

MINI PROJECT

18CSS202J - Computer Communication

HOSPITAL NETWORK SYSTEM

Submitted by

**C.KARTHIK REDDY [RA2111030010081]
K. HEMANTH REDDY [RA2111030010087]
M.E.V.S AKHIL VARMA [RA211030010099]
K. LOKESH REDDY [RA2111030010105]
G. PRANAY [RA2111030010115]**

Under the Guidance of

Mrs D.Saveetha

Assistant Professor, Department of Networking and Communications

In partial fulfilment of the course of

18CSS202J - Computer Communication



**SCHOOL OF COMPUTING
COLLEGE OF ENGINEERING AND TECHNOLOGY
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
KATTANKULATHUR - 603203**

MAY 2023



**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
KATTANKULATHUR-603203**

BONAFIDE CERTIFICATE

Certified that this mini project report “**University Campus Networking**” is the bonafide work done by C.KARTHIK REDDY(RA2111030010081), K.HEMANTH REDDY(RA2111030010087), M.E.V.S.AKHIL VARMA(RA2111030010099),G.PRANAY(RA2111030010115), K.LOKESH REDDY(RA2111030010105), who carried out the Project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other work.

SIGNATURE

Mrs. Saveetha D

Computer Communication

Assistant Professor, Department of Networking and
Communications SRM Institute of Science and
Technology

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1.**ABSTRACT**

This project is to design a suitable for department in the universities in developing countries. The aim was to design a network with high security and low cost. This project will help to enhanced education of developing countries. The advantages of networking can be seen clearly in terms of efficiency, security, manageability and cost as it allows collaboration between users in a wide area. To improve college campus network design, the technology used was creating LAN, WLAN and using cheap device to reduce cost of the network. But the network can also become better using routing protocols and other protocol. So, we are going to use such protocols using less number of devices and will also maintain the cost of the network less. To design such network, we are going to use software Cisco-Packet Tracer.

2. OBJECTIVE OF THE PROJECT

Computer networks significantly affect how well an organisation operates. Universities' departments rely on the appropriate operation and analysis of their networks for automation, education, administration, communication, and e-libraries, among other things. The systematic and economical transmission of information inside an organisation in the form of messages, files, and resources depends on an effective network. The project offers insights into a number of aspects, including topology design, IP address configuration, and how to transfer information to wireless networks in various parts of a university.

This project's goal is to design the topology of the university network while implementing wireless networking technologies utilising the Cisco Packet Tracer software. This network of universities includes the

- 1) Router (2621XM)
- 2) Switches (2950-24T)
- 3) DNS server

The design includes the following Departments of the University:

- ITKM
- CTECH
- NWC
- Medical Services

3.**INTRODUCTION**

The word “digital is very significant in today’s world, with an increase in the development of technology the entire world is moving towards the digital era. The educational institution plays an important role in this digitalisation; hence the campus should adapt to digital means of networking as well and become a “digital campus”.

Campus networking 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 PC’s and intelligent terminals are widely used, demand for access to information anytime and anywhere has become more and more urgent. Then wired network construction becomes necessary and essential. The wired network is one of the important components of a digital campus and wisdom campus. It provides an efficient way to explore the internet with a router for teachers and students regardless of cables and places. This is an important mark of the modern campus as a supplement of a cable network. With the development of network and communication technology, cable networks on a university campus bring much convenience for teaching and research work. But for mobility and flexibility, it has obvious shortcomings. A wireless network can overcome these drawbacks and has been applied to the university campus.

PROJECT STATEMENT:

In this mini-project, we defined a simulation of campus networks based on wired networking. The network is divided into four sets: one for the ITKM and the second for the NWC and third for CTECH and fourth for the MEDICAL SCIENCES. Major aim of this project is to show the connectivity that is used in universities to make the network efficient and mobile at the same time. In order to provide equal functionality to all the users (college staff and students), we have added DNS 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, so it needs networking for smooth processing.

4. LITERATURE REVIEW

- **What is Packet Tracer?**

Packet Tracer is a cross-platform visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks. The software allows users to simulate the configuration of Cisco routers and switches using a simulated command-line interface. Packet Tracer makes use of a drag-and-drop user interface, allowing users to add and remove simulated network devices as they see fit. The software is mainly focused on Certified Cisco Network Associate Academy students as an educational tool for helping them learn fundamental CCNA concepts. Previously students enrolled in a CCNA Academy program could freely download and use the tool free of charge for educational use.

- **Router**

A router is a device like a switch that routes data packets based on their IP addresses. The router is mainly a Network Layer device. Routers normally connect LANs and WANs together and have a dynamically updating routing table based on which they make decisions on routing the data packets. Router divides broadcast domains of hosts connected through it.

- **Switch**

A network switch (also called switching hub, bridging hub, officially MAC bridge is networking hardware that connects devices on a computer network by using packet switching to receive and forward data to the destination device. A network switch is a multiport network bridge that uses MAC addresses to forward data at the data link layer (layer 2) of the OSI model. Some switches can also forward data at the network layer (layer 3) by additionally incorporating routing functionality. Such switches are commonly known as layer-3 switches or multilayer switches.

- **Network Packet**

A network packet is a formatted unit of data carried by a packet-switched network. A packet consists of control information and user data, which is also known as the payload.

- **Server**

A server is a computer or system that provides resources, data, services, or programs to other computers, known as clients, over a network. In theory, whenever computers share resources with client machines they are considered servers. There are many types of servers, including web servers, mail servers, and virtual servers.

Many networks contain one or more of the common servers. The servers used in our project are as follows:

- **DNS Server**

DNS stands for Domain Name System servers which are application servers that provide a human-friendly naming method to the user computers in order to make IP addresses readable by users. The DNS system is a widely distributed database of names and other DNS servers, each of which can be used to request an otherwise unknown computer name. When a user needs the address of a system, it sends a DNS request with the name of the desired resource to a DNS server. The DNS server responds with the necessary IP address from its table of names.

- **Wired Network**

As we all know, “wired” refers to any physical medium made up of cables. Copper wire, twisted pair, or fiber optic cables are all options. A wired network employs wires to link devices to the Internet or another network, such as laptops or desktop PCs.

- **Ethernet**

This is the backbone of our network. It consists of the cabling and is typically able to

transfer data at a rate of 100mb/s. It is a system for connecting a number of computer systems to form a local area network, with protocols to control the passing of information and to avoid simultaneous transmission by two or more systems. Among the different types of ethernet, we have used Gigabit Ethernet, which is a type of Ethernet network capable of transferring data at a rate of 1000 Mbps and fast Ethernet is a type of Ethernet network that can transfer data at a rate of 100 Mbps.

- **Computing Device**

Computing devices are the electronic devices that take user inputs, process the inputs, and then provide us with the end results. These devices may be Smartphones, PC Desktops, Laptops, printer, and many more.

- **Internet Protocol**

Internet Protocol (IP) is one of the fundamental protocols that allow the internet to work. IP addresses are a unique set of numbers on each network and they allow machines to address each other across a network. It is implemented on the internet layer in the IP/TCP model.

- **SSH Protocol**

Secure Shell enables a user to access a remote device and manage it remotely. However, with SSH, all data transmitted over a network (including usernames and passwords) is encrypted and secure from eavesdropping.

SSH is a client-server protocol, with an SSH client and an SSH server. The client machine (such as a PC) establishes a connection to an SSH server running on a remote device (such as a router). Once the connection has been established, a network admin can execute commands on the remote device.

- **Simulation Environment**

The simulations of our network topology can be easily achieved using cisco packet tracer. Using a simulation mode, you can see packets flowing from one node to another and can also click on a packet to see detailed information about the OSI layers of the networking. Packet

Tracer offers a huge platform to combine realistic simulation and visualize them simultaneously. Cisco Packet Tracer makes learning and teaching significantly easier by supporting multi-user collaboration and by providing a realistic simulation environment for experimenting with projects.

Routing Information Protocol (RIP)

Routing Information Protocol (RIP) is a dynamic routing protocol that uses hop count as a routing metric to find the best path between the source and the destination network. It is a distance-vector routing protocol that has an AD value of 120 and works on the Network layer of the OSI model. RIP uses port number 520.

Hop Count

Hop count is the number of routers occurring in between the source and destination network. The path with the lowest hop count is considered as the best route to reach a network and therefore placed in the routing table. RIP prevents routing loops by limiting the number of hops allowed in a path from source and destination. The maximum hop count allowed for RIP is 15 and a hop count of 16 is considered as network unreachable.

Features of RIP

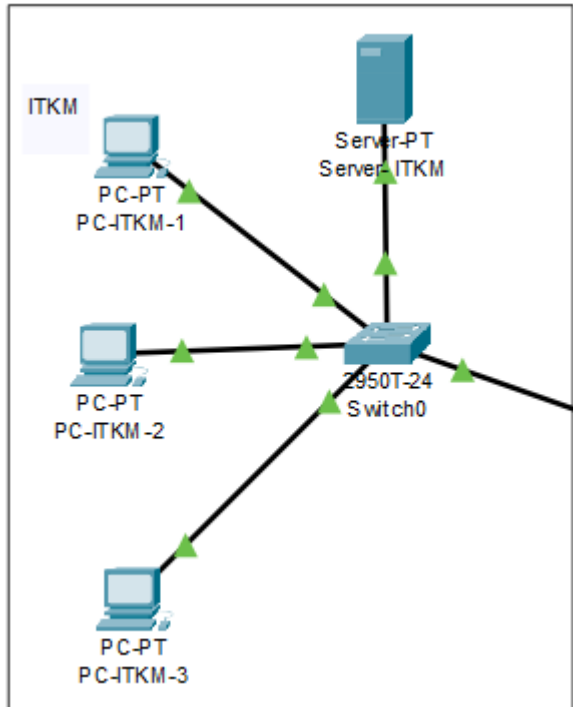
1. Updates of the network are exchanged periodically.
2. Updates (routing information) are always broadcast.
3. Full routing tables are sent in updates.
4. Routers always trust routing information received from neighbor routers. This is also known as *Routing on rumors*.

5. MODULES IN THE PROJECT

- 1. ITKM**
- 2. NWC**
- 3. CTECH**
- 4. MEDICAL SERVICES**

5. DESCRIPTION OF THE MODULES IN THE PROJECT

1) ITKM:



IP Configuration of the module:

PC-1 :192.168.0.4

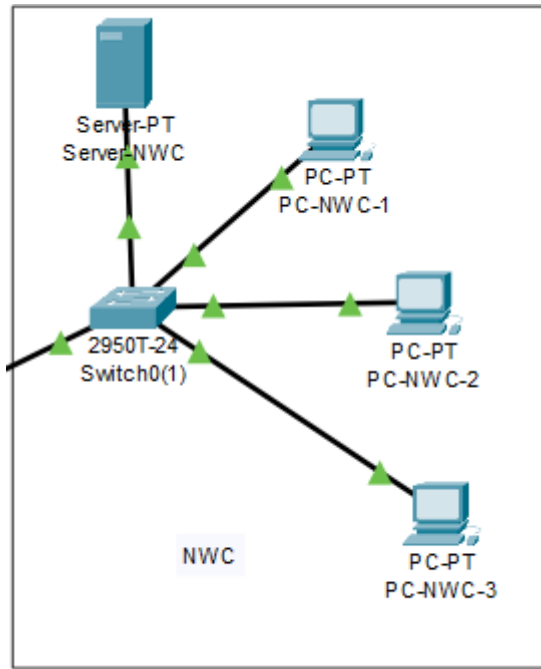
PC-2 :192.168.0.5

PC-3 :192.168.0.3

Server :192.168.0.2

Default Gateway- 192.168.10.1

Subnet Mask- 255.255.255.0

2) NWC:**IP Configuration of the module:**

ROUTER:192.168.1.1

PC1- 192.168.1.5

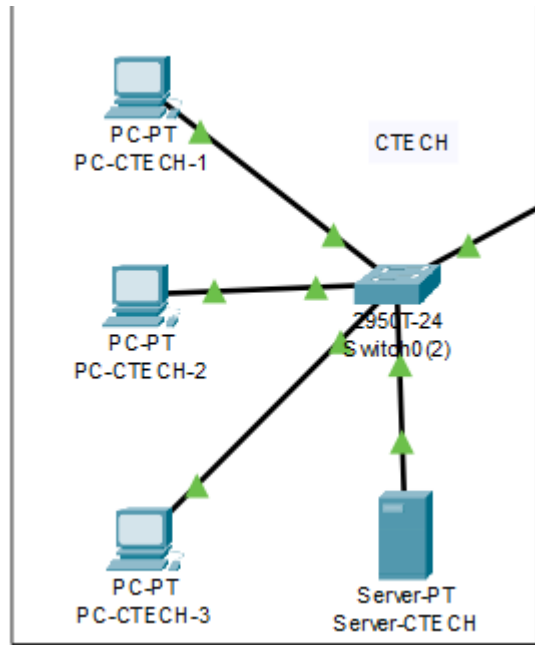
PC2-192.168.1.3

PC3-192.168.1.4

SERVER-192.168.1.2

Default Gateway- 192.168.1.1

Subnet Mask- 255.255.255.0

3) CTECH:**IP Configuration of the module:**

Router: 192.168.12.1

PC1- 192.168.12.3

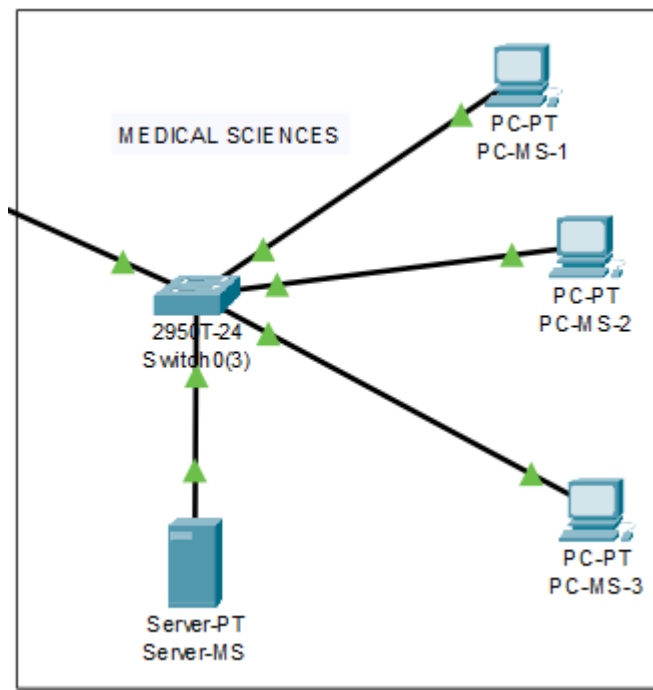
PC2-192.168.12.5

PC3-192.168.12.4

Default Gateway- 192.168.12.1

Subnet Mask- 255.255.255.0

4) MEDICAL SCIENCES:



IP Configuration of the module:

Router: 192.168.0.1

PC1- 192.168.13.5

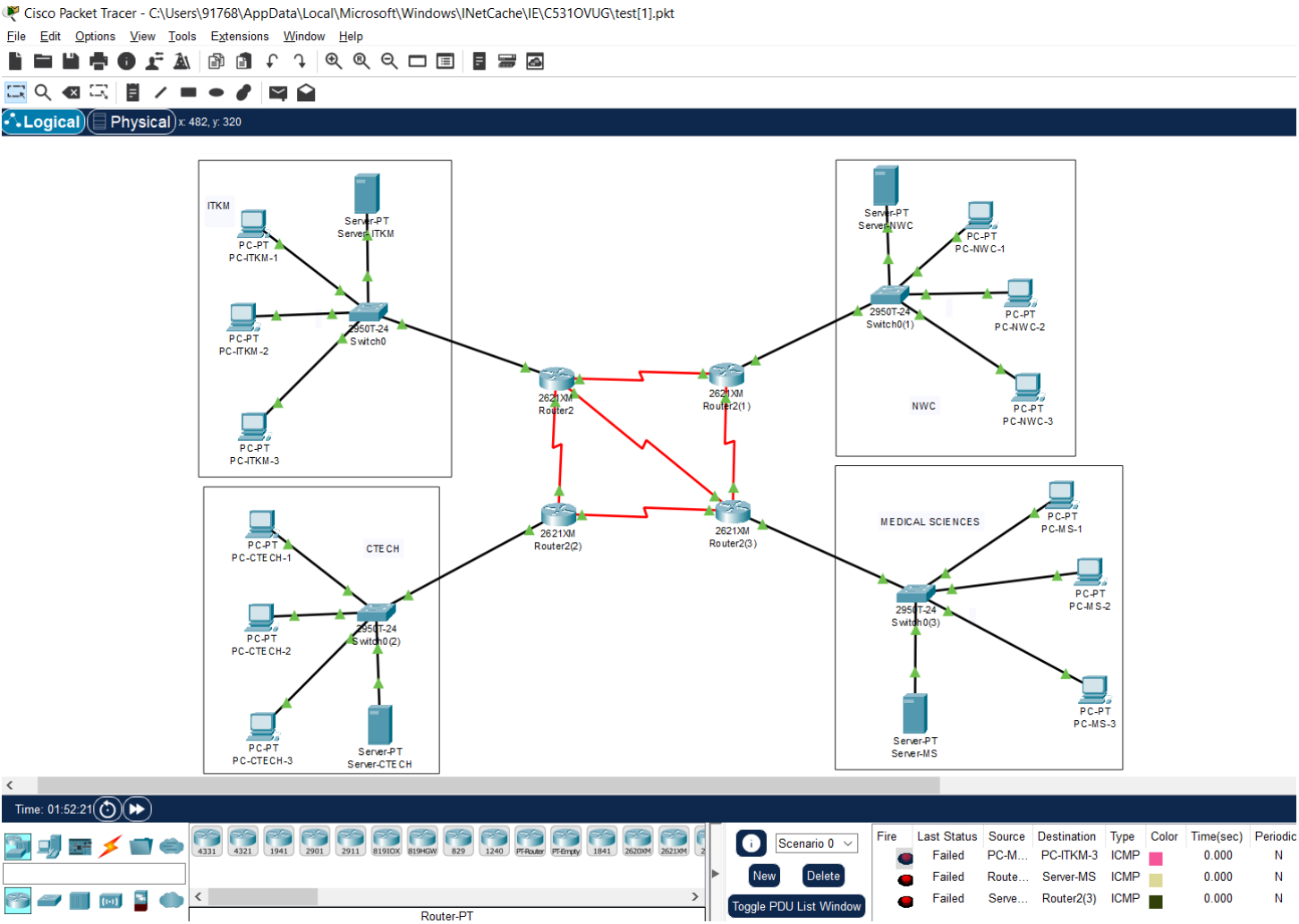
PC2- 192.168.13.3

Pc3- 192.168.13.4

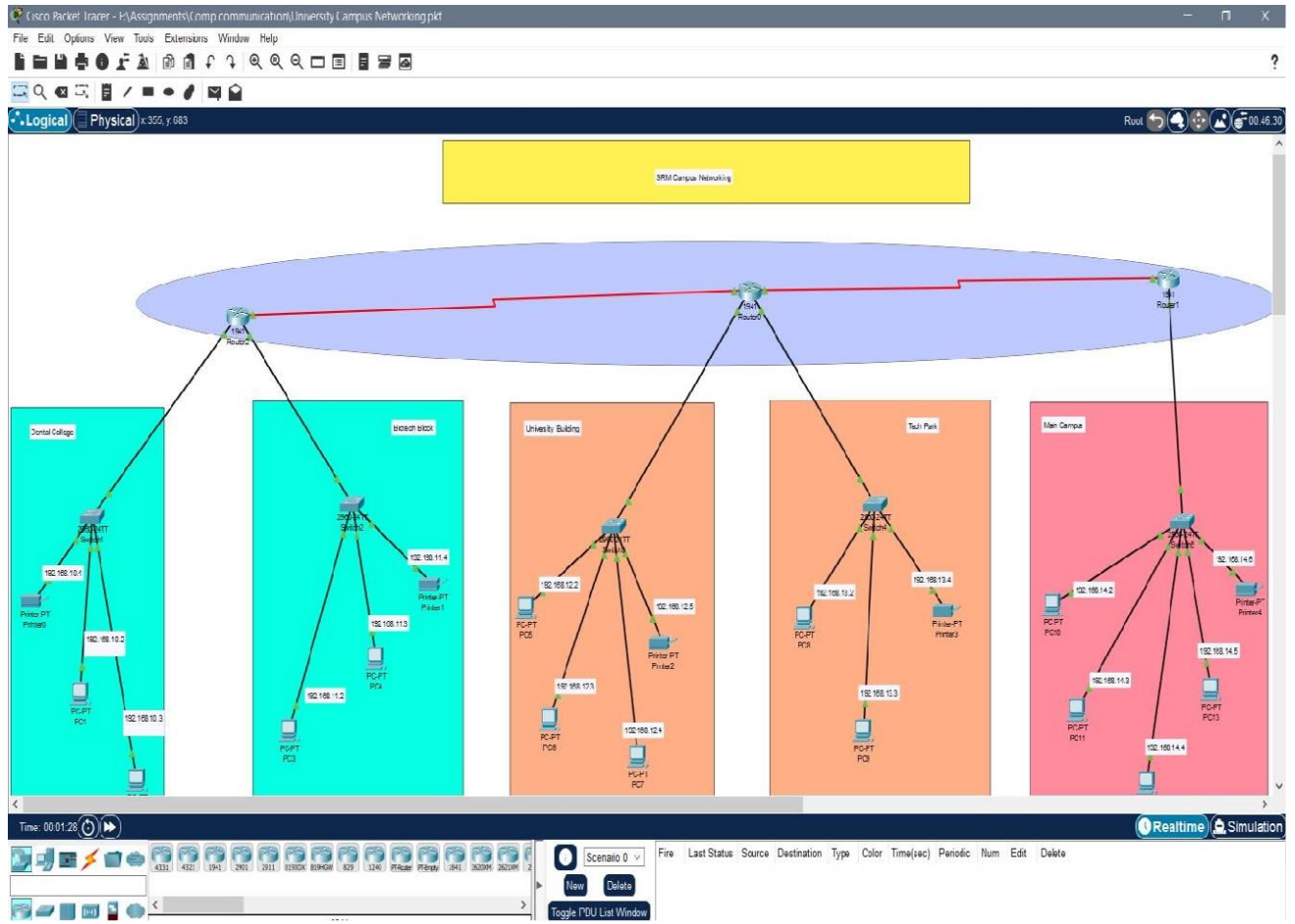
Default Gateway- 192.168.13.4

Subnet Mask- 255.255.255.0

PROJECT SCREENSHOT:



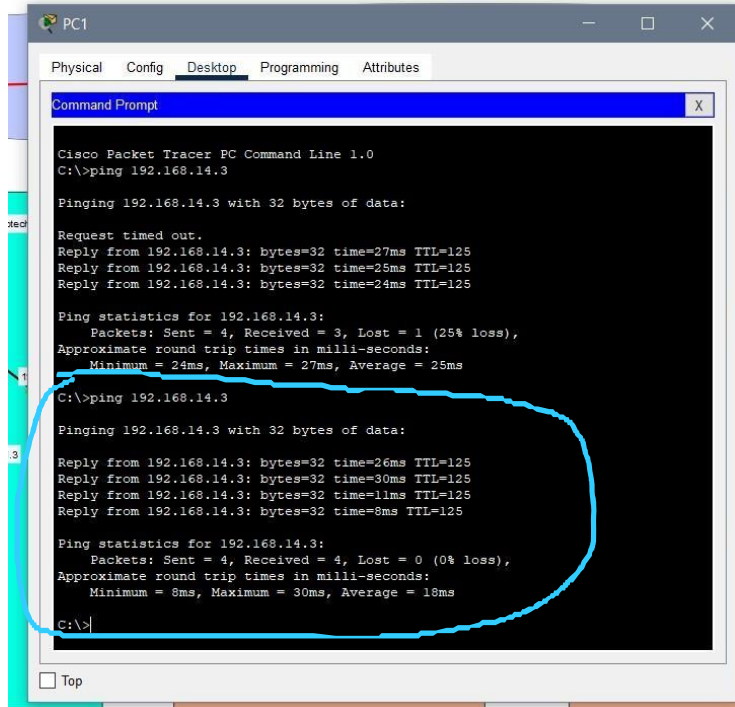
PROJECT Screenshot



6. Results and Inferences

Results:-

Ping test from PC1 (192.168.10.2) to PC11 (192.168.14.3) to check for connectivity:-



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.14.3

Pinging 192.168.14.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.14.3: bytes=32 time=27ms TTL=125
Reply from 192.168.14.3: bytes=32 time=25ms TTL=125
Reply from 192.168.14.3: bytes=32 time=24ms TTL=125

Ping statistics for 192.168.14.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 24ms, Maximum = 27ms, Average = 25ms

C:\>ping 192.168.14.3

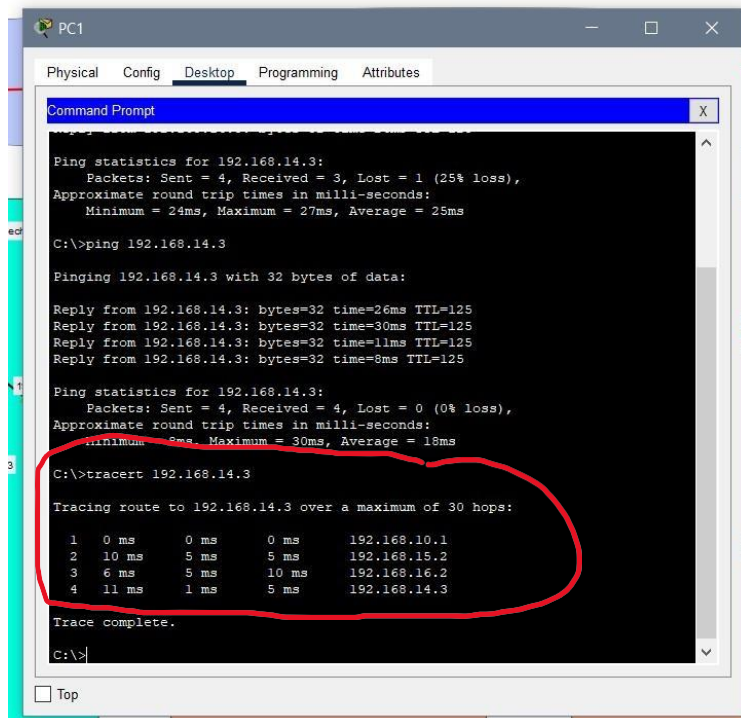
Pinging 192.168.14.3 with 32 bytes of data:

Reply from 192.168.14.3: bytes=32 time=26ms TTL=125
Reply from 192.168.14.3: bytes=32 time=30ms TTL=125
Reply from 192.168.14.3: bytes=32 time=11ms TTL=125
Reply from 192.168.14.3: bytes=32 time=8ms TTL=125

Ping statistics for 192.168.14.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 30ms, Average = 18ms

C:\>
```

Tracert test for 192.168.14.3 to see all the hops:-



The screenshot shows a virtual PC1 environment with a Command Prompt window open. The window displays the results of a ping and a traceroute to the IP address 192.168.14.3. The ping command shows a 25% loss of packets. The traceroute command shows a successful path with four hops, with the final hop being the destination IP. A red circle highlights the traceroute output.

```
PC1
Physical Config Desktop Programming Attributes
Command Prompt
Ping statistics for 192.168.14.3:
  Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 24ms, Maximum = 27ms, Average = 25ms
C:\>ping 192.168.14.3

Pinging 192.168.14.3 with 32 bytes of data:

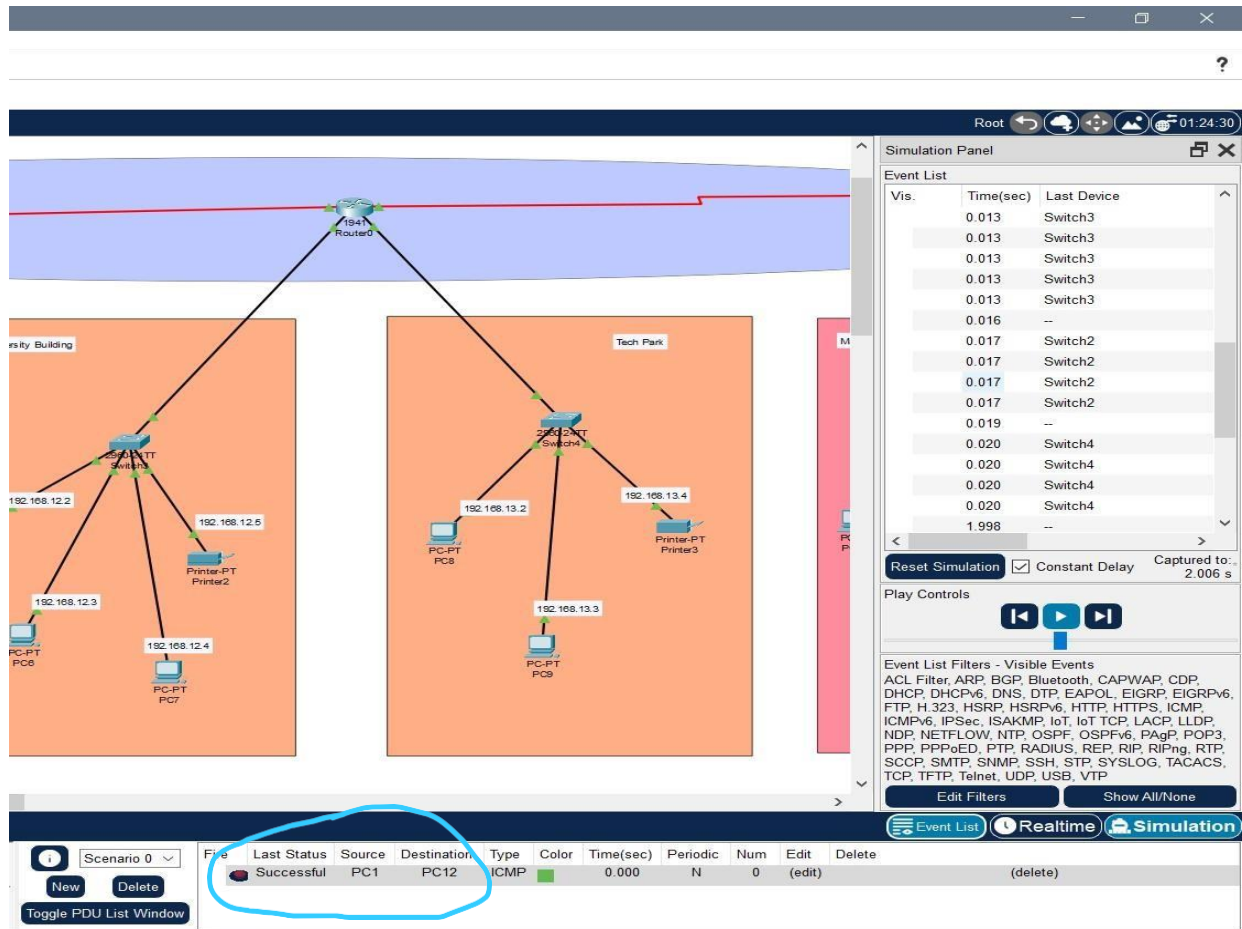
Reply from 192.168.14.3: bytes=32 time=26ms TTL=125
Reply from 192.168.14.3: bytes=32 time=30ms TTL=125
Reply from 192.168.14.3: bytes=32 time=11ms TTL=125
Reply from 192.168.14.3: bytes=32 time=8ms TTL=125

Ping statistics for 192.168.14.3:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 30ms, Average = 18ms
C:\>tracert 192.168.14.3

Tracing route to 192.168.14.3 over a maximum of 30 hops:
  0  0 ms    0 ms    0 ms    192.168.10.1
  1  10 ms   5 ms    5 ms    192.168.15.2
  2  6 ms    5 ms   10 ms    192.168.16.2
  3  11 ms   1 ms    5 ms    192.168.14.3

Trace complete.
C:\>
```

Sending message from one PC to another to check proper connection :-



• Inference

We started our discussion with the word “digitalization” and in order to achieve it, we aimed to start with an educational institute, and finally, we designed a network for a University, which is wireless. As we mentioned, mobility and efficiency are the key aspects of wireless networks, which were our main goal, and hence, we decided to shift to a wireless network instead of a wired one, making our network clean and less chaotic.

In this project, we 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 intra university communication through emails within the domain. We have used console passwords and ssh protocol to ensure a safe and secure transfer of data.

7.

REFERENCES

Books:-

- Data and Computer communication by William Stallings
- Computer Communication and Network technologies by Bill Hancock

Websites:-

- www.geeksforgeeks.org
- www.ibm.com
- www.javatpoint.com

-----The End-----