

**INTERNSHIP ON COMPUTER NETWORKING WITH CISCO**

**BY**

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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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**DAFFODIL INTERNATIONAL UNIVERSITY**

**DHAKA, BANGLADESH**

**06 FEBRUARY 2023**

## **APPROVAL**

This Project/internship titled “**Internship on Computer Networking with CISCO**”, submitted by Md. Abu Solaiman, ID No: 191-15-12105 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 06-February 2023.

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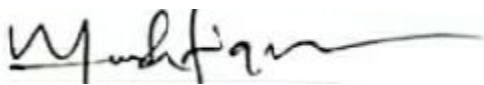
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## DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Rubel Sheikh, Lecturer, Department of CSE**, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

**Supervised by:**



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Finally, we must acknowledge with due respect the constant support and patients of our parents.

## **ABSTRACT**

This stage is a representation of how the Internet Service Provider operates. The main driving force behind the report is to use hands-on experience at Networld Technology Limited, Kawran Bazar in Dhaka to learn more about computer networking and ISP network components such as servers, computers, cables, routers, and connections. Working with them has provided me with a wealth of information about how to build a network and how to manage problems with a significant network. One of Bangladesh's top ICT solution providers, NetWorld Group offers a variety of services and products to banks and other financial institutions all throughout the nation. Through our various businesses, we put our belief in the advancement of mankind through innovation into practice. Since 2006, we have offered financial institutions and other clients around the nation IT support and services. In this report, I'd like to emphasize the things I've accomplished and the things I've learned through my internship. My primary focus throughout my internship in computer networking was on honing my networking abilities and learning about IP addressing, switching, various types of routing, and associated protocols. Many network managers are currently utilizing new technology. I want to know how the internet protocol differs from the routing and switching protocols. I want to learn more about practical daily activities. I'm curious to see how a practical task will operate. I'm eager to begin working as a network engineer. I learned a lot about the workplace over the course of my six-month internship with Networld Technology Limited.

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Introduction**

The age of information technology is now. Without the internet, we are unable to consider the future. Networking is a crucial component of internet innovation, which is used by many people throughout the world. All technology depends on networking. Without the internet, we are powerless. These days, networking and correspondence form the foundation of every company, office, bank, and exchange. For an office of a business and all ISP agencies to maintain the Internet, networking is essential. I've highlighted a lot of issues in this study that are crucial for networking.

### **1.2 Motivation**

People are using technology more frequently and on a daily basis in the current environment. Everywhere we go, from daily life to work, we use the internet. There is therefore a lot of room for growth for IT workers. Since the majority of our vital tasks now depend on the internet and we just cannot imagine life without it, there is a demand for individuals who can provide these services. As a network engineer, I have several career options and a liking for it. I enjoy building and configuring networks.

### **1.3 Objectives of Internship**

1. To apply what we have learned in the real world.
2. To comprehend the basic principles behind networking principles, protocols, and technologies.
3. To become familiar with various routing techniques.
4. To become familiar with the protocol stack's various layers' introductions.

### **1.4 Introduction of Company**

Networld Technology Limited offers a wide range of services. They also give recent graduates the chance to intern so that they can hone their practical abilities. This organization has a highly distinctive work environment where employees assist one another in completing tasks.

## **1.5 Report Layout**

I briefly discussed my motivations for pursuing the internship in computer networking in Chapter 1 and outlined the internship's goals. The organization's history, members, and activities are described in Chapter 2. I completed numerous daily duties and little projects throughout my internship, which are listed in chapter 3. I learned a lot of new things during my internship and got to work with professionals. They teach me various topics, which are briefly discussed in chapter 4. I have attempted to explain everything about the internship and my future plans in chapter 5, which is the last chapter of this report.

## **CHAPTER 2 ORGANIZATION**

### **2.1 Introduction**

A business called Networld Technology Limited offers IT services to the Bangladeshi market. Through its sibling company, ATM, it offers IT services. Additionally, Networld Technology Limited provides project training, job placement, and training. From their own datacenter in Bangladesh, it provides comprehensive ATM Networking IT services.

### **2.2 Product and Market Situation**

While I was an intern, I use technologies from Cisco, cloud networks, DNS, Mikrotik, DHCP, , TP-LINK, , and ATM Networking. But the subject that I learned the most about was Cisco packages. The Commercial & Industrial Network Corporation makes use of it. Cisco's product line includes Wireless systems, unified fabrics, switches, routers, WAN accelerators, warehouse networks, ATM Networking, Customer Service & Support and pole computing services. We are aware of the many requirements that the networking sector has. Every sector and type of business need its own network. The organization offers excellent work prospects.

### **2.3 Target Group**

To become a network-required institution was the aim of my training company. They get my training bandages from a selection committee that controls candidates, and I also see their client ads on social media. The association cannot reply to each customer separately without the consumer's permission. Before I can launch a company or a group, I need to identify my rivals and their target audiences. They have serious challenges in both their clientele's perception of them and their customer service. In addition, I give my clients a special level of attention.

### **2.4 SWOT Analysis**

Your first step should be to research the benefits, drawbacks, potentials, and hazards of a clothing design. Once you've determined what the problem is, analyze its shortcomings until you know what it is.

## 2.5 Organizational Structure

You must assess the partnership's advantages, disadvantages, opportunities, and dangers before deciding on a partnership structure. Once you have an understanding of it, examine its flaws until you find a solution.

One of Bangladesh's top ICT solution providers, NetWorld Group offers a variety of services and products to banks and other financial institutions all throughout the nation. Through our various businesses, we put our belief in the advancement of mankind through innovation into practice. Since 2006, we have offered financial institutions and other clients around the nation IT support and services. To be the finest ICT solutions provider in the nation by being innovative, providing exceptional customer service, being trustworthy, and supporting Bangladesh's effort to grow its technology. To create smooth, dynamic, and improved banking experiences for our clients through innovation and sector-leading design. The NCR Corporation's approved distributor is NetWorld Technology Limited. NCR is widely regarded as the world's top manufacturer of ATMs, as well as a leader in consumer transaction technologies and self-service solutions. Along with various forms of banking software and solutions, we offer NCR's ATMs (both dispensers and recyclers). Along with performing FLM (First Level Maintenance) and SLM (Second Level Maintenance) work, we also offer an ATM Managed Service that includes UPS, AC, and other types of ATM Booth maintenance. Through our cooperation with NCR, we also offer the premier Automated Cheque Clearing Solution to banks. Avanza Solutions and NetWorld Technology are partners in offering financial middleware solutions to enhance the effectiveness and dynamism of banking services. Avanza is a multinational provider of software solutions with a focus on enterprise application services, IT consulting, e-commerce and e-banking solutions, infrastructure management, and quality services.

A significant supplier of security solutions in Bangladesh is NetWorld Services Limited. Certis Technology Pte Ltd, a Singapore-based business with more than 50 years of experience in the security field, has chosen NetWorld Services as its official distributor. According to the Central Bank of Bangladesh's criteria, we offer CISCO, MicroTik, and install CCTV monitoring and access control, as well as the upkeep and storage of CCTV footage (Bangladesh Bank).

## CHAPTER 3 TASK AND ACTIVITIES

### 3.1 Daily Work and Performances

I put in a lot of effort every day as an intern and generate a lot of content. Network Technology Limited was the name of the internship company where I archived my knowledge. My team and I stay in touch daily, and they help me out academically all semester.

### 3.2 During the first several days, they teach me the fundamentals of knowledge.

1. To terminate the con, tie a knot.
2. Network configurations.
3. The topology of the network.
4. A range of transmission techniques.
5. Ethernet cabling.

### 3.3 End the ruse with a knot

Laptops, desktop computers, mobile phones, scanners, and other similar gadgets are all allowed as long as they are data-admitting and can shoot.

### 3.4 Topology of Network

The communication network includes this. Type of network topology:

1. Mesh
2. Star
3. Bus
4. Ring

- **Mesh** : A sort of point-to-point connection known as a mesh topology connects several bumps simultaneously. At height  $n$ , this network has  $n(n-1) / 2$  anchors.
- **Star** : The Star network is the most widely used network. A principal network device, such as a switch, computer, or hub, is present in every star network design. The primary network component serves as a server.
- **Bus** : Each node is joined by a large cable. Bus topology is the term for it

- **Ring** : The only two bumps on either side of the ring topology connect it via a point-to-point link (P to P).

### 3.5 Network Categories

- LAN (Local Area network)
- MAN (Metropolitan Area Network)
- WAN (Wide Area network)

#### LAN (Local Area network)

- providing connection to the computers hosting centralized applications;
- Enable the centralized storage of business-critical data across all devices.;
- Share resources for common services like apps and printers.;
- Allow several LAN-connected devices to share a single internet connection.;
- Utilize a network security solution to safeguard gadgets connected to LAN

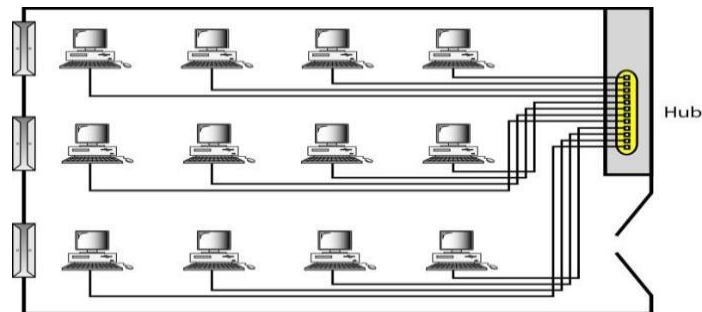


Fig. 3.1: LAN

## MAN (Metropolitan Area Network)

- a) It is a city-wide plan.
- b) It could be private or public.
- c) Internet service provider (ISP) and cable television network (Cable TV).

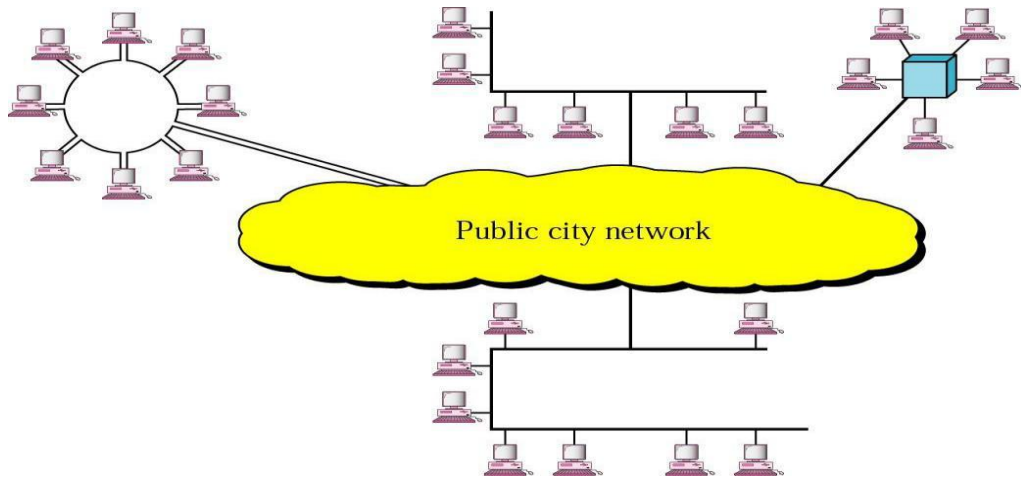


Fig. 3.2: MAN

In this above figure we can see MAN network which consist of some small network. This type of network mainly stablish at the Metropolitan area.



## WAN (Wide Area Network)

- a. Use this method for transmissions across huge distances.
- b. A WAN is owned and used by just one company.

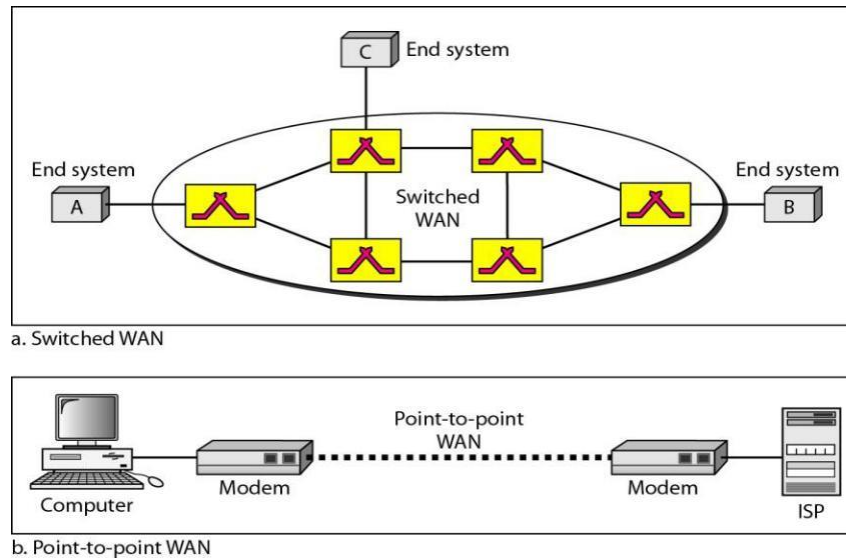


Fig. 3.3: WAN

WAN refers to Wide Area Network which covers a wide area as well as it connects different type of network. Under WAN there can be MAN as well as LAN. In this type of network architecture , there are lots of users.

### 3.6 Media Converter

A piece of fiber optic networking hardware is a media converter. With the help of this equipment, Electrical signals are employed in copper UTP network connections to produce optical waves that are used in fiber optic cables. A fiber optic connection is required if the distance between the two network devices is larger than the copper cable's transmission distance [4].

The fiber patch cord is attached to this device on both sides. A patch cord is also used to connect the fiber optic cable core. Fiber optic cables with 4 cores, 12 cores, 24 cores, 48 cores, and 96 cores are among the types used by ISPs.



Fig. 3.4: Media Converter

In the above figure we can see a MC or Media Converter is used to convert light signal to electronic signal and that signal passed to the router.

### 3.7 FTTx Network

The most crucial component of an ISP's network is the FTTx network. The use of optical fiber optic cable is decreased. Fiber optic cable will be used to link an OLT, a PON module, and a Fiber Splitter to the center. There are several different types of fiber splitters. 1:1, 1:4, 1:8, and 1:16 are the ratios. In the last mile, the following connections between Splitter and ONU were made: in 1:32, 1:64, 1:72, 1:72, 2:4, 2:8, 2:00, 2:00, 2:00, 2:00, 2:00.

#### 3.7.1 ONU :

ONU stands for optical network unit in abbreviated. The optical impulses transmitted across fibers are converted into electrical signals by the ONU. Each subscriber then receives these electrical impulses. There is often a distance or another access network between ONU and the end user's location.

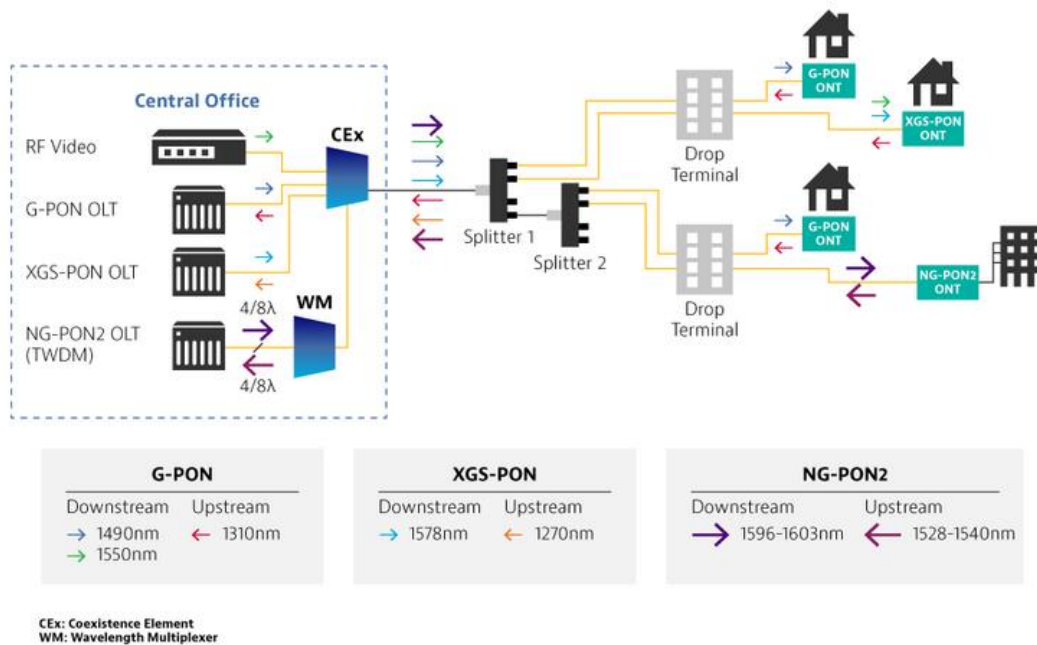


Fig. 3.5: FTTx Network

## CHAPTER 4

### CISCO

#### 4.1 IP Address

The term "IP" is used to refer to Internet Protocol. The movement of all data through the Internet is what propels it. The address is dual-configured for the two IP types that are currently used on the global internet (IPv4 and IPv6). Compared to IPv4 addresses, which have 32 bits, IPv6 addresses contain 128 bits.

Both have an IPv4 to IPv6 conversion. Although these two protocols are incompatible, a "dual stack" system can transport data across both IPv4 and IPv6. The main importance of IP addressing is TCP/IP. Numbers are expressed as precise decimals. Four octets are separated by the void (192.168.10.1). The number given to each quintet ranges from 0 to 255. In order to communicate via the Internet, a protocol must be used. This protects the Internet's universal protocol.

#### 4.2 IP Address Classes

Class	Address Range
Class A	1.0.0.1 to 126.255.255.254
Class B	128.1.0.1 to 191.255.255.254
Class C	191.0.1.1 to 223.255.254.254
Class D	224.0.0.0 to 239.255.255.255

### 4.3 IP Subnet Class C

192.168.1.0/26

Block Size = 256 - 192 = 64 Block size

$2^n = 2^2 = 4$  Network

Host		
$2^n - 2$		
$2^6 - 2 = 64 - 2 = 62$		
Subnet Mask:	255.255.255.192	
Network	Host	B/A
192.168.1.0	1-62	63
192.168.1.64	63-126	127
192.168.1.128	127-190	191
192.168.1.192	193-254	255

#### 4.4 Sub-networking mask, B-Class

173.17.0.0/19

Subnet Mask =255.255.224.0

Block Size=256-224=32

$2^n=2^3=8$

$2^{13}-2=8192-2=8190$  Host

Network	Host	B/A
173.17.0.0	173.13.0.1-173.17.31.254	173.17.31.255
173.17.32.0	173.17.32.1-173.17.63.254	173.17.63.255
173.17.64.0	173.17.64.1-173.17.95.254	173.17.95.255
173.17.96.0	173.17.96.1-173.17.127.254	173.17.127.255
173.17.128.0	173.17.128.1-173.17.159.254	173.17.159.255
173.17.160.0	173.17.160.1-173.17.191.254	173.17.191.255
173.17.192.0	173.17.192.1-173.17.223.254	173.17.223.255
173.17.224.0	173.17.224.1-173.17.255.254	173.17.255.255

|

## 4.5 VLSM

By using different length subnet masks for various network configurations, we'll show you how to create many networks from a single network. This system is known as the VLSM network.

Given IP:173.10.0.0

Now Need HR Department 509 Host

173.10.0.0/23

$2^9 - 2 = 512 - 2 = 510$

Subnet- 255.255.254.0

Marketing= 1020

Need Marketing = 1020

173.10.0.0/22

$2^{10} - 2 = 1024 - 2 = 1022$

Subnet:255.255.252.0

IT: 1015 Host

173.10.0.0/22

$2^{10} - 2 = 1024 - 2 = 1022$

Subnet- 255.255.252.0

Now Sales 220 host

173.10.0.0/24

$2^8 - 2 = 256 - 2 = 254$

Subnet- 255.255.255.0

## 4.6 Routing Protocol

- The protocol for distance vector routing RIP V-1 bellman ford algorithm was used.

- OSPF link state, IS-IS
- EIGP RIP V-2 Hybrid

## 4.7 Administrative Distance

Connected	0
Static	0/1
EIGRP	90
EIGRP	100
OSPF	110
RIP	120
EIGRP EX	170



Fig. 4.1: IP Related

## 4.8 OSPF Protocol Basic

### OSPF

- Version 2 is a standard that is accessible to anyone.
- Convergence.
- Resulted to an update.
- LSA is used to interact with other routers.
- Classless.
- Manual route summarization is supported by VLSM.



- Greetings! Router from DR&BDR others to DR others at 224.0.0.5 and 224.0.0.6
- Metric: 40 seconds, 10 dead timers.
- multicast addresses for multicasts updated 108 bits per second make up the interface bandwidth (bps).
- The OSPF term "area" describes how a large network is split up into smaller networks.
- Range 1-65535, Area 0 of OSPF (The Backbone) Use a hierarchy and two layers.

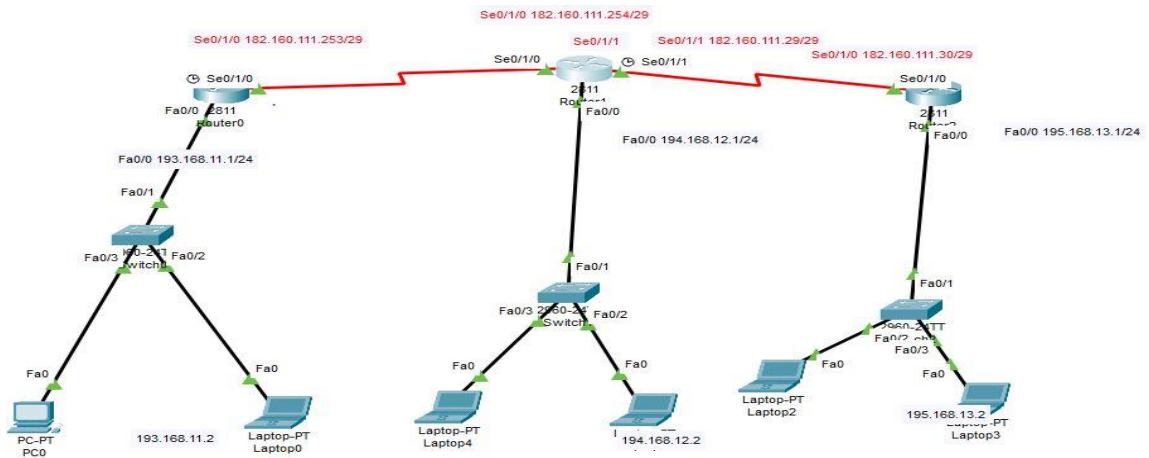


Fig. 4.2: Single area OSPF

## Configuration of OSPF Single area

### OSPF Single area Configuration Output

```
Router1>ena
Router1>enable
Router1#show ip rout
O 182.160.111.24 [110/128] via 182.160.111.254, 00:20:53, Serial0/1/0
C 182.160.111.248 is directly connected, Serial0/1/0
C 193.168.11.0/24 is directly connected, FastEthernet0/0
O 194.168.12.0/24 [110/65] via 182.160.111.254, 00:20:53, Serial0/1/0
O 195.168.13.0/24 [110/129] via 182.160.111.254, 00:20:53, Serial0/1/0
Router_2#
C 182.160.111.24 is directly connected, Serial0/1/1
C 182.160.111.248 is directly connected, Serial0/1/0
O 193.168.11.0/24 [110/65] via 182.160.111.253, 00:23:39, Serial0/1/0
C 194.168.12.0/24 is directly connected, FastEthernet0/0
O 195.168.13.0/24 [110/65] via 182.160.111.30, 00:23:39, Serial0/1/1
Router_3#
C 182.160.111.24 is directly connected, Serial0/1/0
O 182.160.111.248 [110/128] via 182.160.111.29, 00:25:47, Serial0/1/0
O 193.168.11.0/24 [110/129] via 182.160.111.29, 00:25:37, Serial0/1/0
O 194.168.12.0/24 [110/65] via 182.160.111.29, 00:25:47, Serial0/1/0
C 195.168.13.0/24 is directly connected, FastEthernet0/0
```

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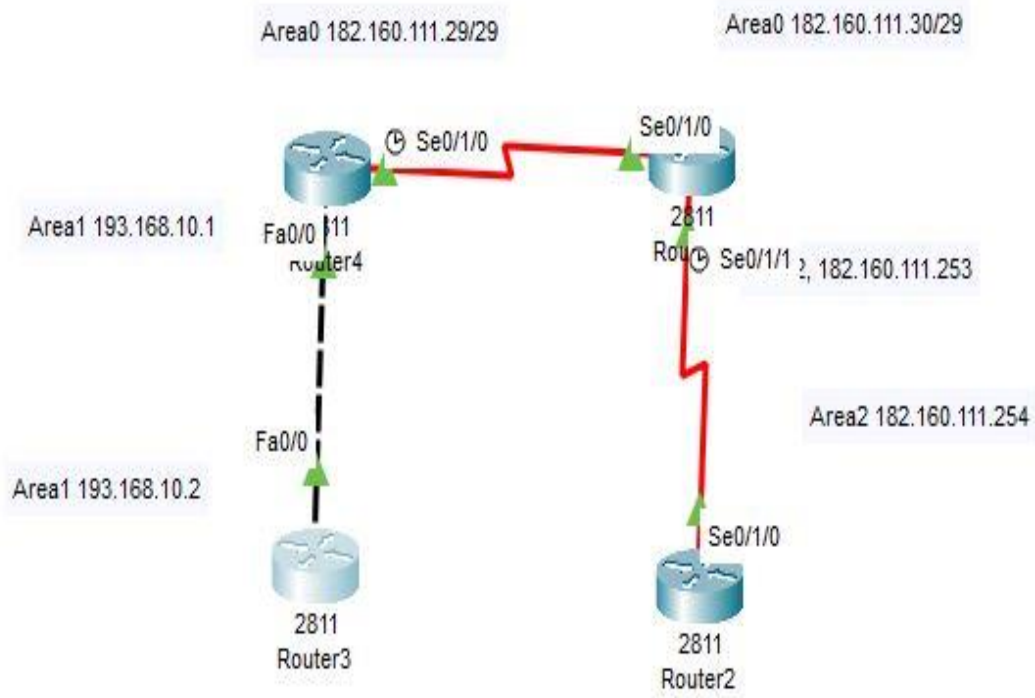


Fig. 4.3 Multi area OSPF

In this above figure we have designed a network to implement Multi area OSPF protocol. In this network I have dynamically routed Area 1 and Area 2, this results area 1 can communicate with area 2. OSPF helps to connect different area. This is a dynamic routing protocol.

## Multi Area OSPF Configuration Output

```
Router_1#
```

```
182.160.0.0/29 is subnetted, 2 subnets
```

```
C 182.160.111.24 is directly connected, Serial0/1/0
```

```
O IA 182.160.111.248 [110/128] via 182.160.111.30, 00:03:51, Serial0/1/0
```

```
C 193.168.10.0/24 is directly connected, FastEthernet0/0
```

```
Router_2#show ip rou
```

```
182.160.0.0/29 is subnetted, 2 subnets
```

```
C 182.160.111.24 is directly connected, Serial0/1/0
```

```
C 182.160.111.248 is directly connected, Serial0/1/1
```

```
O IA 193.168.10.0/24 [110/65] via 182.160.111.29, 00:07:35, Serial0/1/0
```

```
Router_3>ena
```

```
Router_3>enable
```

```
Router_3#show ip rout
```

```
O IA 182.160.111.24 [110/128] via 182.160.111.253, 00:10:23, Serial0/1/0
```

```
C 182.160.111.248 is directly connected, Serial0/1/0
```

```
O IA 193.168.10.0/24 [110/129] via 182.160.111.253, 00:09:43,
```

```
Router_4#
```

```
182.160.0.0/29
```

```
O IA 182.160.111.24 [110/65] via 193.168.10.1, 00:10:46, FastEthernet0/0
```

```
O IA 182.160.111.248 [110/129] via 193.168.10.1, 00:10:46, FastEthernet0/0
```

```
C 193.168.10.0/24 is directly connected, FastEthernet0/0
```

## 4.9 EIGRP

- ◆ Improvements to the internal gateway routing protocol.
- ◆ The Cisco technology that is special.
- ◆ Routing hybrid protocol.
- ◆ speeded-up convergence
- ◆ Promote the adoption of VLSM IP and AppleTalk.
- ◆ The RTP reliable transport protocol is used by EIGRP routers to communicate with one another.
- ◆ EIGRP is a technique for combining two or more routes to determine the optimum course (diffusion update algorithm).
- ◆ This topology is devoid of loops.
- ◆ Automatic and manual route summaries by default Automatic summarization takes place.
- ◆ The MTU is used to calculate measurements for bandwidth, latency, load, and reliability.
- ◆ Multicasting and updating incremental multicast addresses

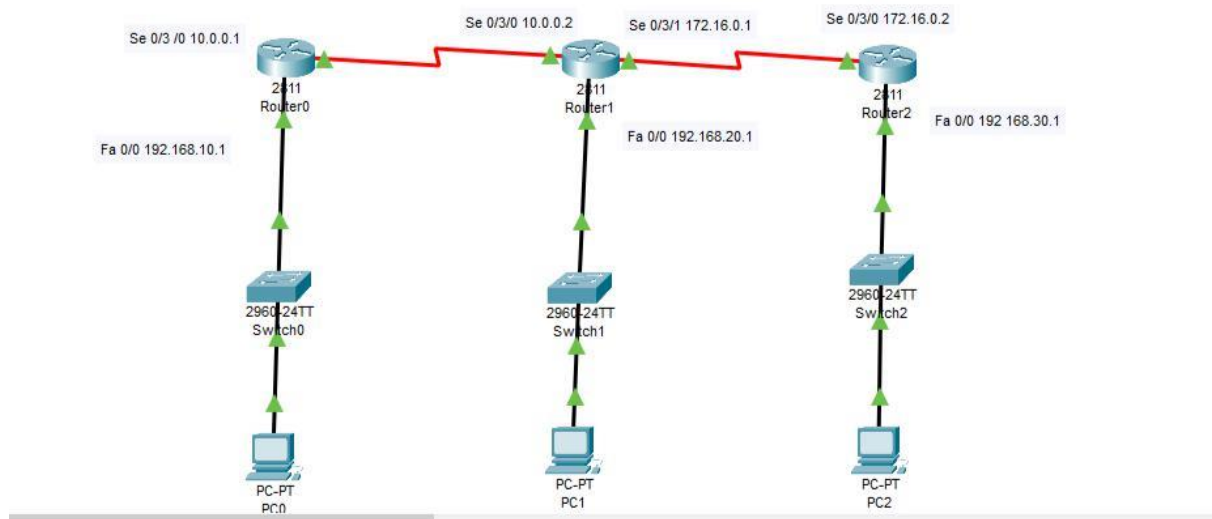


Fig. 4.4: EIGRP

## Configuration of EIGRP Output

```
Router0#show ip route
Gateway of last resort is not set
C 10.0.0.0/8 is directly connected, Serial0/3/0
D 172.16.0.0/16 [90/2681856] via 10.0.0.2, 00:07:26,
Serial0/3/0 C 192.168.10.0/24 is directly connected,
FastEthernet0/0
D 192.168.20.0/24 [90/2172416] via 10.0.0.2, 00:06:48,
Serial0/3/0 D 192.168.30.0/24 [90/2684416] via 10.0.0.2,
00:04:11, Serial0/3/0
```

```
Router1#show ip route
Gateway of last resort is not set
C 10.0.0.0/8 is directly connected, Serial0/3/0
C 172.16.0.0/16 is directly connected, Serial0/3/1
D 192.168.10.0/24 [90/2172416] via 10.0.0.1, 00:14:37,
Serial0/3/0 C 192.168.20.0/24 is directly connected,
FastEthernet0/0
D 192.168.30.0/24 [90/2172416] via 172.16.0.2, 00:10:59, Serial0/3/1
```

```
Router2#show ip route
Gateway of last resort is not set
D 10.0.0.0/8 [90/2681856] via 172.16.0.1, 00:14:10,
Serial0/3/0 C 172.16.0.0/16 is directly connected,
Serial0/3/0
D 192.168.10.0/24 [90/2684416] via 172.16.0.1, 00:14:10,
Serial0/3/0 D 192.168.20.0/24 [90/2172416] via 172.16.0.1,
00:14:10, Serial0/3/0 C 192.168.30.0/24 is directly connected,
FastEthernet0/0
```

## 4.10 Inter-VLAN Routing

A logical collection of network resources and users connected to a switch port under administrative control is known as a VLAN. In a Layer 2 switched network while building a VLAN, you can create a small broadcast domain by allocating different ports on the switch to different subnets. Only frames that are broadcast to the network as if they were on their own subnet or broadcast domain can logically switch across ports in the same VLAN. Do these conditions prevent the use of routers? The answer might be "yes," but it's equally possible that it won't. It is absolutely up to you what you want or need to do. The server often resides in a specified location. If you want to communicate with hosts on another VLAN, however, a VLAN cannot connect with hosts on another VLAN, you will need to use a new VLAN.

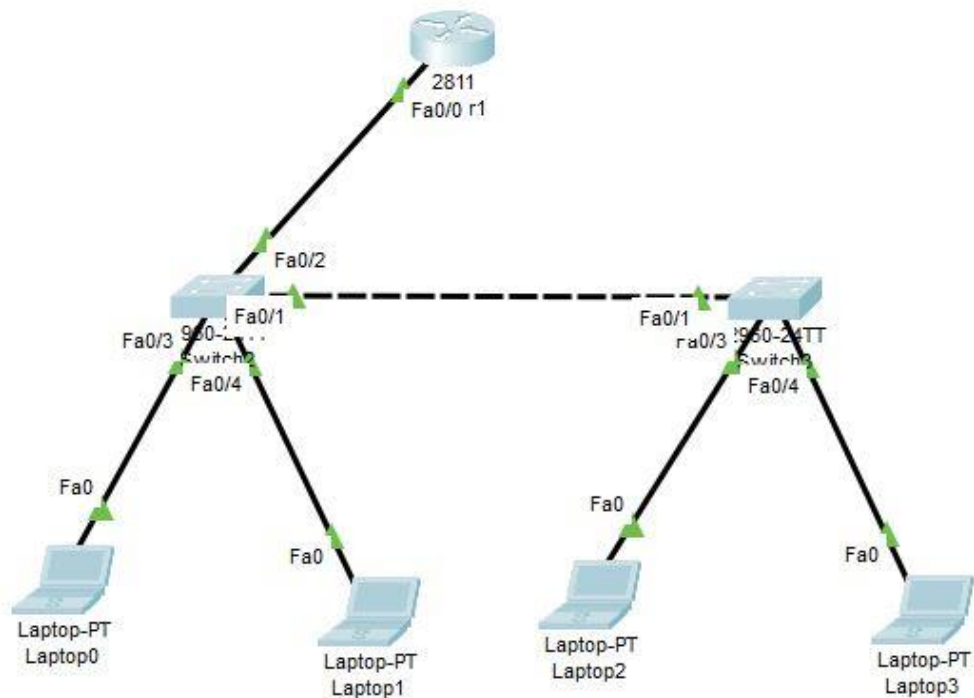


Fig. 4.5: Inter-VLAN Routing

## Configuration of Inter-VLAN routing Output

```
Switch_1#show running-config
Building Configuration...
hostname Switch_1
!
interface FastEthernet0/1
switchport mode trunk
!
interface FastEthernet0/2
switchport mode trunk
!
interface FastEthernet0/3
switchport access vlan 10
switchport mode access
!
interface FastEthernet0/4
switchport access vlan 20
switchport mode access
```

```
Switch_2#show running-config
Building Configuration...
hostname Switch_2
interface FastEthernet0/1
switchport mode trunk
!
interface FastEthernet0/2
!
interface FastEthernet0/3
switchport access vlan 10
switchport mode access
```

```
interface FastEthernet0/4
switchport access vlan 20
switchport mode access
Router#show run
Router#show running-config
Building Configuration...
```



```
interface FastEthernet0/0.1
encapsulation dot1Q 10
ip address 192.168.10.1 255.255.255.0
!
```

```
interface FastEthernet0/0.2
encapsulation dot1Q 20
ip address 10.10.10.1 255.0.0.0
!
```

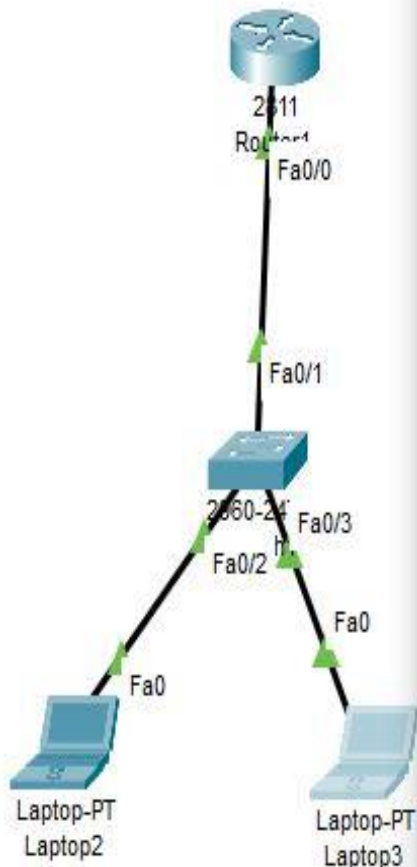
## 4.11 DHCP Server

Full protocol for dynamic host configuration for names (DHCP). It's a network server, to be more precise. It automatically gives IP addresses to clients, such as PCs, laptops, and mobile servers. Customers' devices won't have root access or any other network functions. Customers may rely on DHCP to reply to broadcast queries as a result.

The client can automatically and correctly interact across the network thanks to the parameters that the DHCP server will supply. Otherwise, the network administrator would have to manually set up each new client connecting to the network. This can be challenging, particularly on broad networks. Normally, each client is given a dynamic IP address that changes as it expires.

TCP/IP configuration by manually:

- The IP address of every client computer is manually entered.
- You might enter a fictitious or incorrect IP address.
- A bad configuration could cause communication and network issues.
- On networks, there is an administrative overload when PCs are often transferred.



Laptop3

Physical Config **Desktop** Programming Attributes

**IP Configuration**

Interface: FastEthernet0

IP Configuration

DHCP  Static

IP Address: 192.168.20.3

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.20.1

DNS Server: 1.1.1.1

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address: [Empty Field]

Link Local Address: FE80::206:2AFF:FE1E:8A82

IPv6 Gateway: [Empty Field]

IPv6 DNS Server: [Empty Field]

802.1X

Use 802.1X Security

Top

Fig. 4.6: DHCP Server

## Configuration of DHCP Server Output

```
DHCP_Router#show
DHCP_Router#show ru
DHCP_Router#show running-config
hostname DHCP_Router
ip dhcp pool DHCP_New_Server
network 192.168.20.0 255.255.255.0
default-router 192.168.20.1
dns-server 1.1.1.1
interface FastEthernet0/0
ip address 192.168.20.1 255.255.255.0
duplex auto
speed auto
```

## 4.12 NAT

Similar to Class-less inter-domain routing, the initial purpose of NAT was to prevent the exhaustion of the available IP address space by allowing a large number of private addresses to be represented by a small number of public IP addresses (CIDR) [3].

NAT is increasingly recognized as being helpful for network development, network migration, and server load balancing.

The number of public IP addresses needed for network configuration may occasionally be decreased through NAT. NAT is quite effective when two organizations with distinct internal address systems work together.

The following list of NAT facilities:

1. It provides you a public IP address and allows you to save money.
2. I require internet access, but the host doesn't have a global IP address.
3. You must renumber your network because you are changing Internet service providers. It is necessary to connect two networks that have the same addresses.

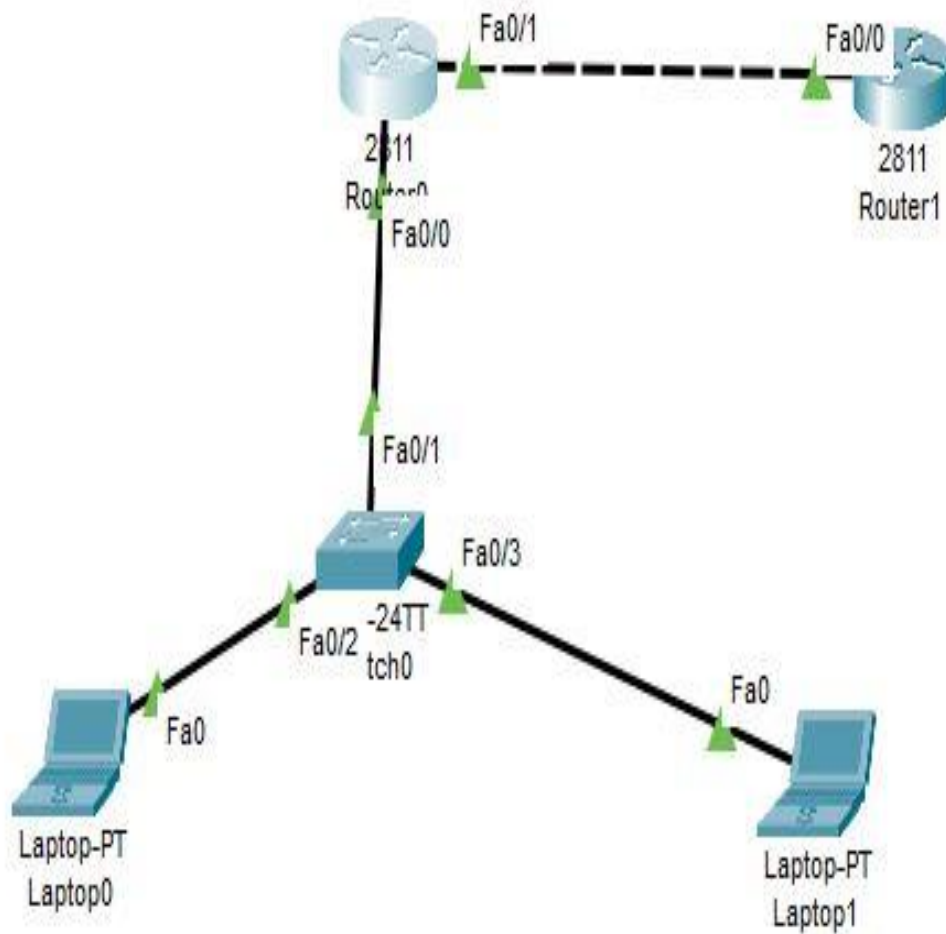


Fig. 4.7: NAT

## NAT Configuration Output

```
Router>ena
Router>enable
Router#show run
Router#show running-config
Building configuration...
hostname NAT_Router

interface FastEthernet0/0
ip address 192.168.10.1 255.255.255.0
ip nat inside
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 182.160.111.250 255.255.255.248
ip nat outside
duplex auto
speed auto
!
ip nat pool abc 182.160.111.250 182.160.111.250 netmask 255.255.255.248
ip nat inside source list 10 pool abc overload

access-list 10 permit 192.168.10.0 0.0.0.255
```

## 4.13 ACL (Access Control List)

If a secure network is what you need. Utilize an ACL to your advantage. As if there were a difficulty with privileges and limited access. When a match is found, top-down processing of the ACL statements stops, and the remaining statements in the list are not processed any further. List the statements in order of decreasing degree of restriction, starting with the most restrictive. The packet is implicitly discarded if there is no match in the list.

Cisco ACL are given below

Standard ACL, Work only source

Extended ACL, Source and destination, Protocol

Standard ACL 1-99, 1300-1999

Extended ACL 100-199, 2000-2699

```
Router_3>
```

```
Router_3>confi
```

```
Router_3>ena
```

```
Router_3>enable
```

```
Router_3#conf
```

```
Router_3#configure ter|
```

```
Router_3#configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Router_3(config)#acc
```

```
Router_3(config)#access-list ?
```

```
<1-99> IP standard access list
```

```
<100-199> IP extended access list
```

```
Router_3(config)#access-list 1300 ?
```

```
% Unrecognized command
```

```
Router_3(config)#access-list 10 per
```

```
Router_3(config)#access-list 10 permit any
```

```
Router_3(config)#access-list 10 de
```

```

Router_3(config)#access-list 10 deny 193.168.11.2 ?
A.B.C.D Wildcard bits
<cr>
Router_3(config)#access-list 10 deny 193.168.11.2 0.0.0.0 ?
<cr>
Router_3(config)#access-list 10 deny 193.168.11.2 0.0.0.0
Router_3(config)#acc
Router_3(config)#access-list perm
Router_3(config)#access-list 10 per
Router_3(config)#access-list 10 permit an
Router_3(config)#access-list 10 permit any ?
<cr>
Router_3(config)#access-list 10 permit any
Router_3(config)#inter
Router_3(config)#interface fas
Router_3(config)#interface fastEthernet 0/0
Router_3(config-if)#ip acc
Router_3(config-if)#ip access-group 10 ?
in inbound packets
out outbound packets
Router_3(config-if)#ip access-group 10 ou
Router_3(config-if)#ip access-group 10 out ?
<cr>
Router_3(config-if)#ip access-group 10 out
Router_3(config-if)#exit
Router_3(config)#exit
Router_3#
%SYS-5-CONFIG_I: Configured from console by console

Router_3#wr

```

```

Router_3#write
Building configuration...
[OK]
Router_3#ping 192.168.11.2

```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.11.2, timeout is 2 seconds:

.....

Success rate is 0 percent (0/5)

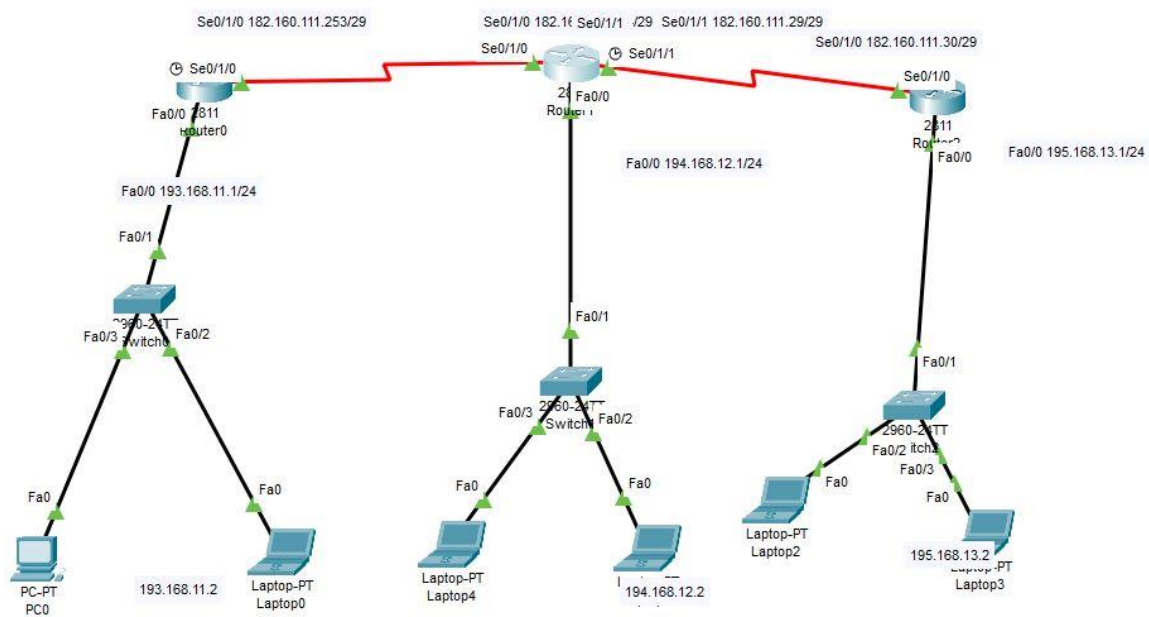


Fig. 4.8: Access Control List



## **CHAPTER 5**

### **COMPETENCIES & SMART PLAN**

#### **5.1 Competencies Earned**

Throughout the internship, I picked up a lot of new knowledge. I have a great opportunity to improve my practical knowledge. I learned all I didn't know about how networks work and how they interact with one another throughout my internship. During my internship, I learned about core networking ideas including IP addresses, static routing, dynamic routing, NAT, PAT, VLAN, sub-netting, etc. Additionally, I have experimented with real hardware like switches, UTP cables, and routers. I gained knowledge about setting up and configuring networks.

#### **5.2 Smart Plan**

In order to learn anything new, one needs to pay closer attention to the details. The networking industry is very complex, but complexity can be minimized by working with a solid plan. Despite the numerous challenges I faced during my internship, having a clear plan allowed me to decide on my best path of action.

#### **5.3 Reflections**

While theoretical knowledge cannot adequately prepare one for employment in the real world, an internship can close the knowledge gap. Internships offer a variety of options for new graduates. because a student can learn from professionals during an internship and collaborate with others to solve problems in the real world. I believe that my internship has helped me develop my abilities in preparation for a future job.

## CHAPTER 6

### CONCLUSION & FUTURE CAREER

#### 6.1 Conclusion

At Networld Technology Limited, I had a variety of positions to pick from. You will have a range of possibilities and experiences during the training sessions. This sector of computer office network planning and design encompasses a wide range of activities. A few responsibilities of the position include network security, data and internet connectivity, and various program configuration and maintenance. The paper also contained details on how to set up, configure, and optimize office networks. Throughout the internship, my supervisor taught me many useful skills, and after performing a few jobs as per usual, I gradually developed the courage to take risks on my own. I believe this is a fantastic opportunity for them to apply who they are and what they know. Additionally, I learnt how to overcome huge obstacles every day and produced new ideas every day. I'm going to give this painting technique another shot because it will be very beneficial for my upcoming employment.

#### 6.2 Future Scope

This internship has helped me learn a lot about the network. I got some aid from it. It's possible that it will benefit me later on in both my personal and professional lives.

1. These internship possibilities will aid in my quest for a decent position.
2. I'm capable of launching my own Internet service provider.
3. In order to try my hand at working as a skilled worker in this area, I am learning more about this subject.
4. Your internship could assist you in getting a job in a bank.
5. I am prepared to take the CCNA Exam.

## CHAPTER 7

### CASE STUDY

#### 7.1 Packet Loss

```
Pinging 192.168.0.196 with 32 bytes of data:
Reply from 192.168.0.196: bytes=32 time<1ms TTL=128
Reply from 192.168.0.196: bytes=32 time<1ms TTL=128
Reply from 192.168.0.196: bytes=32 time<1ms TTL=128
Reply from 192.168.0.196: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.196:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Fig 7.1 : Packet Loss check

#### What is Packet Loss:

Data is transmitted and received over the network in discrete units known as packets in any network setting. This holds true for everything I do online, including sending and receiving emails, watching video, playing games, and uploading or downloading images and data.

Packet loss occurs when one or more of these packets are broken up in the middle. In order to facilitate routing, Transmission Control Protocol (TCP) separates files into efficiently sized packets. Each package has a unique number and the Internet address of the recipient. Each individual packet can take a different route, and upon arrival, the receiving TCP will decompress it back into the original file.

Data is transmitted and received over the network in discrete units known as packets in any network setting.

### Reasons for Packet Loss:

- A cable or Ethernet port with a problem.
- Problems with your PC's network interface controller (NIC).
- Outdated firmware for routers.
- Network sluggishness.
- Server problems with the game.

### 7.2 ONU for FTTX connectivity

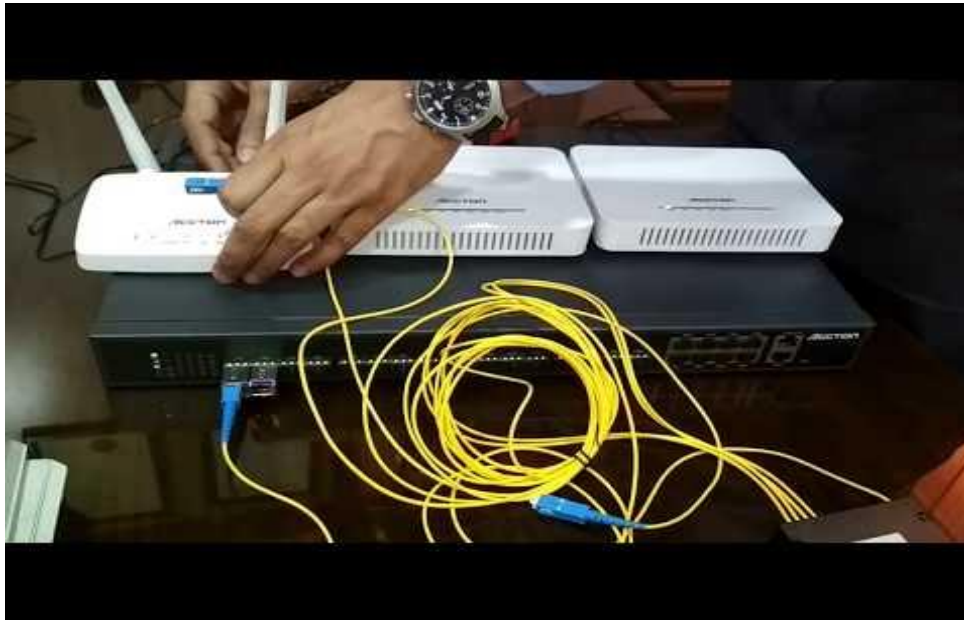


Fig 7.2 : ONU for FTTX connection

A gateway ONU based on GPON technology called ONU300G-4GE2V2W is intended for users at home and in SOHOs (small offices and home offices). Equipped with an optical interface conforming to the ITU-T G984.X and ITU-T G.988 standards. For FTTH requirements, fiber access offers high-speed data channels that can deliver enough bandwidth support for a variety of innovative network applications. It offers numerous concurrent users two voice interfaces and four channels of self-adaptive 10/100/1000M Ethernet interfaces.

## 7.3 Troubleshooting for Bandwidth

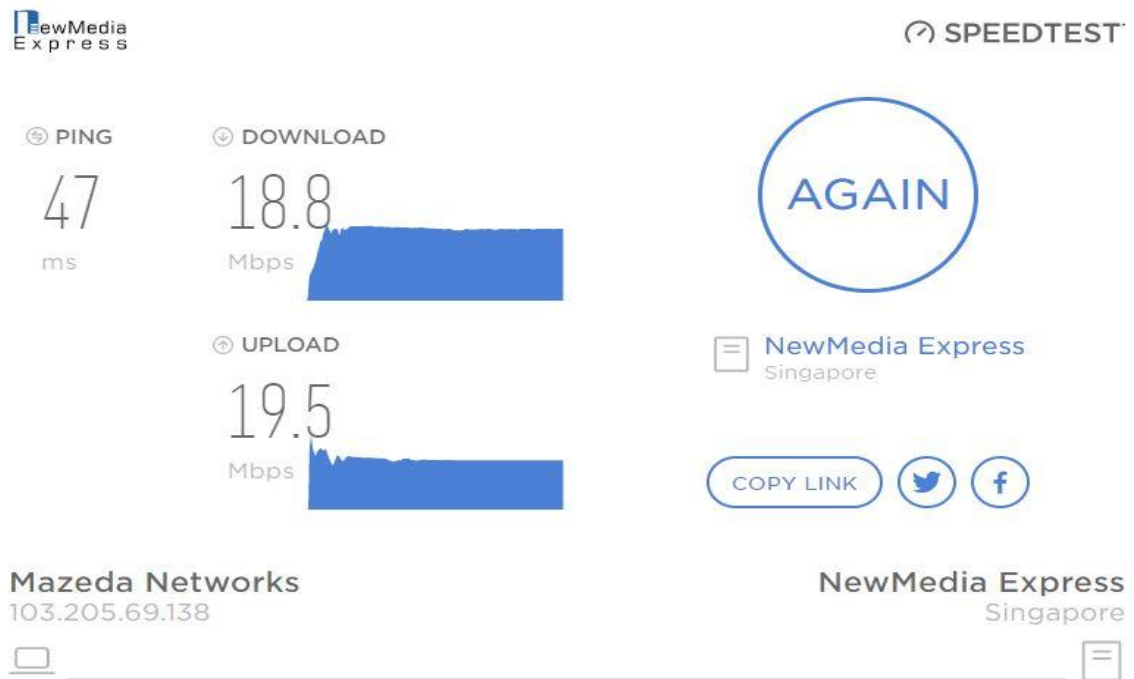


Fig 7.3 : Troubleshooting of Bandwidth

**How to speed up internet downloads and make the most of your internet connection is provided here:**

- Switch off your computer.
- Close programs and applications you don't need.
- Unplug other devices.
- Invest on an Ethernet cable.
- For associated devices, update the drivers.

## 7.4 Splicing Machine

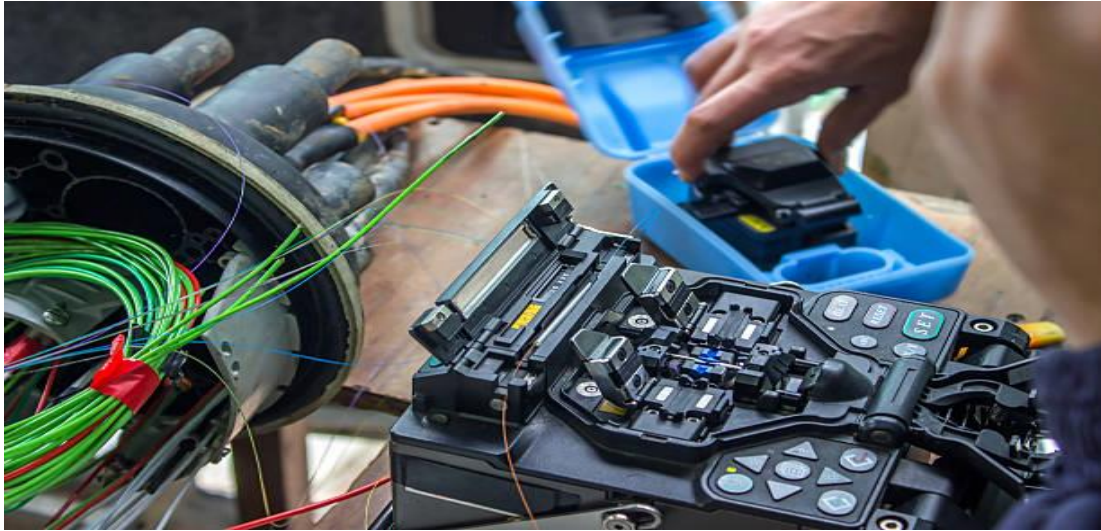


Fig 7.4 : Splicing Machine of Fiber

In fusion splicing, two fiber ends are precisely aligned by a machine before the glass ends are heated or fused together by an electric arc. This creates a continuous link between the fibers and allows for the transmission of light with very minimal loss.

### **What is the splicing procedure :**

The method by which exons (i.e., coding sections) are linked together to form mature messenger RNA while introns, the non-coding portions of genes, are removed from the primary messenger RNA transcript. The latter acts as a model for the creation of a particular protein.

## 7.5 Troubleshooting of ATM Link Down

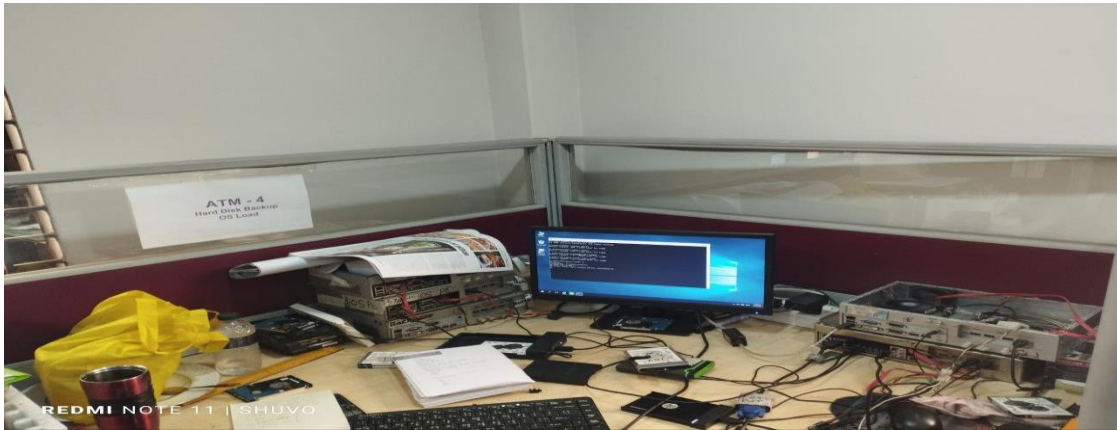


Fig 7.5 : ATM Link down

## 7.6 ATM Switching

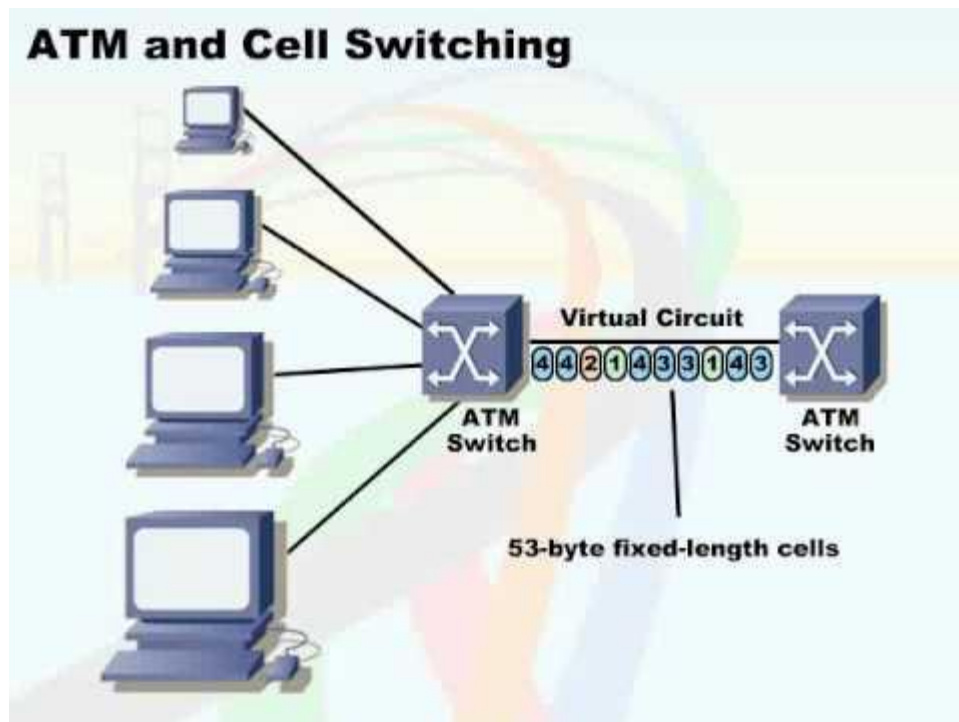


Fig 7.6 : ATM & Cell Switching



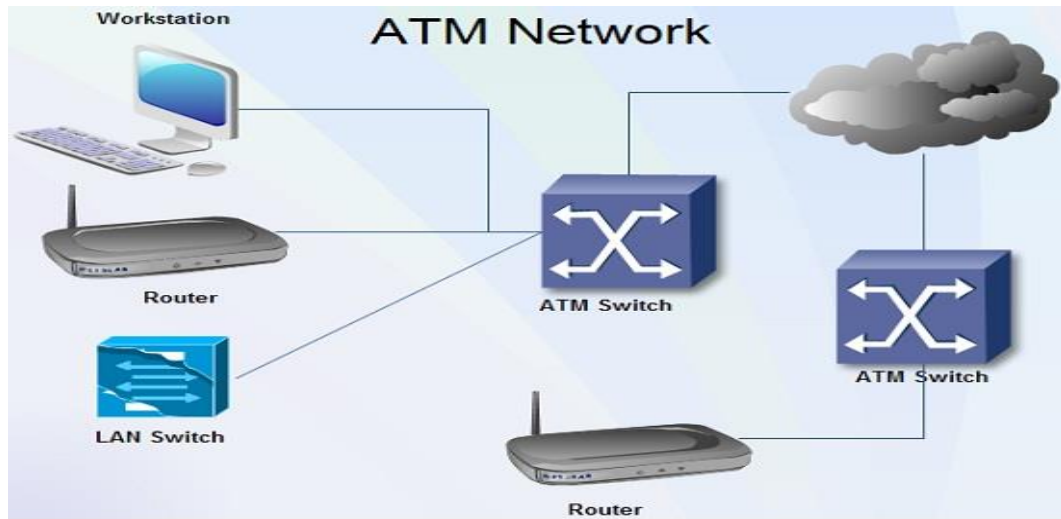


Fig 7.7 : ATM Network Procedure

ATM switching is a type of packet switching where cells are defined as packets with a fixed length. This switching is intended for very high quality links with high speed transmission methods.

**The process of switching in an ATM network:**

In ATM networks, a connection is made when a routing determination has been made for the first cell in a flow. The remaining cells in the flow are then forwarded using basic switches based solely on their Virtual Connection Identifier (VCI) and Virtual Path Identifier (VPI).



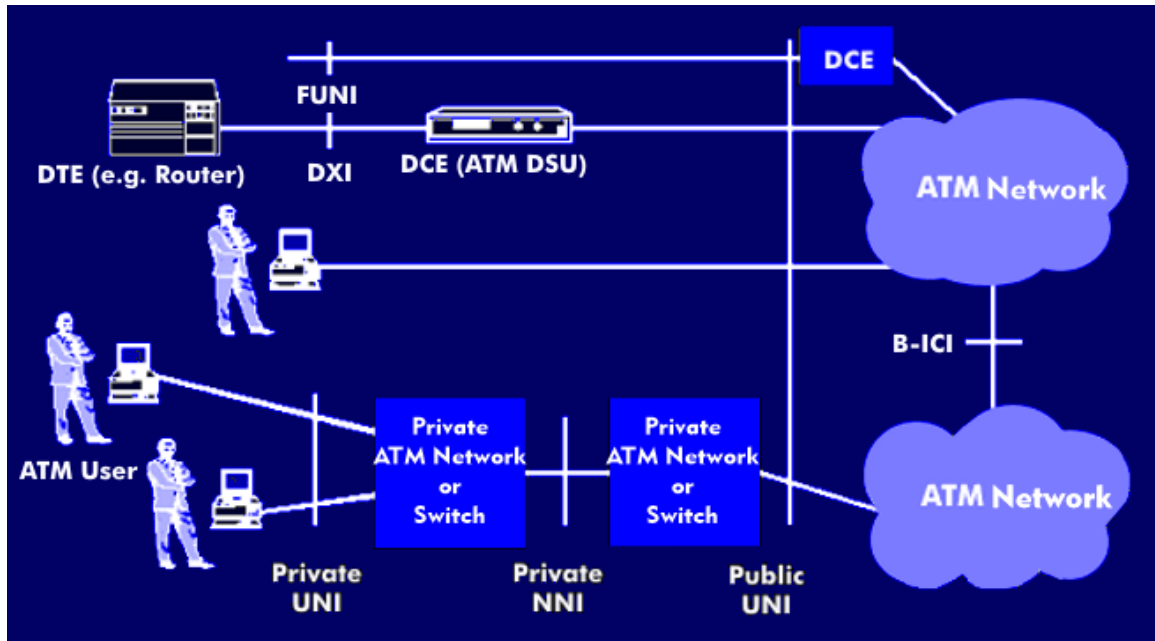


Fig 7.8 : ATM Networking Interface

### What purpose does an ATM switch serve :

Through an ATM switch, a bank's ATMs are linked to its accounting system (es). By establishing apex level switches to allow communication between the ATM switches of various banks, inter-bank ATM networks can be built.



Fig 7.9 : ATM Operation at NCR Lab

## **Appendixes**

### **Appendix A: Internship Reflection**

The only actual knowledge is found at the conclusion of the task. I used to think about what I had observed and the gifts I had given the individuals I worked with when I complimented them. I've used that as an illustration of ethical behavior in business. Consider how you can interact with others and the master caregiver while leveraging the help of your clients and your own productive behavior. There is a master teacher and a group of specialists involved. The key is being depressed. An entrepreneurial mindset, interpersonal skills, resource optimization, and certain specialist expertise are beneficial to the orchestration and decision-making processes. establishing a business and addressing its obligations as well as those of its participants Feedback Internship The person in charge of my internship knit me something. a tool for evaluation that allows you to look for a specific assembly. Pick a master.

### **Appendix B: Company Details**

Name : Networld Technology Limited

Address : 41/1 Zeenat Bhaban(1<sup>st</sup> floor), Kazi Nazrul Islam Avenue, Dhaka-1215

Phone : +8802-8144503

Email : info@networld-bd.com

Fax : 88-02-8144503

Website : www.networld-bd.com

## References

- [1] Todd Lammle, Cisco Certified Network Associate, Sixth Edition, Wiley publishing 2007, Page, 115-134, 417-482, 552-607.
- [2] Manual: IP/DHCP Server, available at <<[https://wiki.mikrotik.com/wiki/Manual:IP/DHCP\\_Server](https://wiki.mikrotik.com/wiki/Manual:IP/DHCP_Server) >> 3-26-2021, 5:00PM.
- [3] Manual: IP/Firewall/NAT available at <<<https://wiki.mikrotik.com/wiki/Manual:IP/Firewall/NAT>>> 12-4-2021 3:30PM.
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- [5] Kaspersky, “What is an IP address – definition and explanation,” [www.kaspersky.com](http://www.kaspersky.com), 18-Apr-2022. [Online]. Available: <https://www.kaspersky.com/resource-center/definitions/what-is-an-ip-address>. [Accessed: 05-Jan-2023].
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## Final Defense Abu Solaiman

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