CAMPUS AREA NETWORK OF SUKKUR IBA UNIVERSITY

COMPUTER COMMUNICATION & NETWORKS

PROJECT REPORT

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ABTRACT

Computer networks have a significant impact on the working of an organization. Universities depend on the proper functioning and analysis of their networks for education, administration, communication, e-library, automation, etc.

An efficient network is essential to facilitate the systematic and cost-efficient transfer of information in an organization in the form of messages, files, and resources.

The project provides insights into various concepts such as topology design,

IP address configuration, and how to send information in the form of packets to the wireless networks of different areas of a University.

1) Routers
2) Switches (2960-24TT)
3) Email server
4) DNS server
5) WEB server (HTTP)
6) Wireless Device (Access Point)
7) PCs
8) Laptops
9) Smartphones

INTRODUCTION

Campus networking via wireless connection becomes an important part of campus life and provides the main way for teachers and students to access educational resources, which gives an important platform to exchange information. As laptops and intelligent terminals are widely used, demand for access to information anytime and anywhere has become more and more urgent, but traditional cable networks cannot meet this requirement.

In this mini-project, I have defined a simulation of campus networks based on wired and wireless networking. It provides an efficient way to explore the internet with a mobile terminal for teachers and students regardless of cables and places.

The major aim of this project is to show the wireless connectivity that is used in universities to make the network efficient and mobile at the same time. Mobility is the major concentration of this project. In order to provide equal functionality to all the users (college staff and students), we have added DNS, Email, and HTTP servers for the maximum utilization of resources.

Hence the campus network provides different services such as connecting the user to the internet, data sharing among users (students, teachers, and different university members), accessing different web services for different functionalities.

EXPLANATION

In order to make my project understandable, we have divided the content into steps. They are as follows:

1. **Software and hardware requirements**

Before heading towards the implementation we need to make sure of the following requirements.

- A proper workstation (any mid-high range laptop will suffice).
- Packet Tracer by Cisco
- 8 GB RAM.
- Any 10,000+ Average CPU Mark scored processor.
- 16 GB of dedicated hard disk space.
- USB 3.0+ port.

2. **Network Requirements**

    1. Campus Area|

The Campus area is further divided into various accessing points like Dome building, Library, Academic Blocks (AB1, AB2 and AB3), Server Center, and IT consulting.

    2. Hostel Area

The Hostel area is further divided into Boys blocks and Girls blocks respectively.

Devices used in the Network

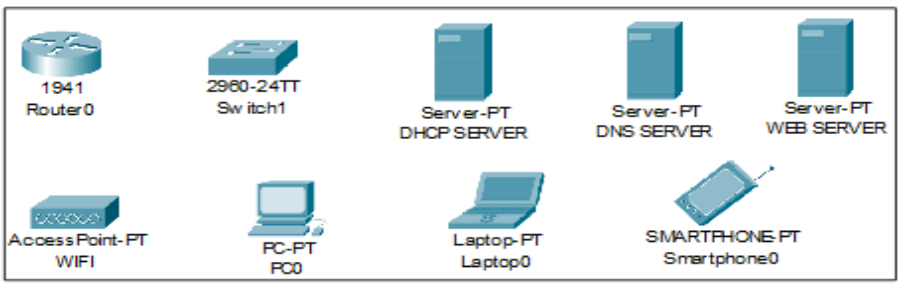


Figure 1: Devices used in the network

3. Implementation and Flow Diagram

- To design the wireless network of the university we initially started by placing the core devices into the frame as mentioned in the layout.

- Firstly, we placed the main router at the center of the university outline, which was further connected to the server switch using the gigabit Ethernet port with copper straight-through cable and sub routers (campus router and hostel router) using the serial port with serial DCE cable at the hostel area and campus area respectively.

- The server switch was further connected to the EMAIL, DNS, and WEB servers respectively.

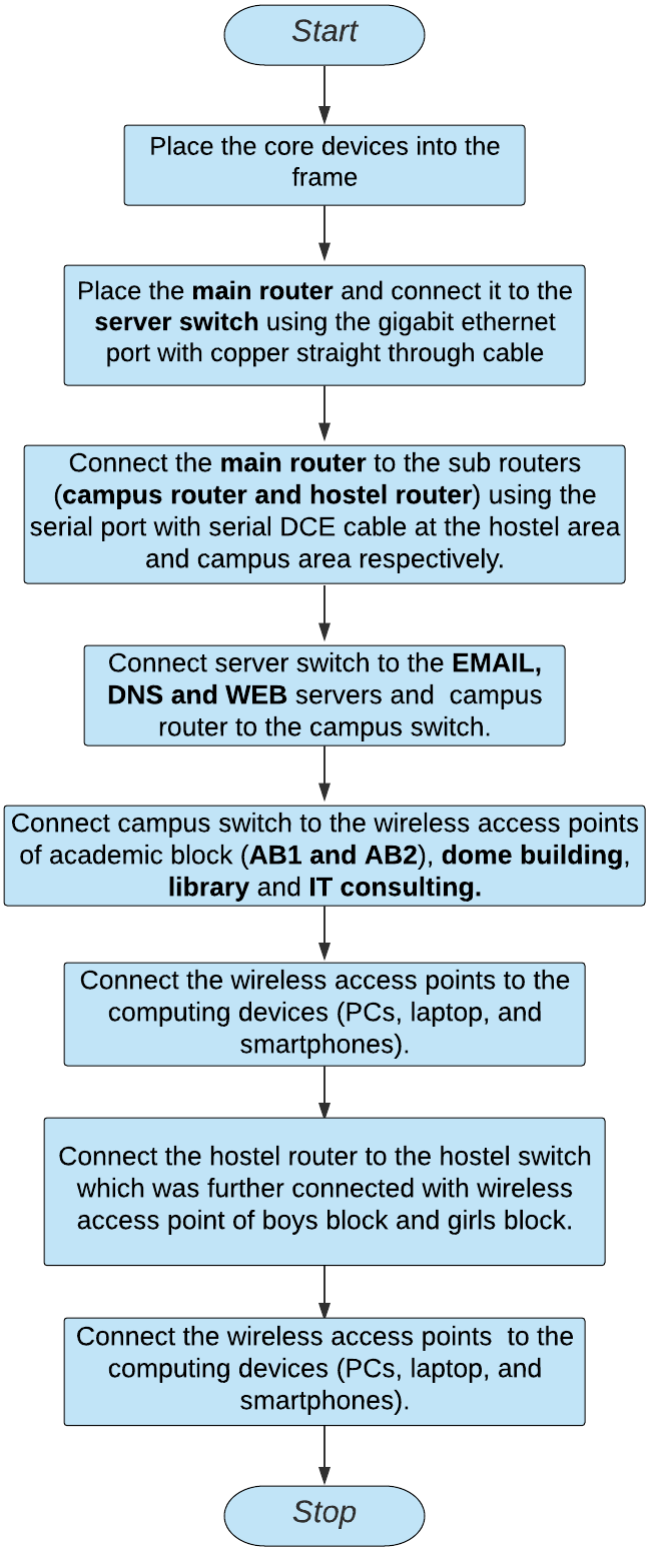
- Campus router was connected to the campus switch which was further connected with wireless access points of the academic block (AB1, AB2 and AB3), dome building, library, and IT consulting.

- The wireless access points were then connected to computing devices (PCs, laptops, and smartphones).

- Similarly, the hostel router was connected to the hostel switch which was further connected with the wireless access point of boys block and girls block.

- The wireless access points were then connected to the computing devices (PCs, laptops, and smartphones), every area has a dedicated access point which can only be connected with the help of a password.

- All these connections are made through Ethernet ports (gigabit Ethernet and fast Ethernet) using copper straight-through cables.

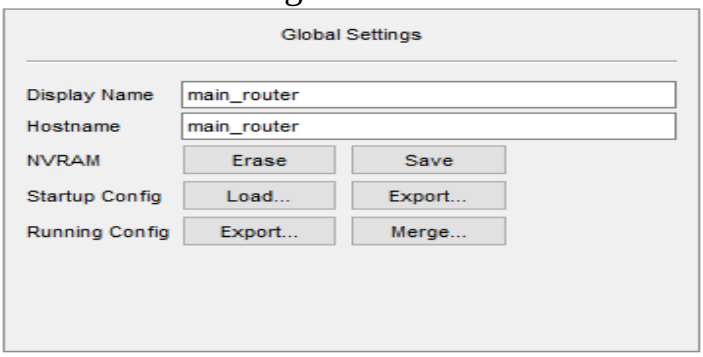


This is the flow diagram for a better understanding of the steps mentioned above

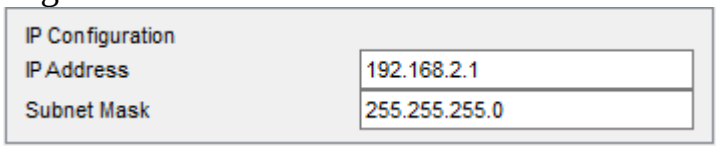
4. Configuring IP Addresses

We have attached the screenshots of all the IP configuration below:

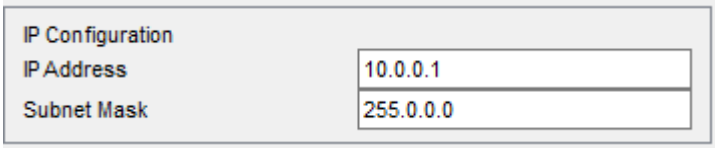
- Main Router configuration



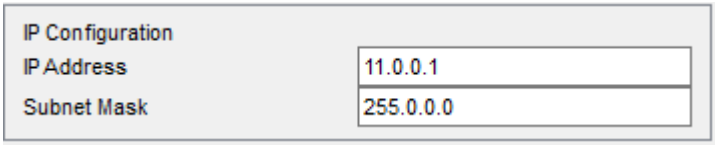
GigabitEthernet0/1



Serial0/1/0



Serial0/1/1




```
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/8 is directly connected, Serial0/3/0
L       10.0.0.1/32 is directly connected, Serial0/3/0
     11.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       11.0.0.0/8 is directly connected, Serial0/3/1
L       11.0.0.1/32 is directly connected, Serial0/3/1
R    192.168.1.0/24 [120/1] via 10.0.0.2, 00:00:01, Serial0/3/0
R    192.168.2.0/24 [120/1] via 10.0.0.2, 00:00:01, Serial0/3/0
     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.3.0/24 is directly connected, GigabitEthernet0/1
L       192.168.3.1/32 is directly connected, GigabitEthernet0/1
     192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.10.0/24 is directly connected, GigabitEthernet0/0
L       192.168.10.1/32 is directly connected, GigabitEthernet0/0
     192.168.14.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.14.0/24 is directly connected, GigabitEthernet0/2
L       192.168.14.1/32 is directly connected, GigabitEthernet0/2
R    192.168.15.0/24 [120/1] via 10.0.0.2, 00:00:01, Serial0/3/0
     192.168.16.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.16.0/24 is directly connected, GigabitEthernet0/0.10
L       192.168.16.2/32 is directly connected, GigabitEthernet0/0.10
```

AB-III FACULTY 192.168.1.0

AB-III STUDENT 192.168.2.0

LIBRARY 192.168.3.0

IT-SERVER ROOM 192.168.10.0

AB-I FACULTY 192.168.4.0

AB-I STUDENT 192.168.5.0

AB-II FACULTY 192.168.6.0

BOYS HOSTEL 192.168.7.0

GIRLS HOSTEL 192.168.8.0

FACULTY HOSTEL 192.168.9.0

AB-II Students 192.168.14.0

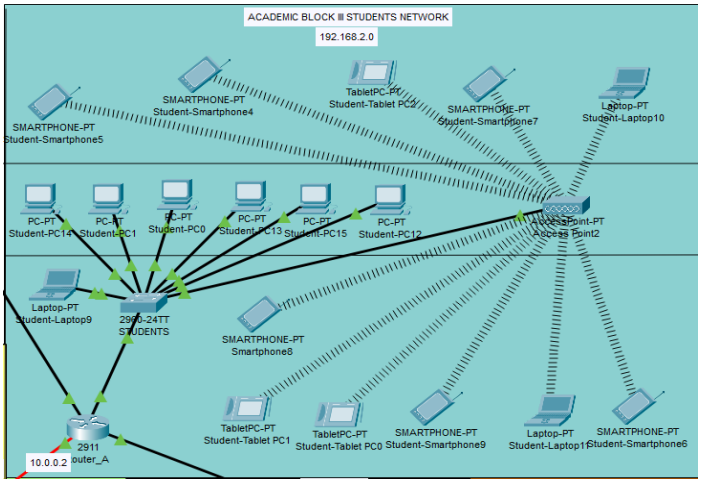
Admin 192.168.15.0

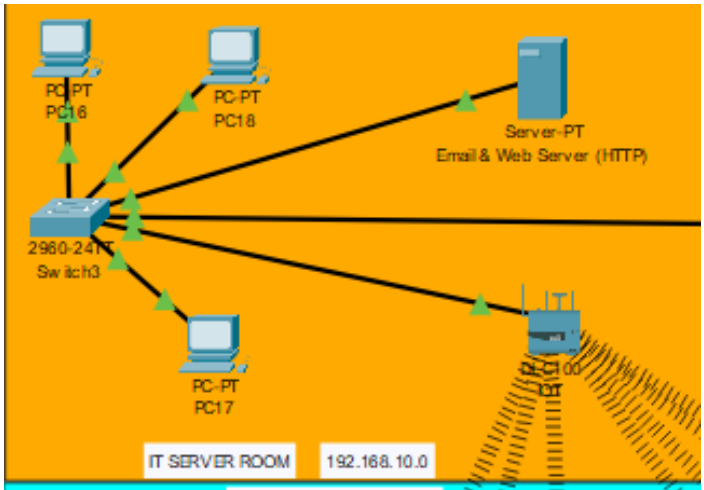
Router_A : routerA

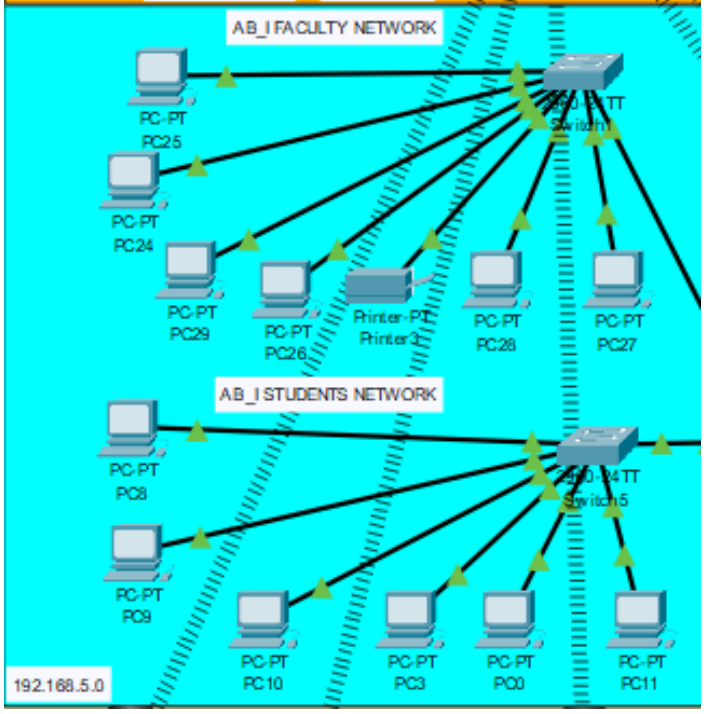
Main_router : mainrouter

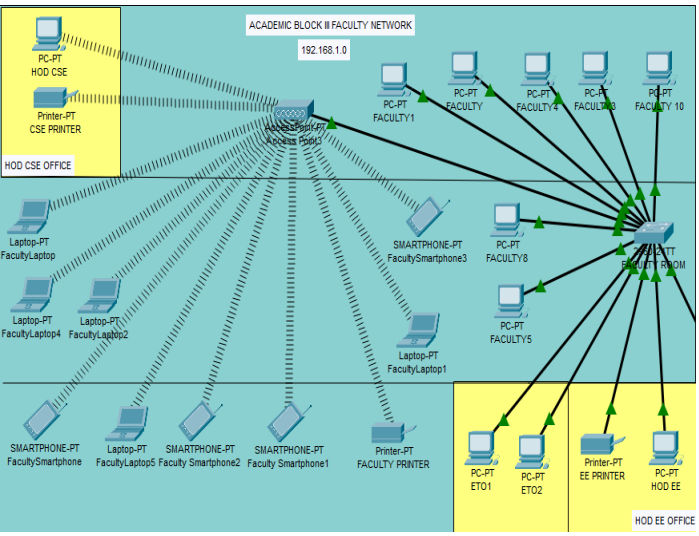
Router_B: routerB

Hostel_Router : hostelrouter









5. Securing the network

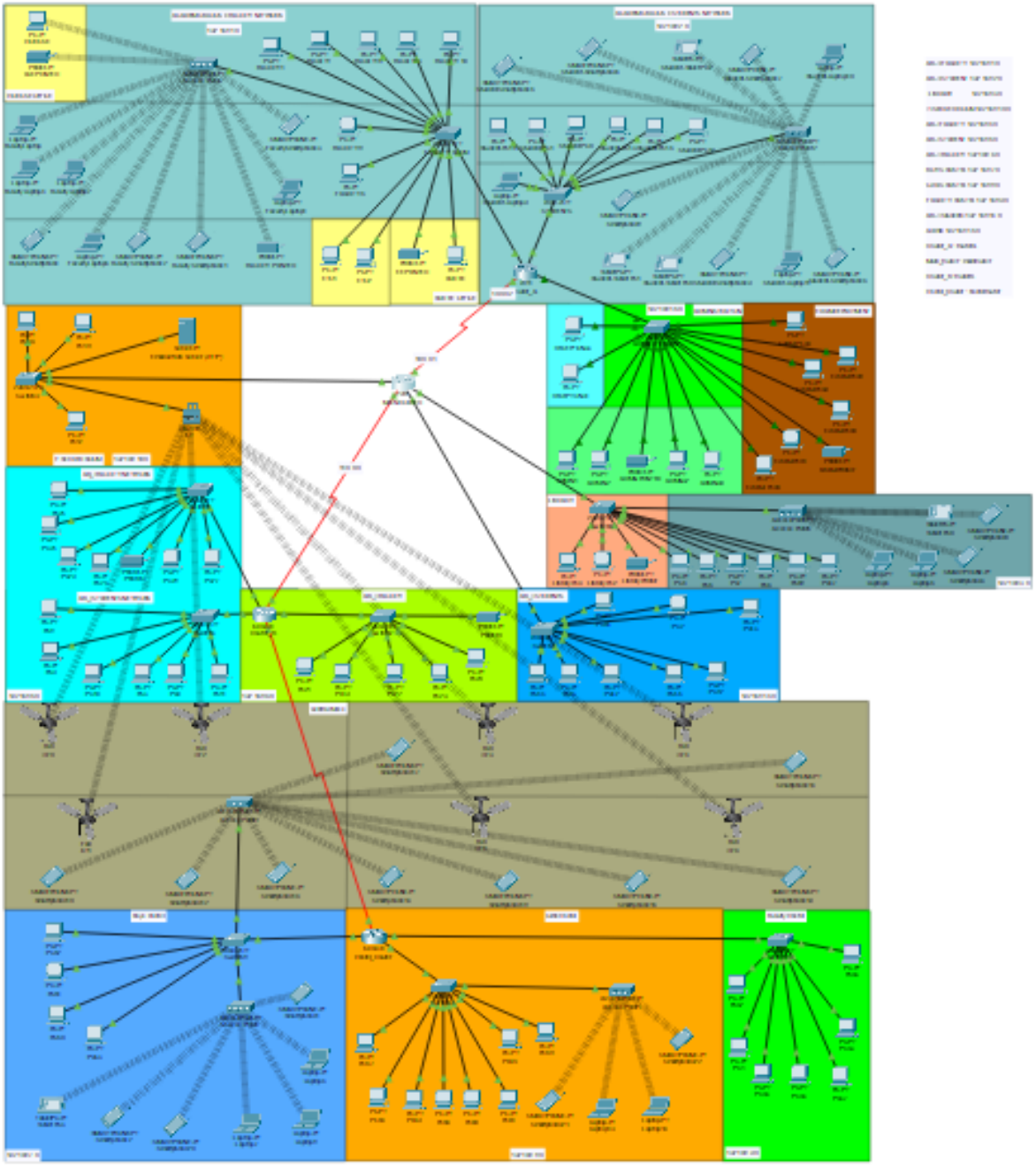
Passwords are used in accessing the router and all the wireless networks to make the access limited to University authorized users only.

Routers and their assigned passwords are mentioned below:

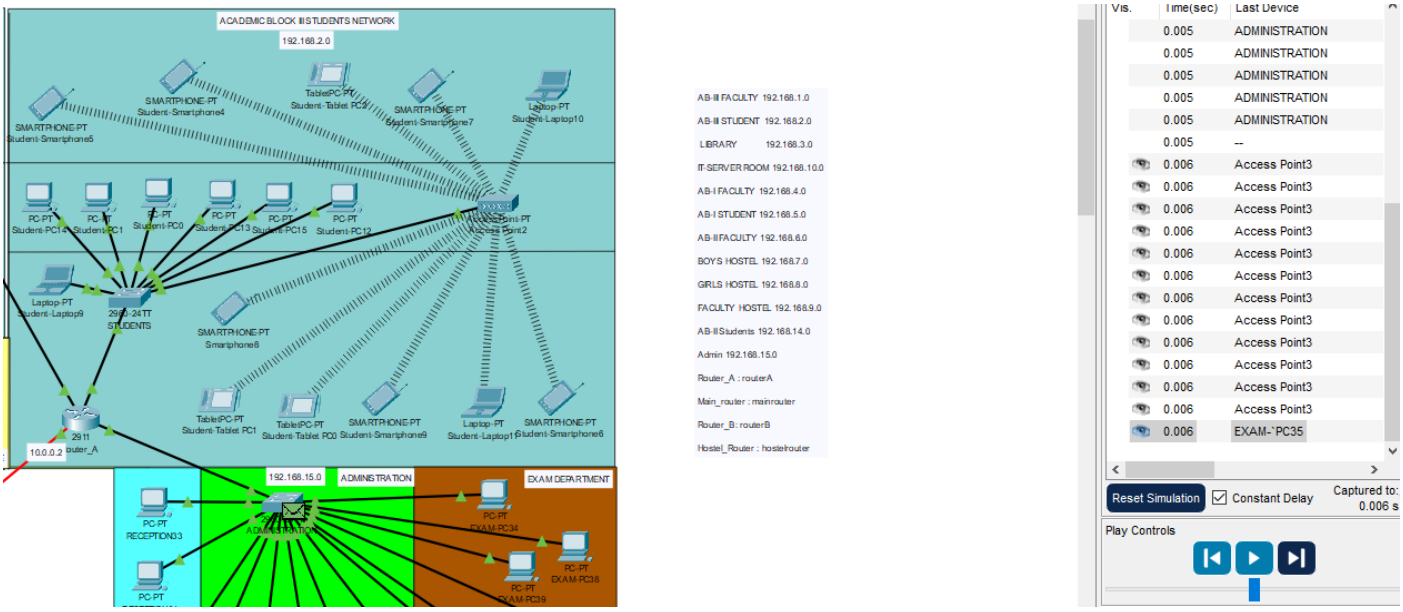
Router Name	Passwords
1)main_router	password: mainrouter
2)Router_A	password: routerA
3)Router_B	Password : routerB
4) Hostel Router	Password : hostelrouter

RESULT & DISCUSSION

Finally, we have combined all the steps as mentioned and implemented the desired network for University. We have the complete network providing various facilities to the teaching staff, non-teaching staff, and students.



The complete diagram of the University Area Network Scenario created in Packet Tracer Environment



Final simulation for the network system to check all the connection

- Ping Test: Network connectivity and communication can be tested using the ping command, followed by the domain name or the IP address of the device (equipment) whose connectivity one wishes to verify.

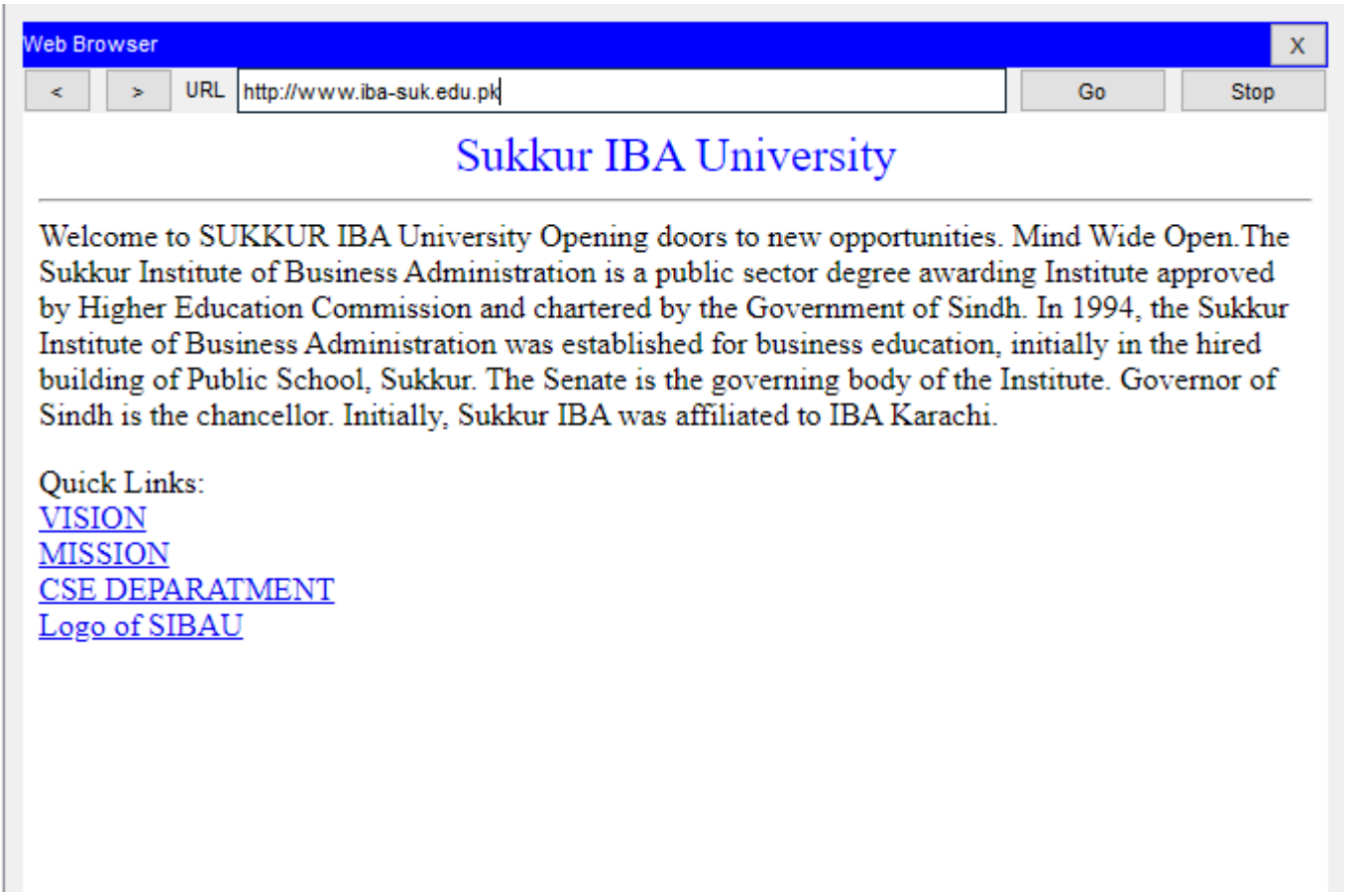
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping www.iba-suk.edu.pk

Pinging 192.168.10.6 with 32 bytes of data:

Reply from 192.168.10.6: bytes=32 time<1ms TTL=128
Reply from 192.168.10.6: bytes=32 time<1ms TTL=128
Reply from 192.168.10.6: bytes=32 time<1ms TTL=128
Reply from 192.168.10.6: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```



Ping Test for WEB server

CONCLUSION

In this project, I have designed a University Network using Cisco Packet Tracer that uses a networking topology implemented using servers, routers, switches, and end devices in a multiple area networks. We have covered all the necessary features that are required for a network to function properly. We have included a DNS server and a web server for establishing a smooth communication system between different areas of our network and specifically for the communication between students and teachers. We have included an email server to facilitate university communication through emails within the domain. We have used console passwords to ensure a safe and secure transfer of data.

REFERENCE

- https://www.youtube.com/watch?v=RSBn0vF21n4&t=2937s&ab_channel=Natasha
- https://www.youtube.com/watch?v=e1cD2KIme-E&ab_channel=BenardOtom