

INTERNSHIP ON CCNA ROUTING AND SWITCHING IN CSL TRAINING

SUBMITTED

BY

MD. GOLAM SAIDY

ID: 183-15-12044

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

Supervised By

Ms. Farah Sharmin

Senior Lecturer

Department of CSE

Daffodil International University

Co-Supervised By

Ms. Moushumi Zaman Bonny

Assistant Professor

Department of CSE

Daffodil International University



DAFFODIL INTERNATIONAL UNIVERSITY

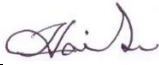
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APPROVAL

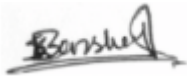
This Internship titled “CCNA Routing and switching”, submitted by **Md Golam Saidy**, ID No: **183-15-12044** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial and fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on July 2021.

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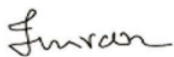
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Faculty of Science & Information Technology
Daffodil International University



Internal Examiner

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Senior Lecturer
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University



Shah Md. Imran
Industry Promotion Expert
LICT Project, ICT Division, Bangladesh

External Examiner

DECLARATION

I hereby notify that, this internship report is prepared by me, **Md Golam Saidu**, ID No: **183-15-12044** to the department of Computer Science and Engineering, Daffodil International University. Under the supervisor of **Ms. Farah Sharmin, Senior Lecturer, Department of CSE, and Ms. Moushumi Zaman Bonny, Assistant Professor, 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 Bachelor of Science and Engineering

Supervised by:

Farah Sharmin

Ms. Farah Sharmin
Senior Lecturer
Department of CSE
Daffodil International University

Co-Supervised by:



Ms. Moushumi Zaman Bonny
Assistant Professor
Department of CSE
Daffodil International University

Submitted by:

Golam Saidu

Md. Golam Saidu
ID: -183-15-12044
Department of CSE
Daffodil International University

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ABSTRACT

This challenge evaluates the design of an undertaking system in a short amount of time. It examines the limits of planning, developing, and executing a venture plan. This project also addresses the methods for putting project-level systems into action. In this project, we'll start with basic switch configuration and then move on to the routing advancements needed to route data across branches. After that, we've implemented WAN, and frame-transfer is seen as a good choice since it connects several areas with a single switch interface, lowering equipment costs. As a result, we should pay attention to it and strive to achieve it in our future lives. That is why I chose "Temporary Position on CCNA Routing and Switching" as the topic of my paper on Computer Networking. The purpose of specific routing, switching, and addressing was described in the study. RIP is used for the Cisco Center convention, EIGRP is used for each systems administration framework, OSPF is also used for each convention, and VLAN is a one-of-a-kind convention. This is due to the necessity for a robust IT foundation in developing nations, which is undervalued in developed ones. Organizing an enterprise in a developing nation is a lot like organizing one in a desert.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

We wouldn't be able to achieve anything if it weren't for the Internet. We can't think about our future if we don't have access to the internet. By and large, the globe is using online development, and networking is a critical part of that. The most widely used and secure systems management framework in the world is the CCNA. Every company, office, bank, and trade nowadays is heavily reliant on communication and networking. For maintaining the Internet, CCNA guiding and exchanging is critical for an office, an organization, and all ISP organizations. We can no longer think without the internet in the present or the future. As a result, we should pay attention to it and strive to achieve it in our future lives. I've included a number of topics in this report that are important for systems management. The majority of the time, CCNA directing and swapping is standard and customary in the communication design for delivery.

1.2 Motivation

Currently, I am Daffodil International University understudy studying for a Bachelor in Computer Science and Engineering. There is a huge activity portion for PC organizing in Bangladesh, which prompted me to look into PC systems administration courses. Perusing and understudying have access to data that allows them to have a more comprehensive understanding of the topics. CCNA is a framework that allows me to expand my solidarity in order to enhance my future. So I chose and was spurred to perform temporary employment in the field of PC organization for the CCNA Routing and Switching certification. As a network manager, what is at the forefront of my thoughts incredibly well and great to deal with for critical thinking is talking with people, understanding their needs, and thinking about how to keep up issues and give them better organization is at the forefront of my thoughts incredibly well. Talking with people, understanding their needs, and thinking about how to keep up issues and give them better organization is at the forefront of my thoughts incredibly well.

1.3 Internship Objectives

Temporary work is a commitment to our future success in the workplace. As a result, I am completely reliant on CCNA's direction and exchange for my temporary employment. My internship's outrageous goal is to assist and consider myself a certified one in the engaged movement. As a result, this is unusually persuasive of the ability to progress. Through this temporary job, I've learned a lot of new things that will help me advance in my career.

1.4 Introduction to the Company

CSL Training is in charge of the complete preparation system. Routing and Switching Academy is an IT skills and career development operator for teach companies and individuals in general innovation. The CSL specialist group is made up of competent and experienced professionals. CSL Training has constantly monitored and altered their client's administration in every way. Our innovators are in better shape than your creative imagination. They have already demonstrated their aptitudes in the fields of design, computer networking, marketing and sales, installation, commissioning, and maintenance of fire detection and alarm systems, intrusion detection and alarm systems, CCTV surveillance systems, public address systems, networking, and PABX systems, and so on.

1.5 Report Layout

There are five chapters in this internship report. All chapters are condensed in the report layout. We attempted to summarize each chapter. The following is a summary of the information:

Section-1: I have shown the temporary position's goal, entry-level position's motivation, and the association's prologue.

Section-2: My impermanent activity style of thinking has been shown. This section also contains information on how the section level position has been linked to grasping this preparation. Furthermore, how we respond to a circumstance in the future. In addition, how were the transitory activity abilities played out concerning the association? What IT advantages are supplied in CSL, and what are the components of the CCNA directing and switching market?

Section-3: I've shown step-by-step attempts and actions, as well as events, exercises, and challenges. There are daily tasks and exercises displayed there.

Section-4: I have shown the Competencies Earned, Smart Plan, and Reflections in part four.

Section-5: The diagram depicts the conclusion and future scope of interest. in or employment location in the future. At the end, I look at the CCNA Routing and Switching Future Scopes.

CHAPTER 2

INTERNSHIP ORGANIZATION

2.1 Company Introduction:

CSL Training oversees the entire preparation process. Systems Administration Academy is an IT aptitude and career development organization for learning companies and information-gathering people. The technical staff at CSL is made up of highly skilled and experienced individuals. Our technical employees are competent beyond your wildest dreams. They have previously shown their abilities in the sectors of design, computer networking, marketing & sales, fire detection and alarm systems, intrusion detection and alarm systems, CCTV surveillance systems, public address systems, networking, PABX systems, and others. This organization provides its internal pupils with the most up-to-date networking courses in order to keep them informed about the most recent breakthroughs.

2.2 Services and Market Situation

CSL Training Institute is basically a training institute; they provide various types of training to make students and professionals self reliant.

List of training name that they are provide.

- CCNA
- CCNA CyberOps
- Red Hat Certified System Administrator (RHCSA)
- Red Hat Certified Engineer (RHCEv8)
- IT Essentials
- Linux Server Administration
- Zimbra Mail Server Administrator
- AWS: Amazon Web Services
- VMware vSphere 7.0: ICM
- Microsoft Azure Administrator
- MikroTik With ISP Setup
- Windows Server 2019
- Python For Networking
- Ethical Hacking
- HCIA Routing & Swicthing

2.3 SWOT Analysis:

SWOT Analysis is a method of thinking about our strengths and weaknesses. As a result, we should use it in every project to understand our strengths and weaknesses, as well as to evaluate both the opportunities and threats we face in order to make decisions.

Strength: High hindrance to section Exceptionally experience administrator Exceptionally sell item on the web

Weakness: Restricted adaptable in cost Contenders can offers rapidly

2.4 Organizational Structure: Organizational Structure of CSL Training. Shown below in figure:

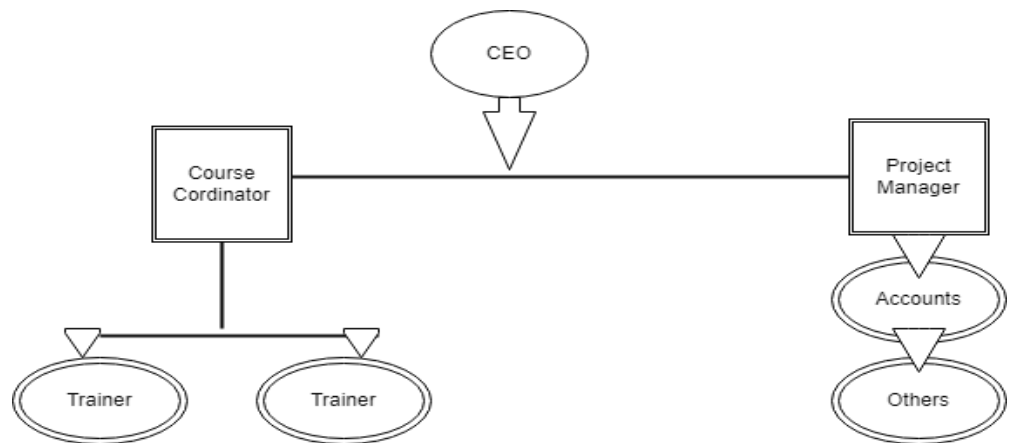


Figure 2.1: Organizational Structure

CHAPTER 3

TASKS, EVENTS AND ACTIVITIES

3.1 Daily Tasks and Activities:

Month-1: In the first month of systematic training for entry-level learners I have correctly layered and practiced the following points.

- ❖ Internetworking Technology
- ❖ OSI and TCP/IP Model
- ❖ IPv4 Addressing and Sub-netting
- ❖ Routing convention Information

Month-2: In the second month of entry level position on CSL Training, I have prepared and played out the accompanying points appropriately: Static & Default Routing.

- ❖ RIP
- ❖ EIGRP
- ❖ OSPF

Month – 3: in the third month of temporary job CSL Training, I have prepared and played out the accompanying themes appropriately: NAT and PAT

- ❖ Switching Introduction
- ❖ VLAN
- ❖ Wireless Technology

3.2 Internetworking Technology:

Computer Network: A PC system is essentially the majority of the components that assist in connecting one PC to another across short and long distances. Clients' productivity is increased by using systems that provide easy access to data. The system is built up by the association using a few conventions.

Component that make up a Computer Network:

- ❖ End Devices
- ❖ Medium
- ❖ Network Device
- ❖ Messages

Rules Why needs Networking?

Build a Network offers several opportunities, but the three most important facts are as follows:

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

Types of Networks:

1. Local Area Network (LAN): A local area network is a computer network that interconnects computers within a limited area such as a residence, school, laboratory, university campus or office building. By contrast, a wide area network not only covers a larger geographic distance, but also generally involves leased telecommunication circuits.
2. Metropolitan Area Network (MAN): A metropolitan area network is a computer network that interconnects users with computer resources in a geographic region of the size of a metropolitan area.
3. Wide Area Network (WAN): A wide area network is a telecommunications network that extends over a large geographic area for the primary purpose of computer networking. Wide area networks are often established with leased telecommunication circuits

3.3 OSI Model & TCP/IP Protocol:

OSI: The open framework Interconnection (OSI) model was created and made by the International Organization for Standard (ISO). It gives the First structure administering how data Should be over a system.

OSI model: There are 7 layers-

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

OSI Model The Upper Layers.

The top three layers of the OSI model are referred to as the "upper layers" by a vast percentage of the population:

- ❖ Application Layer (Layer7)
- ❖ Presentation Layer (Layer6)
- ❖ Session Layer (Layer5)

OSI reference model The arrangement of the top and lower layers is unique. The OSI model's rules of thumb In general, it provides the initial govt. system.

Application Layer: The Application layer describes how real work actually gets done. This layer would implement file system operations.

Presentation Layer: The presentation layer is the lowest layer at which application programmers consider data structure and presentation, instead of simply sending data in the form of datagrams or packets between hosts.

Session Layer: The Session Layer is the 5th layer in the Open System Interconnection (OSI) model. This layer allows users on different machines to establish active communications sessions between them. It is responsible for establishing, maintaining, synchronizing, terminating sessions between end-user applications.

Transport Layer: In computer networking, the transport layer is a conceptual division of methods in the layered architecture of protocols in the network stack in the Internet protocol suite and the OSI model. The protocols of this layer provide host-to-host communication services for applications

Network Layer: Layer-3 in the OSI model is called Network layer. Network layer manages options pertaining to host and network addressing, managing sub-networks, and internetworking.

- ❖ Addressing devices and networks.
- ❖ Populating routing tables or static routes.
- ❖ Queuing incoming and outgoing data and then forwarding them according to quality of service constraints set for those packets.
- ❖ Internetworking between two different subnets.
- ❖ Delivering packets to destination with best efforts.
- ❖ Provides connection oriented and connection less mechanism.

Data Link Layer: Data Link Layer is second layer of OSI Layered Model. This layer is one of the most complicated layers and has complex functionalities and liabilities. Data link layer hides the details of underlying hardware and represents itself to upper layer as the medium to communicate

- ❖ **Logical Link Control:** It deals with protocols, flow-control, and error control
- ❖ **Media Access Control:** It deals with actual control of media

Physical Layer: Physical layer in the OSI model plays the role of interacting with actual hardware and signaling mechanism. Physical layer is the only layer of OSI network model which actually deals with the physical connectivity of two different stations. This layer defines the hardware equipment, cabling, wiring, frequencies, pulses used to represent binary signals etc.

TCP/IP Suite: Transmission Control Protocol/Internet Protocol (TCP/IP) is a set of communication protocols that are used to connect network devices on the internet. In a private computer network, TCP/IP is also used as a communications protocol (an intranet or extranet).

- ❖ Application
- ❖ Transport
- ❖ Internet
- ❖ Network Access

Protocols: A network protocol is a collection of rules that govern how data is formatted, sent, and received by computer network devices, ranging from servers and routers to endpoints, independent of variations in their underlying infrastructures, designs, or standards.

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

3.4 IP Addressing and Sub Netting

The computation for building an IP address, classes of IP addresses built for certain routing purposes, and public vs private IP addresses are all components of IP addressing. There are two different forms of IP addressing.

- ❖ IP version 4 (IPv4)
- ❖ 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:

Class Full	Classless
In classful routing, VLMS (Variable Length Subnet Mask) is not supported.	While in classless routing, VLMS (Variable Length Subnet Mask) is supported.
Classful routing requires more bandwidth.	While it requires less bandwidth.
In classful routing, hello messages are not used.	While in classless routing, hello messages are used.
Classful routing does not import subnet mask.	Whereas it imports subnet mask.
In classful routing, address is divided into three parts which are: Network, Subnet and Host.	While in classless routing, address is divided into two parts which are: Subnet and Host.
In classful routing, regular or periodic updates are used.	Whereas in this, triggered updates are used.
In classful routing, fault can be detected easily.	While in classless routing, fault detection is little tough.

IPv4 Addressing:

IP stands for Internet Protocol and v4 stands for Version Four (IPv4). IPv4 was the primary version brought into action for production within the ARPANET in 1983.

IP version four addresses are 32-bit integers which will be expressed in decimal notation.

Example- 192.0.2.126 could be an IPv4 address.

An IP address vindicated into four octets:

First Octets	Second Octets	Third Octets	Fourth Octets
192	168	1	1

A PC value an IP address in its paired structure, Each Octets is 8-bits in length, resulting in a 32 bit IP addresses. The above location in double would looks as pursue

First Octets	Second Octets	Third Octets	Fourth Octets
11000000	10101000	00000001	00000001

IPv6 Addressing: An IPv6 address is 128 bits in length and consists of eight, 16-bit fields, with each field bounded by a colon. Each field must contain a hexadecimal number, in contrast to the dotted-decimal notation of IPv4 addresses. In the next figure, the x's represent hexadecimal numbers. The features that comes with IPv6are-

- ❖ Longer address space
- ❖ New security properties
- ❖ Basic Header structure
- ❖ Improves
- ❖ 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 $8 \times 4 \times 4 \text{bit} = 128 \text{ bit}$.

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 -

- ❖ UnicastAddresses
- ❖ MulticastAddresses
- ❖ AnycastAddresses

Subnet Mask: Subnet Mask: The system address and the host address are the two types of segments in an IP address. A subnet cover protects IP addresses from being injected into the system and host addresses. A Subnet veil is a 32-bit number that contains every bit of the system portion as well as the host part. Requested system bits are framed to all "1s," while requested host bits are framed to all "0s." Two host sites are protected for special objective to within a certain system and cannot be distributed to has. The "0" address is compelled to be a system address, while the "255" address is forced to be a communicate address.

3.1 Routing Protocol Introduction

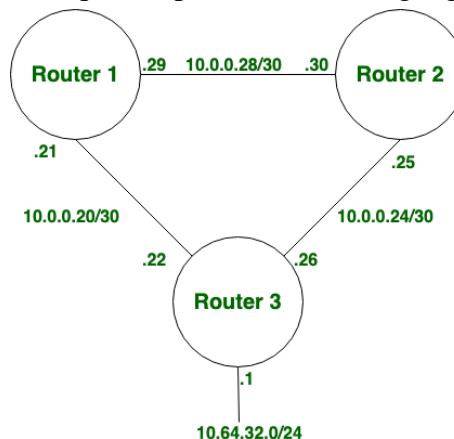
3.5 Routing Protocol Introduction

Introduction: Directing is a method of moving a bundle from one location to another. To send a package, a switch must recognize the destination address and determine which interfaces the traffic should be sent out on. When a bundle enters an interface on a switch, the goal tends to look at the goal IP address in the parcel header and compare it to the directing table. The direction table, which is stored in RAM on the PC, instructs the switch on which outgoing interface the package should use to reach its destination.

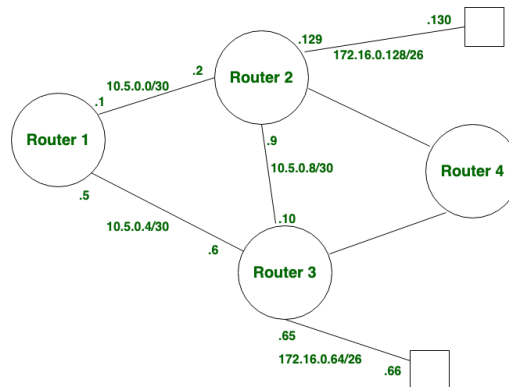
There are three ways to control routing decisions on your router-

- ❖ Static Router
- ❖ Default Router
- ❖ Dynamic Router

Static Router: Static routing, also known as non-adaptive routing, does not update the routing table unless it is actively changed or modified by the network administrator. Static routing is more secure than dynamic routing since it does not require sophisticated routing algorithms.



Dynamic Routing: Dynamic routing is also known as adaptive routing which change routing table according to the change in topology. Dynamic routing uses complex routing algorithms and it does not provide high security like static routing. When the network change(topology) occurs, it sends the message to router to ensure that changes then the routes are recalculated for sending updated routing information.



Routing Concepts:

Steering is a method of moving a bundle from one location to another. To transmit a bundle, a switch must first recognize the destination address and determine which interfaces the traffic should be sent out on. When a bundle enters an interface on a switch, the goal tends to look at the goal IP address in the parcel header and compare it to the directing table. The steering table, which is stored in RAM on the PC, instructs the switch on which outgoing interface the package should use to reach the destination network. Individuals may communicate, engage, and collaborate from many points of view for system administration via networks. Networks are used to view website pages, communicate on IP phones, participate in video meetings, compete in online games, shop on the Internet, complete online courses, and access a variety of other systems. Ethernet switches are used to advance Ethernet outlines between devices within a similar system and operate at the information connection layer, Layer 2 information connection layer. When the source and destination IP addresses are on different computers, the Ethernet casing from each source must be delivered to a switch.

Characteristic of dynamic IP routing protocols:

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

3.6 Static and Default Routing

Introduction: The reason for arranging of static switch, just as RIP and IGRP, is to add courses to a switches directing table. Tear and IGRP do as such naturally. A switch can advance parcels to subnets that are not appended to it.

Advantages:

- ❖ Static Routers can be easy to configured and quick to configure.
- ❖ Static routing is supported for all routing devices
- ❖ Static routers is known easy to predict and using at 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) is a protocol that allows you to send (RIP). This convention employs separation vector calculation as a steering metric, and it is one of the most well-known directing conventions for separation vector frameworks that apply the jump check and deliver the bundle for the next bounce for the response. 15 trusts have the most dramatic bounce. As a result, the maximum number of systems that RIP can handle is 15.

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).



Figure 3.1: RIP Routing Table1



Figure 3.2: RIP Routing Table2

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: Upgraded IGRP (EIGRP) is a filthy, enhanced separation vector convention that provides us a genuine edge experience for another Cisco owner convention, IGRP inside

Entryway steering. Enhanced IGRP is another name for it.

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

```

R1# debug eigrp packet hello
EIGRP Packets debugging is on
(HELLO)
R1#
Nov 20 08:07:33.131: EIGRP: Sending HELLO on Serial0
Nov 20 08:07:33.135: AS 1, Flags 0x0, Seq 0/0 idbQ 0/0 iidbQ un/rely 0/0
Nov 20 08:07:35.327: EIGRP: Received HELLO on Serial0 nbr 192.168.1.1
Nov 20 08:07:35.331: AS 1, Flags 0x0, Seq 0/0 idbQ 0/0 iidbQ un/rely 0/0 peerQ un/rely 0/0

R1# show ip eigrp neighbor
IP-EIGRP neighbors for process 1
H Address Interface Hold Uptime SRTT RT0 Q Seq Type
(sec) (ms) Cnt Num
0 192.168.1.1 Se0 13 00:24:47 1 3000 0 1
    
```

Figure 3.4: Neighbor relationship distribute list

EIGRP Configuration:

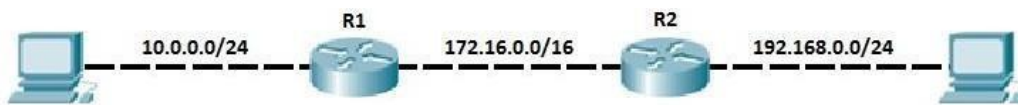


Figure 3.5: EIGRP Topology

```
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

3.1 Open Shortest Path First (OSPF)

Introduction: Because it is an open utilizing steering convention, Open Shortest Path Quick (OSPF) is the most widely used inside system entryway convention directing convention for everywhere throughout the world. Its greatest directing framework, EIGRP, is under Cisco restrictive convention, so different sellers can't access or utilize it. OSPF (Open Shortest Path First) is a perplexing Link to Link state steering 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

Advantages:

- Static Routers can be easy to configured and quick to configure.
- static routing is supported for all routing devices
- Static routers is know easy to predict and using at smallnetworks.

Static Routing Configuration:

- DefaultRoute
- Static NullRoute
- PreferredRoutes
- BackupRoutes
- Static LoadBalancing.

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.>}
```

3.2 Routing Information Protocol (RIP)

Routing Information Protocol (RIP): The Routing Information Protocol (RIP). This convention uses separation vector calculation is one of the most seasoned directing conventions for separation vector framework which utilize the jump check and send the bundle for the following bounce for the respose as a steering metric. The most extreme bounce are 15 trusts. Which restricts the size of systems that RIP can support of 15.

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 2and

RIP next generation for IPv6 (RIP).

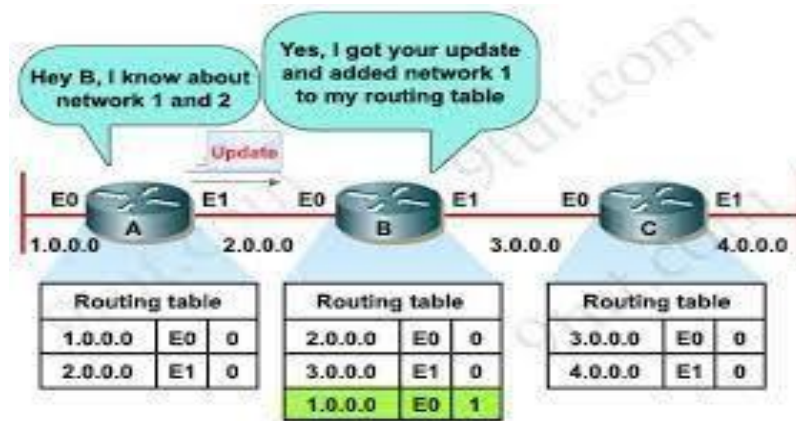


Figure 3.1: RIP Routing Table1



Figure 3.2: RIP Routing Table2

Routing Information Protocol (RIP) Configuration:

```
Router>enable
Router#configur
e terminal
Router(config)#router
rip
Router(config-
router)#version 2
```

3.3 Enhanced Interior Gateway Routing Protocol(EIGRP)

Introduction: Upgraded IGRP (EIGRP) is a convention of raunchy, improved separation vector convention that gives us a genuine edge experience for another cisco owner convention, inside entryway steering convention IGRP. That likewise called as 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

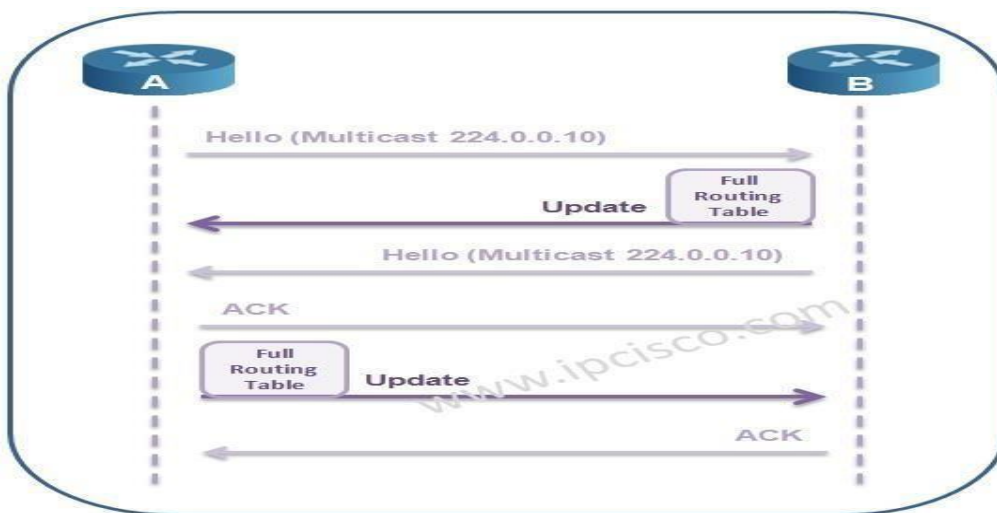


Figure 3.3: EIGRP Neighbor Establishment IP Cisco Packet

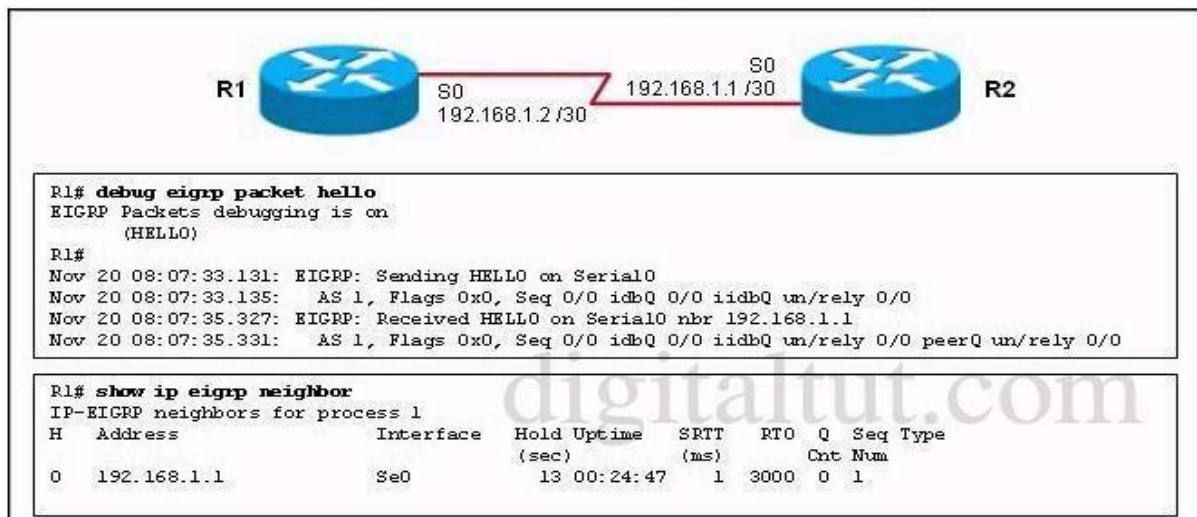


Figure 3.4: Neighbor relationship distribute list

EIGRP Configuration:

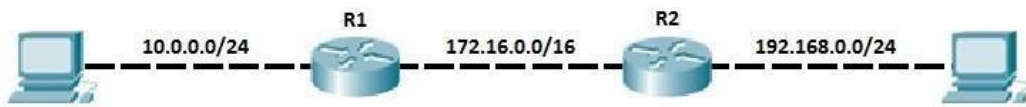


Figure 3.5: EIGRP Topology

```
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

3.4 Open Shortest Path First (OSPF)

Introduction: Open Shortest Path First (OSPF) is the most widely used link-state routing protocol in the world since it is an open standard. While its predecessor, EIGRP, is a Cisco-proprietary protocol, OSPF is an open standard that allows different vendors to implement and use it. OSPF is a link-state routing protocol.

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 Hopcount
- 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)

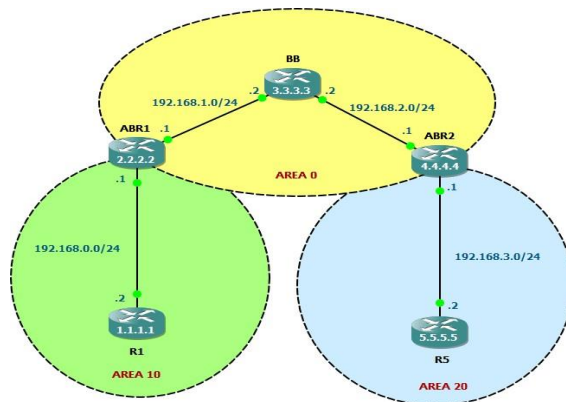


Figure 3.8: OSPF Area Defined

OSPF Configuration:

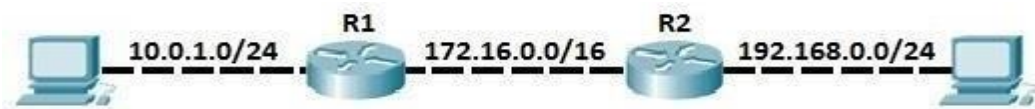


Figure 3.9: OSPF Topology

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:

The introduction of Network Address Translation (NAT) was made to address the addressing issues that arose as a result of the internet's fast proliferation. NAT, in its most basic form, allows a single network device to function as an intermediary between a private local area network and a public network, such as the internet. The goal of this NAT device is to convert the source IP addresses of internal network hosts into public routable IP addresses that may be used to interact using the internet protocol.

What is NAT?

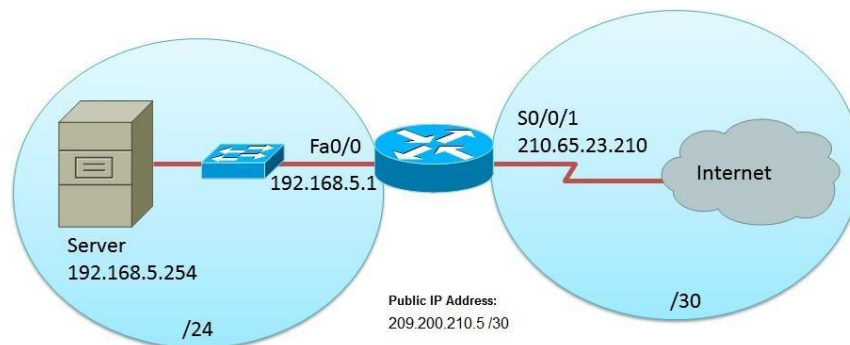
"NAT permits a host that does not have a substantial enlisted IP address to speak with

different has through the web"

For Example your PCs have a private IP of 192.168.11.10, 192.168.11.11 And 192.168.11.15 and of bend this IP can not be directed on the web but rather you can't in any case get to the web. Just the rezone your switch making an interpretation of to this location into an open IP 200.20.20.2 for instance, before directing your information into the web check the convention and IP.

Figure 3.14: Simple NAT Topology

NAT Terminology:



- ❖ Inside Local address
- ❖ Inside global address
- ❖ Outside Local address
- ❖ Outside global address

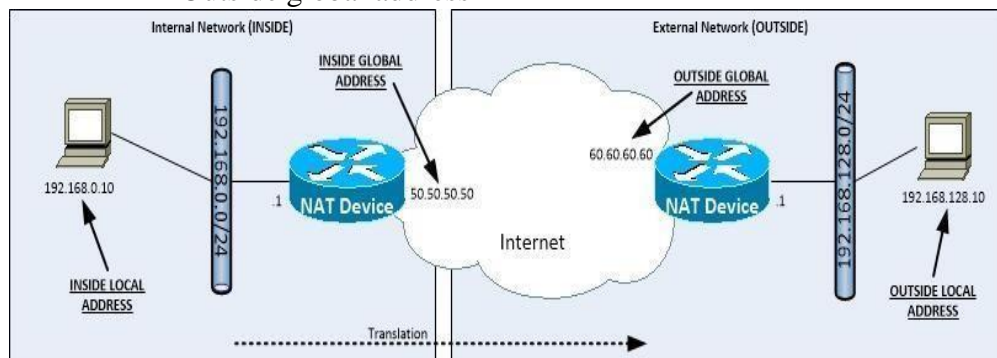


Figure 3.15: NAT Terminology

Types of Network Address Translation:

There are three types of NAT that we use in today 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 gadget who get the sign and retransmits the sign and recuperation the information it to beneficiary. In media transmission repeater are retransmit the information and recuperation the information to recipient.

There are a few sorts of repeater transmit and communicate sign to transmit the information and recuperation to the recipient. Recurrence and baud rate are information transmit rate.

There are some vindicate kinds of repeaters and ISP line , a phone repeater is an enhancing in a phone line. A repeater rehash the line transmission an optical repeater is an optoelectronic circuit that enhancing the light bar signal in an optical fiber link to enhance the optical pillar a dish recieving wire link repeater, and a radio repeater is gotten the radio sign and transmitter the sign for that retransmits signal the radio sign persistently.



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 for this kind of repeater. Any digital signal received from a segment on a hub port recognize or re amplified and transmitted out for all ports on the hub for transmitting the signal.



Figure 3.17: Network

Bridge:

Dividing at layer 2 of the interconnection OSI model open framework can decrease blockage of the availability, and extensions were an early way to do this. This themes portrays how scaffold lighten Network blockage.



Figure 3.18: Network Bridge

Switch:

Dividing at layer 2 of the interconnection OSI model open framework can decrease blockage of the availability, and extensions were an early way to do this. This themes portrays how scaffold lighten Network blockage. as follow-[7]

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



Figure 3.19: Network Switch

3.2 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
- ❖ Multiple broadcast domains Divides by a single broadcast domain
- ❖ By default all ports of the switch are in VLAN1.
- ❖ VLAN can be created from 2 –1001
- ❖ Can be configured on a manageable switch only

Types of VLAN configuration

- ❖ -Static VLAN
- ❖ -Dynamic VLAN

VLAN Benefits:

- ❖ Security
- ❖ Reduction Cost
- ❖ Performance High
- ❖ Mitigation the Broadcast storm
- ❖ Improved the efficiency of IT staff
- ❖ Application management or Simple project

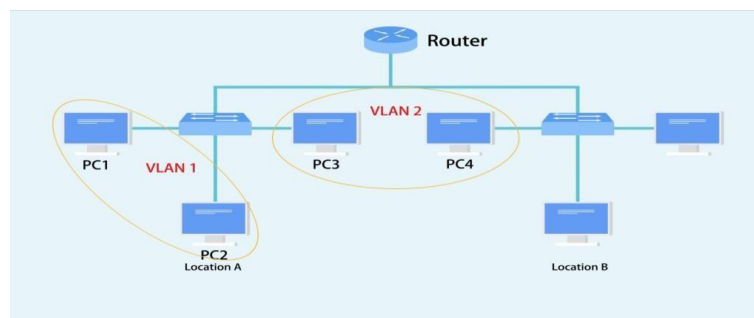


Figure 3.20: VLAN Configure

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.

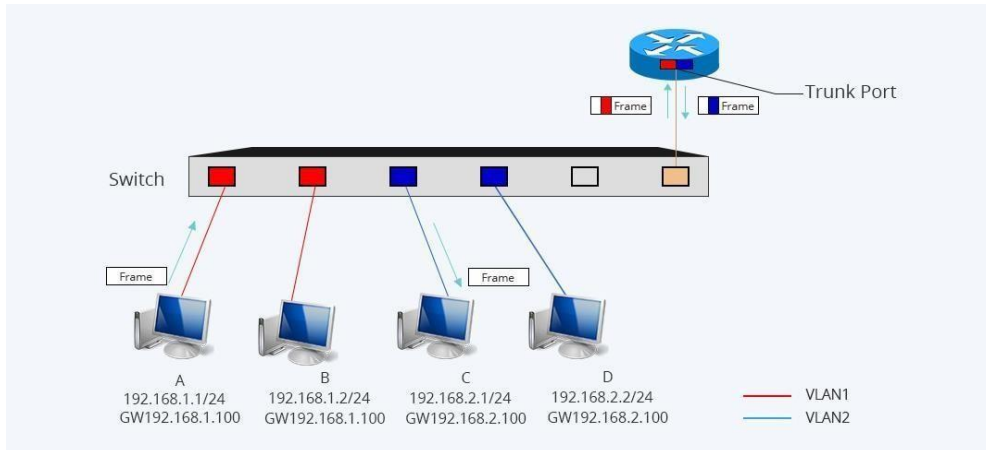


Figure 3.21: Inter VLAN

3.13 Wireless Technology:

Wireless networking is a technique of avoiding the costly system of inserting wires into a building, institution, or shopping mall, or as a link between various equipment locations in residences, telecommunications connections, and business improvement. Wireless networks have existed for a long time.

A wireless network simplifies people's lives by allowing them to interact and access applications and information without the use of cables. This gives users the flexibility to travel wherever they want, but instead of utilizing cable internet, they can utilize wireless internet, which allows them to expand applications to other parts of the building, city, or practically anywhere on the globe.



Figure 3.22: Tower

Types of wireless Networks:

Wireless networks have vindicated types of categories. They are depending on the capable of covered area and also the size of the physical area that providing the internet services also network. 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 ModeWLAN
- ✓ Infrastructure ModeWLAN
- ✓ Basic Service Set(BSS)
- ✓ Extended Service Set(ESS)

Wireless LAN Operating Modes: Ad-hoc mode

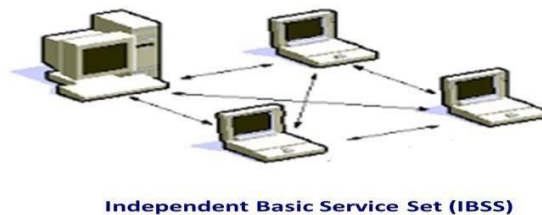


Figure 3.23: Wireless LAN Operating Modes Ad-hoc mode

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 channel are 5 MHz apart.

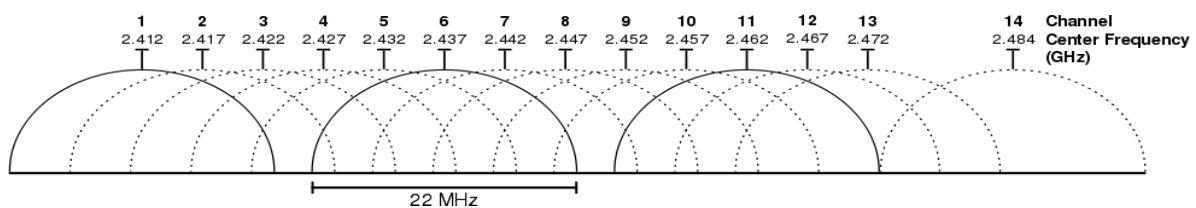


Figure 3.24: Wireless Channel

3.14 Challenges:

Every workplace is full of challenges. There is no such thing as a job that isn't filled with problems. As a result, we should take our work seriously and treat it as such. It is quite beneficial to get information and exchange companions throughout a four-month internship in order to identify our training weaknesses. To solve the answers, it is critical to take up and grasp unknown items as well as a variety of other issues.

There have been inadequate jobs to solve during my training sessions at the firm. Some of the tasks I completed on my own initiative and emailed to my company's supervisor. Some of the jobs are done by me, some by my supervisors, and some by labor. As a result of my youthful efforts, I completed several of the tasks assigned to me during the training periods.

I know how to do my task without injuring myself. So, at the beginning of any job, I am cautious of accidents and take precautions to avoid them. I don't know everything, but I do my best to learn as much as possible about all areas. And I'm free to ask whatever questions I want and to work as an independent contractor.

In the internship competition, I was fortunate in that I was able to finish the internship periods without incident. During this time, I learned how to work cooperatively with others and establish customer relationships. As a potential employee, I've learned a lot about corporate life and how to keep my calm while maintaining workplace etiquette.

After completing my studies at this university, I plan to change my lifestyle and begin a new career.

As a former student and as a person, I will do all in my power to improve the reputation of our university via my knowledge and hard work. When I start my new life with a job that requires me to work long hours, from 9 a.m. to 5 p.m., I will continue to practice this behavior throughout my internship.

CHAPTER 4

COMPETENCIES AND SMART PLAN

4.1 Competence Earned:

Nowadays, any employment center or elsewhere is bursting with talents, which is why we must ensure our practical knowledge. Because of the learning approach, abilities help to earn or learn for the outcome, which is a declaration of what an understudy is required to know, be involved in, or have the capacity to. PC systems administrator is a future earning position for me. At two datacenters, present and decommission the bulk of the framework and server equipment. In router configuration, you take the lead. During my temporary employment times, I have made more than a few problems, so it will push me in the future to have a calm mind when dealing with large issues. As a result, it's a huge accomplishment for me from my short work. In this entry-level role, you will introduce and configure routers and switches, as well as configure and use services such as VLAN design, OSPF configuration, EIGRP configuration, and RIP configuration. Apart from that, I am unwavering in my belief that the internship will provide positive consequences. The Site Supervisor, on the other hand, was giving me a presentation on valid systems and philosophy in that mechanical skill.

4.2 Smart Plan:

An organization establishes top label management to differentiate their strategy from other organizations by making it more effective, efficient, and innovative in order to achieve more and greater success gains. It is a dream come true to have a successful career and a happy life. This internship is extremely beneficial to a well-thought-out strategy.

4.3 Reflections:

The CSL Training Institute trains students and professionals with the utmost care, which plays an effective role in the workplace for both students and professionals. At the same time, the CSL Training Institute provides its various services to regular customers, which is extremely standard. I have spent a lot of time with the CSL Training Institute, which will play a leading role in my future career

CHAPTER 5

CONCLUSION AND FUTURE CAREER

5.1 Discussion and Conclusion:

My internship was completed successfully. This internship is critical for gaining practical experience. This internship teaches me how to work in an office for 8 to 9 hours. Also, self-motivation to perform good work and solve challenges. I work hard for 8–9 hours a day, 5 or 6 days a week, and this internship has helped me develop these habits. As I have disclosed, the primary concerns of time are maintained by self-inspiration and driven by internship. This training session maintains time sense, which is quite common and necessary in every day-to-day corporate and commercial life.

During my internship, I learned many vital aspects of my course's associated themes, as well as many other important skills that will be useful in my future job. It teaches me how to retain my calm in the workplace when the work pressure is too severe. I gained information and will continue to work hard as a result of my job and future aspirations. I understand how to change my boss's thinking and gain promotion via my work and attitude. This internship has made me more honest and motivated to work hard. Finally, I'd want to emphasize the necessity of internships in any educational institution or workplace for gaining real-world experience and skill expertise.

5.2 Scope for Further Career:

At the moment, computer networking is a highly sought-after career field. The IT industry is divided into several categories. There are many job opportunities in IT, such as CCNA Routing and Switching, Mikro-Tik routers, Linux, and so on. It also provides a variety of networking options, including wireless networking, router and switching, computer to computer networking, and network system engineer or administrator. One or more IT specialists are required in every office, bank, or corporation. This is just another piece of good news for network engineers. A skilled worker is in high demand in any location, so I must first develop a proficient job before moving on to a higher level in my life.

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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

An internship is a measure of how essential an internship is to our business level or our knowledge attainment. As a result, the internship period is extremely beneficial to the development of our skills in real life. When I was in business training, I took every step extremely seriously. The internship taught me how to keep a client, deal with a project, and maintain a problem-solving strategy. During my internship, I work and network with other professional workers who attentively instruct me. I know how to take on a difficult assignment and make it simple to complete. I am an association's primary objective or vision is realized, how control is shared, how to communicate with partners, how to organize, how to select the best method, and how to maintain input and output associations. The internship pushes me to make life and career plans for myself and for the rest of the world. The internship teaches me how to manage supervisors in a professional manner, and many reps benefit from it. The internship reflection has influenced my whole life, teaching me how to balance practical life and corporate life, as well as how to keep my cool in a stressful situation. It also improves our real-life circumstances and how to deal with them in order to create a brighter future. Internships are a great way to meet and work with professionals on a professional level. It is crucial to understand how they solve numerous critical tasks.

Appendix B: Company Details:

Name	CSL Training Institute
Address	2/1 (2nd floor), Beside Sunrise Plaza, Block-A, Lalmatia, Dhaka 1207
Phone	01613-275275
Email	office@csltraining.com
Website	https://www.csltraining.com/
Type of organization	Training Institute

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