Project on
Corporate Office Network

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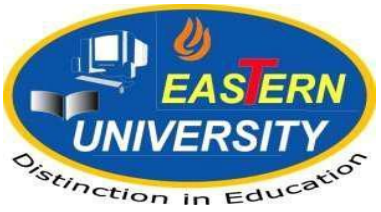

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Chapter 1
Introduction

1.1 Introduction

This report presents a detailed networking project implemented using Cisco Packet Tracer. The project demonstrates the integration of several networking technologies and protocols, including DHCP, sub-interfaces with encapsulation, switch trunk, OSPF, VLANs, email services, HTTP web servers, and DNS servers. The aim is to design, configure, and test a reliable and scalable network that adheres to the outlined specifications.

1.2 Objectives

The main objective of this project is to set up a functional and efficient network using Cisco Packet Tracer. Key goals include:

- Configuring DHCP to dynamically assign IP addresses.
- Implementing sub-interfaces with encapsulation to support multiple VLANs.
- Setting up switch trunking to enable VLAN traffic across multiple switches.
- Configuring OSPF for dynamic routing.
- Setting up and testing email and HTTP web servers.
- DNS server resolves hostnames to IP addresses, facilitating communication between devices.

1.3 Expected Outcome

The expected outcomes of this project are:

- A fully operational network with dynamic IP allocation via DHCP.
- Successful communication between devices across VLANs using trunk ports.
- Efficient data packet routing using OSPF.
- Segmented network traffic to improve security and manageability using VLANs.
- Functional Email, HTTP web servers, and a DNS server accessible within the network.

Chapter 2
Methodology and Tools

2.1 Methodology

The methodology employed in this project involves the following steps:

- **Network design:** Designing the network topology, including the placement of devices, VLANs, and sub-interfaces.
- **Device configuration:** Configuring Cisco devices, including routers, switches, and servers, using Cisco Packet Tracer.
- **Protocol implementation:** Implementing DHCP, OSPF, and other protocols to enable network communication.
- **Testing and verification:** Testing the network to ensure that it meets the expected outcome.

2.1 Tools

The following tools were used in this project:

- **Cisco Packet Tracer:** A Network simulation software used to design, configure, and test the network infrastructure.
- **Cisco devices:** Routers, switches, and servers were used to build the network infrastructure.

Chapter 3
Design and Implementation

3.1 Use Case/ Block Diagram of the System

The network design consists of the following components:

- Four routers (R,R2,R3,R4) with six sub-interfaces (**VLAN 20**<A,C,E> and **VLAN 40**<B,D,F>).
- Five **switches** (S0,S1,S3,S4 and S5), here three s**witches**(S0,S1,S3) has trunking enabled and rest of the **switches** are in default mode.
- One **DHCP** server.
- One **Email** server.
- One **HTTP** web server.
- One **DNS** server.
- Multiple clients (PCs and laptops).

The block diagram of the system is shown below:

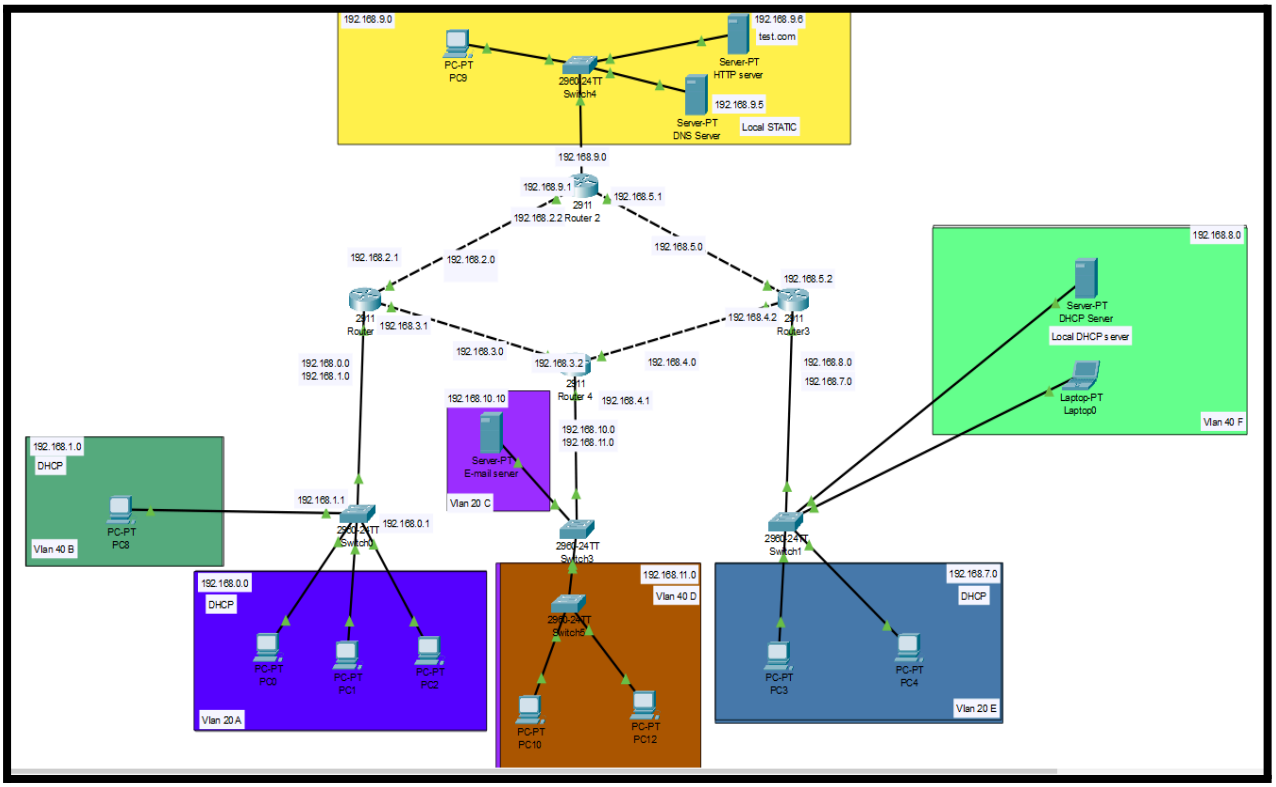


Fig: 01

3.2 Implementation

NETWORK ADDRESS TABLE:

NETWORK ADDRESS	SUBNET MASK	ROUTER(IP)	SWITCH	VLAN (name)/DHCP
192.168.0.0	255.255.255.0/24	R1(192.168.0.1)	SW0	VLAN20 A
192.168.1.0	255.255.255.0/24	R1(192.168.1.1)	SW0	VLAN 40 B
192.168.2.0	255.255.255.0/24	R1(192.168.2.1), R2(192.168.2.2)		
192.168.3.0	255.255.255.0/24	R1(192.168.3.1), R4(192.168.3.2)		
192.168.4.0	255.255.255.0/24	R3(192.168.4.2), R4(192.168.4.1)		
192.168.5.0	255.255.255.0/24	R2(192.168.5.1), R3(192.168.5.2)		
192.168.7.0	255.255.255.0/24	R3(192.168.7.1)	SW1	VLAN20 E (DHCP)
192.168.8.0	255.255.255.0/24	R3(192.168.8.1)	SW1	VLAN 40 F (DHCP)
192.168.9.0	255.255.255.0/24	R2(192.168.9.1)	SW4	LAN STATIC ADDRESS
192.168.10.0	255.255.255.0/24	R4(192.168.10.1)	SW3	VLAN 20 C (LAN STATIC)
192.168.11.0	255.255.255.0/24	R4(192.168.11.1)	SW3	VLAN 40 D (DHCP)

Following this, the configuration files for each device are provided below:

Router 1,

```
enable
configure terminal
int gig0/0
no ip address
no shutdown
exit
int gig0/0.20
encapsulation dot1Q 20
ip address 192.168.0.1 255.255.255.0
exit
int gig0/0.40
encapsulation dot1Q 40
ip address 192.168.1.1 255.255.255.0
exit
int gig0/1
ip address 192.168.2.1 255.255.255.0
no shutdown
exit
int gig0/2
ip address 192.168.3.1 255.255.255.0
no shutdown
exit
ip dhcp pool vlan20A
network 192.168.0.0 255.255.255.0
default-router 192.168.0.1
dns-server 192.168.8.2
exit
ip dhcp pool vlan40B
network 192.168.1.0 255.255.255.0
default-router 192.168.1.1
dns-server 192.168.8.2
exit
ip dhcp excluded-address 192.168.0.1
ip dhcp excluded-address 192.168.1.1
router ospf 1
network 192.168.0.0 0.0.0.255 area 1
network 192.168.1.0 0.0.0.255 area 1
network 192.168.2.0 0.0.0.255 area 1
network 192.168.3.0 0.0.0.255 area 1
end
```

Switch 0,

```
enable
configure terminal
vlan 20
name Anik20A
exit
vlan 40
name Anik40B
exit
int range fa0/1-2
switchport mode access
switchport access vlan 20
exit
int fa0/3
switchport mode access
switchport access vlan 40
exit
int gig0/1
switchport mode trunk
end
```

Router 2,

```
enable
configure terminal
int gig0/0
ip address 192.168.2.2 255.255.255.0
no shutdown
exit
int gig0/1
ip address 192.168.5.1 255.255.255.0
no shutdown
exit
int gig0/2
ip address 192.168.9.1 255.255.255.0
no shutdown
exit
router ospf 2
network 192.168.2.0 0.0.0.255 area 1
network 192.168.5.0 0.0.0.255 area 1
network 192.168.9.0 0.0.0.255 area 1
end
```

Router 3
Switch1,

```
enable
configure terminal
int gig0/1
ip address 192.168.4.2 255.255.255.0
no shutdown
exit
int gig0/0
ip address 192.168.5.2 255.255.255.0
no shutdown
exit
int gig0/2
no ip address
no shutdown
exit
int gig0/2.10
encapsulation dot1Q 10
ip address 192.168.7.1 255.255.255.0
ip helper-address 192.168.8.2
exit
int gig0/2.20
encapsulation dot1Q 20
ip address 192.168.8.1 255.255.255.0
ip helper-address 192.168.8.2
exit
router ospf 3
network 192.168.4.0 0.0.0.255 area 1
network 192.168.5.0 0.0.0.255 area 1
network 192.168.7.0 0.0.0.255 area 1
network 192.168.8.0 0.0.0.255 area 1
end
```

```
enable
configure terminal
vlan 20
name Anik20E
exit
vlan 40
name Anikserver40F
exit
int range fa0/1-2
switchport mode access
switchport access vlan 20
exit
int range fa0/3-4
switchport mode access
switchport access vlan 40
exit
int gig0/1
switchport mode trunk
end
```

Router 4

```
enable
configure terminal
int gig0/0
ip address 192.168.3.2 255.255.255.0
no shutdown
exit
int gig0/1
ip address 192.168.4.1 255.255.255.0
no shutdown
exit
int gig0/2.10
encapsulation dot1Q 10
ip address 192.168.10.1 255.255.255.0
exit
int gig0/2.20
encapsulation dot1Q 20
ip address 192.168.11.1 255.255.255.0
ip helper-address 192.168.8.2
exit
router ospf 4
network 192.168.3.0 0.0.0.255 area 1
network 192.168.4.0 0.0.0.255 area 1
network 192.168.10.0 0.0.0.255 area 1
network 192.168.11.0 0.0.0.255 area 1
end
```

Switch 3

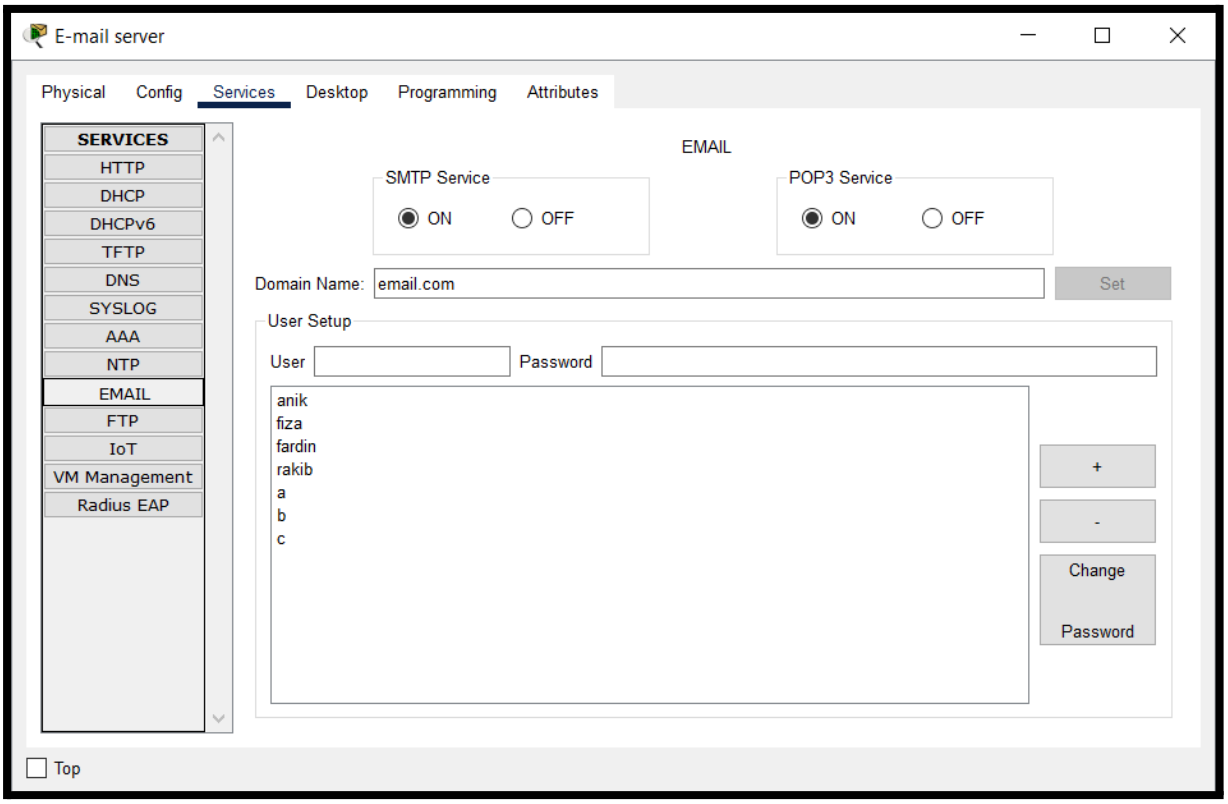
```
enabl
confi
vlan
name
exit
vlan
name
exit
int r
switc
switc
exit
int f
switc
switc
exit
int g
switc
end
```

Switch 4 Default

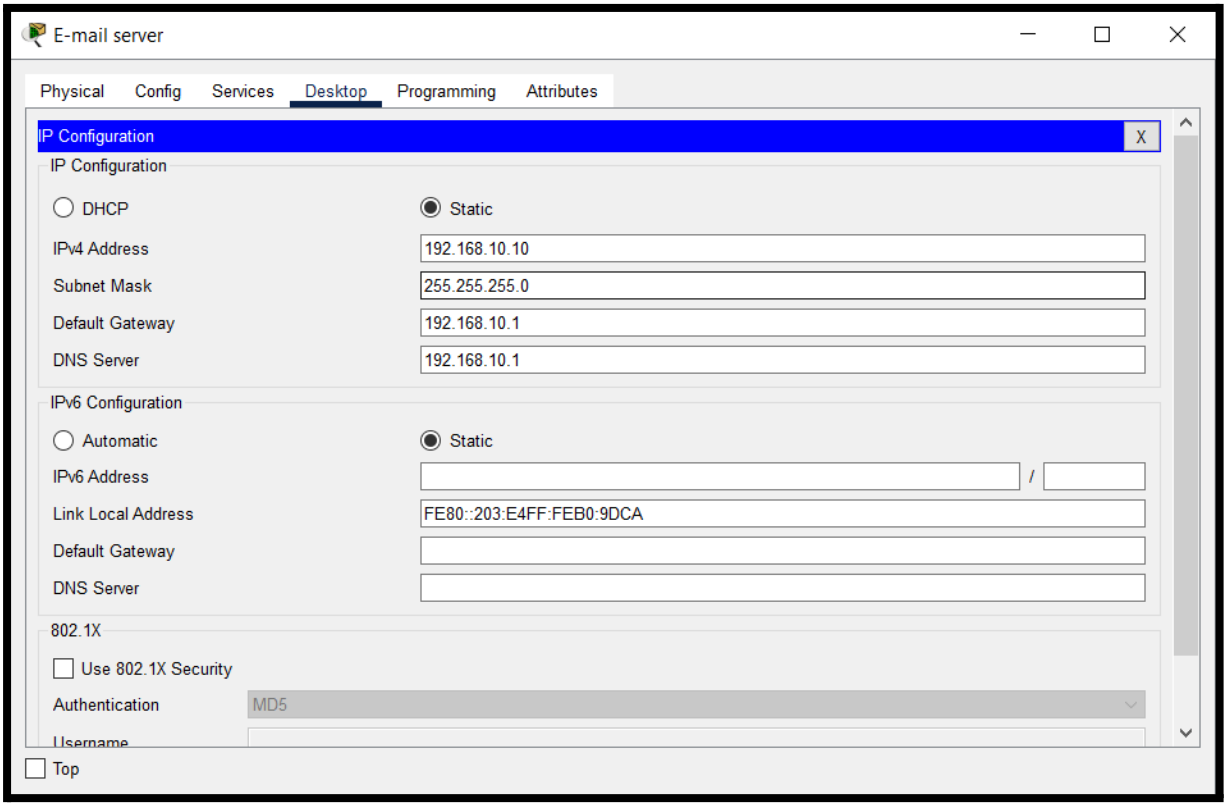
Switch 5 Default

E-mail Server Configuration:

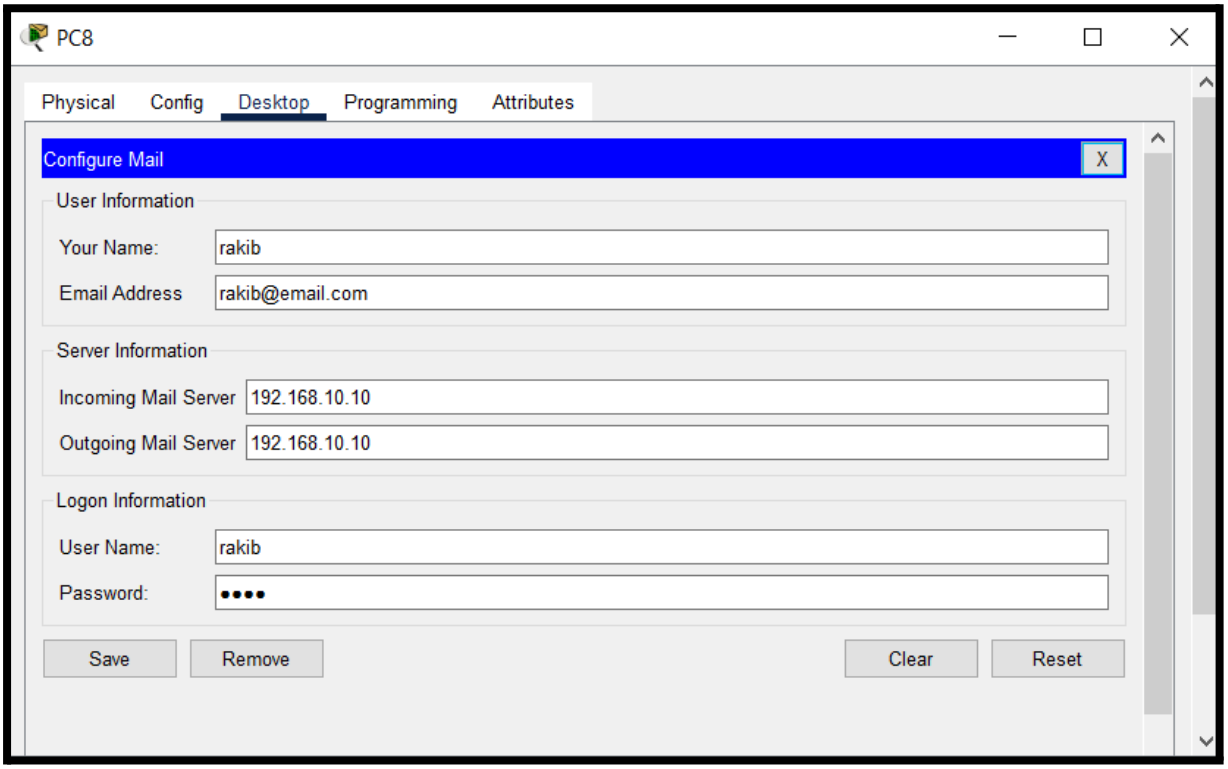
Email domain: email.com



Here, we manually set a static local IP address for incoming and outgoing email server.
That will be used in every client connected to this network for email service.

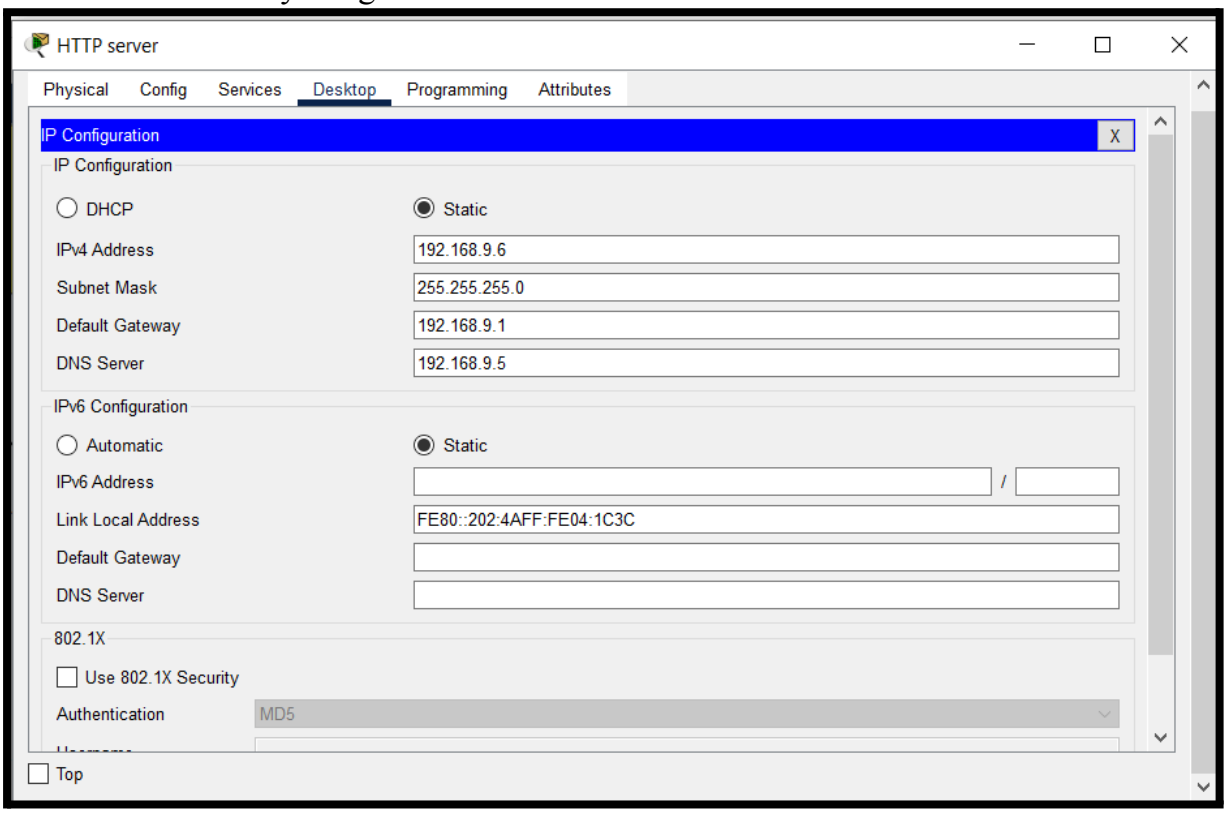


Client setup Page for email,

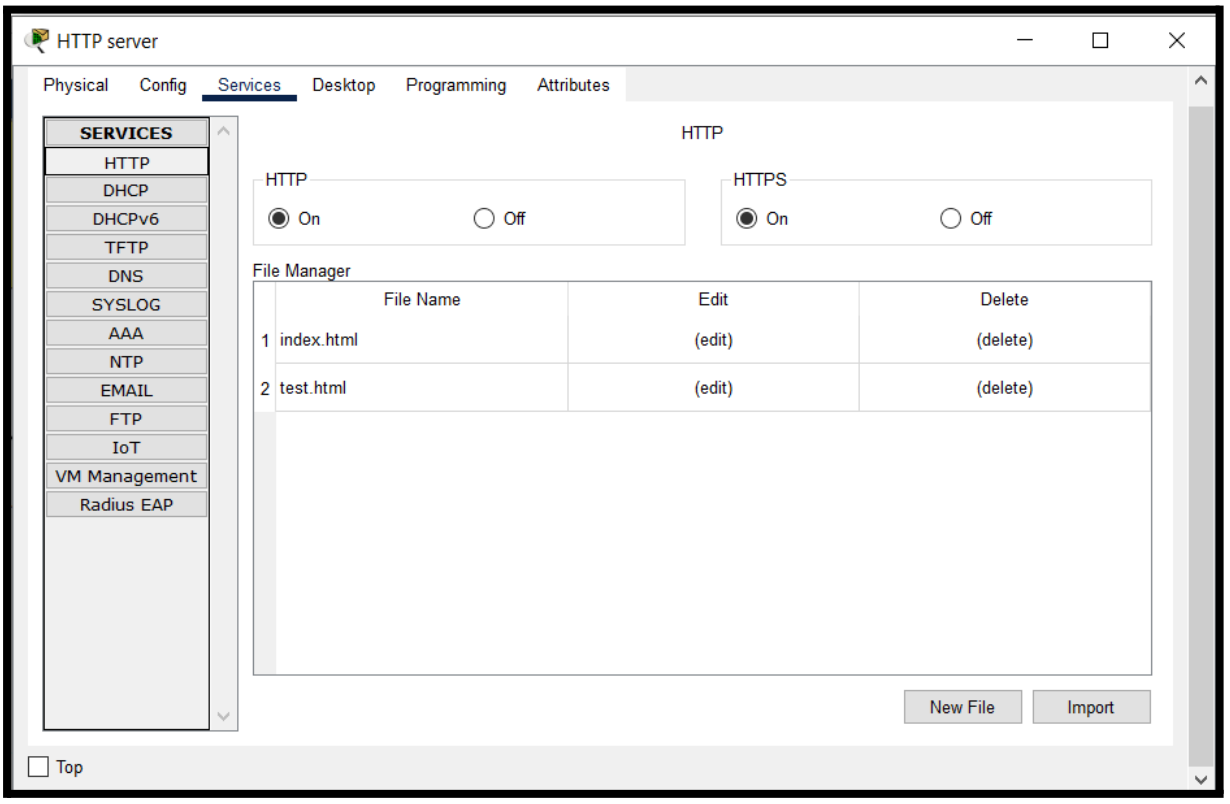


Webserver Configuration:

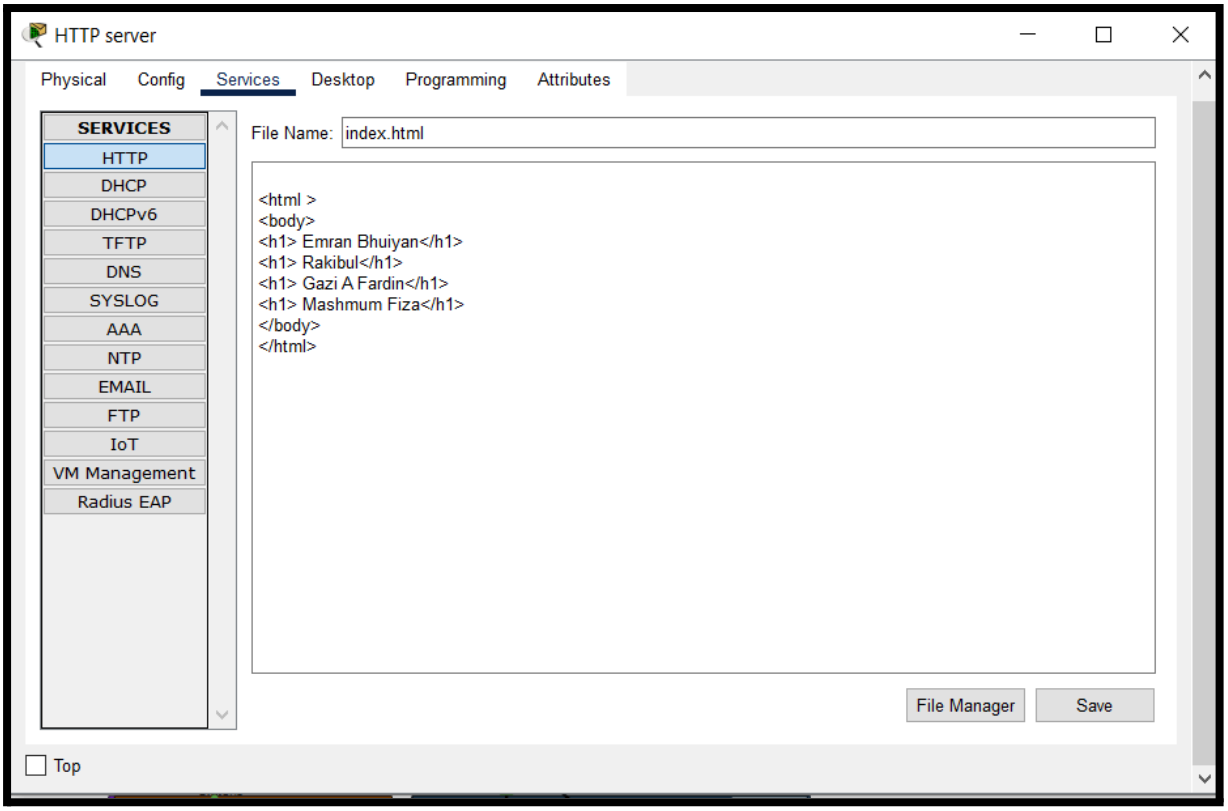
1st of all we manually assign a static local IP address for our web server.



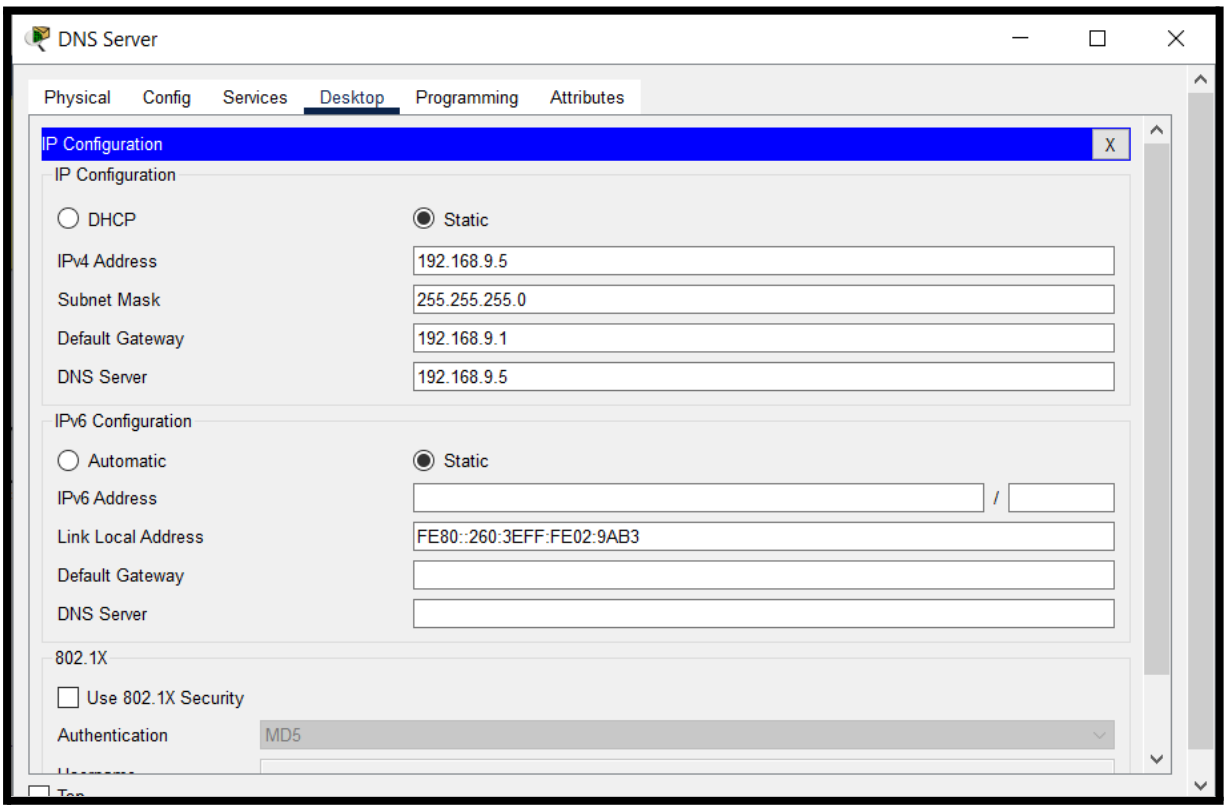
Then, we enable http services in our server,



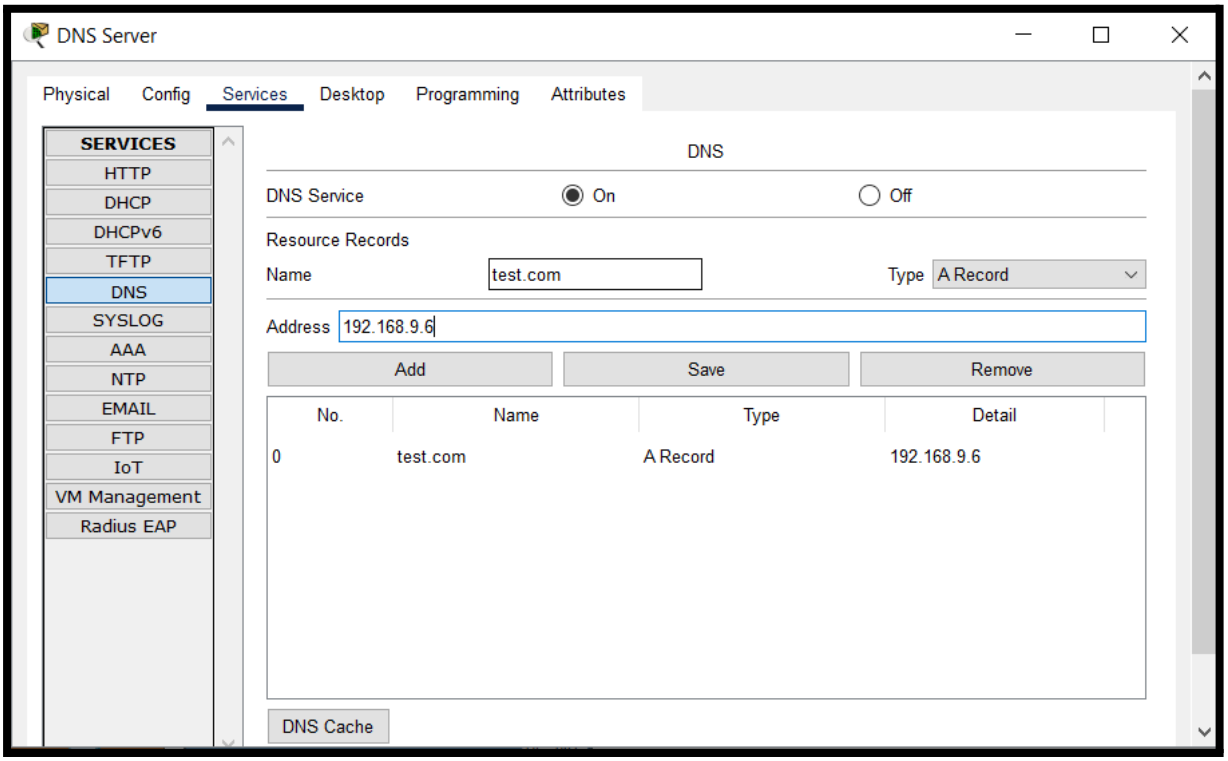
Lastly, we provide our html files for website into the server.



After completing this step, we setup our DNS server for domain name and entire network. So that, client can access or visit this website smoothly. Our DNS server IP address should be static.



Now, we have to add domain name into DNS server and our website is now ready for entire network to visit smoothly.

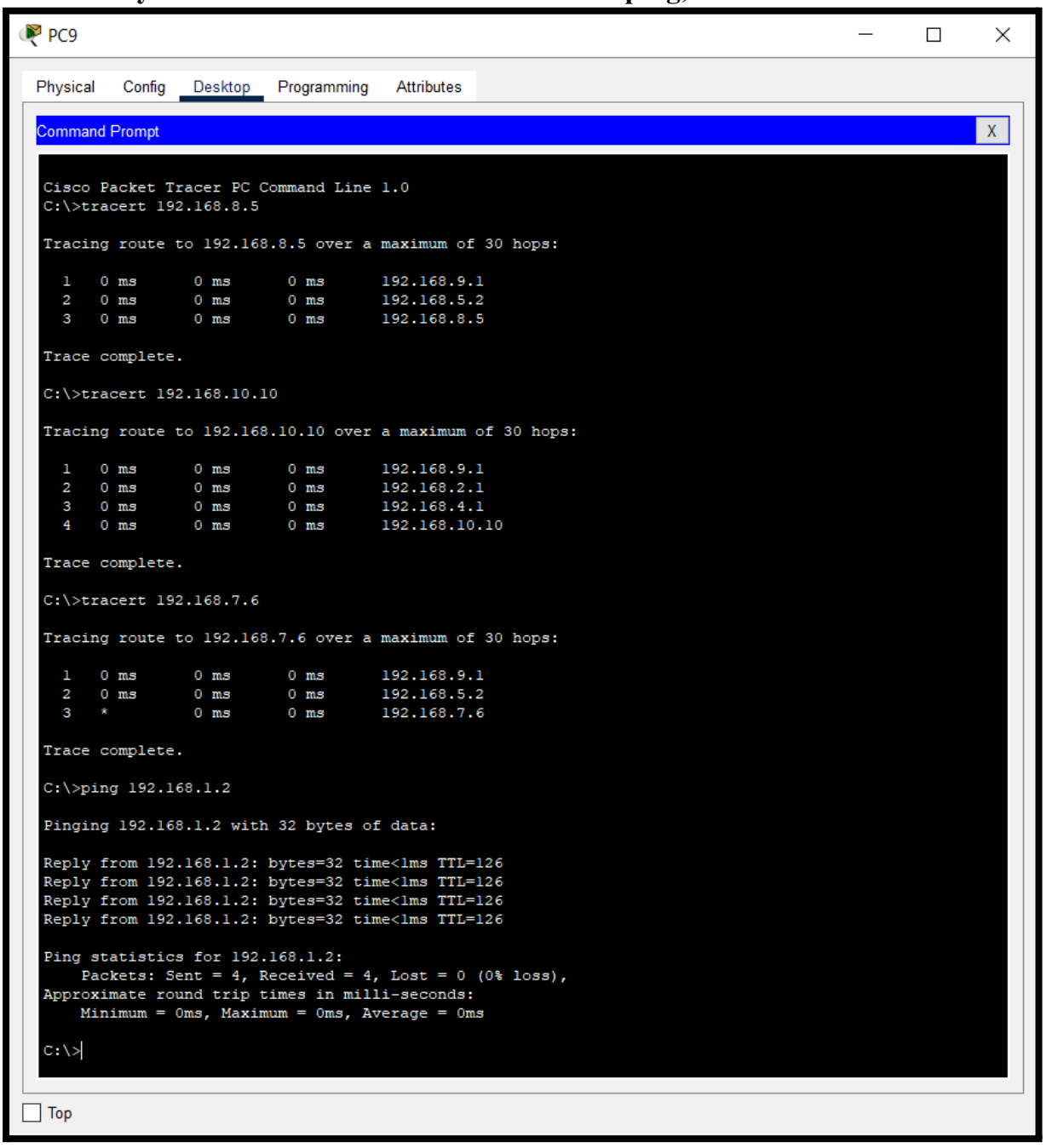


Chapter 4
Result and Conclusion

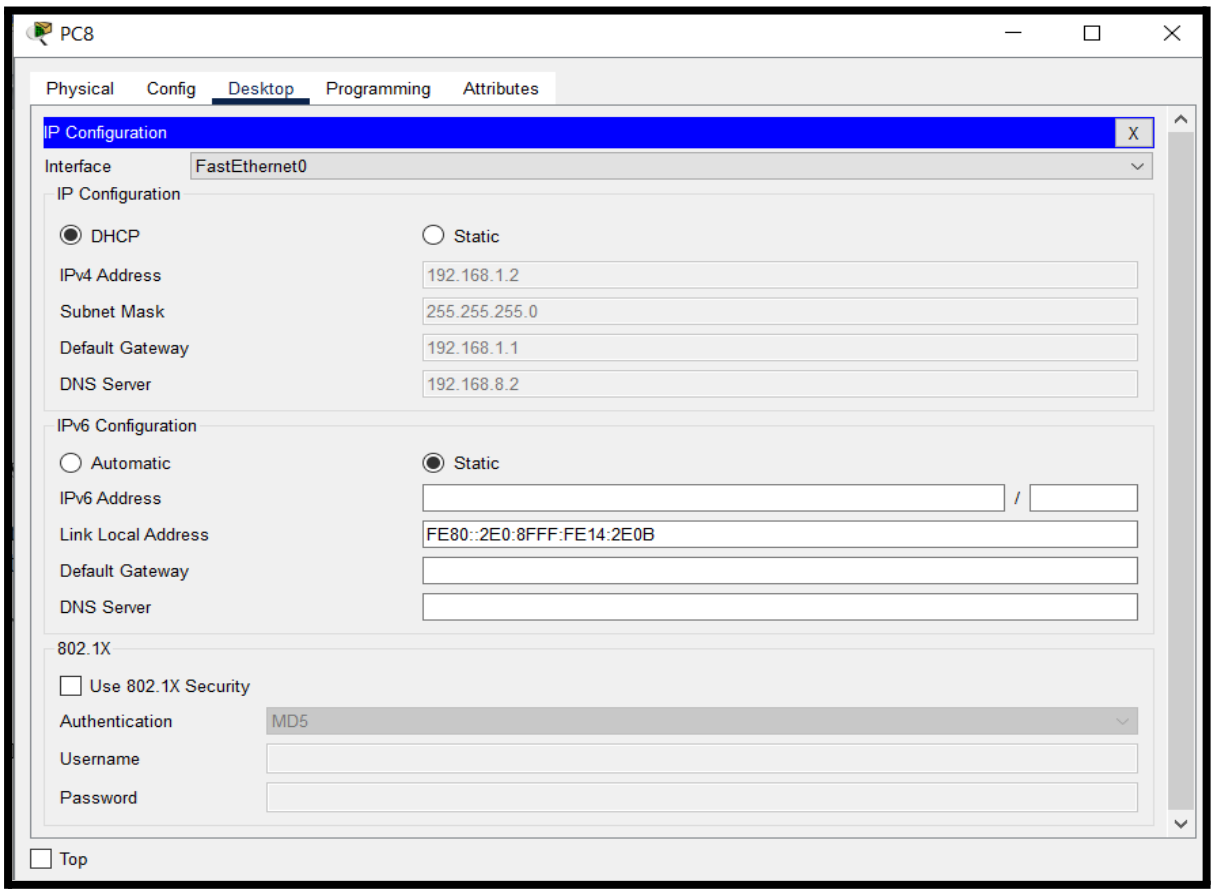
4.1 Result

The network infrastructure was successfully implemented, and the following screen shots demonstrate the expected outcome:

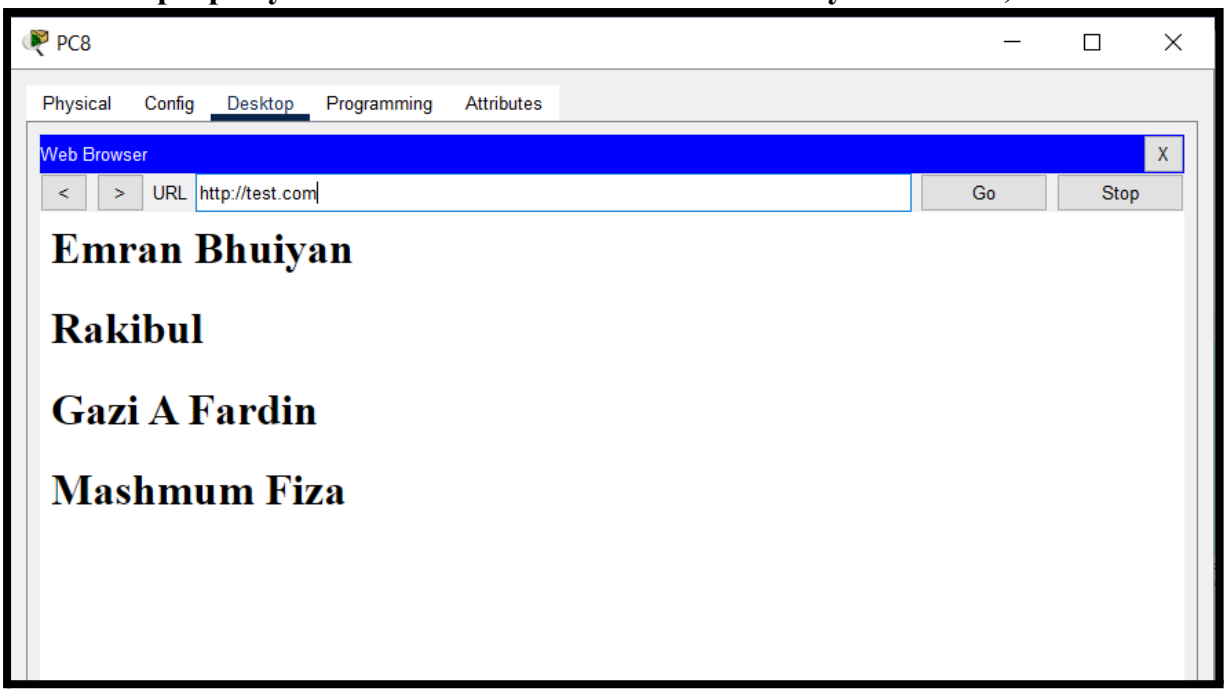
Our entire network system is working properly with an excellent speed of connectivity. Tested some clients with tracert and ping,



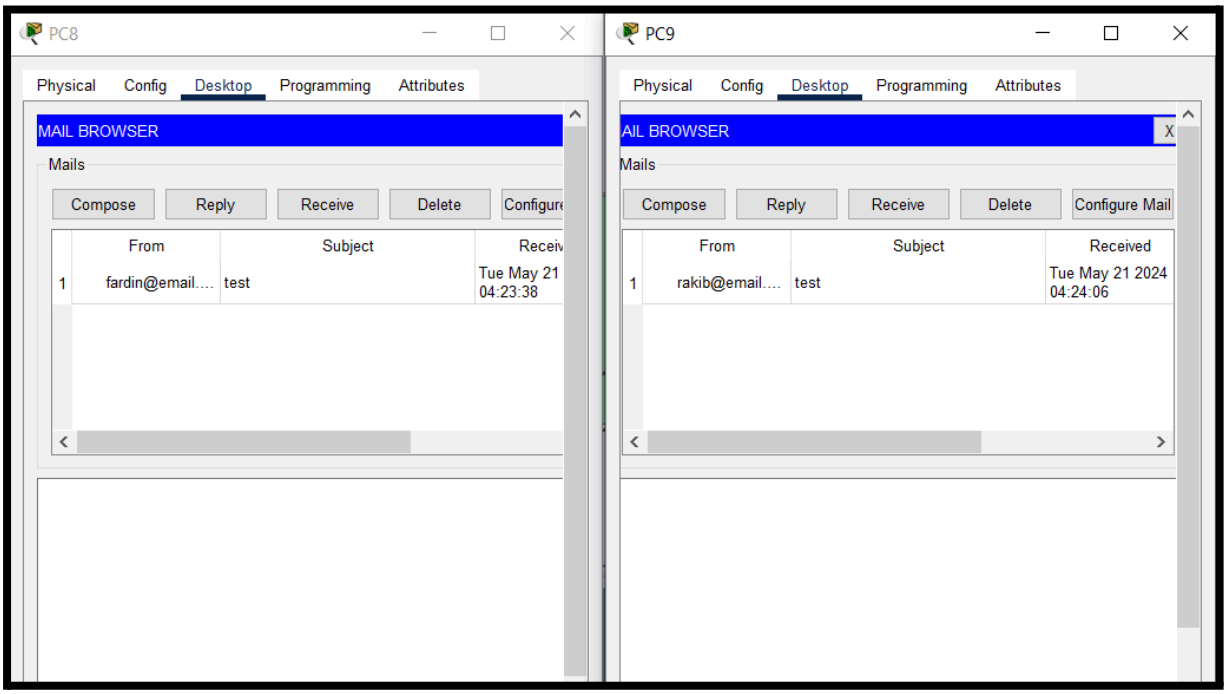
DHCP Services working properly,

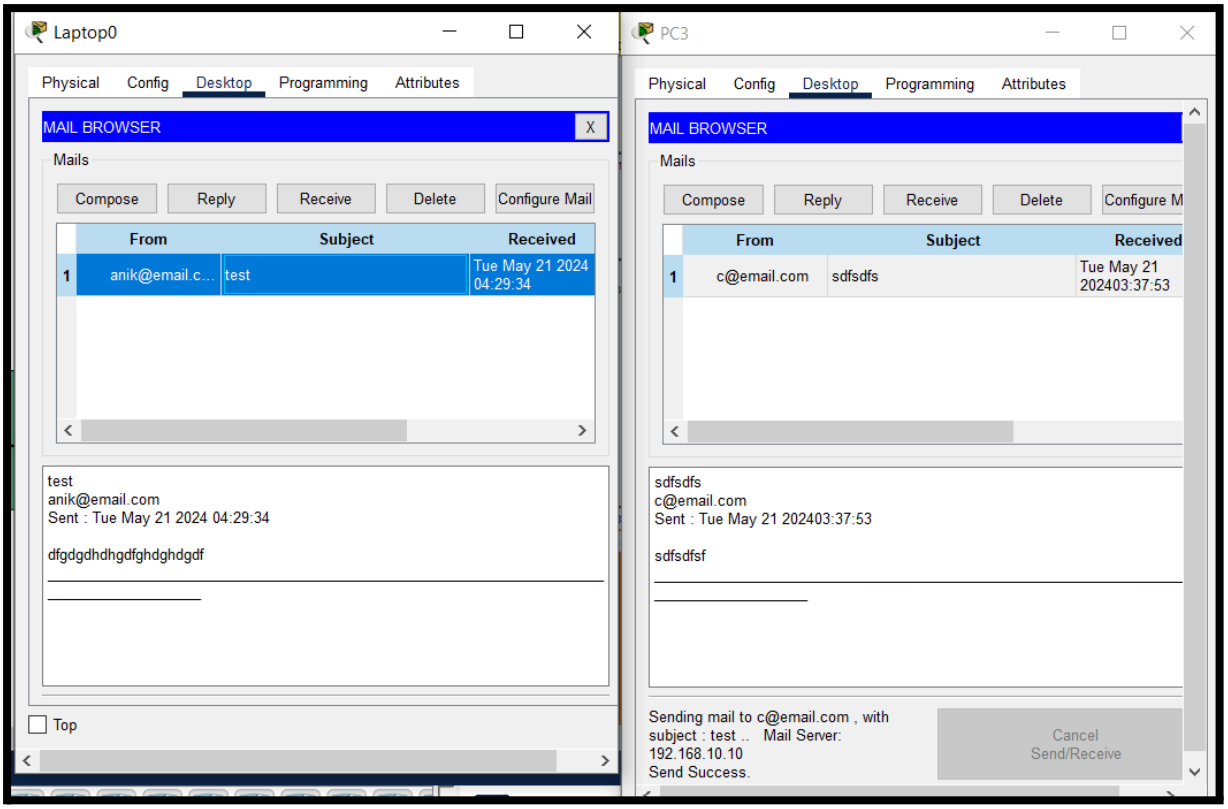


Website is properly accessed from all devices without any DNS issue,



Email system is properly working for all client,





4.2 Conclusion

In conclusion, this project demonstrates the design and implementation of a comprehensive network infrastructure using Cisco Packet Tracer. The network incorporates various networking concepts and protocols, including DHCP, sub-interfaces with encapsulation, switch trunking, OSPF, VLANs, email,

HTTP web server, and DNS server. The successful implementation of this network infrastructure ensures secure and efficient communication between devices, meeting the expected outcome of the project.