible only within the department.

# **Routing**

# We used dynamic routing to make the network more adaptable and easier to manage. Dynamic routing automatically updates routes, which is crucial as our network grows with multiple VLANs and departments. It reduces manual configuration, minimizes errors, and ensures efficient communication between VLANs. Dynamic routing also optimizes path selection, improving network performance and simplifying maintenance, especially when adding or changing network components. This approach is scalable and efficient, making it ideal for handling inter-VLAN communication and network expansion.