

# CCNA ROUTING AND SWITCHING

**SUBMITTED**

**BY**

**Delowar Hossain**

**ID: 162-15-8117**

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

Supervised By

**Md. Rakib Hasan**

Lecturer

Department of CSE

Daffodil International University



**DAFFODIL INTERNATIONAL UNIVERSITY**



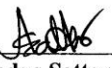

**DHAKA, BANGLADESH**

**MAY 2019**

## **APPROVAL**

This internship titled “ **CCNA Routing & Switching**”, submitted by **Delowar Hossain**, ID No: **162-15-8117** 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 04 May 2019.

### **BOARD OF EXAMINERS**

 _____	
<b>Dr. Syed Akhter Hossain</b> <b>Professor and Head</b> Department of Computer Science and Engineering Faculty of Science & Information Technology Daffodil International University	<b>Chairman</b>
 _____	
<b>Nazmun Nessa Moon</b> <b>Assistant Professor</b> Department of Computer Science and Engineering Faculty of Science & Information Technology Daffodil International University	<b>Internal Examiner</b>
 _____	
<b>Abdus Sattar</b> <b>Assistant Professor</b> Department of Computer Science and Engineering Faculty of Science & Information Technology Daffodil International University	<b>Internal Examiner</b>
 _____	
<b>Dr. Mohammad Shorif Uddin</b> <b>Professor</b> Department of Computer Science and Engineering Jahangirnagar University	<b>External Examiner</b>

## DECLARATION

I hereby notify that, this internship report is prepared by me, Delowar Hossain, ID No: **162-15-8117** to the department of Computer Science and Engineering, Daffodil International University. Under the supervisor of **Md. Rakib Hasan, Lecturer, Department of CSE, Daffodil International University.** I also notify that this internship report nor any part of this internship report has been submitted elsewhere for award of any Degree or Diploma.

Supervised by:



---

**Md. Rakib Hasan**

Lecturer

Department of CSE

Daffodil International University

Submitted by:



**Delowar Hossain**

ID: 162-15-8117

Department of CSE

Daffodil International University

## ACKNOWLEDGEMENT

At first I want to express heartiest thanks and thankfulness to all-powerful God for his celestial gift makes us conceivable to finish the Final year internship effectively.

I extremely appreciative and wish significant obligation to **Md. Rakib Hasan, Lecturer, Department of CSE Daffodil International University, Dhaka**. He was always guiding me to successfully complete the internship periods. Profound Knowledge and unmistakable fascination of administrator in the field of "CCNA Routing & Switching" to do this entry level position. His unending tolerance, insightful direction, persistent consolation, consistent and lively investigation, productive feedback, significant guidance, perusing numerous second rate draft and revising them at all stage have made it conceivable to finish this Internship.

Heartiest thanks to **Dr. Syed Akhter Hossain, Professor and Head, Department of CSE**, for his kind help to finish my internship. I want also like to thank my parents and friends who helped me a lot in finishing this training within the limited time. I would like to extend my sincere appreciation to my friends Ruman and Fahad who offered many suggestions for the training and training time.

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

## **ABSTRACT**

This Internship titled "CCNA Routing and Switching" is mixed various field of computer networking. If two or more PCs are interconnected and ready to trade and share information or data then we call Network. We need a lots of computer connected to. At present and future we can't think anymore without internet. So we should take it seriously and achieve it for our future life. That's why I pick this subject of my report is "Internship on CCNA Routing and Switching" on Computer Networking. The report talked about the reason for the particular Routing, switching, Addressing, RIP, EIGRP, OSPF and VLAN. The context include connecting to a WAN, implementing network security, network types, network media, routing and switching fundamentals, the TCP/IP and OSI models, IP addressing, WAN technologies, operating and configuring IOS devices, extending switched networks with VLANs, determining IP routes, managing IP traffic with access lists, and establishing point to point internet connections. And configures the all communication system or networking type.

## TABLE OF CONTENTS

<b>CONTENTS</b>	<b>PAGE</b>
Approval	i
Declaration	ii
Acknowledgement	iii
Abstract	iv
Table of contents	v
List of Figure	vii
<b>CHAPTER</b>	
<b>CHAPTER 1: INTRODUCTION</b>	<b>1-3</b>
1.1 Introduction	1
1.2 Motivations	1
1.3 Internship Objectives	2
1.4 Introduction to the Company	2
1.5 Report Layout	2
<b>CHAPTER 2: INTERNSHIP ORGANIZATION</b>	<b>4-6</b>
2.1 Company Introduction	4
2.2 Services and Market Situation	4
2.3 SWOT Analysis	5
2.4 Organizational Structure	6
<b>CHAPTER 3: TASKS, EVENTS AND ACTIVITIES</b>	<b>7-35</b>
3.1 Daily Task and Activities	7
3.2 Internetworking Technology	8
3.3 OSI & TCP/IP Model	10
3.4 IP Addressing and Sub-netting	13
3.5 Routing Protocol Information	16
3.6 Static and Default Routing	18

3.7 Routing Information Protocol (RIP)	19
3.8. Enhanced Interior Gateway Routing Protocol(EIGRP)	21
3.9 Open Shortest Path First (OSPF)	23
3.10 NAT and PAT	26
3.11 Switching Introduction	28
3.12 Virtual Local Area Network (VLAN)	31
3.13 Wireless Technology	33
3.14 Challenges	35
<b>CHAPTER 4: COMPETENCIES AND SMART PLAN</b>	<b>36</b>
4.1 Competencies Earned	36
4.2 Smart Plan	36
4.3 Reflections	36
<b>CHAPTER 5: CONCLUSION AND SMART PLAN</b>	<b>37</b>
5.1 Discussion and Conclusion	37
5.2 Scope for Further Career	37
<b>REFERENCES</b>	<b>38</b>
<b>APPENDIX</b>	<b>39</b>
Internship Reflection	39
Company Detail	40

## LIST OF FIGURES

<b>FIGURES</b>	<b>PAGE NO</b>
Figure 2.1: Organizational Structure	6
Figure 3.1 : RIP Routing Table 1	19
Figure 3.2 : RIP Routing Table 2	20
Figure 3.3 : EIGRP Neighbor establishment IP Cisco Packet	21
Figure 3.4 : Neighbor relationship distribute list	22
Figure 3.5 : EIGRP Topology	22
Figure 3.6 : Router 1 Configuration	22
Figure 3.7 : Router 2 Configuration	22
Figure 3.8 : OSPF Area Defined	24
Figure 3.9: OSPF Topology	24
Figure 3.10 : Router 1 Configuration	24
Figure 3.11 : Router 2 Configuration	24
Figure 3.12 : Showing OSPF Neighbor	25
Figure 3.13 : Showing IP Routes	25
Figure 3.14 : Simple NAT Topology	26
Figure 3.15 : NAT Terminology	27
Figure 3.16 : Wireless Repeater	28
Figure 3.17 : Network Hub	29
Figure 3.18 : Network Bridge	29
Figure 3.19 : Fig: Network Switch	30
Figure 3.20 : VLAN Configure	32
Figure 3.21 : Inter VLAN	32
Figure 3.22 : Tower	33
Figure 3.23 : Wireless LAN Operating Modes Ad-hoc mode	34
Figure 3.24 : Wireless Channel	34



# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

This is the time of Information Technology. So all then technology depends on Networking. Without internet we can't think any more about our future. Presently a day's a substantial number of individuals everywhere throughout the world utilize web innovation and Networking is a important part. CCNA is most familiar and secure networking system in the world. We can't do anything without Internet. Today every business, every office, bank and trade is especially based correspondence and Networking. CCNA routing & switching is very important for a office, a company and all ISP company for maintaining the Internet. At present and future we can't think anymore without internet. So we should take it seriously and achieve it for our future life. In this report there are many topic I have included which is important for networking. CCNA routing and switching is mostly common and familiar to the communication engineering for communicate.

### 1.2 Motivation

At present I am a student of Daffodil International University and studying Bachelor of Computer Science and Engineering. In Bangladesh there is a huge job sector for computer networking. I comprehend the significance of increasing down to earth learning which will supplement the course reading information and enable an understudy to pick up a more extensive point of view of the subjects. CCNA is a system that increase my strength to better for my future. So I choose and motivate to do internship about domain of computer networking on CCNA Routing and Switching.

As a Network administrator what is on my mind extremely well, and good to handle for problem solving, speaking with individuals, understanding their needs and know about how to maintain problem and giving them better administration.

### **1.3 Internship Objectives**

Internship is very obligate for our future life for successful in job. So I have complete my internship based on CCNA routing and switching. Extreme target of my Internship is to set myself up as a qualified one in the focused activity advertises. So this is exceptionally compelling of expertise advancement. In this internship I have learned a lots of new things which is very important for my career.

The Internship in Computer science and engineering is intended to give work understanding and while understudies is still in school, to coordinate the job experience with academic training and to help understudy to make the progress from classroom to work properly.

### **1.4 Introduction to the Company**

The whole training program is done under JBS Security Solution Ltd. Networking Academy Routing and Switching is an IT skills and career building program for learning institutions and individuals worldwide technology. JBS technical team consists of qualified and well experience professionals. JBS Security Solution Ltd is very strictly controlled their customer and serviced their service. Our technology employees are more capable than your imagination. They already have proven their skills in the fields of Design, Computer Networking, Marketing& Sales, Installation, Commissioning and Maintenance of Fire Detection and Alarm System, Intrusion Detection and Alarm System, CCTV Surveillance System, Public Address System, Networking and PABX System etc. [1]

This Company provides the latest courses on the Networking domain to its students inside the company to keep them updated about the latest advancements.

### **1.5 Report Layout**

This Internship report consists of five Chapters. In report layout all chapter is condensed. We tried to summarize all the chapters. The summarization is given below:

**In the chapter (1)** I have depicted goal of internship, Motivation of internship and Prologue to the organization and describe it.

**In the chapter (2)** I have depicted the philosophy of my temporary job. What's more, this part gives the data about where the entry level position has been connected to embrace this training. And how we take a position in our future life. Likewise included about how performed the temporary job functions, about the organization, what are the IT benefit offered in JBL and what are the parts of in employments market of CCNA routing & Switching.

**In the chapter (3)** I have delineate about day by day undertaking and exercises, Events and Activities and Challenges. Daily tasks and activities are describe there.

**In the chapter (4)** In the chapter four I have describe about the Competencies Earned, Smart Plan, and Reflections.

**In the chapter (5)** I have portrayed is Conclusion and Future Scope. Future demand on or job place. I examine Future Scopes of CCNA Routing & Switching and compose conclusion.

## CHAPTER 2

### INTERNSHIP ORGANIZATION

#### 2.1 Company Introduction:

The whole training program is done under **JBS Security Solution Ltd.** Networking Academy is an IT skills and career building program for learning institutions and knowledge achieving individuals worldwide technology. JBS technical team consists of qualified and well experience professionals. Our technology employees are more capable than your imagination. They already have proven their skills in the fields of Design, Computer Networking, Marketing & Sales, Installation, Commissioning and Maintenance of Fire Detection and Alarm System, Intrusion Detection and Alarm System, CCTV Surveillance System, Public Address System, Networking and PABX System etc.

This Company provides the latest courses on the Networking domain to its students inside the company to keep them updated about the latest advancements.

#### 2.2 Services and Market Situation

JBS Security solution Ltd. It is computer and communication technology services company. It provides the IT and different services to their customer. JBS Security Solution is a ISP service provider. It is a business type company and they give service to their customer. Where they are looking for long term business policy to serve their best services. JBS Security solution Ltd. also provides different types of IT Services and Professional Training services. These are given below.

##### IT Services

- Security solution.
- Open source application solution.
- Internet Service Provider
- Hi speed Wi-Fi Zone.
- Data Connectivity, Data center& Co-Location.

- And All computer accessories
- Professional course and trainings.
- CCTV Surveillance
- X-ray & baggage scanner
- Car park management system
- ID Card Printing Solution.

### **Professional Training Services**

- Training Course on CCNA
- PHP and MYSQL for Website Development.
- Networking & PABX System

## **2.3 SWOT Analysis**

SWOT Analysis is a useful technique to know about our weakness and strong site. So we should apply it in every work for understanding your Strengths and Weaknesses, and for identifying both the Opportunities open to you and the Threats you face to determine.

### **Strength:**

High barrier to entry

Highly experienced owner Operator

Highly sell product online

### **Weakness:**

Limited flexibility in pricing

Competitors can offers quickly

**2.4 Organizational Structure:** Organizational Structure of JBS Security Solution Ltd.

Shown below in figure:

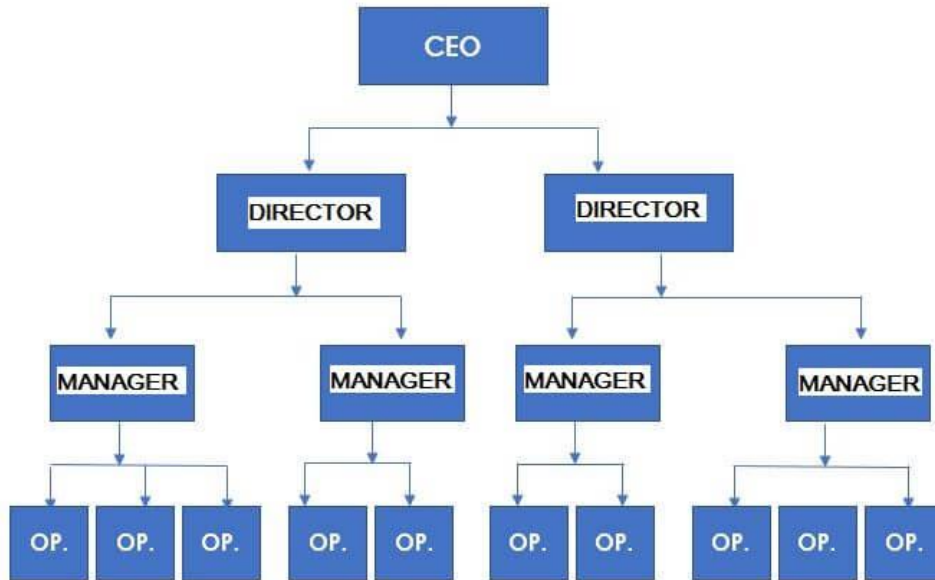


Figure 2.1: Organizational Structure

## CHAPTER 3

### TASKS, EVENTS AND ACTIVITIES

#### 3.1 Daily Tasks and Activities

Month - 1: In the first month of internship on JBS Security Solution Ltd I have learned and Exercise the following topics properly:

- Internetworking Technology
- OSI & TCP/IP Model
- IPv4 Addressing & Sub-netting
- Routing protocol Information

Month - 2: In the second month of internship on JBS Security Solution Ltd I have learned and performed the following topics properly:

- Static & Default Routing
- RIP
- EIGRP
- OSPF

Month – 3: in the third month of internship on JBS Security Solution Ltd I have learned and performed the following topics properly:

- NAT ant PAT
- Switching Introduction
- VLAN
- Wireless Technology

## 3.2 Internetworking Technology

### Computer Network:

A computer network is basically all of the components involved in connecting computers across small & large Distances. Network are used to provide easy access to information, thus increasing productivity for users.[3]

### Element That make up a Computer Network:

- End Devices
- Medium
- Network Device
- Messages
- Rules

### Why needs Networking?

There are lots of advantages from Build up a Network, but the three bigs facts are-

1. File sharing
- 2.Resource Sharing
- 3 Program Sharing

### Types of Networks:

1. Local Area Networks(LAN): are used to connect networking devices that are very closed geographic area, such as a floor of a building, abuilding, a campus.
2. Metropolitan Area Networks(MAN): is a hybrid between a LAN and a MAN. A MAN (Metropolitan Area Network) is another category of network, though the term is not always used. A MAN is defined as a network that connects LAN's across a area, city-wide, networking geographic area.



3. Wide Area Networks(WAN): are used to connect LANs together. Typically, WANs are used when the LANs that must be connected are separated by a large distance. A WAN can be defined one of two ways. The book define of a WAN is a network that space large geographical locations, usually to connect multiple LANs and connect each others. This is a general definition, and not always accurate to connect the devices.

### 3.3 OSI Model & TCP/IP Protocol

**OSI:** The open system Interconnection(OSI) model was developed by the International Organization for Standard(ISO). It provides the First framework governing how information Should be across a network.

OSI model: There are 7 layers-

- 1.Physical Layer
- 2.DataLink layer
- 3.Network Layer
- 4.Transport Layer
- 5.Session Layer
- 6.Presentation Layer
- 7.Application Layer

#### **OSI Model - The Upper Layers:**

The most of the OSI model top three layers are often referred to as the upper layers:

- Application Layer (Layer 7)
- Presentation Layer (Layer 6)
- Session Layer (Layer 5)

OSI reference model the upper layer and the lower layer are format is different. The protocols of the OSI model. Generally it provides the first govt. framework

#### **Application Layer**

- Provides network services and application processes
- like e-mail
- File Transfer and Terminal Emulation.

#### **Presentation Layer**

- Ensures data is very readable and by receiving system

- Format of data present
- Data representation
- Data structure
- Negotiates data transfer syntax for application layer in layer 6
- Compression data, decompression data, encryption and decryption data.

### **Session Layer**

- Inter-host communication mode
- Establishment, manages data
- And terminates sessions between applications

### **Transport Layer**

- Concerned with the data transport system issues between the hosts
- Data transport reliability system
- Establishes, maintains, and terminates virtual circuits
- End to end connection reliability for transport
- Fault detection and recovery system
- Information and flow control.

### **Network Layer**

- Addresses the best path for communicate
- Provides the best connectivity and path selection between two end to end systems
- Domain of routing protocol system
- 

### **Data Link Layer**

- Access to media Provides reliable transfer of data across media
- Use for sent messages
- Physical addressing, network topology
- error notification and flow control

## **Physical Layer**

- Binary transmission data
- Encoding & signaling
- Through wires
- Connectors
- Voltages
- Data rates

**TCP/IP Suite:** Whose name is actually a combination of just two individual protocols, Transmission Control Protocol(TCP) and Internet Protocol(IP)- is divided into layers, This topics describes how the layers of TCP/IP are organized into a stack.

- 1.Application
- 2.Transport
- 3.Internet
- 4.Network Access

**Protocols:** are rules that govern how devices communicate and share information across a network. Examples of protocols include:

- IP – Internet Protocol
- HTTP - Hyper Text Transfer Protocol
- SMTP – Simple Mail Transfer Protocol

Multiple protocols often work together to facilitate end to end network communication technology, forming protocol suites or stacks. Protocols are covered in great detail in other guides.

### 3.4 IP Addressing and Subnetting

There are various aspects to IP addressing, including calculation for constructing an IP address, classes of IP address designed for specific routing purpose and public versus private IP addresses. There are also two types of IP addresses.

They are-

IP version 4 (IPv4) and

IP version 6 (IPv6).

The 32bit IPv4 address type is currently most common. But the 128 bit IPv6 is also in use.

#### **Different Between Class Full And Classless IP Address:**

When the concept of IP addressing was first thought up, it was decided that IP addresses would be put into classes, defining local address and default mask according to network size. "classless" routing protocol doesn't assume that IP addresses have their default subnet masks. Classless IP address. Today, these default subnet masks aren't much used except as a point of reference or on some certification tests.

The term "class full" means that the IP address or software is assuming that IP addresses fall into these classes and uses the default subnet. And it is look like default IP address. If a routing protocol is class full, it has trouble with the IP addresses that don't use the default subnet masks. On the other hand, a "classless" routing protocol doesn't assume that IP addresses have their default subnet masks.

**IPv4 Addressing:** An IP address provides a hierarchical structures to separate networks. IPv4 is very common and easy to use. Consider the following address as an example-

**192.168.1.1**

An IP address separated into four octets:

First Octets	Second Octets	Third Octets	Fourth Octets
<b>192</b>	<b>168</b>	<b>1</b>	<b>1</b>

A computer understands an IP address in its binary form, Each Octets is 8-bits long, Resulting in a 32 bit IP addresses. The above address in binary would look as follow-

First Octets	Second Octets	Third Octets	Fourth Octets
<b>11000000</b>	<b>10101000</b>	<b>00000001</b>	<b>00000001</b>

IPv6 Addressing: The new IP Protocol, IPv6 protocol comes with some new features beside it. The features that comes with IPv6 are-

- Longer address space
- New security properties
- Basic Header structure
- Improve Q o S
- Automatic address assignation
- ICMPv6
- Mobility
- Extensibility
- Backward compatibility with IPv4.

It is different than IPv4, IPv6 address written with hexadecimal digits.

The address is consisting of Eights colons, and each colons there are four digits.

So the address becomes  $8*4*4\text{bit} = 128 \text{ bit}$  .

An example of an IPv6 address is below-

**2345:0425:2CA1:0000:0000:0567:5673:23b5**

There are Three main address types inIPv6. These are-

1. Unicast Addresses
2. Multicast Addresses
3. Any cast Addresses

**Subnet Mask:** An IP address has two components, the network address and the host address. A subnet mask separates the IP address from into the network and host addresses. A Subnet mask is a 32-bit number where all the bits of the network part and which part is the host part. Subnet Mask is made by setting network bits to all "1"s and setting host bits to all "0"s. Within a given network, two host addresses are reserved for special purpose to and cannot be assigned to hosts. The "0" address is assigned a network address and "255" is assigned to a broadcast address, and they cannot be assigned to hosts.

### 3.5 Routing Protocol Introduction

**Introduction:** Routing is a process by which a packet gets from the location to another. To route a packet, a router needs to know the destination address and to on what interfaces to send the traffic out. When a packet comes into an interfaces on a router destination addresses it looks up the destination IP address in the packet header and compare it with its routing table. The routing table which is stored in RAM to the computer, tells the router which outgoing interface the packet should go out to reach the destination network.

There are three ways to control routing decisions on your router-

1. Static Router
2. Default Router
3. Dynamic Router

#### **Static Routing:**

- Route path are Manually set by administrator
- Any changes should be made by the administrator
- Good for small networks.
- Scalability becomes complex in terms of configuration and maintenance.
- Highly secured because only administrator knows the routing paths.
- Consumes Less Resources (CPU, RAM)

#### **Dynamic Routing:**

- Router exchange routing information Dynamically.
- Router dynamically learns the changes.
- Can perform Small to Large (Any network).



- Scalable and configuration is easy. Router dynamically performs.
- Less Secured compared to static routing. But works fine for large network infrastructure.
- Consumes more resources (CPU, RAM) because router has to work dynamically.

### **Routing Concepts:**

Networks allow people to communicate and collaborate, and interact in many ways for networking. Routing is a process by which a packet gets from the location to another. Networks are used to access web pages, talk using IP telephones, participate in video conferences, compete in online gaming, shop using the Internet, complete online coursework, and more of network access. Ethernet switches function at the data link layer, Layer 2 data link layer, and are used to forward Ethernet frames between devices within the same network. when the source IP and destination IP addresses are on different networks, on the different sources the Ethernet frame must be sent to a router.

### **Characteristic of dynamic IP routing protocols:**

- RIPv1
- RIPv2
- EIGRP
- OSPFv2
- IS-IS
- BGPv4

## 3.6 Static and Default Routing

**Introduction:** The purpose of configuring of static router, as well as RIP and IGRP, is to add routes to a routers routing table. RIP and IGRP do so automatically. A router can forward packets to subnets that are not attached to it.

### Advantages:

- Static Routers are simple and quick to configure.
- static routing is supported on all routing devices and all routers.
- Static routers are easy to predict and understand in small networks.

### Static Routing Configuration:

- Default Route
- Static Null Route
- Preferred Routes
- Backup Routes
- Static Load Balancing.

### Configuring Static Router:

The basic syntax for a static route is as follows-

```
Router(config)#IP route [destination network] [subnet mask] [next-hop]
```

### Default routing:

```
Router(config)#IP route 0.0.0.0 0.0.0.0 {<next hop IP address> or <Exit interface type><No.>}
```

### 3.7 Routing Information Protocol (RIP)

**Routing Information Protocol (RIP):** The Routing Information Protocol (RIP). This protocol uses distance vector algorithm is one of the oldest distance vector routing protocols which employ the hop count as a routing metric. The maximum hop are 15 hopes. The largest number of hops allowed for RIP is 15, which limits the size of networks that RIP can support

**When you utilize this protocol:**

- When you want to make a small scale network
- When your network is not supported to have scalability
- when you route in one autonomous

RIP is still utilized now. These protocols is the oldest among others.

The types of RIP are-

RIP version 1

RIP version 2 and

RIP next generation for IPv6(RIP ng).

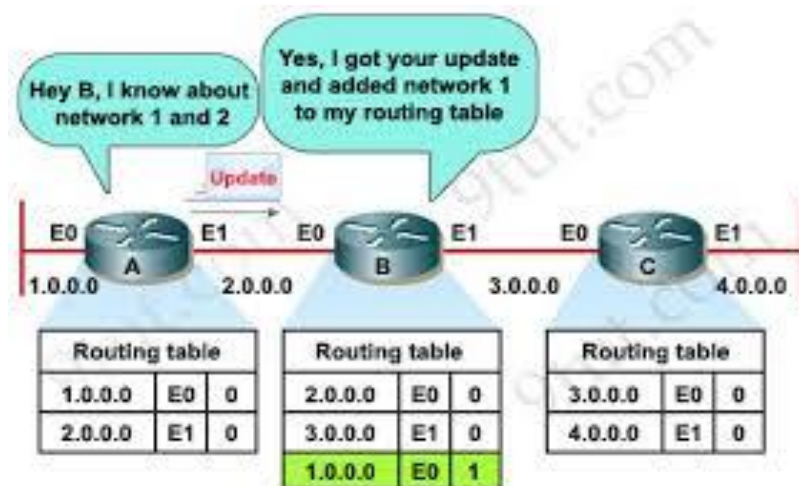


Figure 3.1 : RIP Routing Table 1

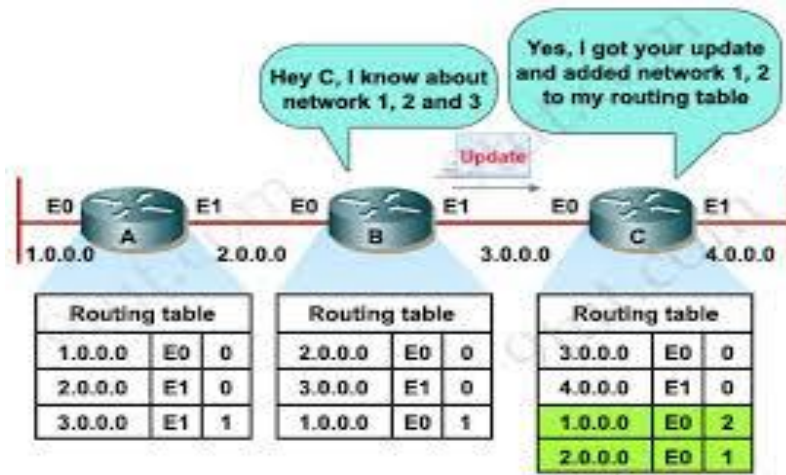


Figure 3.2 : RIP Routing Table 2

### Routing Information Protocol(RIP) Configuration:

**Router>enable**

**Router#configure terminal**

**Router(config)#router rip**

**Router(config-router)#version 2**

### 3.8 Enhanced Interior Gateway Routing Protocol (EIGRP)

**Introduction:** Enhanced IGRP (EIGRP) is a classless, enhanced distance-vector protocol that gives us a real edge over another cisco propriator protocol, interior gateway routing protocol IGRP. That basically why it's called Enhanced IGRP.

#### Configuring EIGRP Metrics:

```
Router(config)# router EIGRP 10
```

```
Router(config-router)# metric weights 0 1 1 1 0 0
```

**EIGRP packets:** EIGRP use five types of packets to communicates-

1. Hello
2. Update
3. Acknowledge
4. Query
5. Reply

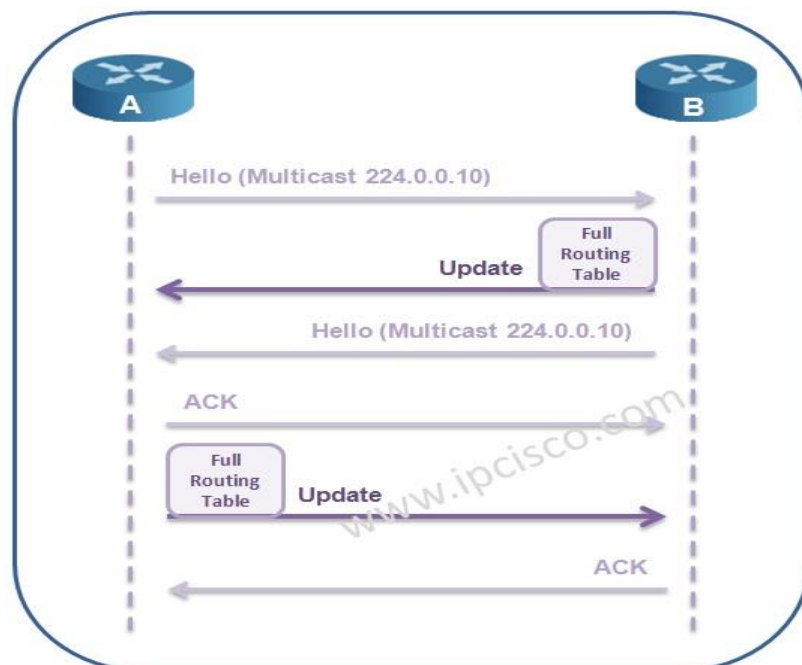


Figure 3.3 : EIGRP Neighbor establishment IP Cisco Packet

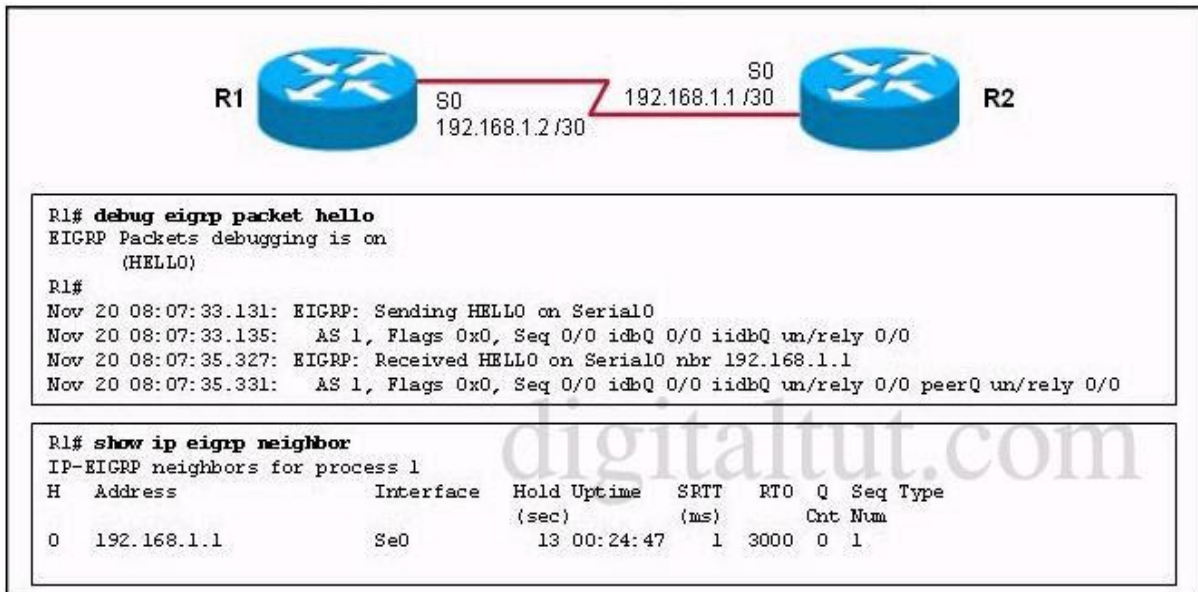


Figure 3.4 : Neighbor relationship distribute list

### EIGRP Configuration:

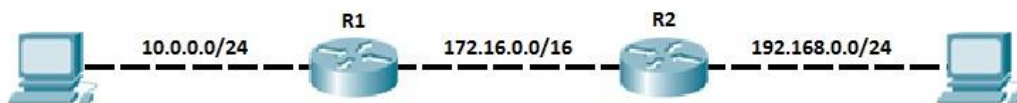


Figure 3.5 : EIGRP Topology

```

R1(config)#router eigrp 1
R1(config-router)#network 10.0.0.0
R1(config-router)#network 172.16.0.0
R1(config-router)#

```

Figure 3.6 : Router 1 Configuration

```

R2(config)#router eigrp 1
R2(config-router)#network 192.168.0.0
R2(config-router)#network 172.16.0.0
R2(config-router)#

```

Figure 3.7 : Router 2 Configuration

### 3.9 Open Shortest Path First (OSPF)

**Introduction:** Open Shortest Path fast (OSPF) is the most widely used interior gateway protocol routing protocol on the world because it is a public routing protocol while its biggest rival, EIGRP is a cisco proprietary protocol so other vendors can't use it.

OSPF is a complex Link-state routing protocol.[8]

#### OSPF Features:

- OSPF stands for Open Shortest Path First
- Is the only Link-state routing protocol you learn in CCNA
- It's a link state protocol
- It uses SPF or Dijkstra algorithm
- Unlimited Hop count
- Administrative distance is 110
- It supports VLSM and CIDR
- Faster convergence

There are five types of OSPF Link-state packets (LSPs)-

- Hello
- Database Description
- Link-State Request (LSR)
- Link-State Update (LSU)
- Link-State Acknowledgement (LSA)

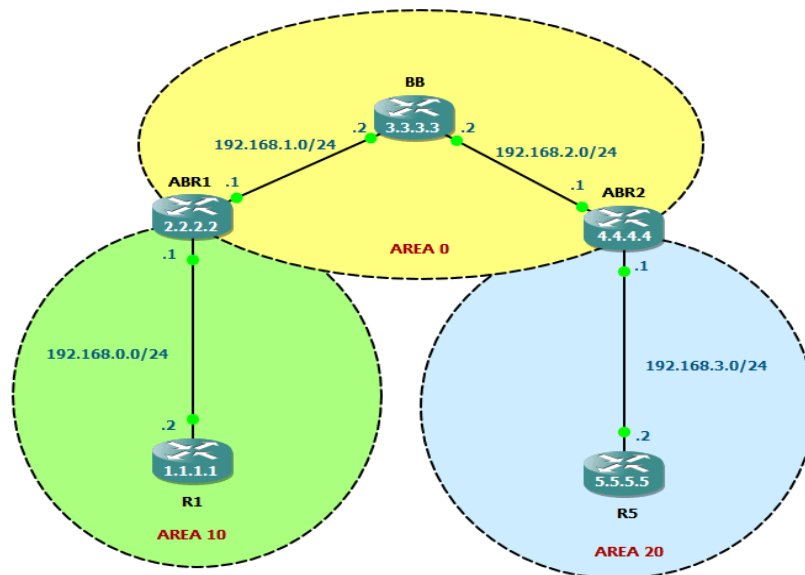


Figure 3.8 : OSPF Area Defined

### OSPF Configuration:

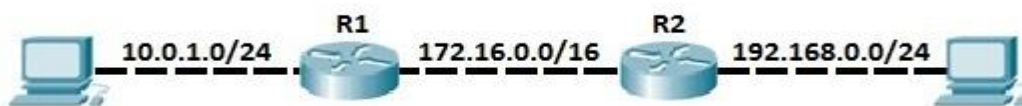


Figure 3.9: OSPF Topology

### Router 1

```
R1(config-router)#router ospf 1
R1(config-router)#network 10.0.1.0 0.0.0.255 area 0
R1(config-router)#network 172.16.0.0 0.0.255.255 area 0
```

Figure 3.10: Router 1 Configuration

### Router 2

```
R2(config)#router ospf 1
R2(config-router)#network 192.168.0.0 0.0.0.255 area 0
R2(config-router)#network 172.16.0.0 0.0.255.255 area 0
```

Figure 3.11 : Router 2 Configuration



```

R1#show ip ospf neighbor

Neighbor ID    Pri   State           Dead Time   Address      Interface
192.168.0.2    1     FULL/BDR        00:00:32   172.16.0.2   FastEthernet0/1

```

Figure 3.12 : Showing OSPF Neighbor

```

R1#show 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

    10.0.0.0/24 is subnetted, 1 subnets
C       10.0.1.0 is directly connected, FastEthernet0/0
C       172.16.0.0/16 is directly connected, FastEthernet0/1
O       192.168.0.0/24 [110/2] via 172.16.0.2, 00:03:44, FastEthernet0/1

```

Figure 3.13 : Showing IP Routes

### 3.10 NAT and PAT

Network Address Translation (NAT) was introduced to overcome these addressing problems that occurred with the rapid expansion of the internet. Basically NAT allows a single network device to act as an agent between a private local area network and a public network such as the internet. The purpose of this NAT device is to translate the source IP address of the internal Network hosts into public routable IP addresses in order to communicate with the internet.

What is NAT?

“NAT allows a host that does not have a valid registered IP address to communicate with other hosts through the internet”

For Example your computers are assigned a private IP address of 192.168.11.10, 192.168.11.11 And 192.168.11.15 and of course this address can not be routed on the internet but you can still access the internet. This is because your router translates this address into a public IP address 200.20.20.2 for example, before routing your data into the internet.

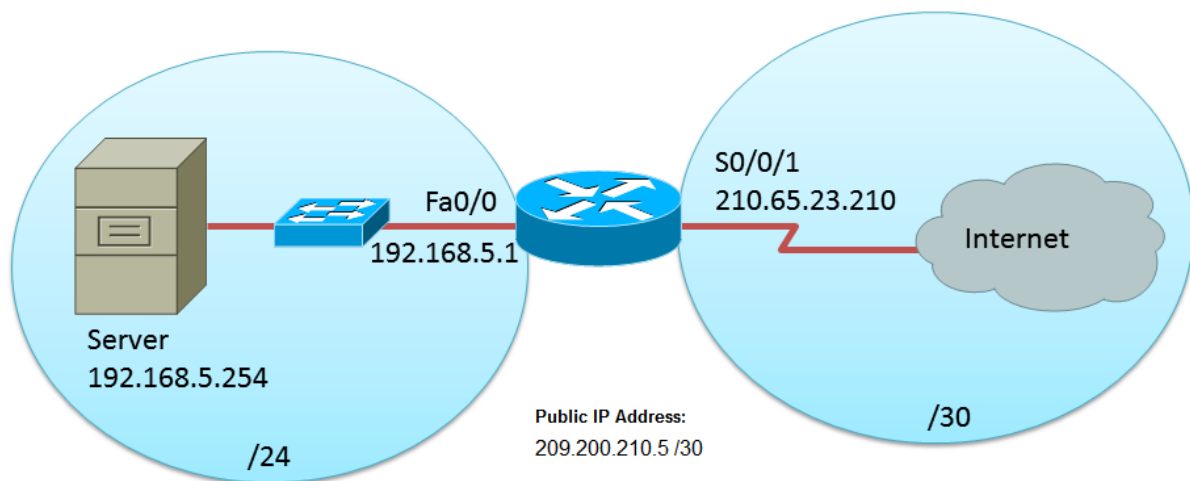


Figure 3.14 : Simple NAT Topology

#### NAT Terminology:

- Inside Local address
- Inside global address

- Outside Local address
- Outside global address

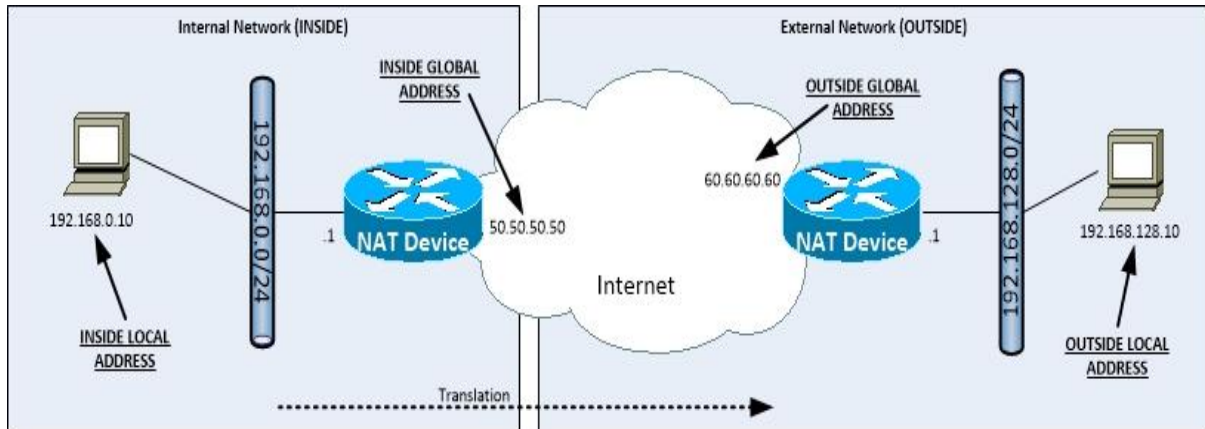


Figure 3.15 : NAT Terminology

Types of Network Address Translation:

There are three types of NAT that we use in today's networks. They are-

- Static NAT
- Dynamic NAT
- Overloaded NAT

Overloaded NAT is also sometimes called a PAT or Port Address Translation.

### 3.11 Switching Introduction

#### Repeater:

A repeater is an electronic device that receives a signal and retransmits and recovery the data it to receiver. In telecommunication repeater are retransmit the data and recovery the data to receiver.

There are some types of repeater transmit and broadcast signal to transmit the data and recovery to the receiver. Frequency and baud rate are data transmit rate.

There are some different types of repeaters and ISP line , a telephone repeater is an amplifier in a telephone line. A repeater repeat the line transmission. an optical repeater is an optoelectronic circuit that amplifies the light beam in an optical fiber cable to amplify the optical beam. a dis antenna cable repeater, and a radio repeater is a radio receiver and transmitter that retransmits the radio signal continuously.



Figure 3.16 : Wireless Repeater

### **Hubs:**

Create one large collision domain. Only allow one driver per network segment to communicate at a time. A hub is multiple port repeater. Any digital signal received from a segment on a hub port recognize or re amplified and transmitted out all ports on the hub.



Figure 3.17 : Network Hub

### **Bridge:**

Segmenting at layer 2 of the open system interconnection OSI model can reduce congestion, and bridges were an early means to do this. This topics describes how bridge alleviate Network congestion.



Figure 3.18 : Network Bridge

## Switch:

Switch operates in Layer 2 Data-link Layer. Like bridges, switches, connect LAN segments, Use a table of MAC addresses to determine the segments to which the data is to be sent, and reduce network traffic. Switches however operate at must higher speeds then bridges and support more advanced functionality, as follow-[7]

- High port density
- Large frame buffers
- Port speeds
- Fast internal Switching
- Cut-through switching
- Store and forward switching
- Fragment-free switching



Figure 3.19: Network Switch

### **3.12 Virtual Local Area Network (VLAN)**

#### **VLAN Overview:**

(Virtual Local Area Networks) VLAN separate broadcast domain as well as segments the networks so that security can be ensured.

In every switch there are have a by default VLAN. VLAN ensure the data security and communicate to its own VLAN.

#### **VLAN Features:**

- A layer 2 security
- Divides a single broadcast domain into multiple broadcast domains
- By default all ports of the switch are in VLAN 1. This VLAN 1 is known as administrative VLAN or management VLAN
- VLAN can be created from 2 – 1001
- Can be configured on a manageable switch only
- 2 Types of VLAN configuration

-Static VLAN

-Dynamic VLAN

#### **VLAN Benefits:**

- Security
- Cost reduction
- Higher performance
- Broadcast storm mitigation
- Improved IT staff efficiency
- Simple project or Application management

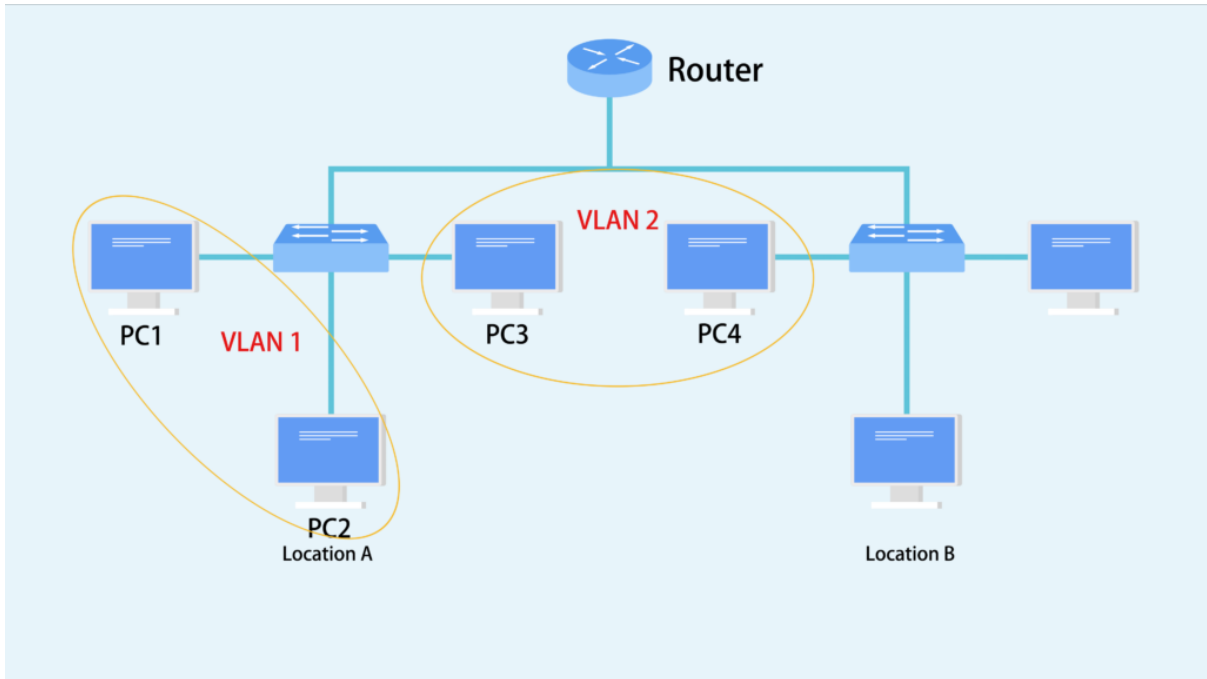


Figure 3.20 : VLAN Configure

**Inter VLAN Routing:**

If you only configure VLAN on the 2950 or other layer 2 switches, the client can only communicate with other clients with the Same VLAN.

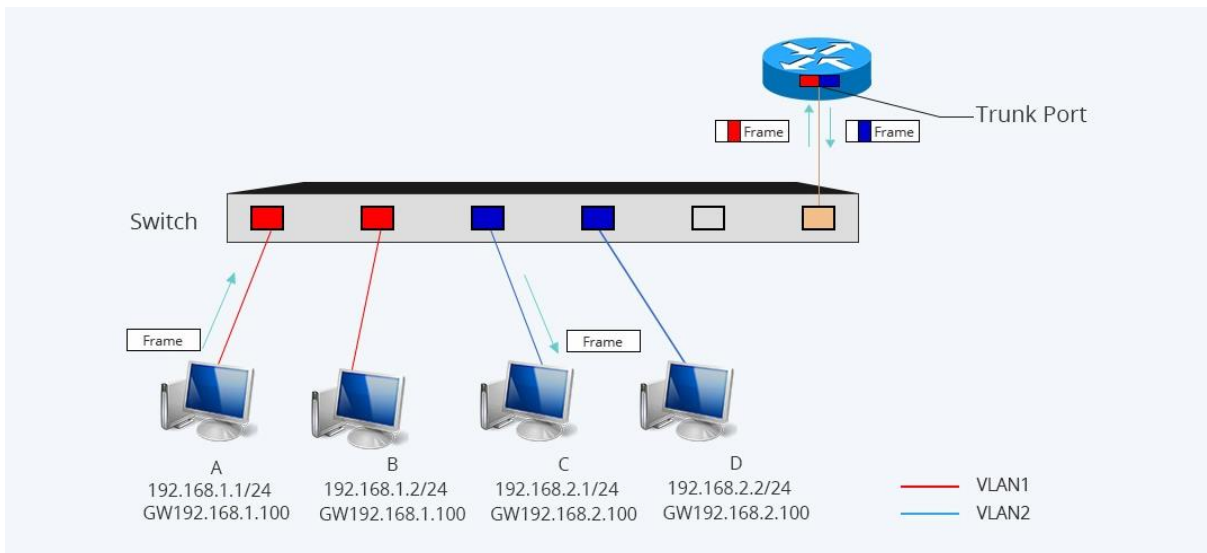


Figure 3.21 : Inter VLAN



### 3.13 Wireless Technology

Wireless networking is a method by which homes, telecommunications networks and business installations avoid the costly process of introducing cables into a building or a campus or a market place, or as a connection between various equipment locations. Wireless networks have been around for many years.

A wireless network enables people to communicate and access application and information without wires. This provides freedom of movement and ability to extend applications to different part of building, city, or nearly anywhere of the world.[6]



Figure 3.22 : Tower

#### **Types of wireless Networks:**

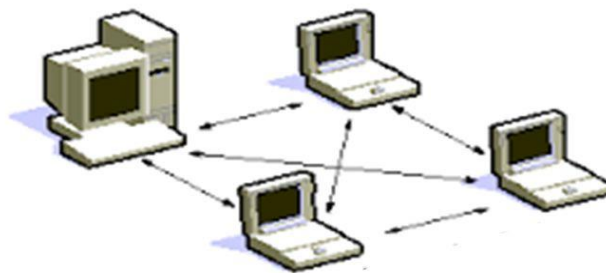
Wireless networks fall into several categories. They are depending on the size of the physical area that they are capable of covering the area. The types of following wireless networks satisfy diverse user requirement is:

- Wireless Personal Area Network (WPAN)
- Wireless Local Area Network (WLAN)
- Wireless Metropolitan Area Network (WMAN)
- Wireless Wide Area Network (WWAN)

**WLAN Modes:** WLAN has two basic modes of operation-

- Ad-hoc Mode WLAN
- Infrastructure Mode WLAN
- ✓ Basic Service Set (BSS)
- ✓ Extended Service Set (ESS)

**Wireless LAN Operating Modes: Ad-hoc mode**



**Independent Basic Service Set (IBSS)**

Figure 3.23 : Wireless LAN Operating Modes Ad-hoc mode

**Wireless Channels:**

IEEE 802.11g /b wireless nodes communicates with each other using radio frequency signal in the ISM band between 2.4 GHz and 2.5 GHz. Neighboring channels are 5 MHz apart.

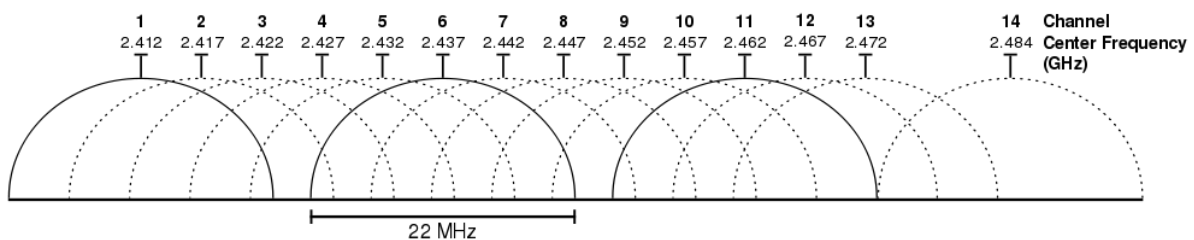


Figure 3.24 : Wireless Channel

### **3.14 Challenges**

In every work place is very challenge full. There is no work without challenges. So we should take our work properly and make it to seriously. In four months internship is very positive to get knowledge and share companions in finding out our weakness about our training time. It is very important to pick up and understanding unknown things and many more problems to solve the solutions.

In my training periods to the company there have insufficient works to solve. Some of work I complete to my own skill and it send to my company supervisor to his mail. Some of works done by me, some of my supervisors and some of works are done by labors. So as a youthful labors I done some of works in training periods.

I know how to complete my work without injuries. So in every work at first I am careful to about injuries and avoid of it. I don't know every things but I try to my best to know about all topics how catch as possible to know. And I feel free to asking any questions and feel free to independent laborer.

In the internship contend luckily I have complete the internship periods without any problems. In this periods I known how to co-operate work with other, and make relationship to customer. As a future employee I have get many tricks about corporate life and how to maintain office courtesy and keep me cool.

After complete my graduation from this university I will get a new lifestyle. As a alumni I will try to my best to achieve reputation of our varsity in my knowledge and by hard work. When i will start my new life with job for a huge hours is 9 am to 5 pm, so I abiding this habit by this internship periods.

## CHAPTER 4

### COMPETENCIES AND SMART PLAN

#### 4.1 Competencies Earned:

At present every job market place or any place is full of competencies. That's why we should make sure our practical skills. Skills earned or learning result is an announcement of what a student is required to know, comprehend or have the capacity to do because of a learning procedure. Computer networking is the part of my future earned place. Introduce and decommission of both system and server machines at two datacenters. Lead part in Configuring Router. Internship periods time I have complete more than problem solutions, so it will help me to future for maintaining big problem in cool head. So it's my big achievement from this internship. In this internship Introduce and Configure Routers and Switches; Configure, and Employer Services to more, VLAN configure, OSPF configure, EIGRP configures and RIP configures. Furthermore, steady with the learning results from this, the Internship On Site Supervisor will give an introduction concerning authoritative strategies and methodology technological skill.

#### 4.2 Smart Plan

For getting more and a better achievement gain and an organization set their top label management to make their plan unique and more effectively and innovative from the other Organization. To make my bright career and successful life. This internship is very helpful for smart plan.

#### 4.3 Reflections

JBS Security Solution Ltd. is served their service very carefully to customer. They are very concern from their launch date to provide their service. And they are very careful to take their customer and keep them to their service more. They are corporate Network solution and telecommunication company they provides their network to highly and most effective art of network to their technical group.

They worked with many organizations and many projects and achieved the reputation which is very helpful of them. They are using the latest technologies and upgrading the services wherever it is required.

## **CHAPTER 5**

### **CONCLUSION AND FUTURE CAREER**

#### **5.1 Discussion and Conclusion**

I have successfully complete my internship. This internship is very important to achieve practical knowledge. In this internship is teaches me to how survive 8 to 9 hours in an office. And self-inspiration to do work properly and solve the problems. Daily 8-9 hours and 5 or 6 days in a week to work hard, so i have this habits and practiced by this internship. I have revealed the main issues of time is maintain by self-inspiration and motivated by internship. Time sense is very common and important in every corporate and business life which is maintained by this training periods.

In this internship periods teaches me many important features of my course related topics and many others important things which will be needed in make future career. It helps me to when the work pressure are too much then how to keep cool my mind in working place. I got the knowledge to and keep on working hard from my position and plans for next work. I know how to get my bosses mind and how to get promotion by my work and personality. This internship makes me sincere and impress to work hard. In the end I just want to say in every educational institution or a work place the importance of internship is very important to get real life practice and skill knowledge.

#### **5.2 Scope for Further Career**

At present Computer networking is a sector which is very demandable for job place. There is various zone of IT sector. There are huge work place for in this IT, like CCNA Routing and Switching, mikrotik router, Linux etc. And it has several various types of networking wireless networking, router and switching, Computer to computer networking, Network system engineer or administrator . In every office, bank, or any business company need one or more IT specialist. So this is the another positive news for an Network engineer. A skillful worker is very demandable person in every place , so at first to make skillful career, and then it will be gone to me a higher place of my life.

## REFERENCE

- [1] Get information about JBS security Solution Ltd. , available at : <<<http://www.jbssslbd.com/>>> last accessed on 03-04-2019 at 03:00PM.
- [2] About internship, Available at: <<<https://www.teenvogue.com/story/how-to-network-for-internships>>> , last accessed on 30-03-2019 at 03:00pm.
- [3] Get all Concept from Note Book- CCNA Routing and Switching.
- [4] Get Concept about File and directory details, Available at <<<http://www.google.com/>>> last accessed on 03-04-19 at 10pm.
- [5] Get Concept about CCNA <<<https://study-ccna.com/what-ccna/>>>last accessed on 02-04-2019 at 07:00pm.
- [6] Get Concept about Wireless <<[https://en.wikipedia.org/wiki/Wireless\\_network\\_](https://en.wikipedia.org/wiki/Wireless_network_)>> last accessed on 02-03-2019 at 10:00pm.
- [7] Get Concept about Switching <<[http://ecomputernotes.com/computernetworkingnotes/computer-network/what-is-switching\\_](http://ecomputernotes.com/computernetworkingnotes/computer-network/what-is-switching_)>> last accessed on 02-04-2019 at 12:00pm.
- [8] Get Concept about Router Board, <<[https://en.wikipedia.org/wiki/MikroTik\\_](https://en.wikipedia.org/wiki/MikroTik_)>> last accessed on 03-04-2019 at 11:00am.
- [9] CCNA Routing and Switching, CSLiT, CCNA 200-120, page number (3,76,121,134,138,149,162,182,190,197,235).

## APPENDIX

### Appendix A: Internship Reflection

Internship is how important in our corporate level or our knowledge achievement is to unsayable. So the internship time is very useful for our skill developed in our real life. When I was training in the company I work every step very carefully. The internship learn to me how to maintain the customer, how to deal a project, and how maintain to solve the problem. In the internship time I work and connect with other expert worker who teaches me very carefully. I know how to handled a hard project to easily solve. I am an association central goal or vision is actualized, how control is shared, how to contact with partners, how to organize, how to choice the best way and maintain input ant output association. The internship encourages me to plan for life and worldwide society, Career plan. The internship teaches me how to manages bosses and and expert manner and different representatives gain from this training. The internship reflection influence in my whole life to know how maintain practical life and how to behave to corporate life, how to cool my head in a critical place. Also it improves our real life situation and how to handled it to make a bright future . Internship is a way to meet the professional level expert and it's a chance to work of them. Which is very important to know how to they solve many critical work.

## Appendix B:

### Company Details:

	<b>Head Office</b>
Name	JBS Security Solution Ltd.
Address	West raja Bazar Sher-e Bangla nagar, Dhaka - 1215, Bangladesh.
Phone	01918544116
E-mail	<a href="mailto:sabuj.bu60@gmail.com">sabuj.bu60@gmail.com</a>
Website	<a href="http://www.jbssslbd.com">www.jbssslbd.com</a>
Type of Organization	Information & Communication Technology company