REPORT

18CSS202J – COMPUTER COMMUNICATIONS

Submitted by

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In partial satisfaction of the requirements for the degree of

BACHELOR OF TECHNOLOGY

in
COMPUTER SCIENCE ENGINEERING

with specialization in CLOUD COMPUTING

SCHOOL OF COMPUTING

COLLEGE OF ENGINEERING AND TECHNOLOGYSRM INSTITUTE OF SCIENCE AND TECHNOLOGYKATTANKULATHUR - 603203

JUNE 2022

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SIGNATURE OF INTERNAL EXAMINER

SIGNATURE OF EXTERNAL EXAMINER

INTERNET CAFÉ

Abstract:

This assignment is based on the network implementation of internet cafe which is based near the campus of SRM University. We have to design and implement a network and describe the Local Area Network and Wide Area Network management. We have to describe the cost effectiveness solutions with software and hardware we use in this network with justifications. Different layers will also be discussed at different stages in this assignment. Different IP schemes and other network suggestions will be discussed. This assignment also includes conclusion and references of the research used to build this assignment. Research method plays an important role in this assignment.

Introduction to ARPANET:

Advance Research Projects Agency Network (ARPANET) is the world's first Network which gives Packet Switching and allows access over network widely. Packet switching helps in establishing a communication link. It was started in the mid-1968. It started through LAN.

Phenomenon of Internet cafe:

We have to work on internet cafe project which is close to University of East London. This cafe is existing on three floors, and we have to connect or share 75 computers in cost effective solutions. These all computers should be registered with the single IP address. OSI layers have to been defined at different stages on the network. TCP/IP systems relate to local area network and the internet. This network has to been defined using network layout diagram.

Objective:

The main objective of this project is to come up with a simulation of an internet café network design which can be controlled by the admin pc of the internet café. Use of Cisco Packet Tracer features simulated network topology and also can easily show the flow of the internet data packets.

Cisco Packet Tracer:

Cisco Packet Tracer is a free application that enables you to practice network configuration and troubleshooting on your desktop or laptop computer. It enables you to mimic networks without having physical access to the underlying hardware. Along with networking, you may improve your Internet of Things (IoT) and cybersecurity skills through education and practice. You have the option of creating a network from scratch, using a pre-built sample network, or completing lab projects. While Packet Tracer is not a substitute for practicing on physical routers, switches, firewalls, and servers, it does offer a number of advantages.

Benefits-

Imagine being able to peer inside a small business network or the internet. Have you ever wished to create an Internet of Things system that would notify you through the phone if there was an issue in your home environment? Welcome to Cisco Packet Tracer, the simulation environment that may assist you in doing all of these tasks and more. It is intended to familiarize you with the Cisco Packet Tracer network simulation and visualization tool. In Packet Tracer, you will design your own network (PT). Additionally, you will learn about the many sorts of PT files.

INTRODUCTION:

With the increase in the demand of the internet these days, many people do not have access to the internet. So that they can use the internet service, internet cafés are running. In this project, we will try to make a design of internet café and also run a simulation of that topology to see the transfer of the data packets or the information from the cloud server to the local server and then to the local systems and also see the connection between two system and between systems and the printer.

Network Cost and Specification:

This project of internet cafe would require 15 computers, 2 router, LAN cables and 1 printer.

A normal computer specification should be:

1 GB RAM

At least 2.1 GHZ processor (Intel or Atom)

150 GB hard disk

17″ Display

Standard USB keyboard

Standard USB mouse

CD/DVD ROM

This is normal system specifications which could be used in internet cafe and can be easily used by the customer. Normally when computers are purchased in bulk for a computer lab or internet cafe system, loyalty discount is normally given by that provider. This specification would estimate cost around minimum of Rs. 35000 as according to Curry's or PC world. Dell computers are normally recommended and purchasing from DELL can be more cost effective.

Modules:

- Routers
- Printer
- PC
- Server
- LAN Cables

Router

We also have to use a router. As this is internet cafe connection, so there should be powerful router connection which could enable more surfers to use internet more easily. There is a router which has recently been launched (EDIMAX BR-6574n Wireless Gigabit Router) this is really power and is available at Curry's store for Rs.6000. Apart from that, there are other NETGEAR routers as well which range starts from Rs.2500.

LAN cable

We would need LAN cables to make connections overall on the network to connect computers with switches and router. RJ-45 connector cable is used for this purpose. A 50-meter Ethernet LAN cable costs about Rs.400. The more length would be needed, more prices would be increased.

Printers

We can also add Printers to the network. It is essential in network computers to have a printer but it is not recommended or compulsory. Normally Printer ranges from Rs.3000 that is all in one, which is better for home and office purposes as it includes Printer, Scanner and Copier.

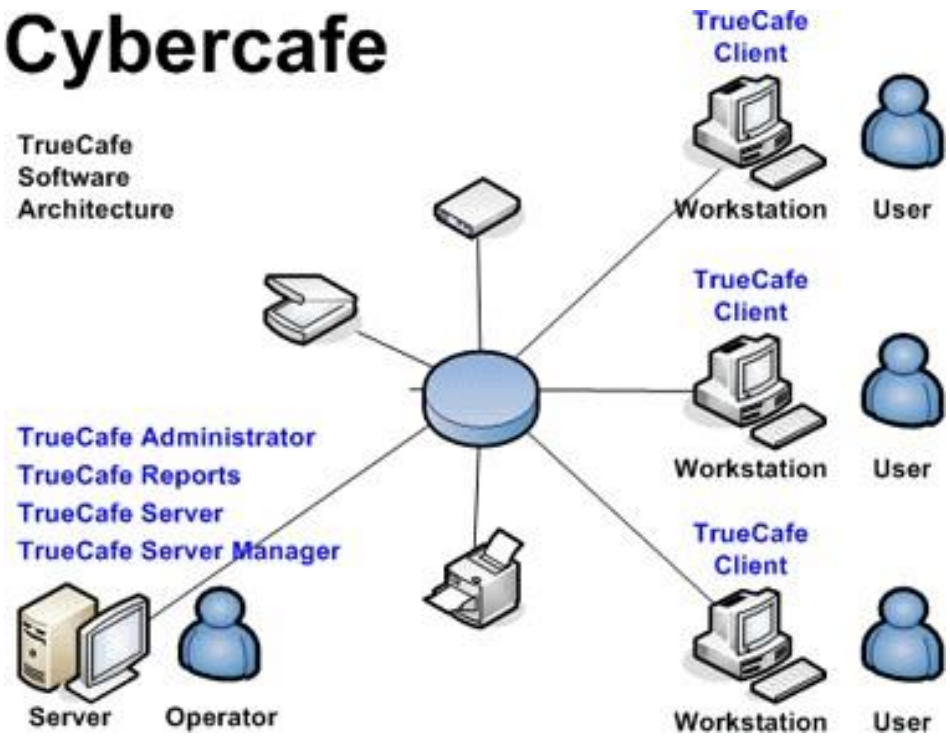
Server

A server is a computer program or device that provides a service to another computer program and its user, also known as the client. In a data centre, the physical computer that a server program runs on is also frequently referred to as a server. That machine might be a dedicated server or it might be used for other purposes. Normally server i.e., local database costs around Rs.10000.

PC

PC stands for personal computer. PCs are multipurpose computers suited for individual end users, as opposed to high-performance computers that are typically reserved for IT specialists for carrying out tasks such as managing servers. PCs typically run on commercial operating systems (OS), commercial software applications, and freeway and open source software. Generally, a PC setup costs around Rs.12000.

General diagram for a internet café:



Implementation of Network:

We have to work on internet cafe. Cafe has 3 floors and we have arranged 15 computers over three floors. We have to place 3 computers for server purpose. We can divide 5 computers on three floors and also 3 computers as server on third floor. To make a network local, we connect computers first using switch. On first floor, we will place 5 computers, and we have connected these 5 computers using Fibre cable for LAN (Local Area Network). Also, we need 1 printer to share on three floors and we connect 1 printer on 1st floor. We connect all 5 computers and 1 printer with router. This process has to be repeated on three floors, and then we have to connect them with router. Server computers will be connected with router directly but through switch. When server is directly connected with router, it enables firewall implementation and sharing among the network with secure authentication.

LAN is used to connect computers within local area and make a network between them. We use this network in this case to connect computers within the same building. After connecting them through LAN cable, we connect them to Switch.

HUB is also called concentrator or multi station access unit (MAU). A normal hub contains 8 to 24 ports for the computers and other devices. It works as a multiple port repeater. It receives a digital signal and re amplifies or regenerates that signal. It then forwards the digital signal to all ports on the hub without looking at any data.

Switch is also used for the same purpose as hub but it is more intelligent device. It operates at data link layer of OSI model. The biggest benefit of using switches instead of hubs is that each switch port has its own collision domain. Switch plays really an important role in network.

Once they are connected with hub or switch, they will be connected with ROUTER.

ROUTER

ROUTER is a device which connects multiple networks using similar or different protocols. It manages the route between any two communication networks.

IP address will remain the same because there is just one router and it will supply access to all four switches. Each Switch which is having 25 computers and 1 printer on three floors and third one is also having server computers on it will connect with switch which will lead to router. Each computer will have different IP but their ISP will be one only as this will be provided by service provider. After three sets of 75 computers and three printers connected with Switch which is connected to router, after this process we connect one more switch with router which has 3 server computers on it. One server would be file server or printer server, and one would be DHCP/Authentication/Certification server and DNS server. This server system would help in file or printer sharing along the network to protect the computers with firewall option and also to provide certification to computers for different task over the network.

OSI

OSI stands for Open System Interconnection. It is a set of protocols that allows any two different systems to communicate regardless of their underlying architectures.

This physical connection of router with switch and computers comes in Physical Layer of OSI model.

Physical layer relates the electrical, optical, mechanical and functional interface to the cable as it defines how the cable is attached to the network adaptor card.

Connection of computers with Switch includes Data Link Layer of OSI model. It sends data frames from network later to physical layer.

Router is supplying single IP address, and each computer has different IP address. This concept involves Network Layer of OSI model which is responsible for putting data segments into packets.

Transport layer works after Network Layer which is responsible segmenting data. It ensures that packets are delivered free of errors with no loss.

For implementation of Network especially of Internet cafe, some software's have also been recommended. Cyber cafe management and installation of networking protocols like IPX, SPX and TCP/IP.

This thing comes in Session Layer. The main purpose of session layer is to establish a connection through application running on two different computers.

Presentation layer and Application layer are after session layer. Presentation layer is used to determine the format of exchanging the data among network. Application layer handles network access, control the flow and recover errors.

Addressing Scheme:

Addressing scheme plays an important role in network. TCP/IP, IPv4, IPv6 are essentials of Network scheme. They are normally set to default but they can be changed according to the requirements.

Each network system must be identified as unique. This is done through MAC address of device. Each machine always has different IP address on the network.

TCP/IP is known as transmission control protocol/Internet protocol. It is a technology that is used to manage the transmission of data by breaking it into packets. These packets travel through router. TCP/IP addressing scheme is used in implementation of this network. This network scheme is normally used for sharing of computers over the network and gives them internet access.

IPv4 (Internet Protocol version 4) addressing scheme is really important in a network. The most important aspect of IPv4 is its size. It is most widely organized internet layer protocol. It is a connectionless protocol used for packet switching link layer. IPv4 can establish more than 256 connections. Its range starts from 0 – 255. This connection is really helpful in internet cafe setup. Normally IPv4 is set to default which detects IP automatically, but we can define IPv4 manually as well which can be allocated. Manual configuration can change IP of the system for some purposes as well.

Sub-netting plays an important role in networking. It is a subdivision of an IP network or when the network is divided into several small networks. It results in logical division of an IP address. Subnetting an IP can be done for the various reasons which generally include different physical media, address space, security, control network traffic etc.

Subnetting makes it easier to manage the smaller network as well. Subnet masks are also used with IP. Computer performs a bitwise logical AND operation between the address and subnet mask in order to find the Network Address or number. The general syntax for Subnetting is 255.255.255.0

There are generally three classes used for Subnet masks

Class A: 255.0.0.0

Class B: 255.255.0.0

Class C: 255.255.255.0

Calculations of Network Subnetting:

We have to implement a network with single registered IP which is given by our service provider. 195.5.20.0

This is known an IP address. The default subnet mask for this one would be 255.255.255.0

We have to implement 4 networks and they should be provided with different IP addresses. We use the following steps to find out the network and host computers over the network and range as well

195.5.20.0

255.255.255.0

We use 8 bits for binary written form.

255.255.255.0 = 11111111.11111111.11111111.00000000

This is default Subnet of network

We have to implement four networks in a network, so we will do with 4 in binary

2 4

2 2 – 0

1 – 0

4 Decimal = 100 binary

We will take 3 bits as a result of binary conversion from bit scale.

The bit scale helps in implementing a network more easily

128 64 32 16 8 4 2 1

We will take 3 bits for new subnet mask and new Subnet mask will be

11111111.11111111.11111111.11100000

This will be equal to 255.255.255.224

Our new IP range will be

195.5.20.0 – 195.5.20.31

195.5.20.32 – 195.5.20.63

195.5.20.64 – 195.5.20.95

195.5.20.96 – 195.5.20.127

This is our range of new 4 Networks made by Single registered IP.

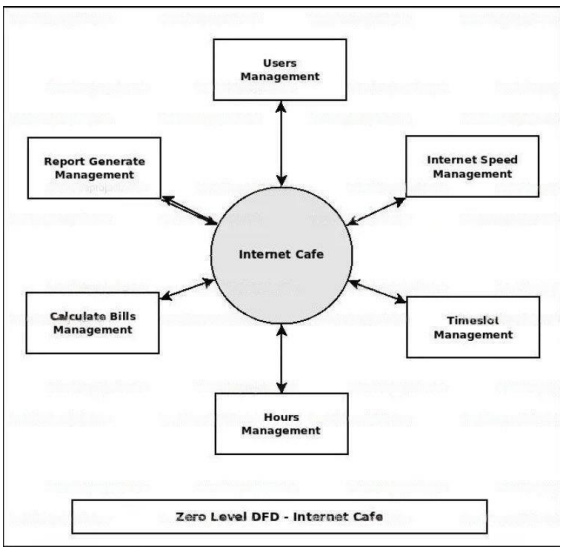
Data Flow Diagram for Internet Café:

-Zero Level Data Flow Diagram (0 Level DFD) Of Internet Cafe

This is the Zero Level DFD of Internet Cafe, where we have elaborated the high level process of Internet. It's a basic overview of the whole Internet Cafe or process being analysed or modelled. It's designed to be an at-a-glance view of Calculate Bills, Report Generate and Login showing the system as a single high-level process, with its relationship to external entities of Users, Internet Speed and Time slot. It should be easily understood by a wide audience, including Users, Time slot and Calculate Bills In zero live DFD of Internet Cafe, we have described the high-level flow of the Internet system.

High Level Entities and process flow of Internet Cafe:

- Managing all the Users
- Managing all the Internet Speed
- Managing all the Time slot
- Managing all the Hours
- Managing all the Calculate Bills
- Managing all the Report Generate
- Managing all the Login

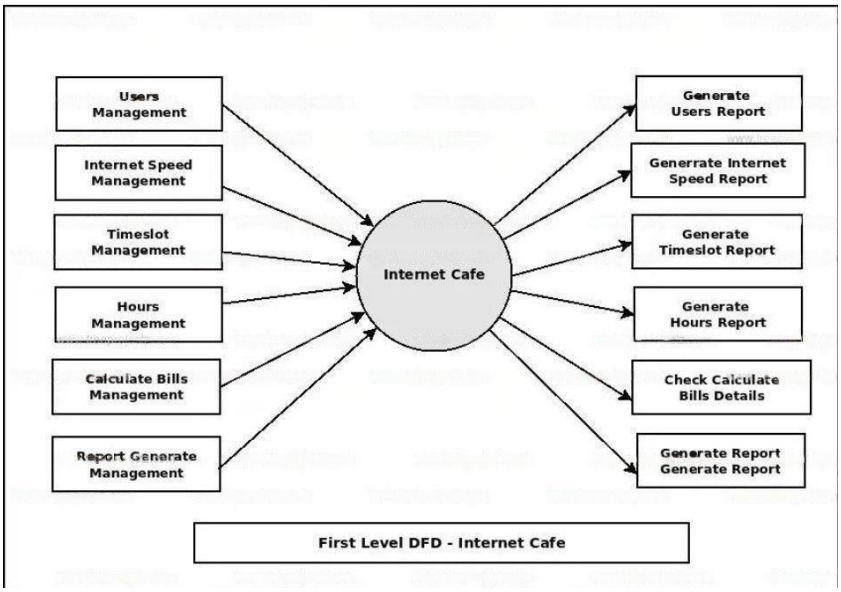


-First Level Data Flow Diagram (1st Level DFD) Of Internet Café

First Level DFD (1st Level) of Internet Cafe shows how the system is divided into sub-systems (processes), each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the Internet Cafe system as a whole. It also identifies internal data stores of Login, Report Generate, Calculate Bills, Hours, Time slot that must be present in order for the Internet system to do its job, and shows the flow of data between the various parts of Users, Time slot, Report Generate, Login, Calculate Bills of the system. DFD Level 1 provides a more detailed breakout of pieces of the 1st level DFD. You will highlight the main functionalities of Internet.

Main entities and output of First Level DFD (1st Level DFD):

- Processing Users records and generate report of all Users
- Processing Internet Speed records and generate report of all Internet Speed
- Processing Time slot records and generate report of all Time slot
- Processing Hours records and generate report of all Hours
- Processing Calculate Bills records and generate report of all Calculate Bills
- Processing Report Generate records and generate report of all Report Generate
- Processing Login records and generate report of all Login

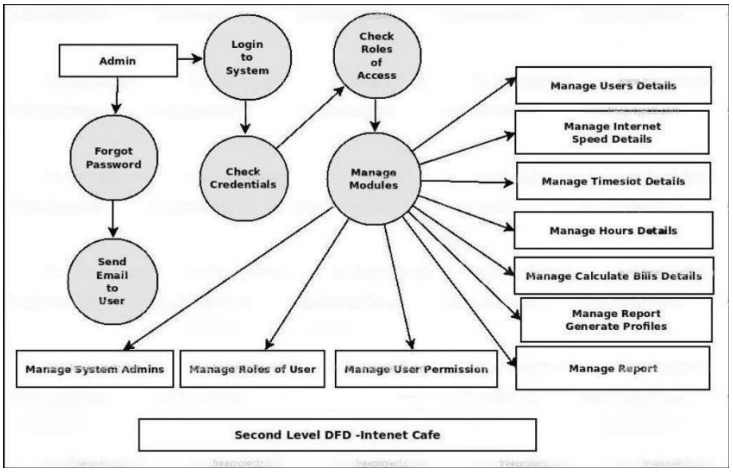


-Second Level Data Flow Diagram (2nd Level DFD) Of Internet Cafe :

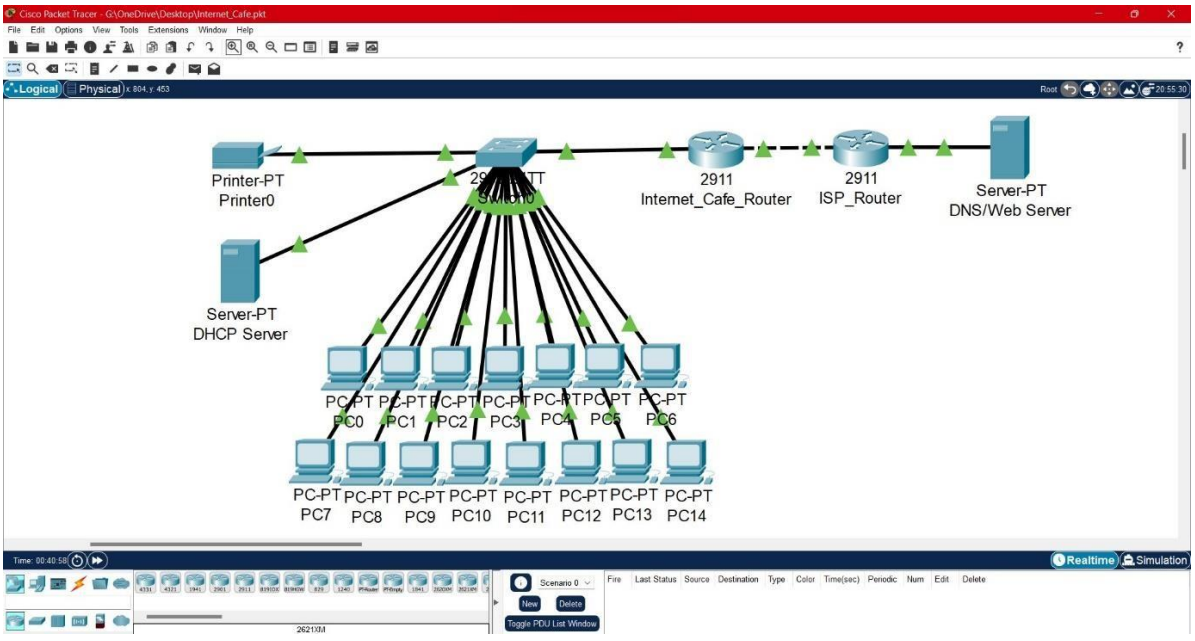
DFD Level 2 then goes one step deeper into parts of Level 1 of Internet. It may require more functionalities of Internet to reach the necessary level of detail about the Internet functioning. First Level DFD (1st Level) of Internet Cafe shows how the system is divided into sub-systems (processes). The 2nd Level DFD contains more details of Login, Report Generate, Calculate Bills, Hours, Time slot, Internet Speed, Users.

Low level functionalities of Internet Cafe

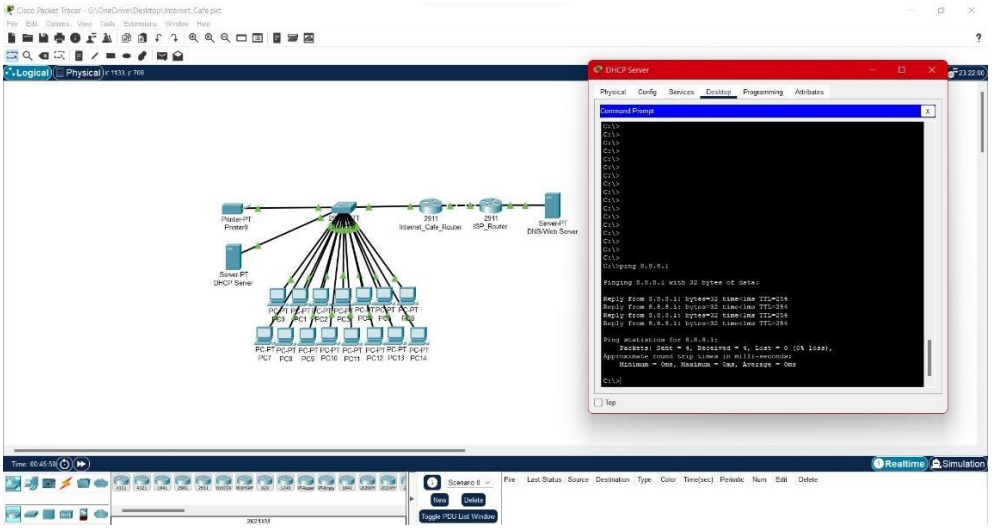
- Admin logins to the system and manage all the functionalities of Internet Cafe
- Admin can add, edit, delete and view the records of Users, Time slot, Calculate Bills, Login
- Admin can manage all the details of Internet Speed, Hours, Report Generate
- Admin can also generate reports of Users, Internet Speed, Time slot, Hours, Calculate Bills, Report Generate
- Admin can search the details of Internet Speed, Calculate Bills, Report Generate
- Admin can apply different level of filters on report of Users, Hours, Calculate Bills
- Admin can tracks the detailed information of Internet Speed, Time slot, Hours, , Calculate Bills



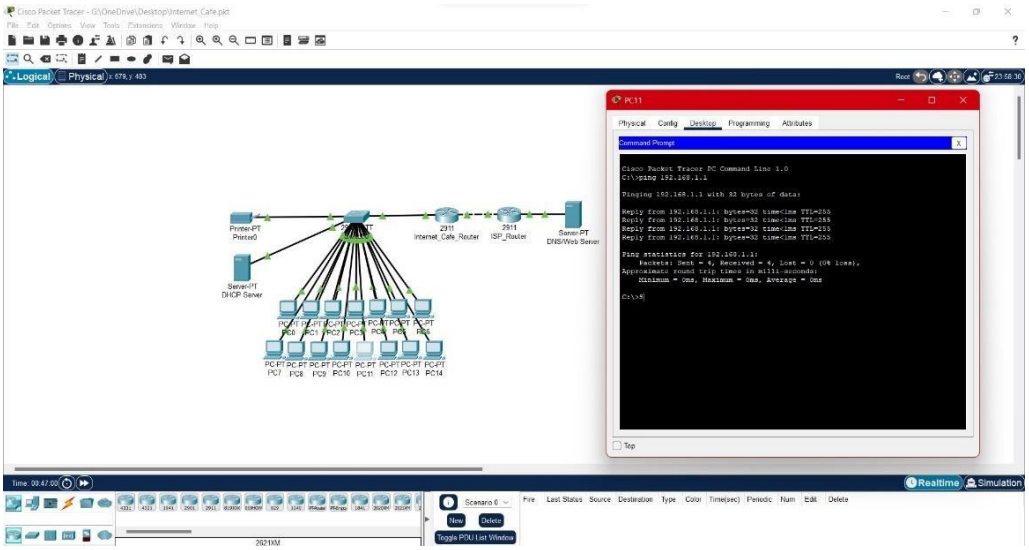
Simulation for Internet Café:



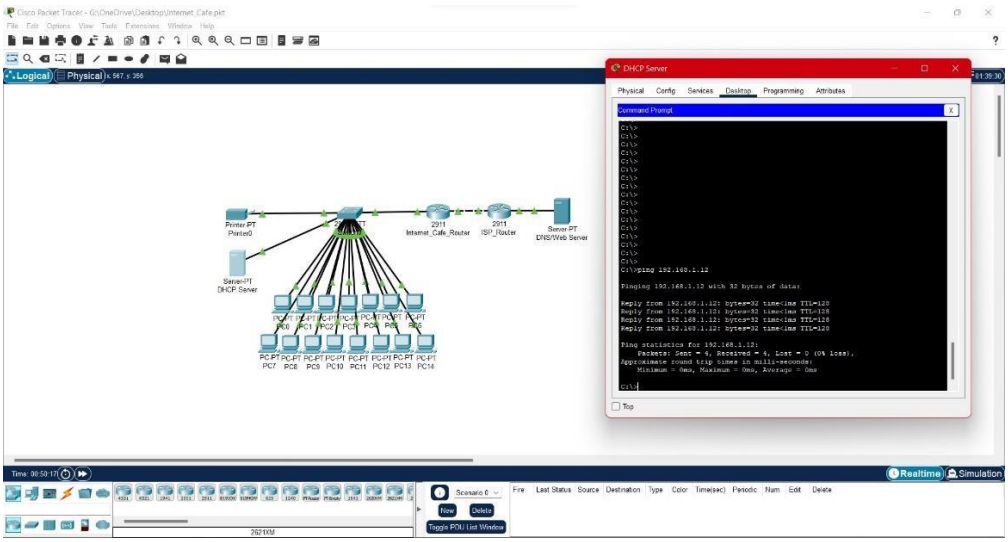
Data packets transfer from Web Server to Local Server-



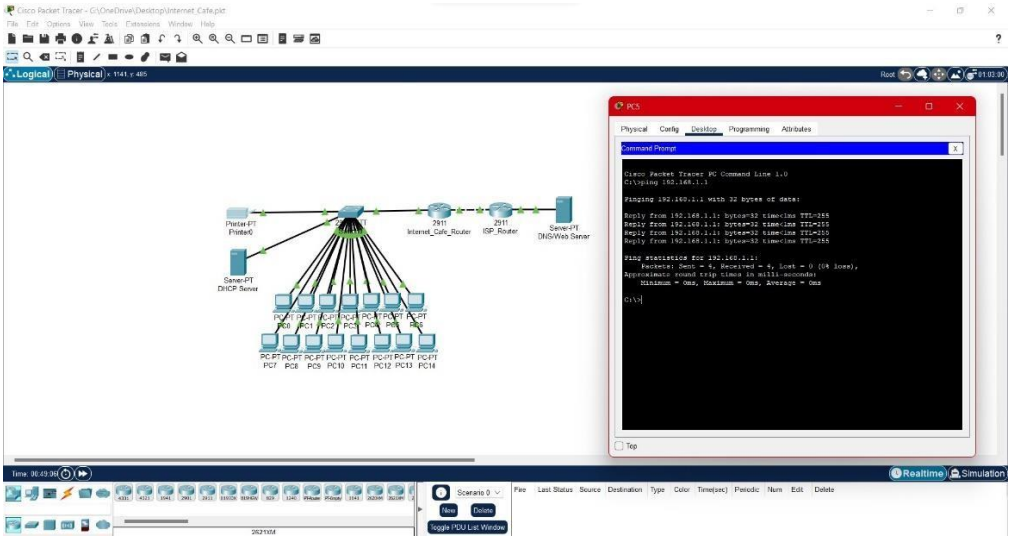
Data packets transfer from Local Server to PC-



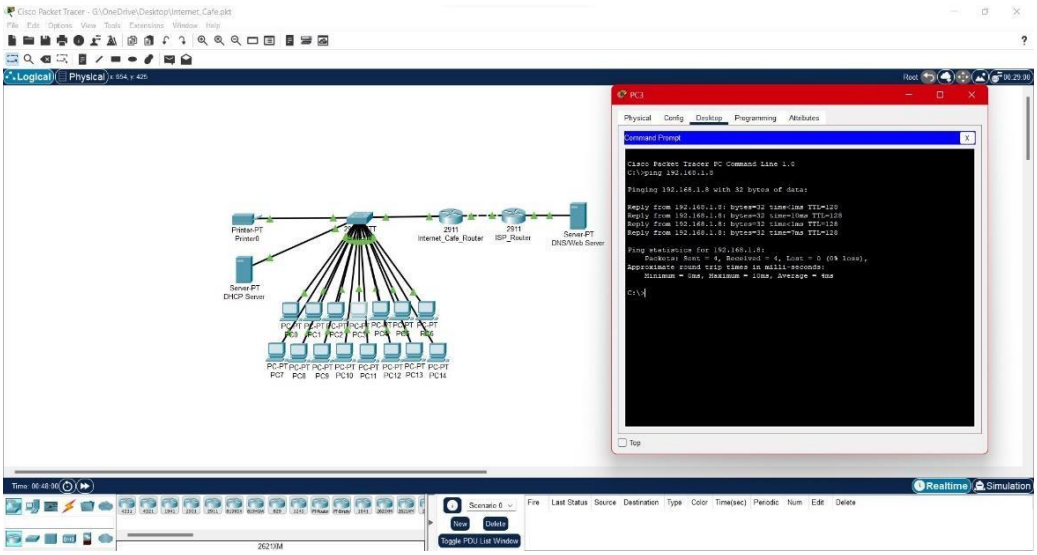
Data packets transfer from PC to Local Server-



Data packets transfer from PC to Printer-



Data packets transfer from Between One PC to another PC-



Inference:

This has been concluded from this project that it is reliable and secure network. It can easily give access to all the computers equally. There is less risk of virus spreading over the network as secure switches have been used which gives the high profile for Firewall and other activities. This project uses the latest technology routers and switches which enables the network to communicate more effectively. Also, this project is cost effective, and it allows less cost to be spent over the network. Computers have been used with moderate specifications which are compatible to run over network properly.

Reference:

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