



Shaheed Zulfikar Ali Bhutto
Institute of Science & Technology

CNDC PROJECT REPORT

SZABIST NETWORK 99,100 Campus

COURSE:

CSC3205

CSCL3205

BY:

DUAA ALI – 2112109

SAADA ASGHAR – 2112125

SUHAIB TASLEEM – 2112132

TOOBA MUSHTAQ – 2112136

SUBMITTED TO:

SIR MUBEEN AHMED

SIR IDREES DARBAR

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TABLE OF CONTENT

Introduction.....	3
Network Design and Implementation	3-7
IP Pooling and Subnetting	8-9
VLAN Implementation.....	10
Network Functionality and Security Enhancements.....	11
Topology.....	12
Conclusion.....	13

Introduction

This report details the design and implementation of the networking infrastructure for SZABIST Karachi's 99 and 100 campuses. Our primary goal is to create a robust, scalable, and efficient network to support the diverse needs of various departments and buildings within the campus.

We begin by analyzing the specific requirements for each building, ensuring all unique needs are addressed. The report outlines our strategic approach to network design, including discussions on IP pooling to efficiently allocate IP addresses, maximizing performance and scalability.

Subnetting is covered as a critical component, providing a method to divide the network into smaller segments, enhancing security and performance. We also extensively discuss VLAN implementation, which logically segments network traffic, improving security and efficiency.

Inter-VLAN routing methods are detailed to enable communication between different VLANs, ensuring seamless connectivity across the campus. DHCP configuration is explained to highlight how dynamic IP addressing simplifies network administration.

We outline port security measures to protect against unauthorized access and potential threats. The implementation of Network Address Translation (NAT) is discussed for efficient IP address use and enhanced security. Access Control Lists (ACLs) are also covered, detailing how they control traffic flow and enforce security policies.

Finally, we provide insights into the connectivity and security measures implemented to ensure a reliable and secure network infrastructure. These measures are crucial for maintaining network integrity and availability, supporting the academic and administrative functions of SZABIST Karachi's campuses.

NOTE:

Line console password = xyz.123

Network Design and Implementation

This section describes the networking infrastructure for 99, 100 building within the SZABIST Karachi campus.

100 Campus Building

The 100 Campus Building consists of seven labs, classrooms, and departments. The following devices are present in each lab:

CS Lab: 58 PCs, 2 Printers, 1

FTP server AI Lab: 48 PCs

and 1 Printer

Lab-3: 38 PCs, 2 Printers, 1 FTP server

Lab-4: 35 PCs, 2 Printers

Lab-5: 35 PCs, 2 Printers, 1 FTP server

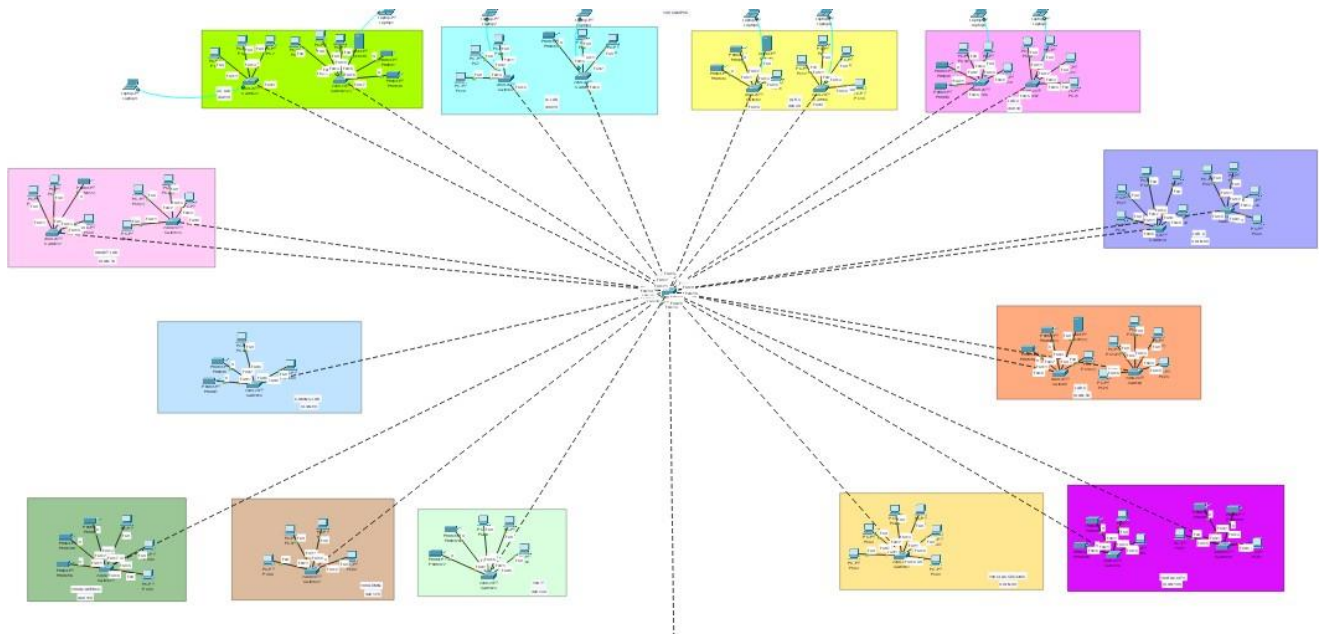
Lab-6: 35 PCs

Smart Lab: 40 PCs, 1 Printer

Gaming Lab: 9 PCs, 2 Printers

Additionally, there are classrooms, faculty PCs, printers, and department-specific devices. The networking infrastructure for the 100 Campus Building will be designed and implemented to accommodate these requirements.

100 Campus Topology



99 Campus Building

There are 18 classrooms in 99-building, each class room has one PC. There are around 32 PCs belong to faculty and 6 printers.

There are six PCs and two printers belong to Academic department. There are four PCs and one printer belongs to IT department.

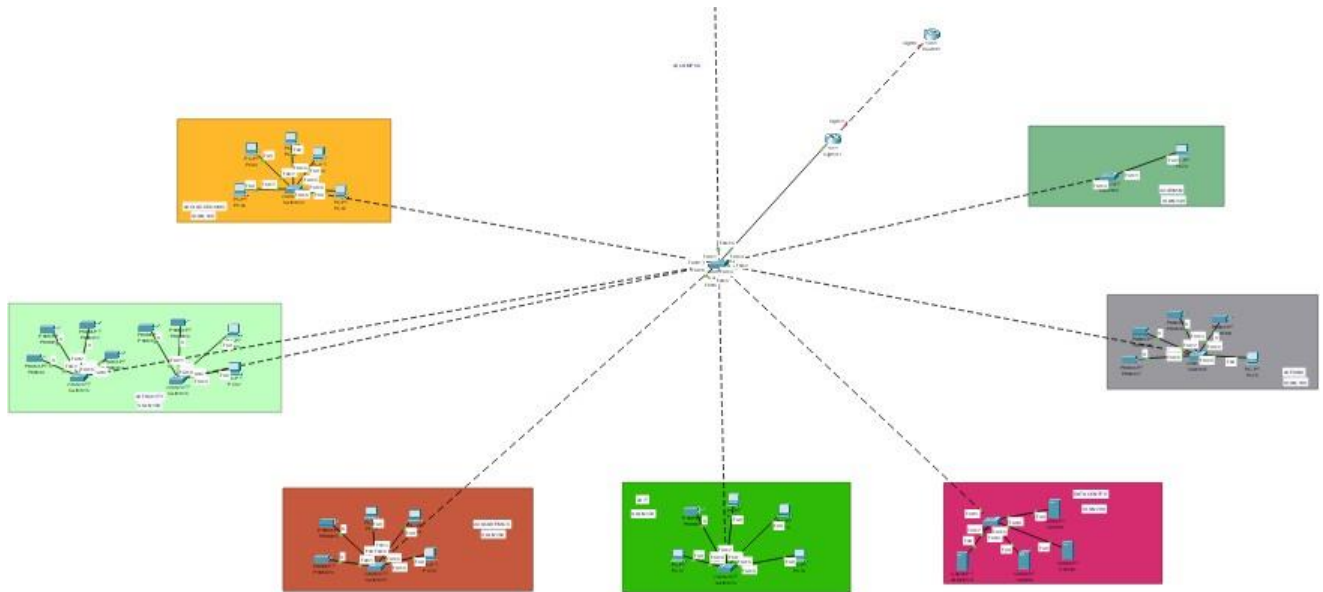
There are 12 PCs and 4 printers belong to EXAMINATION department. There are two PCs belong to ADMINISTRATION department.

There are four servers in data center, one for web server, one for ZABDESK, one for email and one for CMS.

EDGE router is located at 99-Campus Building.

The 99 Campus Building comprises classrooms, faculty PCs, printers, and departments such as Academic, IT, and Examination. The networking infrastructure for this building will be designed to meet the specific needs of each department.

99 Campus Topology



IP Pooling and Subnetting

To optimize IP address allocation and minimize wastage, Variable Length Subnet Masking (VLSM) will be utilized. Four IP pools will be created based on the project group members, using the format xx.xx.xx.xx/24, where xx represents the roll number.

100 Campus:

CS Lab: 58 PCs, 2 Printer and 1 ftp server. (211.21.36.0/26) (ips = 0-63) (for ftp server use ip address 211.21.30.21/30 (ips 21 - 24))(vlan 10)

AI Lab: 48 PCs and 1 Printer (211.21.36.64/26) (ips = 64-127)(vlan 20)

Lab-3: 38 PCs, 2 Printer and 1 ftp server. (211.21.36.128/26) (ips = 128- 191)(vlan 30)

Lab-4: 35 PCs and 2 Printers. (211.21.36.192/26) (ips = 192 - 255)(vlan 40)

Lab-5: 35 PCs, 2 Printer and 1 ftp server. (211.21.25.0/26) (ips = 0-63)(vlan 50)

Lab-6: 35 PCs only (211.21.25.64/26) (ips = 64-127) (vlan 60)

Smart Lab: 40 PCs and 1 Printer. (211.21.25.128) (ips = 128- 191)(vlan 70)

99 Campus:

32 PCs belong to faculty and 6 printers. (99 Campus Faculty) (211.21.25.192/26) (ips = 192 - 255) (VLAN because in 99 campus)(vlan 150)

IP Pool 1: 211.21.36.0/24 (Using all hosts)

IP Pool 2: 211.21.25.0/24 (Using all hosts)

100 Campus:

Gaming Lab: 9 PCs and 2 Printers. 16 (211.21.09.124/28) (ips = 124 - 139) (vlan 80)

20 classrooms in 100-building, each classroom has one PC. 32 (211.21.09.0/27) (ips = 0 - 31)(vlan 90)

25 PCs and 4 printers belong to the faculty. 32 (211.21.09.32/27) (ips = 32 - 63)(vlan 100)

5 PCs and three printers belong to the Academic department. 16 (211.21.09.140/28) (ips = 140- 155)(vlan 110)

4 PCs belong to the ADMINISTRATION department. 8 (211.21.30.0/29) (ips 0 - 7)(vlan 120)

10 PCs and two printers belong to the IT department. 16 (211.21.09.156/28) (ips = 156 - 171)(vlan 130)

99 Campus:

18 classrooms in 99-building, each classroom has one PC. 32 (211.21.09.64/27) (ips = 64 - 95)(vlan 140)

6 PCs and 2 printers belong to the Academic department. 16 (211.21.09.176/28) (ips = 176-191)(vlan 160)

4 PCs and one printer belong to the IT department. 8 (211.21.30.8/29) (ips 8 - 15)(vlan 170)

12 PCs and 4 printers belong to the EXAMINATION department. 32 (211.21.09.96/27) (ips = 96-127)(vlan 180)

2 PCs belong to the ADMINISTRATION department. 4 (211.21.30.24/30) (ips 24- 27)(vlan 190)

4 servers in data center, 1 for web server, 1 for ZABDESK, 1 for email and 1 for CMS. 8 (211.21.30.16/29) (ips 16 - 23)(vlan 200)

EDGE router is located at 99-Campus Building.

IP Pool 3: 211.21.09/24 (Using 124 hosts)

IP Pool 4: 211.21.30/24 (Using 20 hosts)

VLAN Implementation

VLANs are implemented for better network management and where necessary. VLAN segmentation will enable efficient traffic separation and enhance network security.

VLAN	Name	Status	Ports
1	default	active	Fa0/22, Fa0/23, Gig0/1, Gig0/2
10	CS_Lab	active	
20	AI_Lab	active	
30	Lab_3	active	
40	Lab_4	active	
50	Lab_5	active	
60	Lab_6	active	
70	Smart_lab	active	
80	Gaming_lab	active	
90	100_CR	active	
100	100_Faculty	active	
110	100_Academics	active	
120	100_Admin	active	
130	100_IT	active	
140	99_CR	active	
150	99_Faculty	active	
160	99_Academics	active	
170	99_IT	active	
180	99_Examination	active	
190	99_Admin	active	
200	Data_Center	active	
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

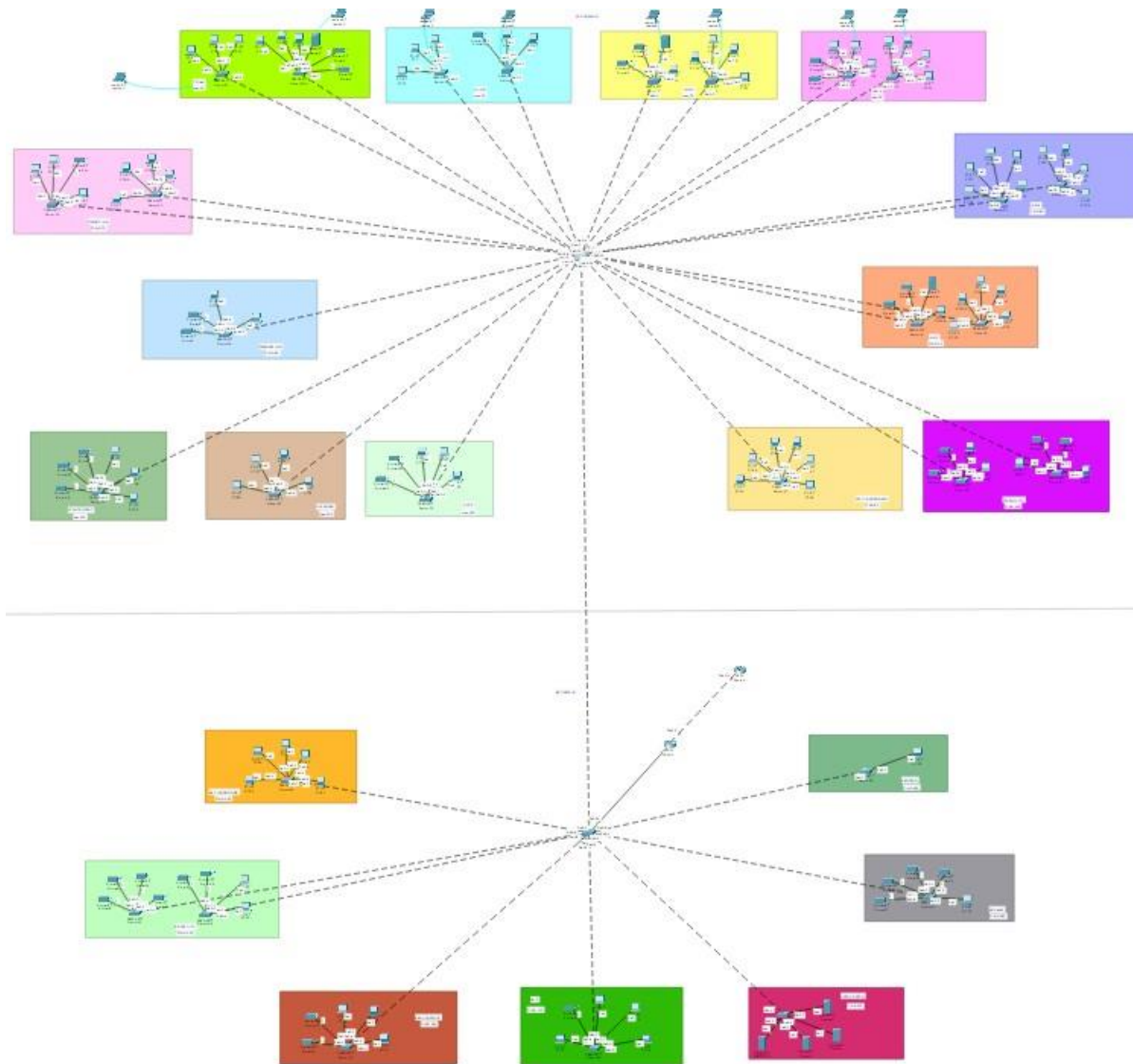
Network Functionality and Security Enhancements

To optimize the network infrastructure at SZABIST Karachi campus, several key measures will be implemented:

1. **Inter-VLAN Routing:** This will facilitate seamless communication between VLANs, promoting efficient data transfer and network connectivity.
2. **DHCP Configuration:** Dynamic Host Configuration Protocol (DHCP) will dynamically assign IP addresses to PCs, streamlining network management and device configuration. Static IP addresses will be allocated to servers and printers to ensure consistent and reliable connectivity.
3. **Port Security:** Implementing port security measures will enhance network security by restricting unauthorized access to servers and lab devices.
4. **Network Address Translation (NAT):** NAT will use a public IP pool to establish a secure connection between SZABIST's network and the internet, enabling efficient internet access.
5. **Access Control Lists (ACLs):** ACLs will be implemented to control network traffic, ensuring that only authorized users and devices can access critical network resources.

Collectively, these measures will enhance network functionality, efficiency, and security at SZABIST Karachi campus.

Complete Topology



Conclusion

In conclusion, the design and implementation of the networking infrastructure for SZABIST Karachi campus will provide a resilient and adaptable network solution, tailored to the diverse needs of its departments and buildings. By incorporating advanced techniques such as IP pooling, subnetting, VLANs, inter-VLAN routing, DHCP configuration, port security, PAT, ACLs, and robust security measures, the network will ensure seamless and secure operations across the campus. These comprehensive approaches guarantee efficient IP address utilization, effective traffic routing, centralized management, and protection against unauthorized access. The result will be a reliable, high-performing network infrastructure for SZABIST Karachi.