

INTERNSHIP ON COMPUTER NETWORKING SYSTEM

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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DHAKA, BANGLADESH

JULY 2024

APPROVAL

This Project/Internship titled “Internship on Computer Network System”, submitted by Md. Mahadi Hasan and, ID 213-15-4505 to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on **16/07/2024**.

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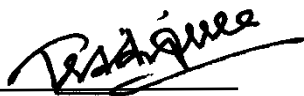
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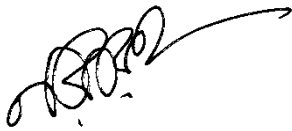
I hereby announce that, I am Mahadi Hasan, ID: 213-15-4505, student of DIU- Daffodil International University. Under the **supervisor** of **Mr. Saiful Islam Assistant Professor Department of CSE Daffodil International University**. In full respect of the fact that this internship was about Networking, I say that it was productive. I also declare that to the best of my knowledge neither this internship report nor any part of it has been entered for any degree or Bachelor of Science and Engineering.

Supervised by:



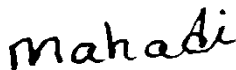
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ACKNOWLEDGEMENT

Firsts I would like to pay my heartfelt thanks and appreciation to Almighty Allah for endowing us the honor to come out successfully in the final internship. And a big thank you to my parents, for providing me with support and much assistance. I would like to thanks to my dear **supervisor Mr. Saiful Islam, Assistant professor, Department of CSE**. He was always coaching me on how to successfully complete the internship periods. I believe that without the help of supervisors its impossible me for doing my internship constructive criticism, valuable advice, reading many inferior drafts and correcting them at all stage have made it possible to complete this project. I thank them for assisting me to do my internship.

I would like to convey my deepest, sincere gratitude to **Dr. Sheak Rashed Haider Noori Professor, Department of CSE and Head Department of CSE**, for his kind help to finish our project and besides, to the other employee as well as the staff of CSE department of Daffodil International University.

I would like to thank my entire course mate of Daffodil International University, who participated in this discussion and finished their course work.

Last but not the least I would like to pay my humble respect and gratitude for bearing my companies with their unprejudiced support and immense patience.

ABSTRACT

As a student of CSE, I possess ended my internship at Atova Technology. The outline is a necessary of the internship program for my Bachelor of Science course degree. A company has a lot of implement associated by similarity joins. Utilize of the internet is measureless in a part of us life. At the moment, all of us can do each thing in our daily working life from anywhere through uses of the internet.to have check and balance from time to time through them invented tools and devices for us to undergo through to enhance our living standards. Indeed, there are many populations that fully rely with computer network. Networks can help not just in present but also approximating the future. This is phase represents the operating (ISP). The main and major purpose of the report is to take more knowledge about Computer Networking and the ISP Network Devices such as Server, Computer, Cables, Router etc. That's why I take this internship as "Network Engineer". Atova Technology helped me a lot in my future or upcoming careers added huge experiences in it. This paper aims at describing why some of the routing, switching, addressing, protocols are used and how they can be configured. It includes the type of networks, routing and switching basics, TCP/IP and OSI models, IP address, WAN technology, network security implementations, extension addition with VLAN, IP route ascertainment, approach to hold-up with approach list, and sharp end arrangement between others.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

An internship remains the best method that a student can acquire his own experience or skill. Here we can learn hands-on with professional education, which makes us proactive in the future. So, I learned computer networking. We still communicate with each other on this worldwide network. The greatest networking era has passed. Computer networks are very essential in the modern world that is significantly dominated by digital technology. Practically every business organization, as well as banks, employ the use of CISCO. For connecting to the Internet and for managing it the CCNA Routing and Switching is employed. Computer networking is a fairly young, rather highly developed sphere, which can give students an opportunity to have a job.

1.2 Motivation

I have wanted to know and learn about networking for a long time now. Therefore, I took admission in CSE group in Daffodil International University. Networking of programs in a company enables one to acquire hands on experience in real working environment. Besides, fair use of the networking is going up step by step along with the world. The most significant function is communication with one another and from one country to the other this is through networking. It offers a foundation in which to study CCNA to enhance our future and fortify and enlarge IT organizations. Guards cyberspace of government and country. Through this internship, I participated in the job market; therefore, I selected the internship as my future career.

1.3 Internship Objective

An internship allows me the encounter and expose myself to a lot of things such as networking. Gaining knowledge about networking to make my future career successful. Internships give me the opportunity to gain practical experience in offices, meetings and events. Every day in the internship I had objectives, ie

- Familiarity with various devices like routers, switches, cables etc.
- Knowing how routers, switches work and testing skills.
- Fulfill and practice internship requirements for CSE program.

- To gain knowledge about CCNA MikroTic and Cisco Switch

1.4 Introduction of the Company

Completed my entire training at Atova Technology Ltd. This company is ranked at the top in the ICT sector in Bangladesh. They mainly deal with hardware, software and networking devices. Atova Technology Ltd in the Networking Division is an authorized distributor of several companies including Cisco, Micro-Tick, Gigabyte, Bandwidth. Internships provide students with hands-on experience. This is a high level of customer service and regulatory bodies. Day by day is progressing with time. But their journey was not easy at all. This company brings change quickly where they need change and internship students are freed from the curse of unemployment by keeping them busy.

1.5 Report Layout

I possess split this training detail five sections. Each chapter of the report has been discussed in details. Followings a given of the chapter summary.

Chapter 1: The topics I possess discussed in fore period are Introduction, Motivation, Internship Objectives, and Internship Report Layout.

Chapter 2: In this division I find explained regarding organization and agency. We have discussed how the organization services the customers.

Chapter 3: In this phase I find detailed relating to the day by day work and activities, events of the internship. Tried learning about networking, switches, routers, OSI Model, TCP/IP etc.

Chapter 4: In this chapter I discuss my own experiences, smart planning, and how to apply them in the future.

Chapter 5: Discussion about how the internship will affective my future life.

CHAPTER 2

ORGANIZATION

2.1 Introduction

Atova Technology limited is an agency organization that offers Atova Technology internship or training programs to its clients or students in information technology fields such as network sector, cyber sector, digital marketing and software. I joined Atova Technology as a Support Engineering Intern. One thing I notice is that Atova Technology internships prepare students for successful careers and future jobs. This company includes both theoretical and practical knowledge of the students. This institute provides hands-on learning with used equipment and technology. This company provides high-speed internet services to customers. This institution respects the interests of the students and gives them opportunities to develop their skills to the fullest. It gives students an idea of how to deal with the real-world.

2.2 Product and Market Situation

Atova Technology Limited is a company that provides communication technology and various marketing and other services to customers. Atova Technology is a major networking system distributor in Bangladesh. Below are the services offered by Atova Technology Limited to its customers:

- Very powerful domain registration
- Provides SSL certificate above CCNA. Which plays an important role in the job market.
- Troubleshoots various server issues.
- Provides networking services to many organizations.
- IP Telephony Service

2.3 Target Group

The objective of Atova technology limited is to provide the highest service to the customers and to accept the challenge in the job market of the internship students within the company as well as to build up communication with the government offices. Analyzing current data-technology and taking action accordingly. To ensure the place of trust in the company to the customers and employee. To prove efficient and

competitive in all sectors such as hardware, software, and networking devices. Share employees or internship students by viewing on-the-job activities within the company. To make those who are unskilled employees or internship students skilled with proper guidance. Running some advertisement system updated on social media to promote the company. Company's work to ensure that clients can easily access the website.

2.4 SWOT Analysis

SWOT exploration term very dominant for a company. SWOT analysis identifies strengths and weaknesses within a company. Also find out the pros and cons. Using SWOT for practical testing activates company management and ensures caution signals. Inquire about how the company should operate efficiently. We do a minimum SWOT analysis of Atova Technology limited.

The following figure 1 shows basic SWOT Analysis of Atova Technology.

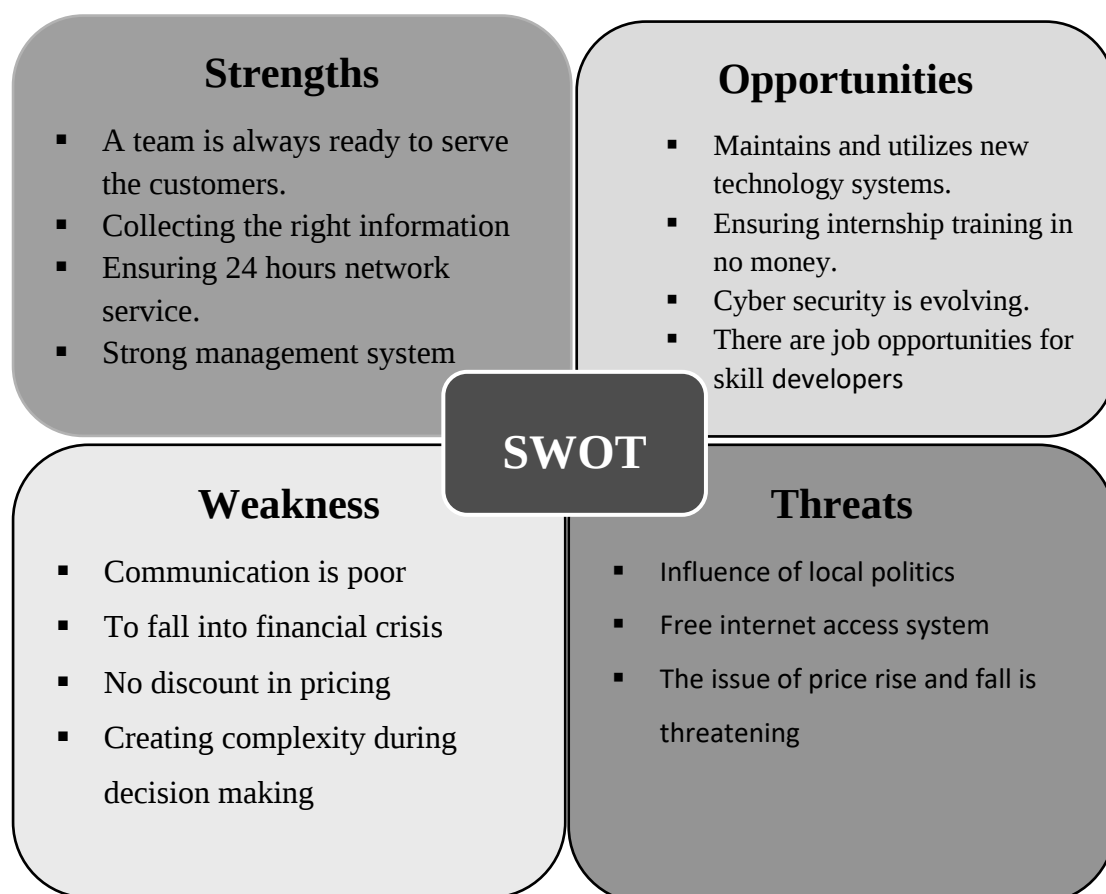


Figure 2.1.1: SWOT Analysis of Atova Technology Limited

2.5 Organization Structure



Figure 2.1.2: Structure of Organization

CHAPTER 3

TASKS, PROJECTS AND ACTIVITIES

3.1 Daily Task and Activities

The internship company gave me various tasks and responsibilities for three months. I divided these tasks into monthly tasks and learned. Below is show in how I observed the three-month obligation.

1st Month: Following are the tasks I performed and achieved through me first duration of training at Atova Technology Limited:

- Network
- OSI & TCP/IP Model
- IP Addressing & Sub-netting
- RPI

2nd Month: In after the first month of my education at Atova Technology, the following are the tasks that I have performed and achieved in a wide range on networking:

- DNS & DHCP
- RIP
- EIGRP
- VLAN

3rd Month: In after the second month of my education at Atova Technology, the following are the tasks that I have performed and achieved in a wide range on networking:

- STP
- OSPF)
- NOC support system
- Challenges

3.2 Events and Activities

Daily Internship at Atova Technology faces a variety of challenges. I have into realize absent these problems and try to solve the problems by discussing with more internship members. The subject or place where the problem occurred is divided separately, so

that the problems can be found quickly. These experiences have helped me to prepare my future career and prove myself in the job market. Now let's see what happened and activities in my internship company:

- Monitor network and computer systems.
- Create login system and register opportunity for customers
- Ensuring access to Internet users.
- Solving router, switch and server problems.
- Familiarity with different devices.
- Understanding IP.
- Subnetting, Broadcast, Bandwidth to get full idea knowledge them.
- Maintaining the security of the device

3.3 Project Task and Activities

In this internship I include one or a project of networking work and discuss the concept of work in detail and bundle the projects to create complex items. These tasks were similar to associate degree exercises. Project topics in work packages, which are very user friendly and easy to understand. I had to do various types of work and completed the tasks very efficiently.

Below are the figures on my daily work.

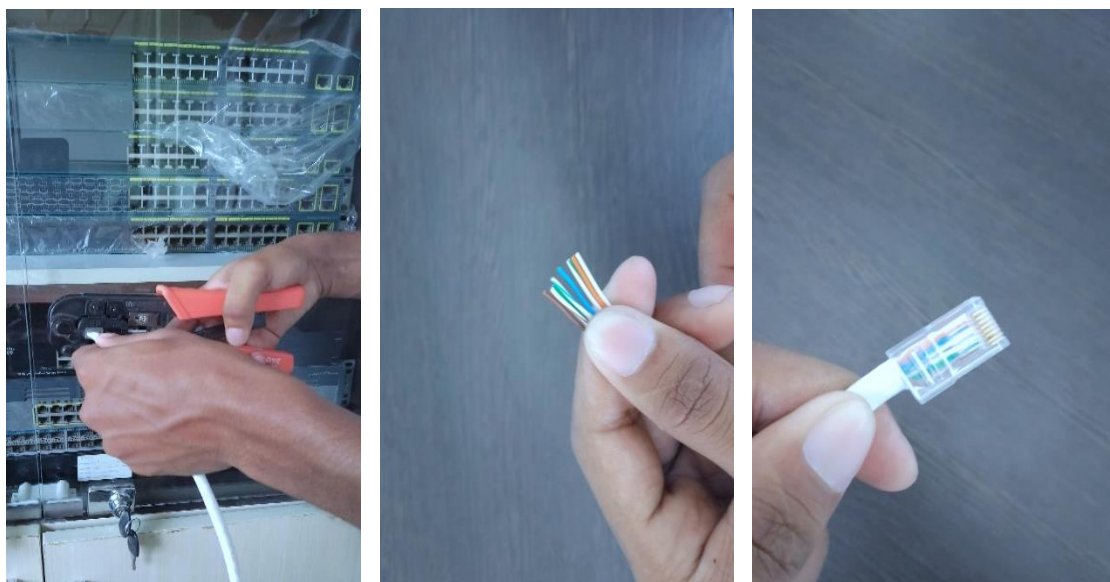


Figure 3.3.1: Insert RJ-45 Connector Twisted Pair Cable

3.3.1 Network

Networking is the communication and exchange of information between one or more computers. With the help of networking we can easily communicate with each other. Networking has made our lives easier. Networking uses specific protocols and devices to complete tasks. Networking use is essential in every corner of the world and in different companies, universities, homes.

Type of Networking

There are three types of networks

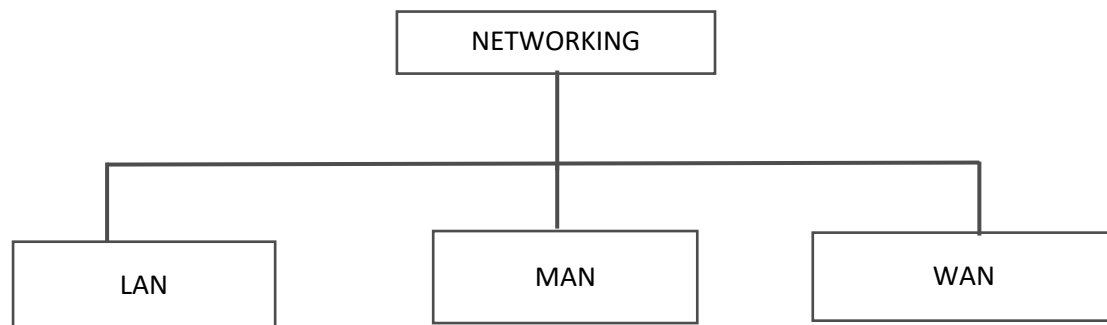


Figure 3.3.1.1: Network Category

Local Area Network: A small local area covered by networking. LAN establishes communication between two or more personal computers. It has only one hub, so the cost is much less. It ensures safety.

Metropolitan Area Network: A geographical area or city is connected to a larger network. LAN is used as interconnection. MAN networking is connected over government institutions and private industries of.

Wide Area Network: This network covers a country. Wide Area Network is larger than Metropolitan Networking. Phone and cable companies are designated as Wide Area Networks. In the university we use Wide Area Network. This applies to large companies such as satellite companies Provides Wide Area Network services.

Network Devices

Some devices are used to perform networking functions. Network cannot function without these devices. Devices are hardware. Each device works differently. When There is network problem, the device fault is traced. Today we will get to know device

Router

A router plays a functional role in networking. It sends data packets to different network devices. Many customers use phones and computers through one router. It checks specific route points and delivers data to specific IP addresses.



Figure 3.3.1.2: Cisco Router

Switch

A network switch allows two or more IT devices to communicate with each other. A switch has many ports connected, and through each of these ports another device is connected, thus the network communicates. It connects to the router and uses data packets to send data to specific destinations through receive processing and physical address processing. Reduces company networking implementation costs for switches.



Figure 3.3.1.3: Cisco Switch

Cables

A networking cable is a piece of hardware that connects one networking device to another. Different ones are just used for different purposes. The cables used to perform networking are described below

Optical Fiber Cable

Optical fiber cable consists of a glass core surrounded by a protective layer. It consists of two types of materials. Used for short range communication. It is expensive but has high quality bandwidth and can send data to many remote locations



Figure 3.3.1.4: Bijli 4 Optical Fiber Cable

Twisted Pair Cabling

Twisted pair cabling continues to be used for a wide variety of data and audio transmissions. In fact, the former is classified into two categories, namely: shielded and unshielded. Unshielded is mostly used in ethernet installations and the shielded twisted pair is applied in instances where there is a high probability of electromagnetic interference.

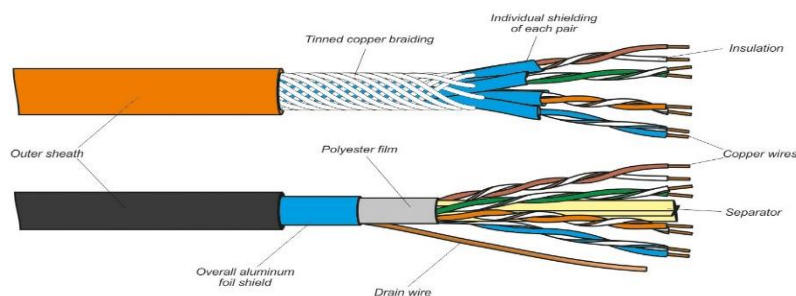


Figure 3.3.1.5: Twisted Pair Cabling

Network Topology: In a computer network, there are different ways in which they are connected to each other, and these ways are called network topology. We see different types of network topologies, eg. Star Topology, Bus Topology, Ring Topology, Mesh Topology, Hybrid Topology

Star Topology: A network topology is where each different part of the network is connected to a central node, called a hub

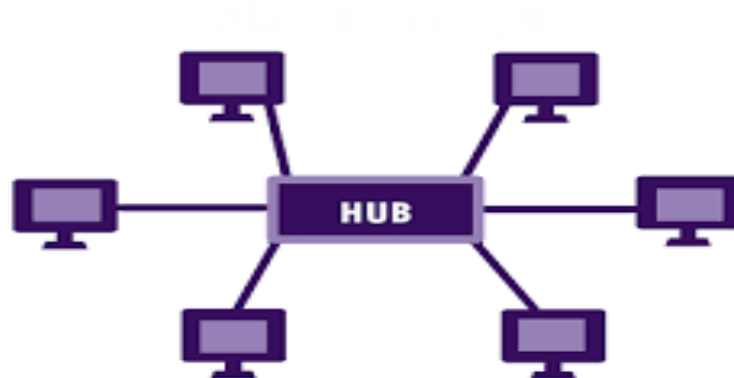


Figure 3.3.1.6: Star Topology

Bus Topology: Bus topology refers to a setup where network devices are connected with a single cable.

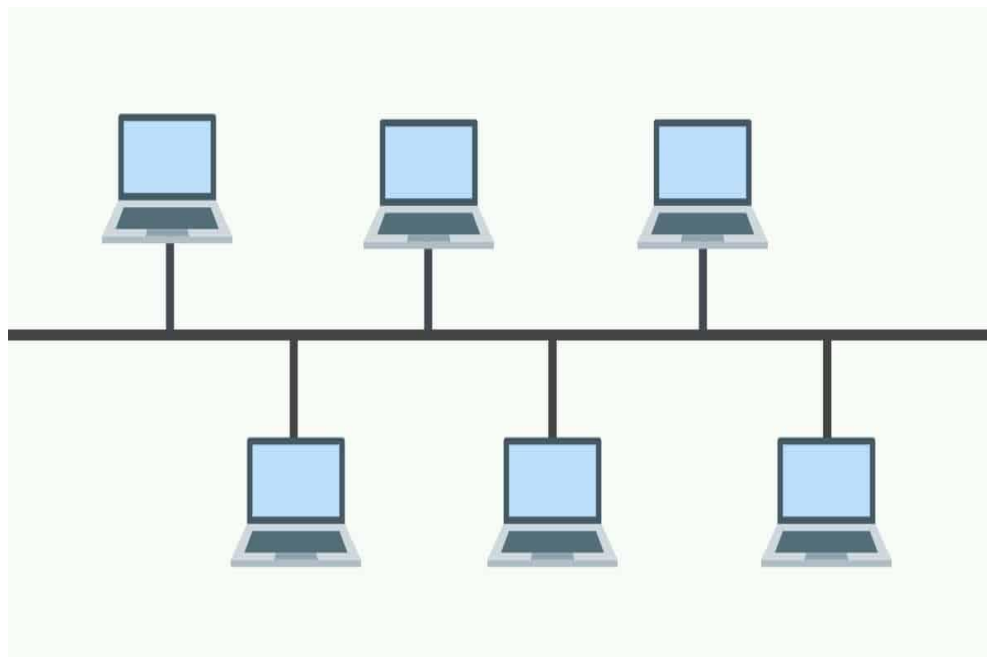


Figure 3.3.1.7: Bus Topology

Ring Topology: Ring topology refers to a network architecture where network devices are connected in a ring structure. It handles better than bus topology. Can take loads more efficiently. Two types of ring topology occur

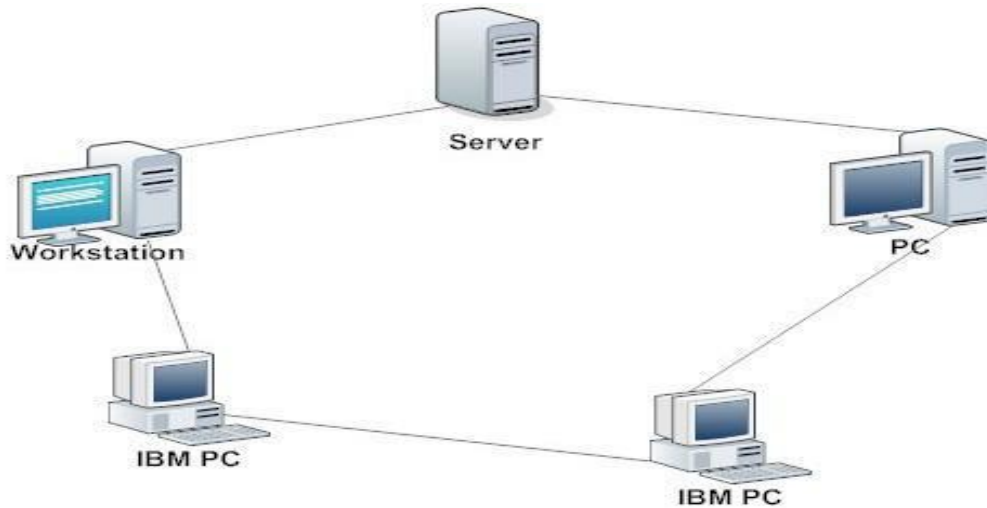


Figure 3.3.1.8: Ring Topology

Mesh Topology: In mesh topology, each device is directly connected to other devices. Its structure looks like a mesh.

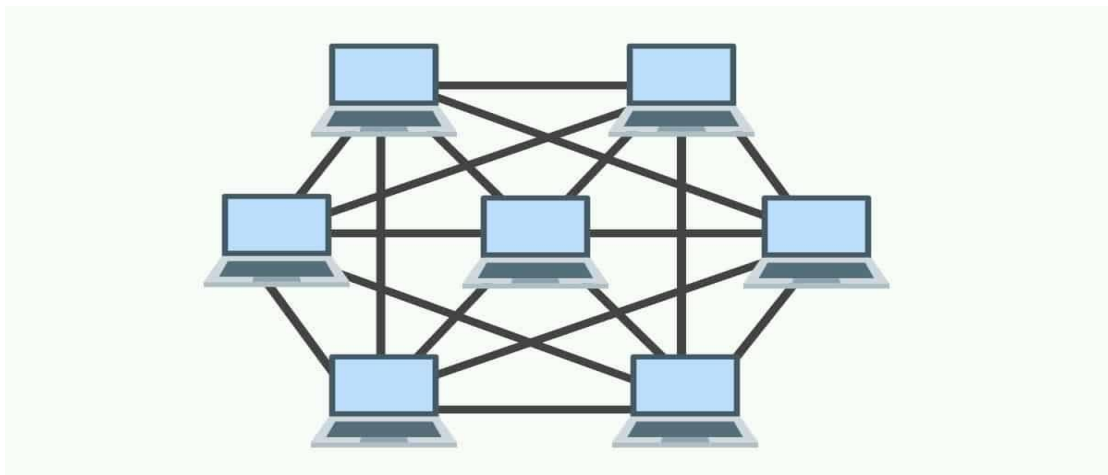


Figure 3.3.1.9: Mesh Topology

Hybrid Topology: In a hybrid topology each network device is internally interconnected, and has its own nodes. Hybrid Topology Basically, devices work in combination of Mesh Topology, Ring Topology, Bus Topology

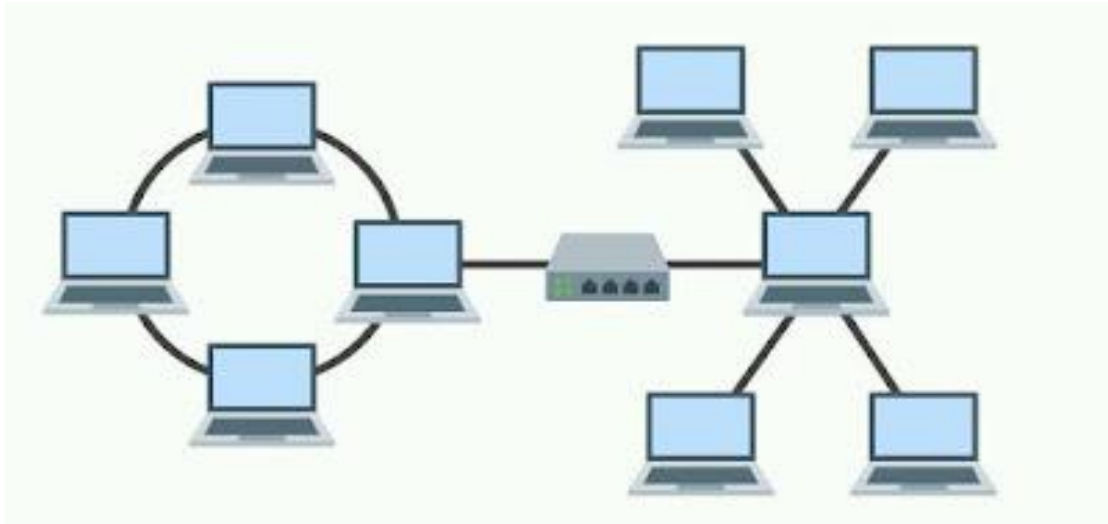


Figure 3.3.1.10: Hybrid Topology

Network Connectivity and Speed

TABLE 1: Network Connectivity and Speed for transmission time 10 Mbytes

Network Connectivity	Speed	Transmission time and 10 Mbytes
Fast Ethernet	100 Mbps	
FDDI	100 Mbps	
ATM	25 Mbps/2.4 gbs	
Ethernet	10 Mbps	9s
ISDM Modem	56/128 Mbps	45/12 min
T1 Connection	1.54 Mbps	50s
Dial-Up modem	14.4 Mbps	90 min
Token Ring	4/16 Mbps	
Gigabit Ethernet	1 Gbps	

3.3.2 OSI & TCP/IP Model

OSI Model: The OSI model is defined by the International Organization for Standardization. The full form of OSI model is Open System Interconnection. This model works with 7 levels. Used for network communication. These 7 layers work separately and simplify network management. When a computer sends data, the data reaches another computer through many channels. There are certain rules to ensure that the data reaches the destination correctly. which is known as a protocol. This set of protocols is called the OSI model.

Data	Layers	Functions	Protocols
Data	Application	Network Process to Application	HTTP, FTP, SMTP
Data	Presentation	Data Representation	JPEG, GIF, MPEG
Data	Session	Host Communication	Appletalk, WinSock
Segment	Transport	End-to-End Connection	TCP, UDP, SPX
Packets	Network	IP Determination	IP, ICMP,
Frames	Data Link	MAC & LLC	Ethernet, Switch
Bits	Physical	Media, Signal, Binary Transmission	Token Ring, Hub

Figure 3.3.2.1: OSI Model

Application Layer: Application is the 7th layer of the OSI model. A software application Depending on the 7th level. It acts as a user interface between network services. Tasks performed at the application level are visible. Supports user applications. The most commonly used protocols at the application layer are HTTP, FTP, SMTP, POP DNS, DHCP, SSH.

Presentation Layer: Presentation is the 6th layer of the OSI model. It changes the format of the data. It helps to move data from one data to another i.e. works as data transmission. Data encryption and decryption takes place at this level.

Session Layer: Session Layer: The 5th layer of the OSI model is the session layer. It basically setups different hosts within the network and helps in transmission. Establish

or start session, manage or continue session and terminate or end session. It works in three modes.

Transport Layer: The function of the transport layer is to deliver data packets. It works for start-to-end data flow control and throughout within the network. If a data packet is out of capacity, then the transport layer performs the network by making small data packets. The transport layer uses two types of transmission, e.g. Connection oriented, connection less.

Network Layer: It is the third layer of the OSI model. By establishing a logical relationship between the sender and the customer. This layer deals with IP inside data routing. Source IP address and destination IP address and given the data segment.

Data Link Layer: It refer to the second layer of the OSI model. This layer successfully transmits data from the sender to the receiver through the help of physical link. This layer plays the following roles:

- Data Synchronization
- Manage data issues
- Addressing
- Maintain data flow.
- Editing links

Physical Layer: It is the first layer of the OSI model. Its function is to establish physical relationship with different devices, and to transfer data from one place to another. The means of physical are,

- Twisted pair cable
- Coaxial cable
- Fiber optical cable

TCP/IP Model

The TCP/IP model is one of the main conceptual models used in computer networks. It means Transmission Control Protocol/Internet Protocol which are the two standard protocols of internet. This model explains how information is sent over networks, by providing means of communicating device to device.

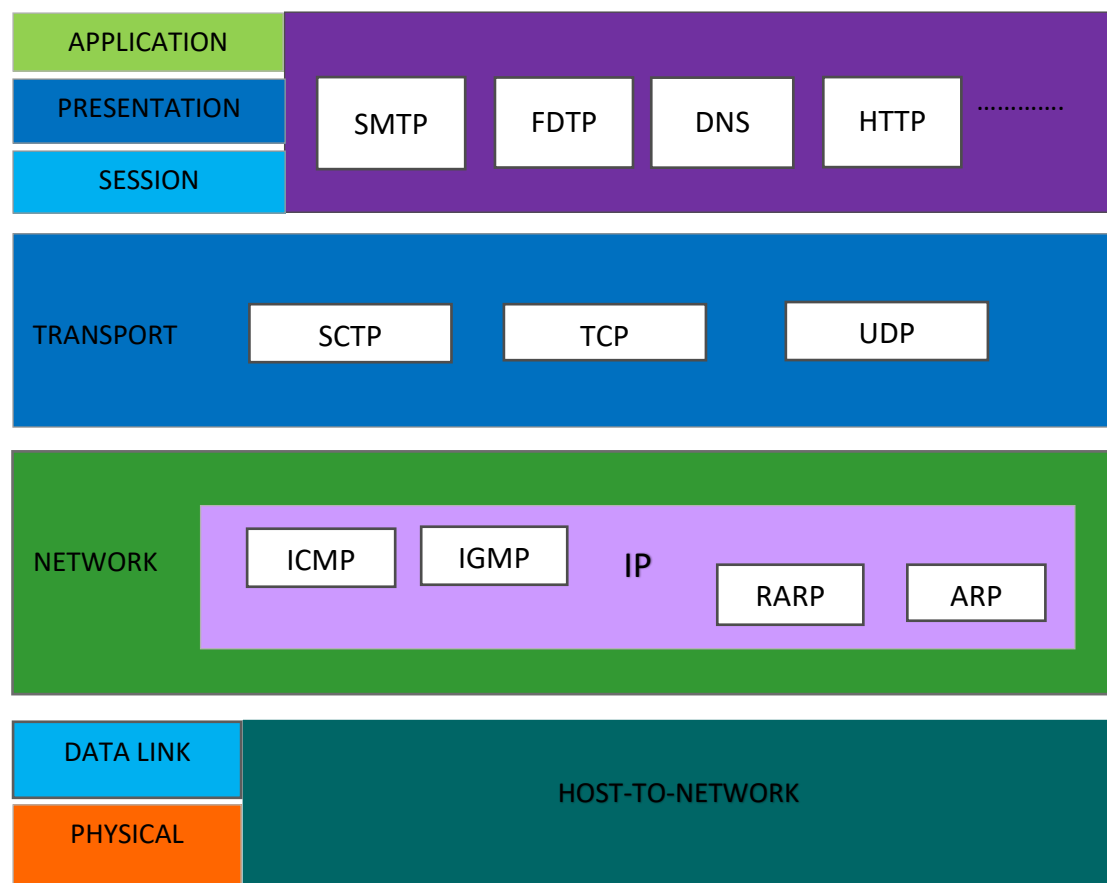


Figure 3.3.2.2: TCP/IP Protocol

3.3.3 IP Addressing and Sub-netting

IP Addressing

We mean by IP address, the identification number or host address. connected to the Internet, different addresses have different IP addresses, and the IP address determines which address the Internet will travel to. Network devices, such as routers, have specific identification numbers. When a router provides Internet access to a host address, the router checks the IP address, then grants Internet access. The default gateway IP is located on this Internet road, so the Internet gets its IP address very easily.

Types of IP addresses: IP addresses are classified based on different categories.

There are two types of IP address:

- IPv4
- IPv6IP

addresses are classified into following:

- Public IP Address
- Private IP Address
- Static IP Address
- Dynamic Ip Address

TABLE 2: Difference Between IPv4 and IPv6

IPv4	IPv6
IPv4 has 5 different IP address classes, Class A, Class B, Class C, Class D, Class E.	IPv6 does not use any IP classes
It Supports VLSM	IPv6 does not use any IP classes
IPv4 uses a decimal numbering system	IPv6 uses IP address hexadecimal numbering system
IPv4 supports 32-bit addresses	IPv6 supports 64-bit addresses
IPv4 supports manual DHCP configuration	IPv6 supports DHCP renumbering with manual configuration

Public IP Address

Internet service provider (ISP) network address that provides Internet is called public IP address. Internet identifies these IPs and gives access to these IPs from the company, while the Internet flows to the customer's IP address through some protocol. Public IPs are usually given access to DNS etc. servers on various websites, so they can be accessed from anywhere in the country. Public IP Address Example: 17.5.7.2.

Private IP Address

This is an internal address of the device. It is also called private address. Here there is no need to route the internet, and no need to exchange data. It is only active or visible within its own network. This address is more secure. Its range is as follows: 10.0.0.0 to 10.255.255.255, 172.16.0.0 to 172.16.255.255 and 192.168.0.0 to 192.168.255.255.

Classes of IP address

TABLE 3: IP Class and IP Range

IP Class	IP Range
A	1-126
B	128-191
C	192-223
D	224-239
E	240-255

Three classes of IP addresses are most commonly used. The summary of these three classes is given below.

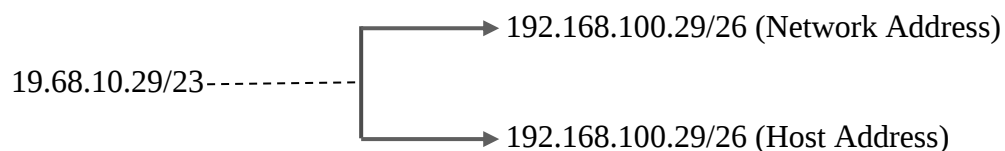


TABLE 4: Network Bit and Host Bit of IP Class

Class	1 st Octet	2 nd Octet	3 rd Octet	4 th Octet
Class A	N	H	H	H
Class B	N	N	H	H
Class C	N	N	N	H

Sub-netting

Subnetting reduces network complexity by dividing a large network into smaller segments. There can be millions of devices in a class, while searching for a specific device, we have to face many problems and we use subnetting to solve these problems. It breaks the IP address into smaller pieces and the IP can easily find the device. Subnetting works efficiently to reduce traffic and maintain connectivity.

IP ranges for Subnetting =0-255

Usable IP range =1-254

Example: IP = 192.168.100.0/24

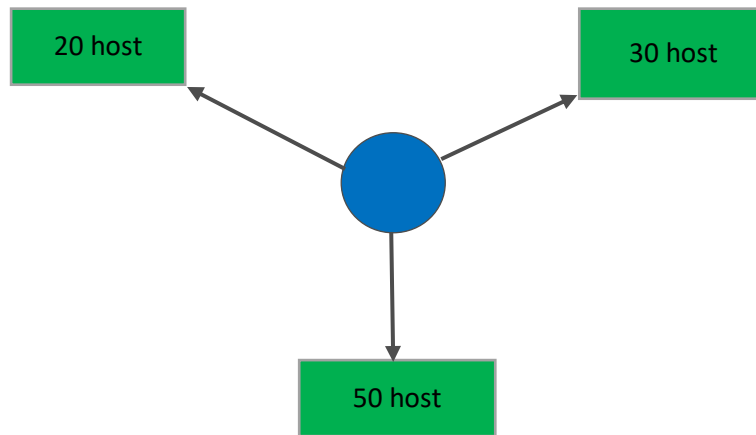


Figure 3.3.3.1: Subnetting Value

Given IP: 192.168.100.0/24

- **50 host**

No of host = $2^6 - 2$
62

Network Address = 192.168.100.0/26

Subnet mask = nnnnnnnn. nnnnnnnn. nnnnnnnn. hh
255.255.255.192

1st subnet = 192.168.100.1

Last subnet = 192.168.100.62

Broadcast Address = 192.168.100.63

- **30 host**

No of host = $2^5 - 2$
30

Network Address = 192.168.100.64/27

Subnet mask = nnnnnnnn. Nnnnnnnn. Nnnnnnnn. hhh
255.255.255.224

1st subnet = 192.168.100.65

Last subnet = 192.168.100.94

Broadcast Address = 192.168.100.95

- **20 host**

No of host = $2^5 - 2$

30

Network Address = 192.168.100.96/27

Subnet mask = nnnnnnnnn. nnnnnnnnn. nnnnnnnnn. hhh
255.255.255.224

1st subnet = 192.168.100.97

Last subnet = 192.168.100.126

Broadcast Address = 192.168.100.127

Subnet Mask

Subnet Mask: Example for Class-A

Table 5: Network Bit, Host Bit and Subnet Mask Value

Network Bit	Host Bit	Host Bit	Host Bit
nnnnnnnn	hhhhhhhh	hhhhhhhh	hhhhhhhh
255	0	0	0

Subnet Mask: Example for Class-B

Table 6: Network Bit, Host Bit and Subnet Mask Value

Network Bit	Network Bit	Host Bit	Host Bit
nnnnnnnn	nnnnnnnn	hhhhhhhh	hhhhhhhh
255	255	0	0

Subnet Mask: Example for Class-C

Table 7: Network Bit, Host Bit and Subnet Mask Value

Network Bit	Network Bit	Network Bit	Host Bit
nnnnnnnn	nnnnnnnn	nnnnnnnn	hhhhhhhh
255	255	255	0

3.3.4 DNS and DHCP

DNS

Domain Name System (DNS) is any server or browser that translate IP addresses to domains such as (.com. Edu .bd .pdf). DNS is a setup on the server at that IP address with the help of internet. The servers make the address of that domain name visible. It supports UDP and TCP protocols at this time. DNS does not require us to remember IP addresses. If I search the server by typing education.com it is used to convert the IP behind this domain name. Since 1985, domain name servers have played a vital role in the functioning of the Internet. It works on port number 53.

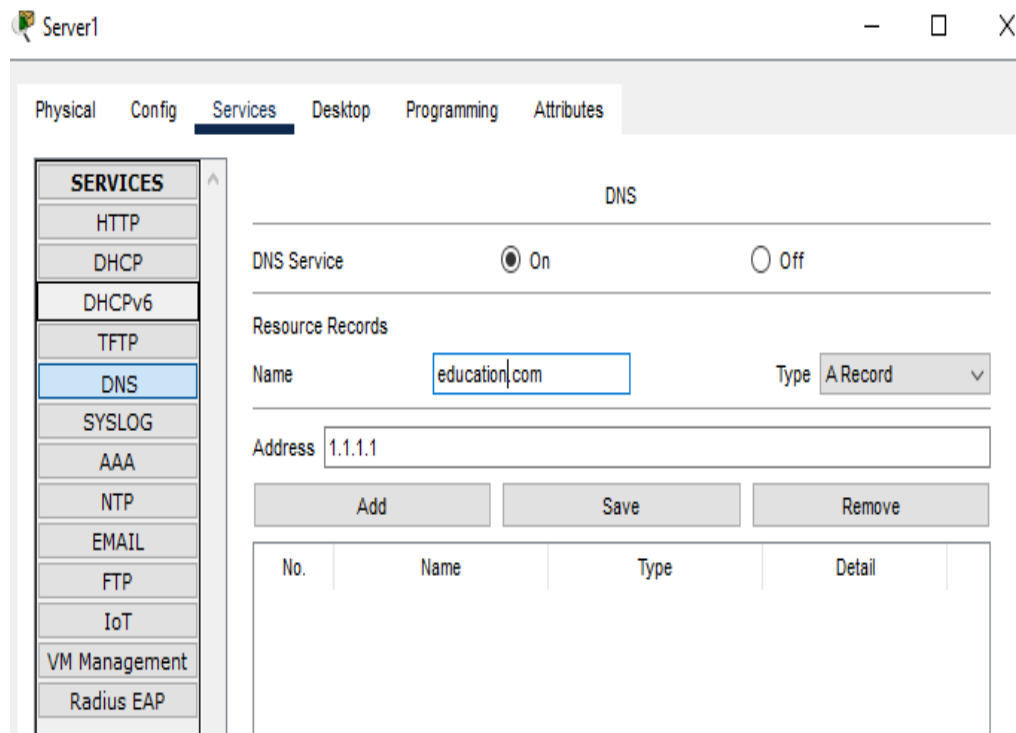


Figure 3.3.4.1: DNS Server

DHCP

The full form of DHCP is available as the Dynamic Host Configuration Protocol. These enable the internet to run in an efficient manner and network protocols for networks are the ones that assist in Internet management by addressing the IP devices that are a part of a network as well as the User server architecture. DHCP, therefore, fits the category of client-server by providing an IP address and other aspects, including subnet mask and default gateway, through the internet for the configuration of devices. During this time the server get involve port number 67 while the client gets involve port number 68. Conventions help the Web work lawfully and set up conventions for systems.

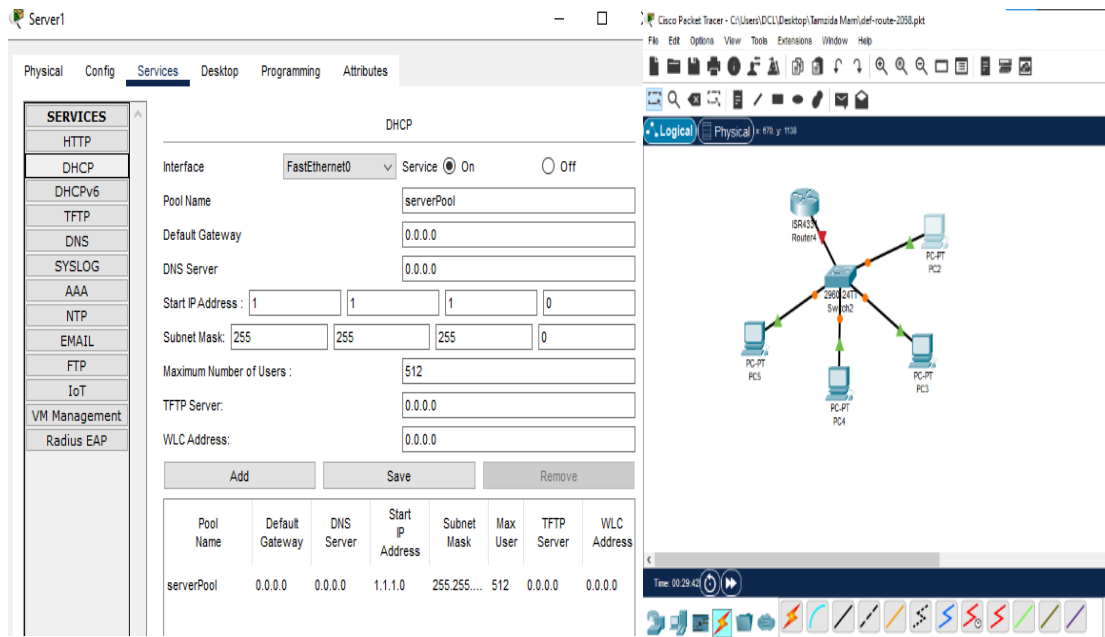


Figure 3.3.4.2: DHCP Model and Setup

3.3.5 Basic IP Routing and Types

An important aspect of computer networks is IP routing. Through this the data reaches its specific destination. IP routing is basically the transfer of data by determining the shortest path of data within itself or from one computer to another computer network. Different protocols are used for different networks.

Types

We see three different types of IP routing

- Static Routing
- Dynamic Routing
- Default Routing

Static Routing: In a small network, routers and switches are manually configured to define routes, called static routing. Here network administrators work manually. Routing information not update automatically.

Advantage

- Static routing network is small, so it can be setup easily.
- It is easy to configure.
- Problems are easy to solve.

- It takes less bandwidth.

Disadvantage

- In static routing, failure of the link disrupts the rerouting.
- Administrative distance
- Cannot be used in large networks

Below is a static routing diagram and routing table example

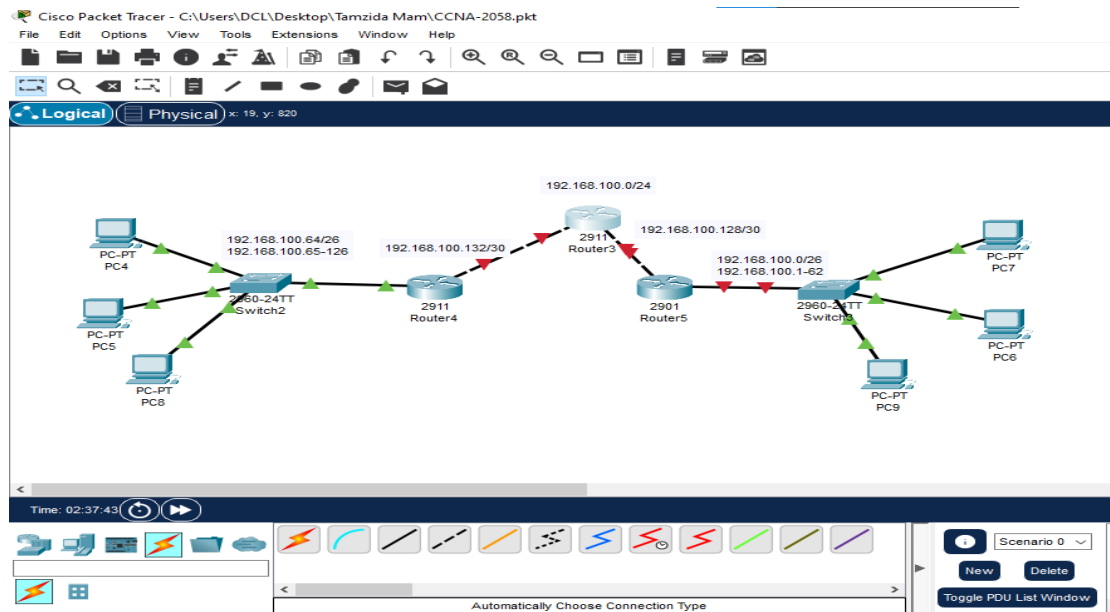


Figure 3.3.5.1: Static Routing Model Design

```

Router3
Physical Config CLI Attributes
IOS Command Line Interface

Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>ena
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R3
R3(config)#interface gi0/2
R3(config-if)#no shut
R3(config-if)#no shutdown
R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up
R3(config-if)#hostname R1
R1(config)#interface gi0/0
R1(config-if)#no shut
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
  
```

Figure 3.3.5.2: Static Routing Configure Table

Dynamic Routing: Dynamic routing is also called adaptive routing. Dynamic routing is the method of forwarding data to a specific destination by identifying a different route to a router based on the current conditions within a system. If there is a problem with any route, it has the ability to send data through another route.

Advantage

- Larger networks can use dynamic routers
- Administrative mode does not have to be configured manually
- It has the ability to change the network in real time by sharing the status between them at the right time.
- If one path is broken, the data is routed through the other path

Disadvantage

- Configuring dynamic routing can be complex.
- Corrupt root streams can cause network damage
- Network administration takes time

Below is a dynamic routing diagram and routing table example

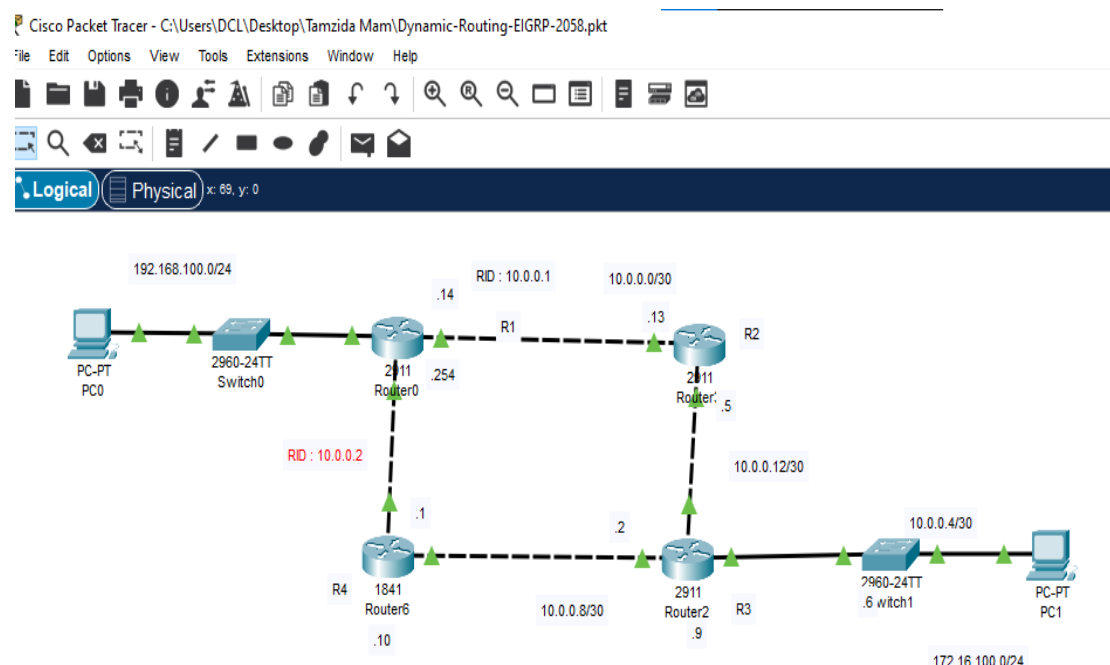


Figure 3.3.5.3: Dynamic Routing Model Design

```

Router0
Physical Config CLI Attributes
IOS Command Line Interface

R1>
R1>ena
R1>enable
R1#config t
R1(config)#hostname r1
r1(config)#interface gi0/0
r1(config-if)#ip add
r1(config-if)#ip address
% Incomplete command.
r1(config-if)#ip add
r1(config-if)#ip address 10.0.0.2 255.255.255.255
Bad mask /32 for address 10.0.0.2
r1(config-if)#ip add
r1(config-if)#ip address 10.0.0.2 255.255.255.252
r1(config-if)#
%DUAL-5-NBRCHANGE: IP-EIGRP 100: Neighbor 10.0.0.2 (GigabitEthernet0/0) is down:
interface down
%IP-4-DUPADDR: Duplicate address 10.0.0.2 on GigabitEthernet0/0, sourced by
00E0.F9A3.0D01
%IP-4-DUPADDR: Duplicate address 10.0.0.2 on GigabitEthernet0/0, sourced by
00E0.F9A3.0D01

r1(config-if)#hostname r2
r2(config)#interface gi0/1
r2(config-if)#ip add
r2(config-if)#ip address 10.0.0.3 255.255.255.252
Bad mask /30 for address 10.0.0.3
r2(config-if)#ip add
r2(config-if)#ip address 10.0.0.5 255.255.255.252
r2(config-if)#
%DUAL-5-NBRCHANGE: IP-EIGRP 100: Neighbor 10.0.0.13 (GigabitEthernet0/1) is down:
interface down
r2(config-if)#

```

Figure 3.3.5.4: Dynamic Routing Configure Table

Default Routing: We only use default routing when the network ID of a destination is unknown to the router. and helps reduce routing. A packet is sent to devices for which default routing is configured. Static configuration must be done before configuring default routing. The IP route it maintains is IP route 0.0.0.0 0.0.0.0 <Gateway>.

<Destination network id><Subnet mask> <Gateway>

Below is a default routing diagram and routing table Example

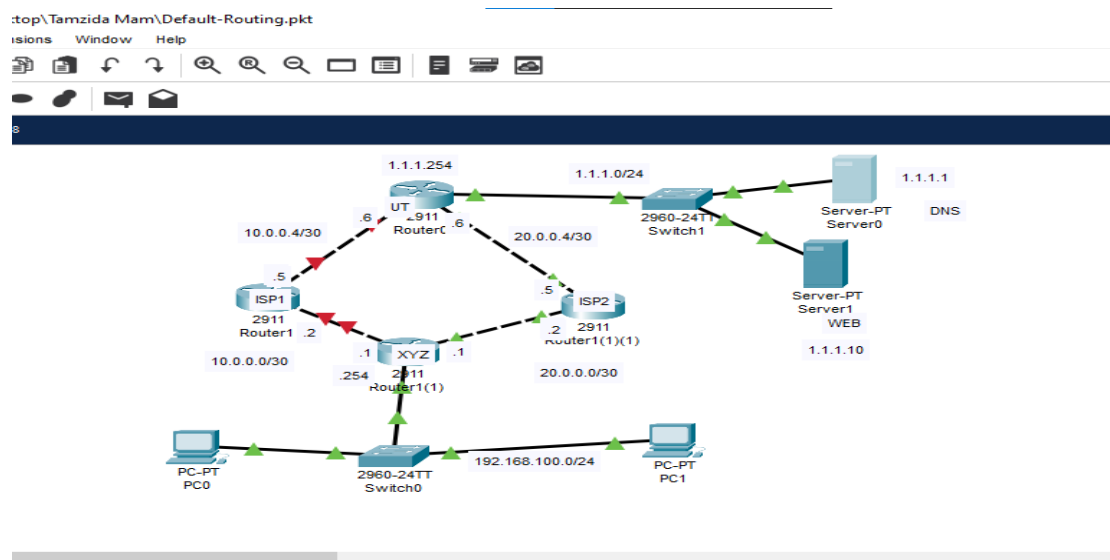


Figure 3.3.5.5: Default Routing Model Design



```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

ISPl>interface gi0/0
% Invalid input detected at '^' marker.
ISPl>interface gi0/0
% Invalid input detected at '^' marker.

ISPl>ena
ISPl>enable
ISPl#config t
ISPl#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
ISPl(config)#interface gi0/0
ISPl(config-if)#no shut
ISPl(config-if)#no shutdown
ISPl(config-if)#ip add
ISPl(config-if)#ip address 10.0.0.2 255.255.255.252
ISPl(config-if)#interface gi0/1
ISPl(config-if)#no shut
ISPl(config-if)#no shutdown
ISPl(config-if)#ip add
ISPl(config-if)#ip address 10.0.0.5 255.255.255.252
ISPl(config-if)#ip route 0.0.0.0 0.0.0.0 10.0.0.6
ISPl(config)#ip route 192.168.100.0 255.255.255.0 10.0.0.1
ISPl(config)#sh ip route
```

Figure 3.3.5.6: Default Routing Configuration Table

3.3.6 Routing Information Protocol (RIP)

A routing protocol that finds the best path from a source to a destination and uses hop calculations, which has an administrative value of 120, is basically called a routing information protocol. It works at the network layer. It counts like 15 hops. This is checked by exchanging the routing table every few seconds. But it has some advantages and disadvantages.

Advantage

- It is easy to configure and implement
- No loops are here
- Architecture has no limitations.
- Supports many network protocols.

Disadvantages

- It can have a maximum hop count of 15 so the network limitation comes into play.
- Here periodic updates have to be used, resulting in more traffic which requires more bandwidth.
- Does not support encryption as it does not require IP authentication.

Types of RIP:

Routing Information Protocol are two types

1.RIPv1: Only advertise class full not support VLSM, CIDR. Share routing update via broadcast address (255.255.255.255)

2.RIPv2: Can advertise class less support VLSM, CIDR routing update multicast address (224.0.0.9)

Below is a rip diagram and Syntax

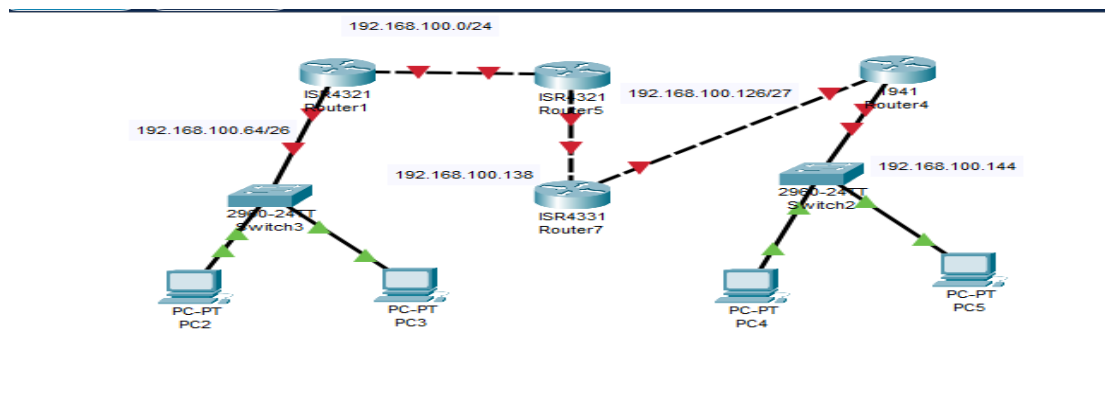


Figure 3.3.6.1: Rip Model Design

```
Router6
Physical Config CLI Attributes
IOS Command Line Interface
63400 Bytes of RAM CompactFlash (read/write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1, RELEASE
SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

R4>
R4>sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

 10.0.0.0/30 is subnetted, 4 subnets
R   10.0.0.0 [120/1] via 10.0.0.14, 00:00:05, FastEthernet0/0
R   10.0.0.4 [120/1] via 10.0.0.9, 00:00:02, FastEthernet0/1
C   10.0.0.8 is directly connected, FastEthernet0/1
C   10.0.0.12 is directly connected, FastEthernet0/0
 172.16.0.0/24 is subnetted, 1 subnets
R   172.16.100.0 [120/1] via 10.0.0.9, 00:00:02, FastEthernet0/1
R   192.168.100.0/24 [120/1] via 10.0.0.14, 00:00:05, FastEthernet0/0

R4>
```

Figure 3.3.6.2: RIP Configuration Syntax

3.3.7 EIGRP

Replaced the EIGRP routing protocol in 1993. The Enhanced Interior Gateway Routing Protocol is a distance-vector routing protocol and is used for configuring computer networks such that the routing itself knows its own path. Cisco System Category It was designed to serve only Cisco routers. EIGRP is used to share routes from one router to routes from other routers. As a result, the router is largely stress-free. EIGRP contains information about all neighboring routers. If the router does not find its correct route, EIGRP queries its neighbors for alternative routes. The queries continue until the router finds its route. Once the information is received, the router resumes operation

Feature of EIGRP

- Metric value = 5k (10100-default)
- Information sharing = multicast (224.0.0.10)
- Convergence - Very fast
- Ad value = LAN-90 , WAN-170
- Hop count = 100 (default)
- OSPF external type -1
- Hello timer = LAN-5sec
- Hold timer = LAN-15sec
- Periodic downloaded static route.

Below is EIGRP diagram and Routing Table

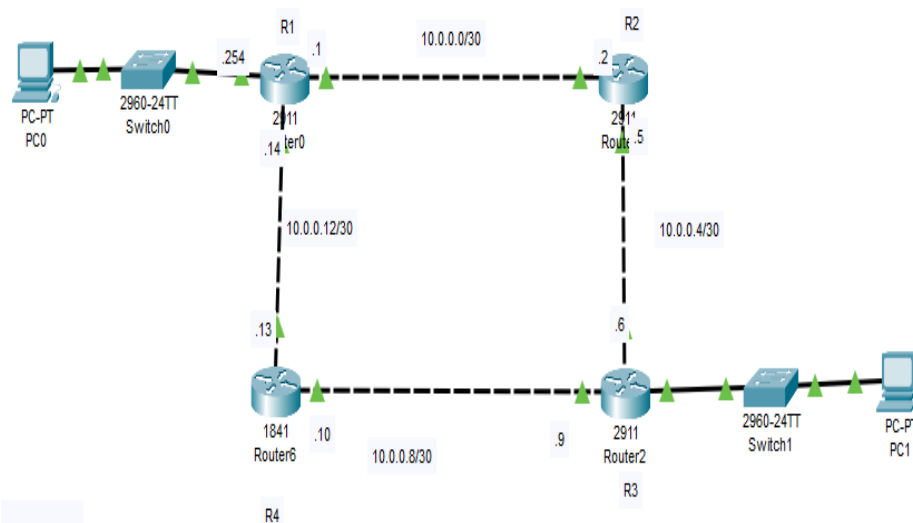


Figure 3.3.7.1: EIGRP Model Design

```

Router0
Physical Config CLI Attributes
IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up
%DUAL-5-NBRCHANGE: IP-EIGRP 100: Neighbor 10.0.0.13 (GigabitEthernet0/1) is up: new adjacency
%DUAL-5-NBRCHANGE: IP-EIGRP 100: Neighbor 10.0.0.2 (GigabitEthernet0/0) is up: new adjacency

R1>
R1>sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

    10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
C       10.0.0.0/30 is directly connected, GigabitEthernet0/0
L       10.0.0.1/32 is directly connected, GigabitEthernet0/0
D       10.0.0.4/30 [90/3072] via 10.0.0.2, 00:00:18, GigabitEthernet0/0
D       10.0.0.8/30 [90/5632] via 10.0.0.2, 00:00:18, GigabitEthernet0/0
C       10.0.0.12/30 is directly connected, GigabitEthernet0/1
L       10.0.0.14/32 is directly connected, GigabitEthernet0/1
    172.16.0.0/24 is subnetted, 1 subnets
D       172.16.100.0/24 [90/5632] via 10.0.0.2, 00:00:18, GigabitEthernet0/0
    192.168.100.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.100.0/24 is directly connected, GigabitEthernet0/2
L       192.168.100.254/32 is directly connected, GigabitEthernet0/2

```

Figure 3.3.7.1: EIGRP Configuration Table

3.3.8 Virtual Local Area Network (VLAN)

A method of creating a logical network is VLAN. It basically solves the problems of broadcasting domain and ensures security. VLANs are configured in software rather than hardware, making it more flexible.

VLANs following is the topics

- Basically 2-1005 create more VLAN inside.
- It provides layer 2 security.
- Works on port number.
- VLAN numbers range from 1 to 4094.

The VLAN configuration sub-mode are:

- VLAN Name
- VLAN State
- Shutdown or not Shutdown

Below is VLAN diagram and Routing Table

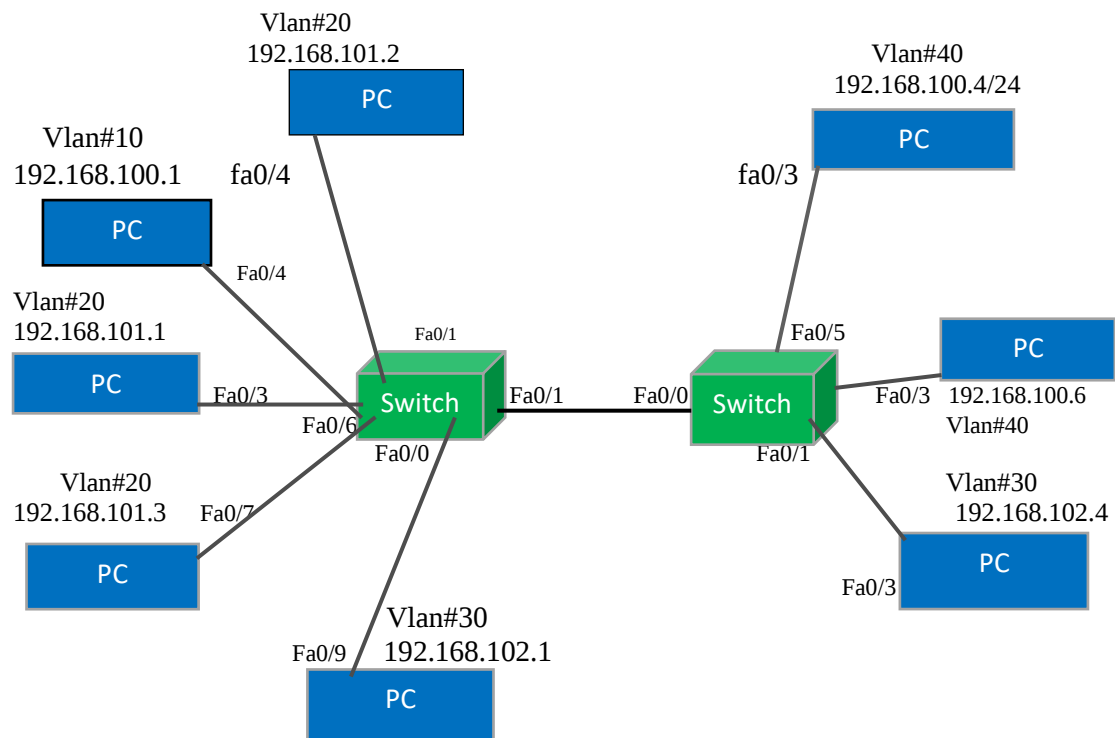


Figure 3.3.8.1: Diagram on VLAN

The configuration syntax of VLAN is given below:

```
Switch>
Switch>enable
Switch# config t
Switch(config)#interface fa0/1
Switch(config-if)# Vlan 10
Switch(config-vlan)#name HR
Switch(config-vlan)#exit
Switch(config)#interface fa0/1
Switch(config-if)#description HR
Switch(config-if)#switchport mode access
Switch(config-if)#switchprt access vlan 10
Switch(config-if)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name TR
Switch# config terminal
Switch(config)#interface fa0/3
Switch(config-if)#switchport access mode
Switch(config-if)#switchport acces vlan 20
```

Figure 3.3.8.2: VLAN Configuration Code Table

3.3.9 Spanning Tree Protocol (STP)

Using a one or more switch creates unnecessary paths within the device and causes network problems due to excessive data flowing between packets. And this position is also called bridging loop. To prevent or avoid this loop we use STP. First select Root Bridge to STP. Next select Port and fix a designated port on the network segment. Bridge ID = Bridge Priority + Mac Address (Each switch interface has specific MAC (address))

Type of bridge priority:

- Bridge priority value.
- Extended System ID (Basically Vlan Id).

Each switch has a default priority of 32768.

Bridge Priority = 16bits (4bits Priority Value + 12bits Vlan Id).

How STP basically works is explained through a design

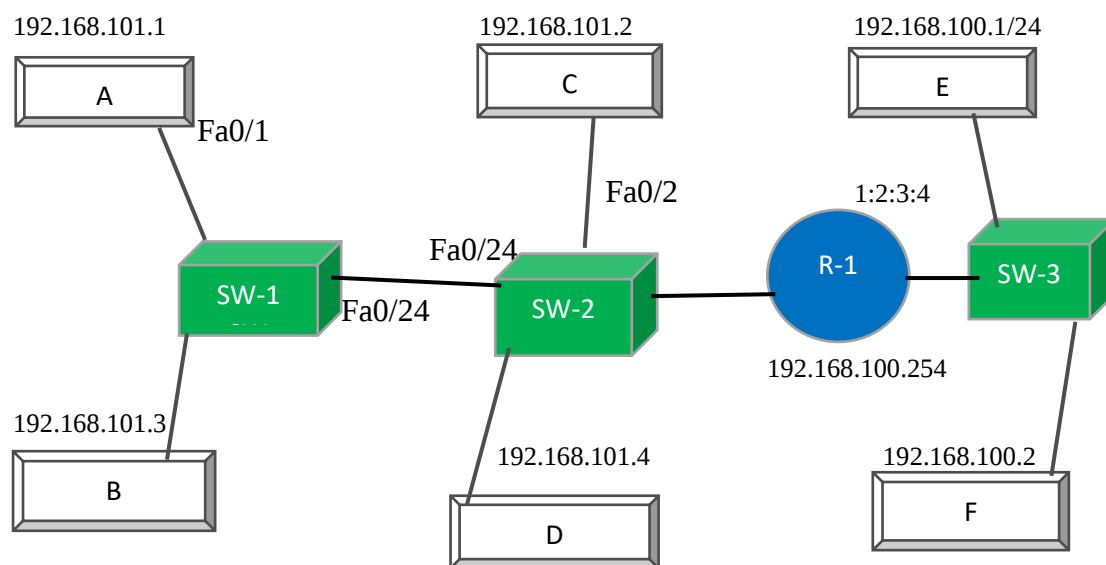


Figure 3.3.9.1: Spanning Tree Protocol Design

A → C

SRP IP: 192.168.101.1

DST IP: 192.168.100.2

SRC MAC: a: a: a: a

DST MAC:

Address Resolution Protocol

SW-1 MAC Table

VLAN	MAC	Type	PORT
1	a: a: a: a	DYN	fa0/1
1	a: a: a: a	DYN	fa0/24?
1	a: a: a: a	DYN	fa0/2

SW-2 MAC Table

ARP REQ

SRC IP: 192.168.101.1

DST IP: 192.168.100.2

SRC MAC: a: a: a: a

DST MAC: f: f: f: f

VLAN	MAC	TYPE	PORT
------	-----	------	------

1	a: a: a: a	DYN	fa0/24
---	------------	-----	--------

1	a: a: a: a	DYN	fa0/1
---	------------	-----	-------

1	a: a: a: a	DYN	fa0/24
---	------------	-----	--------

3.3.10 OSPF

Open Shortest Path First (OSPF) is an internal gateway protocol in IP networks. It is a single autonomous system.

- A Routing Protocol
- Link State Routing Protocol
- EIGRP & RIP are Distance Vector Routing Protocol
- OSPF Metrics: Cost
- OSPF AD Value: 110

Basic Terms of OSPF

- Area
- LSA
- LSDB

Area:

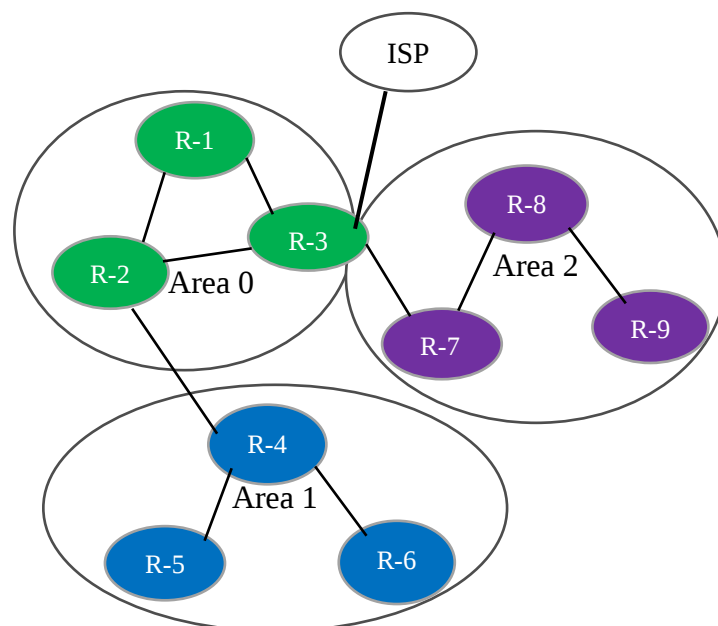


Figure 3.3.10.1: OSPF Area System Design

Area 0, is called backbone Area. Router R-1, R-2 and R-3 are backbone Area. All Areas will connected with backbone Area.

ABR (Area Border Router): Routers that are members of multiple areas are called ABR.

R-2 & R-3 are ABR.

LSA: Link-State Acknowledgment. Carry routing information.

LSDB: Routers create an LSDB after starting OSPF, and the LSDB stores the LSA.

How LSDB stores LSAs is shown below.

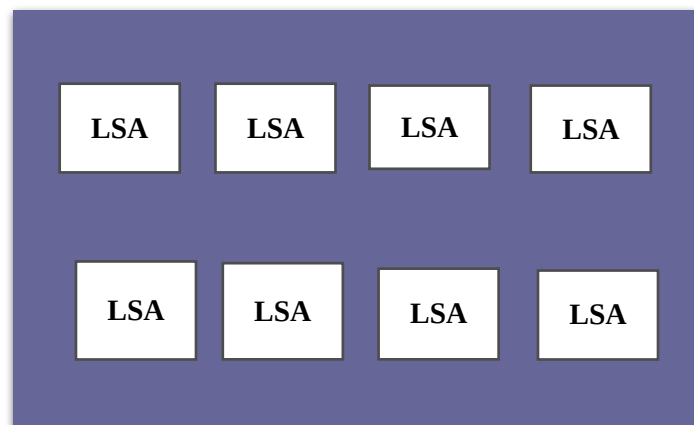


Figure 3.3.10.2: Link State Database System Design

Below is a OSPF routing diagram and routing table Example

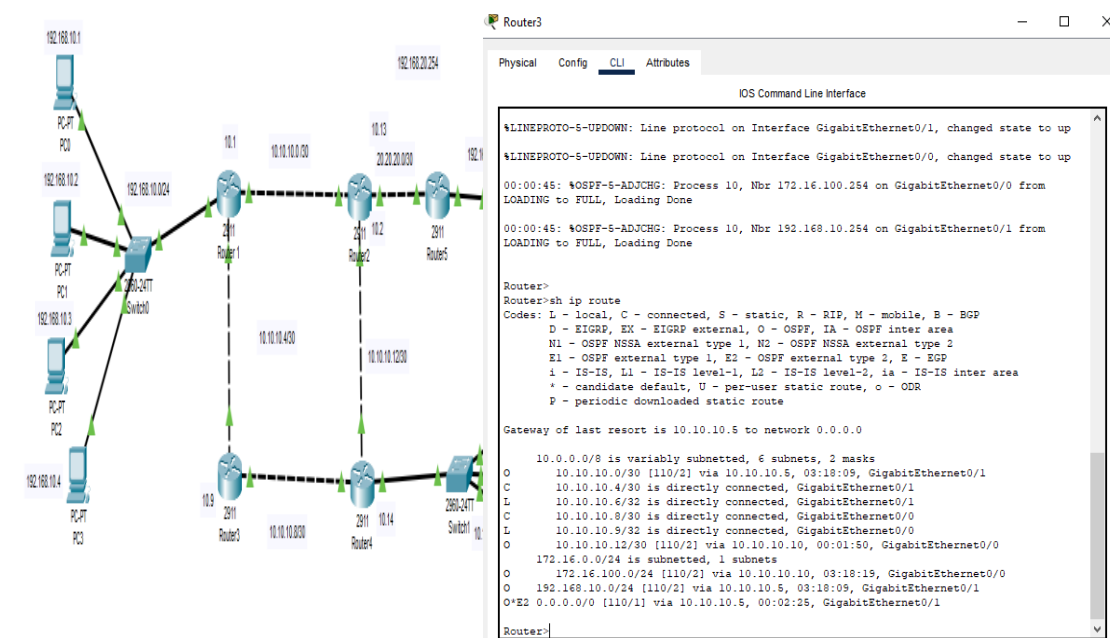


Figure 3.3.10.3: Model on OSPF and Configure Table

3.3.11 NOC Support System

A NOC team supervises IT companies or organizations to see if their internal operations are running properly or where problems are occurring. An NOC team deals with DDoS attacks, power issues, network failures and black-holes in routing etc. The NOC team has to monitor all aspects of the organization. The NOC support team relies on the company's infrastructure. IT teams constantly monitor network performance and customer service. It is the first system of remediation against network interruptions and failures. The essential terms of a NOC team are:

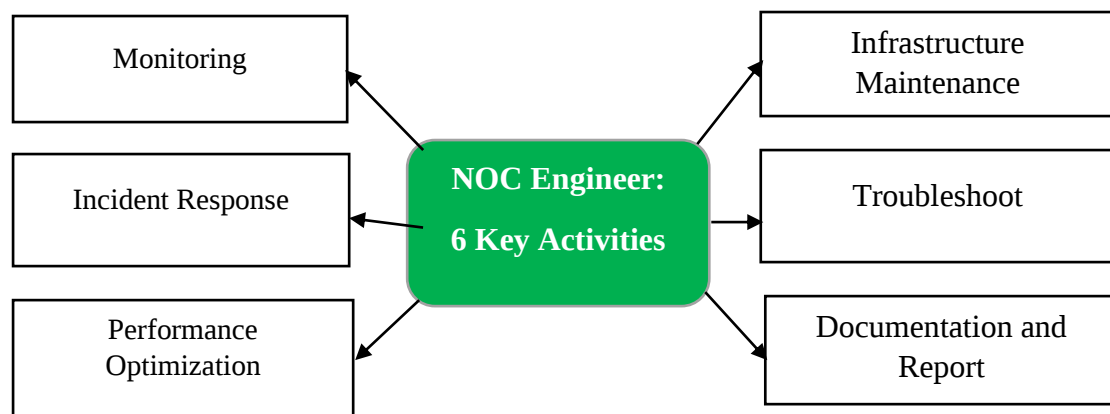


Figure 3.3.11.1: NOC Activities Key

3.4 Challenges

My internship exposed me to a variety of challenges above the actual workplace environment. Always be ready to take on the challenge of knowing a lot about the unknown. Accepting the challenge was as difficult as it was an opportunity to prove yourself on the real job. During the three months internship, the company used to give different offers based on the work, like job offers, company marketing offers, etc. I take these as challenges. Prepares himself to adapt to the professional environment. Keep an eye on the fast-paced work of the office and maintain active relationships with other members of the internship. Sometimes assignments are suddenly given and they have to be completed along with the challenge and mailed to the internship supervisor. An internship career in the network industry involves struggling with new challenges every day to prepare yourself for the job market. The internship journey is a multi-faceted process that has to be acquired just like academic knowledge. Appears to prepare itself with the challenge.

CHAPTER 4

COMPETENCIES AND SMART PLAN

4.1 Competencies Earned

I have lived my future life in computer networking. The use of networking is essential in every case. Nowadays, one has to survive in the job market by competing with talented people everywhere. Practical knowledge must be acquired efficiently to prove oneself otherwise. So, I survived an internship in a company along with academics. During the three months internship I got a basic idea of what to do and learn in practical terms. We gain practical skills in the internal work of the network company and how to solve various problems. Also let me learn how to configure routers, switches, VLANs, EIGRP, RIP, OSPF etc. and which ones are used in which areas. The internship experience taught me how to complete any task in any situation. So, I can say I have achieved the goal of internship with the help of supervisor and my own efforts.

4.2 Smart Plan

A company keeps the right leadership and strategy on top of their operations. Meetings and arrangements were made with everyone on how to make the company efficient and innovative. This time Smart Plan advises. Being a internship student I have to look after the smart plan. I can move on to different plans, such as becoming a skilled network administrator, and me for that Spend a few more years networking and networking at different companies Plan ahead on how to compete with the competition in the job market as a professional engineer. Working in an top quality network company.

4.3 Reflection

I gained practical experience and skills during a three-month internship in a network company. Atova Technology Limited has given me the opportunity to work in different sectors and situations. Acquiring how to position yourself professionally with experience in the job market is crucial. I gradually learned to overcome my weakness on the network. Consequently, I can speak from a place of my own confidence Get opportunities to demonstrate skills. All the assignments given on company projects were solved with great precision. So, I got self confidence in my career by relying on my skills.

CHAPTER 5

CONCLUSION AND FUTURE CAREER

5.1 Discussion and Conclusion

Successfully completed my internship journey with many challenges. My internship journey was not easy at all. 5 days per week in the internship company I had to work on the network with hard work and responsibility from 8.00 am to 5.00 pm. Besides, I had to maintain the academic activities of my university. These experiences encourage me to be realistic and employ professional. How the planned work pattern inside a networked office and how to manage customer services should always be kept in mind, such as keeping the officer environment under control, securing data and internet systems, ensuring network security, configuring applications on different model systems. and maintain devices. These subjects are mastered with the help of the internship supervisor and prepared to tackle on my own. Day by day I focus on career. It was a wonderful achievement for me. In all this the professional members of Atova Technology Limited and my internship supervisor represented me well and motivated me to take up the challenge in the job market.

5.2 Scope for Future Career

Computer networking is a very demanding sector for jobs in today's world. A popular network expansion of Cisco company in this sector is CCNA. Network job market with many important job posts vacant due to lack of skilled and responsible personnel. Internships don't survive on networking to expose yourself to real-world skills. It was the best medium for my future career. Every bank, IT office and business organization needs people skilled in IT i.e. network which is good news for a network engineer and a half. In these organizations or in the IT sector, I do the network work with great skill. Build yourself up over the network to take on every challenge. Following are the benefits that I can get by completing the internship course

- There may be a job opportunity in an ISP company.
- Can be employed as a network administrator in educational institutions or banking sector.
- I can take job opportunity in data center.

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APPENDIX

Appendix A: Internship Reflection

The main objective of a temporary job was to collect the knowledge gained during the internship within the company and apply it effectively by analyzing the problems. Company experts have a different power and link. In the internship I focused to work with the experts of the company and they shared their experience with me and practically taught me the systems of the network. how a master affiliation knows its way of life and its level of responsibility and responsiveness. I am in favor of using short sessions, administration and administration to organize life in a global society.

Appendix B: Company Detail

Name	Atova Technology Limited
Address	Satmasjid Super Market, 3 rd Floor, Mohammadpur Bus Stand, Dhaka-1207
Website	www.atovatech.com/
Type of organization	IT Firm and Software Based
Mobile or Fax Number	+88 01713615331
Email	info@atovatech.com

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