## FINAL YEAR INTERNSHIP REPORT ON OFFICE NETWORK USING CISCO AND MIKROTIK ROUTER

BY

#### HAZRAT ALI RANA ID: 173-15-10352

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

Supervised By

## Ms. Zakia Zaman

Lecturer Department of C.S.E. Daffodil International University

Co-Supervised By

## Mr. Narayan Ranjan Chakraborty

Assistant Professor Department of C.S.E. Daffodil International University



## DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

## JANUARY 2021

### APPROVAL

This internship titled "OFFICE NETWORK USING CISCO AND MIKROTIK ROUTER", submitted by Hazrat Ali Rana, ID No: 173-15-10352 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 31th JANUARY 2021.

#### **BOARD OF EXAMINERS**

**Dr. Touhid Bhuiyan Professor and Head** Department of C.S.E. Faculty of Science & Information Technology Daffodil International University

Sudih

Md. Sadekur Rahman Assistant Professor Department of C.S.E. Faculty of Science & Information Technology Daffodil International University

fulanja

**Rubaiya Hafiz** Senior Lecturer Department of Computer Science and Engineering Faculty of Science & Information Technology

© Daffodil International University

Chairman

**Internal Examiner** 

**Internal Examiner** 

Daffodil International University

hanin

**Dr. Shamim H Ripon Professor** Department of Computer Science and Engineering East West University **External Examiner** 

### DECLARATION

I am announcing that, my internship has done by me under the supervision of **Ms. Zakia Zaman, Lecturer, Department of C.S.E.** Daffodil International University. I further declare that this internship or any part of this internship has not been submitted for any degree or diploma elsewhere.

#### Supervised by:

Zakia Laman

**Ms. Zakia Zaman** Lecturer Department of C.S.E. Daffodil International University

#### **Co-Supervised by:**

HARR

**Mr. Narayan Ranjan Chakraborty** Assistant Professor Department of C.S.E. Daffodil International University

Submitted by:

र्थाक्त जाली

Hazrat Ali Rana ID: 173-15-10352 Department of C.S.E.

Daffodil International University

### ACKNOWLEDGEMENTS

First I would pay thanks and gratitude to the Almighty ALLAH (S.W.T) for divine blessing which makes us possible to complete the final year internship successfully.

I really grateful and wish my profound indebtedness to **Ms. Zakia Zaman**, **Lecturer**, Department of C.S.E. Daffodil International University, Dhaka. My supervisor's deep knowledge and interest in this field of "Networking" to carry out this internship. Her endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior draft and correcting them at all stage have made it possible to complete this internship.

I would like to pay thanks to Md. Abbas Ali Khan, Mr. Narayan Chandra Chakraborty Department of C.S.E. and Md. Hafizur Rahman (Senior Network Engineer at aamra Network Limited) for their kind help to finish my internship and also to other faculty member and the staff of C.S.E. department of Daffodil International University.

I would also pay thanks to all my course colleagues at Daffodil International University who participated in this discussion on completing the course work. Finally, I must accept the continued support of my parents and the appropriate respect for patients.

#### ABSTRACT

The report is based on the operation of Cisco and MikroTik routers for an office network. Different types of switches, hubs, routers, etc. are used in a broadband network in the office. The nature of switches, hubs, router types and work speeds have improved over time. Cisco and MikroTik devices are among the most popular routers. Different types of routing procedures are followed to facilitate uninterrupted data transmission over the network. TCP or IP is also used to strengthen a network. Where data transmission is done through some rules and policies. Control and security of data flow is also an essential issue. Different types of routers are used depending on the work of the office network. Cisco routers are considered great in the workplace for some of their features. For example, Cisco routers can be hosted in a database without hosting costs and other costs. But it is more convenient for large companies to provide high-quality bandwidth contracts through MikroTik routers. Which can act as a firewall and filter through a single device. To create a network, we need to combine computer and peripheral devices. This is a very basic topic when it comes to networking. So, we can connect to the internet to share resources, files and other documents for daily basis needs and necessary purposes.

# TABLE OF CONTENTS

CONTENTS	PAGE
Approval	i-ii
Declaration	iii
Acknowledgements	iv
Abstract	v
List of Figures	viii-ix
CHAPTER 1: INTRODUCTION	1-2
1.1 Introduction	1
1.2 Motivation	1
1.3 Objective	1-2
1.4 Scope	2
CHAPTER 2: COMPANY'S PROFILE	3-5
2.1 About aamra network	3
2.2 Products and services	3-4
2.3 Mission	4
2.4 Vision	4
2.5 Office schedule	5
<b>CHAPTER 3: INTERNSHIP ACTIVITIES</b>	6-65

3.1. Cisco	6-29
3.2. Mikrotik Router	29-45
3.3 Windows server 2016/2019	45-54
3.4 Wi-Fi	54-62
3.5 Microsoft Outlook 2016	62-65
CHAPTER 4: SMALL OFFICE DESIGN	66-68
4.1. Network design method	66
4.2 Office design requirements	67-68
CHAPTER 5: RESULTS	69-71
5.1. Packet tracer (Cisco)	69
5.2. IP configuration	70
5.3. Link check	70
5.4. Packet check	71
5.5. Result	71
<b>CHAPTER 6: CONCLUSION</b>	72
APPENDIX	73-74
REFERENCES	75-76

List of Figures		
Fig No.   Figure Name   Page		Page Number
3.1	Cisco	6
3.1.2 A	IP subnetting Class C	8
3.1.2 B	IP subnetting Class B	8
3.1.3 C	IP subnetting Class A	9
3.1.3	Routing protocol	10
3.1.4	Administrative distance	11
3.1.5	RIP basic	12
3.1.7	EIGRP basic	19
3.1.9	Static router basic	24
3.2.1	Feature of Mikrotik router	29
3.2.2	Interface of Mikrotik router	30
3.2.3	Bridge interface	30
3.2.4	B/W control	31
3.2.6	DHCP server configuration	31

3.2.7	IP address assigning procedure	32
3.2.8	NAT	33
3.2.9	Routing	33
3.3.2.1-22	DNS server configuration	34-45
3.3.4.1-17	DHCP server configuration	46-54
3.4.1.1-6	Wi-Fi configuration	55-57
3.4.3.1-8	Cloud controller account create	58-62
3.5.1.1-6	Microsoft Outlook configuration	63-64
4.1	Corporate office design steps	65
4.2	Simple office design (Network diagram)	67
5.1	Final office network topology	69
5.2	IP configure in packet tracer	70
5.3	Link check using command prompt	70
5.4	Packet checking (Pack sending successful)	71

### **CHAPTER 1: INTRODUCTION**

#### **1.1 INTRODUCTION:**

An internship is a strategy to become experienced in the job sector and refer to as gain knowledge by work practically and learn through it. An internship provides us an experience of real-life work and helps us to assist in company rules, environment, culture and behavior. Internship helps to develop our carrier, the real-life working environment can be perceived and the ability to undertaking responsibilities in corporate life can be built up through this.

#### **1.2 MOTIVATION:**

I found out that aamra Network has an excellent reputation for customer service and satisfaction. aamra network is well known and first category I.S.P. service provider in Bangladesh. I expect to enhance my skills by experiencing several challenges. I am very confident to get it from aamra Network Limited. I hope this internship will allow me to extend my professionalism. I was contributing as much as possible in the field of networking in aamra network limited and learning as much as I can.

#### **1.3 OBJECTIVE:**

- Acquiring knowledge for Office networking
- Gain knowledge about our countryside I.S.P.
- Gain essential background knowledge of Networking
- > Develop and improve the impersonal ability

Develop and increase communicative, administrative, analytical, professional and all other necessary skills

Gain the ability to work with colleagues

# **1.4 SCOPE:**

Networking has the potential to lead to career development, establishment and success in professional life. A person can acquire knowledge in his/her own educational and professional perspective in a very willful manner. aamra network is a way of such a manner to fulfill once expected to make dreams come true.

## **1.5 LAYOUT OF THE REPORT:**

In this record, I have illustrated the initial thinking of a few activities that analyze and work through this 4-month timeline.

In CHAPTER 1 i discussed about the creation of internship.

In CHAPTER 2 i tried to give a brief picture about my internship organization.

In CHAPTER 3 i give an over view of my work inclusion during the internship period.

In CHAPTER 4 i construct the design of a small office

In CHAPTER 5 i showed The virtual configuration of a small office and output

At last in the CHAPTER 6 i ended my report by conclusion

I have composed almost every work here that I have finished and tried to illustrate what I have performed.

### **CHAPTER 2: COMPANY'S PROFILE**

#### 2.1 ABOUT aamra NETWORK:

aamra network is the most popular and well-known I.S.P. in our country. Their service is global. They are consistently giving services to their customers of I.T. communication. The service of aamra is comparatively good. So customers feel minimal worry about their I.T. communication because of dependency.

More than 322 employees are working with their diverse skill sets and expertise. Because of experience, aamra network can assure their services to their consistently changing customers.

aamra network use about their 30% budget to adopting new technologies. The company also maintains a standard of products and services. aamra network is upholding 9001:2008 certification for the last 8years.

aamra network is one concern company of their company. They also have textile, lifestyle sectors in Bangladesh. aamra group started their business in 1985 and today their employee amount is around 500.

#### **2.2 PRODUCTS AND SERVICES:**

aamra networks mainly giving services in four purposes. Bandwidth transmission, infrastructure, VAS and software-related services.

Bandwidth transmission are partitioned in two ways. One is the internet which has formed new internet connection fiber optic or wireless radios and another one is WAN as build to provide communication solutions those need to exchange digital information between/among the offices within desired areas.

Infrastructure is divided into three segments. The first one is Data Connectivity. This means a dedicated link can be established where ensures excellent quality, high capacity and low latency with QoS over the network are providing by aamra networks. Then MPLS, it enables enterprise and service providers to build nextgeneration networks. Delivering highly scalable, differentiated, end-to-end IP services with simple configuration for providers and subscribers.

I.T. infrastructure management for aamra networks to satisfy the company's information technology needs, A.M.C. solution. By which it should be able to focus on core business rather than dealing with the I.T. issue.

VAS is referring to as multi-operation such as video surveillance, video conferencing, colocation service, call center service and business emails and hosting solutions for aamra's management operation.

Software work as office management system, network monitoring solution and hosted anti-spam firewall for aamra.

#### 2.3 MISSION:

aamra's mission is to keep carry on their excellence, unlimited innovation and thought of the organization aamra network limited.

#### 2.4 VISSION:

aamra network is consistently working to empower their customers, employees, partners and communities by providing the finest products, services and practices.

#### **2.5 OFFICE SCHEDULE:**

- > The office starts from 09:00 am 6.00 pm, from Sunday to Thursday.
- ▶ Help center services always open 24 hours a week.

## **CHAPTER: 3 INTERNSHIP ACTIVITIES**

### 3.1. Cisco:

Cisco is a type of networking where two or more devices can connect and communicate with one to another using router, switch, wireless router etc. It is a technique by which a network can be handled securely and reliably throughout the entire network and also can be handled by virtually using its platform. So we can provide very smooth and consistent services to users.



Figure 3.1: Cisco

## **3.1.1. IP addressing:**

IP means Internet Protocol. IP addressing means the numerical method of labeling of devices to uniquely identify a device in a network. In IPv4 IP address is 32 bit

in size. It limits the address space in between 42949672 IP's approximately. IP addresses are consisting of four-octet numbers from 0 to 255. The IP address is shown in decimal form instead of its octet in binary form. The IP address has Five classes: Class A, Class B, Class C, Class D and Class E. Every class has its own range and limit. Among of them First Four classes used Mostly and another one reserved for special purposes. Normally this address is two types: Public and Private. Public IP is normally generating IP used by router and clients directly but Private IP is special and dedicated that is only known to a router and its client network. The name IP address can identify uniquely a TCP/IP network as a host network. Private IP might be uniform and Public IP may uniform or non-uniform. Now, IPv6 has formed instead of IPv4 which is giving a very wide and healthy area of IP address.

#### **3.1.2. IP subnetting:**

Subnetting refers to an operation that subdivides an IP network. So the system of the subdivision process of two or more networks is called subnetting. A subnet mask is used to divide the IP address into two parts. One part identifies as the host and another part as it belongs. Subnetting calculates as two-class: Class full interdomain routing and classless inter-domain routing.

IP Address:	192.168.1.0
Network Address:	192.168.1.0
Usable Host IP Range:	192.168.1.1 - 192.168.1.2
Broadcast Address:	192.168.1.3
Total Number of Hosts:	4
Number of Usable Hosts:	2
Subnet Mask:	255.255.255.252
Wildcard Mask:	0.0.0.3
Binary Subnet Mask:	11111111.11111111.11111111.11111100
IP Class:	С
CIDR Notation:	/30
IP Type:	Private
	·
Short:	192.168.1.0 /30
Binary ID:	11000000101010000000000010000000
Integer ID:	3232235776
Hex ID:	0xc0a80100
in-addr.arpa:	0.1.168.192.in-addr.arpa
IPv4 Mapped Address:	::ffff:c0a8.0100
6to4 Prefix:	2002:c0a8.0100::/48

Figure 3.1.2 A: IP subnetting Class C

IP Address:	170.0.0.1
Network Address:	170.0.0.0
Usable Host IP Range:	170.0.0.1 - 170.0.31.254
Broadcast Address:	170.0.31.255
Total Number of Hosts:	8,192
Number of Usable Hosts:	8,190
Subnet Mask:	255.255.224.0
Wildcard Mask:	0.0.31.255
Binary Subnet Mask:	11111111.1111111.11100000.0000000
IP Class:	В
CIDR Notation:	/19
IP Type:	Public
Short:	170.0.0.1 /19
Binary ID:	101010100000000000000000000000000000000
Integer ID:	2852126721
Hex ID:	0xaa000001
in-addr.arpa:	1.0.0.170.in-addr.arpa
IPv4 Mapped Address:	::ffff:aa00.01
6to4 Prefix:	2002:aa00.01::/48

Figure 3.1.2 B: IP subnetting Class B

IP Address:	126.0.0.0
Network Address:	126.0.0.0
Usable Host IP Range:	126.0.0.1 - 126.255.255.254
Broadcast Address:	126.255.255.255
Total Number of Hosts:	16,777,216
Number of Usable Hosts:	16,777,214
Subnet Mask:	255.0.0.0
Wildcard Mask:	0.255.255.255
Binary Subnet Mask:	11111111.0000000.0000000.00000000
IP Class:	A
CIDR Notation:	/8
IP Type:	Public
Short:	126.0.0.0 /8
Binary ID:	011111100000000000000000000000000000000
Integer ID:	2113929216
Hex ID:	0x7e000000
in-addr.arpa:	0.0.0.126.in-addr.arpa
IPv4 Mapped Address:	::ffff:7e00.00
6to4 Prefix:	2002:7e00.00::/48

Figure 3.1.2 C: IP subnetting Class A

<u>Class Name</u>	Address range
1. D	224.0.0.0 - 239.255.255.255
2. C	192.0.1.0 - 239.255.255.254
3. B	128.1.0.1 - 191.255.255.254
4. A	1.0.0.1 - 126.255.255.254

## 3.1.3 Routing protocol:

Routing protocol means to exchange routing information and reachability from one hop to another with each other. It means some rules that distribute information and enable themselves to select routes between each other. Some examples of routing protocol are EIGRP, OSPF, RIPv1, RIPv2 etc. There are two routing protocols has used. It can be static or dynamic. In a static algorithm, it is required to assign IP manually and in dynamic Routing, it doesn't require to assign IP dynamically. To find the best path for transport information several algorithms are used in routing protocols. Such as distance-vector, path vector, link-state etc.

**R.IP** features:

- 1. Distance vector routing protocol
- 2. Bellman ford Algorithm
- 3. Local Broadcast to share routing information
- 4. Class full routing protocol
- 5. Broadcast update 30 sec
- 6. Hold down Timer 180 Sec
- 7. Flash Timer 240 sec
- 8. Uses Hop count as Metric

### 9. Maximum hop count 15

10. Four equal-cost load Balance



Figure 3.1.3: Routing protocol

## 3.1.4. Administrative distance:

Administrative distance is a technique to select the best path to reach the destination whether there have other more different routes to the same destination from another more routing protocol. It helps to find the destination from one to another router most efficiently. In a word, it gives the reliability of the routing protocol. Administrative distance is not permanent and it can be changed or modified. The best way to reach in a destination is based on the value or metric. The best path is the lowest metric to a network.

Routing Protocol	Administrative Distance
Directly connected	0
Static route	1
Internal EIGRP	90
OSPF	110
RIP	120
External EIGRP	170
Unknown	255

Figure 3.1.4: Administrative distance

### **3.1.5. Rip basic:**

R.IP means routing information protocol. It is one of the oldest routing protocols used in small geographical areas to find small routes to various networks within that network. The R.IP protocol sends the entire routing table to directly neighbors within 30 seconds simultaneously. This a dynamic routing protocol that uses hop count as a routing metric to find the best path between the source and the destination. Its A.D. value is 120 and works on the application layer.



Figure 3.1.5: R.IP basic

#### **3.1.6 R.IP configure version 2:**

Some features of RIPv2: RIPv2 uses the Hybrid routing Protocol which is Based on rip V1. Moreover, it is multicasts to disseminate routing information 224.0.0.9ans supports triggered update also supports VLSM. Then others are same to rip V1

Router#conf Router#configure Configuring from terminal, memory, or network [terminal]? Enter configuration commands, one per line. End with CNTL/Z. Router(config)#inter Router(config)#interface se Router(config)#interface serial 0/3/0 Router(config-if)#ip add Router(config-if)#ip address 10.0.0.1 255.0.0.0 Router(config-if)#no shu Router(config-if)#no shu Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/3/0, changed state to down Router(config-if)#exit Router(config)#inter Router(config)#interface fa Router(config)#interface fastEthernet 0/0 Router(config-if)#ip add Router(config-if)#ip address 192.168.11.1 255.255.255.0 Router(config-if)#no sh Router(config-if)#no shutdown

Router(config-if)# %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

Router(config-if)#exit Router(config)#host Router(config)#hostname Router-1 Router-1(config)#exit Router-1# %SYS-5-CONFIG\_I: Configured from console by console

%LINK-5-CHANGED: Interface Serial0/3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up

Router-1#conf

Router-1#configure te Router-1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router-1(config)#inter Router-1(config)#interface ser Router-1(config)#interface serial 0/3/0 Router-1(config-if)#cloc Router-1(config-if)#clock ra Router-1(config-if)#clock rate ? Speed (bits per second

Router-1#conf Router-1#configure te Router-1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router-1(config)#route Router-1(config)#router ri Router-1(config)#router rip ? <cr> Router-1(config)#router rip Router-1(config-router)#ver Router-1(config-router)#version 2? <1-2> Router-1(config-router)#version 2 Router-1(config-router)#netw Router-1(config-router)#network 10.0.0.0 Router-1(config-router)#netw Router-1(config-router)#network 192.168.10.0 Router-1(config-router)#exit Router-1(config)#exit

interface FastEthernet0/0 ip addresses 192.168.10.1 255.255.255.0 duplex auto speed auto ! interface FastEthernet0/1 no ip address

duplex auto speed auto shutdown ١ interface Serial0/0/0 no ip address clock rate 2000000 shutdown 1 interface Serial0/0/1 no ip address clock rate 2000000 shutdown ١ interface Serial 0/1/0 ip address 10.0.0.50 255.0.0.0 1 interface Serial0/1/1 ip address 172.16.0.1 255.255.0.0 clock rate 64000 ! interface Ethernet1/0 no ip address duplex auto speed auto shutdown ۱ interface Ethernet1/1 no ip address duplex auto speed auto shutdown ! interface Ethernet1/2 no ip address duplex auto speed auto shutdown ! interface Ethernet1/3 no ip address

```
duplex auto
speed auto
shutdown
١
interface Vlan1
no ip address
shutdown
!
router rip
version 2
network 10.0.0.0
network 172.16.0.0
network 192.168.20.0
١
ip classless
ip flow-export version 9
١
۱
--More--
router-2#conf
router-2#configure te
router-2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
router-2(config)#rou
router-2(config)#router r
router-2(config)#router rip
router-2(config-router)#ver
router-2(config-router)#version 2
router-2(config-router)#net
router-2(config-router)#network
router-2(config-router)#network 10.0.0.0
router-2(config-router)#net
router-2(config-router)#network 172.16.0.0
router-2(config-router)#network 10.0.0.0
router-2(config-router)#net
router-2(config-router)#network 192.168.20.0
router-2(config-router)#
```

interface FastEthernet0/0 ip address 192.168.300.1 255.255.255.0 duplex auto speed auto ! interface FastEthernet0/1 no ip address duplex auto speed auto shutdown ! interface Serial0/3/0 ip address 172.16.0.2 255.255.0.0 ١ interface Serial0/3/1 no ip address clock rate 2000000 shutdown ! interface Ethernet1/0 no ip address duplex auto speed auto shutdown ! interface Ethernet1/1 no ip address duplex auto speed auto shutdown ! interface Ethernet1/2 no ip address duplex auto speed auto shutdown ! interface Ethernet1/3 no ip address duplex auto speed auto

```
shutdown
!
interface Vlan1
no ip address
shutdown
١
router rip
version 2
network 172.16.0.0
network 192.168.30.0
۱
ip classless
١
ip flow-export version 9
١
line con 0
```

## 3.1.7 EIGRP basic:

EIGRP means Enhanced interior gateway routing protocol. It's a part of Cisco proprietary. It uses a hybrid routing protocol and it's based on IGRP. It can communicate among the EIGRP routers that are handed by RTP reliable transport protocol. Advantages of EIGRP are: Best paths are selected using a dual (Diffusing update algorithm. It has fast convergence and loop-free topology. It also supports VLSM. It can calculate Auto and manual route summarization by default auto summarization. It supports IP, AppleTalk. Therefore, Metric used bandwidth, delay, load, reliability MTU support from EIGRP. It has features of multicast and incremental update multicast address.

EIGRP maintains three tables:

- 1. It has a neighbor table.
- 2. It generates Hallow Message after 5 sec
- 3. Maintain K Values (Means Metric)

Troubleshooting command:

Router#show ip route

# show ip protocols

#show ip eigrp neighbors

#show ip eigrp neighbors topology



Figure 3.1.7: EIGRP basic

## **3.1.8 EIGRP configuration:**

- 4. Router#enable
- 5. Router#conf
- 6. Router#configure te
- 7. Router#configure terminal
- 8. Enter configuration commands, one per line. End with CNTL/Z.
- 9. Router(config)#inte
- 10. Router(config)#interface se
- 11. Router(config)#interface serial 0/3/0
- 12. Router(config-if)#ip addr
- 13. Router(config-if)#ip address 10.0.0.1 255.0.0.0

- 14. Router(config-if)#clock
- 15. Router(config-if)#clock ra
- 16. Router(config-if)#clock rate 64000
- 17. Router(config-if)#no shu
- 18. Router(config-if)#no shutdown
- 19.
- 20. %LINK-5-CHANGED: Interface Serial0/3/0, changed state to down
- 21. Router(config-if)#exit
- 22. Router(config)#inte
- 23. Router(config)#interface fas
- 24. Router(config)#interface fastEthernet 0/0
- 25. Router(config-if)#ip add
- 26. Router(config-if)#ip address 192.168.10.1 255.255.255.0
- 27. Router(config-if)#no shut
- 28. Router(config-if)#no shutdown

29.

- 30. Router(config-if)#
- 31. %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up 32.
- 33. %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

34.

- 35. Router>
- 36. Router>ena
- 37. Router#confi
- 38. Router#configure te
- 39. Router#configure terminal
- 40. Enter configuration commands, one per line. End with CNTL/Z.
- 41. Router(config)#rote
- 42. Router(config)#roter
- 43. Router(config)#rou
- 44. Router(config)#router eig
- 45. Router(config)#router eigrp ?
- 46. <1-65535> Autonomous system number
- 47. Router(config)#router eigrp 5
- 48. Router(config-router)#netw
- 49. Router(config-router)#network 10.0.0.0
- 50. Router(config-router)#netw
- 51. Router(config-router)#network 192.168.10.0
- 52. Router(config-router)#
- 53.

- 54. C 10.0.0/8 is directly connected, Serial0/3/0
- 55. D 172.16.0.0/16 [90/2681856] via 10.0.0.2, 00:02:56, Serial0/3/0
- 56. C 192.168.10.0/24 is directlly conneccted, FasthEthernet0/0
- 57. D 192.168.20.0/24 [90/217241] via 10.0.0.2, 00:17:41, Serial0/3/0
- 58. D 192.168.30.0/24 [90/268441] via 10.0.0.2, 00:02:12, Serial0/3/0
- 59.
- 60.
- 61.
- 62. Router(config-if)#exit
- 63. Router(config)#inte
- 64. Router(config)#interface ser
- 65. Router(config)#interface serial 0/3/1
- 66. Router(config-if)#ip add
- 67. Router(config-if)#ip address 172.16.0.1 255.255.0.0
- 68. Router(config-if)#no shut
- 69. Router(config-if)#no shutdown
- 70.
- 71. %LINK-5-CHANGED: Interface Serial0/3/1, changed state to down
- 72. Router(config-if)#clock
- 73. Router(config-if)#clock ra
- 74. Router(config-if)#clock rate 64000
- 75. Router(config-if)#exit
- 76. Router(config)#inte
- 77. Router(config)#interface fas
- 78. Router(config)#interface fastEthernet 0/0
- 79. Router(config-if)#ip add
- 80. Router(config-if)#ip address 192.168.20.1 255.255.255.0
- 81. Router(config-if)#no shu
- 82. Router(config-if)#no shutdown
- 83.
- 84. Router(config-if)#
- %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
   86.
- 87. %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
- 88. Router(config)#rout
- 89. Router(config)#router eig
- 90. Router(config)#router eigrp 5
- 91. Router(config-router)#net
- 92. Router(config-router)#network 10.0.0.0
- 93. Router(config-router)#

94. %DUAL-5-NBRCHANGE: IP-EIGRP 5: Neighbor 10.0.0.1 (Serial0/3/0) is up: new adjacency

95.

- 96. Router(config-router)#net
- 97. Router(config-router)#network 172.16.0.0
- 98. Router(config-router)#net
- 99. Router(config-router)#network 192.168.20.0
- 100. Router(config-router)#

101.

- 102. Router#show ip rout
- 103. Router#show ip route
- 104. Router#configure te
- 105. Router#configure terminal
- 106. Enter configuration commands, one per line. End with CNTL/Z.
- 107. Router(config)#inte
- 108. Router(config)#interface ser
- 109. Router(config)#interface serial 0/3/0
- 110. Router(config-if)#ip add
- 111. Router(config-if)#ip address 172.16.0.2 255.255.0.0
- 112. Router(config-if)#no sh
- 113. Router(config-if)#no shutdown
- 114.
- 115. Router(config-if)#
- 116. %LINK-5-CHANGED: Interface Serial0/3/0, changed state to up

117.

- 118. Router(config-if)#exit
- 119. Router(config)#i
- 120. %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up
- 121.
- 122. %DUAL-5-NBRCHANGE: IP-EIGRP 5: Neighbor 172.16.0.1 (Serial0/3/0) is up: new adjacency
- 123. nte
- 124. Router(config)#interface fas
- 125. Router(config)#interface fastEthernet 0/9
- 126. %Invalid interface type and number
- 127. Router(config)#interface fastEthernet 0/0
- 128. Router(config-if)#ip add
- 129. Router(config-if)#ip address 192.168.30.1
- 130. % Incomplete command.
- 131. Router(config-if)#ip address 192.168.30.1 255.255.255.0

- 132. Router(config-if)#no sh
- 133. Router(config-if)#no shutdown
- 134.
- 135. Router(config-if)#
- 136. %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up 137.
- 138. %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

139.

140.

- 141. Router(config)#route
- 142. Router(config)#router eig
- 143. Router(config)#router eigrp 5
- 144. Router(config-router)#net
- 145. Router(config-router)#network 172.16.0.0
- 146. Router(config-router)#net
- 147. Router(config-router)#network 192.168.30.0
- 148. Router(config-router)#
- 149. Router>
- 150. Router>en
- 151. Router>enable
- 152. Router#show IP rout

## **3.1.9 Static Routing basic:**

Routing in a secure way is known as static Routing. It decreases overhead from network resources. For static Routing, we need to route manually in the routing table. It is useful for limited network routing.

#### Advantage of Static Routing:

The most effective feature is, easy to implement and the most secure way of Routing. Because information is not shared with other routers. It doesn't put overhead on resources such as CPU or memory.

#### Disadvantage of static Routing:

It is not suitable for a large network and once a link fails it cannot reroute the traffic.



Figure 3.1.9: Static router basic

## **3.1.10 Static Routing configure:**

Router#enable Router#conf Router#configure te Router#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)#inter Router(config)#interface se Router(config)#interface serial 0/3/0 Router(config-if)#ip addr Router(config-if)#ip address 10.0.0.1 255.0.0.0 Router(config-if)#clock Router(config-if)#clock ra Router(config-if)#clock rate 64000 Router(config-if)#clock rate 64000 Router(config-if)#no shu Router(config-if)#no shu Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/3/0, changed state to down Router(config-if)#exit Router(config)#inte

Router(config)#interface fas Router(config)#interface fastEthernet 0/0 Router(config-if)#ip add Router(config-if)#ip address 192.168.10.1 255.255.255.0 Router(config-if)#no shut Router(config-if)#no shutdown

Router(config-if)# %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

Router(config-if)#exit Router(config)#inter Router(config)#interface ser Router(config)#interface serial 0/3/1 Router(config-if)#ip add Router(config-if)#ip address 172.16.0.1 255.255.0.0 Router(config-if)#no shut Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/3/1, changed state to down Router(config-if)#clock Router(config-if)#clock ra Router(config-if)#clock rate 64000 Router(config-if)#exit Router(config)#interface fas Router(config)#interface fas Router(config)#interface fastEthernet 0/0 Router(config-if)#ip add Router(config-if)#ip address 192.168.20.1 255.255.255.0 Router(config-if)#no shu Router(config-if)#no shu Router(config-if)#no shutdown

Router(config-if)# %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up Router#configure te Router#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)#interface ser Router(config)#interface ser Router(config)#interface serial 0/3/0 Router(config-if)#ip add Router(config-if)#ip address 172.16.0.2 255.255.0.0 Router(config-if)#no sh Router(config-if)#no shutdown

Router(config-if)# %LINK-5-CHANGED: Interface Serial0/3/0, changed state to up

Router(config-if)#exit Router(config)#i %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up

%DUAL-5-NBRCHANGE: IP-EIGRP 5: Neighbor 172.16.0.1 (Serial0/3/0) is up: new adjacency nte Router(config)#interface fas Router(config)#interface fastEthernet 0/0 Router(config-if)#ip add Router(config-if)#ip address 192.168.30.1 % Incomplete command. Router(config-if)#ip address 192.168.30.1 255.255.255.0 Router(config-if)#no sh Router(config-if)#no shutdown Router-1#conf Router-1#configure te Router-1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router-1(config)#ip rout Router-1(config)#ip rout Router-1(config)#ip route Router-1(config)#ip rout Router-1(config)#ip route Router-1(config)#ip route 192.168.20.0 255.255.255.0 10.0.0.2 Router-1(config)#ip route

Router-1(config)#ip route 172.16.0.0 255.255.0.0 10.0.0.2 Router-1(config)#ip rout Router-1(config)#ip route 192.168.30.0 255.255.255.0 10.0.0.2 Router-1(config)#exit Router-1# %SYS-5-CONFIG\_I: Configured from console by console

Router-1#sho ip rou P - periodic downloaded static route

Gateway of last resort is not set

Router-1#

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up Router(config)#rout Router(config)#router eig router-2> router-2>en router-2>enable router-2#conf router-2#configure te router-2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. router-2(config)#ip rout router-2(config)#ip rout router-2(config)#ip route 192.168.10.0 255.255.255.0 10.0.0.1 router-2(config)#ip route 192.168.30.0 255.255.255.0 172.16.02 Λ % Invalid input detected at '^' marker. router-2(config)#ip route 192.168.30.0 255.255.255.0 172.16.0.2 router-2(config)# Router# Router#configure te Router#configure terminal Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#inte

Router(config)#interface ser Router(config)#interface serial 0/3/0 Router(config-if)#ip add Router(config-if)#ip address 172.16.0.2 255.255.0.0 Router(config-if)#no sh Router(config-if)#no shutdown

Router(config-if)# %LINK-5-CHANGED: Interface Serial0/3/0, changed state to up

Router(config-if)#exit Router(config)#i %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up

%DUAL-5-NBRCHANGE: IP-EIGRP 5: Neighbor 172.16.0.1 (Serial0/3/0) is up: new adjacency nte Router(config)#interface fas Router(config)#interface fastEthernet 0/0 Router(config-if)#ip add Router(config-if)#ip address 192.168.30.1 % Incomplete command. Router(config-if)#ip address 192.168.30.1 255.255.255.0 Router(config-if)#no sh Router(config-if)#no shutdown

Router(config-if)# %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

Router-3>en Router-3>enable Router-3#conf Router-3#configure te Router-3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router-3(config)#ip rout Router-3(config)#ip rout 192.168.20.0 255.255.255.0 172.16.0.1
Router-3(config)#ip rout Router-3(config)#ip route 10.0.0.0 255.0.0.0 172.16.0.1 Router-3(config)#ip route 192.168.10.0 255.255.255.0 172.16.0.1 Router-3(config)#exit Router-3# %SYS-5-CONFIG\_I: Configured from console by console

Router-3#show ip rout

## 3.2 Mikrotik router:

Latvian company developed a router and wireless devices which are known as mikrotik router. This a quality router type that includes better performance and services. To enter a mikrotik router we have to enter 192.168.88.1 in a web browser. It vulnerable at risk and not fully secured. Mikrotik is an operating system that can be used as a reliable router network. Mikrotik router configuration is very simple and easy that's why it's being popular day by day.

# 3.2.1 Mikrotik router Features:

Sale Mode	Constant 1992 100 112 242 9000				
	3000011 [102.100.112.212.0000]	_			
A Guick Set	Route Unt				
I CAPSMAN	Routes Neithope Rules VRF				
im Interfaces					Find al
I Wreless	Det. Addrees / Gateway	Distance	Routing Mark	Pref. Source	
Bridge	AS 0.0.0/0 182 160 112 241 reachable Wan_Bidge	1			
PPP	DAC b 192 160 112 2 Was Bridge machable	2		182 160 112	
PI2 Mesh	DAC 192 168 88 0/ LAN_Bridge reachable	ő		192 168 88 1	
Inter IP	DAC P 202.84.43.52/ ether2 reachable	0		202 84.43 54	
the second se					
W MPLS					
Routing P					
(j) System					
Gueues					
Files					
E Log					
A RADIUS					
Tools					
New Terrical					
de Detty					
ala Dociv					
LCD					
Partition					
Alke Supout If					
Manual					
New WinBox					
Ext					

Figure 3.2.1: Feature of Mikrotik router

# **3.2.2 MikroTik router interface:**

Safe Mode	Sessio	in: 182.160.112.2	42:8000												
Quick Set	Interfac	e List													
CAPsMAN	Interfa	ce Interface List	Ethernet EoIP	Tunnel IP Tunnel G	RE Tunnel VLA	N VRRP Bonding LTE									
Interfaces				text leternet											
Marless	-			sect internet									<i></i>		
. Wildicoo	0	Vame /	Type	Actual MTU	L2 MTU IX	HX 10.2 likes	10 41-6-0	x Packet (p/s)	Hx Packet (p/s)	FP IX	FP Hx	10 41-6-1	FP 1x Packet (p/s)	FP Hx Packet (p/s)	
Bridge	8 4	the Bidge	Bridge	1500	1580	190 3 kbne	24.4 khos		15	24	Obps	24.4 kbps		24	
PPP	RS	thether1	Bhemet	1500	1580	194.1 kbps	24.9 kbps		35	25	194.1 kbps	24.9 kbos	3	5 25	
Mesh	R	+ether2	Bhemet	1500	1580	3.6 kbps	43.7 kbps		4	44	3.6 kbps	43.7 kbps		44	
in N	S 4	+ether3	Ethemet	1500	1580	0 bps	0 bps		0	0	0 bps	0 bps		0 0	
	RS 4	Pether4	Bhemet	1500	1580	3.8 kbps	480 bps		4	1	3.8 kbps	480 bps		1	
MPLS P	S 4	Pether5	Ethemet	1500	1580	0 bps	0 bps		0	0	0 bps	0 bps		0	
Routing	5 4	Petherb	Ethemet	1500	1580	Ubps	Obps		0	0	Ubps	0 bps		0	
Sustam 1	20	hether?	Ethemet	1500	1580	22.6 kbps	10.4 kbps	5	18	15	22.6 kbps	10.4 kbps	1	15	
Jyacom	RS 4	Prether9	Pthemet	1500	1580	3.3 kbns	0 bps		3	0	33kbps	0 hps		3 0	
Queues	S 4	Pether10	Ethemet	1500	1580	0 bps	0 bps		0	0	0 bps	0 bps		0 0	
Files	S 4	Pether11	Ethemet	1500	1580	0 bps	0 bps		0	0	0 bps	0 bps		0 0	
Loo	S 4	+ether12	Ethernet	1500	1580	0 bps	0 bps		0	0	0 bps	0 bps		0 0	
DADWIG .		∎estp1	Ethernet	1500	1580	0 bps	0 bps		0	0	0 bps	0 bps		0 0	
RADIUS		stp2	Ethernet	1500	1580	0 bps	0 bps		0	0	0 bps	0 bps		0	
Tools 1		stp3	Ethemet	1500	1580	Ubps	Obps		0	0	Ubps	0 bps		0	
New Terminal		dealba	Euriemet	1900	1360	o phe	0 bps		0	U	0 bps	0 bps		0	
Dot1X															
Lon															
LCD															
Partition															
Make Supout of															
Maqual															
Mariadi															
New WinBox															
Exit															



# 3.2.3 Bridge interface:

	Session	182.160.112.24	2:8000					
Quick Set	Bridge							
T CAPEMAN	Bridge	Ports VLANs	MSTIN Port MST On	remides Filters NAT	Hosts MDB			
interfaces								
The second cost			- 8					
T vvreiesa	#	Interface	Bridge	Horizon Trusted	Priority (n Path	Cost Role	Root Pet	
Bridge	1	4Thether4	Wan_Bridge	10	80	10 disabled port		
PPP	21	1tether5	Wan Bridge	10	80	10 disabled port		
12 Mesh	31	1tother6	Wan_Bridge	no	80	10 disabled port		
101 100 D	4	ditether1	Wan_Bridge	no	80	10 designated port		
go re	51	11tether7	LAN_Bridge	no	80	10 disabled port		
MPLS P	6	dilether8	LAN_Bridge	no	80	10 designated port		
🛋 Routing 💦	01	differing 1/2	LAN Bridge	no	80	10 root port	10	
System 1	91	4therfi	LAN Bridge	10	80	10 disabled port		
Currier .	10 1	titether12	LAN_Bridge	no	80	10 disabled port		
The checks								
Pres								
Log								
DADILIS								
< 100m								
New Terminal								
Dot1X								
LICD								
Partition								
Make Supout.nf								
Manual								
Maur MinDow								
THEN THILDOX								
Exit								

Figure 3.2 3: Bridge interface

#### 3.2.4 B/W control:



Figure 3.2 4: B/W control.

# **3.2.5. DHCP server basic:**

DHCP means dynamic host control protocol. It is a type of server that provides automatically IP address assign, default gateways, and other network parameters to the client end. DHCP allows a router to reserve the lease of IP address on network devices which assures that no IP has been assigned to other devices through this network.

**3.2.6. DHCP server configure:** 



Figure 3.2.6: DHCP server configuration

#### 3.2.7. How to assign an IP address:

An IP address is required for any computer or device that wants to connect with the internet or another computer. Addresses are assigned to devices in one of two manners statically or dynamically. The dynamic address set from the server is called DHCP and the static address needs to assign manually. DHCP is configured with the database which contains IP addresses available for uses in the network. Entering IP addresses, Subnet Mask, Router, and DNS server addresses as required and then applying it to finalize the assigning process.



Figure 3.2.7: IP address assigning procedure

#### 3.2.8. N.A.T.:

N.A.T. means network address translator. It is a technique to reducing network traffic using a router that involves re-writing the source to destination IP addresses and TCP/UDP port. It works by modifying the network address information through the IP header. N.A.T. has two types as source N.A.T. and

hairpin N.A.T. Source address works as it can hide local devices behind a public IP address. Therefore, hairpin means devices on the same LAN can access one another via public IP and gateway of the router.



Figure 3.2.8: NAT

## **3.2.9. Routing:**

Routing can be static or dynamic. In dynamic Routing, IP has been assigned automatically and in static Routing needed to assign IP manually.

ession Settings De	shboard					
CH Sele Mode	Bession 182 160 112 242 8000					
all Check Set	Picker Lin					CR2
I CAPEMAN	Postee Heatiops Plutes VRF					
jes interfaces						Direct. Mat. 14
I. Winkess	Did Address ( Galerowy	mer Prosterus Mer	h Pref Summer			
31 Bridge	A5 0.0.0/0 182.190.112.241 reachable Wan_Bridge	1				
ing ppp	5 0.0.0.00 202.84.45.05 to an abular 2	20	182 160 112			
The Months	DAC P 192 168.88 0/ LAN Bridge reachable	0	192.168.88.1			
1000 HP	DAC P 202.84.43.52/ ether2reachable	0	202.84.43.54			
MPLS (						
and Rocking 1						
C2 System 1						
Cueves						
IIIII Files						
ini Log						
SA HADIUS						
X Tradis						
am Now Torminal						
+0+ Dut 1K						
AND LCD						
Postition						
Make Suprad of						
Manual						
Co New Wintlox						
E. Da						
	5 Kems					
						1-32 AM
J. Type I	sere to search				Part I	11/16/2020

Figure 3.2.9: Routing

#### 3.3. Windows server:

Windows server is a combination of an operating system designed by Microsoft. Which supports enterprise-level management, data storage, applications and communications. Earlier versions focused on security, stability, networking and various improvements of a file system. Windows server is a server operating system that enables us to handle networks such as print, domain controller, web server and file server. It also works as a platform of exchange server or SQL server.

#### 3.3.1. DNS server:

DNS means a domain name system. It provides the solution to match names to IP addresses. DNS server is required for the proper functioning of the domain. If we don't use a DNS match with IP it will be tough to memorize every IP address, we need. To improve the reliability of domain at least two DNS server is required.

# 3.3.2. DNS server configuration windows server 2016:



Das       Add Roles and Features Wizard       -       -       ×         Loc       Destination server       Destination server       Destination server         ADD       Before You Begin       Select a server or a virtual hard disk on which to install roles and features.       Installation Type         Server Selection       Select a server from the server pool       Select a virtual hard disk       -       -         Server Roles       Features       -       -       -       -       -         Confirmation       Results       Server Pool       -       -       -       -         Itter       Name       IP Address       Operating System       -       -       -         Add Roles and Peatures       -       -       -       -       -       -       -         Confirmation       Results       -<	
Loc       DESTINATION SERVER         ADD       Before You Begin         Installation Type       Select a server or a virtual hard disk on which to install roles and features.         Installation Type       Select a server from the server pool         Server Roles       Select a server Pool         Features       Confirmation         Results       IP Address         Operating System       Infiz.white.com         Infiz.white.com       192.168.0.100         Microsoft Windows Server 2016 Essentials         Inspage shows servers that are running Windows Server 2010 a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not show.	
Select destination server       Destination server halls.white.com         AD       Before You Begin Installation Type         Server Selection       Select a server or a virtual hard disk on which to install roles and features.         Server Roles       Select a server from the server pool         Server Roles       Server Pool         Filter       Name         Name       IP Address         Name       IP Address         Operating System       haliz.white.com         haliz.white.com       192.168.0.100         Microsoft Windows Server 2016 Essentials         Inspage shows servers that are running Windows Server 2010 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.         Install       Cancel	
AD DH Before You Begin Installation Type Select a server or a virtual hard disk on which to install roles and features. Server Selection Server Selection Server Pool Features Confirmation Results Server Pool Infice IP Address Operating System Infic.white.com I92.168.0.100 Microsoft Windows Server 2016 Essentials I Computer(s) found This page shows servers that are running Windows Server 2016 Tessentials I Computer(s) found This page shows servers from which data collection is still incomplete are not shown.	
DH       Before You Begin       Select a server or a virtual hard disk on which to install roles and features.         Installation Type       Select a server from the server pool         Server Selection       Select a virtual hard disk         Server Roles       Server Pool         Features       Filter:         Confirmation       Name         Name       IP Address         Operating System         hafiz.white.com       192.168.0.100         Microsoft Windows Server 2016 Essentials         Issues       1 Computer(s) found         This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager, Offline servers and newly-added servers from which data collection is still incomplete are not shown.         < Previous	
Installation Type <ul> <li>Server Selection</li> <li>Select a virtual hard disk</li> <li>Server Roles</li> <li>Features</li> <li>Confirmation</li> <li>Results</li> </ul> Filter: <ul> <li>Installation Type</li> <li>Select a virtual hard disk</li> </ul> Installation Type              Select a virtual hard disk             Server Roles              Features            Confirmation              Results           Name              IP Address              Operating System                 hafizwhite.com              192.168.0.100               Microsoft Windows Server 2016 Essentials                 1 Computer(s) found               1 Computer(s) found                 This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager, Offline servers and newly-added servers from which data collection is still incomplete are not shown.                 Previous              Next >	
Server Selection       O Select a virtual hard disk         Server Roles       Server Pool         Features       Filter:         Confirmation       Name         Results       IP Address         Operating System       Infiz.white.com         192.168.0.100       Microsoft Windows Server 2016 Essentials         1 Computer(s) found       This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager, Offline servers and newly-added servers from which data collection is still incomplete are not shown.         < Previous	
Server Roles       Server Pool         Features       Confirmation         Results       Filter:         Name       IP Address         Operating System         hafiz.white.com         192.168.0.100         Microsoft Windows Server 2016 Essentials         1 Computer(s) found         This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager, Offline servers and newly-added servers from which data collection is still incomplete are not shown.          Previous         Next >       Install	
Features       Confirmation         Results       Filter:         Name       IP Address         Operating System         hafiz.white.com         192.168.0.100         Microsoft Windows Server 2016 Essentials         1 Computer(s) found         This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.          Previous       Next >         Install       Cancel	
Confirmation       Name       IP Address       Operating System         hafiz.white.com       192.168.0.100       Microsoft Windows Server 2016 Essentials         1 Computer(s) found       This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.         < Previous	
Name       IP Address       Operating System         hafiz.white.com       192.168.0.100       Microsoft Windows Server 2016 Essentials         1 Computer(s) found       This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.         < Previous       Next >       Install	
hafiz.white.com       192.168.0.100       Microsoft Windows Server 2016 Essentials         1 Computer(s) found       1 Computer(s) found         This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.         < Previous       Next >       Install	
1 Computer(s) found         This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.         < Previous	Hide
1 Computer(s) found         This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.         < Previous       Next >         Install       Cancel	
1 Computer(s) found         This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.         < Previous	
1 Computer(s) found         This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.          Previous       Next >       Install       Cancel	
1 Computer(s) found         This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.  <	
Intro page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown. <td></td>	
newly-added servers from which data collection is still incomplete are not shown.         < Previous	
< Previous Next > Install Cancel	
< Previous Next > Install Cancel	
RPA results RPA results	

Figure 3.3.2.1: DNS server configuration

Figure 3.3.2.2: DNS server configuration

$\mathbb{D}$	Server Mana	ger • Dashboard	🗸 闭   🖡 Manage	Tools View Help	
Das Loc   All : AD   DH   File	Add Roles and Features Wizard Select server role Before You Begin Installation Type Server Selection Server Roles Peatures DNS Server Confirmation Results	S Select one or more roles to install on the selected server. Roles Active Directory Certificate Services Active Directory Poderation Services Active Directory Federation Services Active Directory Rights Management Services DHCP Server (Installed) Fax Server Fint and Document Services Print and Document Services Print and Desktop Services Print and Desktop Services Volume Activation Services Volume Server Update Services Volume Server Update Services Volume Server Update Services	– – – × DESTINATION SERVER haffzwhite.com           Domain Name System (DNS) Server provides name resolution for TCP/IP networks. DNS Server is easier to metworks. DNS Server is easier to network when it is installed on the same server as Active Directory Domain Services. If you select the Active Directory Domain Services role, you can install and configure DNS Server and Active Directory Domain Services to work together.           xt >         Install	Hide	
		BPA results BPA resul	Its		

Figure 3.3.2.3: DNS server configuration

)(= Das	Server Mana	ger • Dashboard • (♂)   ř Manage – □ ×	Tools	View	Help	^
Loc All : AD DH( File	DNS Server Before You Begin Installation Type Server Selection Server Roles Peatures DNS Server Confirmation Results	Domain Name System (DNS) provides a standard method for associating names with numeric Internet addresses. This makes it possible for users to refer to network computers by using easy-to-remember names instead of a long series of numbers. In addition, DNS provides a hierarchical namespace, ensuring that each host name will be unique across a local or wide-area network. Windows DNS services can be integrated with Dynamic Host Configuration Protocol (DHCP) services on Windows, eliminating the need to add DNS records as computers are added to the network. Things to note: • DNS server integration with Active Directory Domain Services automatically replicates DNS data along with other Directory Service data, making it easier to manage DNS. • Active Directory Domain Services requires a DNS server to be installed on the network. If you are installing a domain controller, you can also install the DNS Server role using Active Directory Domain Services Installation Wizard by selecting the Active Directory Domain Services role.		Hide	2	
		< Previous     Next >     Install     Cancel       BPA results     BPA results				~



)@	Server Mana	ger • Dashboard	- © I	۲	Manage	Tools	View	Help
Das Loc	Add Roles and Features Wizard		-	- c	ı ×			
All S AD	Confirm installatio	on selections	DES	bafiz.wi	SERVER hite.com			
File	Installation Type Server Selection Server Roles	Restart the destination server automatically if required Optional features (such as administration tools) might be displayed or been selected automatically. If you do not want to install these option their check boxes.	n this page becau nal features, click l	ise they h Previous	iave to clear			
	Features DNS Server Confirmation Results	DNS Server Remote Server Administration Tools Role Administration Tools DNS Server Tools					Hide	e
		Export configuration settings Specify an alternate source path						
		< Previous Next >	Install	С	ancel			
		BPA results BPA results						

Figure 3.3.2.5: DNS server configuration

€	DNS Manager     -     -     X	lanage Tools V	′iew Help
	File Action View Help		
D		T/	ASKS 💌
	A BINS Name HAFIZ		$\odot$
i A		ws Activation	
∫∎ D		tivated	
🗿 D			
in Fi			
		T/	ASKS 🔻
			۲



_	2		
)	🚵 DNS Manager – 🗆 🗙	lanage Too	ols View H
	File Action View Help		
D			TASKS 💌
D L A D D Fi	<ul> <li>Image: Construct of the second second</li></ul>	ws Activation	
			1

Figure 3.3.2.7: DNS server configuration

	anager		$\sim$	. 🖅 lanage	e Tools View Hel
」 [	New Zone Wizard	×			
D.		Welcome to the New Zone Wizard	Data	Timestam	TASKS 💌
AI		This wizard helps you create a new zone for your DNS server.			۲
D		A zone translates DNS names to related data, such as IP addresses or network services.	192.168.0.100	12/7/2020 ws Ac	tivation
Fil		To continue, click Next.			
		< Back Next > Cancel			TASKS 💌
					$\odot$
<		> <		>	



/er Ivianager					- u
DISC Manager		_		lanage Too	ols View
New Zone Wizard     Zone Type     The DNS server supports various types of zones and storage.	×	Data	Timestam		TASKS
AI Select the type of zone you want to create: AI © Primary zone Creates a copy of a zone that can be updated directly on this D Secondary zone Creates a copy of a zone that exists on another server. This of the processing load of primary servers and provides fault toler O Stub zone Creates a copy of a zone containing only Name Server (NS), S (SOA), and possibly glue Host (A) records. A server containing authoritative for that zone. Store the zone in Active Directory (available only if DNS server controller)	server. ance. tart of Authority g a stub zone is not is a writeable domain	192.168.0.100	12/7/2020	ws Activation tivated	6
< Back Ne	ext > Cancel		>		TASKS



Ð	New Zone Wizard X		► _ □ × <sup> </sup> a
	Zone Type The DNS server supports various types of zones and storage.     Image: Construction of zone volument to create the type of zone volument t	Data	Timestam
I AI	<ul> <li>Primary zone         Creates a copy of a zone that can be updated directly on this server.         Secondary zone         Creates a copy of a zone that exists on another server. This option helps balance         the processing load of primary servers and provides fault tolerance.         Stub zone         Creates a copy of a zone containing only Name Server (NS), Start of Authority         (SOA), and possibly glue Host (A) records. A server containing a stub zone is not         authoritative for that zone.     </li> <li>Store the zone in Active Directory (available only if DNS server is a writeable domain         controller)</li> </ul>	192.168.0.100	12/7/2020 w
	<back next=""> Cancel Figure 3.3.2.10: DNS server configuration</back>		

€		New Zone Wizard X	- [		lanage Tools	View H
	F	Zone Name What is the name of the new zone?	Data	Timestam		TASKS 💌
A A A		The zone name specifies the portion of the DNS namespace for which this server is authoritative. It might be your organization's domain name (for example, microsoft.com) or a portion of the domain name (for example, newzone.microsoft.com). The zone name is not the name of the DNS server.	192.168.0.100	12/7/2020	ws Activation	$\odot$
Sing Fi		zone name: white.com				
		< Back Next > Cancel				TASKS 💌
	<	> <		>		
					1	

Figure 3.3.2.11: DNS server configuration

erver	Manager	~	. <b>I</b> #*	— Ü
シ	New Zone Wizard	_	□ × <sup>lanage</sup>	Tools View H
D	Dynamic Update     You can specify that this DNS zone accepts secure, nonsecure, or no dynamic     updates.	Data	Timestern	TASKS 💌
AI	Dynamic updates enable DNS client computers to register and dynamically update their resource records with a DNS server whenever changes occur.	Data	Timestam	$\odot$
Al Di	Select the type of dynamic updates you want to allow:	192.168.0.100	12/7/2020 ws Activ	ation
D	<ul> <li>Allow only secure dynamic updates (recommended for Active Directory) This option is available only for Active Directory-integrated zones.</li> </ul>			
	<ul> <li>Allow both nonsecure and secure dynamic updates</li> <li>Dynamic updates of resource records are accepted from any client.</li> <li>Allow botton is a significant security vulnerability because updates can be accepted from universe</li> </ul>			
	<ul> <li>Do not allow dynamic updates</li> <li>Dynamic updates of resource records are not accepted by this zone. You must update these records manually.</li> </ul>			
	< Back Next > Cancel			TASKS 💌
				۲
-	< >> <		>	



Completing the New Zone Wizard	
Lo Repeated by the following settings: A A A A A A A A A A A A A A A A A A A	<u>s</u> ▼
iii Hi       Image: Second secon	KS 💌
	•

S						-
$\sim$	~					
1	New Zone Wizard	×		lanage	lools	View
		Welcome to the New Zone Wizard This wizard helps you create a new zone for your DNS server. A zone translates DNS names to related data, such as IP addresses or network services.	ce to be divided into zones. Each zone Iomains.		Never Downloa 12/4/202	TASKS d updates o 0 4:35 AM
Э П		To continue, click Next.	5	guration	Real-Tim Settings On (UTC-08: Not activ	e Protectio 00) Pacific 1 rated
		< Back Next > Cancel	-		Intel(R) C 2 GB 59.45 GB	ore(TM) i3∙
						TASKS
		Filter 🔎 🖽 🗸	₩ -			•

Figure 3.3.2.14: DNS server configuration

PNS Manager	— — X
New Zone Wizard X	
Zone Type       The DNS server supports various types of zones and storage.	
Select the type of zone you want to create:	
Primary zone Creates a copy of a zone that can be updated directly on this server.	ce to be divided into zones. Each zone Iomains.
Secondary zone Creates a copy of a zone that exists on another server. This option helps balance the processing load of primary servers and provides fault tolerance.	
Stub zone Creates a copy of a zone containing only Name Server (NS), Start of Authority (SOA), and possibly glue Host (A) records. A server containing a stub zone is not authoritative for that zone.	
Store the zone in Active Directory (available only if DNS server is a writeable domain controller)	
< Back Next > Cancel	

Figure 3.3.2.15: DNS server configuration

)	New Zone Wizard X	X	lanage
	Active Directory Zone Replication Scope You can select how you want DNS data replicated throughout your network.		- 
	Select how you want zone data replicated:		
41	$\bigcirc$ To all DNS servers running on domain controllers in this forest: white.com	ce to be divided into zones. Each zone	
D	To all DNS servers running on domain controllers in this domain: white.com	lomains.	
) Fi	<ul> <li>To all domain controllers in this domain (for Windows 2000 compatibility): white.com</li> <li>To all domain controllers specified in the scope of this directory partition:</li> </ul>		guration
	$\sim$		
	< Back Next > Cancel		

Figure 3.3.2.16: DNS server configuration

)	F	DNS Manager New Zone Wizard X	X	lanage	Tools View H
D	<b>Re</b>	Reverse Lookup Zone Name A reverse lookup zone translates IP addresses into DNS names.		-	TASKS 💌
AI AI	~	Choose whether you want to create a reverse lookup zone for IPv4 addresses or IPv6 addresses.	ce to be divided into zones. Each zone		Never Download updates on 12/4/2020 4:35 AM
D		IPv4 Reverse Lookup Zone	lomains.		
DI Fil		O IPv6 Reverse Lookup Zone			Real-Time Protection: Settings
				guration	On (UTC-08:00) Pacific Tim Not activated
			-		Intel(R) Core(TM) i3-41
		< Back Next > Cancel			2 GB 59.45 GB
					>
-					TASKS 💌
L					9

Figure 3.3.2.17: DNS server configuration

<u>erver</u>	New Zone Wizard X	ag
I D	Reverse Lookup Zone Name       Image: Constraint of the Descense of the constraint of the constraint of the constraint of the constraint of the Descense of the Constraint	rat
	< Back Next > Cancel	
		_

Figure 3.3.2.18: DNS server configuration

5			
シ	New Zone Wizard	×	lanage
Da	Dynamic Update     You can specify that this DNS zone accepts secure, nonsecure, or no dynamic updates.		
Lc AI Di Di Fi	updates.         Dynamic updates enable DNS client computers to register and dynamically update their resource records with a DNS server whenever changes occur.         Select the type of dynamic updates you want to allow: <ul> <li>Allow only secure dynamic updates (recommended for Active Directory) This option is available only for Active Directory-integrated zones.</li> <li>Is will updates of resource records are accepted from any client.</li> <li> <ul> <li>This option is a significant security vulnerability because updates can be accepted from untrusted sources.</li> <li>Do not allow dynamic updates</li> <li>Dynamic updates of resource records are not accepted by this zone. You must update these records manually.</li> </ul> </li> </ul>	ce to be divided into zones. Each zone lomains.	guratio
		0	

Figure 3.3.2.19: DNS server configuration



Figure 3.3.2.20: DNS server configuration

LINS Manager le Action View Help					_	ر بن 	~
DNS HAFIZ Solution DNS-1 DNS-1 Solution DNS-1 DNS-1 Solution DNS-1	Name (same as parent folder) (same as parent folder) (same as parent folder) New Por Ht	Type Start of Authority (SOA) Name Server (NS) Resource Record ter (PTR) Start of Authority (SOA) Start IP Address: So 169.0 So 1	Data [1], hafiz.white.com, host hafiz.white.com. Browse e all DNS records with the same records for a new name. OK Cancel	Timestamp static =static			

Figure 3.3.2.21: DNS server configuration

UNS Manager					- u ^			
DNS HAFIZ Forward Lookup Zones DNS-1 Sim white.com Reverse Lookup Zones 10.168.192.in-addr.arp Trut Points Conditional Forwarders	Name dc domains gc pdc (same as parent f 099e4c84-b348-4	Type       New Resource Record       Pointer (PTR)       Host IP Address:       192.168.0.100       Fully qualified domain name (FQDN):       100.0.168.192/n-addr.arpa       Host name:       hafiz.white.com	Data Data Data Dota Dota Dota Dota Dota	Timestamp X tic tic 7/2020 7:00:00 AM se same				

Figure 3.3.2.22: DNS server configuration

## **3.3.3. DHCP server basic:**

DHCP server work into four steps: (i) Server discovery, (ii) IP lease offer, (iii) IP lease request, (iv) IP lease acknowledgment. The process begins when clients broadcast a request.

# **3.3.4. DHCP server installation windows server 2016:**



Figure 3.3.4.1: DHCP server configuration

	Add Roles and Features Wiz	ard					View H
Dashboard	Select destination	on server			DESTINATIO	ON SERVER	
Local Server     Before You Begin     Installation Type     AD DS     File and Storag     File and Storag		Select a server or a vir Select a server fro Select a virtual har Server Pool	tual hard disk on which m the server pool d disk	to install roles and features	2		
Features Confirmation Results	Features Confirmation Results	Filter:	IP Address	Operating System	Ĩ		
		hafiz.white.com	192.168.0.100	Microsoft Windows Serv	er 2016 Essentials		Hide
		1 Computer(s) found This page shows serve and that have been ac newly-added servers f	ins that are running Wind Ided by using the Add S rom which data collectio	lows Server 2012 or a new ervers command in Server I n is still incomplete are no	er release of Window Manager. Offline sen t shown.	s Server, vers and	
		1 Computer(s) found This page shows serve and that have been ac newly-added servers f	rs that are running Win Ided by using the Add S rom which data collectio < Pres	lows Server 2012 or a new ervers command in Server 1 in is still incomplete are no vious Next >	er release of Window Manager. Offline sen t shown.	s Server, vers and Cancel	
	See Per BP	T Computer(a) found This page shows serve and that have been as newly-added servers f rvices from a computer of the servers A results	rs that are running Wind Ided by using the Add S rom which data collection Services Perform BPA res	lows Server 2012 or a new ervers command in Server i nis still incomplete are no zious Next > i iance ults	er release of Window Manager, Offline serv t shown.	Server, vers and	

Figure 3.3.4.2: DHCP server configuration





Dashboard	WELCOME	TO SERVER MANAGER		
.ocal Server All Servers AD DS File and Storage	Add Roles and Features Wiz	erd ES Select one or more roles to install on the selected server	DESTINATION SERVER haffz.white.com	<u></u>
	Installation Type Server Selection Server Roles Features DHCP Server Confirmation Results	Active Directory Certificate Services         ✓ Active Directory Romain Services (Installed)         △ Active Directory Federation Services         △ Active Directory Rights Management Services         △ Active Directory Rights Management Services         ○ Directory Rights Rights Services         ○ Directory Rights Rights Services         ○ Directory Rights Rights Serv	Description Dynamic Host Configuration Protocol (DHCP) Server enables you to centrally configure, manage, and provide temporary IP addresses and related information for client computers.	Hide

Figure 3.3.4.4: DHCP server configuration



Figure 3.3.4.5: DHCP server configuration

Dashboard	WELCOME T	O SERVER MANAGER	
Local Server All Servers AD DS File and Storage	Add Roles and Features Wiza Confirm installat Before You Begin Installation Type Server Selection Server Roles Features DHCP Server Confirmation Results	Ind - C X DESTINATION SERVER hafizwhite.com To install the following roles, role services, or features on selected server, click Install. To install the following roles, role services, or features on selected server, click Install. To install the following roles, role services, or features on selected server, click Install. To install the following roles, role services, or features on selected server, click Install. To install the following roles, role services, or features on selected server, click Install. To install the following roles, role services, or features on selected server, click Install. To install the following roles, role services, or features on this page because they have been selected automatically. If you do not want to install these optional features, click Previous to clear their check boxes. DHCP Server Remote Server Administration Tools Role Administration Tools DHCP Server Tools	Hide
		Export configuration settings Specify an alternate source path	

Figure 3.3.4.6: DHCP server configuration



Figure 3.3.4.7: DHCP server configuration

DHCP ile Action View Help			- D X
DHCP	Contents of DHCP	Status	Actions
<ul> <li>Inhfiz.white.com</li> <li>Inhfiz.white.com</li> <li>Server Options</li> <li>Policies</li> <li>Filters</li> <li>IPv6</li> <li>Server Options</li> </ul>	həfiz.white.com		More Actions

Figure 3.3.4.8: DHCP server configuration





DHCP ile Action View Help ■ ➡   ☶      ☑ ☶   .具.						^
<ul> <li>DHCP</li> <li>Infizwhite.com</li> <li>Server Options</li> <li>Filters</li> <li>Filters</li> <li>Server Options</li> </ul>	Contents of DHCP ■ hafiz.white.com New Scope Wizard Scope Name You have to provide a description. Type a name and de how the scope is to Name: CF Description:	Status an identifying scope name. You scription for this scope. This infor se used on your network. R_DHCP	also have the option of providing mation helps you quickly identify	Cancel	Actions DHCP More Actions	,

Figure 3.3.4.10: DHCP server configuration

DHCP bafiz.white.com	Contents of DHCP	Status			Actions	
<ul> <li>hettz.white.com</li> <li>Betz.white.com</li> <li>Server Options</li> <li>Policies</li> <li>Profi</li> <li>Server Options</li> </ul>	hafiz.white.com   IP Address Range   You define the scope     Configuration settings f   Enter the range of add   Start IP address:   End IP address:   Configuration settings t   Length:   Subnet mask:	address range by identifying a for DHCP Server tresses that the scope distribut 1722.16.0.1 1722.16.0.254 hat propagate to DHCP Client 24 255.255.255.0	set of consecutive IP addresse	s.	DHCP More Actions	•



DHCP e Action View Help e III III III III.					- 0 ×
DHCP	Contents of DHCP	Status			Actions
<ul> <li>hafiz.white.com</li> <li>IPv4</li> <li>Server Options</li> </ul>	hafiz.white.com				DHCP  More Actions
Server Options Server Options > ♥ I Filters Note: Server Options Server Options	New Scope Wizard Add Exclusions and I Exclusions are addre server. A delay is the DHCPOFFER messa Type the IP address: Decluded address reserver. Excluded address reserver. 172.16.0.2016.172.	Delay         sees or a range of addresses this         time duration by which the service         ge.         rease in Start IP address:         ind IP address         ind IP address         ind IP address	at are not distributed by the er will delay the transmission of a if you want to exclude a single Add Remove Subnet delay in mill second: 0 4 Sack Next >	Cancel	

Figure 3.3.4.12: DHCP server configuration



Figure 3.3.4.13: DHCP server configuration

DHCP le Action View Help					- D ×
DHCP DHCP Affiz.white.com Server Options Policies Filters Server Options Server Options	Contents of DHCP ■ hafiz.white.com New Scope Wizard Corligue DHCP Optic You have to configure scope. When clients obtain a addresses of routers ( scope. The settings you selec Server Options folder Do you want to corlig ( Yes. I want to corlig ( No, I will configure	Status ons e the most common DHCP option an address, they are given DHC (default gateways). DNS server ct here are for this scope and o for this server. gure the DHCP options for this s figure these options now a these options later	ens before clients can use the P options such as the IP , and WINS settings for that verified settings configured in the cope now?	Cancel	Actions DHCP Actions

Figure 3.3.4.14: DHCP server configuration



Figure 3.3.4.15: DHCP server configuration

DHCP brizwhite.com Server Options Filters Server Options Server Options	Contents of DHCP hafiz.white.com New Scope Wizard Domain Name and The Domain Name and Organ Resolution Parent domain: wh To configure scope of servera. Server name: [8.8.8.8]	Status IDNS Servers ReSystem (DNS) maps and trans earent domain you want the client te com lients to use DNS servers on you IP ad Resolve	ilates domain names used t computers on your netwo r network, enter the IP ad dress:  3.8 < Back Next >	by clients	Actions DHCP More Actions	

Figure 3.3.4.16: DHCP server configuration

5110		
le Action View Help		
) 🔿 📅 🗟 📓 🖬 👢		
DHCP	Contents of DHCP Status	Actions
hafiz.white.com	hafiz.white.com	DHCP 🔺
Server Options		More Actions
Policies	New Scope Wizard	
> 📝 Filters		
Server Options	WINS Servers Computers running Windows can use WINS servers to convert NetBIOS computer names to IP addresses.	
	Entering server IP addresses here enables Windows clients to query WINS before they use broadcasts to register and resolve NetBIOS names.	
	Server name: IP address:	
	172.16.0.1 Add	
	Resolve 172.16.0.1 Remove	
	Up	
	Down	
	To change this behavior for Windows DHCP clients modify option 046, WINS/NBT Node Type, in Scope Options.	
	< Back Next > Cancel	
1	1	11

Figure 3.3.4.17: DHCP server configuration

#### 3.4. Wi-Fi basic:

Wi-Fi means Wireless Fidelity. Wi-Fi is a typical internet connection without wire. It creates a wireless local area network or wide area network which allows pc to communicate one to one connection without cables. There are Wi-Fi types: A, B, G and A.C. Where B and G use 2.4GHz frequencies. For home and business connections use G, N and A.C. 2.4GHz provides longer coverage but slower data transmit and 5GHz provides less coverage but faster speed. Higher frequencies allow faster transmission of data than lower frequencies. So 5GHz is better for download and upload at the fastest speed.

# 3.4.1. Wi-Fi configuration:

0		300M Wireless N Router Model No. TL-WR840N/TL-WR840ND
		IAN - The following parameters apply to the LAN port of the Router You can configure
Status		them in the Network > LAN page.
		MAC Address - The physical address of the Router, as seen from the LAN.
Firmware Version	3.16.9 Build 160406 Rel.40792n	IP Address - The LAN IP address of the Router.     Subnet Mask - The subnet mask associated with LAN IP address.
Hardware Version	WR840N v2 00000000	Wireless - These are the current settings or information for Wireless. You can configure
		them in the Wireless -> Wireless Settings page.
		<ul> <li>Wireless Radio - Indicates whether the wireless radio feature of the Router is enabled or disabled.</li> </ul>
LAN		Name (SSID) - The SSID of the Router.     Mode - The current wireless mode which the Router works on
MAC Address	84-16-F9-A8-DF-42	Channel Width - The bandwidth of the wireless channel.
IP Address	192.168.0.1	<ul> <li>Channel - The current wreless channel in use.</li> <li>MAC Address - The physical address of the Router, as seen from the WLAN.</li> </ul>
Subnet Mask	255.255.255.0	<ul> <li>WDS Status - The status of WDS connection, Init: WDS connection is down; Scan: Try to find the AP; Auth: Try to authenticate; ASSOC: Try to associate; Run:</li> </ul>
		Associated successfully.
Wireless		WAN - The following parameters apply to the WAN ports of the Router. You can configure them in the Network -> WAN page.
Wireless Radio	Enable	MAC Address - The physical address of the WAN port, as seen from the internet
Name (SSID)	Hafiz New	<ul> <li>IP Address - The current WAN (Internet) IP Address. This field will be blank or 0.0.0.0 if the IP Address is assigned dynamically and there is no connection to</li> </ul>
Maria (Sold)	11ban mixed	Internet.
Channel Width	1041-1-	<ul> <li>Subnet Mask - The subnet mask associated with the WAN IP Address.</li> <li>Default Gateway - The Gateway currently used by the Router is shown here. When</li> </ul>
Channel Width	Auto (Current abonnol 2)	you use Dynamic IP as the connection Internet type, the Renew button will be displayed here. Click the Renew button to obtain new IP parameters dynamically
Channel	Auto (Current channel 3)	from the ISP. And if you have got an IP address Release button will be displayed here. Click the Release button to release the IP address the Router has obtained
MAC Address	84-16-F9-A8-DF-42	from the ISP.
WDS Status	Disable	used by the Router. Multiple DNS IP settings are common. Usually, the first
		Online Time - The time that you online. When you use PPPoE as WAN connection
WAN		type, the online time is displayed here. Click the Connect or Disconnect button to connect to or disconnect from Internet.
MAC Address	84-16-F9-A8-DF-43	Secondary Connection - Besides PPPoE, if you use an extra connection type to connect
IP Address	27.147.176.248 Dynamic II	to a local area network provided by ISP, then parameters of this secondary connection will be shown in this area.
Sub		Traffic Statistice - The Router's traffic statistics

Figure 3.4.1.1: Wi-Fi configuration

TP-LINK <sup>®</sup>		300M Wireless N Router Model No. TL WRS40H / TL WRS40HD
Status Quick Setup WP5 Network WAN AcConnection Type: WAN WAN Connection Type: WAN WAN Connection Type: WAN WAN Connection Type: WAN WAN Connection Type: PArticle Control Counts	Static IP     ▼     Detect       27.147.176.248       255.255.255.254       27.147.176.241       1500     (The default is 1500, do not change unless necessary.)       123.200.0.254       203.76.96.6       (Optional)       Save	WAN Heip           Wan Connection Type:           If your ISP provides a static or fixed IP Address, Subnet Mask, Gateway and DNS setting, elect the Static IP option.           If your ISP provides a static or fixed IP Address, Subnet Mask, Gateway and DNS setting, elect the Static IP option.           If your ISP provides a pPPoE connection, please select EigPand Cable cort heart Beat Signal; connection, please select EigPand Cable cort heart Beat Signal; connection, please select EigPand Cable cort heart Beat Signal; connection, please select L2TP/Russia ZPTP option.           If your ISP provides PTP connection, please select C2TP/Russia ZTP option.           If your ISP provides PTP connection, please select C2TP/Russia ZTP option.           If your ISP provides PTP connection, please select C2TP/Russia ZTP option.           If your ISP provides, please refer to the ISP. The various type, dicit the Detect buttion to adomined a search your inference conduct for sarvers and protocols.           If your ISP provides, please refer to the ISP. The various types of Internet connections that the Router can detect are a software.           • Option IIP - Connections which use dynamic IP address assignment.           • PPOSer. The Proderect The IP - Connections which use static IP address cancer material password.           • Promatic IR - Connections which use dynamic IP address assignment.           • PAddress - Enter the subnet Mask in dotted-decimal notation provided by your ISP.           Subter Mask - Enter the subnet Mask in dotted-decimal notation provided by your ISP.           Methowsit         <

Figure 3.4.1.2: Wi-Fi configuration

TP-LINK <sup>®</sup>		300M Wireless N Router Model No. TL WR840N / TL WR840ND
Status Qauke Setup WPS Network -WAN -WAN -WAN -WAN -WAC Clone -ILAN Wireless Guest Network DHCP Forwarding Security Parental Control IP & AdAC Binding Dynamic DNS IIP & Support System Tools Logout	84-16-F9-A8-DF-42 192-168.0.1 255:255:255:0 ✓ Enable ✓ Kote IOMF (internet) Group Management Protocol) works for IPTV multicast stream. The device supports both IOMP proxy with enabled/disabled option and IOMP snooping. Save	LAN Help You can configure the IP parameters of LAN on this page. • MAC Address - The physical address of the LAN ports, as seen from the LAN. The subcorners be charging • great controls to charging • and the series of the P address of your Router in dotted decimal notation (factory defined to the series of the P address of your Router in dotted decimal notation (factory of the rest of the series of the the P address of your Router in dotted decimal notation (factory defined to the series of the series of the network. Usually it is so to the Proxy - If you want to walch TV through IGMP, please Enable it. Note: • If the net LAN IP address, you must use the new IP address to login to the Router. • If the net LAN IP address, you must use the new IP address to login to the Source and DMC Rots with calsa effect unit they are to configured automatically, but the Virtual Server and DMC Rots with calsa effect unit they are re-configured Click the Save button to save your settings. If meet.google.com is sharing your screets. • Step sharing Hide

Figure 3.4.1.3: Wi-Fi configuration

Status         Quick Schup         Wreises         Network         Wreises Schuftig         Bendwidth Control         Prevended Control	TP-LINK <sup>®</sup>	300M Wireless N Router Midde No. 11WR340N / 11WR340ND
client You can also use the survey function to select the BSSID to join.     Survey - Olicit this button, you can search the AP which runs in the current channel.     Voit SALVEYSTOR 27/15 & Autore Francisco Control of the select the second the sec	Status Quick Setup WPS Wreless Settings Wireless Settings Wireless Settings Wireless Settings Wireless Settings Wireless Settings Wireless Settings Channel Width: Channel Width: Channel Wireless Statistics Guest Network DHCP Porvaring Security Parental Control Access Control Advanced Routing Bandwidth Control IP & MAC Binding Dynamic DNS Logout System Tools Logout UD1630.11/CIUS/00/CIO22/64/arce8cm/DataTime/Cn8am tam	Wireless Settings Help         Note: The operating distance or range of your wireless connection varies significantly back wireless factors will operate.

Figure 3.4.1.4: Wi-Fi configuration

TP-LINK <sup>®</sup>		300M Wireless N Router Model No. 11-WR840N / TL-WR840ND
Status Cuick Setup Wr25 Network Guest Network DHCP Settings DHCP Settings DHCP Settings DHCP Settings DHCP Settings ChCP Client List - DHCP Client List - DHCP Client List - Address Reservation Forwarding Security Parental Control Advanced Routing Bandwidth Control Advanced Routing Bandwidth Control Pymanic DN S IPv6 Support System Tools Logout	○ Disable       ● Enable         192.168.0.100       192.168.0.199         120       minutes (1-2880 minutes, the default value is 120)         192.168.0.1       (Optional)         123.200.0.254       (Optional)         123.200.0.254       (Optional)         8.8.8       (Optional)	<ul> <li>HACE IL VIRSAON / TL VIRSAON</li> <li>HACE Settings Help</li> <li>The device is set up by default as a DHCP (Dynamic Host Configuration Protocol) server, which provides the TCP/IP configuration for all the PCS that are connected to this device in the LAN.</li> <li>HHCP Server - Enable or Disable the server. If you disable the Server, you must have another DFCP server within you rehevitor or bey on must configuration the IP Address to the device in the IP Address. This field specifies the first address in the IP Address pool.</li> <li>Bit IP Address - This field specifies the first address in the IP Address pool.</li> <li>HACE Server - Enable or Disable the server. If you disable the Server, you must have another DFCP server with you rehvolve or bey own must configuration of the Address of the Address pool.</li> <li>HA Address - This field specifies the first address in the IP Address pool.</li> <li>HACE Address - This field specifies the bit address in the IP Address pool.</li> <li>Address Lease Time - The Address Lease Time is the length of time a network user with be almosted to keep concenting to the device with the current DFCP Address.</li> <li>Address Lease Time - The Address Lease Time is the LAN port of this device. The difficult value is 192.168.1</li> <li>Obtain Lomania - Optional lip up the doman nee of your network.</li> <li>Your ISP provides two DINS IP address provided by your ISP. Or consult your ISP.</li> <li>Secondary DMS - Optional lip vu Can input the IP Address of another DNS server If your SIP.</li> <li>Detain the DHCP address server.</li> <li>Note Save to save the changes.</li> </ul>

Figure 3.4.1.5: Wi-Fi configuration

TP-LINK	<		300M Wireless N Router Model no. 11WR540H / 11WR540H
Status Quick Setup	Wireless Security		Wireless Security Help
WPS Network Wireless	O Disable Security		You can select one of the following security options: • Disable Security - The wireless security function can be enabled or disabled. If disabled, the wireless stations with be able to connect this device without encryption. It is recommended strongly that you choose one of following options to enable recommended strongly that you choose one of following options to enable
- Wireless Settings - Wireless Security - Wireless MAC Filtering	WPA/WPA2 - Personal(Reco Version:	Automatic V	WDA.WIPA2 - Personal - Select WPA based on pre-shared passphrase.     WDA.WIPA2 - Enterprise - Select WPA based on Radius Server.     WEP - Select 802.11 WEP security.     Each security onlow has it come selfness as refarchibed follows
- Wireless Advanced - Wireless Statistics Guest Network	Encryption: Wireless Password:	ALS     V      Nasif@4321  (You can enter ASCII characters between 8 and 63 or Hexadecimal characters between 8 and 64.)	WPA/WPA2 - Personal Version - You can select one of following versions,
DHCP Forwarding	Group Key Update Period:	0 Seconds (Keep it default if you are not sure, minimum is 30, 0 means no update)	Automatic - Select WPA-PSK or WPA2-PSK automatically based on the wireless station's capability and request.     WPA-PSK - Pre-shared key of WPA WPA-PSK - Pre-shared key of WPA     WAPA DSK - Pre-shared key of WPA     WAPA DSK - Pre-shared key of WPA
Security Parental Control	WPA/WPA2 - Enterprise     Version:	Automatic 🗸	Encryption - You can select either Automatic, or TKIP or AES.
Access Control Advanced Routing Rendwidth Control	Encryption: Radius Server IP:	Automatic	Wherease passwords "Floc call enter ASC for Resudes inter Chalacters, For Resudes inter the length should be between 8 and 64 characters, for ASCII, the length should be between 8 and 63 characters.
IP & MAC Binding Dynamic DNS	Radius Port: Radius Password:	1812 (1-65535, 0 stands for default port 1812)	Group Key Uppate Period - Specify the group key uppate interval in seconds. The Value can be either 0 or at least 30. Enter 0 to disable the update. WPA/WPA2 - Enterprise
IPv6 Support System Tools	Group Key Update Period:	0 (in second, minimum is 30, 0 means no update)	Version - You can select one of following versions, • Automatic - Select WPA or WPA2 automatically based on the wireless station's
Logout	Type: WEP Key Format:	Automatic Hexadecimal	G    meet.google.com is sharing your screen. Stop shuring Hide     W Excention You can called allow Automatic or TKID or ACS
192.168.0.1/KTUSGWSCTQPZNEAA/0	Key Selected Key 1:	WEP Key Key Type Disabled	Radius Server IP - Enter the IP address of the Radius Server.      Radius Port - Enter the port that radius service used,



## **3.4.2 Cloud controller basic:**

The Cloud controller works as a storage appliance. It can move data from one premise to another cloud storage automatically. Cloud controller is a java program that provides high-level resource tracking and management. It handles AWS-compatible APIs. This feature accepts a request from the command line clients or web-based interfaces.



## **3.4.3. Cloud controller configuration:**

Figure 3.4.3.1: Cloud controller account create

Thanks for registering!
A confirmation message has been sent to cridharmondiggmail.com . When you receive it, please follow the link to complete the registration process.
Regards,
Cambium Networks

Figure 3.4.3.2: Cloud controller account create



Figure 3.4.3.3: Cloud controller account create



Figure 3.4.3.4: Cloud controller account create

Onboard Devices				Got Startod			
Add devices to your account.	St.	Update Software Create jobs to automatically update software images on your devices.		Ouick Links			<u>(</u> )
	0		<u> </u>	Overview of c	nMaestro		
Monitor Network		Configure Devices		Quick Start G	ulde		
View dashboards, statistics and maps at each level of the device tree.	(D) ,uh	Set up templates for ePMP/PMP/cnPilot Home/cnMatrix devices, AP Groups for Wi-Fi devices, Switch Groups for cnMatrix devices and	503	C Device Onboa	rding		
		push a template/AP Group/Switch Group to single or multiple devices.	~~~	C Troubleshoot	ing Wi-Fi		
Manage Alarms		Add Users		Support Center			
View and acknowledge live alarms and review alarm history.	Â	Invite users to manage your account,		Documents	Community	Ideas	Support
Reports Pe Generate inventory, performance, events and alarms reports in CSV format available at system, Network, Tower and Site level.	Ê	Wi-Fi Guest Portals Create Guest Portals and configure Splash pages, Access Policies and monitor Client sessions.					

Figure 3.4.3.5: Cloud controller Dashboard

Onboard											
Onboard Claim f	rom Device										
The Onboarding Que configuration, or sof	eue holds devices before they are itware version. <u>Learn more</u>	added to your account.	Devices must be approved in	order to complete the o	onboarding process and I	oe manage <mark>d</mark> by cnMa	estro. You can pre-pr	ovision devices before th	iey are approved t	by setting loo	atior
Q Search								Claim Device	Approve All	Export -	
Туре т	Serial Number T	Device T	MAC T	IP Address T	Added By	Status T	Duration	Configure			
cnPilot e410	W8VJ0DFLNK0H	E410-3028C4	BC:E6:7C:30:28:C4	10.20.8.20	FCI cambium Using Serial Nu	Onboarded	1d 10h 32m	<u>Summary</u>	ONBOARD	ED 🏞	
cnPilot e410	W8VJ051T59XB	E410-E96771	58:C1:7A:E9:67:71	10.20.8.19	FCI cambium Using Serial Nu	Onboarded	1d 12h 22m	<u>Summary</u>	ONBOARD	ED 🏞	
cnPilot e410	W8VJ0DFN0Q18	E410-3028C6	BC:E6:7C:30:28:C6	10.20.32.77	FCI cambium Using Serial Nu	Onboarded	3d 6h 39m	Summary	ONBOARD	ED 🏞	
cnPilot e410	W8VJ0DPCBGD0	E410-3048F3	BC:E6:7C:30:48:F3	10.20.32.79	FCI cambium Using Serial Nu	• Onboarded	3d 7h 17m	Summary	ONBOARD	ED 🏞	
cnPilot e410	W8VJ0DLTFQJL	E410-302961	BC:E6:7C:30:29:61	10.20.32.78	FCI cambium Using Serial Nu	Onboarded	3d 7h 17m	<u>Summary</u>	ONBOARD	ED 🏞	
cnPilot e410	W8VJ0DLBTGN0	E410-302952	BC:E6:7C:30:29:52	10.20.32.76	FCI cambium Using Serial Nu	• Onboarded	3d 8h 19m	<u>Summary</u>	ONBOARD	ED 🏞	
cnPilot e410	W8VJ08HFLFVX	E410-EB031B	58:C1:7A:EB:03:1B	<u>10.20.32.75</u>	FCI cambium Using Serial Nu	Onboarded	3d 8h 37m	<u>Summary</u>	ONBOARD	ED 🏕	
cnPilot e410	W8VJ05B92T74	E410-E987B5	58:C1:7A:E9:87:B5	10.20.32.69	FCI cambium Using Serial Nu	• Onboarded	4d 9h 33m	<u>Summary</u>	ONBOARD	ED 🏞	
cnPilot e410	W8VJ04ZQQHX9	E410-E96732	58:C1:7A:E9:67:32	10.20.32.68	FCI cambium Using Serial Nu	Onboarded	4d 9h 48m	Summary	ONBOARD	ED 🏞	
September 140	WOULDDI CTERV	5410 202052	BC-59-70-20-20-52	10.00 00 70	FCI cambium	• Oshaardad	4d 0h 40m	Summer and			

Figure 3.4.3.6: Cloud controller Dashboard A.P.



Figure 3.4.3.7: Cloud controller Dashboard A.P. Restart Process

	Cambium Networks			LI Combium -
-	Search	System		0
	Networks Wi-Fi AP Groups	Dashboard Notifications Configuration Sta	tistics Report Pro Software Update Map Clients	
ŵ	System i	Devices	Devices By Type Total: 20	Connection Health (Last 24 Hrs) Resolution : 1 hr
2 D	&• default < &• FCI_GROUP < ♦ FCI NETWORK	20 11 0 TOTAL OFFLINE ONBOARDING	cnPilot 0 (Home)	
۹ ا	20 E410-3028C4 20 E410-3028C6	Alarms		10
ŝ	20 E410-302952 20 E410-302953	0 11 0 CRITICAL MAJOR MINOR		24:00 08:00 12:00 18:00 • Offline • Total Devices
89 89	∑0 E410-302961 ∑0 E410-3048D5	12 6	Top Networks ~	Last 5 mins
۸x	E410-3048F3	0 LAST 24 HOURS	NAME         TOTAL         DOWN           ECL GROUP         20         11	DEVICES BY TYPE ALARMS
	E410-E96732	RECOMMENDED SOFTWARE 100%		Critical      Major     Minor
	₩0 E410-E9673F	Details		
	E410-E967/1	NETWORKS 2	C	
	20 E410-E967AC	TOWERS 0		
	- 5410-596786	SITES 1		Baltush Shakur
	HO E410-E96789	AP GROUPS 3	OLD EPZ VADALL ROAD	
	₩0 E410-E9678E	WLANS 4		

Figure 3.4.3.8: Cloud controller Dashboard

#### 3.5. Microsoft Outlook 2016 basic:

The outlook is a platform, which allows us to send and receive a message, store name and numbers and can be manage calendar etc. Using this we can exchange messages when we are offline. So this is using to personalize various tasks and entities. The outlook is free for windows and mobile but we can upgrade it to premium through paying. However, mostly using mail companies allows Outlook to exchange their messages. We can exchange via POP3 and IMAP protocol. Where POP3 providing the only service to outlook to send and receive massage and IMAP provide service both in mail agent and in outlook. The mail transmission system uses the SMTP protocol. SMTM means a simple mail transfer protocol. Nowadays extended edition is using widely.

# 3.5.1 Microsoft Outlook 2016 configuration:

Welcome to Microsoft Outlook 2016

# Welcome to Outlook 2016

Outlook is your personal assistant, helping you manage your life with powerful tools for email, calendar, contacts, and tasks.

Let's get started. In the next few steps, we'll add your email account.

	< Back Next > Cancel
Figure 3.5.1.1: Mic	rosoft Outlook configuration
/icrosoft Outlook Account Setup	59 28
Add an Email Account	×
Use Outlook to connect to email accounts, su Online account as part of Microsoft Office 36 accounts. Do you want to set up Outlook to connect to	ich as your organization's Microsoft Exchange Server or an Exchange 5. Outlook also works with POP, IMAP, and Exchange ActiveSync
● Yes ○ No	an email account?

Figure 3.5.1.2: Microsoft Outlook configuration

© Daffodil International University

 $\times$ 

Add Account

Choose Service



O dadook.com of Exchan	ige Actives file compatible	Scivice			
Connect to a service su	ch as Outlook.com to acce	ss email, calendars, co	ntacts, and	tasks	
POP or IMAP					
Connect to a POP or IN	IAP email account				
			< Back	Nexts	6.

Figure 3.5.1.3: Microsoft Outlook configuration

Jser Information		Test Account Settings
our Name:	Elite	We recommend that you test your account to ensure that
mail Address:	elite.fortinet@gmail.com	the entries are correct.
Server Information		
Account Type:	POP3	Test Account Settings
ncoming mail server:	pop3.gmail.com	Automatically test account settings when Next is clicked
Outgoing mail server (SMTP):	smtp.gmail.com	Deliver new messages to:
ogon Information	L	New Outlook Data File
Jser Name:	elite.fortinet@gmail.com	O Existing Outlook Data File
Password:	******	Browse
Rer	member password	

Figure 3.5.1.4: Microsoft Outlook configuration
Internet E-mail Settings       ×         General       Outgoing Server       Advanced         Mail Account       •         Type the name by which you want to refer to this account. For example: 'Work' or 'Microsoft Mail Server'       •         elite.fortinet@gmail.com       •         Other User Information       •         Organization:       Elite         Reply E-mail:       elite.fortinet@gmail.com         Browse       •         More Settings       •	er	Information	Te	t Acco	unt Settings
Other User Information       w messages to:         Organization:       Elite         Reply E-mail:       elite.fortinet@gmail.com         Browse:       More Settings		General Outgoi Mail Account Type the name example: "Work elite.fortinet@	ttings ing Server Advanced by which you want to refer to this account. For c° or "Microsoft Mail Server" gmail.com	×	mend that you test your account to ensure that s are correct. Sunt Settings omatically test account settings when Next icked
Reply E-mail: elite.fortinet@gmail.com Browse:		Other User Infor	mation	_	w messages to: v Outlook Data File
More Settings	se	Reply E-mail:	elite.fortinet@gmail.com		ting Outlook Data File Browse
					More Settings

Figure 3.5.1.5: Microsoft Outlook configuration

r Information	Test Account Settings
Internet E-mail Settings General Outgoing Server Advanced	mend that you test your account to ensure the s are correct.
Server Port Numbers Incoming server (POP3): 995 Use Defaults This server requires an encrypted connection (SSL) Outgoing server (SMTP): 465 Use the following type of encrypted connection: SS Server Timeouts Short Long 1 minute Delivery Leave a copy of messages on the server Remove from server after 14 4 days Remove from server when deleted from 'Deleted It	iL V Outlook Data File w messages to: v Outlook Data File ting Outlook Data File Browse More Settings < Back Next > Cancel

Figure 3.5.1.6: Microsoft Outlook configuration

## **CHAPTER 4: A SMALL OFFICE DESIGN**

## 4.1. Network design method:

After performing the above activities at least one network should be designed and implemented which is a prerequisite of a corporate office network.



Figure 4.1: Corporate office design steps

## 4.2. Office design requirements:

### For office:

- i. 1 IP router
- ii. 1 Data server
- iii. 1 IP printer
- iv. 2 IP phone
- v. 7 Computer

## For lab:

i. The lab has 5 computers and 1 IP printer

## **Office design:**

- i. One data server for official
- ii. One wireless access point
- iii. Two IP telephone for official
- iv. Four computers for official
- v. IP printer for official
- vi. Laptops connected over Wi-Fi
- vii. Smartphone for employees



Figure 4.2: Simple office design (Network diagram)

## **CHAPTER 5: RESULTS**

#### 5.1. Packet tracer (Cisco):

Cisco packet tracer is a cross-platform for visual simulation. It allows a computer user to create network topologies and emulate a computer network. It is the most powerful simulator. This software allows users to simulate the configuration of Cisco router configuration. It allows students to simulate virtual networks with features like switches, routers, end-user gadgets etc. Using these features I can demonstrate, how to create a lab for a small office. I use the advantage of this software to construct this network. Very firstly I install the packer tracer and then design this network manually.



Figure 5.1: Final office network topology

## 5.2. IP configuration:

		_						
G	LOBAL	$\sim$	FastEthernet0/1					
S	ettings		Port Status 🗹 O					
Algorit	hm Setting	s	Bandwidth   I 100 Mbps  I 10 Mbps					
RO	UTING		Duplex O Half Duplex Full Duplex					
	Static		MAC Address	0002.4A51.0402				
	RIP		IP Configuration					
SWITCHING ID Address								
VLAN	Database		IP Address 50.0.0.5					
INTERFACE								
FastEt								
FastEt	thernet0/1		Tx Ring Limit	10				
Ser	rial0/2/0							
Ser	rial0/2/1							
auivalent	t IOS Comma	nde						
Router	(config)	tinte:	rface FastEthernet	t0/1				
Router	(config-	if)#						
Router(config-if)#exit								
Router(config)#interface Serial0/2/0								
Router(config-if)#								
Router(config-if) #exit								
Router	(config)	inte:	rface FastEthernet	t0/1				
Router (config-if) #								

Figure 5.2: IP configure in packet tracer

#### 5.3. Link check:

PC>ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:
Reply from 10.0.0.1: bytes=32 time=15ms TTL=128
Reply from 10.0.0.1: bytes=32 time=7ms TTL=128
Reply from 10.0.0.1: bytes=32 time=8ms TTL=128
Reply from 10.0.0.1: bytes=32 time=9ms TTL=128
Ping statistics for 10.0.0.1:
 Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
 Minimum = 7ms, Maximum = 15ms, Average = 9ms

Figure 5.3: Ling check using command prompt

# 5.4. Packet check:

									Realti	ne	
		Fire	Last Status	Source	Destination	Туре	Color	Time(sec)	Periodic	Num	۸
	Scenario 0 ∨		Successful	Router0	PC4	ICMP		0.000	Ν	1	
Þ	New Delete		Successful	Router0	Printer0	ICMP		0.000	Ν	2	
	Hew Delete		Successful	Router0	PC2	ICMP		0.000	Ν	3	
	Toggle PDU List Window						_				×
		<								>	

Figure 5.4: Packet checking (Pack sending successful)

# 5.5. Result:

I analyzed every task and operation of the project very carefully. I tried to describe and display every part of my activities particularly. At last, my network design topology for a small office is running correctly. I just plan and design for the office but still project implementation has not started. Hardware parts, fiber optic setup work performed by the transmission team and software part is the responsibility of the administrative team. If the project fully implements, I hope it will bring consistent output.

## **CHAPTER 6:**

#### **Conclusion:**

I performed internship for 4-month. During my internship session, I learned a lot of things like formality, punctuality, responsibility etc. and learned about network-related theoretical and practical knowledge. I hope it will help me much in my future professional life and I will be able to create a more successful project and to promote myself in a better position. I am very optimistic about my internship and I believe that in the 4-month duration of my internship I worked consistently as an employee does his job.

During the internship, I had to face some obstacles. It was great to work with risk in this time of global crisis but I enjoyed those times much. I think we have huge possibilities in the networking sector. In this age of information technology, this internship is one of the possibilities to dream of moving forward through the successful implementation and use of up to date technology which is challenging for me.

## **APPENDIX:**

## **Appendix A: Internship Reflection**

The internship in networking has been a growing experience for me for the first time. I learned about the value of practical work and relationship experience. I know how unique my beliefs are but it may not be accurate or right from other's points of view. But i believe that If anyone sets a target to achieve a goal then their success is what they expect. All the lessons i learned here at aamra network limited can and will be useful for my future life and I feel blessed to conclude so very early part of my life. This internship introduces me to doing what I love to do in my engineering carrier. Overall it was a great opportunity to prove myself and prepare for the carrier. This internship has guided me with much more technical and professional skills that will make me more successful.

## **Appendix B: Company Details**

Company name:	aamra networks limited.
Address:	Safura Tower (12 Floor)
	20 Kamal Ataturk Avenue, Banani C/A
	Dhaka-1213, Bangladesh.
Tell:	+8802222281100
Email:	dhakasupport.networks@aamra.com.bd
Web:	www.ticket.aamranetworks.com
Type of organization:	I.S.P. (Internet Service Provider)
Employees:	150

## REFERENCES

[1] "Product and services ", <u>www.aamranetworks.com</u>, 2020. [Online]. Browsing date: 18-09-2020. Available at: <u>https://www.aamranetworks.com/company/about-us-2</u>

[2] "Router configuration", <u>www.dummies.com</u>, 2020. [Online]. Browsing date: 20-09-2020. Available at: <u>https://www.dummies.com/computers/computer-networking/networking-components/configure-a-router</u>

[3] "IP addressing" docs.oracle.com, 2020. [Online]. Browsing date: 20-09-2020.Available at:<a href="https://docs.oracle.com/cd/E19504-01/802-5753/planning3-18471/index.html">https://docs.oracle.com/cd/E19504-01/802-5753/planning3-18471/index.html</a>

[4] "IP addressing and subnetting" www.cisco.com, 2020. [Online]. Browsingdate:21-09-2020.Availableat:https://www.cisco.com/c/en/us/support/docs/ip/routing-information-protocol-rip/13788-3

[5] "Router information protocol" <u>www.geeksforgeeks.org</u>, 2020. [Online]. Browsing date: 08-10-2020. Available at: <u>https://www.geeksforgeeks.org/routing-information-protocol-rip/</u>

[6] "MikroTik router" wiki.mikrotik.com, 2020. [Online]. Browsing date: 10-10-2020. Available at: <u>https://wiki.mikrotik.com/wiki/Manual:Initial Configuration</u>

[7] "Router O.S., Switch O.S. and Router board" mikrotik.tips, 2020. [Online]. Browsing date: 16-10-2020. Available at: <u>https://mikrotik.tips/differences-between-routeros-switchos-and-routerboard/</u>

[8] "Concept of DNS and DHCP" <u>www.univention.com</u>, 2020. [Online]. Browsing date: 22-10-2020. Available at: <u>https://www.univention.com/blog-en/brief-introduction/2019/03/brief-introduction-dhcp-dns/</u>

[9] "Concept of Web server" whatis.techtarget.com, 2020. [Online]. Browsing date: 07-11-2020. Available at: <u>https://whatis.techtarget.com/definition/Web-server</u>

[10] "Concept of Mail server" <u>www.serversmtp.com</u>, 2020. [Online]. Browsing date: 08-11-2020. Available at: <u>https://www.serversmtp.com/smtp-configuration/</u>

[11] "Cloud networking" <u>www.sdxcentral.com</u>, 2020. [Online]. Browsing date: 11-11-2020. Available at: <u>https://www.sdxcentral.com/cloud/definitions/all-about-cloud-networking/</u>

[12] "Cisco Packet Tracer" <u>www.netacad.com</u>, 2020. [Online]. Browsing date:
23-11-2020. Available at: <u>https://www.netacad.com/courses/packet-tracer</u>

[13] "Most of the information" en.wikipedia.org, 2020. [Online]. Browsing date:19-12-2020. Available at: <u>https://en.wikipedia.org/wiki</u>

[14] "About internship" 2020. [Online]. Browsing date: 14-09-2020. www.teenvogue.com, <u>https://www.teenvogue.com/story/how-to-network-for-internships</u>

# Internship\_rana

ORIGINALITY REPORT



Exclude quotes	On	Exclude matches	< 5%
Exclude bibliography	On		