# NETWORK DESIGN FOR A COLLEGE

A COURSE PROJECT REPORT

By

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Under the guidance of

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# SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

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## BONAFIDE CERTIFICATE

Certified that this mini project report " **NETWORK DESIGN FOR A COLLEGE**" is the bonafide work of **VEDANT TIWARI (RA2011003010354), GOOTY SHAIK MOHAMMED FAHEEM (RA2011003010356), PRITOM ROY(RA2011003010358)** and **MANOJEET MOHATO (RA2011003010365)** who carried out the project work under my supervision.

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# ABSTRACT

Computer Networks have become an integral part of our present- day society. Most companies depend on the proper functioning of their networks for communication, e-business, administrations, etc. The Local Area Network (LAN) is the most basic and important computer network that can be used for interconnection with Wide Area Networks. It is used for resource sharing between equipment's such as mass storage media, mainframe computers or minicomputers, and high-speed printers. Here, LAN serves as the access vehicle for an Intranet or the Internet. In view of this, system managers need professional tools to help them with the design and maintenance of LANs

# ACKNOWLEDGEMENT

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# 1. INTRODUCTION

Networking is referred as connecting computers electronically for the purpose of sharing information. The aim was to design a network with high security. Resources such as a file, application, printers & software are some common information shared in a networking. The advantages of networking can be seen clearly in terms of security, efficiency, manageability & a cost effective which allows to collaborate with wide range. The Switches and Router this device that play an important role in data transfer from one place to another using different technology such as a radio waves & wire. LAN is a Local Area network which is made up of two or more computers connected together in a short distance usually at home, offices buildings or school. WAN is a Wide Area network that covers wider area than LAN and usually covers cities, countries and the whole world. Sometimes Several major LAN can be connected together to form a WAN. AS a several devices are connected to network, it is important to ensure data collision does not happen when this device attempt to use data channel simultaneously. A set of rules called collision detection are used to detect and prevent collision in networks.

# 2. Literature Review

# Paper 1

**Title -** Plan, Design and Simulation of College Network

**Written By –**

Longinus Ezema, Electrical Electronic Engineering, Federal College of Technology Owerri (FUTO), Imo State, Nigeria.

W. E. Mbaonu, Electrical Electronic Engineering, Federal Polytechnic, Nekede, Imo State, Nigeria.

U. O Nwogu, Computer Science, Federal Polytechnic, Nekede, Imo State, Nigeria.

C. Owuamanam, Electrical Electronic Engineering, Federal Polytechnic, Nekede, Imo State, Nigeria.

**Date –** 22 July 2014

# Review of the paper

Computer network in the recent time has continued to evolve and has gone beyond just a collection of interconnected devices. Networking is a process of connecting computers, printers, routers etc. over a medium for the purpose of sharing information/resources. It is a very viable tool in the day-to-day running of an organisation. Research in data communication and networking has resulted in new technologies in which the goal is to be able to exchange data such as text, audio, video etc. Recently, no good establishment can effectively and efficiently work without a good computer network or internet. In Nigeria, virtually every establishment has got one but how these networks are managed, the quality of service and the general performances of these networks are questionable. In this paper, we present; plan, design and simulation of computer network, a case study of Federal College of Technology Owerri (FUTO). The result of the work clearly showed that the simulated network has an edge over the existing real time network in reliability. Approximately 96% of data sent were received successfully on the simulated network and only about 4% were lost. In the existing real time network about 67% packets were received successfully while about 33% got lost on transit. This paper when implemented will solve problems we have identified with the college network.

The layout of the network will be done in such a manner as to ensure effective communication between the connected nodes and sub-networks. All the computers in each department will be linked together, using wired and wireless

media (star topology). The departments in each school (subnetwork) will be linked together to each other using both wired and wireless media. Finally, each subnetwork will be linked together using a wireless media (ring topology). The network will have six sub-networks and each of them will have their own network.

The Internet Protocol addresses were assigned to the host computers dynamically using a server configured to run DHCP. The DHCP server was configured to generate and allocate IP addresses to the host from the range of IP addresses it was configured to generate. The DHCP server itself is running on a static IP address.

Each of the sub networks has their own router and the routers were configured for them to route packets effectively. The routers in each sub networks are configured to forward packets to each other wirelessly. The routers are configured to use dynamic routing to route. The routers in each sub networks are configured to forward packets to each other wirelessly. The routers are configured to use dynamic routing to route packets (RIP version 2).

The computer network for Federal College of Technology Owerri (FUTO) was simulated according to the design of the network. The routers and the computer system were configured accordingly. Packets were sent from one computer to the other and the transmission of such data to their destination was successful. Through the network, Memos, emails and files can be sent and received by staff and students of the institution. The simulated network was tested to be ok just like a real computer network. This shows that the computer network for FUTO will work perfectly when implemented.

From the comparative analysis taken from table1 we can see that the percentage of received packet from the simulated network is 95.83% as against 66.67% from the real network. Also a decrease in percentage of packet lost to just 4.17% as against 33.33% shows that the simulated network outperformed the real time computer network. The result of the simulated network of Federal College of Technology Owerri, when implemented will perform better in speed, higher throughput and security. We therefore recommend an upgrade on the network using the simulated network design

# Paper 2

**Title -** College Network Planning and Design

**Written By -** Huichao Ma, Guoliang Lv, Chunyu Wu

**Date -** 2018

# Review of the paper

Internet technology began to spread in the college, the Internet and our college life has been closely linked together. As a college to cultivate the talents of the century, to achieve network management, teaching is very important.

So the college network is a very interactive and professional LAN. Multimedia teaching software development platform, multimedia presentation classrooms, teacher preparation system, library access system, test database, etc., can work through the network. If a school includes a number of professional disciplines, you can also form a number of local area networks, and through wired connection. College network should have teaching, management and communication three functions. For the current college network construction, the main focus on teaching and communication, it is difficult to achieve the digital college as the core of the management area.

The construction of the college network will design based from the actual situation and characteristics of school. In the design process, pay attention to the practicality of the college network and the combination of advanced, and the use of mature network technology to ensure the practicality of the college network

The so-called 'hierarchical' model is to divide the complex network design into several levels, each of which focuses on certain specific functions, which can make a complex big problem into many simple small problems. Hierarchical model can be applied to both LAN design and WAN design. In order to understand the importance of hierarchical design more clearly, it is best to understand the OSI (Open Systems Interconnection) reference model. The OSI model simplifies the communication requirements between computers. Similarly, the use of a hierarchical model to design a network can simplify the requirements of networking.

According to the distribution of the buildings between the schools, the central room can be set in the training building, because the building has 6 layers, can be set in the middle floor, for example, 2 to 5 floor in a layer. The remaining building blocks are connected to the core switch of the central room via fiber.

The college network uses Gigabit Ethernet switching network. Configure a central switch and seven secondary switches. Each switch supports fiber expansion ports with expansion module slots. College network backbone for the Gigabit network, Fast exchange to the desktop, to protect all users at the same time call the service resources can be fast and smooth, give full play to the role of multimedia classroom teaching; at the same time to ensure that all users at the same time smooth Internet, the college network function most vividly.

With the advent of the Internet age, the impact of our education is unprecedented, and it also provides a rapid leap for education opportunities, education should be oriented towards modernization, facing the world, facing the future, we must first facing the network. Education can only make a combination with network in order to keep up with progress and development of times. The premise of network education is the construction of the network, and as the construction of the college network is not only the construction of the network hard environment, but also must include the college network maintenance and security, college network resources and the effective application of the college network and other three Link. Only the full and effective application of the college network in order to make the entire teaching model and the educational concept of a complete change in order to apply the new century to cultivate high-quality creative and complex talents needs for the college network construction, not applicable to all schools program, even for a school, it is impossible to have the best program, only the better program.

# Paper 3

**Title -** Design and Implementation of Colllege Network

**Written By -** Mugdha Sharma, Chirag Pupreja, Akash Arora

**Date -** July 2019

# Review of the paper

Information technology is being used at numerous places fulfilling various purposes. Doing work at one place by professors and sharing it at another place either to faculty members and students becomes quite difficult. As doing tasks on one PC, a professor might have to visit different classes and labs due to various reasons. Similarly, a student working on a project might have to access a particular project document in multiple labs and classes. Head of Department has to visit various rooms and classes in a particular day. It would be very tedious job to carry laptop everywhere. There might be a situation when a user wants to share a particular data with more than 1 user. There can also be a situation when a particular message/ information needs to be shared with the entire college. So this research work proposes a novel approach to communicate among various users that are present at different sites at the same time where at college premises network system is being proposed which would help departments to share information among faculty members and students Proposed approach takes the help of sharing common network domain by DNS and applies heterogeneous BUS topology model to explore various concepts like topology design, creating dynamic host configuration protocol, sub net masking, DNS and VLAN within a single network with the help of Cisco Packet Tracer to make the network more secured and cost effective.

A computer network is defined as a co-lateral connection of various devices that are connected through different communication medium/channels. Main purpose of a computer network is to facilitate the users to communicate among themselves and share resources with other users. Networks can be classified into various categories with different characteristics that are mentioned and explained further in this section of the research work.

Network access for the hostels is implemented through a separate switch being implemented for the boy's hostel, and similarly for the girl's hostel. A separate switch is implemented for each of the hostels (for example, 3 switches for three boys' hostels) to ensure that the students of one hostel cannot access the Internet services of another hostel. This reduces system traffic. Unlimited network access is arranged for the Director's Office and with a reasonably high speed. The

Director's Office will not have any sites blocked, but will be provided the same speed by the ISP even after fair usage limit. This proposal is extremely simple to implement and is pretty useful so that users can have all the access on a single click. Network access for all the departments other than CSE, one PC is shown as the ―HOD PC‖ – the one specifically reserved for the Head of the Dept. All other PCs are collectively shown as ―Other‖. For CSE, due to the number of labs, multiple switches are created; each switch provides access to one lab where devices in each lab are connected to a VLAN. Unlimited network access for the staff is provided and is implemented by assuming that although the staff will not get their speeds reduced after the fair usage limit, there will be still some restricted sites (the same sites restricted for the students) that are accessible to the Director only. Network access for the library is managed by simply attaching a hub to one of the main routers to enable Internet access. Network access for the college is managed with the help of Wi-Fi access instead of a wired connection, so a DSL modem is a must for providing this facility. Network access for the guest house is managed by simply attaching a switch to one of the main routers to enable Internet access. Instant network access is provided to all the users on the network. Portal for login is not been added as it will be cumbersome. Instead, two Wi-Fi routers are added. One is for the guests (open access, 1/3rd the normal speed), and the other for the students, staff, etc. (password protected WPA2/PSK, normal speed). For security purposes, a selective example is taken to showcase the security measures that can be taken in the future – for example, we have enabled a 256-bit password in the console for the router. The Internet Service Provider provides speed at a rate of 10 MB/s. Network Administrator is the person(s) who can decrease, increase or otherwise modify the speeds of the network, shutdown or restart the entire network (only in cases of severe eventualities),add more sub-networks to the main networks (example – adding more users to a VLAN, in case a new department is established).It is also possible for the routers to get their firmware replaced, updated, etc. by the network administrator(s). There may be other features added (or deleted) in the future which will be updated as necessary.

The proposed design of the college network is been established in a simulated environment. The routers and the computer system were configured accordingly. Packets were sent from one computer to the other and the transmission of such data to their destination was successful in an efficient manner. Through the network, emails and files can be sent and received by staff and students of the institution. In order to provide security to the network various methods are implemented. Password protection is also applied on the switches for restricted usage. The authentication is done within the network. The ACL allows only those files to flow from the server that are allowed for the students. With addition to this VLANs are installed for the better security and protection of the network. Also, MAC flooding attack is also prevented within the simulated

network. Domain name is set as akash@bpit.com which will have the access to different users within the college network from any system. This will also help in broadcasting the messages within the network at the same time. The simulated network was tested and it performed just like a real computer network. This shows that college network will work perfectly when implemented in various other environment and scenarios.

The proposed approach helps in designing the network outlook for the college network that produces the different functionalities within a single network such as security of the network, wireless area network, mobility as well as restricting the access to limited users, operational efficiencies and a cost-effective network. The template provided by this paper is applicable for any network, provided it is not too large. The network is fully featured with ISP, network administration, interconnection of various departments, VLANs for connection of Department Heads and wardens, network access for library using hubs; guesthouse has an open Wi-Fi too. This paper describes the network design scenario approved by Cisco, as well as where we can apply these scenario within the various locations of a college network. Finally, key network foundation services such as switching, routing, multicast, and high availability are given for the college network scenario in an efficient way.

# Paper 4

**Title -** NETWORK DESIGN FOR COLLEGE CAMPUS

**Written By -** Prof. Swati Pawar , Prof. Vivek D. Ugale, Ankita Nirmal , Swapnali Borade , Pallavi Badgujar

**Date –** May 2020

# Review of the paper

This project is to design a suitable network system for 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.

Networking is refereed as connecting computers electronically for the purpose of sharing information. Resources such as a file, applications, printers & software are some common information shared in a networking. The advantages of networking can be seen clearly in terms of security, efficiency, manageability & and cost effectiveness as in allows collaboration between users in a wide range. The Switches and Router this device that play an important role in data transfer from one place to another using different technology such as a radio waves & wire. LAN network is made up of two or more computers connected together in a short distance usually at home, offices buildings or school. WAN is a network that covers wider area than LAN and usually covers cities, countries and the whole world. Several major LAN can be connected together to form a WAN. As a several devices are connected to network, it is important to ensure data collision does not happen when this device attempt to use data channel simultaneously. A set of rules called carrier sense multiple access/collision detection are used to detect and prevent collision in networks.

In this growing network area, it has become necessary to protect our network from unauthorized users and prevent it from hacking, so it is necessary to maintain security in our network by using various security option like port security, encryption using most secure routing protocol. To implement this, we need best

devices which can support these protocols more efficiently. So, our discussion we decide to use layer 3 switches which work as switch as well as router, and using this router it is possible to implement EIGRP routing protocol. By using EIGRP it is possible for load balancing on parallel links between sites and also manages load balancing.

This project has proven that a standard network system can be designed with less cost. Although we used the cheapest devices in designing the network, the security of this network turned out to be very strong. This is because the firewall and backup devices used in this network are of good quality. All networks need many servers for doing their work. For this research, we did not use all servers because of cost, but we used some important servers such as DHCP. These servers help the network to perform their functions in a smooth way. It can be seen in this research that various costs were minimized in order to maximize the quality of the designed network. Although there may have been some challenges in this project due to some financial constraints, at the end our aim was achieved by designing a network for developing universities with minimal cost. For example, we made use of some devices for the network security, but the most interesting part is that, at the end of the day, all challenges and constraints were overcome.

# 3. Requirement analysis

## Network 1-: Computer Lab

There are two switches connected to 9 PCs on each side, through a Copper Straight-through Cable. The users include Communication, Security, OODP, RDBMS, Genetic Engg, Bioengineering, Cytogenic, Nanotech, Software Engineering, Phytochemistry, Cyber Forensics, DSA, Microprocessor, Operating System, Communication Engg, Networking, Tissue Culture and Research. A Router is connected to both the switches using a Copper Straight- through Cable.

The components used in Network 1 are:

| DEVICES | REQUIRED NOS |
|---|---|
| PCs | 18 |
| Switch 2960 IOS15 | 2 |
| Router 1941 | 1 |
| Copper Straight- through Cables | 20 |
| Serial DCE | 2 |

### Network 2- Library Department

There are two switches connected to 9 PCs on each side, through a Copper Straight-through Cable. The users include C.S.E, E.E.E, CC, MATHEMATICS, OS, BIOPROCESS, IMMUNOLOGY, SEPM, SCP, E.C.E, HISTORY, ECONOMICS, GEOGRAPHY, CHEMISTRY, POLITICAL SCIENCE, BUSINESS STUDIES, ARTS and LAW. A Router is connected to both the switches using a Copper Straight- through Cable. Appropriate IP Addresses are chosen for the PCs and Router, thus completing the connection of the third network.

The components used in Network 2 are:

| DEVICES | REQUIRED NOS |
|---|---|
| PCs | 18 |
| Switch 2960 IOS15 | 2 |
| Router 1941 | 1 |
| Copper Straight- through Cables | 20 |
| Serial DCE | 2 |

**Network 3- Exam Cell**

There are two switches connected to 9 PCs on each side, through a Copper Straight-through Cable. The users include CSE, ECE, EEE, MECH, CHEM, BIOTECH, LLB, FASHION, TEXTILE, AUTOMOBILE, MUSIC, DANCE, INSTRUMENTATION, MATHS, DENTISTRY, SURGERY, ARCH and CIVIL. A Router is connected to both the switches using a Copper Straight- through Cable. Appropriate IP Addresses are chosen for the PCs and Router, thus completing the connection of the second network. A Server is attached to the switch for sharing and storing files. Appropriate IP Addresses are chosen for the PCs and Router, thus completing the connection of the third network.

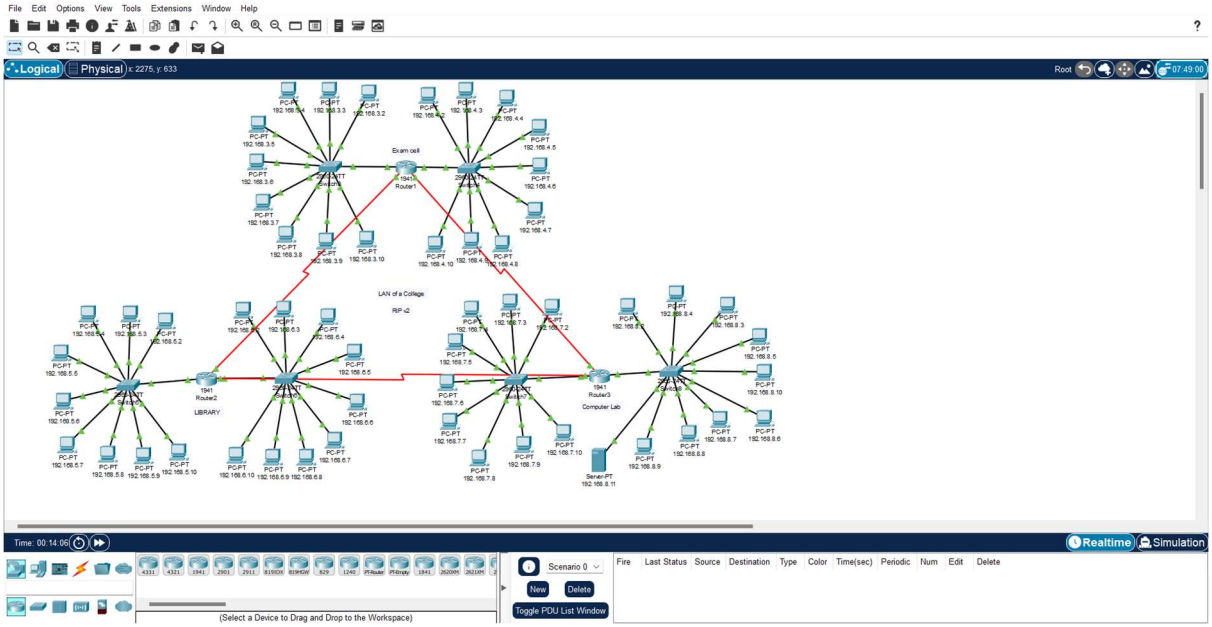
The components used in Network 3 are:

| DEVICES | REQUIRED NOS |
|---|---|
| PCs | 18 |
| Switch 2960 IOS15 | 2 |
| Router 1941 | 1 |
| Copper Straight- through Cables | 20 |
| Serial DCE | 2 |
| Server- PT | 1 |

# 4. ARCHITECTURE AND DESIGN

## 4.1 Network Architecture

The network architecture is as follows:



The architecture consists of three major networks:

- Computer Lab
- Library Department
- Exam cell

These networks are interconnected with each other.

The components used are:

| S.No | Device | Required Nos. |
|---|---|---|
| 1 | PCs | 54 |
| 2 | ROUTERS | 3 |
| 3 | SWITCHES | 6 |
| 4 | COPPER STRAIGHT-THROUGH CABLES | 55 |
| 5 | SERIAL DCE CABLES | 3 |
| 6 | SERVER | 1 |

# 5.IMPLEMENTATION

The LAN model has been developed for a College. Three typical departments of a college have been chosen, that is Computer Lab, Exam Cell, Library Department. Each department has a router and 2 switches. To these switches, a total of 18 PCs (users) are connected using Copper Straight- through Cable. The switches and router are also connected using a Copper Straight-through Cable. To one switch, a server containing the files and resources is attached using a Copper Straight- through Cable. At the end, all three departments are connected, that is, routers are connected using Serial DCE cables with RIP v1 configuration.

## 5.1 DESIGN

We have designed the network step -by- step for all three departments.

### 5.1.1 Network 1- Exam Cell

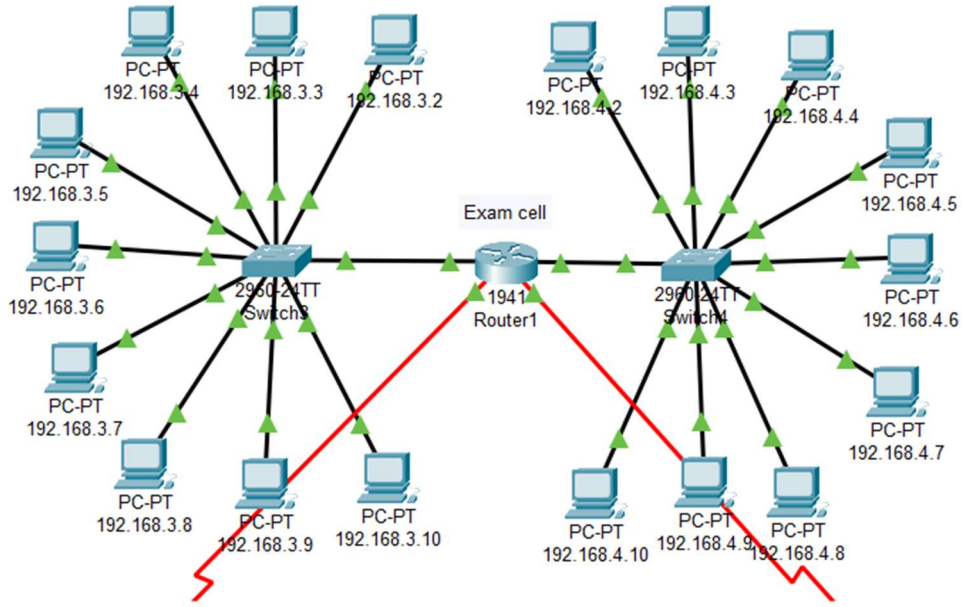
There are two switches connected to 9 PCs on each side, through a Copper Straight-through Cable. A Router is connected to both the switches using a Copper Straight- through Cable. Appropriate IP Addresses are chosen for the PCs and Router, thus completing the connection of the second network.

The components used in Network 1 are:

| DEVICES | REQUIRED NOS |
|---|---|
| PCs | 18 |
| Switch 2960 IOS15 | 2 |
| Router 1941 | 1 |
| Copper Straight- through Cables | 20 |
| Serial DCE | 2 |

For computers to communicate in the network, they must have the same IP address. The IP Addresses for the first network is given below:

| DEVICE | INTERFACE | IP ADDRESS | SUBNET MASK | GATEWAY |
|---|---|---|---|---|
| CSE | Fa0/1 (Switch 3) | 192.168.3.2 | 255.255.255.0 | 192.168.3.1 |
| ECE | Fa0/2 (Switch 3) | 192.168.3.3 | 255.255.255.0 | 192.168.3.1 |
| EEE | Fa0/3 (Switch 3) | 192.168.3.4 | 255.255.255.0 | 192.168.3.1 |
| MECH | Fa0/4 (Switch 3) | 192.168.3.5 | 255.255.255.0 | 192.168.3.1 |
| CHEM | Fa0/5 (Switch 3) | 192.168.3.6 | 255.255.255.0 | 192.168.3.1 |
| BIOTECH | Fa0/6 (Switch 3) | 192.168.3.7 | 255.255.255.0 | 192.168.3.1 |
| LLB | Fa0/7 (Switch 3) | 192.168.3.8 | 255.255.255.0 | 192.168.3.1 |
| FASHION | Fa0/8 (Switch 3) | 192.168.3.9 | 255.255.255.0 | 192.168.3.1 |
| TEXTILE | Fa0/9 (Switch 3) | 192.168.3.10 | 255.255.255.0 | 192.168.3.1 |
| AUTOMOBILE | Fa0/9 (Switch 4) | 192.168.4.10 | 255.255.255.0 | 192.168.4.1 |
| MUSIC | Fa0/8 (Switch 4) | 192.168.4.9 | 255.255.255.0 | 192.168.4.1 |
| DANCE | Fa0/7 (Switch 4) | 192.168.4.8 | 255.255.255.0 | 192.168.4.1 |
| INSTRUMENTATION | Fa0/6 (Switch 4) | 192.168.4.7 | 255.255.255.0 | 192.168.4.1 |
| MATHS | Fa0/5 (Switch 4) | 192.168.4.6 | 255.255.255.0 | 192.168.4.1 |
| DENTISTRY | Fa0/4 (Switch 4) | 192.168.4.5 | 255.255.255.0 | 192.168.4.1 |
| SURGERY | Fa0/3 (Switch 4) | 192.168.4.4 | 255.255.255.0 | 192.168.4.1 |
| ARCH | Fa0/2 (Switch 4) | 192.168.4.3 | 255.255.255.0 | 192.168.4.1 |
| CIVIL | Fa0/1 (Switch 4) | 192.168.4.2 | 255.255.255.0 | 192.168.4.1 |
| Router1 | GigabitEthernet0/0 | 192.168.3.1 | 255.255.255.0 | - |
| Router1 | GigabitEthernet0/1 | 192.168.4.1 | 255.255.255.0 | - |
| Router1 | Serial0/1/0 | 192.168.9.2 | 255.255.255.0 | - |
| Router1 | Serial0/1/1 | 192.168.11.1 | 255.255.255.0 | - |




## 5.1.2 Network 2- Library Department

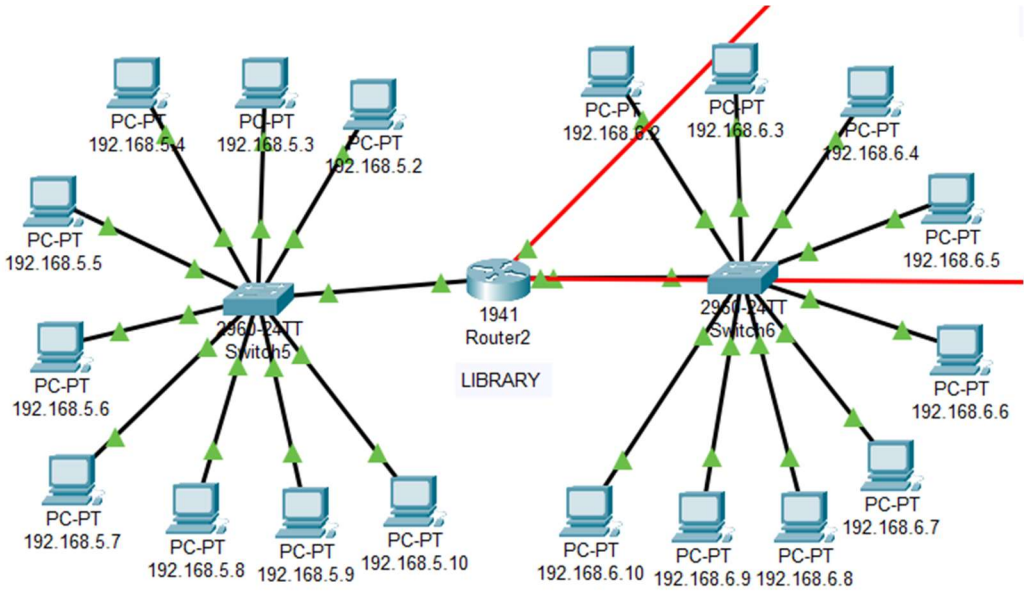
There are two switches connected to 9 PCs on each side, through a Copper Straight-through Cable. A Router is connected to both the switches using a Copper Straight- through Cable. Appropriate IP Addresses are chosen for the PCs and Router, thus completing the connection of the third network.

The components used in Network are:

| DEVICES | REQUIRED NOS |
|---|---|
| PCs | 18 |
| Switch 2960 IOS15 | 2 |
| Router 1941 | 1 |
| Copper Straight- through Cables | 20 |
| Serial DCE | 2 |

For computers to communicate in the network, they must have the same IP address. The IP Addresses for the first network is given below:

| DEVICE | INTERFACE | IP ADDRESS | SUBNET MASK | GATEWAY |
|---|---|---|---|---|
| C.S.E | Fa0/1 (Switch 5) | 192.168.5.2 | 255.255.255.0 | 192.168.5.1 |
| E.E.E | Fa0/2 (Switch 5) | 192.168.5.3 | 255.255.255.0 | 192.168.5.1 |
| CC | Fa0/3 (Switch 5) | 192.168.5.4 | 255.255.255.0 | 192.168.5.1 |
| MATHEMATICS | Fa0/4 (Switch 5) | 192.168.5.5 | 255.255.255.0 | 192.168.5.1 |
| OS | Fa0/5 (Switch 5) | 192.168.5.6 | 255.255.255.0 | 192.168.5.1 |
| BIOPROCESS | Fa0/6 (Switch 5) | 192.168.5.7 | 255.255.255.0 | 192.168.5.1 |
| IMMUNOLOGY | Fa0/7 (Switch 5) | 192.168.5.8 | 255.255.255.0 | 192.168.5.1 |
| SEPM | Fa0/8 (Switch 5) | 192.168.5.9 | 255.255.255.0 | 192.168.5.1 |
| SCP | Fa0/9 (Switch 5) | 192.168.5.10 | 255.255.255.0 | 192.168.5.1 |
| E.C.E | Fa0/9 (Switch 6) | 192.168.6.10 | 255.255.255.0 | 192.168.6.1 |
| HISTORY | Fa0/8 (Switch 6) | 192.168.6.9 | 255.255.255.0 | 192.168.6.1 |
| ECONOMICS | Fa0/7 (Switch 6) | 192.168.6.8 | 255.255.255.0 | 192.168.6.1 |
| GEOGRAPHY | Fa0/6 (Switch 6) | 192.168.6.7 | 255.255.255.0 | 192.168.6.1 |
| CHEMISTRY | Fa0/5 (Switch 6) | 192.168.6.6 | 255.255.255.0 | 192.168.6.1 |
| POLITICAL SCIENCE | Fa0/4 (Switch 6) | 192.168.6.5 | 255.255.255.0 | 192.168.6.1 |
| BUSINESS STUDIES | Fa0/3 (Switch 6) | 192.168.6.4 | 255.255.255.0 | 192.168.6.1 |
| ARTS | Fa0/2 (Switch 6) | 192.168.6.3 | 255.255.255.0 | 192.168.6.1 |
| LAW | Fa0/1 (Switch 6) | 192.168.6.2 | 255.255.255.0 | 192.168.6.1 |
| Router2 | GigabitEthernet0/0 | 192.168.5.1 | 255.255.255.0 | - |
| Router2 | GigabitEthernet0/1 | 192.168.6.1 | 255.255.255.0 | - |
| Router2 | Serial0/1/0 | 192.168.12.1 | 255.255.255.0 | - |
| Router2 | Serial0/1/1 | 192.168.10.2 | 255.255.255.0 | - |




## 5.1.3 Network 3- Computer Lab

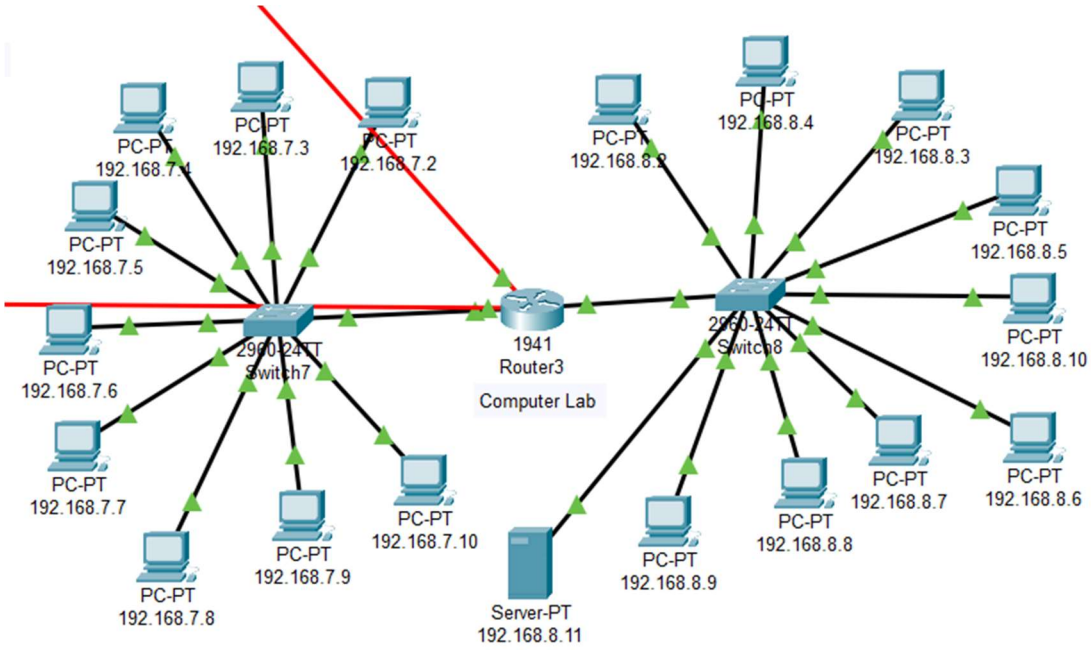
There are two switches connected to 9 PCs on each side, through a Copper Straight-through Cable. A Router is connected to both the switches using a Copper Straight- through Cable. A Server is attached to the switch for sharing and storing files. Appropriate IP Addresses are chosen for the PCs and Router, thus completing the connection of the third network.

The components used in Network 3 are:

| DEVICES | REQUIRED NOS |
|---|---|
| PCs | 18 |
| Switch 2960 IOS15 | 2 |
| Router 1941 | 1 |
| Copper Straight- through Cables | 20 |
| Serial DCE | 2 |
| Server- PT | 1 |

For computers to communicate in the network, they must have the same IP address. The IP Addresses for the first network is given below:

| DEVICE | INTERFACE | IP ADDRESS | SUBNET MASK | GATEWAY |
|---|---|---|---|---|
| Communication | Fa0/1 (Switch 7) | 192.168.7.2 | 255.255.255.0 | 192.168.7.1 |
| Security | Fa0/2 (Switch 7) | 192.168.7.3 | 255.255.255.0 | 192.168.7.1 |
| OS | Fa0/3 (Switch 7) | 192.168.7.4 | 255.255.255.0 | 192.168.7.1 |
| RDBMS | Fa0/4 (Switch 7) | 192.168.7.5 | 255.255.255.0 | 192.168.7.1 |
| Genetic Engg | Fa0/5 (Switch 7) | 192.168.7.6 | 255.255.255.0 | 192.168.7.1 |
| Bioengineering | Fa0/6 (Switch 7) | 192.168.7.7 | 255.255.255.0 | 192.168.7.1 |
| Cytogenics | Fa0/7 (Switch 7) | 192.168.7.8 | 255.255.255.0 | 192.168.7.1 |
| Nanotech | Fa0/8 (Switch 7) | 192.168.7.9 | 255.255.255.0 | 192.168.7.1 |
| Software Engg | Fa0/9 (Switch 7) | 192.168.7.10 | 255.255.255.0 | 192.168.7.1 |
| Phytochemistry | Fa0/9 (Switch 8) | 192.168.8.10 | 255.255.255.0 | 192.168.8.1 |
| Cyber Forensics | Fa0/8 (Switch 8) | 192.168.8.9 | 255.255.255.0 | 192.168.8.1 |
| DSA | Fa0/7 (Switch 8) | 192.168.8.8 | 255.255.255.0 | 192.168.8.1 |
| Microprocessor | Fa0/6 (Switch 8) | 192.168.8.7 | 255.255.255.0 | 192.168.8.1 |
| Operating System | Fa0/5 (Switch 8) | 192.168.8.6 | 255.255.255.0 | 192.168.8.1 |
| Communication Engg | Fa0/4 (Switch 8) | 192.168.8.5 | 255.255.255.0 | 192.168.8.1 |
| Networking | Fa0/3 (Switch 8) | 192.168.8.4 | 255.255.255.0 | 192.168.8.1 |
| Tissue Culture | Fa0/2 (Switch 8) | 192.168.8.3 | 255.255.255.0 | 192.168.8.1 |
| Research | Fa0/1 (Switch 8) | 192.168.8.2 | 255.255.255.0 | 192.168.8.1 |
| Router3 | GigabitEthernet0/0 | 192.168.7.1 | 255.255.255.0 | - |
| Router3 | GigabitEthernet0/1 | 192.168.8.1 | 255.255.255.0 | - |
| Router3 | Serial0/1/0 | 192.168.12.2 | 255.255.255.0 | - |
| Router3 | Serial0/1/1 | 192.168.11.2 | 255.255.255.0 | - |
| Server | Fa0/10 (Switch 8) | 192.168.8.11 | 255.255.255.0 | 192.168.8.1 |

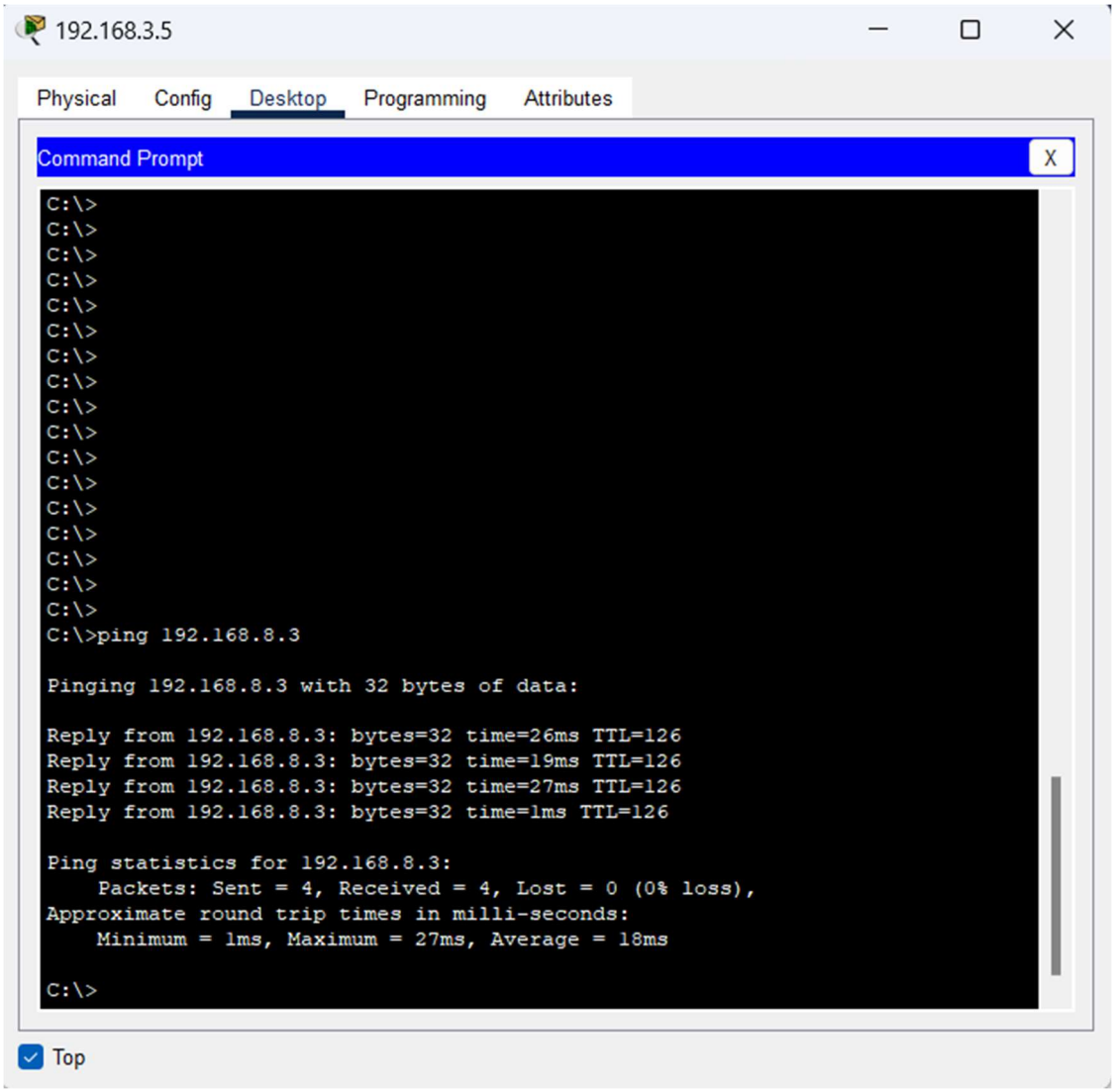

PC-PT
192.168.7.4
PC-PT
192.168.7.3
PC-PT
192.168.7.2
PC-PT
192.168.7.5
PC-PT
192.168.7.6
2960-24TT
Switch7
1941
Router3
Computer Lab
PC-PT
192.168.7.7
PC-PT
192.168.7.8
PC-PT
192.168.7.9
PC-PT
192.168.7.10
Server-PT
192.168.8.11
PC-PT
192.168.8.9
PC-PT
192.168.8.8
PC-PT
192.168.8.7
PC-PT
192.168.8.6
PC-PT
192.168.8.10
PC-PT
192.168.8.5
PC-PT
192.168.8.3
PC-PT
192.168.8.4
PC-PT
192.168.8.2
2960-24TT
Switch8

# 6. EXPERIMENT RESULTS & ANALYSIS

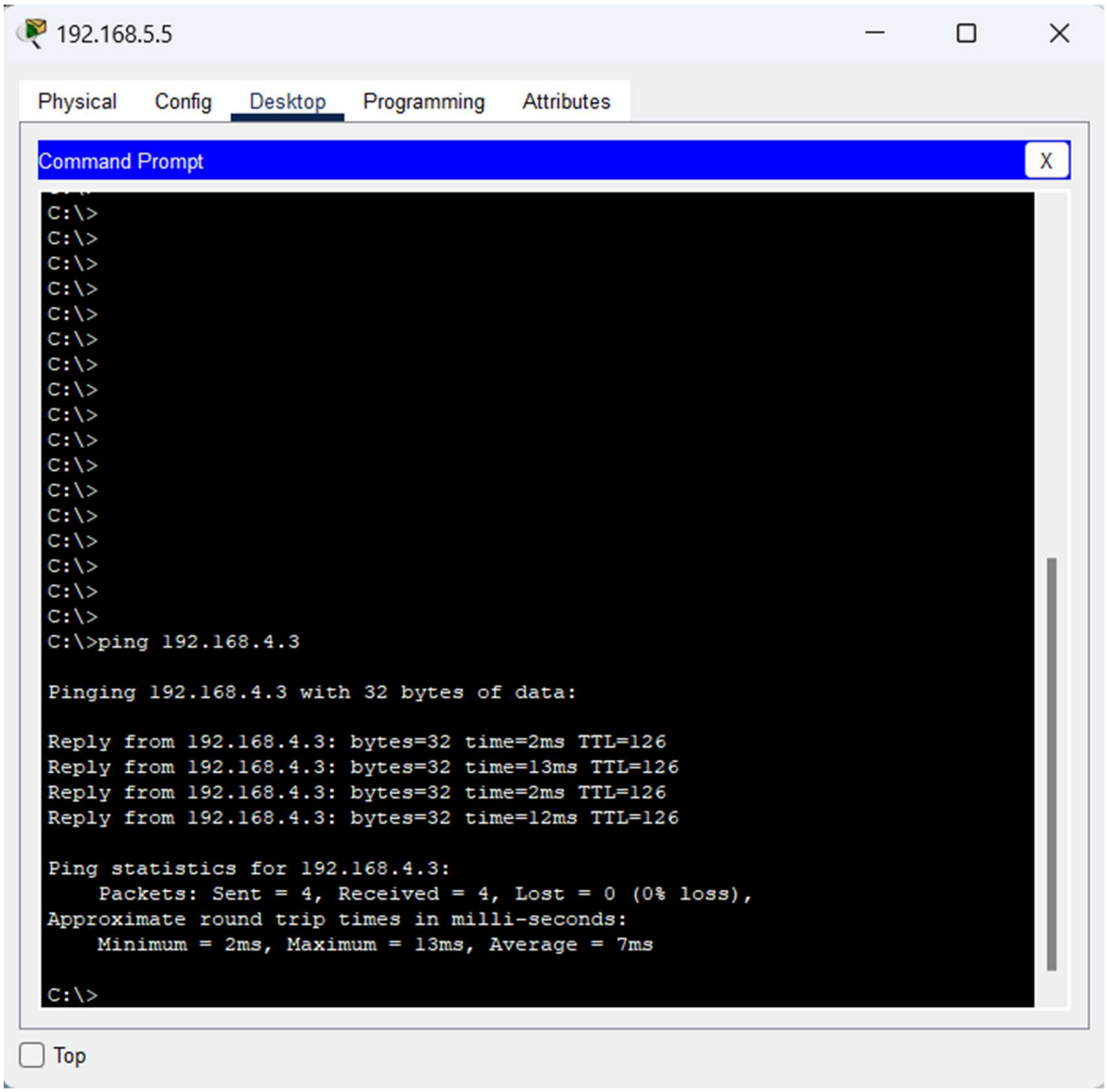
After the LAN has been designed, we must check the connectivity between users of different departments. Also, the connection with the server must be checked.

## 6.1 Connection Check

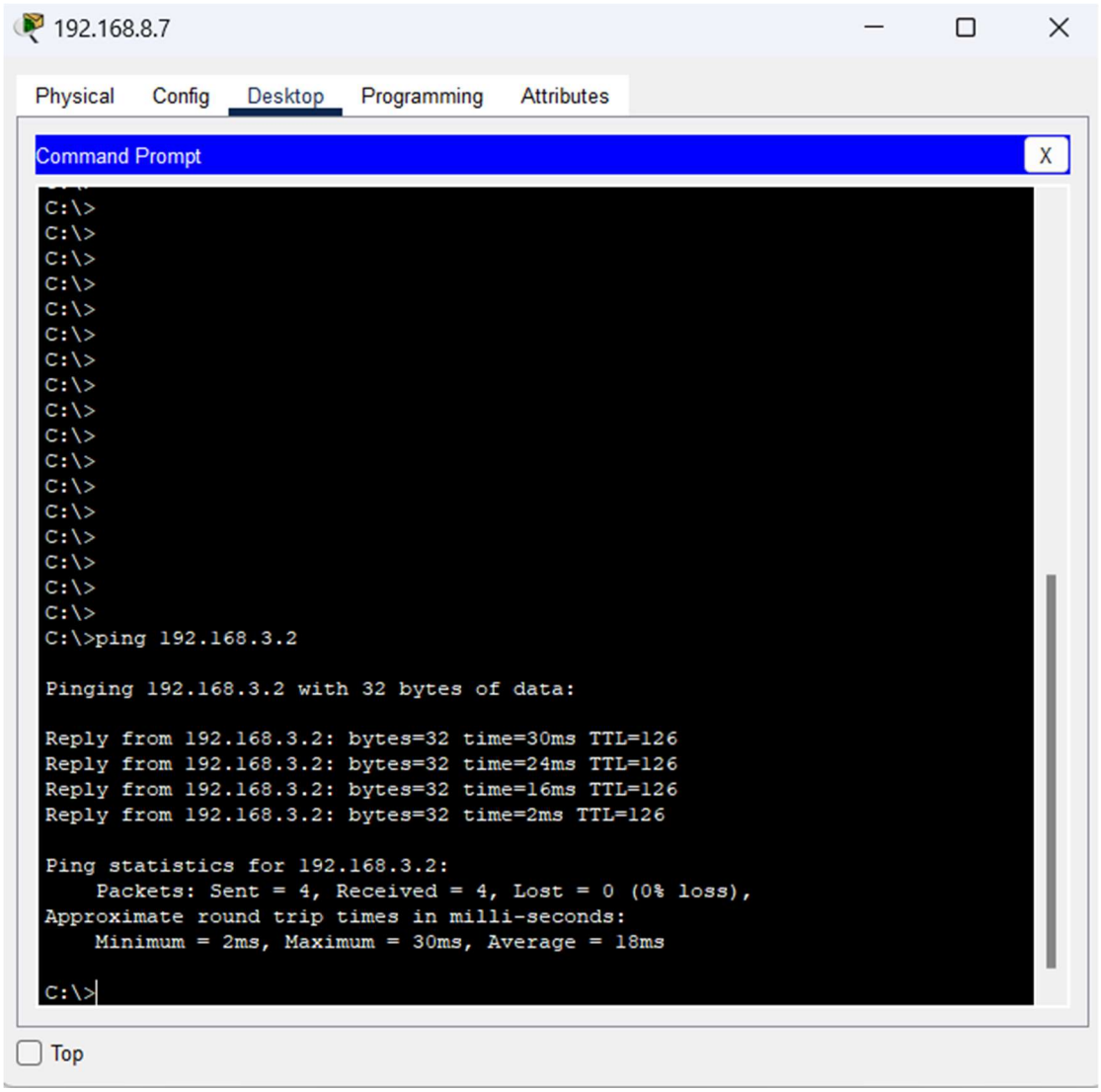
Network connectivity and communication can be tested using a ping command. It is a Command Prompt command used to test the ability of the source computer to reach a specified destination computer.



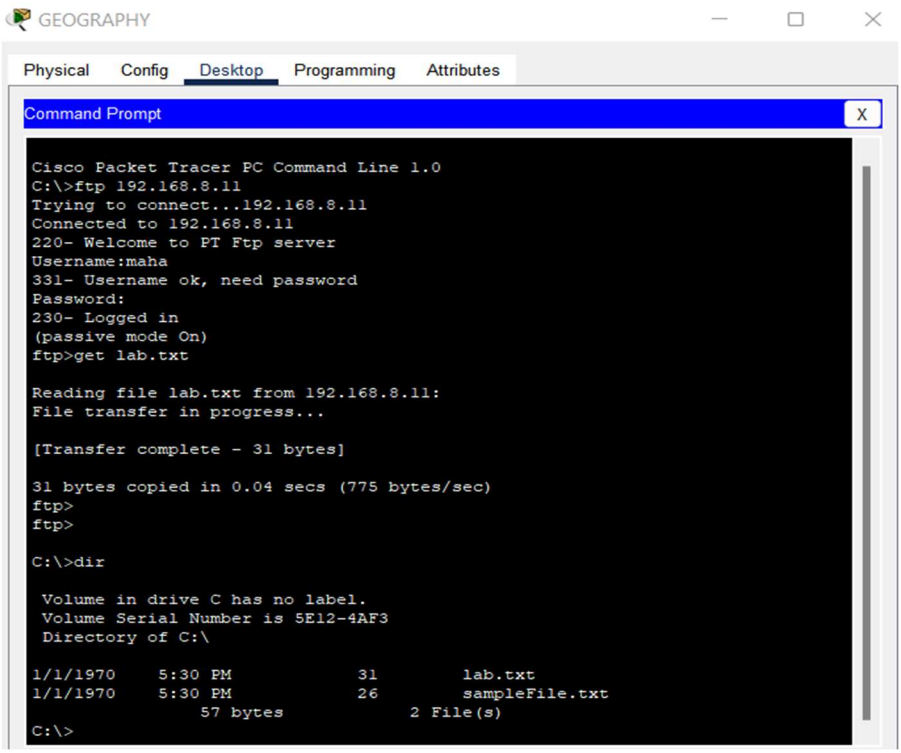

Dance PC (Exam Cell) to Nanotech's PC (Computer Lab)



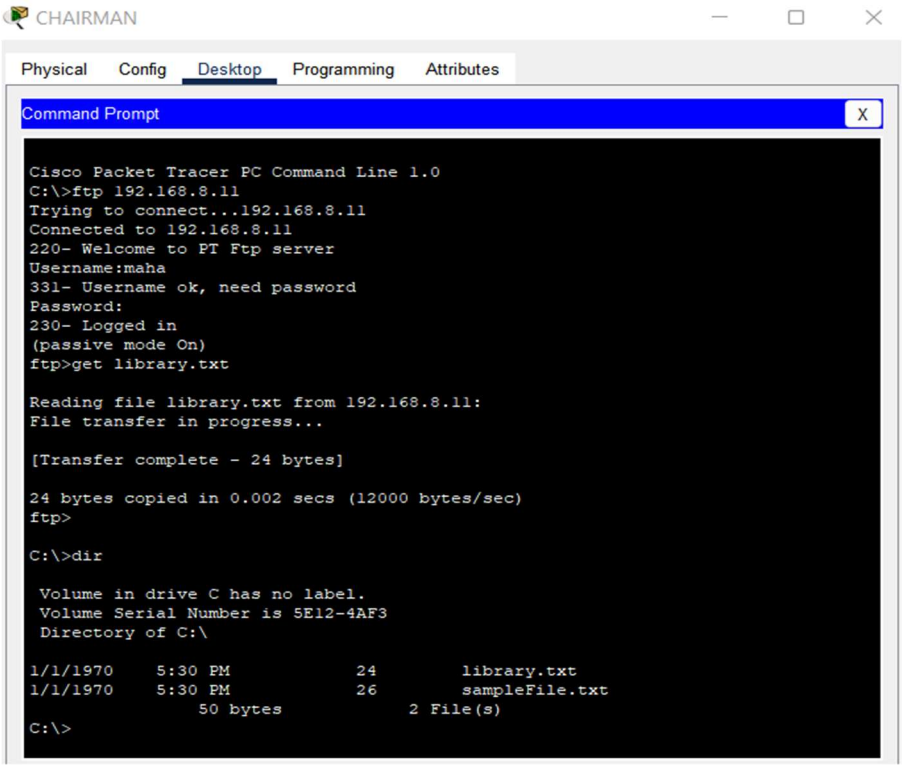

SCP PC (Library) to Surgery's PC (Exam Cell)




SCP PC (Library) to HOD’s PC (Exam Cell)




Geography's PC (Library) getting the uploaded file from Security's PC




Chairman's PC (Exam Cell) getting the uploaded file from SCP's PC

# 7. CONCLUSION AND FUTURE ENHANCEMENT

## Conclusion

Our project consists of a Local Area Network (LAN) that uses the wired topology, using Cisco Packet Tracer. Every component, from the PC to router to switch to server, plays an important role in establishing proper connection. It is also noteworthy that the LAN can be further developed, and additional functionalities can be added to increase support and coverage. The procedures provide a veritable approach for the design of LANs for end-to-end IP network connectivity for next generation network (NGN) architecture implementations.

## Future Enhancement

To improve the campus network service, we can adapt advanced college network design (ACND) by integrating the IOT device with the classically available network device. Each smart device which has been registered to the IOT server or home gateway and is being controlled by the legitimate user. The hierarchical design is used to group devices into multiple layers, and hence we have been effectively used the hierarchical design. Here python programming language is used for coding. And finally, to design the proposed system, the Cisco simulator software is been used.

# 8. REFERENCES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2) https:// www.slideshare.net/abhishekkumar5947/design-and-simulation-of-local-area-network-using-cisco-packet-tracer
3) https:// study-ccna.com/routing-protocols/
4) https:// www.geeksforgeeks.org/routing-information-protocol-rip/
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6) https:// www.cisco.com/c/en_in/products/switches/what-is-a-lan-local-area-network.html