

# **INTERNSHIP ON NETWORKING TECHNOLOGIES**

**BY**

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

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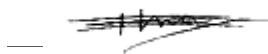


**DAFFODIL INTERNATIONAL UNIVERSITY**  
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## **APPROVAL**

This Internship titled “**INTERNASHIP NO NETWORKING TECHNOLOGIES**”, submitted by **Rakib Hasan Rifat**, bearing **ID: 201-15-13680**, to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfilment 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 19-01-2023.

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## DECLARATION

I am Rakib Hasan Rifat, bearing ID: 201-15-13680, student of Daffodil International University (DIU) on Computer department. I am declaring that I have completed the internship on **Network+** under the supervisor of **Dr. Sheak Rashed Haider Noori, Professor & Associate Head**, Department of Computer Science and Engineering. I am also declaring that this report has not been Published for any other purpose, presentation by any one rather than me. This is also declared that there is no plagiarism or data falsification and materials used in this report from various sources and site.

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I would like to express our heartiest gratitude to **Dr. Touhid Bhuiyan**, Professor and Head, Department of CSE, for his kind help to finish my internship and also to other faculty member and the staff of CSE department of Daffodil International University.

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

## **ABSTRACT**

This report is based on my Four months of practical experience at Mir Group of Companies Limited. Through this internship program, I was able to develop my networking skills. The report details the tasks I completed throughout my four-month internship at the Mir Group of Companies Limited. I learned a great deal about networking. An internship's primary objective is to help you learn by putting what you've learned in class into practice in a real-world setting so you can use the information and abilities you've developed in the tutorial to solve problems. Every significant aspect of the network that I noticed and felt while participating in my internship program has been detailed. An introduction to the organization and a general internship experience with an overview of campus network design, fundamental switch configuration, routing, addressing, RIP, EIGRP, OSPF, and VLAN are included in the report's first section. The general internship experience is then described. The report ends with a few closing observations and lessons learned from the event. The most important part of an internship program is that I use my time honestly and with the goal of discovering how to put theoretical study frameworks into practice. I want to learn about the practical side of networking during my internship and get useful professional experience. The study also offers conclusions and recommendations that, in my opinion, would enhance the culture of the business if put into practice.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Network is almost what we hear. But how much do we really understand about the concept of a network? We still communicate with one another on this network on a global scale. The largest networking age has just passed. We are online from the moment we wake up till the moment we go to sleep. In current digital age, computer networks are extremely important. Thus, networks are essential to all forms of technology. I will thus go into great detail regarding your network today. Learn everything there is to know about the network and how it interacts with us. So let's learn more about the network of today. Simply speaking, a connection is built by attaching a computer to another computer. A network is created by using that connection as a channel for information exchange. On the other hand, a node is any computer that is a part of a network. Additionally, a server stores the data that is created as a result of the information exchange via the network. Additionally, the location where data is kept is known as a server. The world's biggest network is the Internet. And a certain server is where the majority of us regular folks access the internet. The most popular and well-known method of communication engineering is networking. Data are the most significant and valuable objects in the digital age. People today are so eager to communicate and get information.

### 1.2 Motivation

The CSE Program trains students for careers in the IT industry. internship to gain practical experience in this field of computer technology. Gaining practical expertise is crucial. It broadens our knowledge of engineering or information technology and helps me become more professional. I'm hoping that my internship experience will prepare me for the challenges of the job market in my future career. Because of this, I intend to pursue internships in my future career.

### **1.3 Internship Objective**

The most crucial element of my future as well as my professional success is this internship. This paper is built on a networking system. The internship will also cover a section of the entire Network System.

- The acquisition of wisdom is study's main objective.
- I pick an internship because I learn new skills.
- To learn about the newest technology every day and put your talents to the test.
- The network support engineers did their duties and worked while examining their actions from many angles.
- To fulfill the internship requirement for the CSE program.
- To obtain comprehensive knowledge of the Cisco, MikroTic & Cisco Switch.

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

Mir Group of Companies Limited is a multinational Company in my Country. They have already proven skills within the areas of Software development, computer networks, Real-state, cement, marketing, sales and installation, commissioning and maintenance. This company offers the newest internship training within the field of networking to its students inside the corporate to stay them up to this point with the newest developments.

### **1.5 Report Layout**

This internship report is divided into five chapters. The layout report's chapters are each fully described. I try to encapsulate all of the chapters. A summary is as follows:

I look at the introduction, internship aim, internship motivation, internship objectives, and firm introduction in the first chapter. I also discuss the objectives of the internship in this chapter.

In the second chapter, I covered an overview of the organization. Talk about their departmental tasks and job descriptions as well. This chapter also covers the company's location and other specifics, as well as their service and how they deliver and maintain it.

In Chapter Three, I covered common occurrences, activities, issues, and responsibilities. This chapter also covered the characteristics of the current system as well as the way the current network topology functions. Additionally, discuss the tools they now employ to support the functionality of their devices.

I'll discuss my opinions, the practical plan, and the skills I've learnt in Chapter 4.

I'll discuss the conclusion, the future scope, and any potential work requirements in Chapter 5.

## **CHAPTER 2**

### **INTERNSHIP ORGANIZATION**

#### **2.1 Introduction**

Mir Group got its start in 1968 as the renowned construction firm Mir Akhter Hossain Limited (MAH). The company has since expanded into the real estate, telecommunications, and ICT industries.

#### **2.2 Services and Market Situation**

Mir Group of Company provides these services:

- Software Development
- IT services
- Telecommunications Services
- Real estate service's
- ICT industries
- Networking Technologies (NT)
- Network System Administrator

#### **2.3 Target the Group**

This organization is aimed at unskilled people who want to improve their skill. Specially, this organization works to enhance the employment process different non-IT backgrounds like Science, Humanities, Business. The organization also works for engineering students and professionals.

## 2.4 SWOT Analysis

### **Strength:**

- Effective Communication Skills
- Deal with any technological issue
- Recognize the office culture
- A favorable standing in
- Excellent coach market

### **Weakness:**

- Lack of Experience
- Limited Capital
- Poor Marketing

### **Chances:**

- Training for all types of individuals
- Become a coach

### **Threats:**

- Increasing the scope of their training and the institute's scope is a financial challenge.

## CHAPTER 3

### TASKS, EVENTS AND ACTIVITIES

#### 3.1 Daily Tasks and Activities

**1st - month:** In the first month of my internship at Mir Group of Companies Limited, I learned these topics.

- i. Network topologies are one.
- ii. TCP/IP model and the OSI model.
- iii. Subnetting and IPv4
- iv. Information on the routing protocol.

**2nd - month:** In the first month of my internship at Mir Group of Companies Limited, I learned these topics.

- i. Routing that is static and default
- ii. Together with RIP
- iii. EIGRP
- iv. OSPF
- v. SSH Configuration

**3rd - month:** In the first month of my internship at Mir Group of Companies Limited, I learned these topics.

- i. Switching
- ii. VLAN
- iii. Inter VLAN
- iv. STP
- v. Wireless technology

**4th - month:** In the first month of my internship at Mir Group of Companies Limited, I learned these topics.

- i. Windows Server 2019 Installation
- ii. AD DS Installation

## **3.2 Network**

### **Network – what is it?**

Network is almost what we hear. But how much do we really understand about the concept of a network? We still communicate with one another on this network on a global scale. We are online from the moment we wake up till the moment we go to sleep. Therefore, we will talk in depth about your network today. Learn everything there is to know about the network and how it interacts with us. So, let's learn more about the network of today. A network is a connection created by joining two or more devices together, including computers and other media. A network is created by joining two computers together, and a network is simply a system for exchanging information over those connections.

### **Network are Types:**

- i. Local Area Network
- ii. Metropolitan Area Network
- iii. Wide Area Network

**LAN (Local Area Network):** A local area network, or LAN, is a network that is built by connecting two or more computers that are separated by no more than 100 meters. The local area network's connections are made via coaxial cable and twisted cabling.

**MAN (Metropolitan Area Network):** A metropolitan area network, or MAN, is a network that is built by connecting several points within a large metropolis utilizing one or more computers communication devices. The metropolitan area network, which can span between 10 and 30 kilometers, is larger than the local area network. This indicates that a city's network system is

essentially a metropolitan area network, and it needs network speeds of between 34 Mbps and 155 Mbps.

**WAN (Wide Area Network):** A telecommunications network is linked to other computers or devices to form a wide area network (WAN). The largest and most connected network of all is the wide area network. You may effortlessly share information from one country to another with the help of this network technology. The speed required to finish this network system is typically between 1200 Mbps and 2400 Mbps.

### Internetworking Devices:

- i. Router
- ii. Switch
- iii. Hub

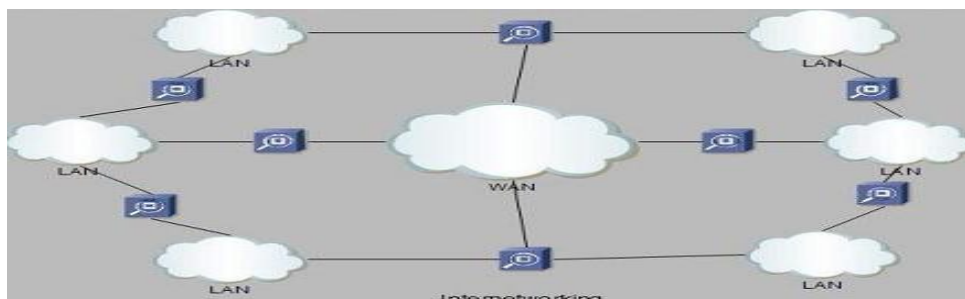


Figure 3.2.1: Internetworking

**Router:** A router is a significant gadget that combines hardware and software. Networks are constructed using it. A router is a networking device that chooses the route a data packet will take across many networks to reach its destination. Data packets are collections of data or data chunks. The data packets are sent to their destination by the router via the shortest way. The task of "directing traffic" to the Internet is carried out by the router. A data packet typically travels from one router to another through a network interconnect before arriving at the destination node.





Figure 3.2.2: Router.

Figure 3.2.2 Router

**Switch:** When it comes to networking, a switch is a piece of equipment that can filter and forward packets of information across various local area network nodes. The switch operates on one of the OSI layer's data link layers. But occasionally it also functions at the network layer. Switched LANs are local area networks (LANs) that employ switches to facilitate communication between their various components.



Figure 3.2.3: Switch

**Hub:** A hub is a piece of hardware that links two or more computers together in a network. The computers are linked to one another via this. How many ports there are will determine how many machines can be connected. The quantity of connections to the computer affects the hub's power. Several port hubs are currently offered on the market. In other words, a hub serves as a hub for connecting network devices. It has a lot of ports. All areas of the LAN can see the data packet because it is truly copied from one port to the other. The hub serves as the star topology's main governing mechanism. Its cost is affordable.



Figure 3.2.4: Hub

### 3.3 The OSI Model

The OSI requirements' most crucial duties include assisting data transmission between various hosts, whether they are Unix-Windows or Mac-based. However, keep in mind that application developers use the OSI model as a conceptual framework to create and deploy network applications. It is a comprehensive but adaptable set of principles.

- i Application (Layer 7)
- ii Presentation (Layer 6)
- iii Session (Layer 5)
- iv Transport (Layer 4)
- v Network (Layer 3)
- vi Data Link (Layer 2)
- vii Physical (Layer 1)

Figure 3.3.1 summarizes the functions that occur at each layer of the OSI model.



Figure 3.3.1: Layer function

The seven levels of the OSI divide it into two groups. How host machine apps communicate with one another and with end users is determined by the top three layers. The data flow from point A to point B is controlled by the bottom four layers.

Figure 3.3.2 shows the top three layers and their functions.

Application	<ul style="list-style-type: none"> <li>Provides a user interface</li> </ul>
Presentation	<ul style="list-style-type: none"> <li>Presents data</li> <li>Handles processing such as encryption</li> </ul>
Session	<ul style="list-style-type: none"> <li>Keeps different applications' data separate</li> </ul>
Transport	
Network	
Data Link	
Physical	

Figure 3.3.2: The upper layers

Figure 2.3 shows the four lower layers and their functions.

Application	
Presentation	
Session	
Transport	<ul style="list-style-type: none"> <li>• Provides reliable or unreliable delivery</li> <li>• Performs error correction before retransmit</li> </ul>
Network	<ul style="list-style-type: none"> <li>• Provides logical addressing, which routers use for path determination</li> </ul>
Data Link	<ul style="list-style-type: none"> <li>• Combines packets into bytes and bytes into frames</li> <li>• Provides access to media using MAC address</li> <li>• Performs error detection, not correction</li> </ul>
Physical	<ul style="list-style-type: none"> <li>• Moves bits between devices</li> <li>• Specifies voltage, wire speed, and pin-out of cables</li> </ul>

Figure 3.3.3: The lower layers

**Application Layer:** The seventh layer of the OSI Model is this one. This layer is a lot clearer in the workplace network. This layer typically stands between the user and the network. It is the only layer that directly engages with user data. The user is required to submit the processed data because client software programs, on the other hand, are not a component of the application layer but are in charge of application layer protocols and data processing. Protocols at the application level include HTTP and SMTP.

**Presentation Layer:** The presentation layer is the sixth layer in the OSI Model. There is a difference in the data format between the network layer, the application, and the display layer. The presentation layer is responsible for data conversion, character code translation, data compression, encryption, and decryption. Presentation Layer, commonly referred to as the Syntax Layer. For instance, this level involves structuring and encrypting the data before it is sent across the network. When the data is received, it is encrypted, formatted, and displayed as text or media content. Through the presentation layer, complex data is serialized into portable forms. The object at the destination is then re-formatted after the data streams have been deserialized.

Figure 3.3.4 shows how to presentation layer works.



Figure 3.3.4: Presentation Layer

**Session Layer:** This is the fifth layer in the OSI Model. The task of the session layer is to link the source and destination devices, manage that connection, and cut it off as needed. The first of three layers that work with the application layer, the session layer, controls communication sessions between servers. A session is the period of time between the establishment and termination of a connection that enables interactive data flow between two networked devices. For instance, HTTPS provides service sessions, which let online visitors browse and explore websites for a predetermined period of time. The session layer offers a variety of services, including starting, stopping, and restarting session activities, authenticating communications between specific apps and servers, determining whether operations are full-duplex or half-duplex, and synchronizing data streams.



Figure 3.3.5: Session Layer connection

**Transport Layer:** The fourth layer of the OSI model is this one. Data packets received from the session layer must safely reach other devices, and that is the responsibility of the transport layer. The Transport Layer monitors data packets for error control, congressional control, and flow control, looks for errors and duplication, and transfers data that hasn't been delivered. Additionally, it is his responsibility to divide any data that exceeds the permitted pocket into smaller portions. Again, this would need you to pay for these procedures. Segmentation and de-segmentation are terms used to describe the splitting up and pairing of data. This layer also regulates how quickly data packets flow.

**Network Layer:** The OSI Model's third level is this one. This layer creates a logical connection between the network's sender and recipient systems. Data transport between two separate networks is accomplished via the network layer. The network layer is not required if there are two linked devices that are on the same network. Through encapsulation, this layer adds the network address to the data packet. This layer selects the best and most effective path among a variety of paths for data flow. A network can have numerous paths for data to reach the destination. In other words, this level chooses the appropriate route for data flow. Hardware at the network layer includes router and routing protocols.

Figure 3.3.6 visualizing a routing table The following details are contained in a router's routing table.:

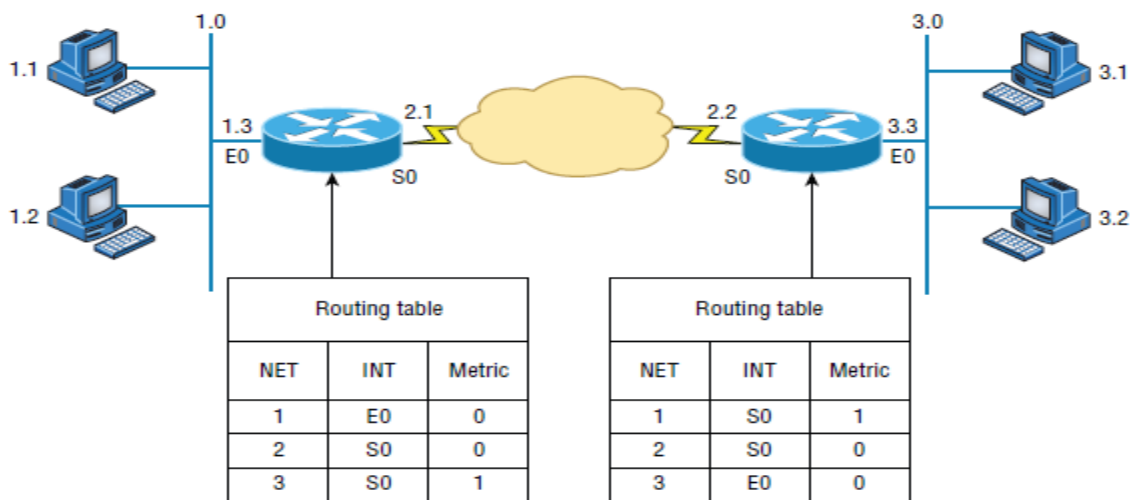


Figure 3.3.6: Routing table used in a router

The easiest way for one piece of modern electronic equipment to communicate with another piece of equipment is via an IP address. In this case, IP, or Internet Protocol, is employed. If you want to find a specific computer device among the billions of other computers, you must find the IP address. The IP Left Internet Protocol rules, which control how all computer hardware connects to the Internet, are listed below. To put it another way, the router must first perform the IP address in order to operate properly.

Another thing to bear in mind is that the router will attempt to connect to the nearest network system. To determine which network is nearby, the router uses a method called as metric value.

The metric value in this case is a special integer that is an intrinsic part of every router. Like when we try to link two routers by spacing them away the same amount but placing them in separate places. In this case, the device will attempt to connect to the router with the lower metric value first. The most important thing to keep in mind in this connection is that the device will never connect to the network if the IP address does not match the IP address.

Figure 3.3.7 demonstrates how a router works within an internetwork.

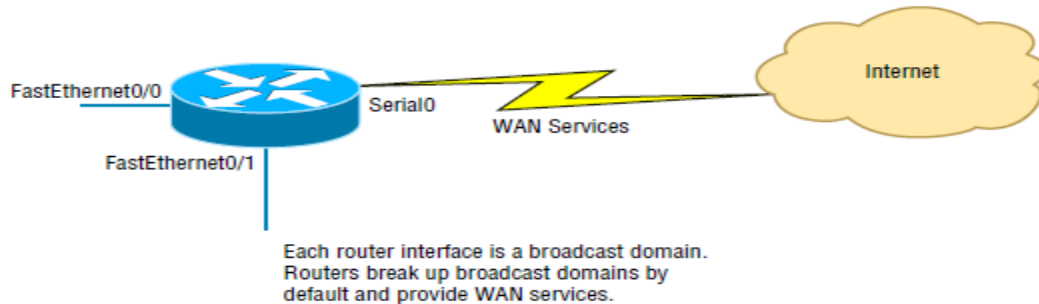


Figure 3.3.7: A router in an internetwork

**Data Link Layer:** The OSI model's second layer is the data link layer. Through physical linkages, this level attempts to freely convey data between the sender and receiver systems. After being synchronized and packaged in a data frame, the raw data from the physical layer is distributed to the proper nodes, which contain the protocols required to route the data. The physical layer sends bits of information from the transmitter to the recipient system without any semantic organization. Therefore, any type of inaccuracy in all of these data can result from the transmission line's operating condition.

Figure 3.3.8 shows the Data Link layer with the Ethernet and Institute of Electrical and Electronics Engineers (IEEE) specifications.

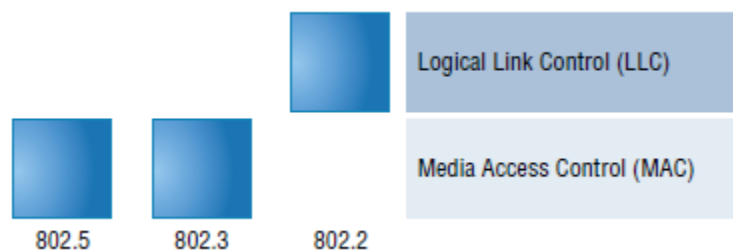


Figure 3.3.8: The Data Link Layer

The data link layer has two sub-layers:

It uses logical link control (LLC) to ensure accurate and error-free data transmission between network nodes by controlling sublayer flow and errors.

Data transmission between sublayer network nodes is controlled by Media Access Control (Mac) by controlling access and permissions.

**Physical Layer:** The OSI Model's lowest level is this one. The physical layer controls the electric signal or data bit format, as well as how the signal will be carried from one device to another. This level's primary duties include making physical touch with various gadgets and transferring data between them using physical mediums. Typically, bits of data are conveyed across various physical media in this layer.

The tangible media are -

- i. Twisted pair cable
- ii. Fiber optic cable
- iii. Coaxial cable
- iv. Wireless media

### 3.4 IP Addressing

#### IP Terminology

**IP address** is a logical address that is used to identify a single host, while it is also possible to utilize IP addresses to refer to many or all hosts. When something is written as just IP, it refers to IPv4. IPv6 must always be written as IPv6.

In this section, a number of key terms that are crucial to your understanding of the Internet Protocol will be covered. Here are some ideas to get you started:

**Bit:** One binary digit, either a 1 or a 0, makes up a bit.

**Byte:** A byte can be either 7 or 8 bits long, depending on whether parity is used. For the remainder of this chapter, always assume a byte to be 8 bits.



**Octet:** An ordinary 8-bit binary number made up of 8 bits is known as an octet. In this chapter, the terms "byte" and "octet" are used interchangeably, as they are both usually expressed in decimal numbers up to 255.

**Network Address:** To send packets to a distant network, use this routing designation; examples include 10.0.0.0, 172.16.0.0, and 192.168.10.0.

**Broadcast Address:** The broadcast address is used by hosts and applications to send data to every host on a network. All subnets and hosts on network 172.16.0.0 are specified by 172.16.255.255, and all subnets and hosts on network 10.0.0.0 are broadcast by 10.255.255.255. All networks and all hosts are identified by the number 255.255.255.

**Classes of IP Address:**

- i. Class A (0-127) /8
- ii. Class B (128-191) /16
- iii. Class C (192-223) /24
- iv. Class D (224-239)
- v. Class E (240-255)

Figure 3.4.1 the three sorts of networks are summarized.

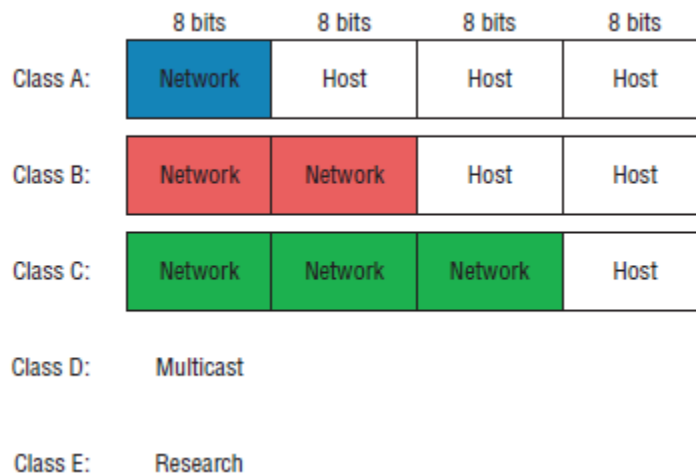


Figure 3.4.1: Summary of the three classes of networks

### 3.5 Subnetting

How does subnetting work? Let's say we have a network address; if we so like, we can break this address up into numerous smaller networks. A large network is divided into smaller networks by a technique called subnetting. For those of us learning networking, subnetting is one of the most crucial topics.

#### Formulas for subnet calculation:

Possible number of subnets=  $2^n$  (n = borrowed bit)

Figure 3.5.1 show the number of subnets.

Bits Borrowed	Formula	Possible Subnets	Bits Borrowed	Formula	Possible Subnets
1	$2^1$	2	12	$2^{12}$	4,096
2	$2^2$	4	13	$2^{13}$	8,192
3	$2^3$	8	14	$2^{14}$	16,384
4	$2^4$	16	15	$2^{15}$	32,268
5	$2^5$	32	16	$2^{16}$	65,536
6	$2^6$	64	17	$2^{17}$	131,072
7	$2^7$	128	18	$2^{18}$	262,144
8	$2^8$	256	19	$2^{19}$	524,288
9	$2^9$	512	20	$2^{20}$	1,048,576
10	$2^{10}$	1,024	21	$2^{21}$	2,097,152
11	$2^{11}$	2,048	22	$2^{22}$	4,194,304

Figure 3.5.1: Number of subnets

Number of valid host per subnet =  $2^h - 2$  (h = host bit)

#### Example:

**192.168.239.5/29**

Subnet mask = 11111111.11111111.11111111.11111000  
= 255.255.255.248

Host bit =  $32 - 29 = 3$

Network bit = 29

Number of subnets =  $2^n$   
=  $2^5$   
= 32

Number of valid hosts per subnet =  $2^h - 2$

$$\begin{aligned} &= 2^3 - 2 \\ &= 8 - 2 \\ &= 6 \end{aligned}$$

### 3.6 Routing Protocol Introduction

A routing protocol is a set of rules that chooses one of a computer network's two nodes and describes how the routers connect and transmit data. Algorithms for routing are used to complete this task. Only a rough understanding of how to connect each router directly to the network exists. These protocols allow routers to communicate network, route, and metric information so that each router can choose the best route. Routers create their own routing tables based on the data they gather with the aid of routing protocols.

- i. Static Routing
- ii. Dynamic Routing

**Static Routing:** The routing protocol known as a static route requires that each routing route be manually created in the router's routing table. The information in the routing table must be changed once again if the network changes for any reason. When using a static route, it is not continuously updated. There is an administrative distance for each routing protocol. This administrative distance is 1, and it applies to static routing.

**Dynamic Routing:** Dynamic routes are those that automatically alter the routing table over time. There is no need to perform any manual tasks as a result. The routing table is automatically updated whenever a route is changed.

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

It is a protocol that combines elements of the Distance Vector Routing Protocol and the Link State Routing Protocol. Due to these reasons, EIGRP is referred to as a hybrid routing protocol. The router can find out about the locations and distances between its nearby routers thanks to the distance vector routing protocol. Using the link state routing protocol, the router may also learn about the issues with each connection and select the best route.

### 3.8 Open Shortest Path First (OSPF)

The OSPF process begins in a router once OSPF is configured in that router. When OSPF first starts, the router chooses its Router ID. The name of an OSPF router used in that router's OSPF activity is Router ID. In essence, this Router ID represents the router's IP address. In other words, an OSPF router chooses a specific IP address from among those added to its interfaces to serve as its Router ID. The issue at hand is which router's IP will choose it as the Router ID. The router will use its Highest Active IP in this situation as the Router ID.

Figure 3.8.1 shows how to OSPF Configuration

#### Example: Dynamic Routing Configuration in CISCO using OSPF

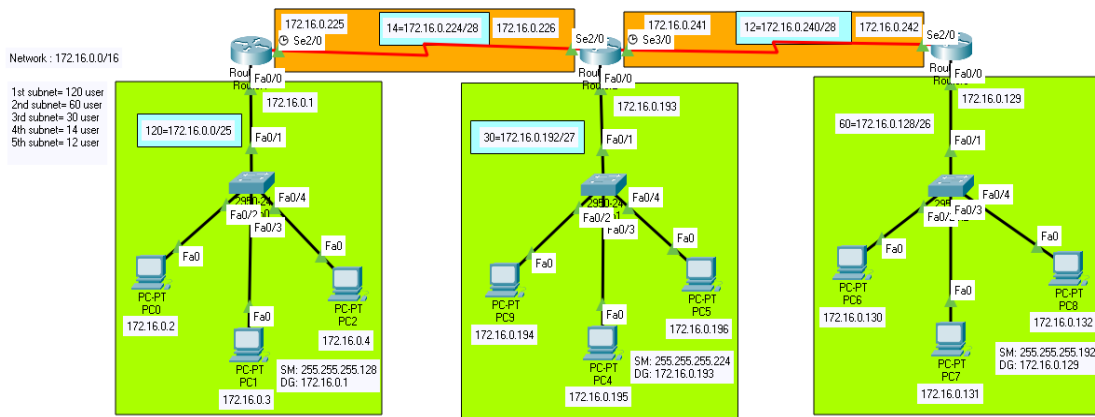


Figure 3.8.1: OSPF Configuration

### Router1 Configuration:

=====

Router>enable

Router#configure terminal

Router(config)#

Router(config)#interface fastEthernet 0/0

Router(config-if)#ip address 172.16.0.1 255.255.255.128

Router(config-if)#no shut down

Router(config-if)#exit

Router(config)#interface serial 2/0

Router(config-if)#ip address 172.16.0.225 255.255.255.240

Router(config-if)#no shut down

Router(config-if)#clock rate 64000

Router(config-if)#exit

Router(config)#router ospf 10 /// (router ospf process ID, process ID=10)

Router(config-router)#network 172.16.0.0 0.0.0.127 area 0

Router(config-router)#network 172.16.0.224 0.0.0.15 area 0

Router(config-router)#exit

Router(config)#exit

Router#copy running-config startup-config /// (for save)

### Router2 Configuration:

=====

Router>enable

Router#configure terminal

Router(config)#

```
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip address 172.16.0.193 255.255.255.224
Router(config-if)#no shut down
Router(config-if)#exit
```

```
Router(config)#interface serial 2/0
Router(config-if)#ip address 172.16.0.226 255.255.255.240
Router(config-if)#no shut down
Router(config-if)#exit
```

```
Router(config)#interface serial 3/0
Router(config-if)#ip address 172.16.0.241 255.255.255.240
Router(config-if)#no shut down
Router(config-if)#clock rate 64000
Router(config-if)#exit
```

```
Router(config)#router ospf 20  /// (router ospf process ID, process ID=20)
Router(config-router)#network 172.16.0.192 0.0.0.31 area 0
Router(config-router)#network 172.16.0.224 0.0.0.15 area 0
Router(config-router)#network 172.16.0.240 0.0.0.15 area 0
Router(config-router)#exit
Router(config)#exit
Router#copy running-config startup-config  /// (for save)
```

### **Router3 configuration:**

```
=====
Router>enable
Router#configure terminal
```

```

Router(config)#
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip address 172.16.0.129 255.255.255.192
Router(config-if)#no shut down
Router(config-if)#exit

Router(config)#interface serial 2/0
Router(config-if)#ip address 172.16.0.242 255.255.255.240
Router(config-if)#no shut down
Router(config-if)#exit

Router(config)#router ospf 30  /// (router ospf process ID, process ID=30)
Router(config-router)#network 172.16.0.128 0.0.0.63 area 0
Router(config-router)#network 172.16.0.240 0.0.0.15 area 0
Router(config-router)#exit
Router(config)#exit
Router#copy running-config startup-config  /// (for save)

```

Finally, we can use the \*(ping or trace) command to see if everything is working or not

### 3.9 SSH Configuration

When enabling remote access to a Cisco device, we typically use Telnet. The TCP 23 port is used by the Telnet protocol to transmit data to Plaintext. Such data packets are susceptible to capture, decoding, and password theft by hackers who use tools like Wireshark and other protocol analyzing software. For remote access, it is therefore recommended to use Secured Shell (SSH) rather than Telnet. Devices that use the TCP port and transfer data in an encrypted state, such as those that use SSH, can be accessed securely from a distance.

#### How to configure SSH in different ways

**I'll now talk about SSH versions:**

**Version 1.55:** It uses the DES algorithm, which can be broken by using powerful servers with 64GB RAM in a matter of hours—roughly 6 or 7 hours.

**Version 1.99:** It is also backwards compatible and works with both versions 1.55 and 2.

**Version 2:** This version is used by all recent Cisco routers.

**Version 3:** Checkpoint similar to a firewall for email security appliances.

### How we can configure SSH?

There are three ways to configure SSH.

#### 1. By using hostname and domain name

Crypto = Encryption and Decryption, Hashing etc.

Key = A mathematical algorithm used to perform a certain task.

Example: Hashing key = is used to perform hashing

Encryption key = is used to perform authenticate

Generate = For generating the key by the algorithm

RSA = An algorithm named by Rivest, Shamir and Adleman (it is the asymmetric also)

The name of Key is combination is Hostname + Domain name.

#### 2. By not using domain name

3. **By enabling SSH and HTTPs on the router. It uses 1024 bits key.** (Key name will be generated randomly here).

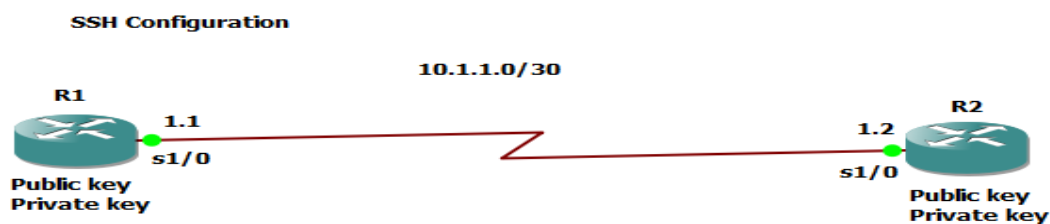


Figure 3.9.1: SSH Configuration



```
R1
R1#
R1#configure terminal
R1(config)#int s1/0
R1(config-if)#ip add 10.1.1.1 255.255.255.252
R1(config-if)#no sh
```

```
R1#
R1#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int s1/0
R1(config-if)#ip add 10.1.1.1 255.255.255.252
R1(config-if)#no sh
R1(config-if)#
*Jun 26 00:29:31.243: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R1(config-if)#
*Jun 26 00:29:32.251: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0,
changed state to up
```

```
R2
R2#
R2#configure terminal
R2(config)#int s1/0
R2(config-if)#ip address 10.1.1.2 255.255.255.252
R2(config-if)#no sh
```

```
R2#
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#int s1/0
R2(config-if)#ip add 10.1.1.2 255.255.255.252
R2(config-if)#no sh
R2(config-if)#
*Jun 26 00:31:08.795: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R2(config-if)#
*Jun 26 00:31:09.799: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
```

## 1. By using hostname and domain name

Using version 1.55

```
R2(config)#hostname Dhaka
Dhaka(config)#ip domain-name it-training.tech
Dhaka(config)#crypto key generate rsa
```

```

r2(config)#hostname Dhaka
Dhaka(config)#ip d
Dhaka(config)#ip do
Dhaka(config)#ip domain-n
Dhaka(config)#ip domain-name it-training.tech
Dhaka(config)#crypto key generate rsa
The name for the keys will be: Dhaka.it-training.tech
Choose the size of the key modulus in the range of 360 to 4096 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 560
% Generating 560 bit RSA keys, keys will be non-exportable...
[OK] (elapsed time was 0 seconds)

Dhaka(config)#
*Jun 26 01:01:09.959: RSA key size needs to be atleast 768 bits for ssh version 2
Dhaka(config)#
*Jun 26 01:01:09.959: %SSH-5-ENABLED: SSH 1.5 has been enabled
Dhaka(config)#

```

Using version 2 in same router:

```

Dhaka(config)#no crypto key zeroize
Dhaka(config)#crypto key generate rsa
How many bits in the modulus [512]: 761

```

```

Dhaka(config)#no crypto key zeroize
% All keys will be removed.
% All router certs issued using these keys will also be removed.
Do you really want to remove these keys? [yes/no]: yes
Dhaka(config)#
*Jun 26 01:09:21.223: %SSH-5-DISABLED: SSH 1.5 has been disabled
Dhaka(config)#crypt
Dhaka(config)#crypto l
Dhaka(config)#crypto k
Dhaka(config)#crypto key g
Dhaka(config)#crypto key generate r
Dhaka(config)#crypto key generate rsa
The name for the keys will be: Dhaka.it-training.tech
Choose the size of the key modulus in the range of 360 to 4096 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 761
% Generating /61 bit RSA keys, Keys will be non-exportable...
[OK] (elapsed time was 1 seconds)

Dhaka(config)#
*Jun 26 01:11:20.099: %SSH-5-ENABLED: SSH 1.99 has been enabled
Dhaka(config)#ip ssh va
Dhaka(config)#ip ssh var
Dhaka(config)#ip ssh ve
Dhaka(config)#ip ssh version 2
Dhaka(config)#l1
Dhaka(config)#lin
Dhaka(config)#line vt
Dhaka(config)#line vty 0 2
Dhaka(config-line)#login local
Dhaka(config-line)#exit
Dhaka(config)#username itbd password itbd
Dhaka(config)#ena
Dhaka(config)#enable pa
Dhaka(config)#enable password cisco
Dhaka(config)#

```

```

Dhaka(config)#
Dhaka(config)#ip ssh version 2
Dhaka(config)#line vty 0 2
Dhaka(config-line)#login local
Dhaka(config-line)#exit
Dhaka(config)#username itbd password itbd
Dhaka(config)#enable password cisco

```

```
R1#  
R1#ssh -l itbd 10.1.1.2  
Password:  
Dhaka>
```

Successfully logged into router Dhaka that's means R2 from R1

## 2. By not using domain-name

```
Dhaka(config)#no ip ssh version 2  
Dhaka(config)#no crypto key zeroize  
Dhaka(config)#crypto key generate rsa general-keys label itbd
```

```
Dhaka(config)#no ip ssh version 2  
Dhaka(config)#no crypt  
Dhaka(config)#no crypto z  
Dhaka(config)#no crypto k  
Dhaka(config)#no crypto keyz  
Dhaka(config)#no crypto key z  
Dhaka(config)#no crypto key zeroize  
% All keys will be removed.  
% All router certs issued using these keys will also be removed.  
Do you really want to remove these keys? [yes/no]: yes  
Dhaka(config)#  
*Jun 26 01:40:19.091: %SSH-5-DISABLED: SSH 1.99 has been disabled  
Dhaka(config)#  
Dhaka(config)#  
Dhaka(config)#  
Dhaka(config)#crypt  
Dhaka(config)#crypto k  
Dhaka(config)#crypto keyg  
Dhaka(config)#crypto key g  
Dhaka(config)#crypto key generate ra  
Dhaka(config)#crypto key generate rs  
Dhaka(config)#crypto key generate rsa l  
Dhaka(config)#crypto key generate rsa ge  
Dhaka(config)#crypto key generate rsa general-keys l  
Dhaka(config)#crypto key generate rsa general-keys label itbd  
The name for the keys will be: itbd  
Choose the size of the key modulus in the range of 360 to 4096 for your  
General Purpose Keys. Choosing a key modulus greater than 512 may take  
a few minutes.  
How many bits in the modulus [512]: 1024  
% Generating 1024 bit RSA keys, keys will be non-exportable...  
[OK] (elapsed time was 1 seconds)
```

Then we will check this command whether working properly.

```
R1#  
R1#ssh -l itbd 10.1.1.2  
Password:  
Dhaka>ena  
Password:  
Dhaka#
```

Now we can see that the command has worked properly.

### 3. By enabling SSH and HTTPs

Dhaka(config)#ip http secure-server

```
Dhaka(config)#ip http sec
Dhaka(config)#ip http secure-s
Dhaka(config)#ip http secure-server
% Generating 1024 bit RSA keys, keys will be non-exportable...
[OK] (elapsed time was 1 seconds)
Failed to generate persistent self-signed certificate.
Secure server will use temporary self-signed certificate.

Dhaka(config)#
*Jun 26 02:53:48.055: %SSH-5-ENABLED: SSH 1.99 has been enabled
Dhaka(config)#
```

By default, generating 1024bit RSA keys and enabled SSH 1.99 version.

Now, we will SSH login into the R2 that's means Dhaka from the R1.

```
R1#
R1#ssh -l itbd 10.1.1.2
Password:

Dhaka>en
Password:
Dhaka#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Dhaka(config)#
```

We can also see that Successfully logged into router Dhaka

```

Dhaka#sh crypto key mypubkey ?
all Show all public keys
ec Show ec public keys
rsa Show RSA public keys

Dhaka#sh crypto key mypubkey r
Dhaka#sh crypto key mypubkey rsa
% Key pair was generated at: 04:00:43 UTC Jun 26 2021
Key name: TP-self-signed-4279256517
key type: RSA KEYS
Storage Device: not specified
Usage: General Purpose Key
Key is not exportable. Redundancy enabled.
Key Data:
30819F30 0D06092A 864886F7 0D010101 05000381 8D003081 89028181 00C4869F
738BA2F1 B1509491 1325E106 F3184A53 B4A6A81D B057C291 A4739C72 72FC3A84
C49D5F50 956AB328 F172F21C B1D2A8BD 6279C470 03EFA43E 6A1CF008 A17D6F55
15C62E26 87E4496F B43C211D A30AA33C 42B8B58F 14474E5E 8A8AB42B 60BBA348
84DE8F13 C2EE9F7A E952C6F3 B654276C A4104F3C 8F230718 291C9050 41020301 0001

% Key pair was generated at: 04:00:45 UTC Jun 26 2021
Key name: TP-self-signed-4279256517.server
Key type: RSA KEYS
Temporary key
Usage: Encryption Key
Key is not exportable. Redundancy enabled.
Key Data:
307C300D 06092A86 4886F70D 01010105 00036B00 30680261 00AAFADC 8131EF61
F41F98E0 978675A2 8539810A FC65BCE5 3D00D45D C461F6A7 45D13554 AA4FE0F2
8D8324B5 88F0EE95 91E7B1E0 B7C48EEA 9ADFB5E6 E654AB71 AFC87958 FB2F9E99

```

Now, we can see above this picture, the key name automatically has generated this way.

### 3.10: Windows Server Installation

- Firstly, we need to turn on computer and insert windows server bootable pen drive or disk. Then press any key to boot if necessary.
- Select language, time and currency format and keyboard.
- Then click next. Figure 3.10.1 shows Windows setup page to install windows server.

Figure 3.10.2 shows which type of installation we want. Now we select **Custom**.



Figure 3.10.1: Windows setup page

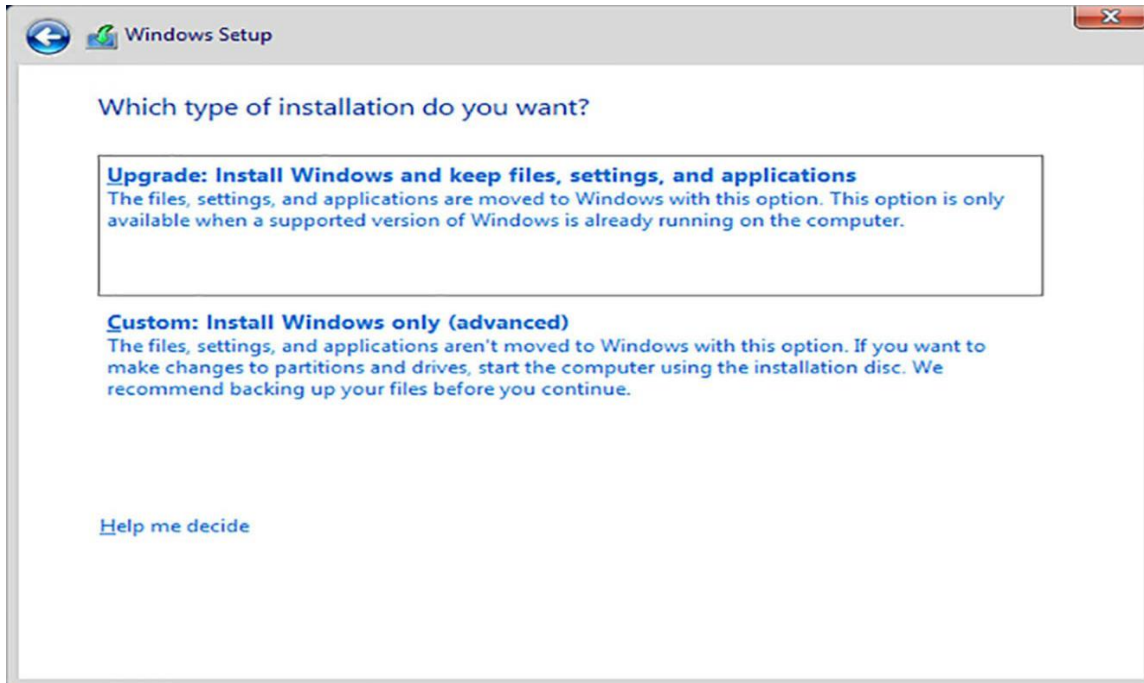


Figure 3.10.2: Which type installation we want

Figure 3.10.3 shows Where we want to store this windows server file. Then click **next**.

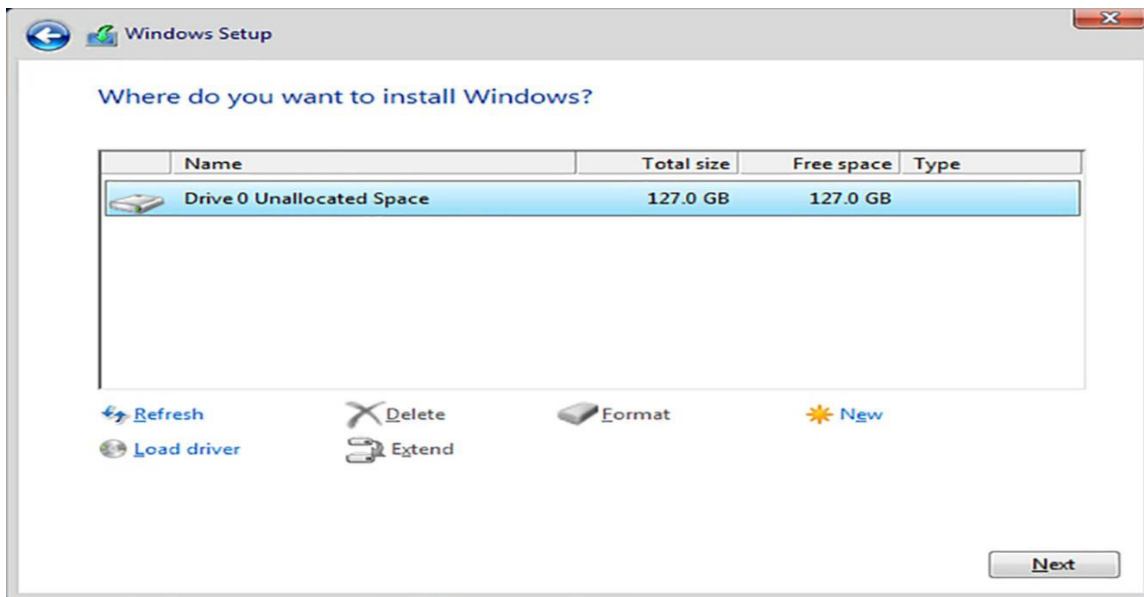


Figure 3.10.3: Where we want to store this windows server file

Figure 3.10.4 shows Customize setting page. Set Password and then click **finish**

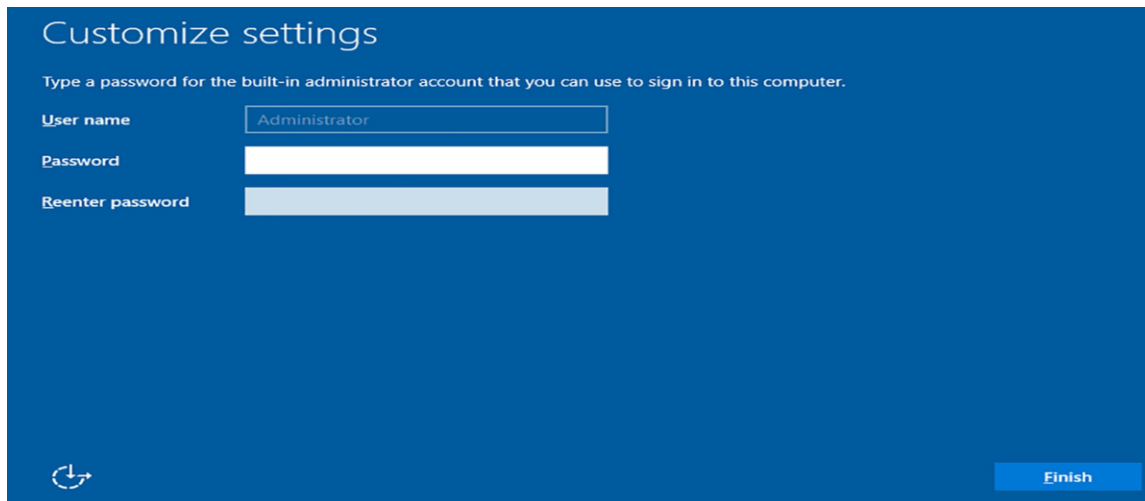


Figure 3.10.4: Customize page

### 3.11 AD DS Installation

1. Login windows server as a local administrator.
2. Go to server manager
3. Select Dashboard
4. Click Add Roles and Features.
5. Select Active Directory Domain Services then click Next.

Figure 3.11.1 shows Add Roles and Features wizard to install AD DS

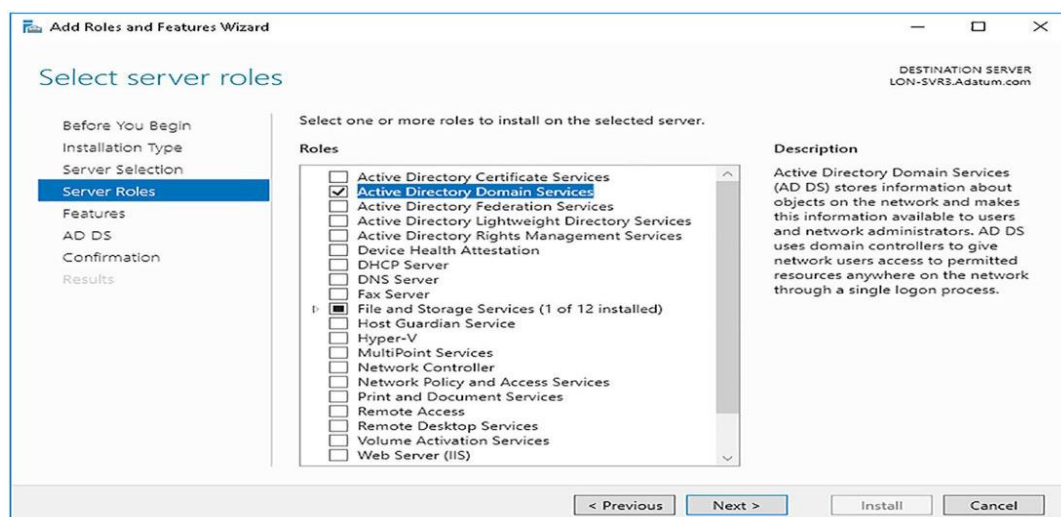


Figure 3.11.1: Add Roles and Features wizard

### **3.12 Challenges**

Every workplace has its own set of difficulties. There are problems in any business. As a result, we must treat our work with respect and take it seriously. Training has improved dramatically in just four months. Positive to learn knowledge and exchange comrades in identifying our training time weaknesses. It is critical to capture and comprehend unknown and numerous things. There are more challenges to solve. There is insufficient work to solve during my training sessions at the organization. Some of the tasks I accomplish on my own initiative and mail to my company's supervisor. Some of the work is completed by myself, some by my supervisors, and some by laborers. As a result, as a youthful worker, I completed some of the works. I know how to finish my work without injuring myself. As a result, at the start of any job, I pay attention to injuries and try to avoid them. I don't know everything, but I try my hardest to learn everything I can on all things, including how to catch it, and I welcome any questions. Feel free to work as a freelancer if you want to.

Fortunately, I was able to complete all of my training sessions on schedule. During this time, I learned how to collaborate with people and develop customer relationships. As a future employee, I've learned a lot about the company's culture and how to preserve office etiquette while remaining calm. I'm going to start a new lifestyle after I graduate from this university. As a graduate, I will do all possible to uphold our university's reputation via my knowledge and hard work. When I start my new job, which is from 9 a.m. to 5 p.m., I will continue to practice this habit during the training sessions.



## **CHAPTER 4**

### **COMPETENCIES AND SMART PLAN**

#### **4.1 Competencies Earned**

Talent is now available in every industry and region. We must make sure we get enough real-world experience as a result. Acquired skills define what is required of the student as a result of the learning process in terms of knowledge, comprehension, or accomplishments. I'll be working somewhere with networking computers. I was in charge of displaying and shutting down server and system equipment in two data centers. Participate in router configuration. My internships helped me develop more than just problem-solving techniques, and they will help me in the future maintain composure in stressful situations. More VLAN configuration, OSPF, EIGRP, and RIP Employer Services configuration In accordance with the learning objectives from this, the on-site Internship Supervisor will also give an introduction to reliable strategies and organized technological prowess.

#### **4.2 Smart Plan**

In order to attain greater and better success advantages, an organization's top label management is established to make their plan distinctive, efficient, and original. the oppositional party. to enhance my professional life in some way. additionally, a joyful existence You will learn how to make wise selections thanks to this internship.

## **CHAPTER 5**

### **CONCLUSION AND FUTURE CAREER**

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

For me, my internship was a big success. Gaining practical experience will be essential thanks to this internship. I've learned how to work an 8- to 9-hour day in an office through my internship, as well as the drive to finish work and effectively resolve issues on one's own. I put in a lot of effort every day for 8 to 9 hours, five to six days a week, thus this internship has helped me form this habit. I've found that self-inspiration and an internship keep the main challenges of time under control. As time awareness is a skill that is frequently used and important in daily corporate and commercial life, these training sessions aid in its retention. During my internship term, I learned several important components of my degree as well as a wide range of additional skills that would be helpful in my future career. When there is too much pressure at work, it helps me to maintain my composure. I now know how important it is to keep working hard based on my current situation and goals for the future. I am aware of how to influence my boss's point of view and how to progress professionally through my work and attitude. I've been motivated to work hard and be honest by this internship. Finally, I want to underline how important internships are for acquiring practical experience and skill proficiency at any type of educational institution or profession.

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

Computer networking is currently a widely sought-after job path. There are various categories that the IT sector falls under. This IT features a sizable workspace that includes Linux, routing and switching, and other technologies. Wireless networking, routers, switches, computer-to-computer networking, and network system engineers and administrators are all examples of networking. Every office, bank, or company needs at least one IT specialist. There is

consequently yet more good news for the network engineer. My top aim is to build a successful profession because skilled workers are in high demand everywhere. This will eventually put me in a better position in life.

## **Appendix: Company Details**



### **Mir Group of Companies**

**Address:** B147, Road 22, Mohakhali DOHS, Dhaka 1206

**Phone:** +8802222289335-9

**Send emails:** [info@mirgroupbd.com](mailto:info@mirgroupbd.com)

## REFERENCES

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- [2] Learn about network, available at << <https://w3programmers.com/>>>
- [3] Learn about OSI layer, available at << [https://en.wikipedia.org/wiki/OSI\\_model](https://en.wikipedia.org/wiki/OSI_model)>>
- [10] Learn about Wikipedia, available at <<[https://en.wikipedia.org/wiki/Network\\_switch](https://en.wikipedia.org/wiki/Network_switch)>>
- [11] Learn about Cisco, available at << <https://www.cisco.com/c/en/us/products/switches/index.html>>>
- [13] Learn about Cisco, available at  
<<<https://www.cisco.com/c/en/us/support/docs/ip/enhanced-interior-gateway-routing-protocol-eigrp/16406-eigrp-toc.html>>>
- [14] Learn about router, available at <<<https://www.cloudflare.com/learning/network-layer/what-is-a-router/>>>

# Internship Report

## ORIGINALITY REPORT

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