

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

**BY**

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

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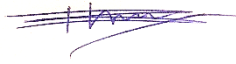


**DAFFODIL INTERNATIONAL UNIVERSITY  
DHAKA, BANGLADESH  
JANUARY 2021**

## 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**.

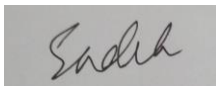
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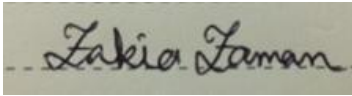
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## DECLARATION

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.

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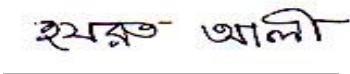
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## **ACKNOWLEDGEMENTS**

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.

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# **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 next-generation 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.

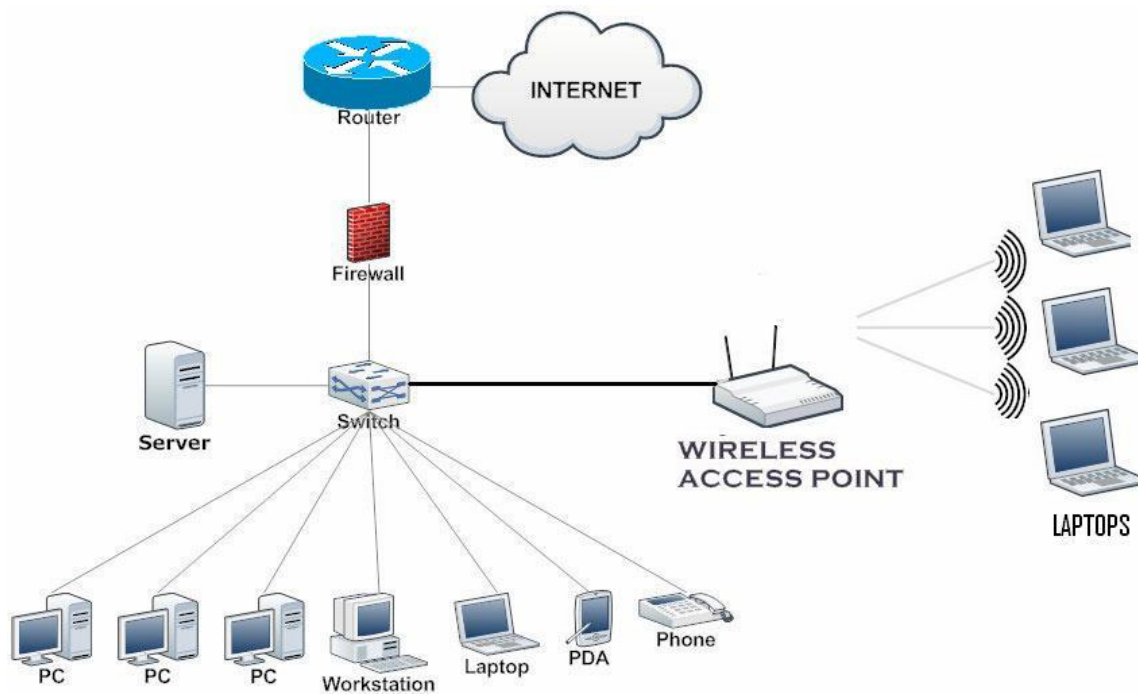


Figure 3.1: Cisco

#### 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 inter-domain 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:	1111111.11111111.11111111.11111100
IP Class:	C
CIDR Notation:	/30
IP Type:	Private
Short:	192.168.1.0 /30
Binary ID:	110000001010100000000000100000000
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





<u>Class Name</u>	<u>Address range</u>
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

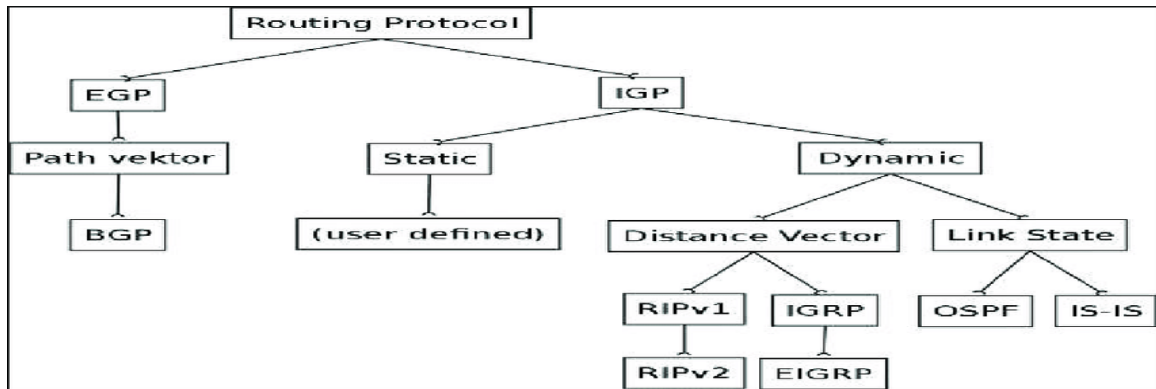


Figure 3.1.3: Routing protocol

### 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.

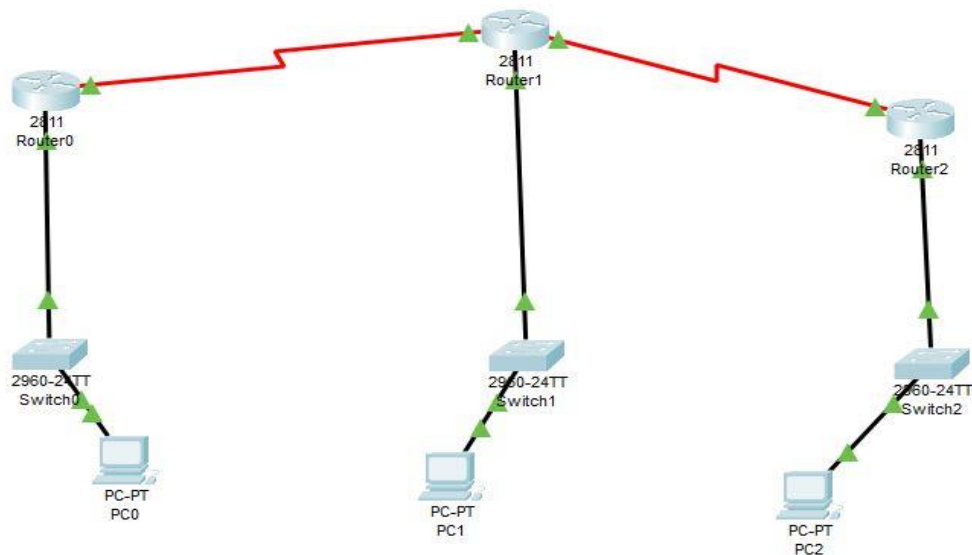


Figure 3.1.5: R.IP basic

### 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)#inte
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 shutdown

%LINK-5-CHANGED: Interface Serial0/3/0, changed state to down
Router(config-if)#exit
Router(config)#inte
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)#inte
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
!
interface Serial0/0/0
no ip address
clock rate 2000000
shutdown
!
interface Serial0/0/1
no ip address
clock rate 2000000
shutdown
!
interface Serial 0/1/0
ip address 10.0.0.50 255.0.0.0
!
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
!
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
!
router rip
version 2
network 10.0.0.0
network 172.16.0.0
network 192.168.20.0
!
ip classless
!
ip flow-export version 9
!
!
!
--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
!
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
```



EIGRP maintains three tables:

1. It has a neighbor table.
2. It generates Hello 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

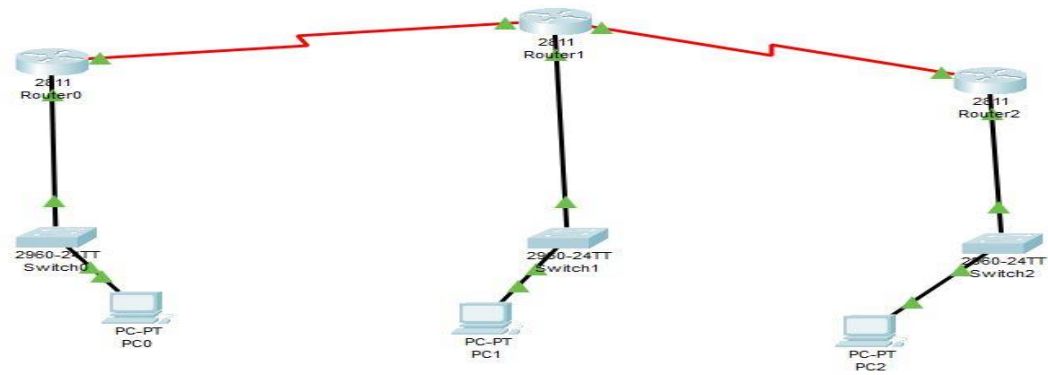


Figure 3.1.7: EIGRP basic

### 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 10.0.0.0/8 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 directly connected, FastEthernet0/0
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)#
85. %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.

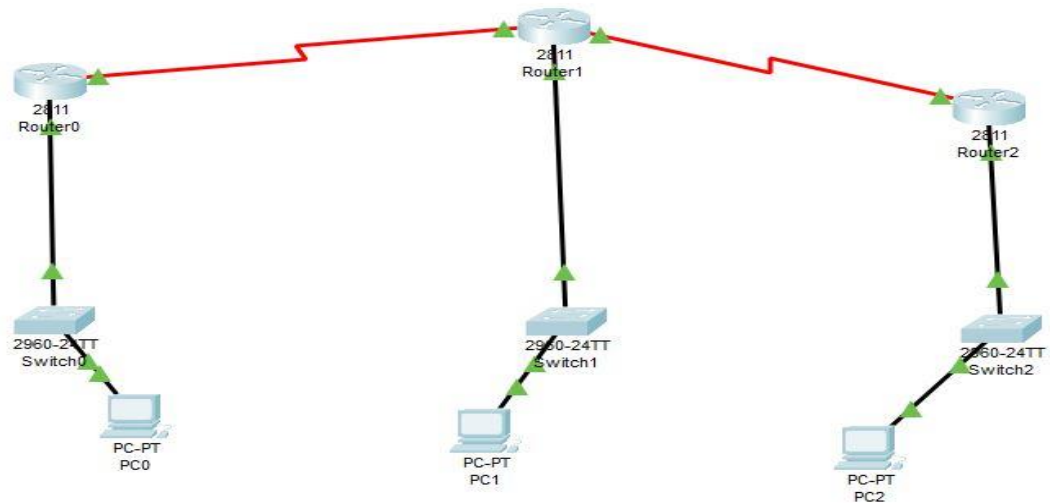


Figure 3.1.9: Static router basic

### 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)#inte
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)#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)#inte
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)#inte
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 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)#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-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 route
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 192.168.30.0 255.255.255.0 172.16.0.2
^
% 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 route 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:

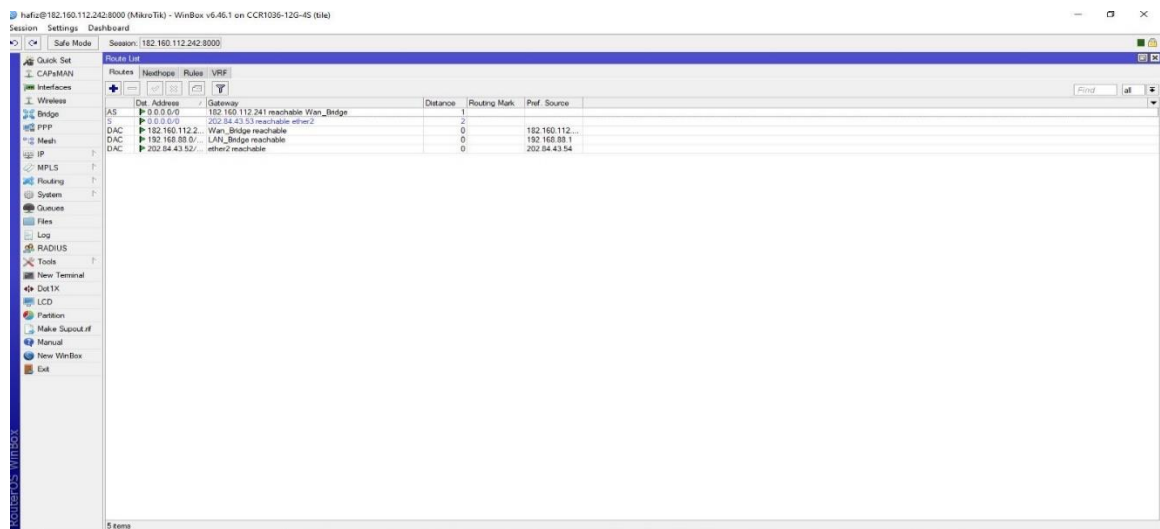


Figure 3.2.1: Feature of Mikrotik router

### 3.2.2 Mikrotik router interface:

haha@192.168.112.242:8000 (MikroTik) - WinBox v6.46.1 on CCR1036-12G-4S (tile)

Session Settings Dashboard

Safe Mode Session: 192.168.112.242:8000

Quick Set CAPsMAN Interface

Interface List

Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx Packet (p/s)
R #1LAN_Bridge	Bridge	1500	1500	19.3 kbps	10.4 kbps	15	15	0 bps	10.4 kbps	0	15
R #2Wan_Bridge	Bridge	1500	1500	190.3 kbps	24.4 kbps	31	24	0 bps	24.4 kbps	0	24
R #ether1	Ethernet	1500	1500	194.1 kbps	24.9 kbps	35	25	194.1 kbps	24.9 kbps	35	25
R #ether2	Ethernet	1500	1500	3.6 kbps	43.7 kbps	4	44	3.6 kbps	43.7 kbps	4	44
S #ether3	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0
S #ether4	Ethernet	1500	1500	3.8 kbps	480 bps	4	1	3.8 kbps	480 bps	4	1
S #ether5	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0
S #ether6	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0
S #ether7	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0
S #ether8	Ethernet	1500	1500	22.6 kbps	10.4 kbps	18	15	22.6 kbps	10.4 kbps	18	15
S #ether9	Ethernet	1500	1500	0 bps	3.3 kbps	3	0	0 bps	3.3 kbps	3	0
S #ether10	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0
S #ether11	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0
S #ether12	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0
S #sp1	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0
S #sp2	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0
S #sp3	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0
S #sp4	Ethernet	1500	1500	0 bps	0 bps	0	0	0 bps	0 bps	0	0

10 items

Figure 3.2 2: Interface of Mikrotik router

### 3.2.3 Bridge interface:

haha@192.168.112.242:8000 (MikroTik) - WinBox v6.46.1 on CCR1036-12G-4S (tile)

Session Settings Dashboard

Safe Mode Session: 192.168.112.242:8000

Quick Set CAPsMAN Bridge

Bridge

#	Interface	Bridge	Horizon	Trusted	Priority (h)	Path Cost	Role	Root Pri...
0	#ether7	Wan_Bridge	no	80	10	designated port		
1	#ether4	Wan_Bridge	no	80	10	designated port		
2	#ether9	Wan_Bridge	no	80	10	designated port		
3	#ether1	Wan_Bridge	no	80	10	designated port		
4	#ether6	Wan_Bridge	no	80	10	designated port		
5	#ether8	LAN_Bridge	no	80	10	designated port		
6	#ether3	LAN_Bridge	no	80	10	designated port		
7	#ether9	LAN_Bridge	no	80	10	root port	10	
8	#ether10	LAN_Bridge	no	80	10	designated port		
9	#ether11	LAN_Bridge	no	80	10	designated port		
10	#ether12	LAN_Bridge	no	80	10	designated port		

11 items

Figure 3.2 3: Bridge interface

### 3.2.4 B/W control:

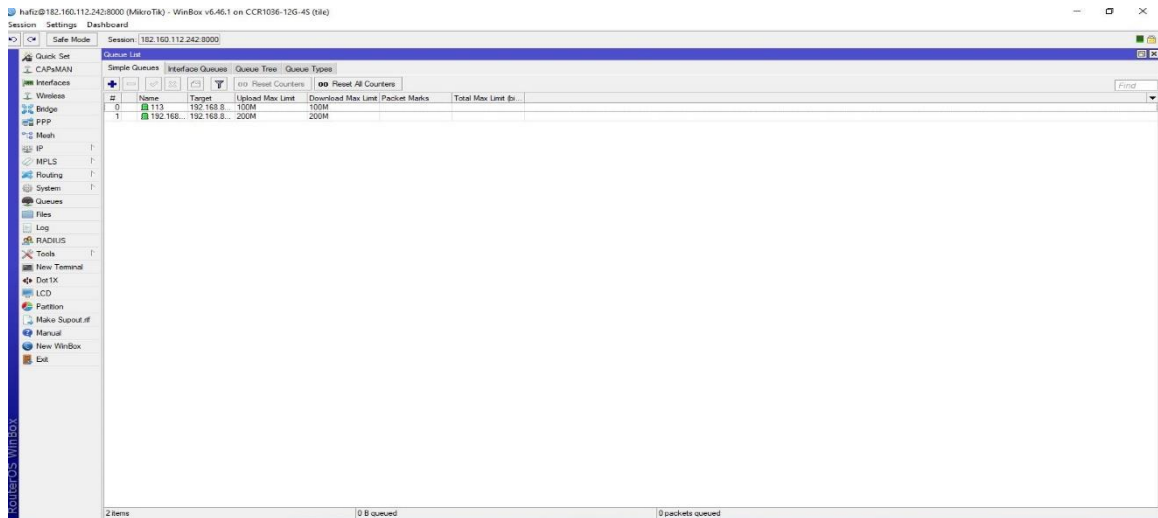


Figure 3.2.4: B/W control.

### 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:

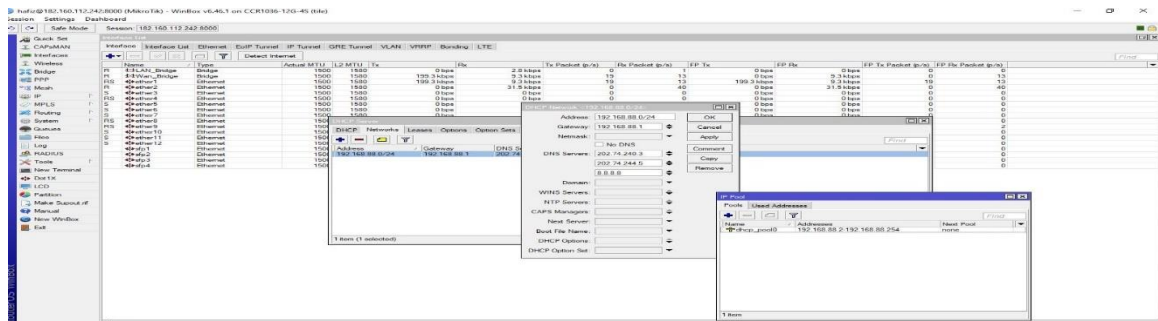


Figure 3.2.6: DHCP server configuration

### 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.

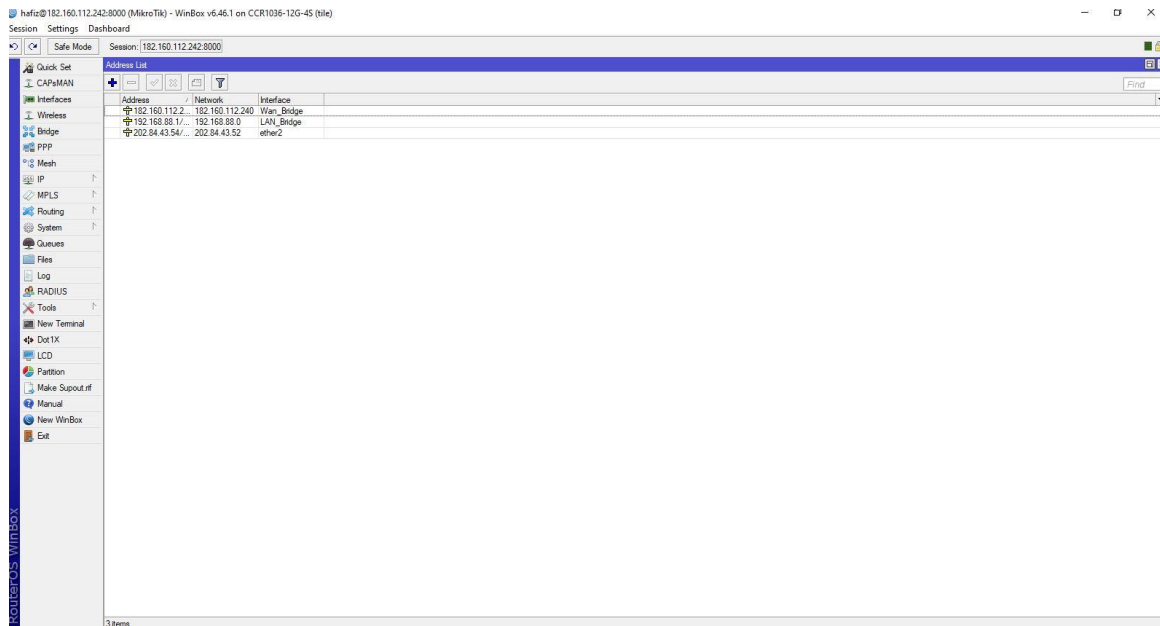


Figure 3.2.7: IP address assigning procedure

### 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.

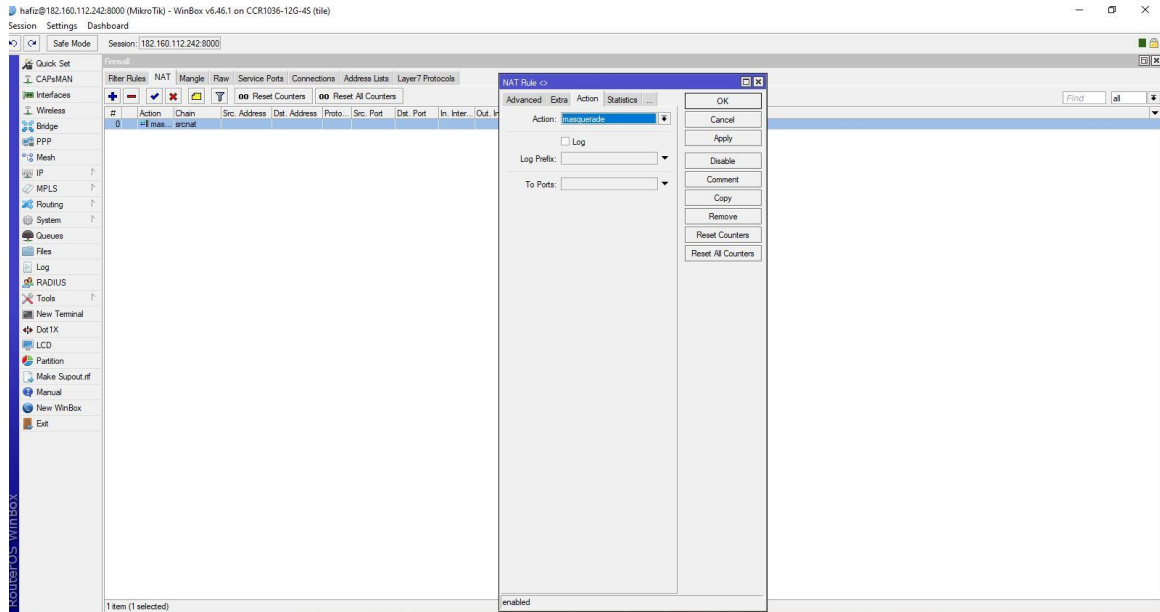


Figure 3.2.8: NAT

### 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.

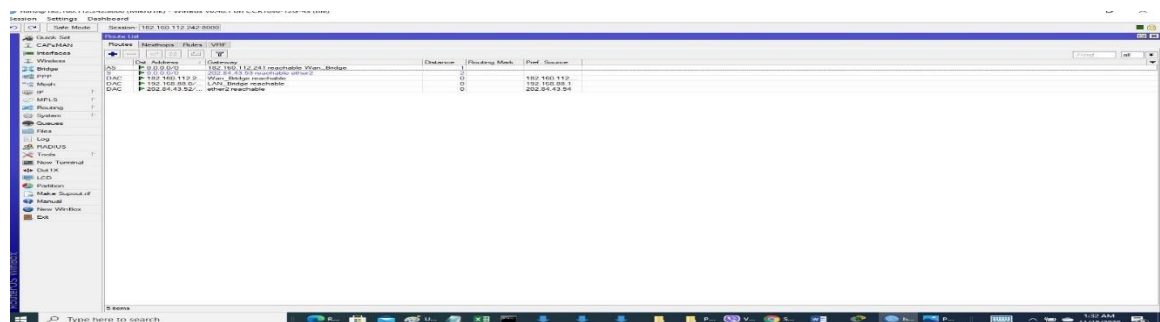


Figure 3.2.9: Routing

### 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:

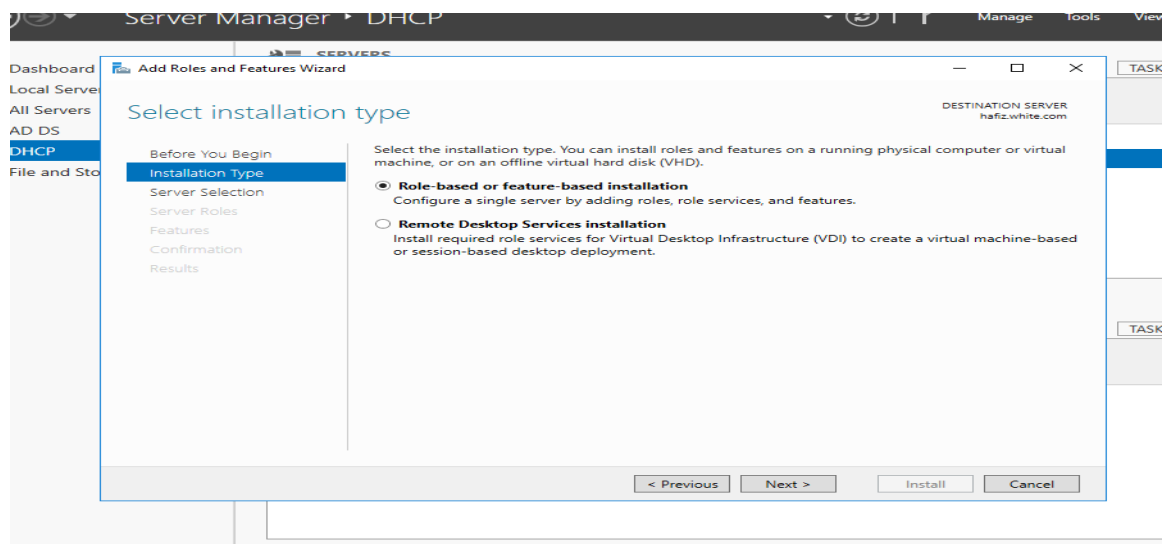


Figure 3.3.2.1: DNS server configuration

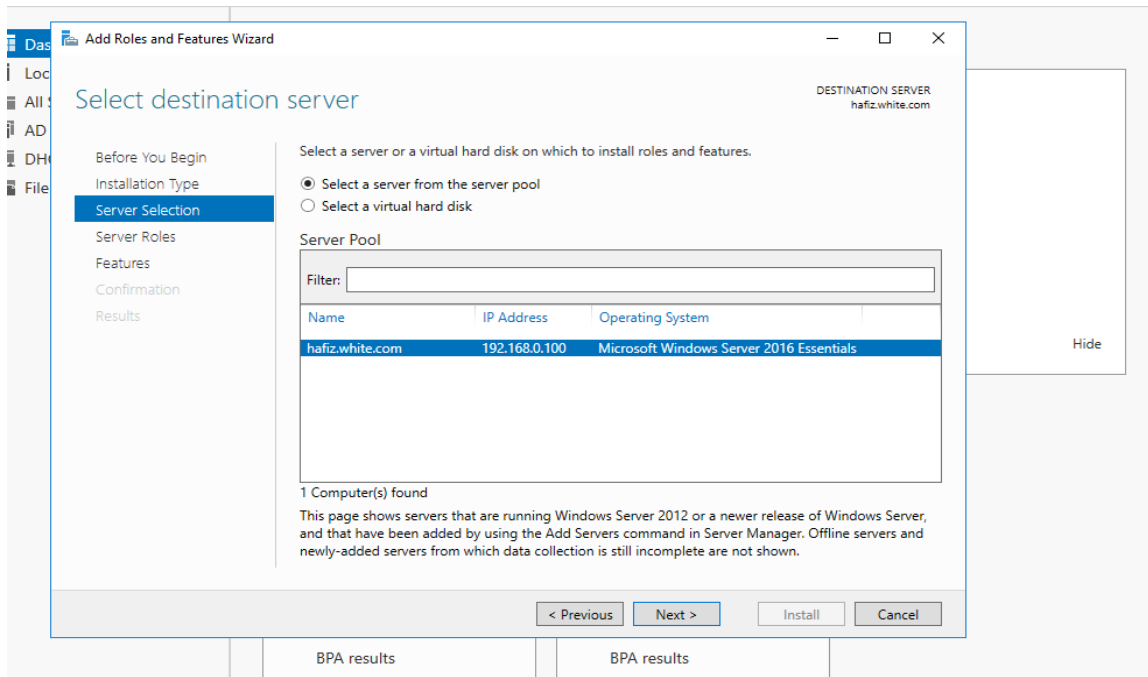


Figure 3.3.2.2: DNS server configuration

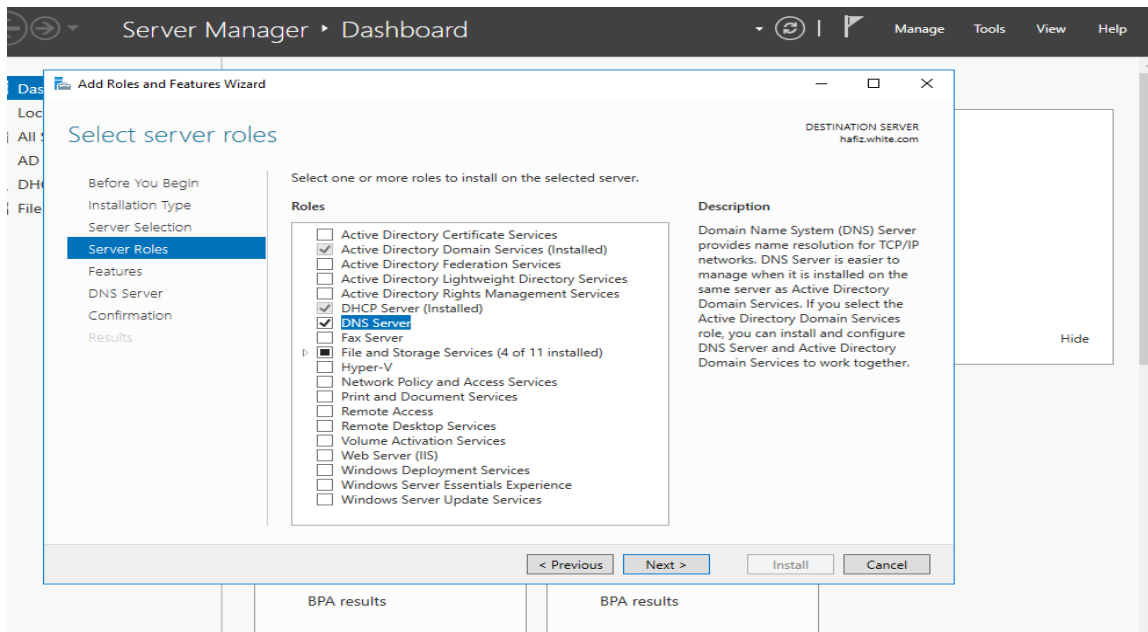


Figure 3.3.2.3: DNS server configuration

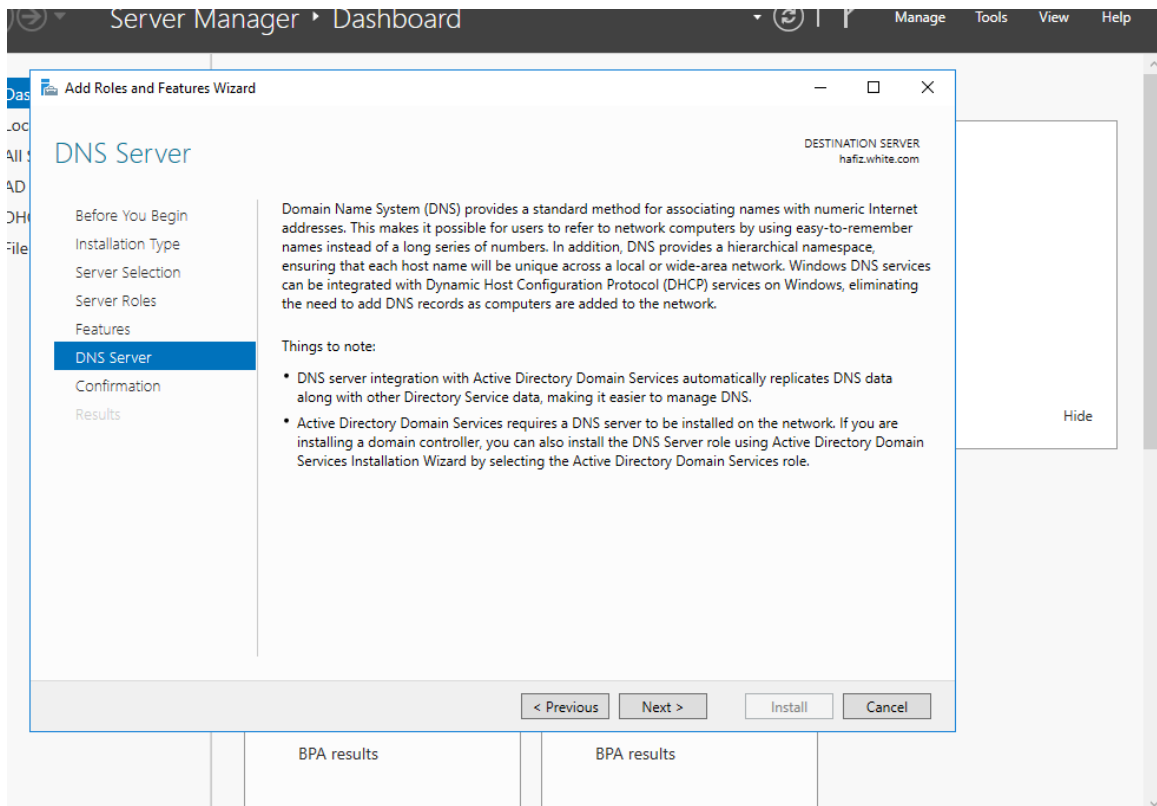


Figure 3.3.2.4: DNS server configuration

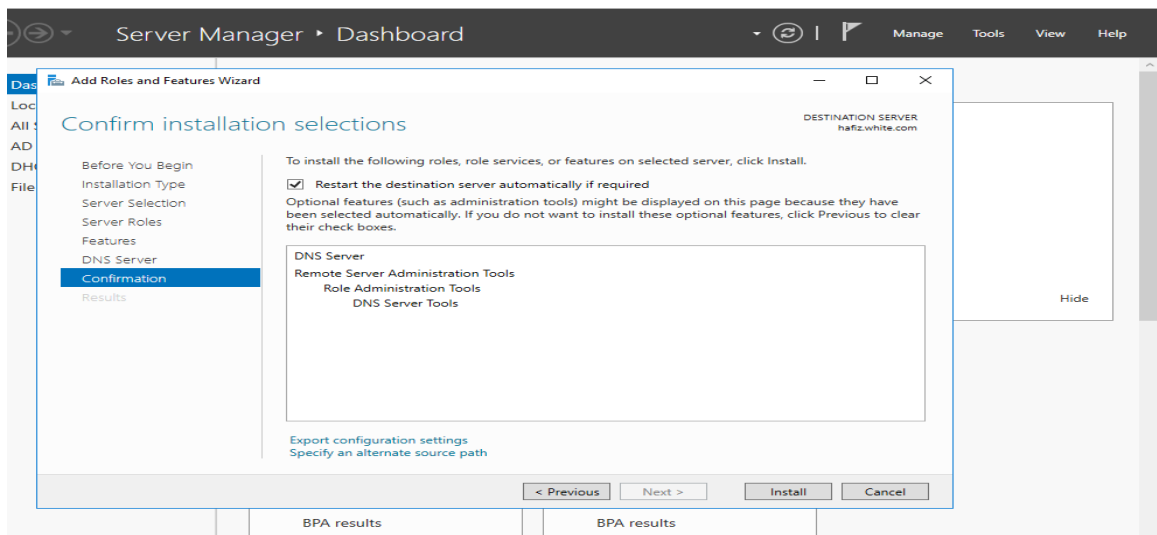


Figure 3.3.2.5: DNS server configuration

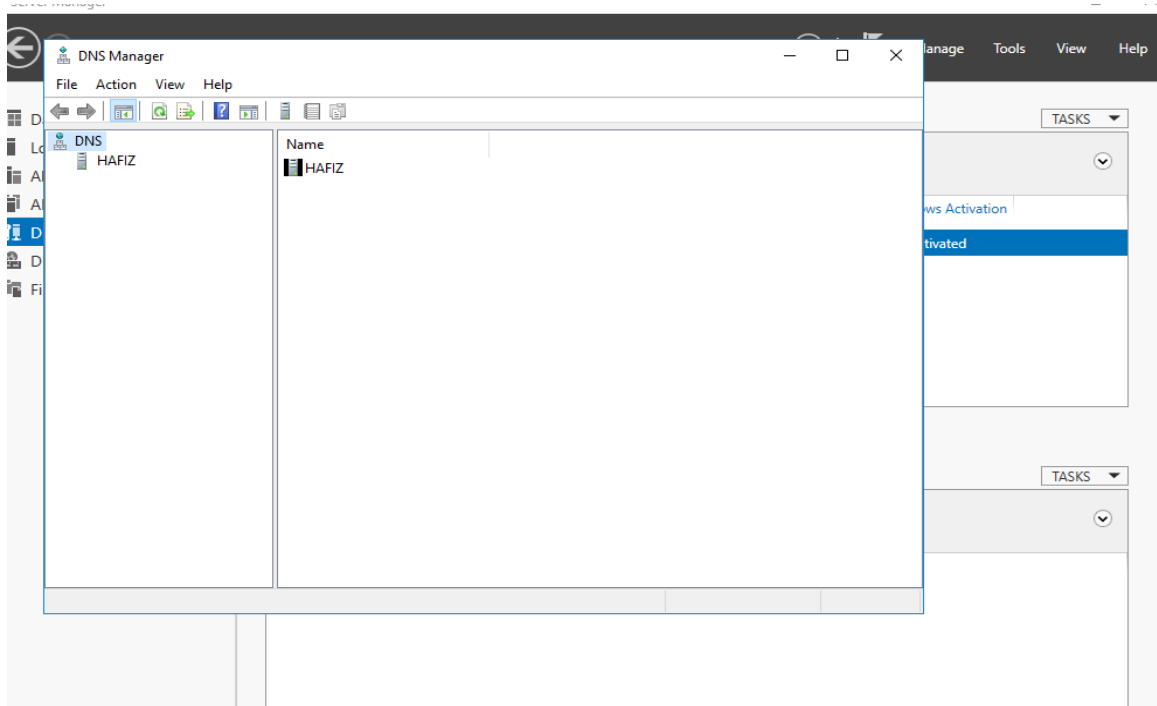


Figure 3.3.2.6: DNS server configuration

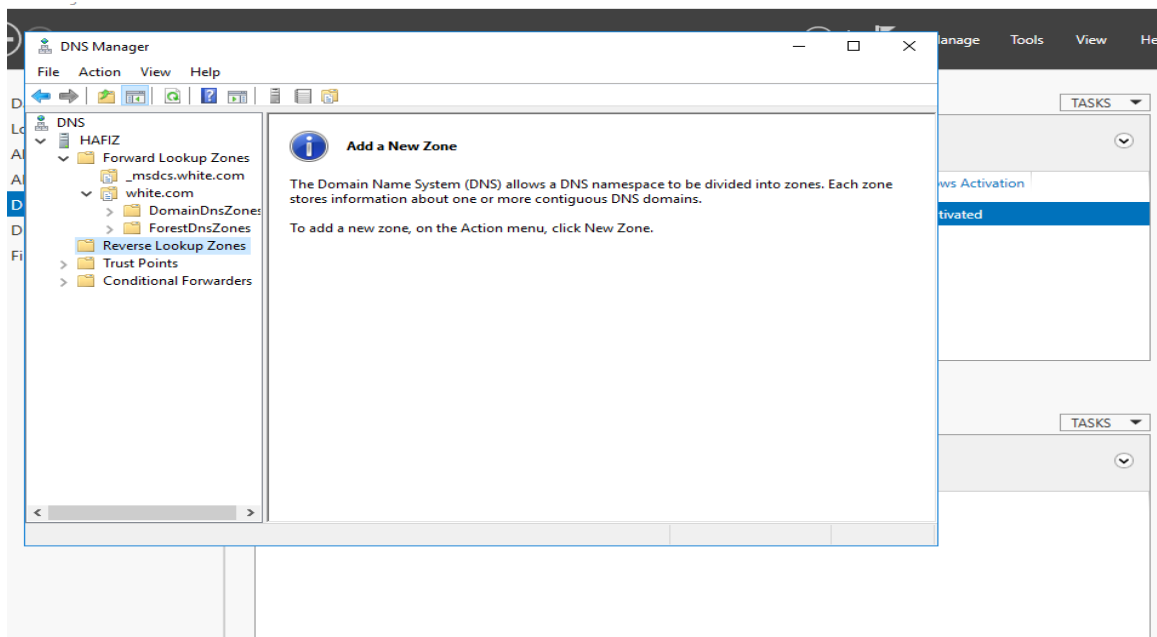


Figure 3.3.2.7: DNS server configuration

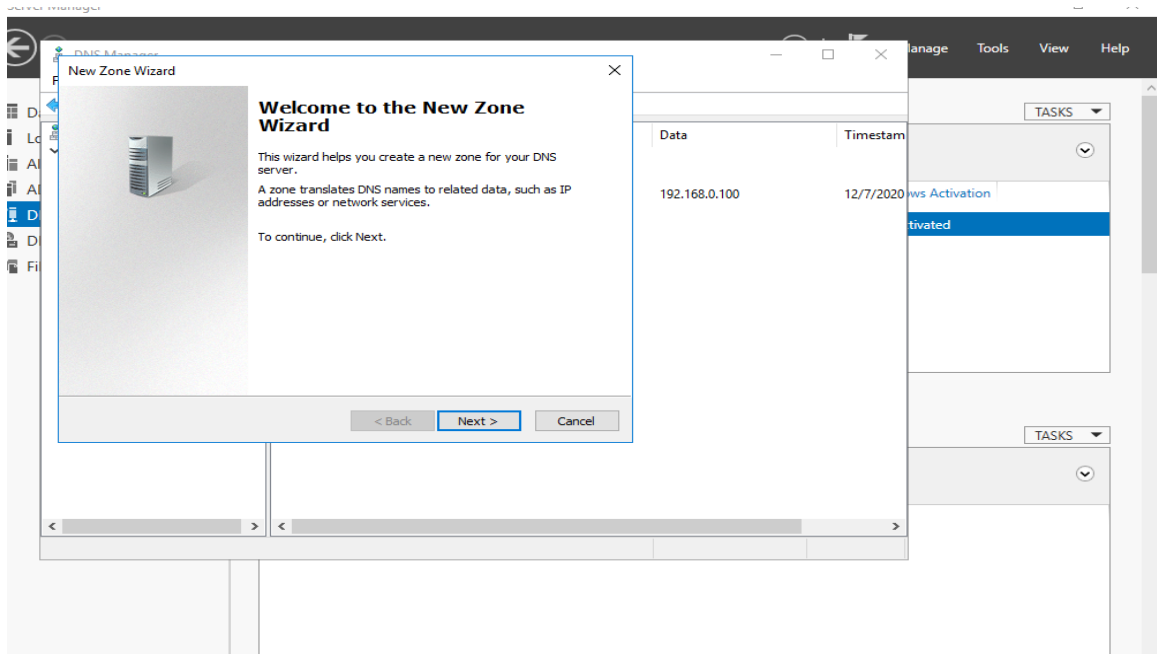


Figure 3.3.2.8: DNS server configuration

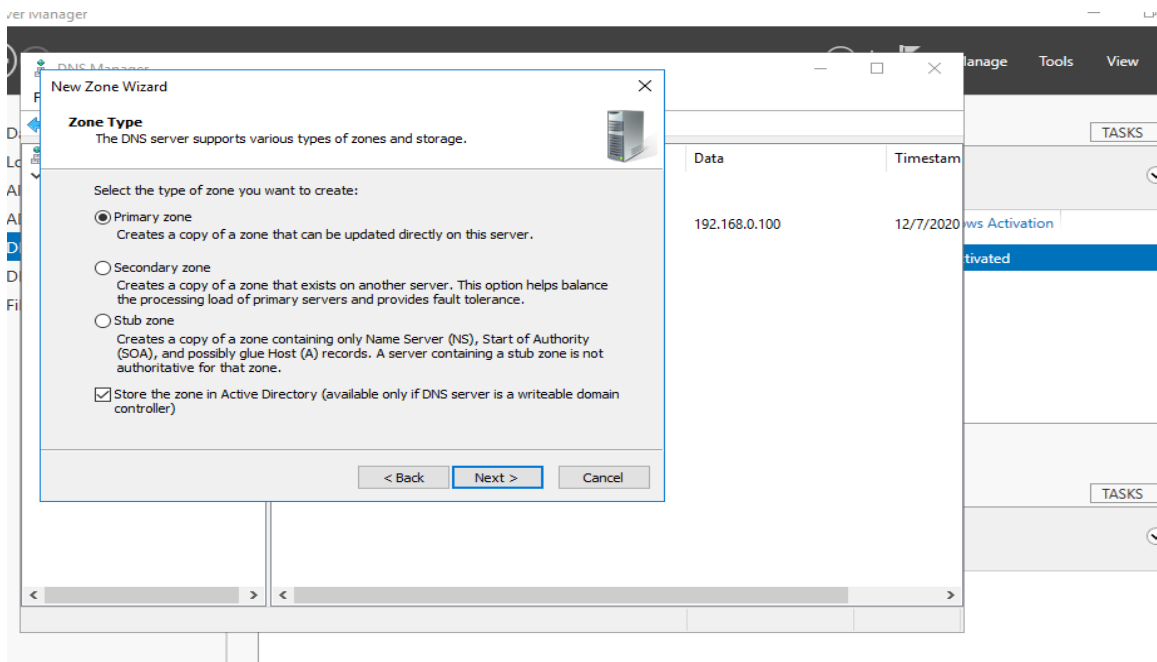


Figure 3.3.2.9: DNS server configuration

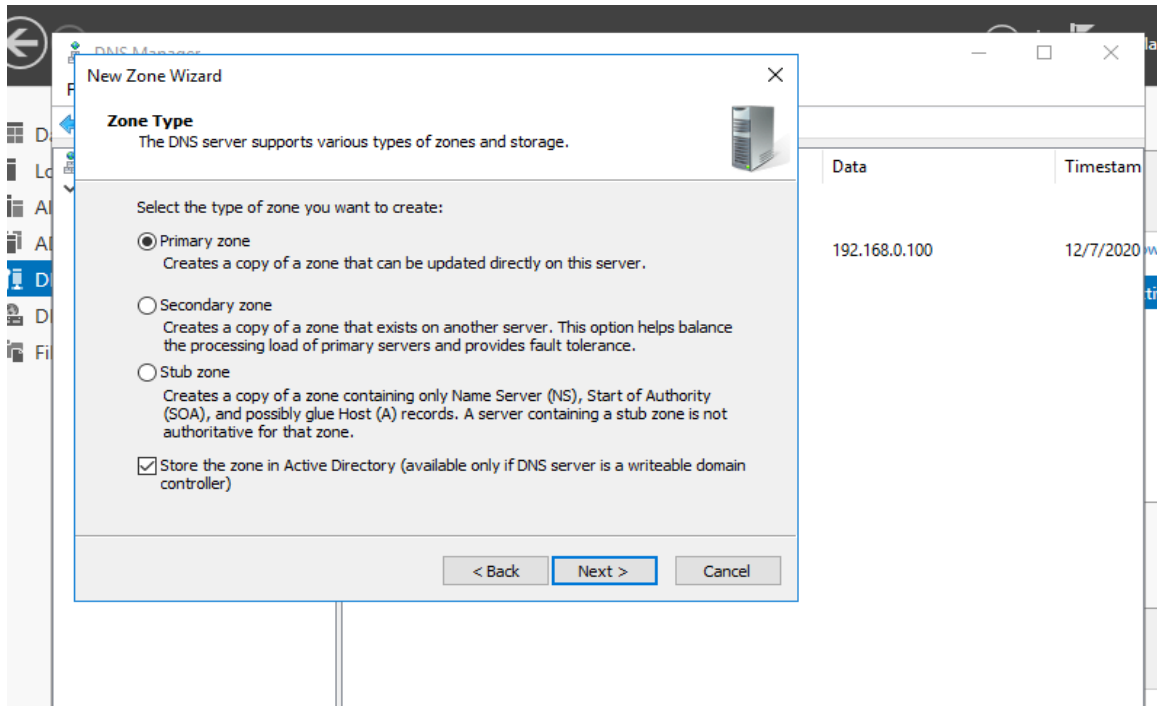


Figure 3.3.2.10: DNS server configuration

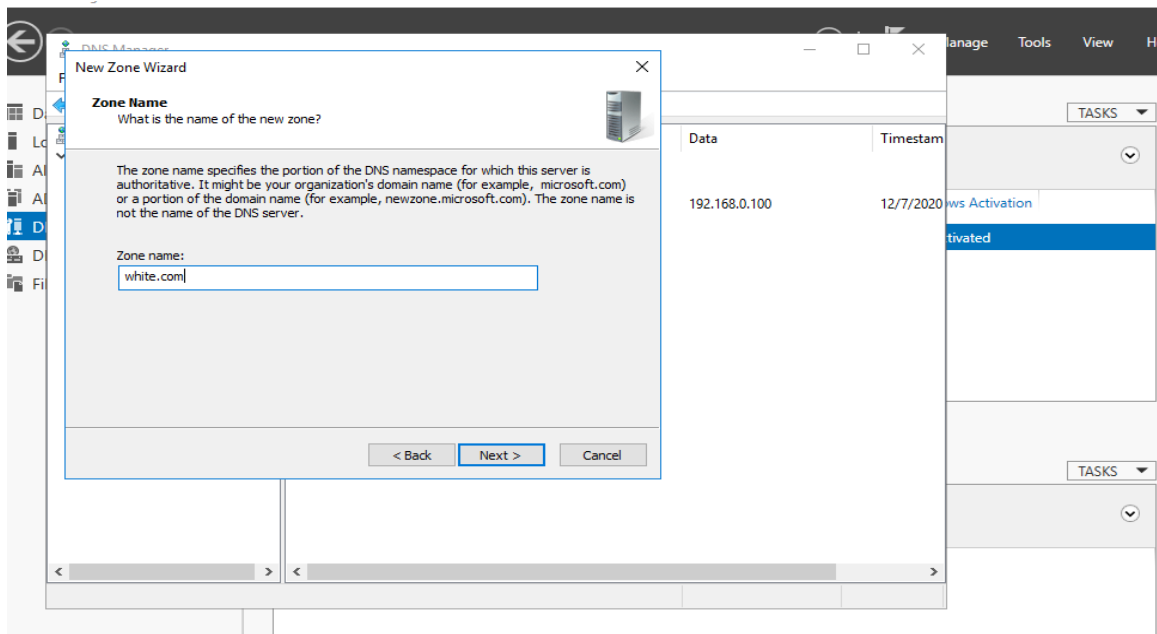


Figure 3.3.2.11: DNS server configuration

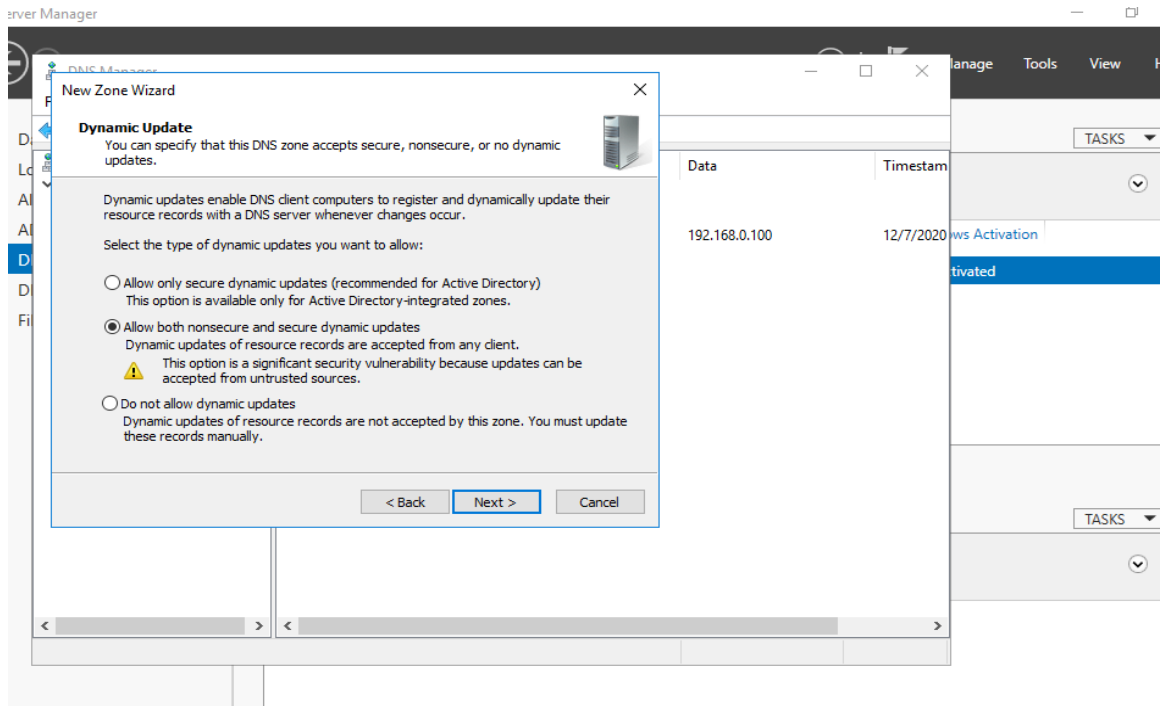


Figure 3.3.2.12: DNS server configuration

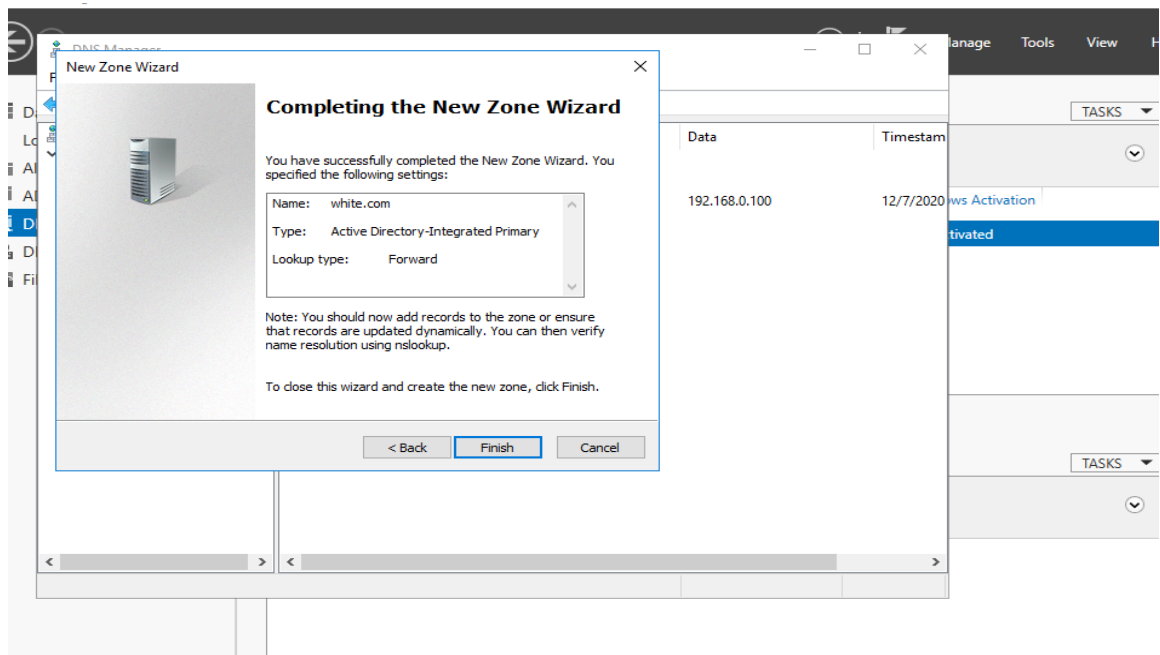


Figure 3.3.2.13: DNS server configuration



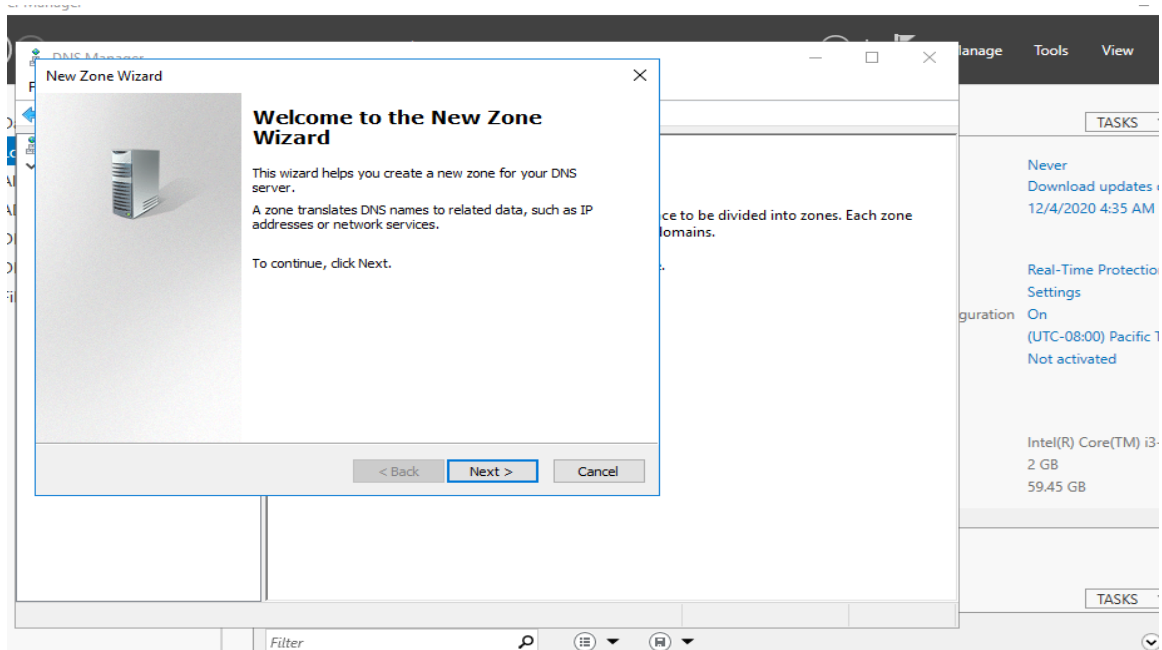


Figure 3.3.2.14: DNS server configuration

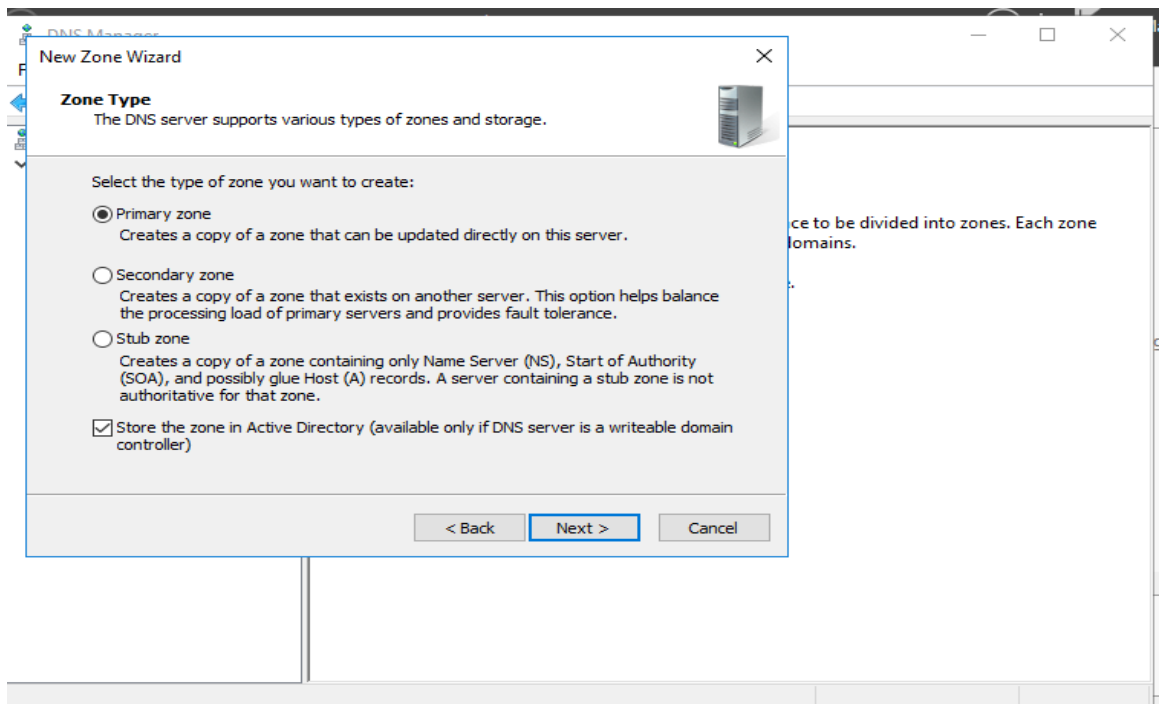


Figure 3.3.2.15: DNS server configuration

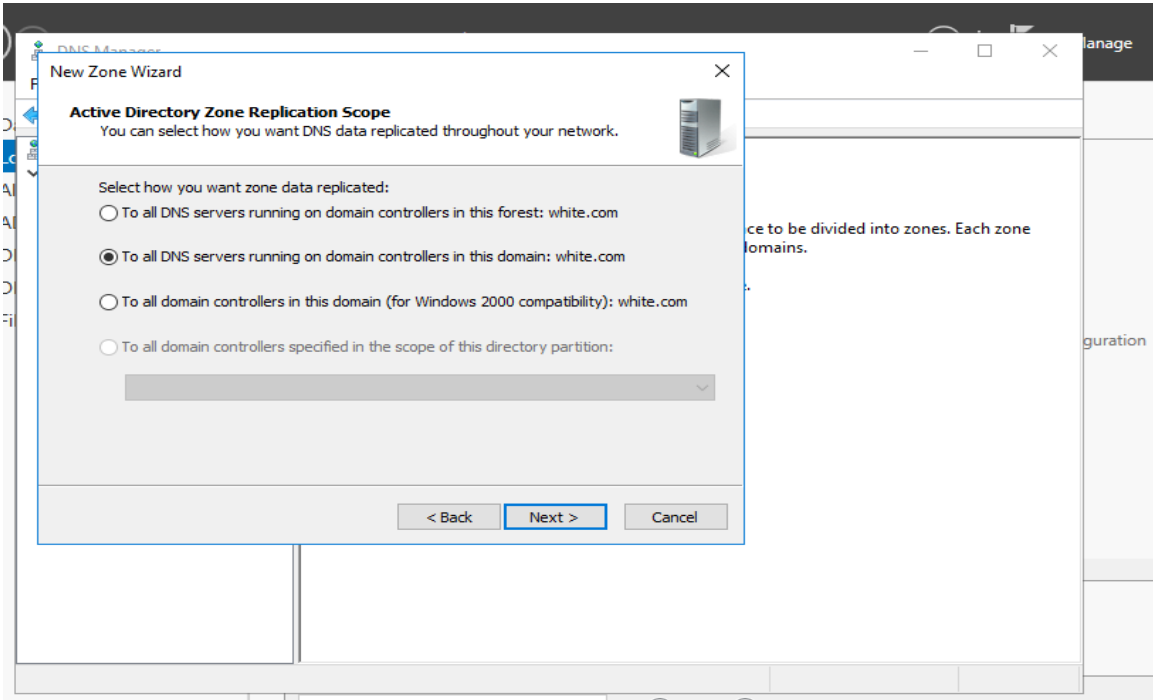


Figure 3.3.2.16: DNS server configuration

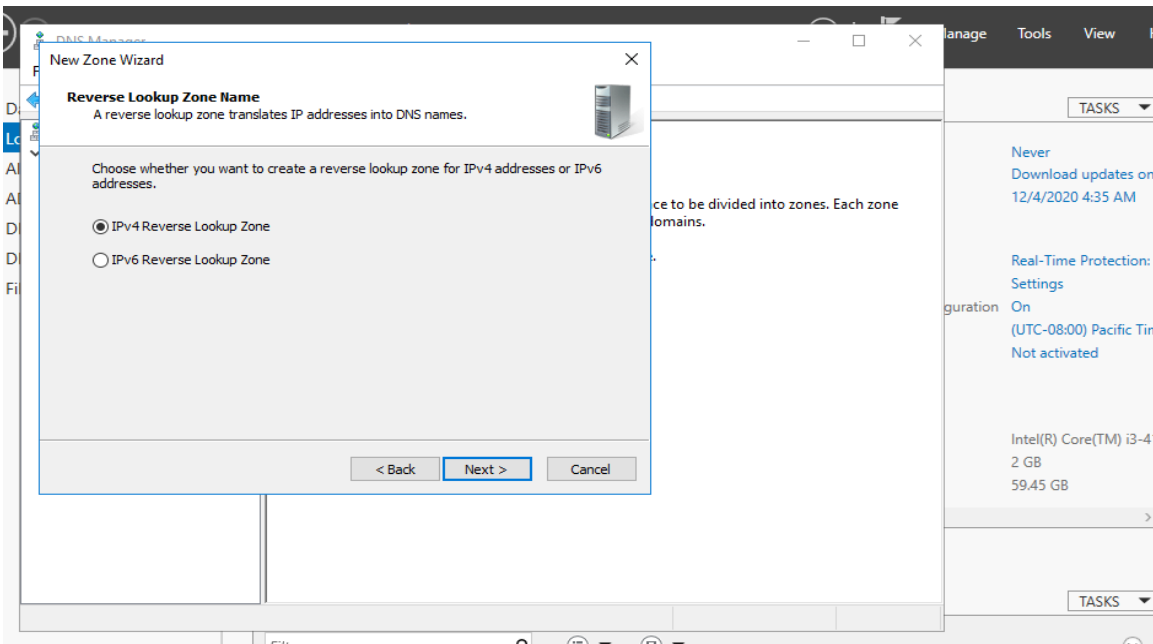


Figure 3.3.2.17: DNS server configuration

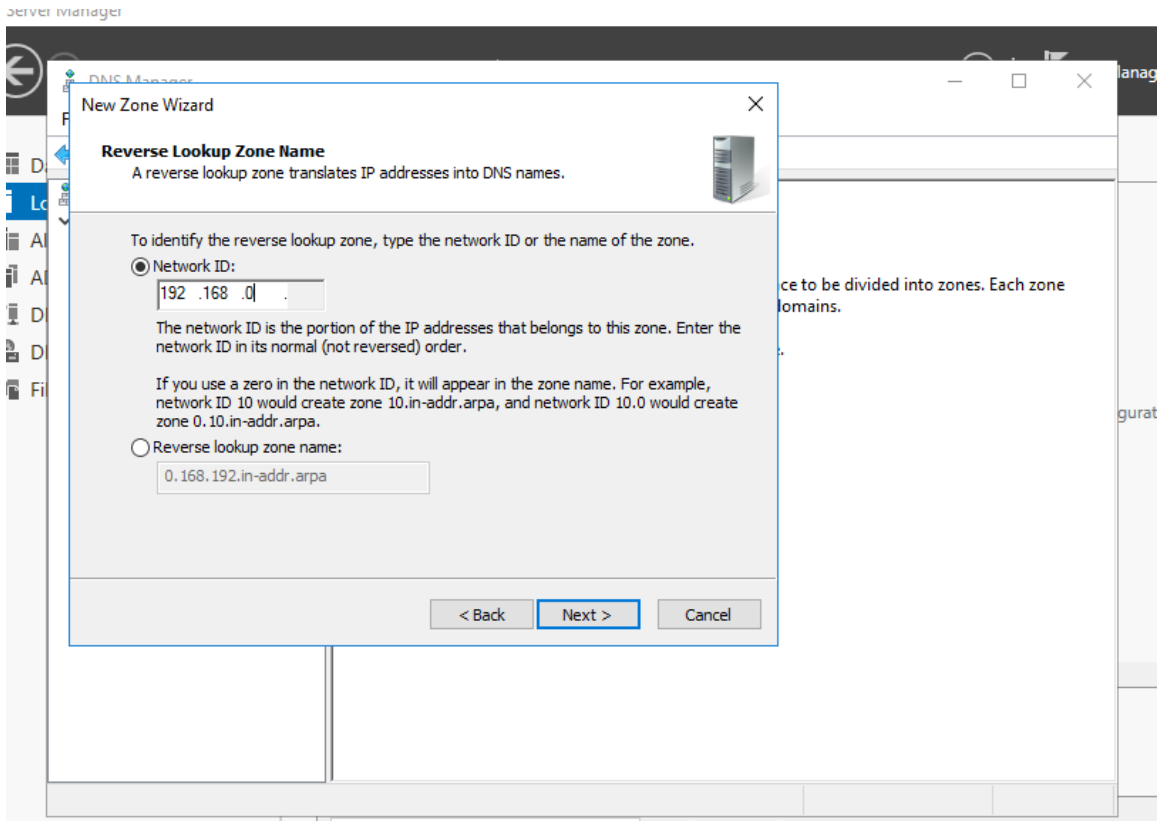


Figure 3.3.2.18: DNS server configuration

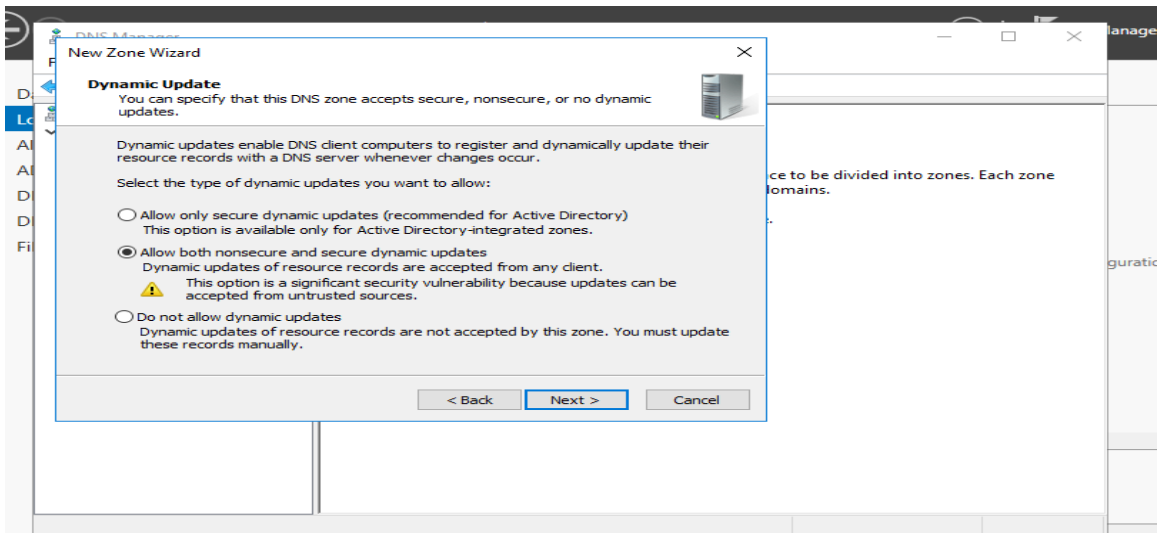


Figure 3.3.2.19: DNS server configuration

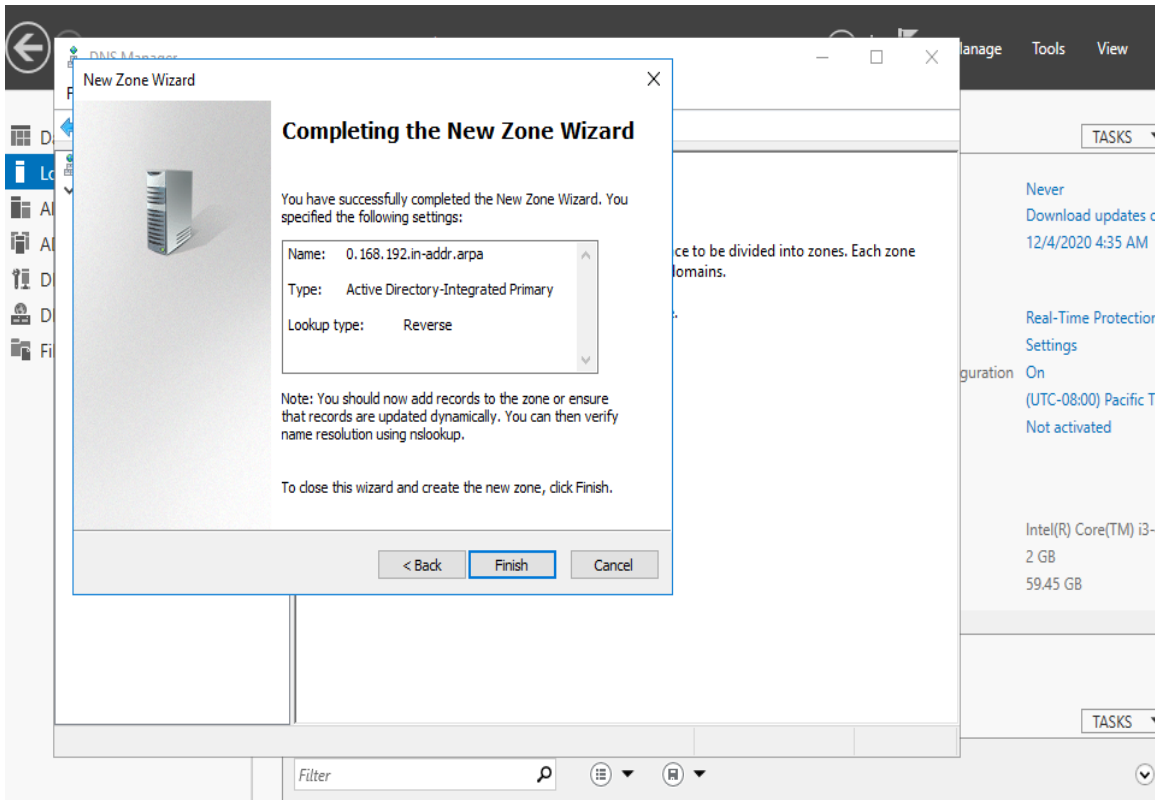


Figure 3.3.2.20: DNS server configuration

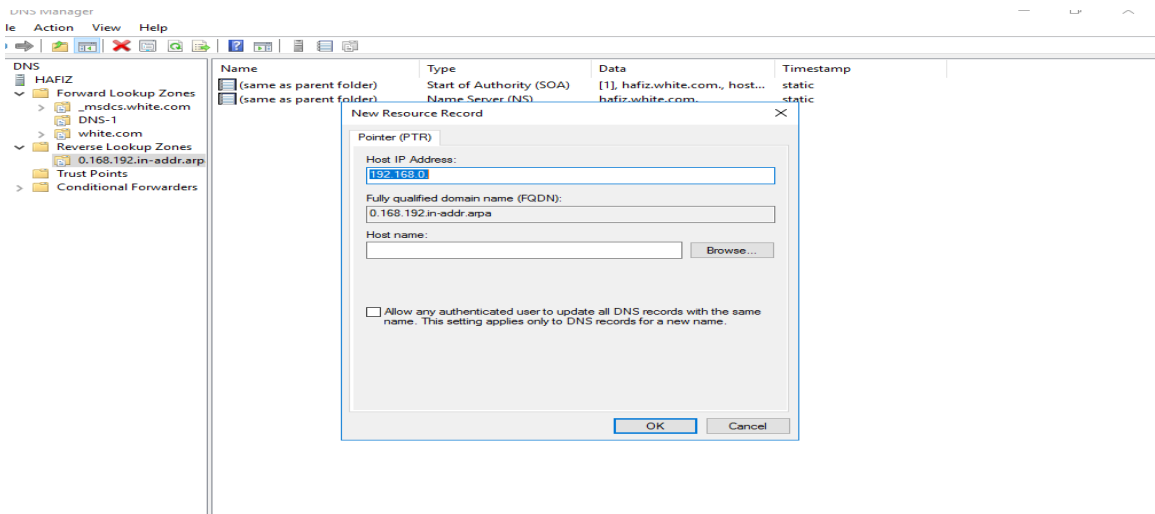


Figure 3.3.2.21: DNS server configuration

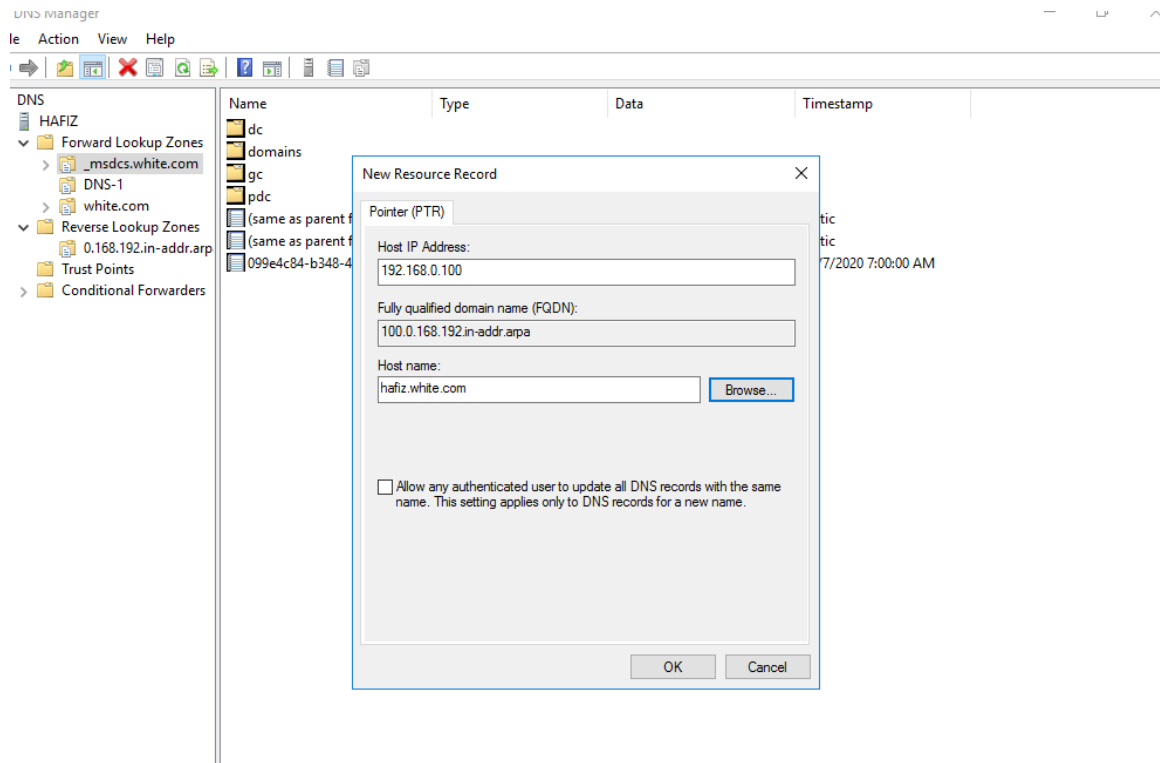


Figure 3.3.2.22: DNS server configuration

### 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:

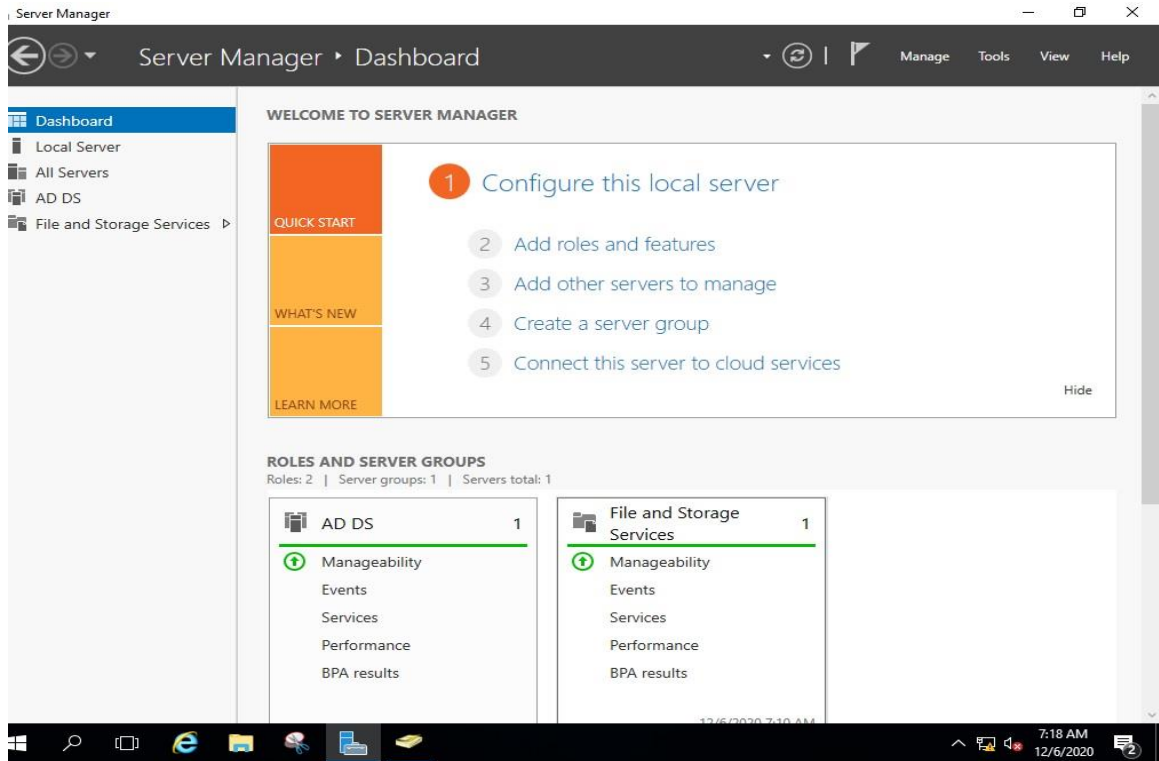


Figure 3.3.4.1: DHCP server configuration

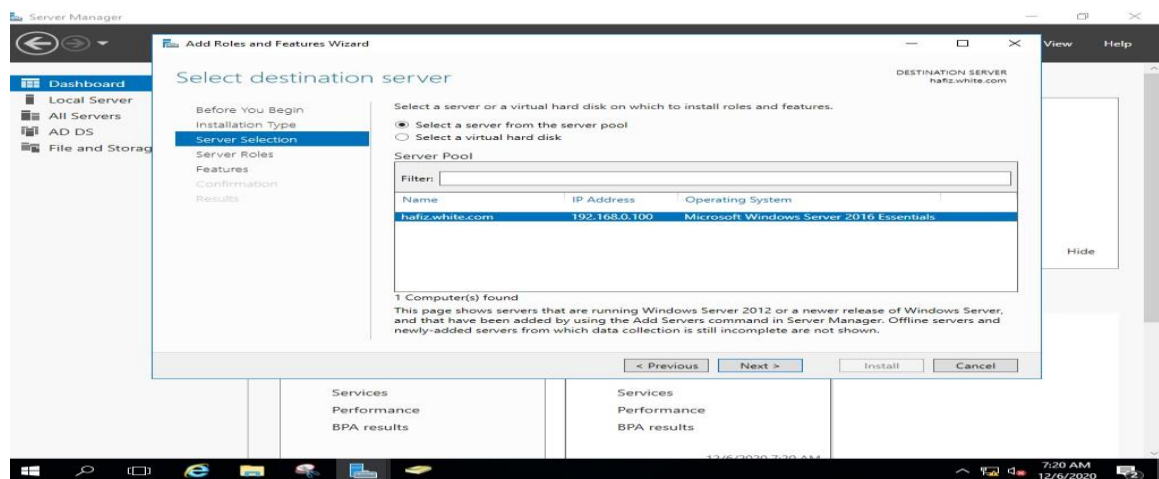


Figure 3.3.4.2: DHCP server configuration

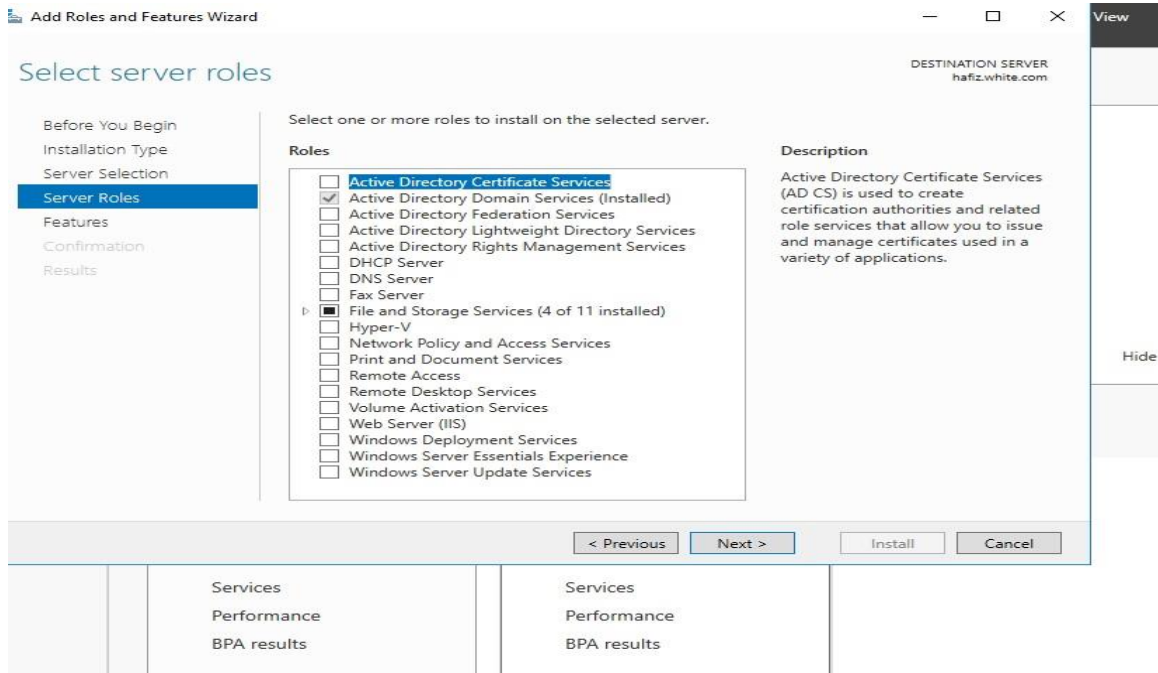


Figure 3.3.4.3: DHCP server configuration

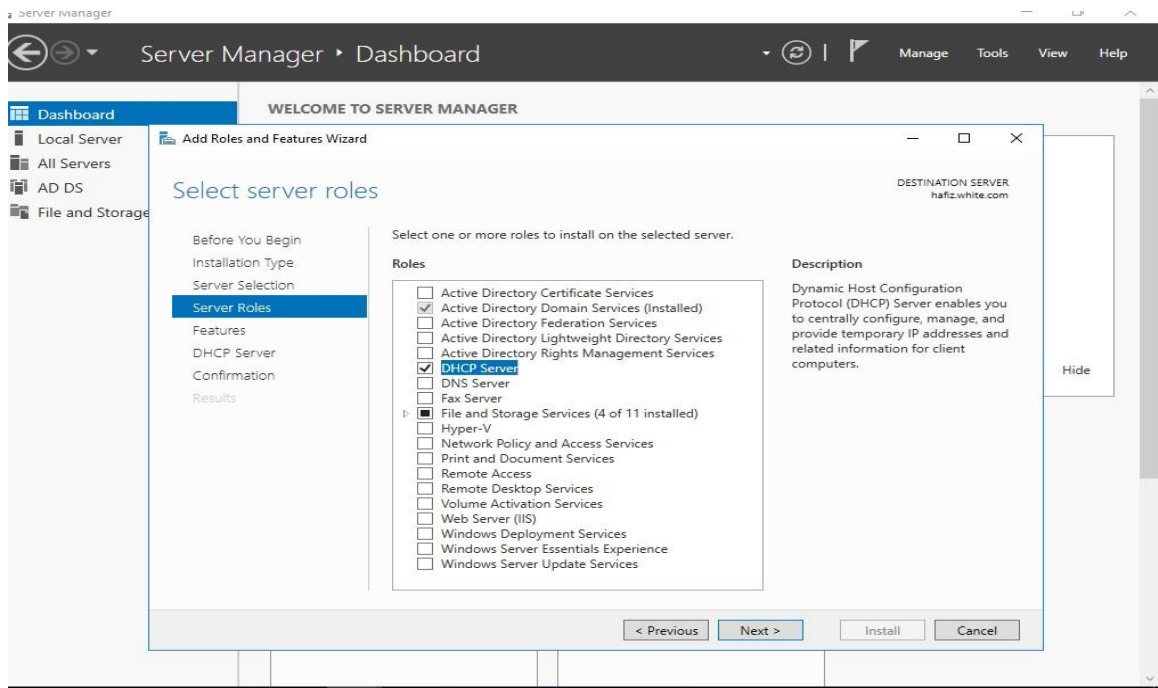


Figure 3.3.4.4: DHCP server configuration

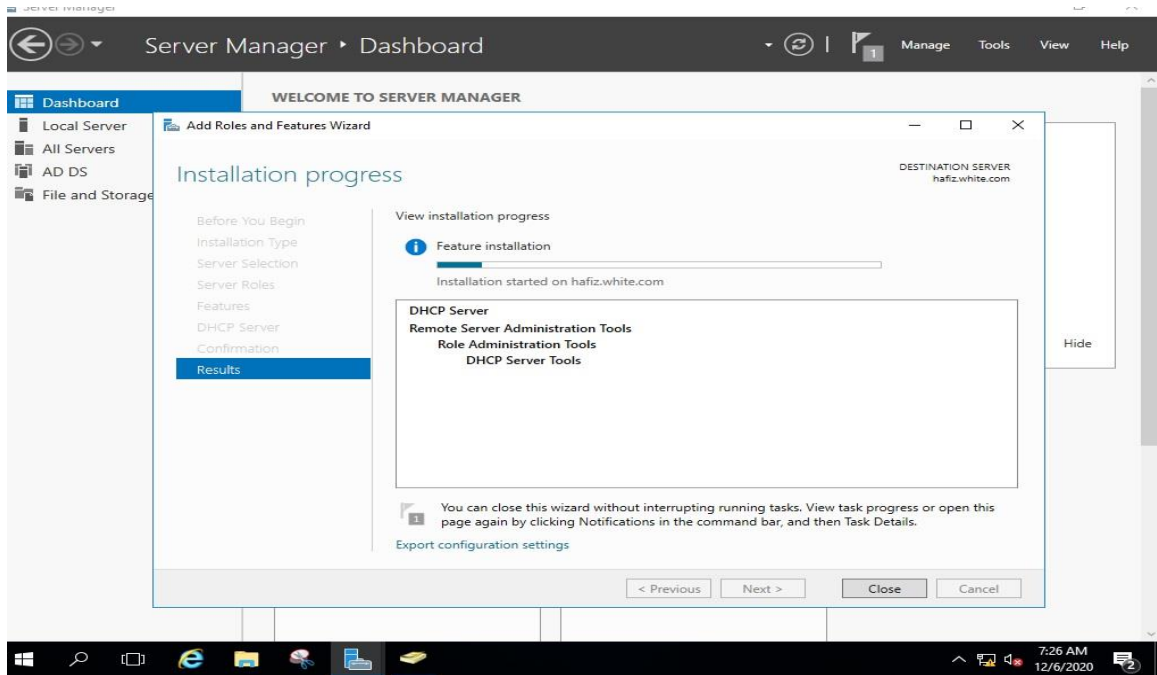


Figure 3.3.4.5: DHCP server configuration

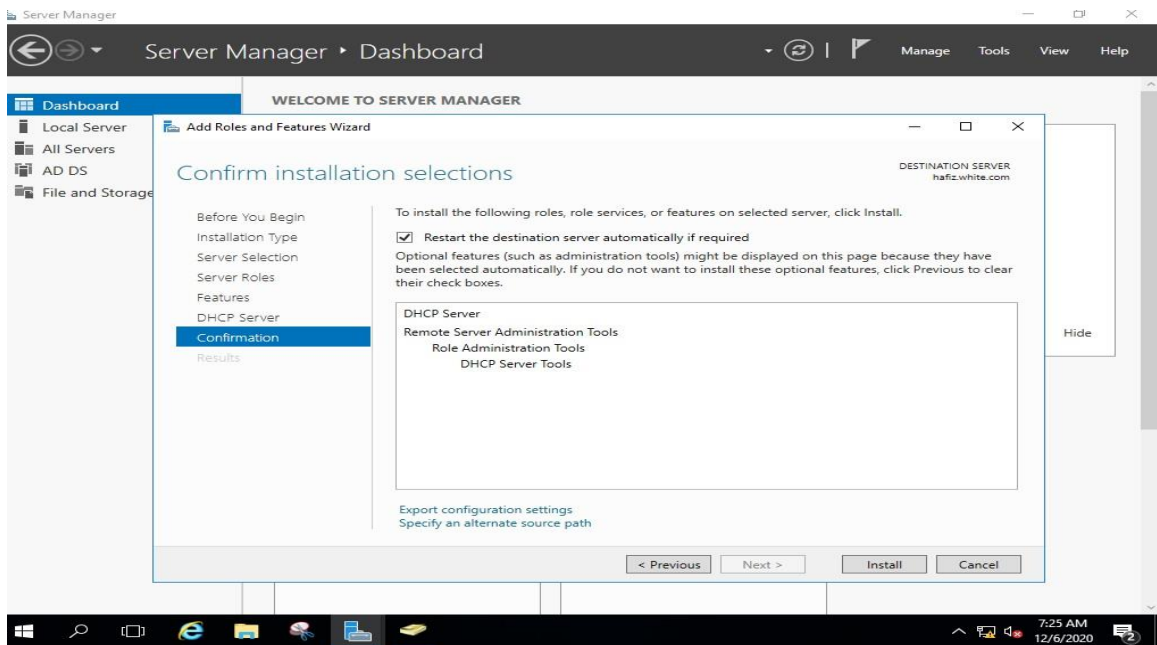


Figure 3.3.4.6: DHCP server configuration



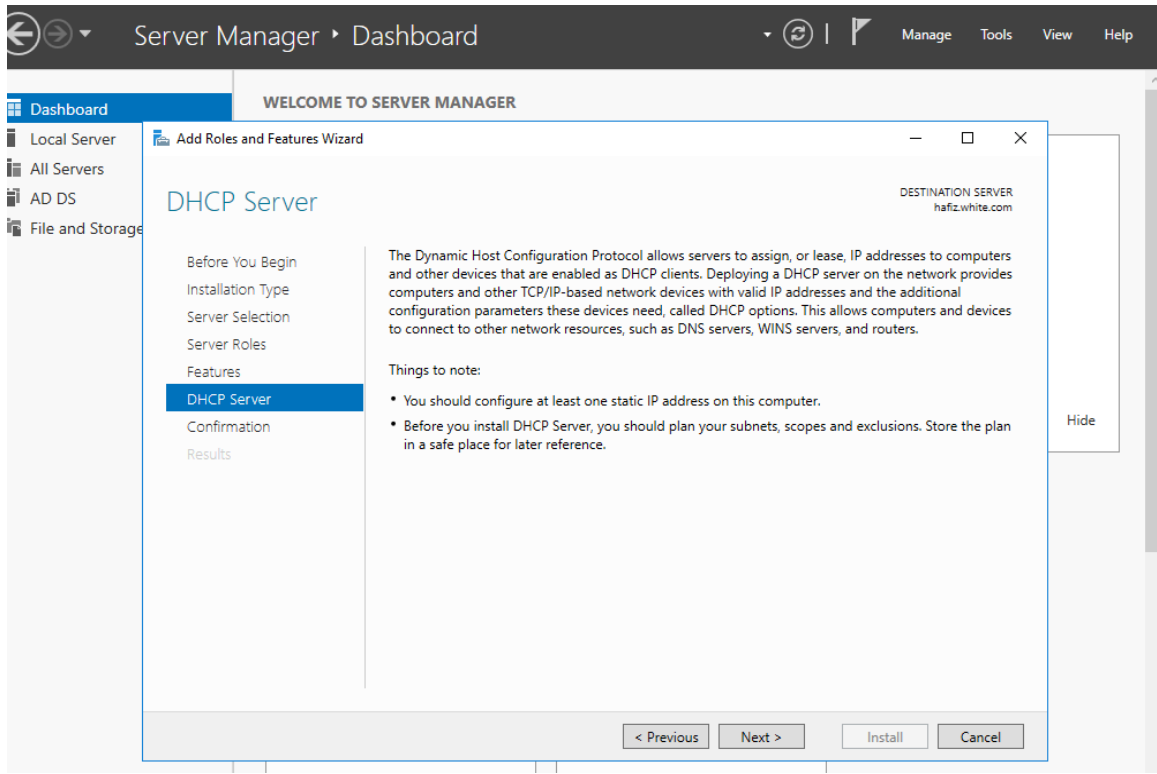


Figure 3.3.4.7: DHCP server configuration

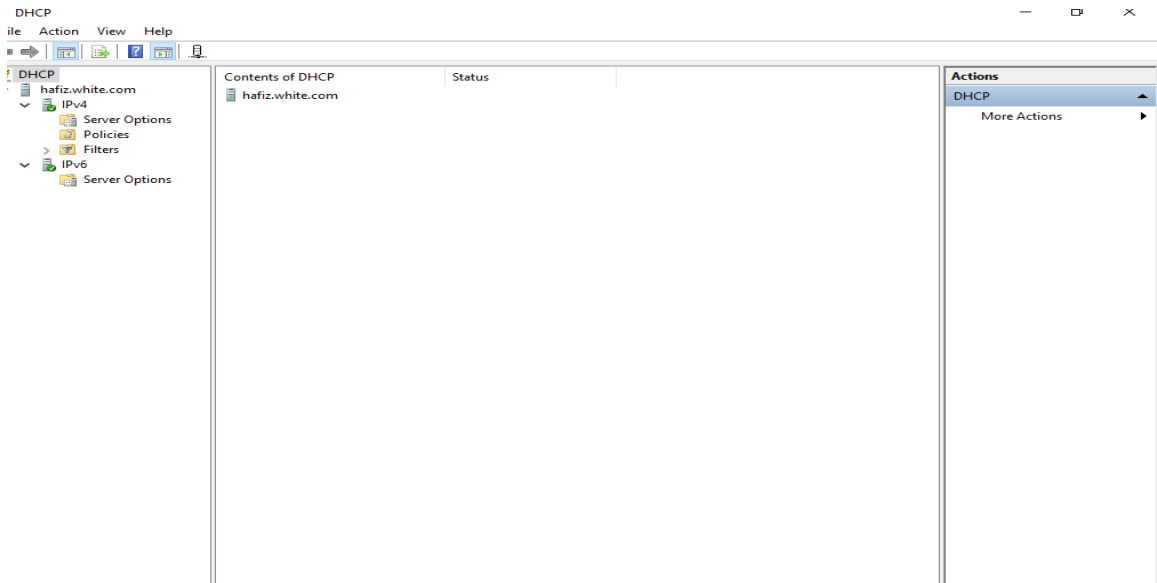


Figure 3.3.4.8: DHCP server configuration

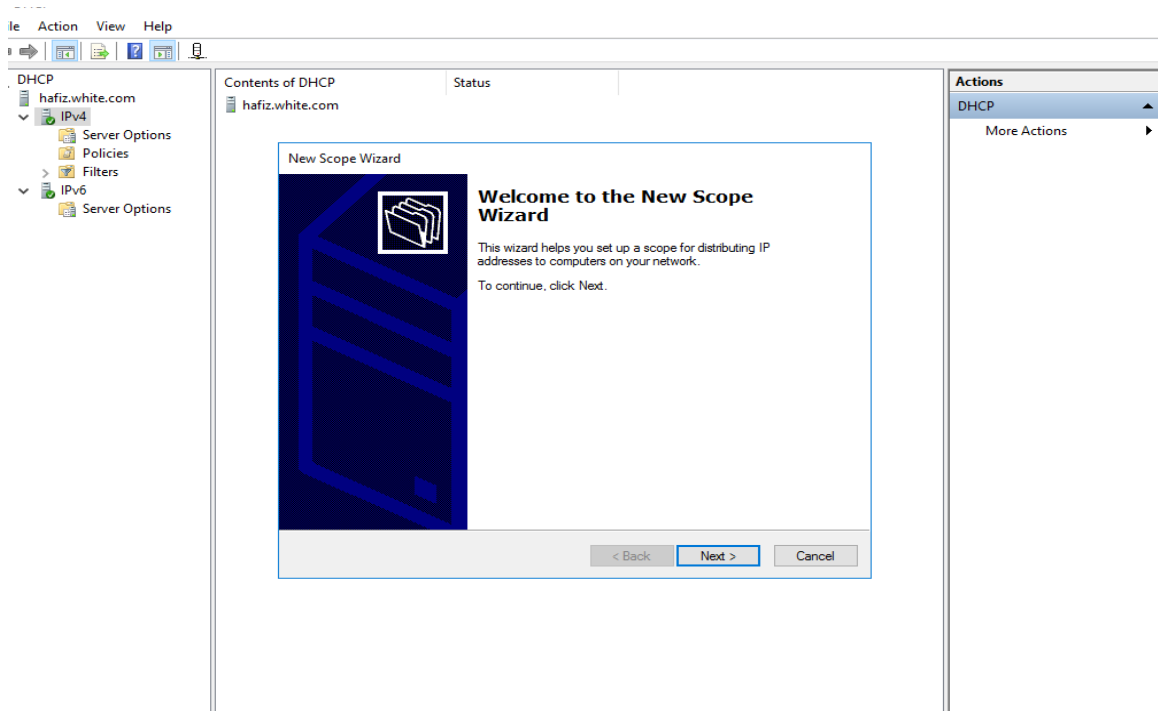


Figure 3.3.4.9: DHCP server configuration

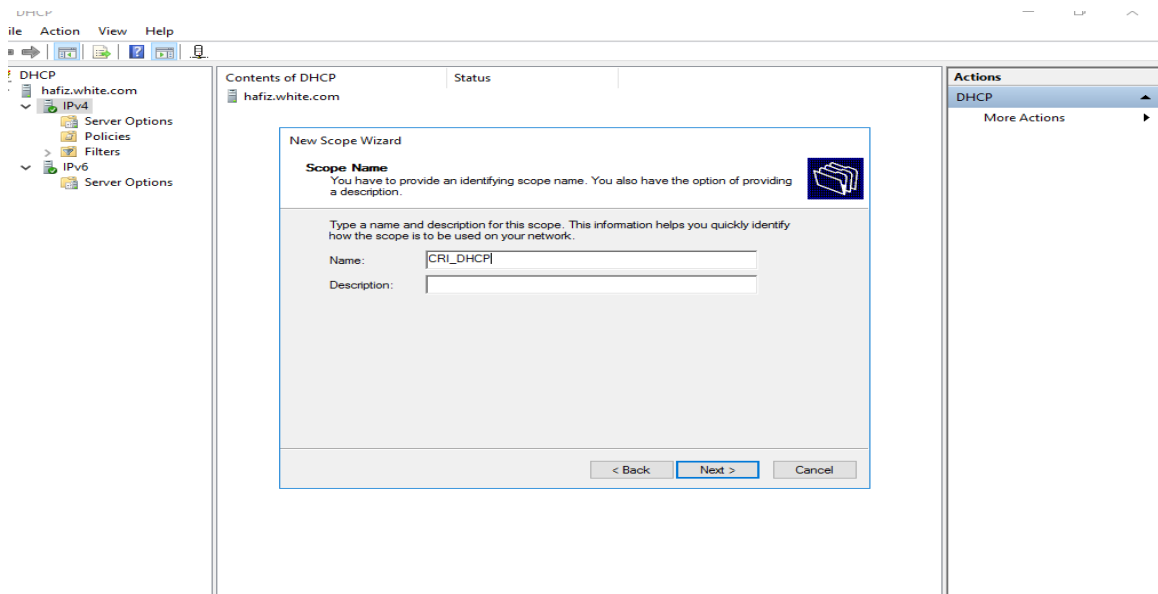


Figure 3.3.4.10: DHCP server configuration

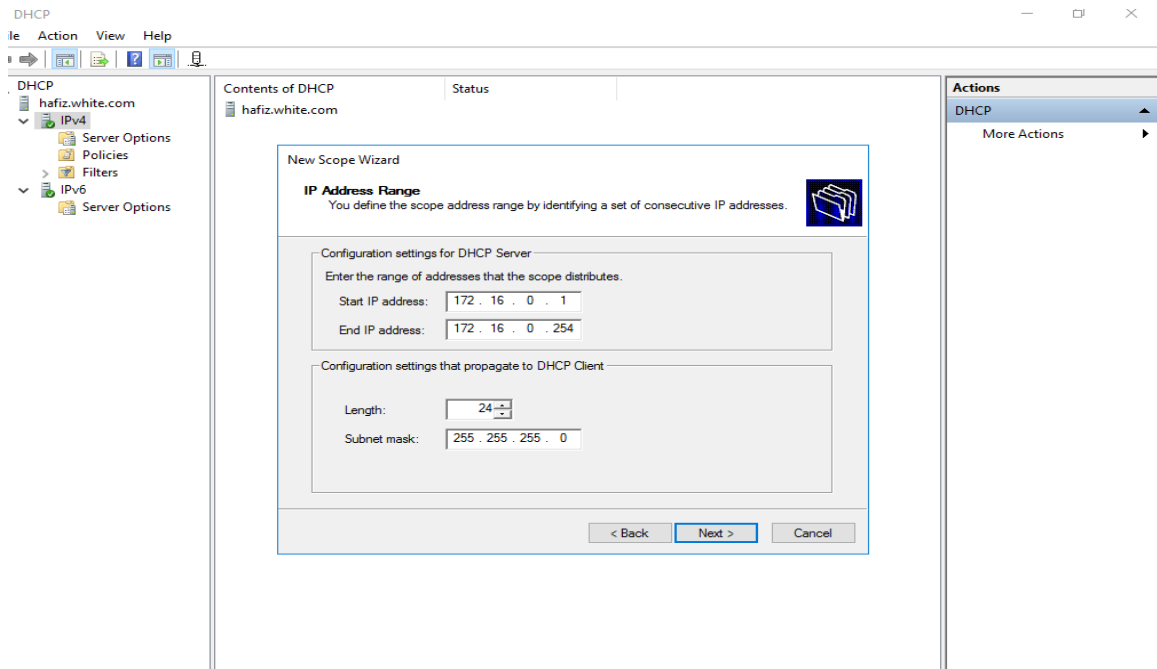


Figure 3.3.4.11: DHCP server configuration

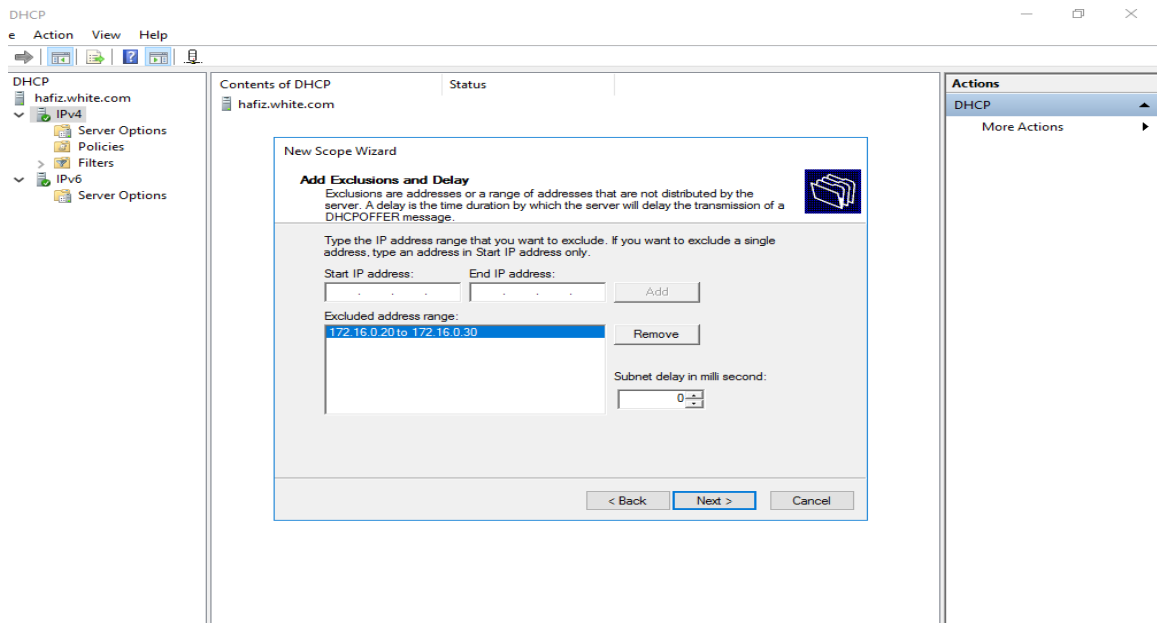


Figure 3.3.4.12: DHCP server configuration

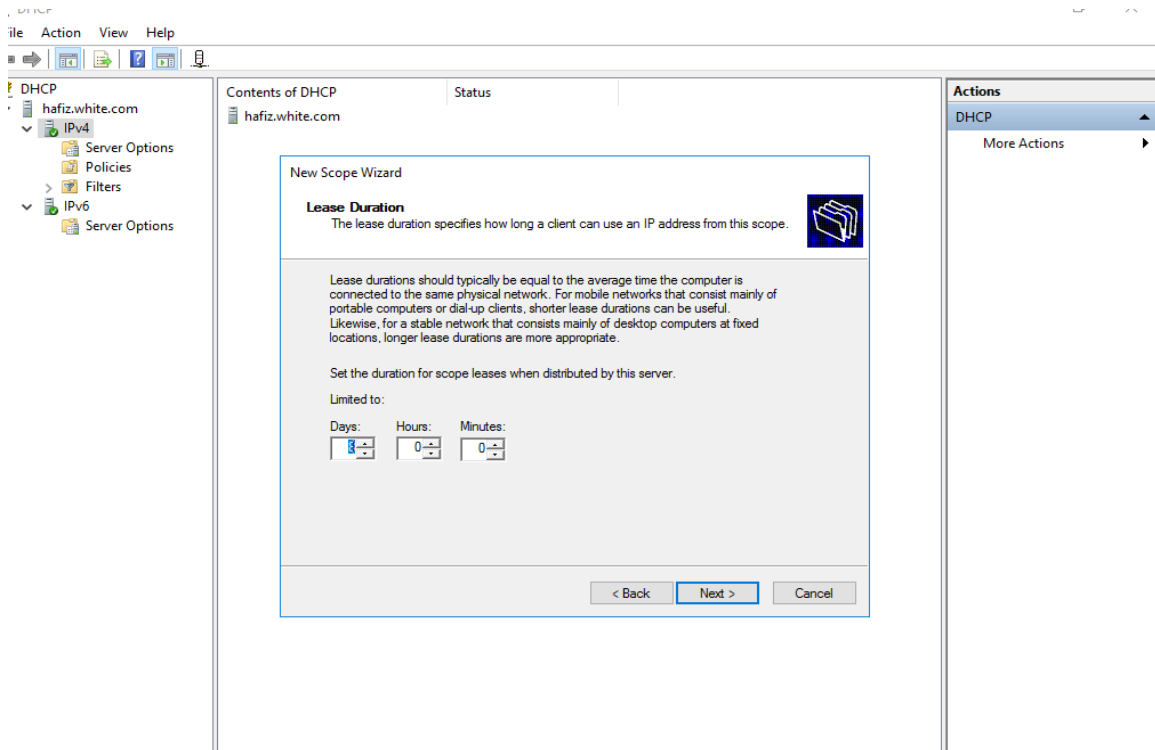


Figure 3.3.4.13: DHCP server configuration

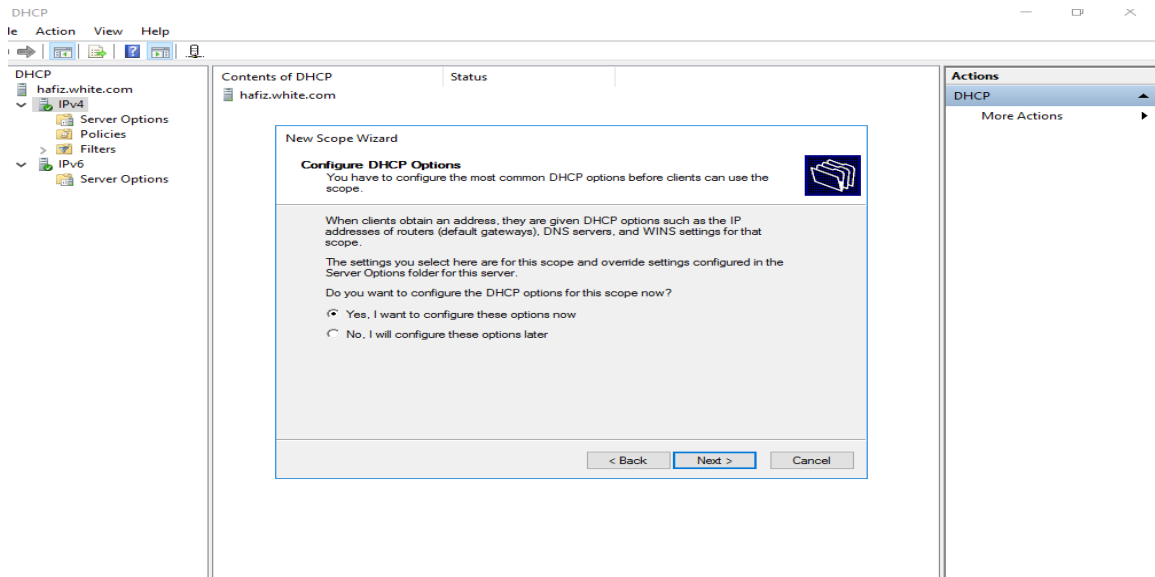


Figure 3.3.4.14: DHCP server configuration

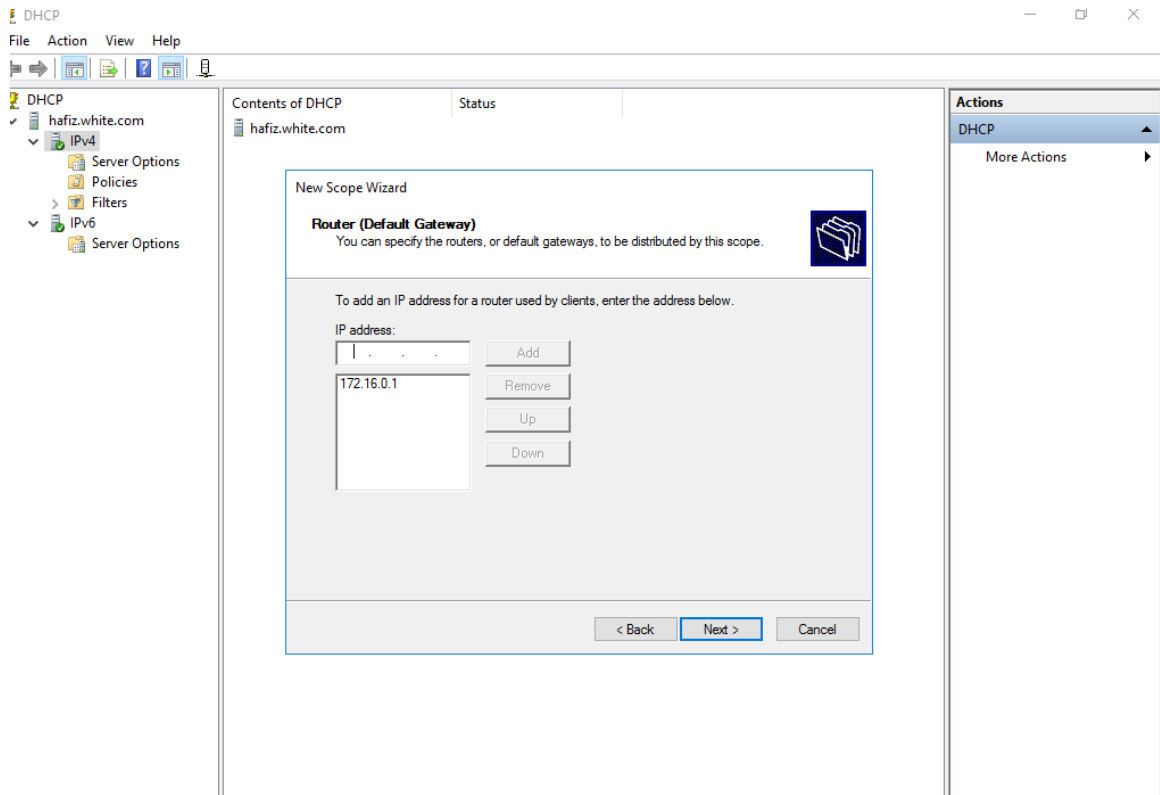


Figure 3.3.4.15: DHCP server configuration

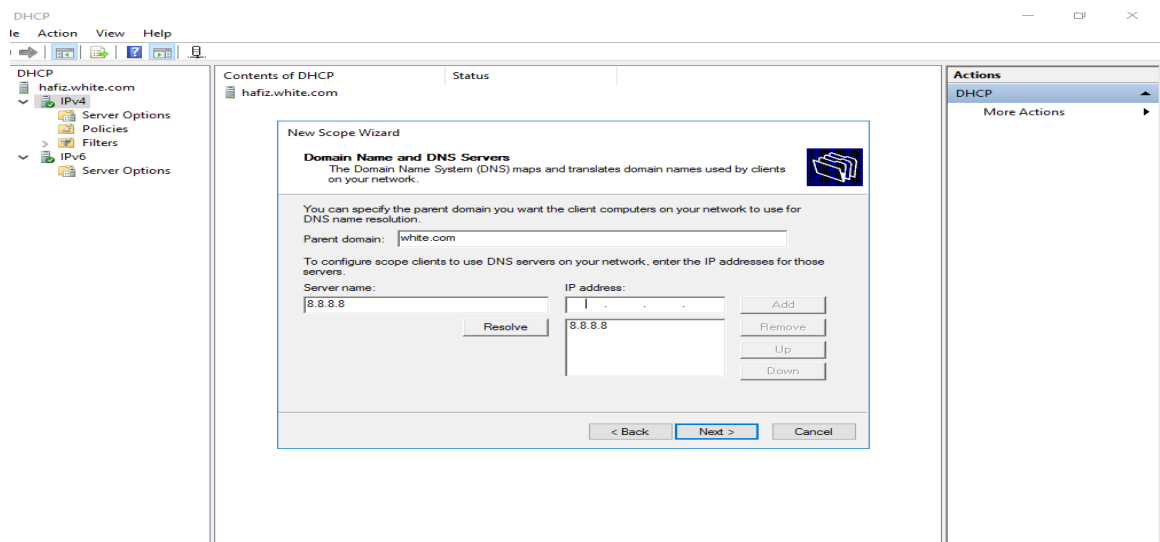


Figure 3.3.4.16: DHCP server configuration

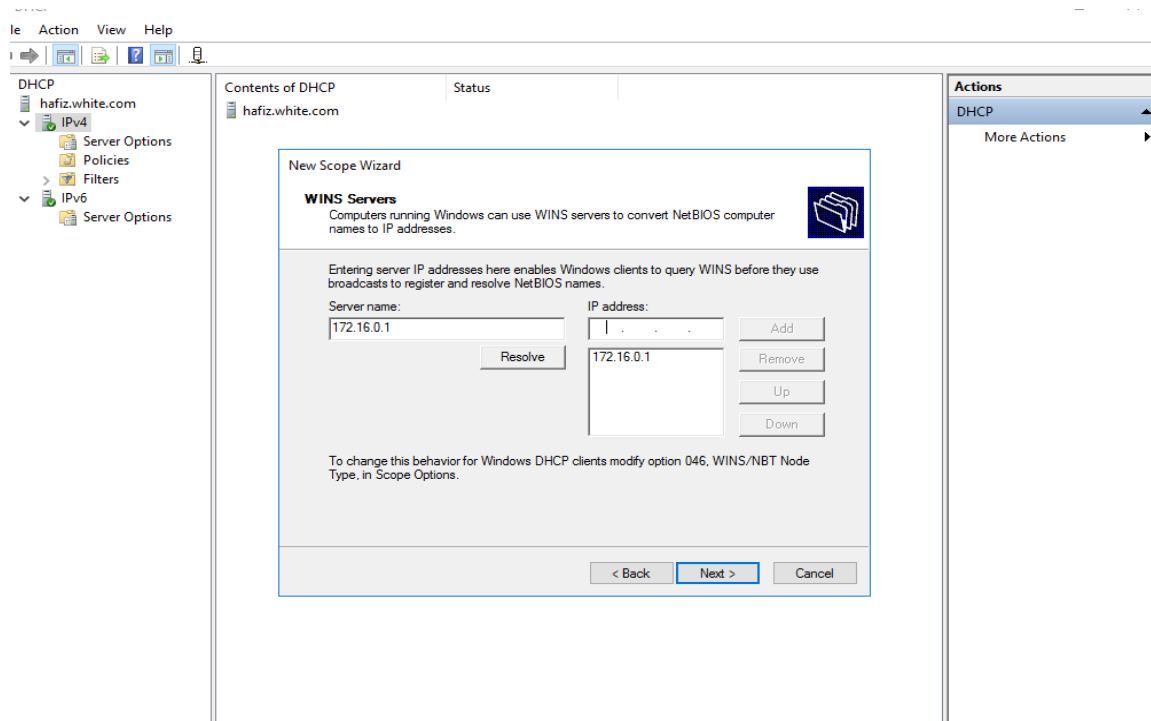


Figure 3.3.4.17: DHCP server configuration

### 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:

The screenshot shows the 'Status' page of a TP-Link 300M Wireless N Router. The interface includes a left-hand navigation menu with options like Status, Quick Setup, WPS, Network, Wireless, Guest Network, DHCP, Forwarding, Security, Parental Control, Access Control, Advanced Routing, Bandwidth Control, IP & MAC Binding, Dynamic DNS, IPv6 Support, System Tools, and Logout. The main content area is divided into several sections:

- Status:** Shows Firmware Version (3.16.9 Build 160406 Rel.40792n) and Hardware Version (WR840N v2.00000000).
- LAN:** Displays MAC Address (84-16-F9-A8-DF-42), IP Address (192.168.0.1), and Subnet Mask (255.255.255.0).
- Wireless:** Shows Wireless Radio (Enable), Name (SSID) (Hafiz New), Mode (11bgn mixed), Channel Width (40MHz), Channel (Auto (Current channel 3)), MAC Address (84-16-F9-A8-DF-42), and WDS Status (Disable).
- WAN:** Displays MAC Address (84-16-F9-A8-DF-43), IP Address (27.147.176.248), and Subnet Mask (255.255.255.0).

Help text on the right side explains the parameters for LAN, Wireless, and WAN sections.

Figure 3.4.1.1: Wi-Fi configuration

The screenshot shows the 'WAN' configuration page of a TP-Link 300M Wireless N Router. The interface includes the same left-hand navigation menu as Figure 3.4.1.1. The main content area is divided into two sections:

- WAN:** A form for configuring WAN settings. The 'WAN Connection Type' is set to 'Static IP'. Fields include IP Address (27.147.176.248), Subnet Mask (255.255.255.224), Default Gateway (27.147.176.241), MTU Size (1500), Primary DNS (123.200.0.254), and Secondary DNS (203.76.96.5). A 'Save' button is at the bottom.
- WAN Help:** Provides instructions for selecting the appropriate WAN connection type based on the ISP's services (DHCP, Static IP, PPPoE, L2TP, PPTP, etc.).

Figure 3.4.1.2: Wi-Fi configuration

**TP-LINK** 300M Wireless N Router  
Model No. TL-WR840N / TL-WR840ND

**LAN**

MAC Address: 84-16-F9-A8-DF-42  
 IP Address: 192.168.0.1  
 Subnet Mask: 255.255.255.0  
 IGMP Proxy: Enabled

Note: IGMP (Internet Group Management Protocol) works for IPTV multicast stream. The device supports both IGMP proxy with enabled/disabled option and IGMP 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 value cannot be changed.
- **IP Address** - Enter the IP address of your Router in dotted-decimal notation (factory default - 192.168.0.1).
- **Subnet Mask** - An address code that determines the size of the network. Usually it is 255.255.255.0.
- **IGMP Proxy** - If you want to watch TV through IGMP, please Enable it.

**Note:**

1. If you change the LAN IP address, you must use the new IP address to login to the Router.
2. If the new LAN IP address you set is not in the same subnet with the previous one, the IP Address pool in the DHCP server will be configured automatically, but the Virtual Server and DMZ Host will not take effect until they are re-configured.

Click the **Save** button to save your settings.

meet-google.com is sharing your screen. Stop sharing Hide

Figure 3.4.1.3: Wi-Fi configuration

**TP-LINK** 300M Wireless N Router  
Model No. TL-WR840N / TL-WR840ND

**Wireless Settings**

Wireless Network Name: Hafiz New (Also called the SSID)  
 Mode: 11bgn mixed  
 Channel Width: 40MHz  
 Channel: Auto

Enable Wireless Router Radio  
 Enable SSID Broadcast  
 Enable WDS Bridging

Save

**Wireless Settings Help**

**Note:** The operating distance or range of your wireless connection varies significantly based on the physical placement of the Router. For best results, place your Router.

- Near the center of the area in which your wireless stations will operate.
- In an elevated location such as a high shelf.
- Away from the potential sources of interference, such as PCs, microwaves, and cordless phones.
- With the Antenna in the upright position.
- Away from large metal surfaces.

**Note:** Failure to follow these guidelines can result in significant performance degradation or inability to wirelessly connect to the Router.

**Wireless Network Name** - Enter a value of up to 32 characters. The same Name (SSID) must be assigned to all wireless devices in your network.

**Mode** - Select transmission mode according to your wireless devices.

**Channel Width** - The bandwidth of the wireless channel.

**Channel** - This field determines which operating frequency will be used. It is not necessary to change the wireless channel unless you notice interference problems with another nearby access point. If you select auto, then AP will choose the best channel automatically.

**Enable Wireless Router Radio** - The wireless radio of the Router can be enabled or disabled to allow wireless stations access. If enabled, the wireless stations will be able to access the Router. Otherwise, wireless stations will not be able to access the Router.

**Enable SSID Broadcast** - If you select the **Enable SSID Broadcast** checkbox, the wireless router will broadcast its name (SSID) on the air.

**Enable WDS Bridging** - You can select this to enable WDS Bridging, with this function, the Router can bridge two or more WLANs. NOTE: If this checkbox is selected, you had better make sure the following settings are correct.

SSID (to) You can meet-google.com is sharing your screen. Stop sharing Hide client.

**BSSID (to be bridged)** - The BSSID of the AP your Router is going to connect to as a client. You can also use the survey function to select the BSSID to join.

**Survey** - Click this button, you can search the AP which runs in the current channel.

**WDS Mode** - This field determines which WDS Mode will be used. It is not necessary to

Figure 3.4.1.4: Wi-Fi configuration



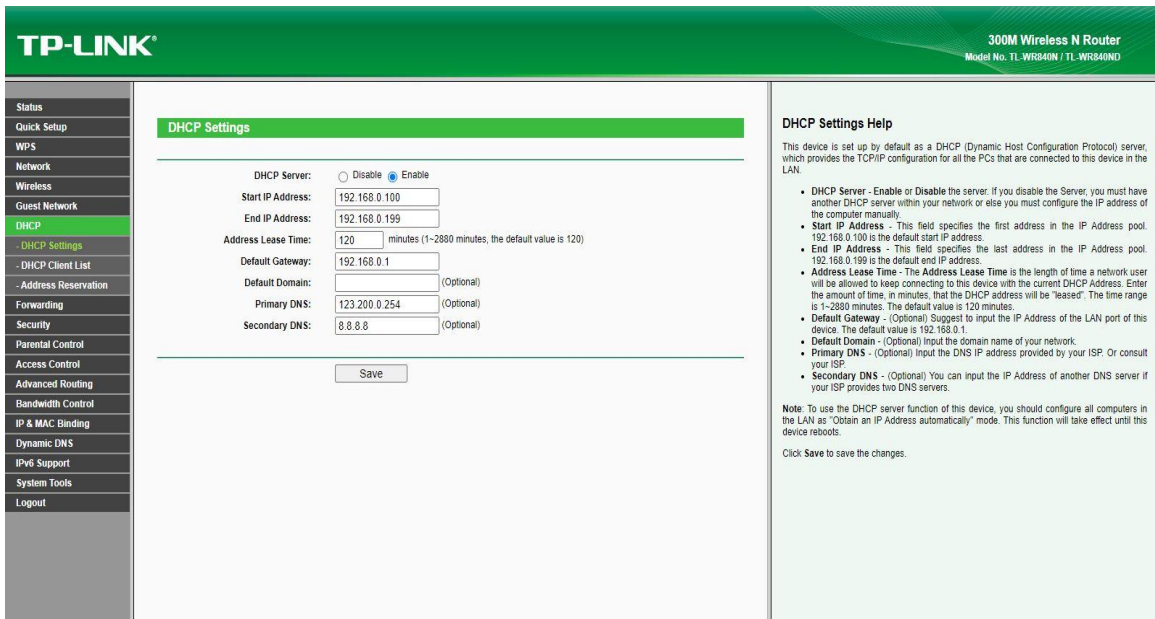


Figure 3.4.1.5: Wi-Fi configuration

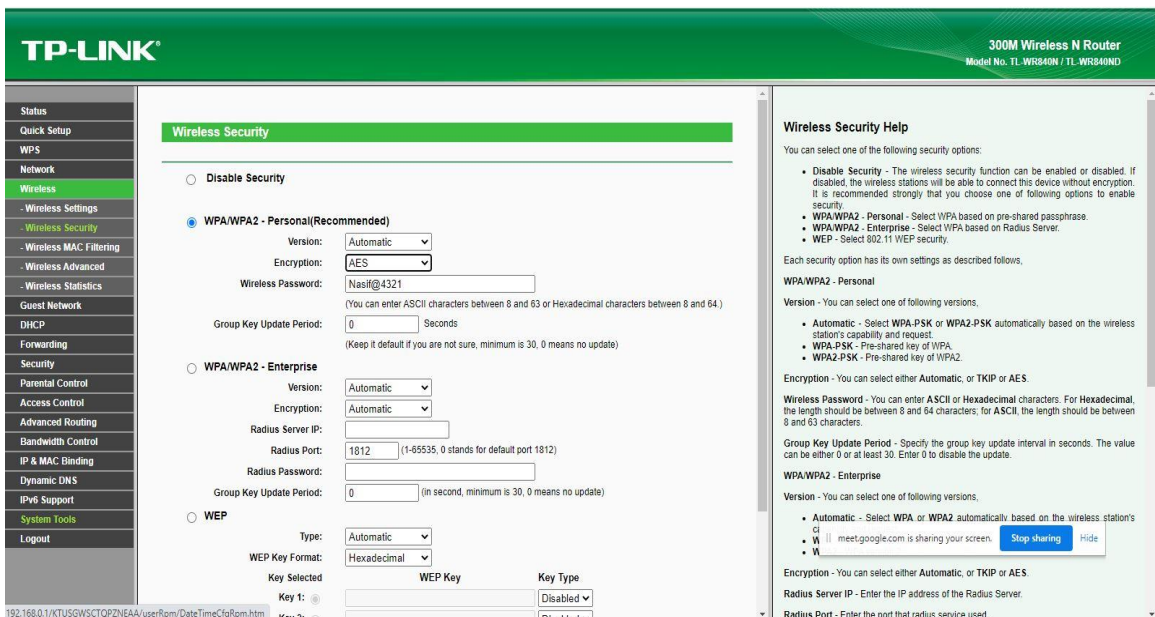


Figure 3.4.1.6: Wi-Fi configuration

### 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 [cri@hammond@gmail.com](mailto:cri@hammond@gmail.com). When you receive it, please follow the link to complete the registration process.

Regards,  
Cambium Networks

[Terms and Conditions](#) | [Privacy Policy](#)

Figure 3.4.3.2: Cloud controller account create

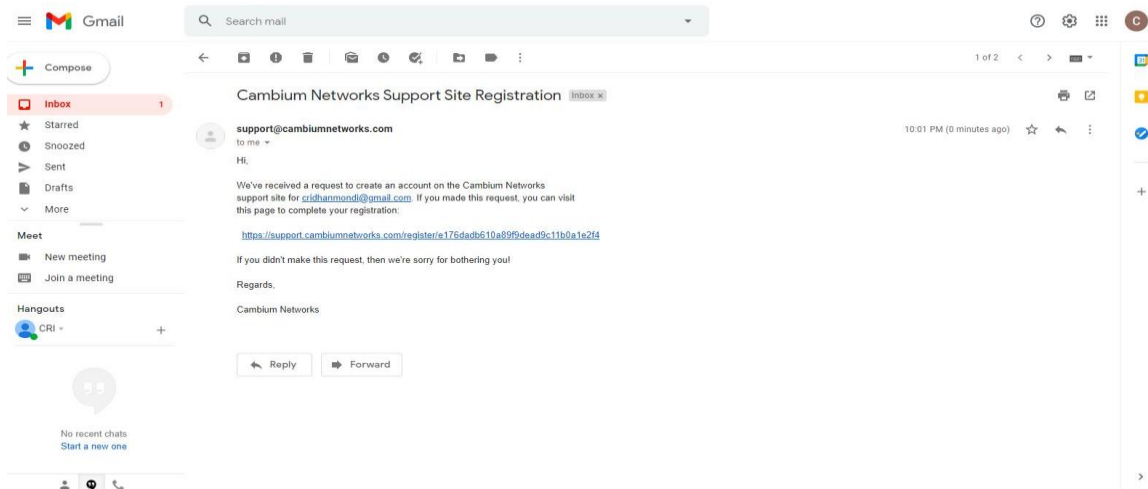


Figure 3.4.3.3: Cloud controller account create

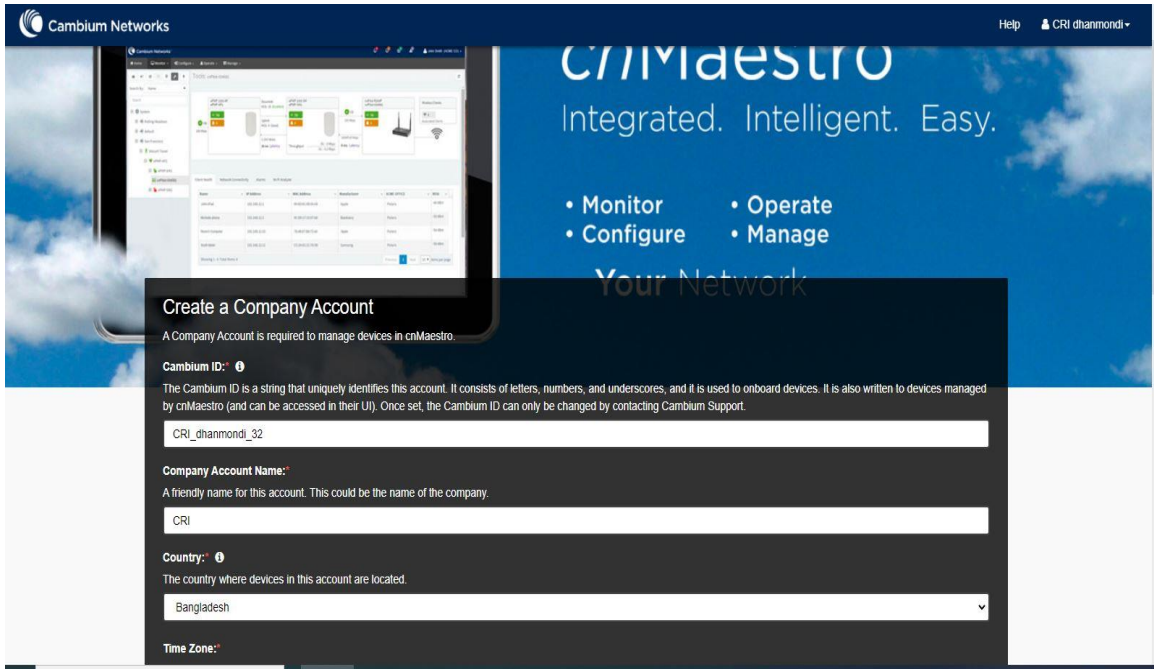


Figure 3.4.3.4: Cloud controller account create

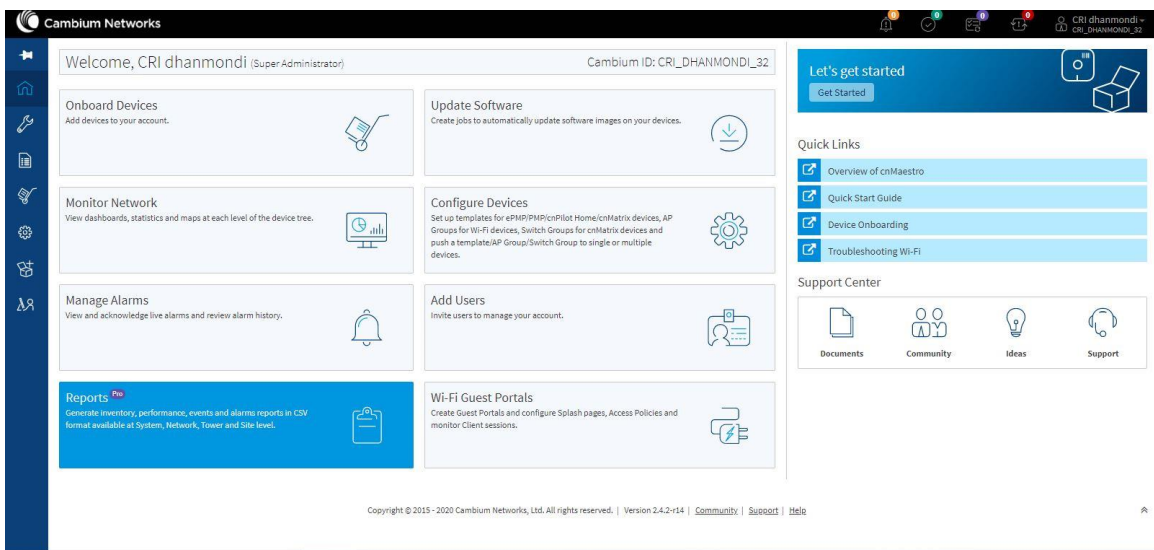


Figure 3.4.3.5: Cloud controller Dashboard

Type	Serial Number	Device	MAC	IP Address	Added By	Status	Duration	Configure
cnPilot e410	W8VJ0DFLNKOH	E410-3028C4	8C:E6:7C:30:28:C4	10.20.8.20	FCI cambium Using Serial Nu...	Onboarded	1d 10h 32m	Summary ONBOARDED
cnPilot e410	W8VJ051T5XKB	E410-E96771	58:C1:7A:E9:67:71	10.20.8.19	FCI cambium Using Serial Nu...	Onboarded	1d 12h 22m	Summary ONBOARDED
cnPilot e410	W8VJ0DFNQ18	E410-3028C6	8C:E6:7C:30:28:C6	10.20.32.77	FCI cambium Using Serial Nu...	Onboarded	3d 6h 39m	Summary ONBOARDED
cnPilot e410	W8VJ0DPCBG00	E410-3048F3	8C:E6:7C:30:48:F3	10.20.32.79	FCI cambium Using Serial Nu...	Onboarded	3d 7h 17m	Summary ONBOARDED
cnPilot e410	W8VJ0DLTFQJL	E410-302961	8C:E6:7C:30:29:61	10.20.32.78	FCI cambium Using Serial Nu...	Onboarded	3d 7h 17m	Summary ONBOARDED
cnPilot e410	W8VJ0DLBTGN0	E410-302952	8C:E6:7C:30:29:52	10.20.32.76	FCI cambium Using Serial Nu...	Onboarded	3d 8h 19m	Summary ONBOARDED
cnPilot e410	W8VJ08HFLVFX	E410-EB031B	58:C1:7A:EB:03:1B	10.20.32.75	FCI cambium Using Serial Nu...	Onboarded	3d 8h 37m	Summary ONBOARDED
cnPilot e410	W8VJ05B92174	E410-E967B5	58:C1:7A:E9:67:B5	10.20.32.69	FCI cambium Using Serial Nu...	Onboarded	4d 9h 33m	Summary ONBOARDED
cnPilot e410	W8VJ04ZQHX9	E410-E96732	58:C1:7A:E9:67:32	10.20.32.68	FCI cambium Using Serial Nu...	Onboarded	4d 9h 48m	Summary ONBOARDED
cnPilot e410	W8VJ0M1CTS0V	E410-303052	8C:E6:7C:30:30:52	10.20.32.72	FCI cambium	Onboarded	4d 9h 48m	Summary

Figure 3.4.3.6: Cloud controller Dashboard A.P.

The screenshot shows the 'Restart Process' for a device. The interface includes a search bar, a navigation menu, and a main content area. The main content area is titled 'Wi-Fi > E410-E96770' and contains a 'Status' section with 'Online' and a 'Wireless' section with a Wi-Fi icon and 'Associated Clients'. The left sidebar shows a tree view of networks and devices, with 'E410-E96770' selected.

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

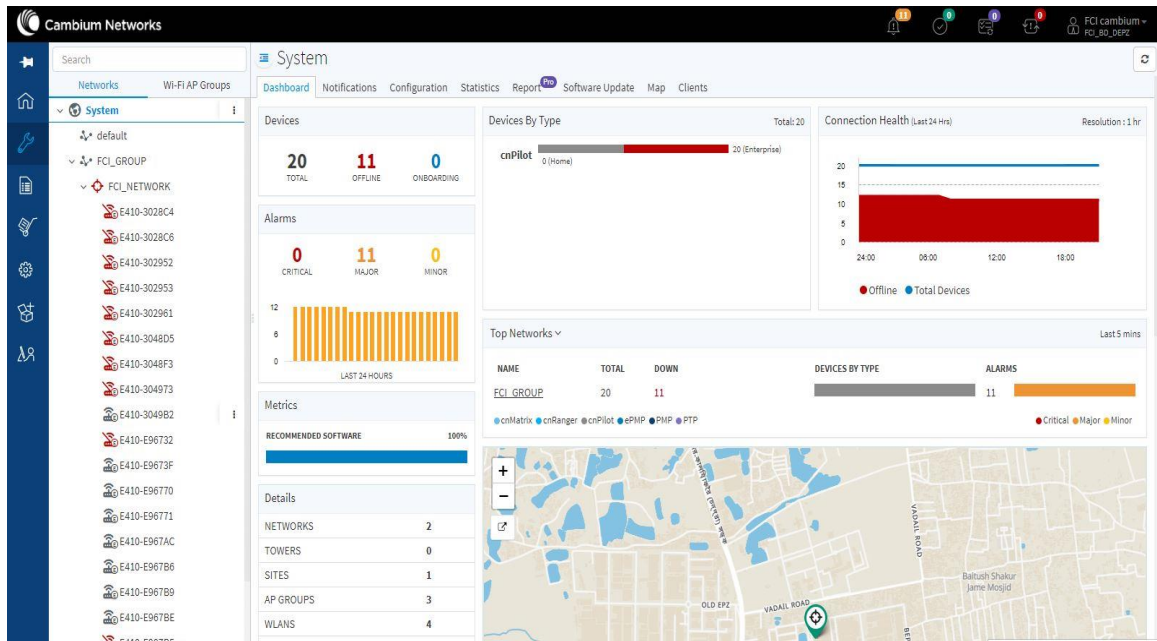


Figure 3.4.3.8: Cloud controller Dashboard

### 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 message 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:

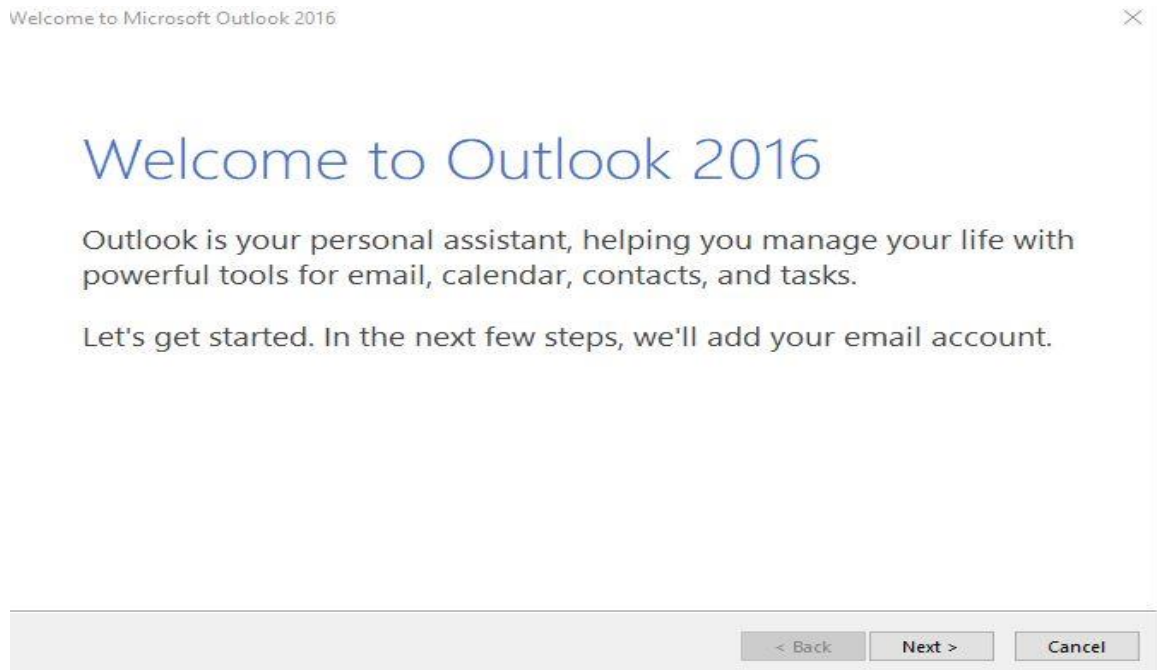


Figure 3.5.1.1: Microsoft Outlook configuration

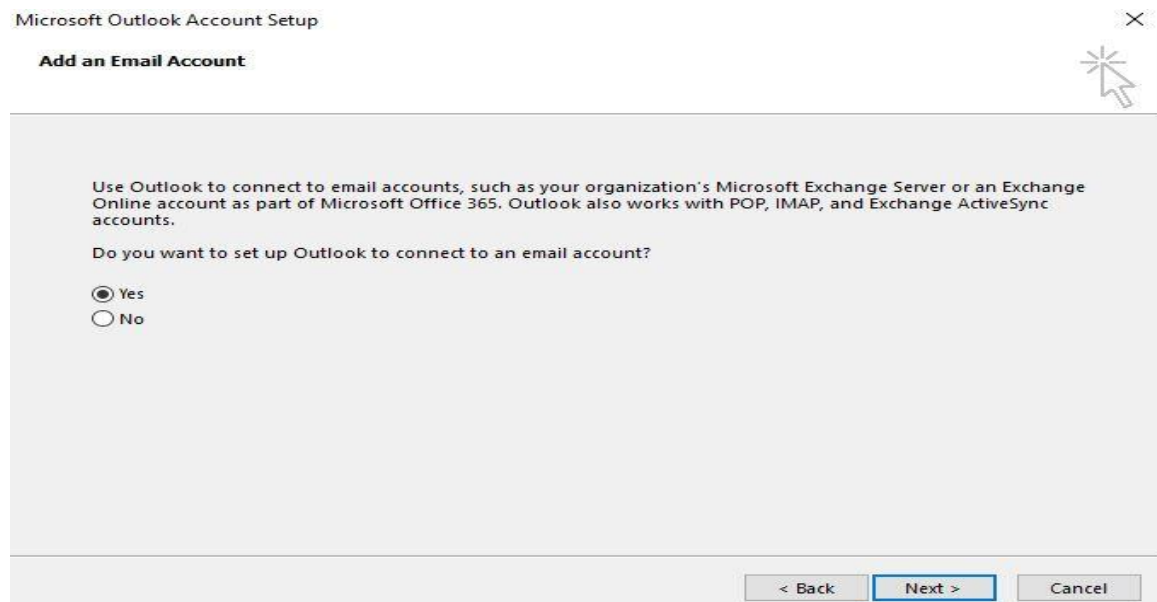


Figure 3.5.1.2: Microsoft Outlook configuration

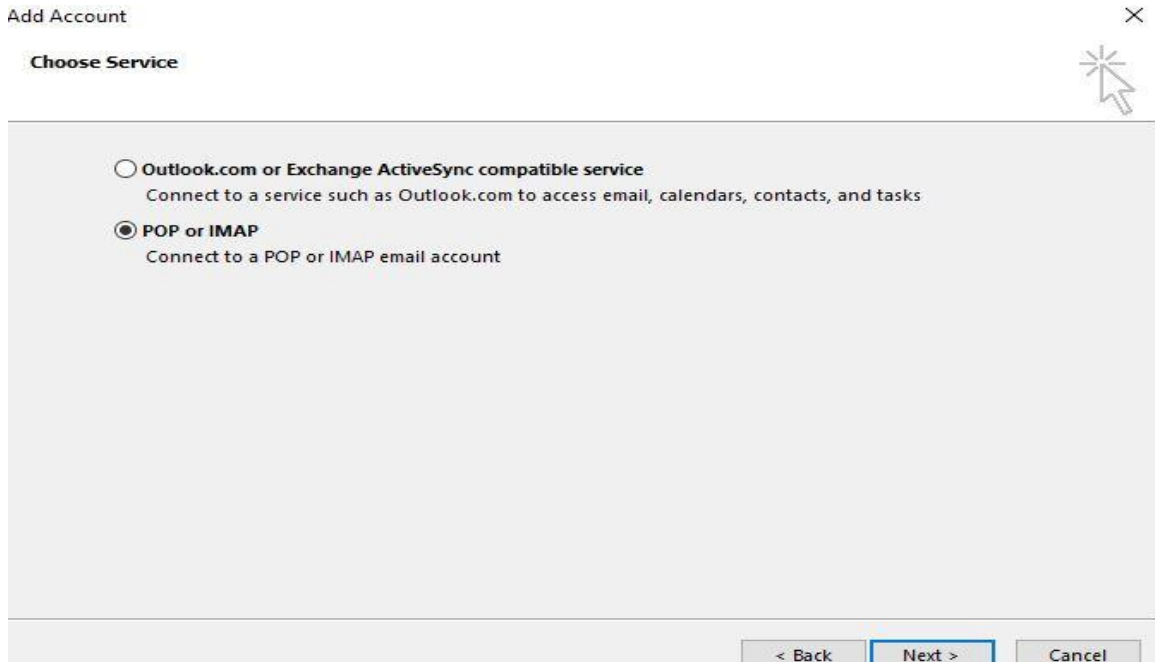


Figure 3.5.1.3: Microsoft Outlook configuration

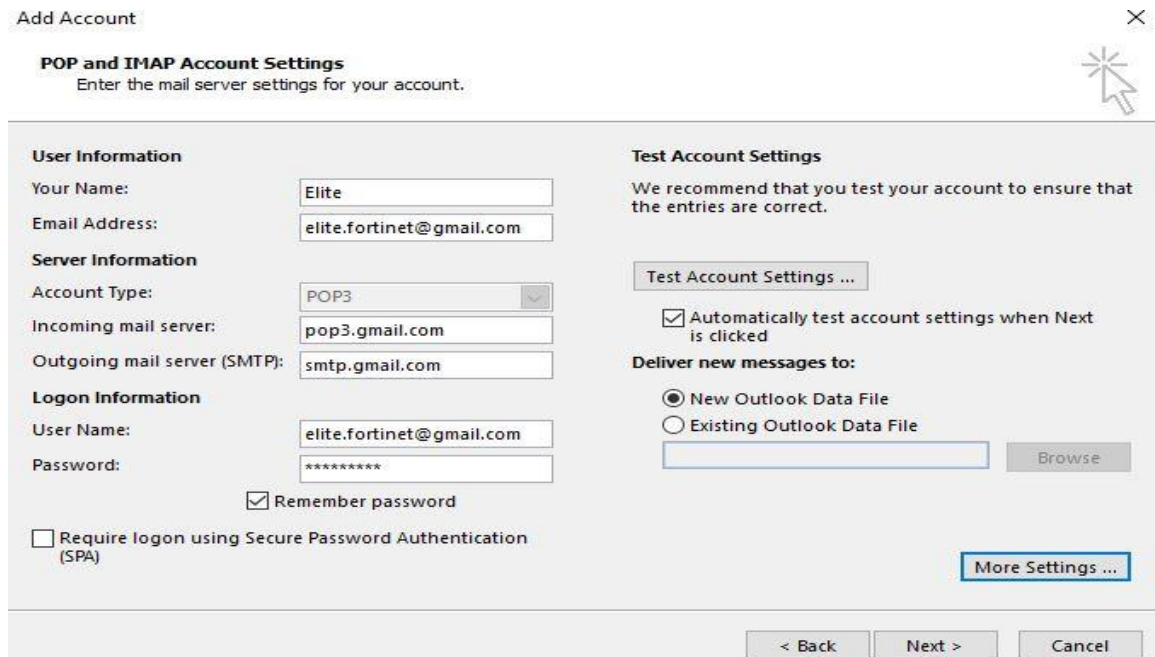


Figure 3.5.1.4: Microsoft Outlook configuration



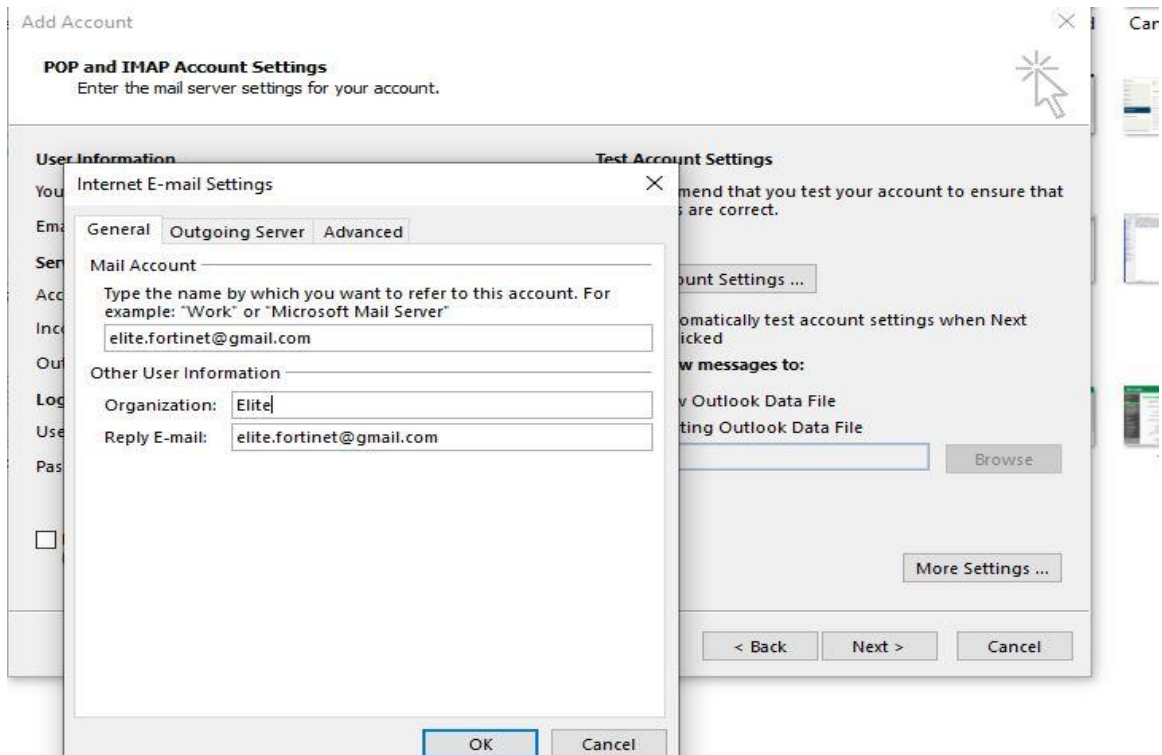


Figure 3.5.1.5: Microsoft Outlook configuration

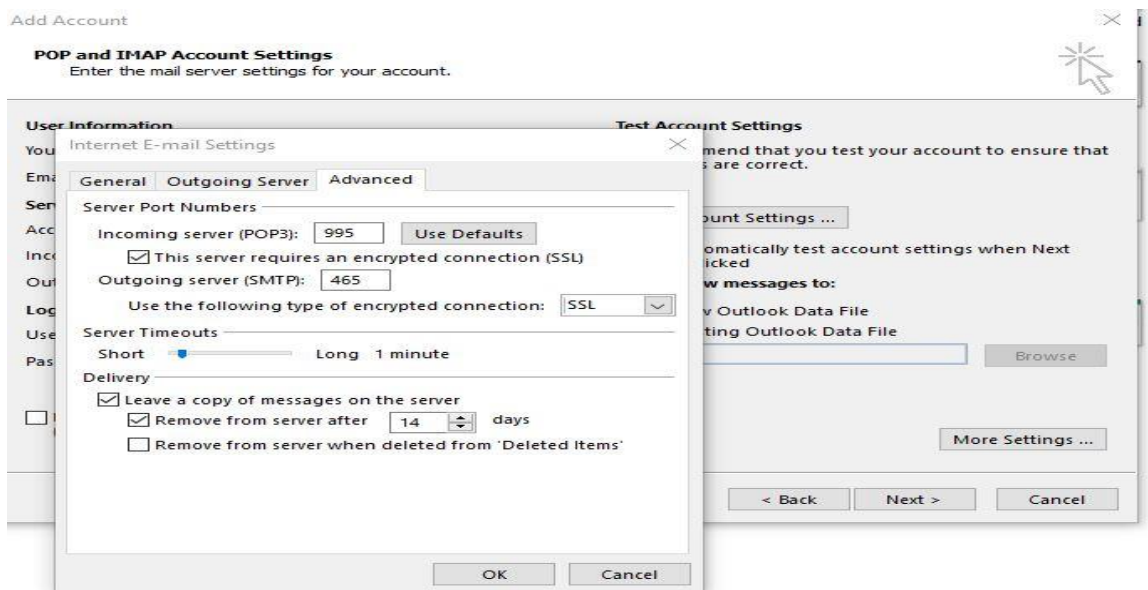


Figure 3.5.1.6: Microsoft Outlook configuration

## 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.

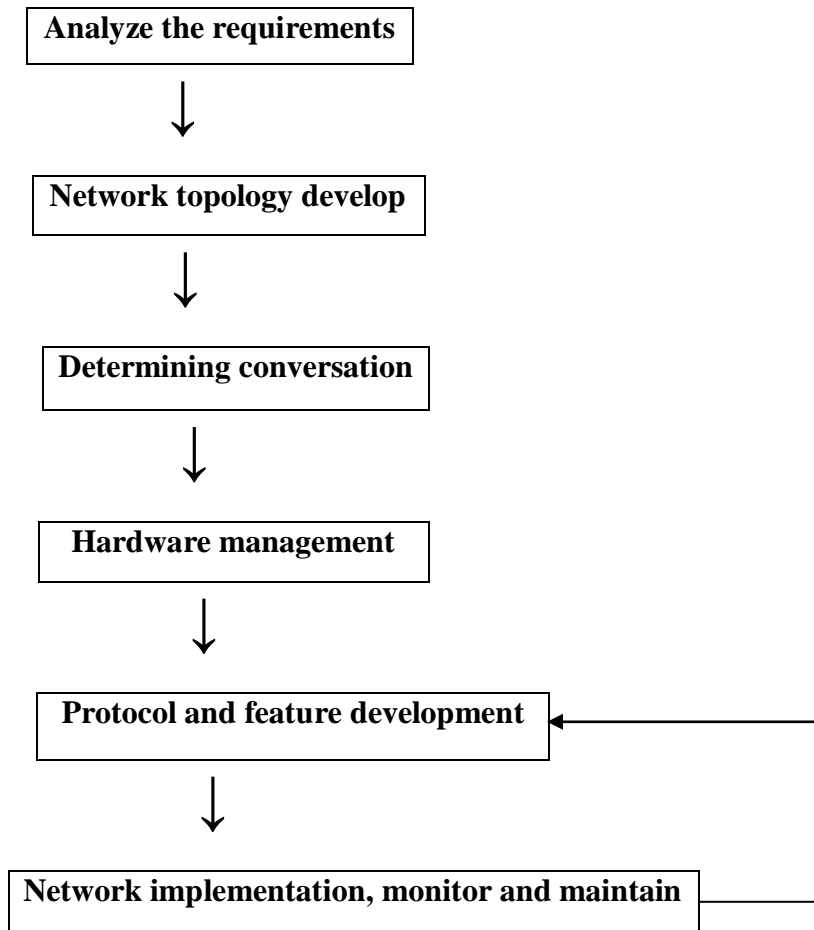


Figure 4.1: Corporate office design steps

## 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

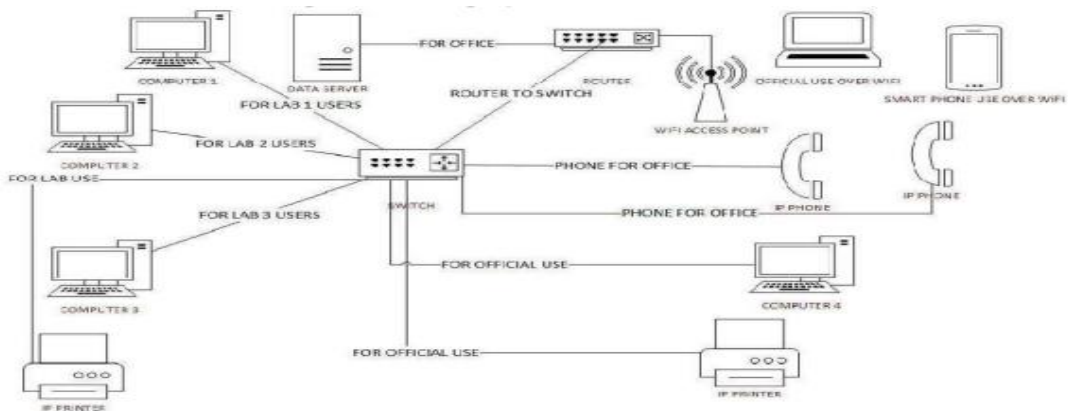


Figure 4.2: Simple office design (Network diagram)



## 5.2. IP configuration:

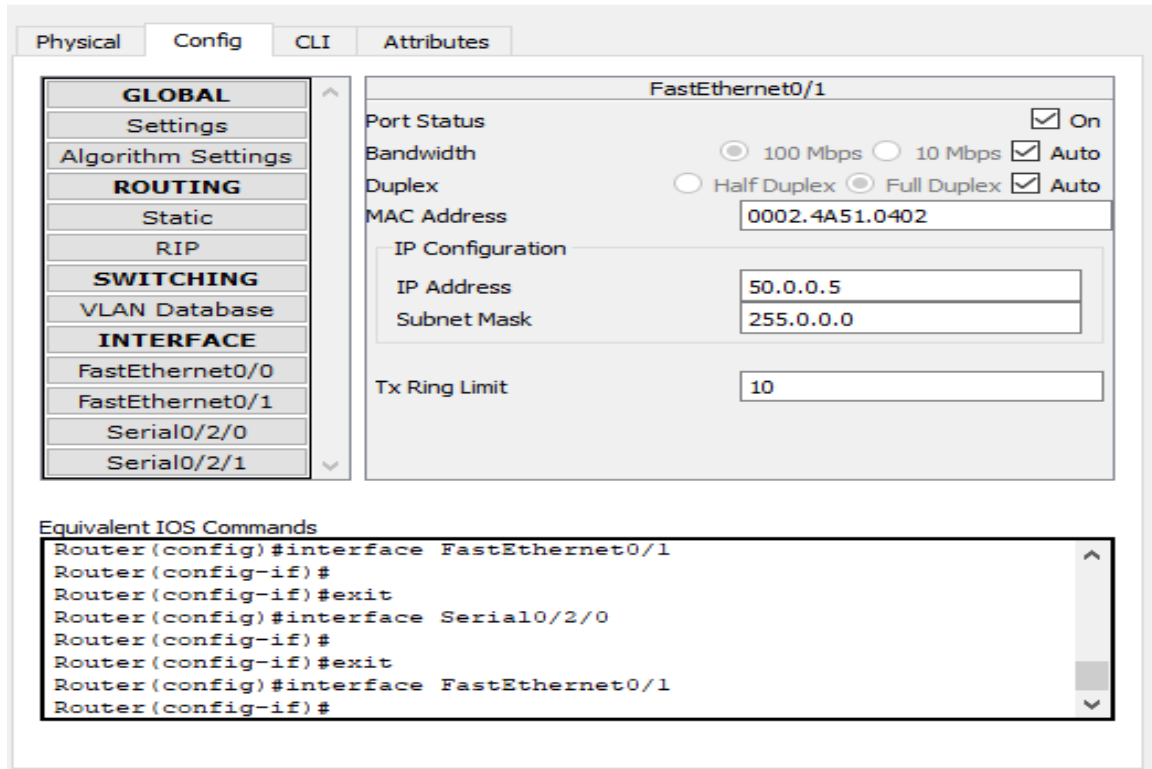


Figure 5.2: IP configure in packet tracer

## 5.3. Link check:

```
PC>ping 10.0.0.1

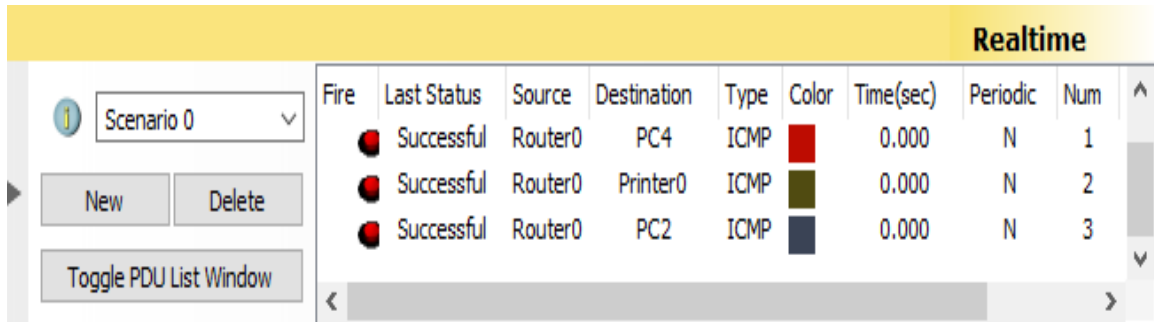
Pinging 10.0.0.1 with 32 bytes of data:

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: Link check using command prompt

## 5.4. Packet check:



Realtime									
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	
	Successful	Router0	PC4	ICMP		0.000	N	1	^
	Successful	Router0	Printer0	ICMP		0.000	N	2	
	Successful	Router0	PC2	ICMP		0.000	N	3	v

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:	<a href="mailto:dhakasupport.networks@aamra.com.bd">dhakasupport.networks@aamra.com.bd</a>
Web:	<a href="http://www.ticket.aamranetworks.com">www.ticket.aamranetworks.com</a>
Type of organization:	I.S.P. (Internet Service Provider)
Employees:	150



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