COMPUTER NETWORKS AND DATA COMMUNICATIONS

PROJECT REPORT

ON

SZABIST NETWORK

CREATED BY:

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INTRODUCTION

This report presents the design and implementation of the networking infrastructure for SZABIST Karachi campus. The objective is to provide a robust and scalable network that supports the various departments and buildings within the campus. The report outlines the requirements for each building and provides details on the network design, IP pooling, subnetting, VLAN implementation, inter-VLAN routing, DHCP configuration, port security, NAT, ACLs, dynamic routing, connectivity, remote management, and security measures.

NOTE:
Line console password = cisco
Privilege mode password = cisco123
Telnet password = 12345

Network Design and Implementation

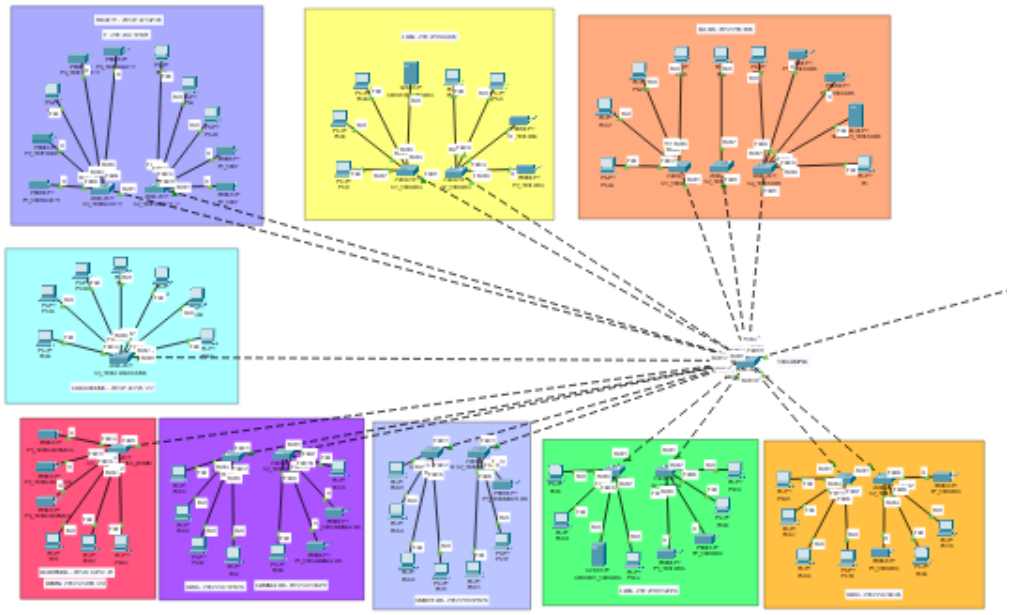
This section describes the networking infrastructure for each building within the SZABIST Karachi campus.

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
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.

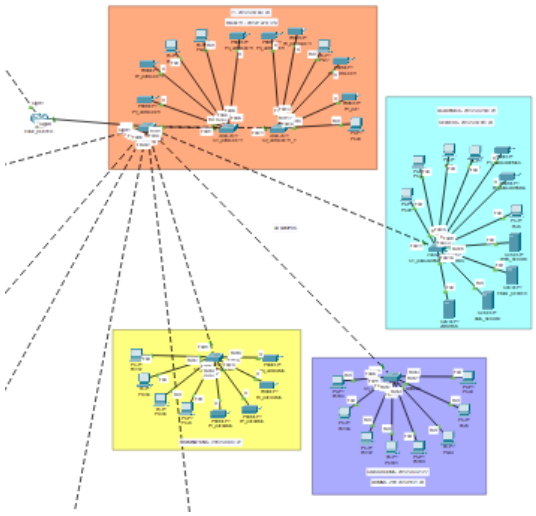
100 Campus Topology



99 Campus Building

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.

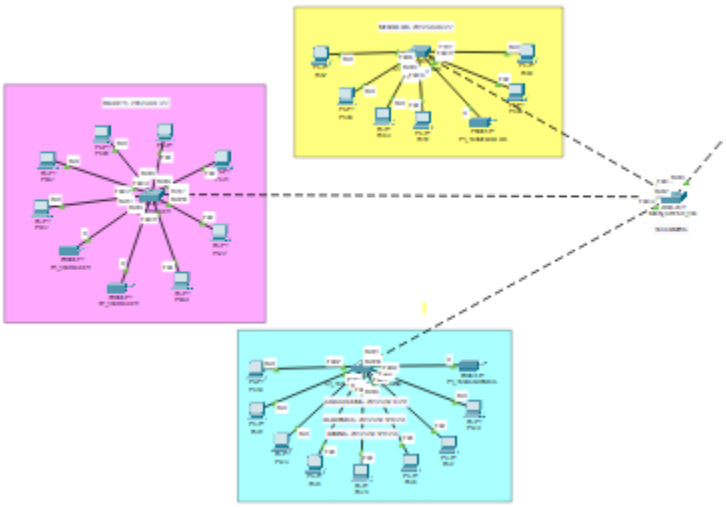
Topology



154 Campus Building

The 154 Campus Building consists of classrooms, faculty PCs, printers, and the Mechatronics Labs. The networking infrastructure in this building will be designed to provide seamless connectivity and support the requirements of the Mechatronics Labs.

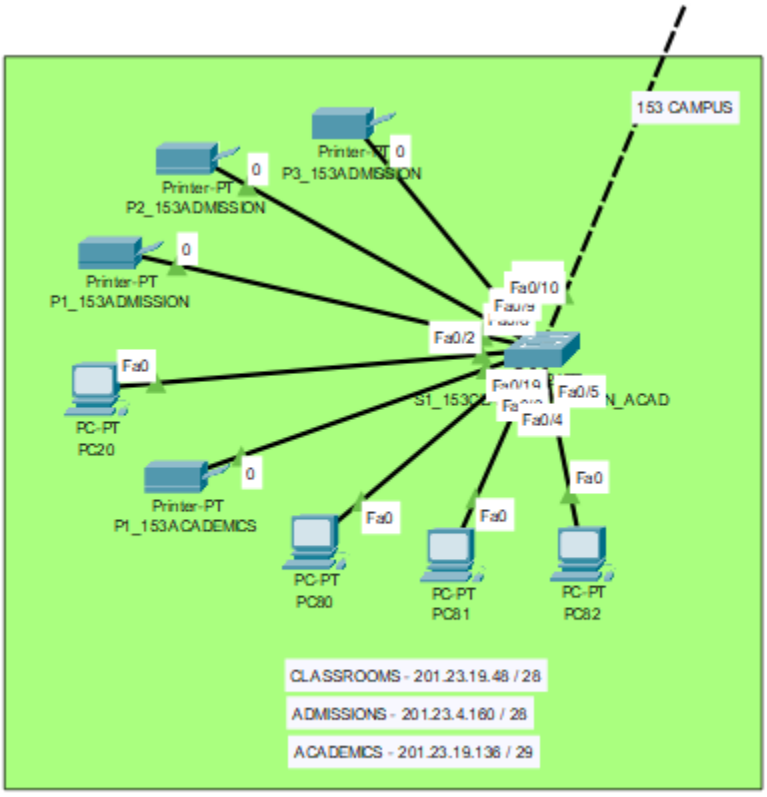
Topology



153 Campus Building

The 153 Campus Building houses classrooms, the Admission department, and the Academic department. The networking infrastructure for this building will ensure reliable connectivity and support the specific needs of these departments.

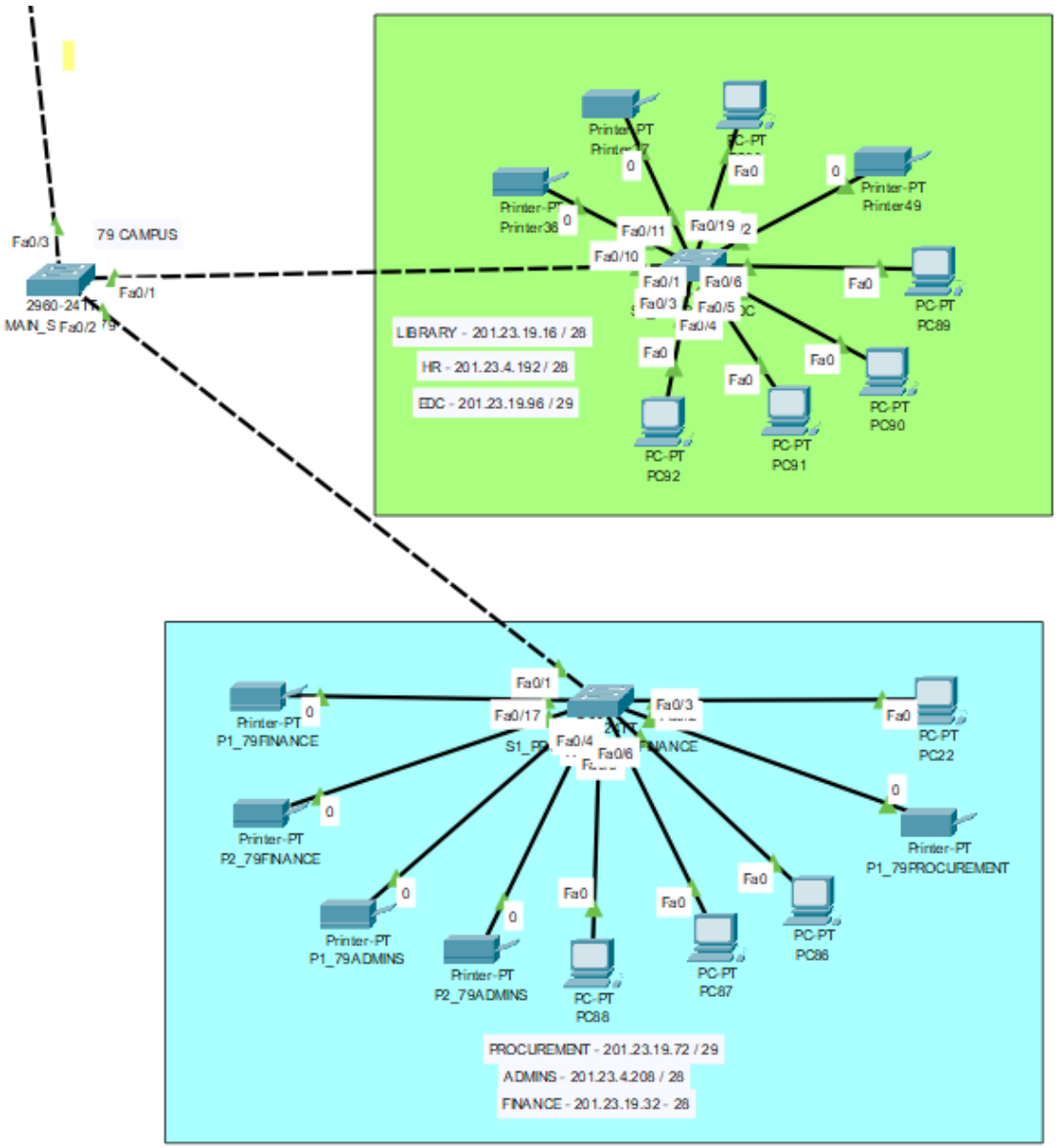
Topology



79 Campus Building

The 79 Campus Building includes a library, HR department, Procurement department, ADMINISTRATION department, Finance department, and EDC department. The networking infrastructure will be designed to cater to the requirements of these departments.

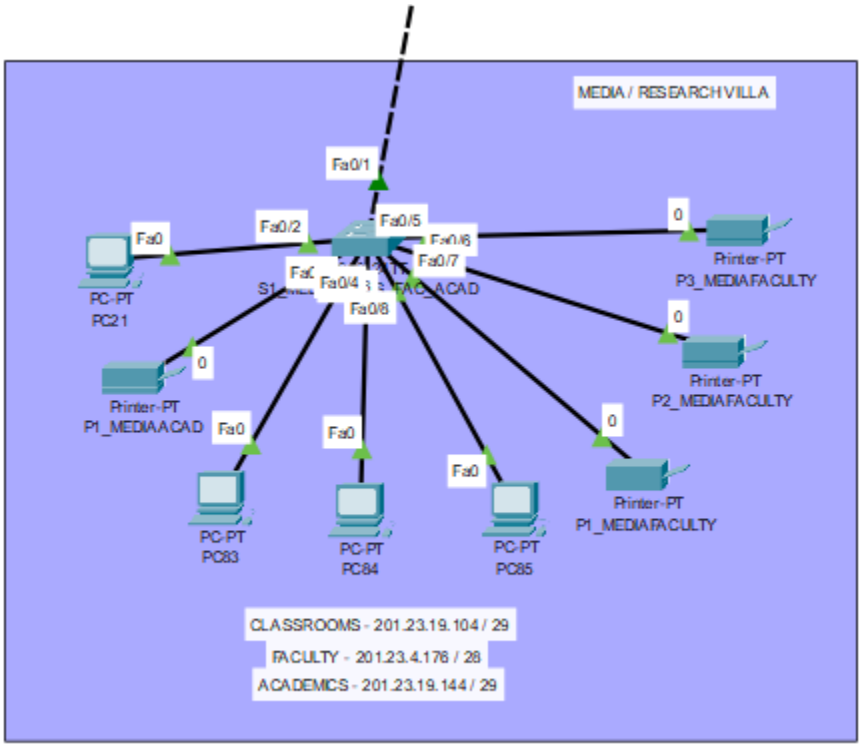
Topology



Media Villa and Research Villa

The Media Villa and Research Villa consist of classrooms, faculty PCs, printers, and the Academic department. The networking infrastructure will be designed to facilitate communication and collaboration within these buildings.

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.

The network 201.22.85.0/24 has 254 hosts.

Your subnets need 185 hosts.

Name	Hosts Needed	Hosts Available	Unused Hosts	Network Address	Slash	Mask	Usable Range	Broadcast	Wildcard
cslab	62	62	0	201.22.85.0	/26	255.255.255.192	201.22.85.1 - 201.22.85.62	201.22.85.63	0.0.0.(
lab3	42	62	20	201.22.85.64	/26	255.255.255.192	201.22.85.65 - 201.22.85.126	201.22.85.127	0.0.0.(
smart lab	42	62	20	201.22.85.128	/26	255.255.255.192	201.22.85.129 - 201.22.85.190	201.22.85.191	0.0.0.(
lab5	39	62	23	201.22.85.192	/26	255.255.255.192	201.22.85.193 - 201.22.85.254	201.22.85.255	0.0.0.63

Name	Hosts Needed	Hosts Available	Unused Hosts	Network Address	Slash	Mask	Usable Range	Broadcast
faculty 99	39	62	23	201.22.97.0	/26	255.255.255.192	201.22.97.1 - 201.22.97.62	201.22.97.63
lab4	38	62	24	201.22.97.64	/26	255.255.255.192	201.22.97.65 - 201.22.97.126	201.22.97.12
lab6	36	62	26	201.22.97.128	/26	255.255.255.192	201.22.97.129 - 201.22.97.190	201.22.97.191
faculty 100	30	30	0	201.22.97.192	/27	255.255.255.224	201.22.97.193 - 201.22.97.222	201.22.97.223
classrooms100	21	30	9	201.22.97.224	/27	255.255.255.224	201.22.97.225 - 201.22.97.254	201.22.97.255

Name	Hosts Needed	Hosts Available	Unused Hosts	Network Address	Slash	Mask	Usable Range	Broadcast	Wildcard
faculty 154	21	30	9	201.23.4.0	/27	255.255.255.224	201.23.4.1 - 201.23.4.30	201.23.4.31	0.0.0.31
classroom 99	19	30	11	201.23.4.32	/27	255.255.255.224	201.23.4.33 - 201.23.4.62	201.23.4.63	0.0.0.31
examination 99	17	30	13	201.23.4.64	/27	255.255.255.224	201.23.4.65 - 201.23.4.94	201.23.4.95	0.0.0.31
mech lab 154	17	30	13	201.23.4.96	/27	255.255.255.224	201.23.4.97 - 201.23.4.126	201.23.4.127	0.0.0.31
IT 100	13	14	1	201.23.4.128	/28	255.255.255.240	201.23.4.129 - 201.23.4.142	201.23.4.143	0.0.0.15
gaming lab	12	14	2	201.23.4.144	/28	255.255.255.240	201.23.4.145 - 201.23.4.158	201.23.4.159	0.0.0.15
admission 153	12	14	2	201.23.4.160	/28	255.255.255.240	201.23.4.161 - 201.23.4.174	201.23.4.175	0.0.0.15
faculty media	12	14	2	201.23.4.176	/28	255.255.255.240	201.23.4.177 - 201.23.4.190	201.23.4.191	0.0.0.15
hr dept 79	10	14	4	201.23.4.192	/28	255.255.255.240	201.23.4.193 - 201.23.4.206	201.23.4.207	0.0.0.15
admin 79	10	14	4	201.23.4.208	/28	255.255.255.240	201.23.4.209 - 201.23.4.222	201.23.4.223	0.0.0.15
academics 100	9	14	5	201.23.4.224	/28	255.255.255.240	201.23.4.225 - 201.23.4.238	201.23.4.239	0.0.0.15
academics 99	9	14	5	201.23.4.240	/28	255.255.255.240	201.23.4.241 - 201.23.4.254	201.23.4.255	0.0.0.15

Name	Hosts Needed	Hosts Available	Unused Hosts	Network Address	Slash	Mask	Usable Range	Broadcast	Wildcard
classroom 154	9	14	5	201.23.19.0	/28	255.255.255.240	201.23.19.1 - 201.23.19.14	201.23.19.15	0.0.0.15
library 79	9	14	5	201.23.19.16	/28	255.255.255.240	201.23.19.17 - 201.23.19.30	201.23.19.31	0.0.0.15
finance 79	8	14	6	201.23.19.32	/28	255.255.255.240	201.23.19.33 - 201.23.19.46	201.23.19.47	0.0.0.15
classroom 153	7	14	7	201.23.19.48	/28	255.255.255.240	201.23.19.49 - 201.23.19.62	201.23.19.63	0.0.0.15
IT 99	6	6	0	201.23.19.64	/29	255.255.255.248	201.23.19.65 - 201.23.19.70	201.23.19.71	0.0.0.7
procurement79	6	6	0	201.23.19.72	/29	255.255.255.248	201.23.19.73 - 201.23.19.78	201.23.19.79	0.0.0.7
admin 100	5	6	1	201.23.19.80	/29	255.255.255.248	201.23.19.81 - 201.23.19.86	201.23.19.87	0.0.0.7
servers 99	5	6	1	201.23.19.88	/29	255.255.255.248	201.23.19.89 - 201.23.19.94	201.23.19.95	0.0.0.7
edc 79	5	6	1	201.23.19.96	/29	255.255.255.248	201.23.19.97 - 201.23.19.102	201.23.19.103	0.0.0.7
class media	4	6	2	201.23.19.104	/29	255.255.255.248	201.23.19.105 - 201.23.19.110	201.23.19.111	0.0.0.7
admin 99	3	6	3	201.23.19.112	/29	255.255.255.248	201.23.19.113 - 201.23.19.118	201.23.19.119	0.0.0.7
academic 154	3	6	3	201.23.19.120	/29	255.255.255.248	201.23.19.121 - 201.23.19.126	201.23.19.127	0.0.0.7
admin 154	3	6	3	201.23.19.128	/29	255.255.255.248	201.23.19.129 - 201.23.19.134	201.23.19.135	0.0.0.7
academic 153	3	6	3	201.23.19.136	/29	255.255.255.248	201.23.19.137 - 201.23.19.142	201.23.19.143	0.0.0.7
edc media	3	6	3	201.23.19.144	/29	255.255.255.248	201.23.19.145 - 201.23.19.150	201.23.19.151	0.0.0.7

VLAN Implementation

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

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VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig0/1, Gig0/2
2    CSLAB_100                         active    Fa0/2, Fa0/3, Fa0/4, Fa0/5
                                                 Fa0/6, Fa0/7, Fa0/8, Fa0/9
                                                 Fa0/10, Fa0/11, Fa0/12, Fa0/13
                                                 Fa0/14, Fa0/15, Fa0/16
3    LAB3_100                          active
4    SMARTLAB_100                      active
5    LAB5_100                          active
6    FACULTY_99                        active
7    LAB4_100                          active
8    LAB6_100                          active
9    FACULTY_100                       active
10   CLASSROOMS_100                    active
11   FACULTY_154                       active
12   CLASSROOMS_99                     active
13   EXAMINATION_99                    active
14   MECHAlAB_154                      active
15   IT_100                            active
16   GAMINGLAB_100                     active
17   ADMISSION_153                     active
18   FACULTY_MEDIA                     active
19   HR_79                             active
20   ADMIN_79                          active
21   ACADEMICS_100                     active
22   ACADEMICS_99                      active
23   CLASSROOMS_154                    active
24   LIBRARY_79                        active
25   FINANCE_79                        active
26   CLASSROOMS_153                    active
27   IT_99                             active
28   PROCUREMENT_79                    active
29   ADMIN_100                         active
30   SERVERS_99                        active
31   EDC_79                            active
32   CLASSROOMS_MEDIA                  active
33   ADMIN_99                          active
34   ACADEMICS_154                     active
35   ADMIN_154                         active
36   ACADEMICS_153                     active
37   ACADEMICS_MEDIA                   active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
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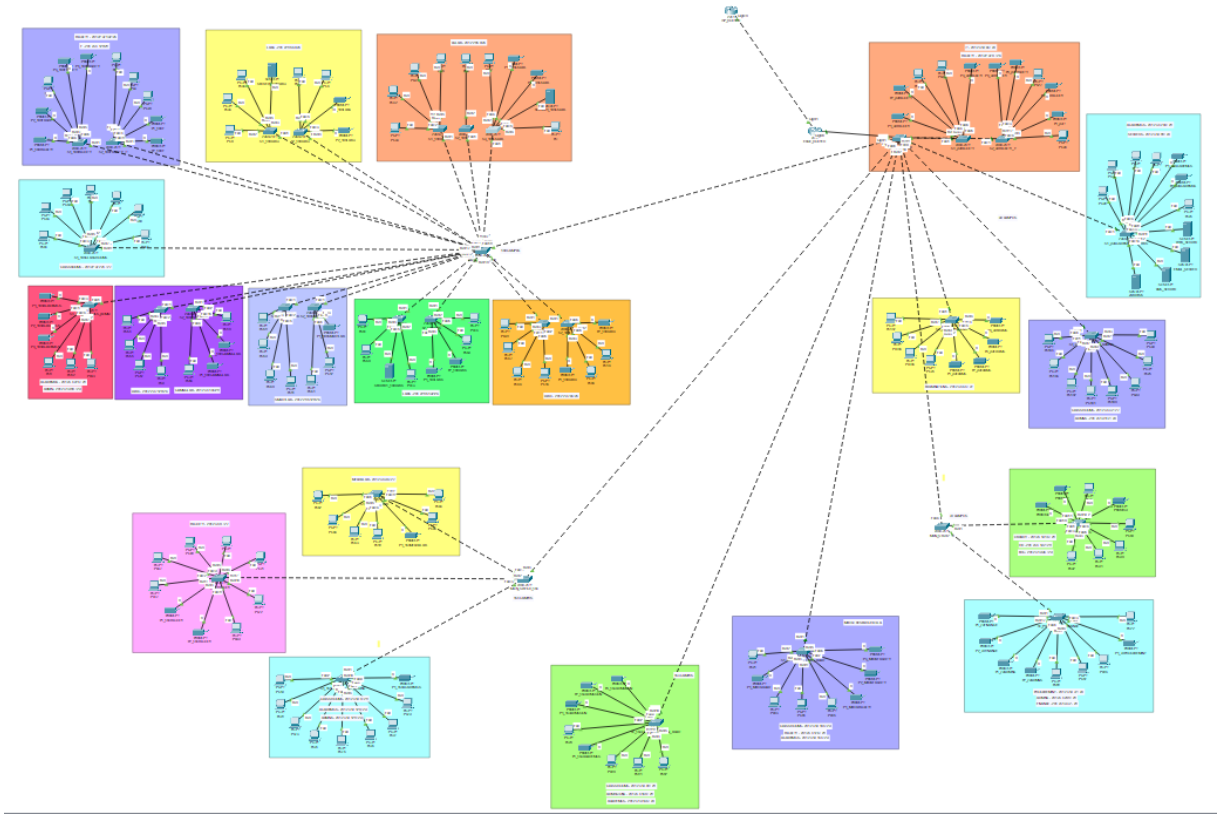
Network Functionality and Security Enhancements

To optimize the network infrastructure at SZABIST Karachi campus, various measures will be implemented. Inter-VLAN routing will facilitate seamless communication between VLANs, promoting efficient data transfer and network connectivity. DHCP configuration will dynamically assign IP addresses to PCs, streamlining network management and device configuration. Static IP addresses will be allocated to servers and printers, ensuring consistent and reliable connectivity. Port security measures will enhance network security by implementing appropriate techniques to restrict unauthorized access to servers and lab devices. Network Address Translation (NAT) will establish a connection between SZABIST's network and the internet using a public IP pool, enabling secure and efficient internet access. Access Control Lists (ACLs) will be implemented to control network traffic, allowing only authorized users and devices to access critical network resources. These measures collectively enhance network functionality, efficiency, and security at SZABIST Karachi campus.

Complete Topology Diagram



Conclusion

In conclusion, the design and implementation of the networking infrastructure for SZABIST Karachi campus will deliver a resilient and adaptable network solution tailored to the diverse needs of different departments and buildings. By incorporating advanced techniques such as IP pooling, subnetting, VLANs, inter-VLAN routing, DHCP configuration, port security, NAT, ACLs, dynamic routing, connectivity, remote management, and robust security measures, the network will offer seamless and secure operations throughout the campus. These comprehensive approaches guarantee efficient utilization of IP addresses, efficient traffic routing, centralized management, and protection against unauthorized access, resulting in a reliable and high-performing network infrastructure for SZABIST Karachi.