CAMPUS WIFI AND SECURITY MODEL

J Component Project Report for the course

ECM 3003 Wireless Communication Networks

by

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Submitted to

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VELLORE INSTITUTE OF TECHNOLOGY

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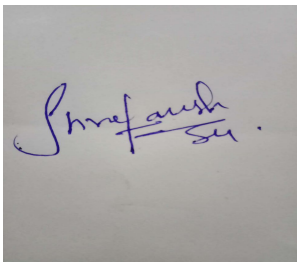
Certificate

This is to certify that the Project work titled "**CAMPUS WIFI AND SECURITY MODEL** " is being submitted by **Shreyansh Surana (19BLC1089)** for the course **Wireless Communication Networks**, is a record of bonafide work done under my guidance. The contents of this project work, in full or in parts, have neither been taken from any other source nor have been submitted to any other Institute or University.



Shreyansh Surana **Dr.D.Vydeki**

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We thank our parents, family, and friends for bearing with us throughout the course of our project and for the opportunity they provided us in undergoing this course in such a prestigious institution.

ABSTRACT

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 facilitates the systematic and cost-efficient transfer of information in an organization in the form of messages, files, and resources. This 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.

The aim of this project is to design the topology of the university network using the software Cisco Packet Tracer with the implementation of wireless networking systems

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1. INTRODUCTION

1.1 Objectives

- To create an interconnected wifi model for all the campus areas and buildings as a whole and provide security
- Establishment of clear authority and accountability for network management in college campus.
- Risk based segregation of groups of systems, users, and information systems.
- Authority to control, actively monitor, and log traffic traversing designated ingress and egress points.

2. TOOL USED

Cisco Packet Tracer:

- Router:
  A router is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet. Data sent through the internet, such as a web page or email, is in the form of data packets.
- Switch:
  Switch allows us to set IP address on interface level. IP address assigned on interface is used to manage that particular interface. To manage entire switch, we have to assign IP address to VLAN1(Default VLAN of switch)
- Connection:
  Connect all the devices with required wire.
- End Device (PC, Laptop, Server, Printer)
  A source or destination device in a networked system. For example, a user's PC is an end device, and so is a server. Network switches, routers and other equipment work in between to enable messages to travel from one end device to the other.
- Home Gateway:
  To add inbuild device select home gateway device from the network devices. To authenticate and validate the wireless connection, we also can configure home gateway with WEP/WPA-PSK /WPA2 protocols
- Web cam

To capture the human motion, we use Web cam

- Door, Alarm

To inform user, we use alarm

- Motion sensor

To detect the human motion

3. Design and Implementation

3.1 Network Design

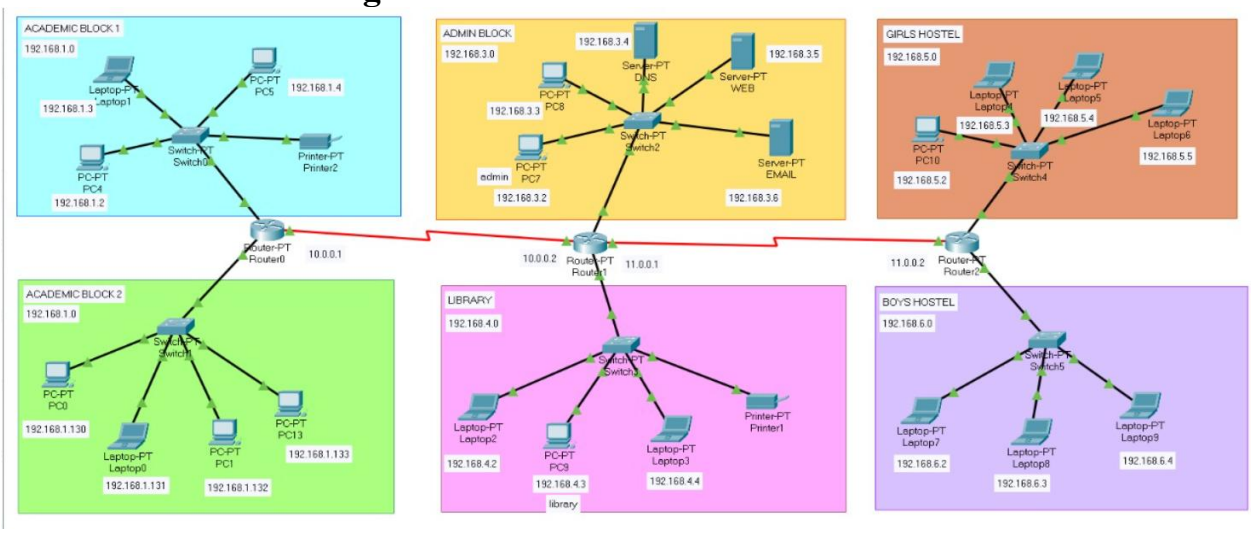


Fig.1

3.2 Configuration

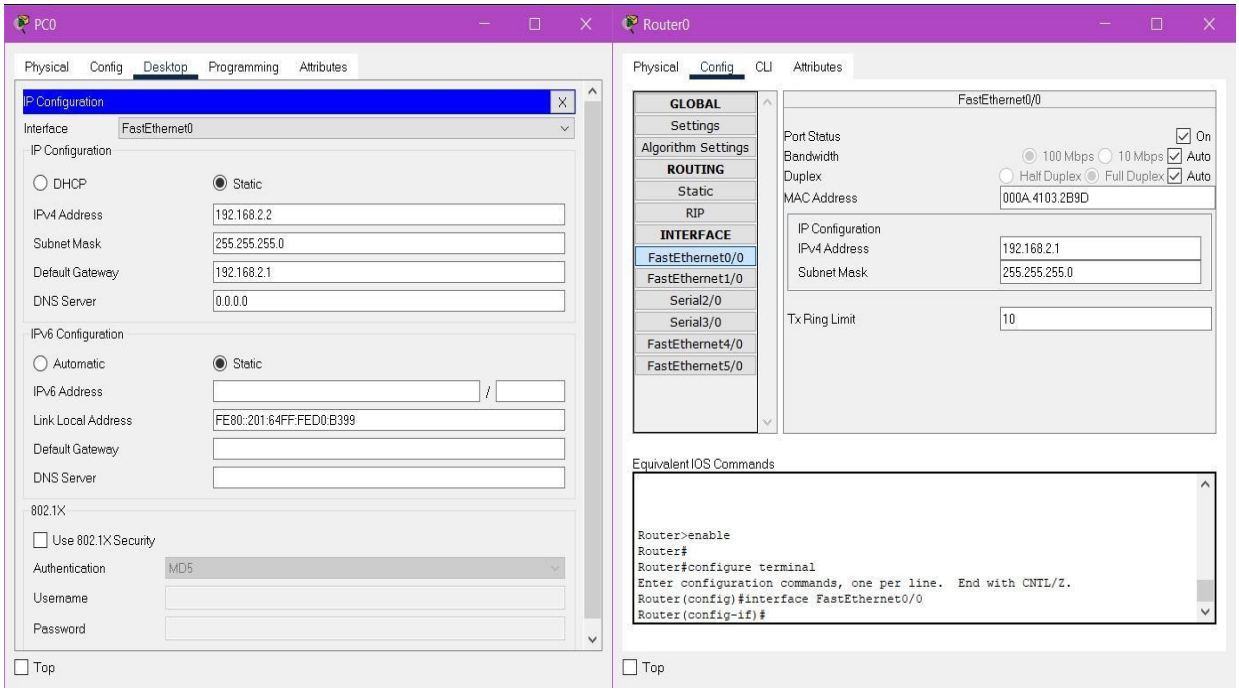


Fig.2

Sending packet from pc to pc and laptop to laptop

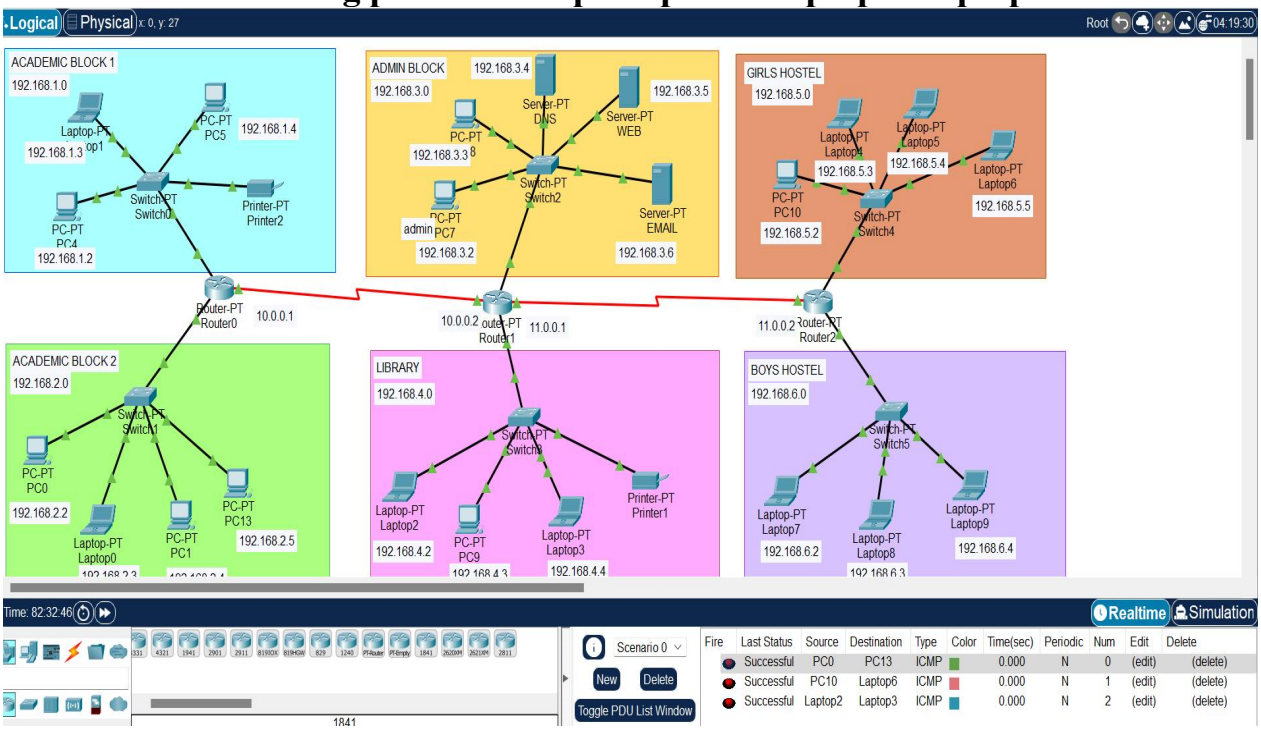


Fig.3

3.3 RIP Protocol

Routing Information Protocol (RIP) is a distance vector protocol that uses hop count as its primary metric. RIP defines how routers should share information when moving traffic among an interconnected group of local area networks (LANs).

RIP uses a distance vector algorithm to decide which path to put a packet on to get to its destination. Each RIP router maintains a routing table, which is a list of all the destinations the router knows how to reach. Each router broadcasts its entire routing table to its closest neighbours every 30 seconds. In this context, neighbours are the other routers to which a router is connected directly -- that is, the other routers on the same network segments as the selected router. The neighbours, in turn, pass the information on to their nearest neighbours, and so on, until all RIP hosts within the network have the same knowledge of routing paths. This shared knowledge is known as convergence.

If a router receives an update on a route, and the new path is shorter, it will update its table entry with the length and next-hop address of the shorter path. If the new path is longer, it will wait through a "hold-down" period to see if later updates reflect the higher value as well. It will only update the table entry if the new, longer path has been determined to be stable.

Configuration of Router with RIP protocol

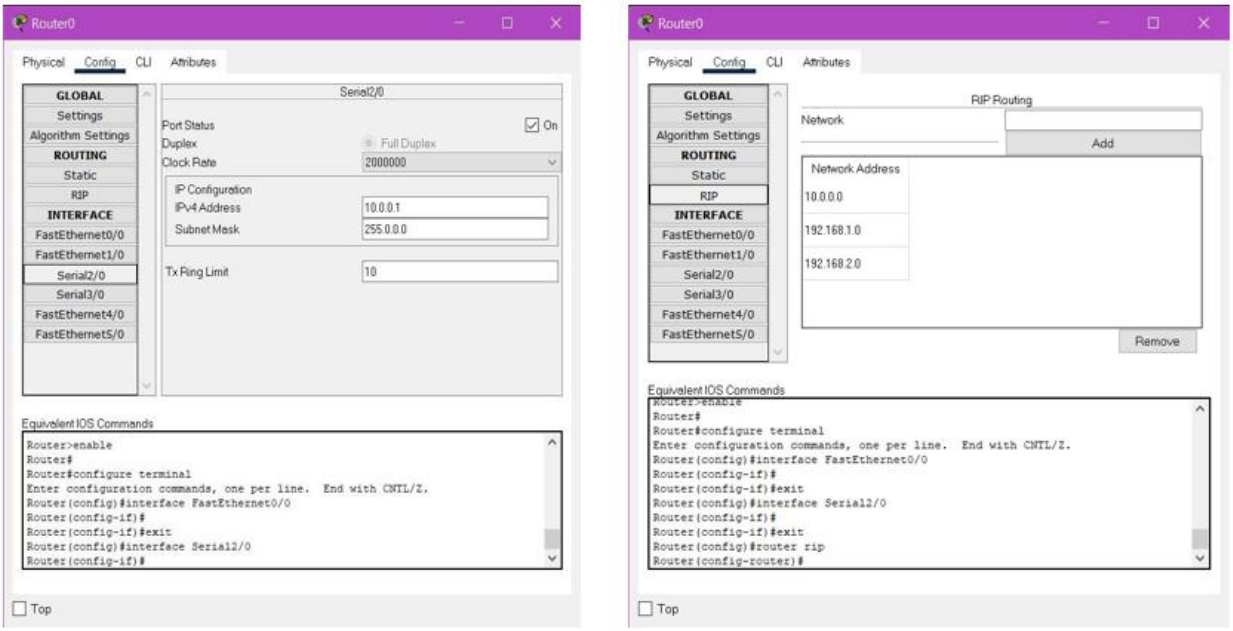


Fig.4

Pinging from Academic block 2 to girls' hostel

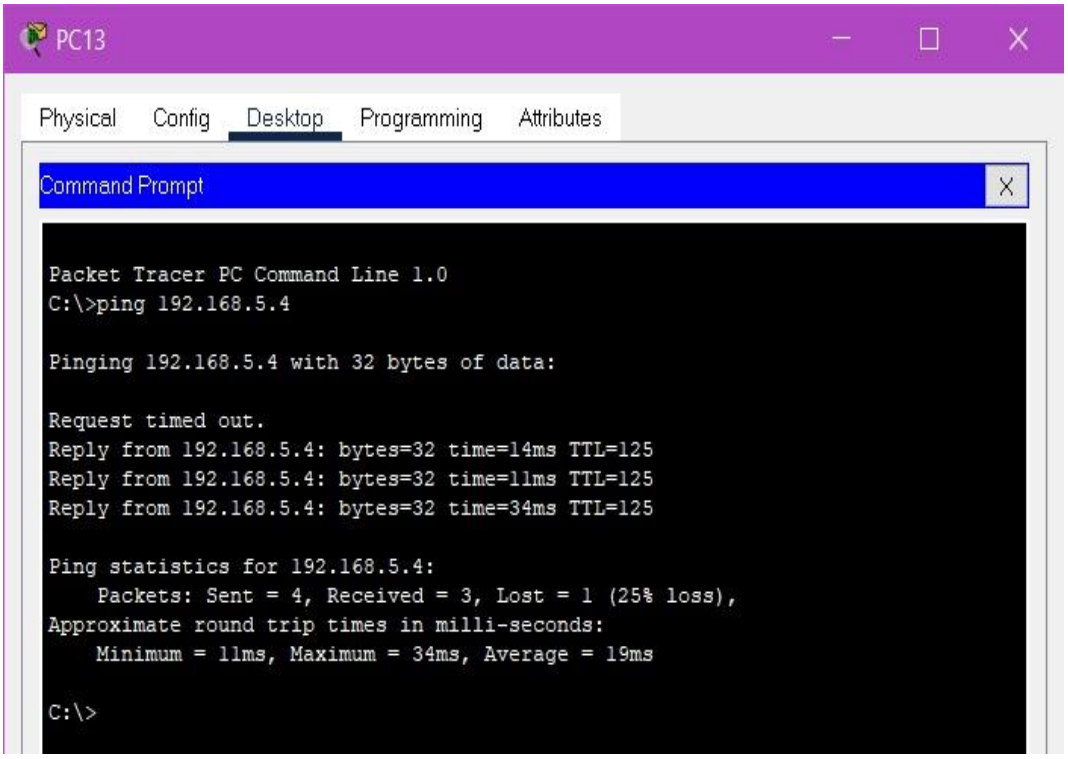


Fig.5

Simulation in Real-time mode - Laptop 3 from Library to Laptop 8 in Boys Hostel

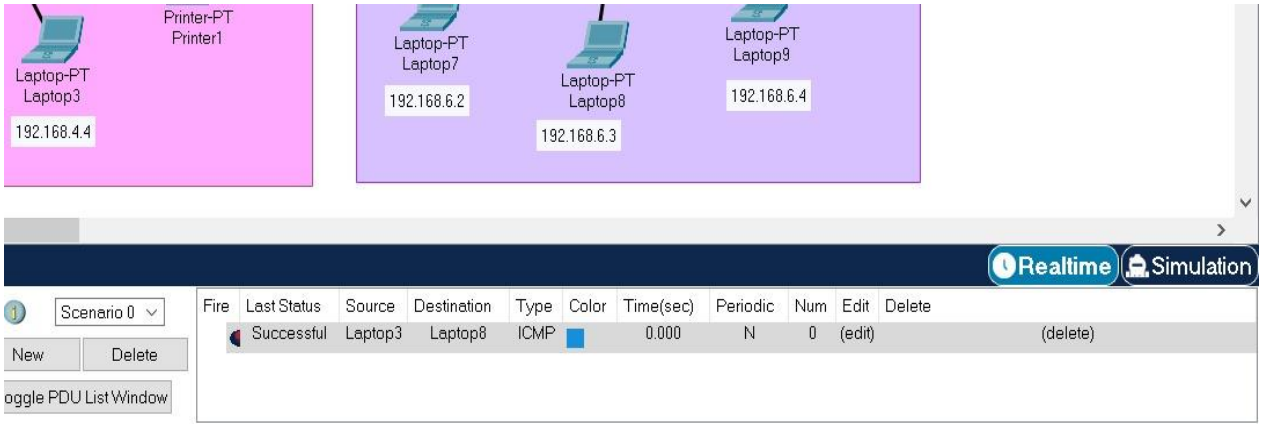


Fig.6

Sending the data from Pc9 to laptop9

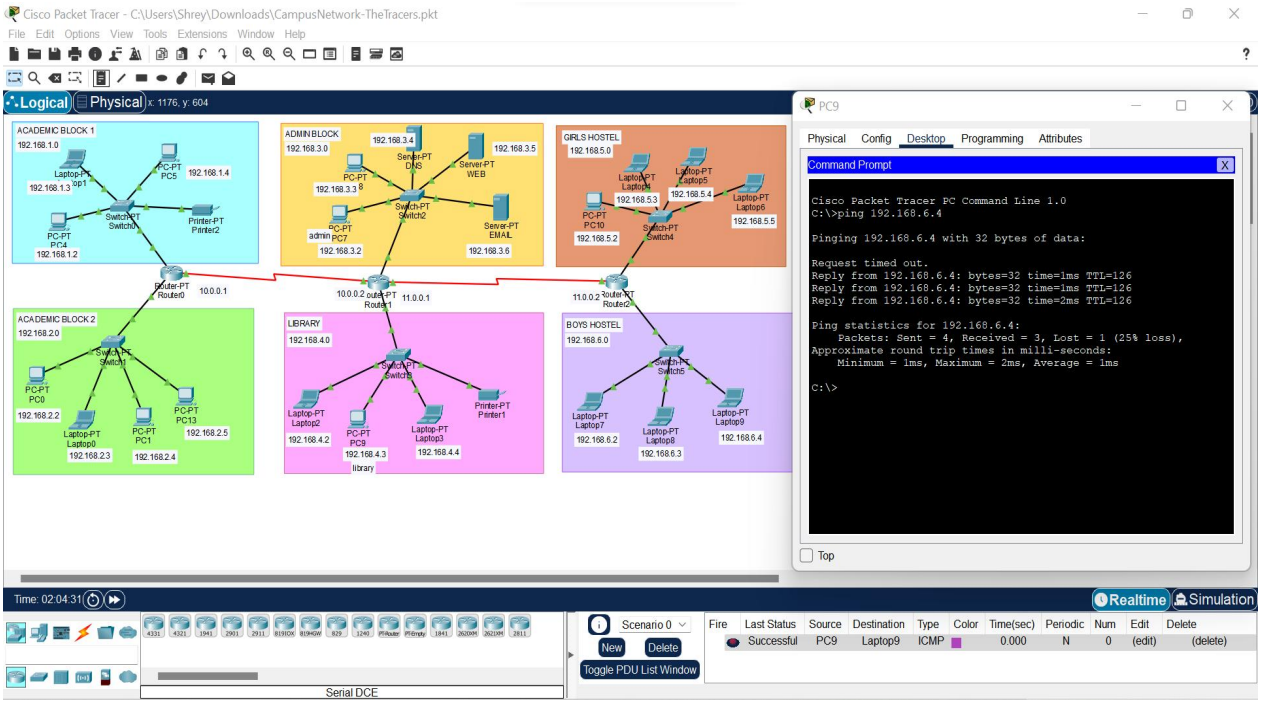


Fig.7

3.4 Domain Name System (DNS)

The Domain Name System (DNS) Server is a server that is specifically used for matching website hostnames (like example.com)to their corresponding Internet Protocol or IP addresses. The DNS server contains a database of public IP addresses and their corresponding domain names.

DNS server IP configuration

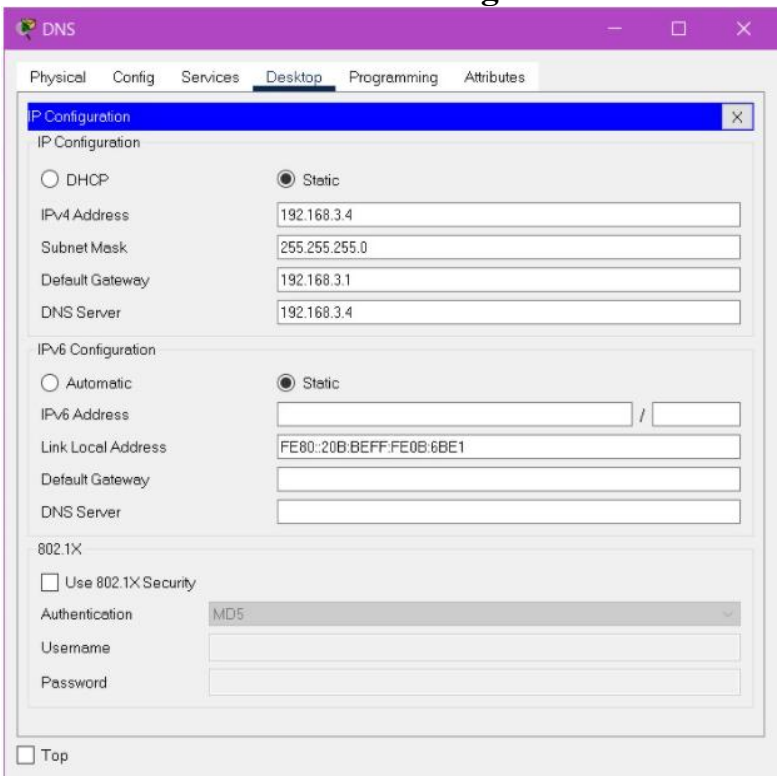


Fig.8

DNS server domain name configuration

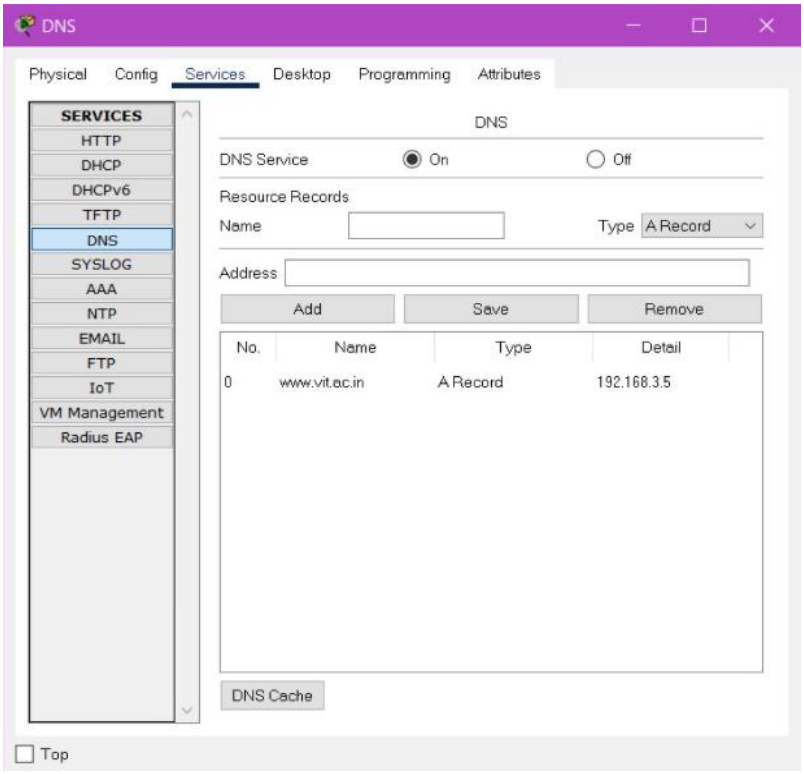


Fig.9

3.5 WEB Server

A web server is a computer that runs websites. It's a computer program that distributes web pages as they are requisitioned. The basic objective of the web server is to store, process, and deliver web pages to the users. This intercommunication is done using Hypertext Transfer Protocol (HTTP).

Web server IP configuration

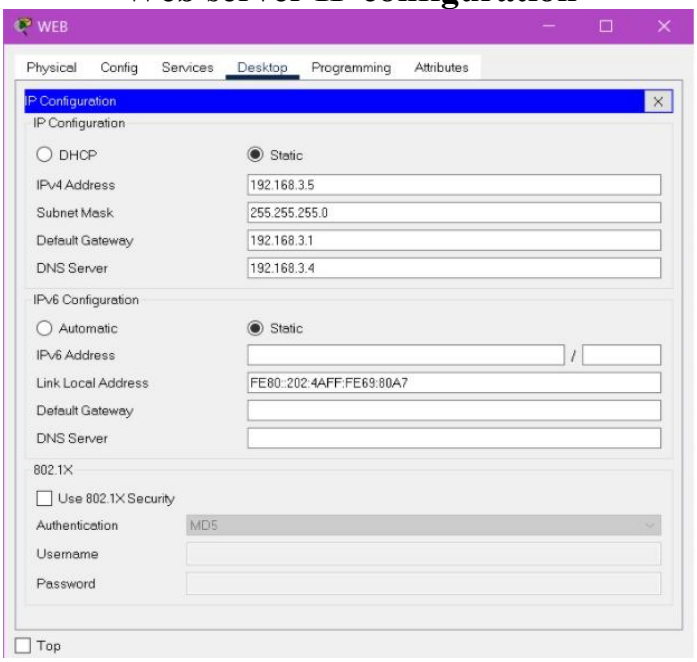


Fig.10

Modify the contents of the website in the web server and save

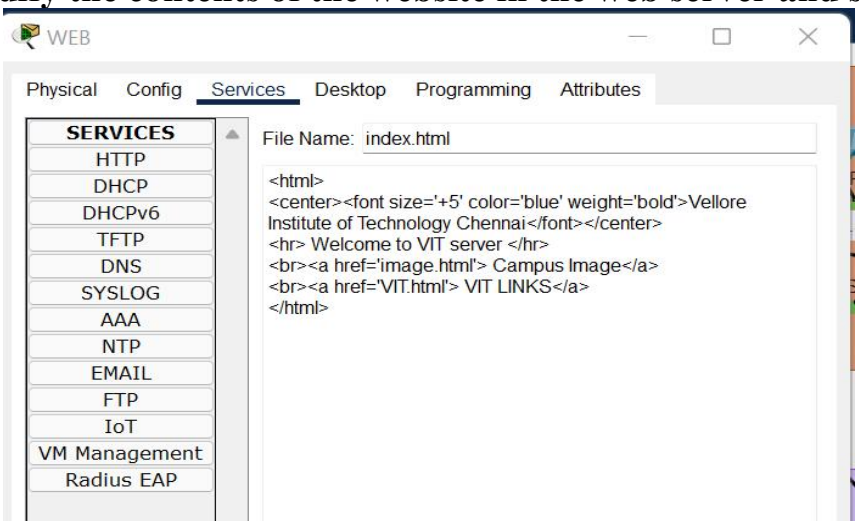


Fig.11

DNS Server of Laptop 2

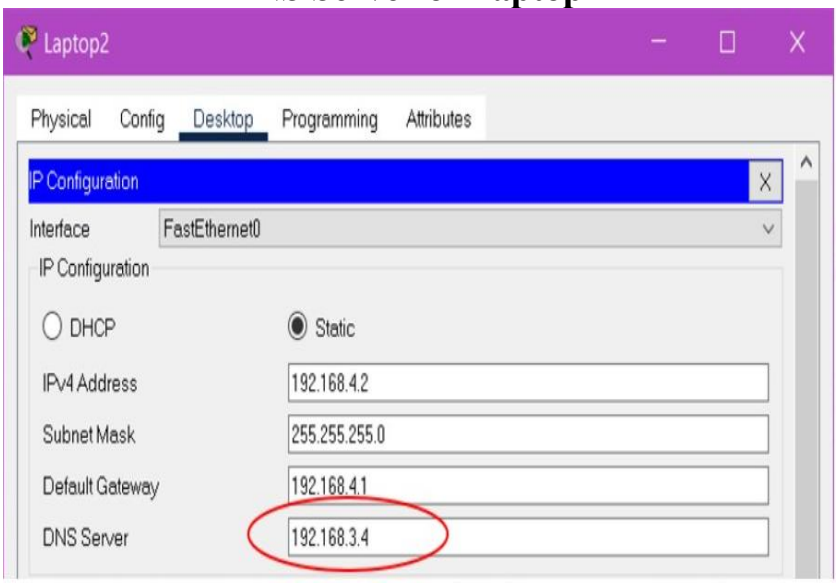


Fig.12

In any end device, open Desktop -> Web Browser and type in the Web Server's IP address and click on "Go" to view the website.Since, we've configured the DNS server we can also access the website by typing in www.vit.ac.in

The DNS server's IP address is added in the IP configuration of all the devices in the network

Website link

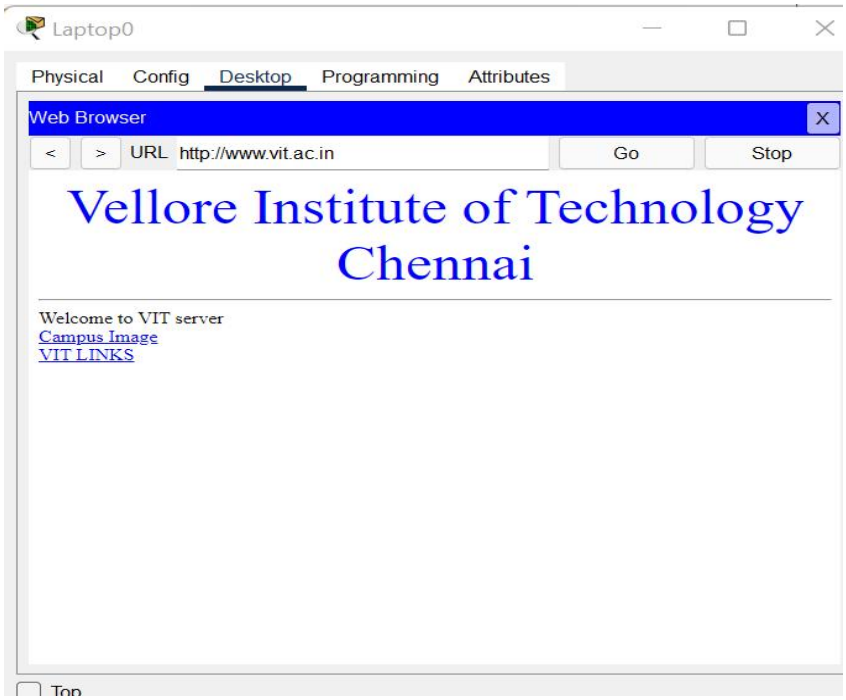


Fig.13

Campus Image

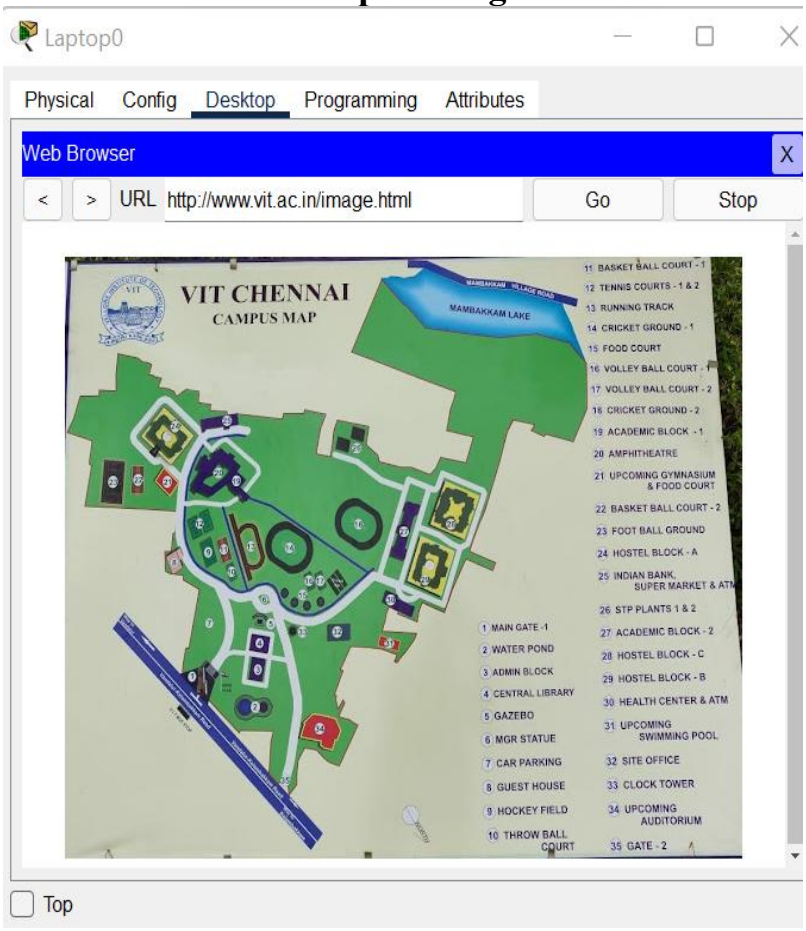


Fig.14

College Webite link

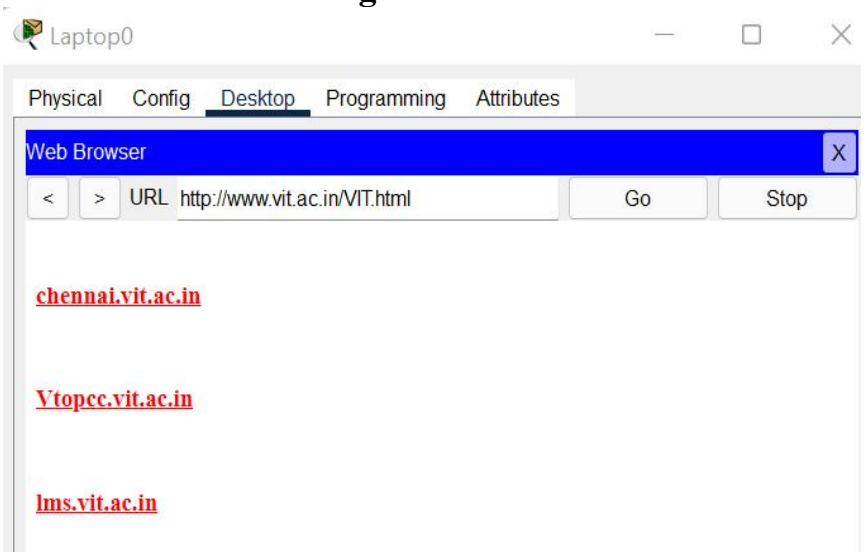


Fig.15

3.6 Email Server

An email server, or simply mail server, is an application or computer in a network whose sole purpose is to act as a virtual post office. The server stores incoming mail for distribution to local users and sends out outgoing messages.

Email server IP configuration

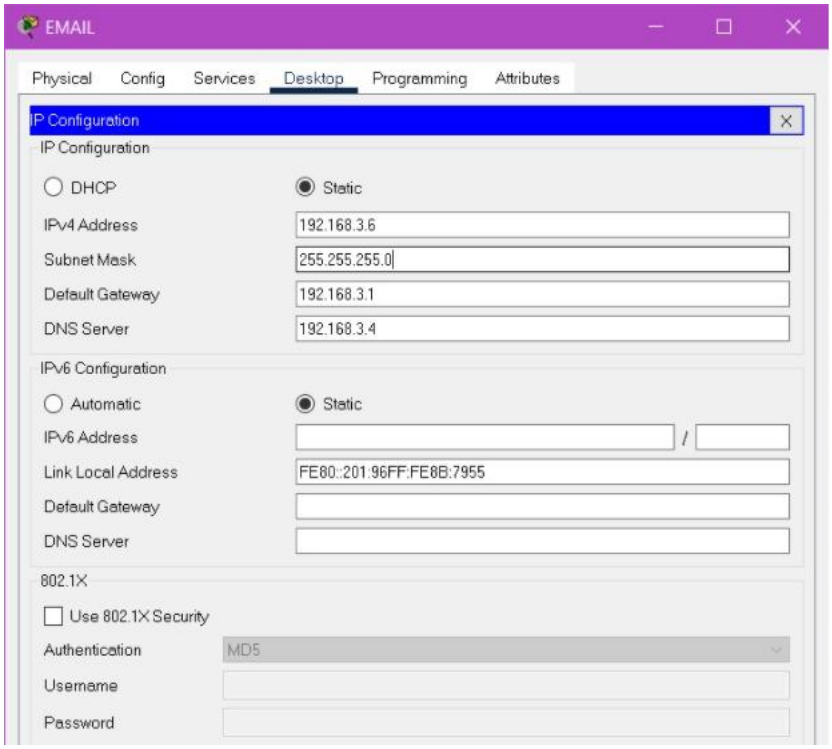


Fig.16

Setting the user name password for Email

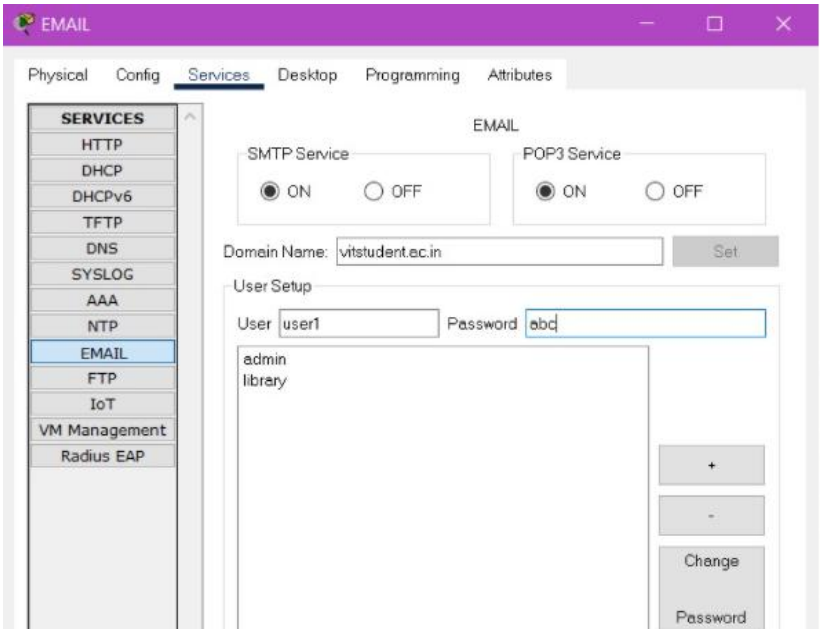


Fig.17

In the Email server, click on Services -> Email, and give the Domain name and click on 'Set'. In the User setup, enter the username and password for different users and add them. Here, domain name is 'vitstudent.ac.in' and two users admin and library have been added.

Configuring admin email address in one of the end devices in Admin block.

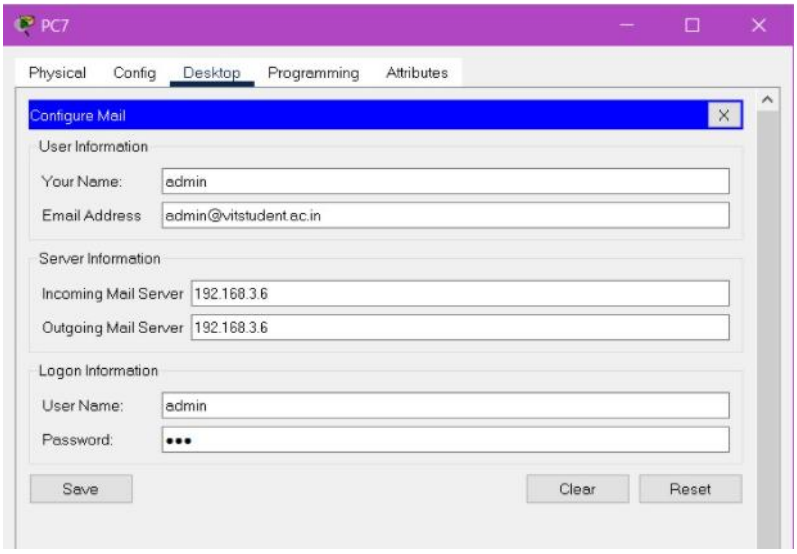


Fig.18

Configuring the library email address in one of the end devices in the library.

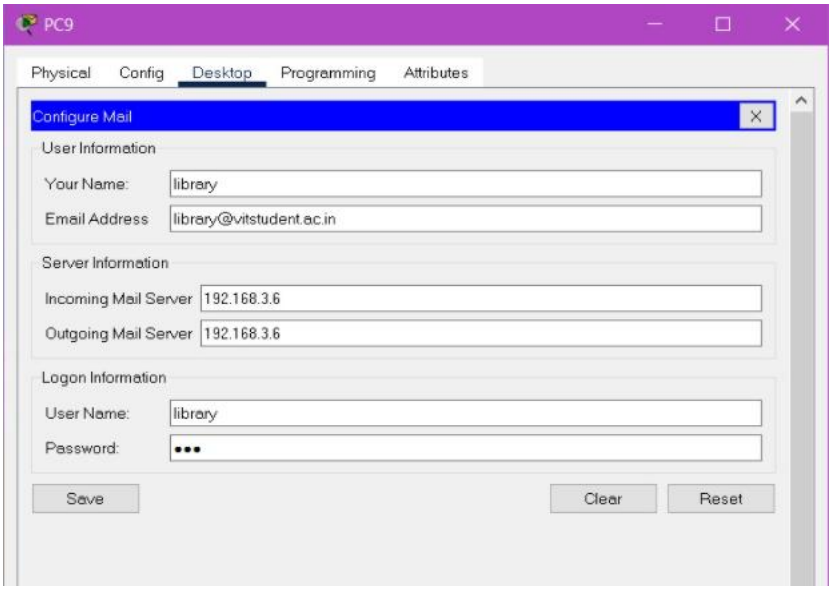


Fig.19

Sending an email from Admin to Library

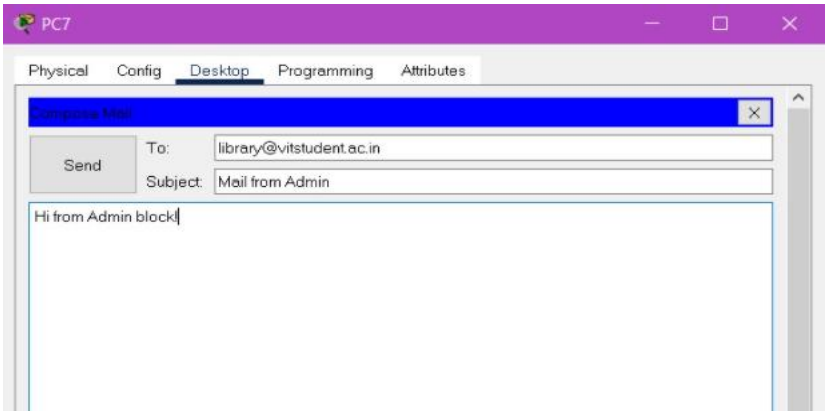


Fig.20

Sending mail

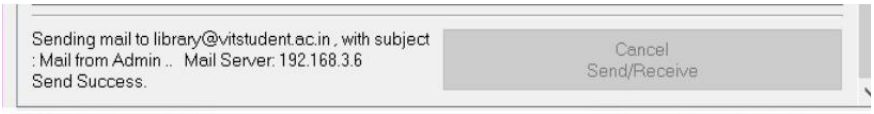


Fig.21

Received mail

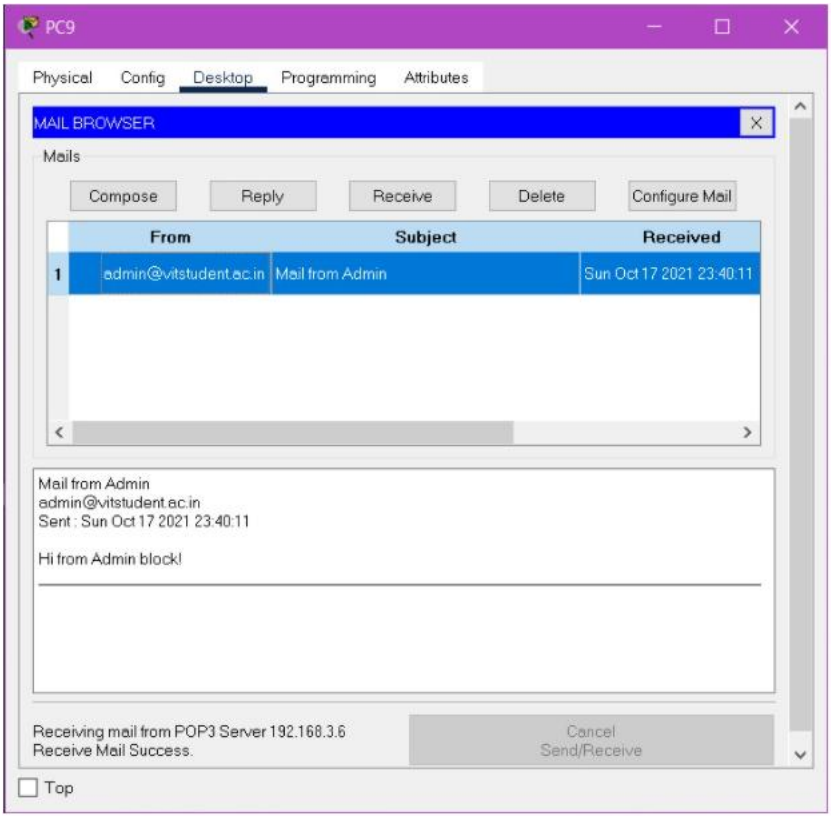


Fig.22

3.7 SECURITY TO CAMPUS

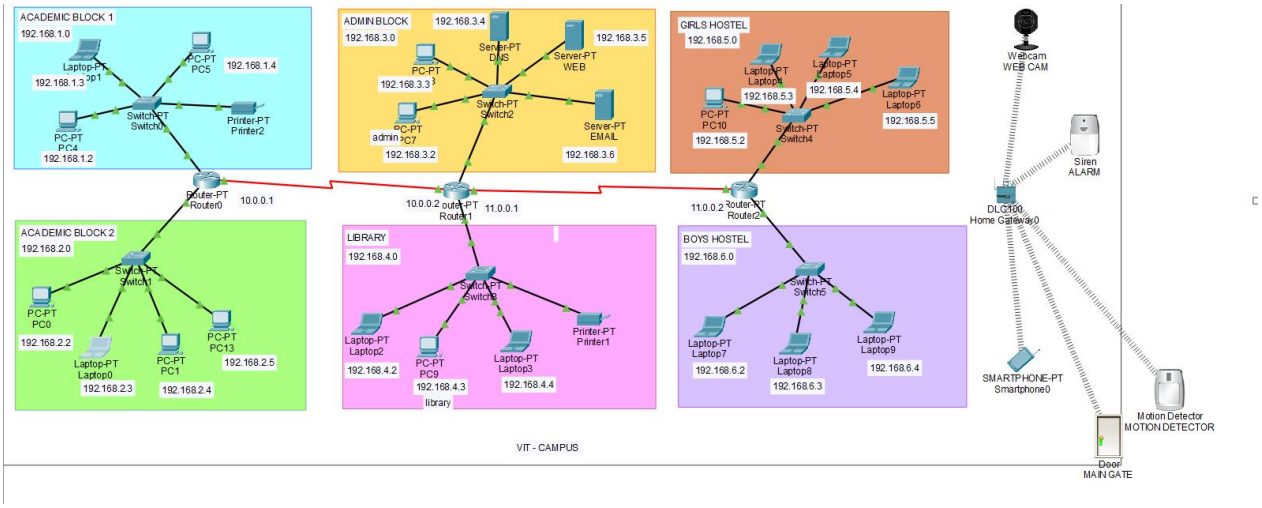


Fig.23

Configuration of home gateway

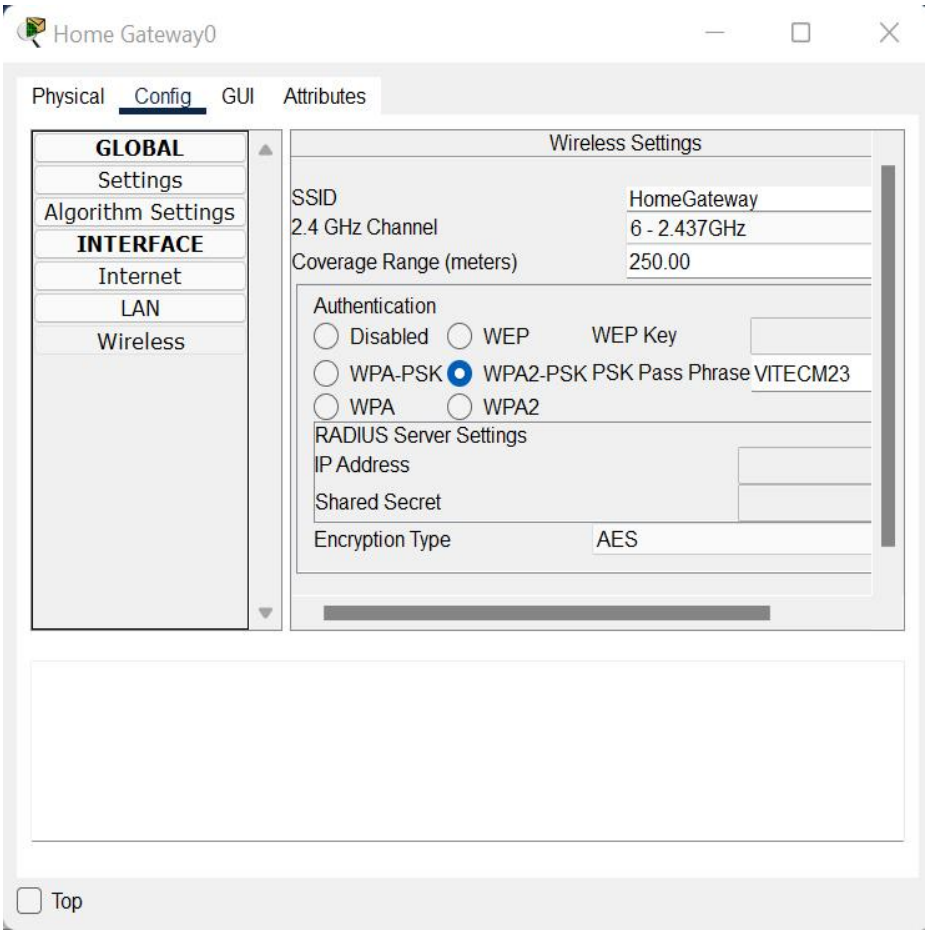


Fig.24

4. Application oriented learning

- In CAN network, to use some hardware devices of networking such as hub, routers, switches, cable, bridge etc. is easily affordable
- Multiple departments of campus are connected to each other in CAN networks. So, message is fired one time, and it transferred to all nodes easily.
- Wireless connections are used to link various offices and buildings with single organization.
- It is capable to transfer huge files with higher speed over entire computer network via internet.
- CAN Network is combination of multiple LAN networks, and it takes form a single entity. In CAN network, firewall or proxy server are used for security purpose from unauthorized access.

5. RESULT & INFERENCE

When user go to desktop with authentic ip address then user will we able to get access of home page

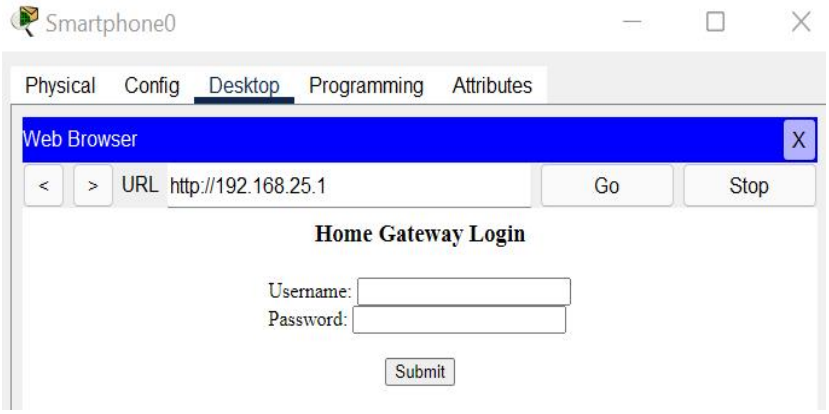
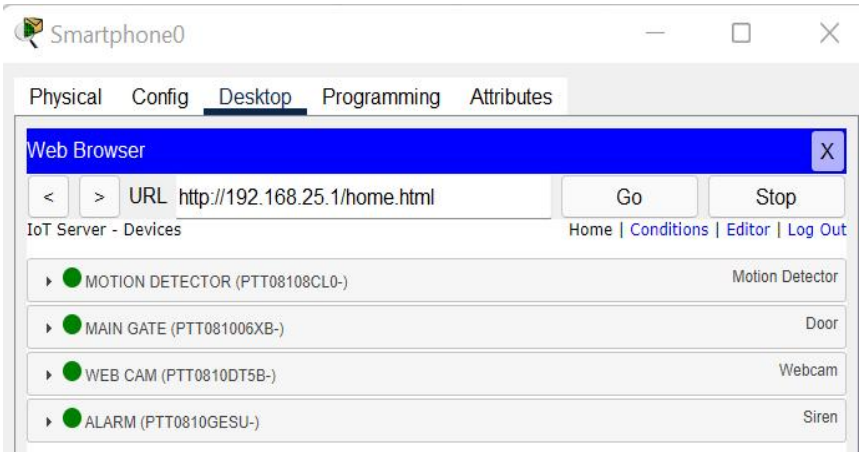


Fig.25

Then web cam will capture the motion when people are entering through main gate and Alarm will sound like siren to inform user


Smartphone0
Physical
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MOTION DETECTOR (PTT08108CL0-)
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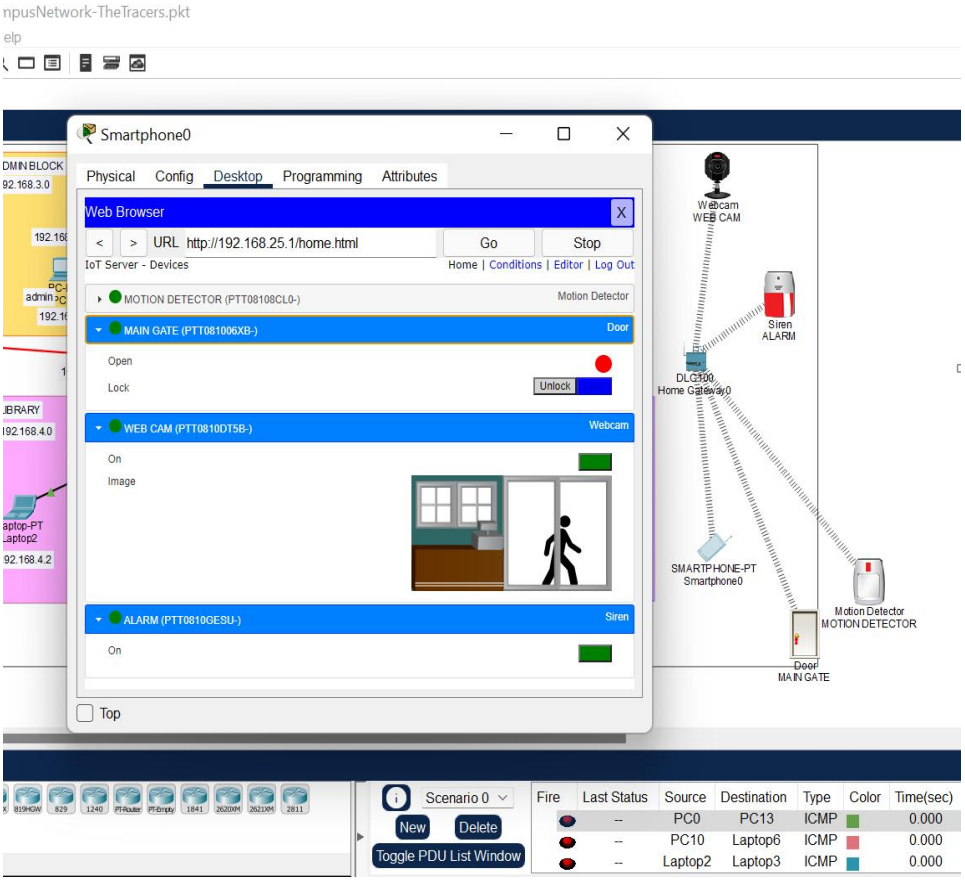
WEB CAM (PTT0810DT5B-)
Webcam
ALARM (PTT0810GESU-)
Siren

Fig.26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MAIN GATE (PTT081006XB-)
Door
Open
Lock
Unlock
WEB CAM (PTT0810DT5B-)
Webcam
On
Image
ALARM (PTT0810GESU-)
Siren
On
Top
Webcam
WEB CAM
Siren
ALARM
DLC100
Home Gateway0
SMARTPHONE-PT
Smartphone0
Motion Detector
MOTION DETECTOR
Door
MAIN GATE
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
PC0
PC13
ICMP
0.000
PC10
Laptop6
ICMP
0.000
Laptop2
Laptop3
ICMP
0.000

Fig.27

6. CONCLUSION:

A campus area network known as (CAN) is used to inter-connect networks in limited geographical locality like university campus, military bases, or organizational campuses etc. It can be taken as the metropolitan network that has the specific settings at the small area just like a computer lab in the university.

CAN (Campus Area Network) area is no doubt larger than a local area network but it is still smaller then a wide area network. These networks are designed for the particular place that hits the highest point level.

Campus Area networks (CAN) are economical, beneficial and easy to implement in the specific kilometers of locality. It is very helpful for the universities and other corporate organizations to work from any block and receive the same speed of data transfer.

7. SCOPE AND FUTURE WORK:

- Campus Area Network (CAN) is used in the school campus for getting accessibility in different departments such as administrative office, hostel, libraries, athletic facilities, research labs, two different buildings etc.
- CAN Network is also very useful in university to make connection with various departments and buildings as well.
- CAN networking use in the large organization and industrial sites with its nearby small building regions.
- Campus Area Network is also used in some automotive applications.

8. References

- https://www.youtube.com/watch?v=UfpI2HSU6lA
- https://juniorboyboy2.medium.com/campus-university-network-design-configuration-on-packet-tracer-simulation-5c6eb04e5307
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- https://www.cisco.com/c/en/us/td/docs/solutions/CVD/Campus/cisco-campus-lan-wlan-design-guide.html
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