

CS361

LABORATORY 7

**NAME:**

ARCHIT AGRAWAL

**ROLL NO. :**

202051213

**SECTION:**

2B

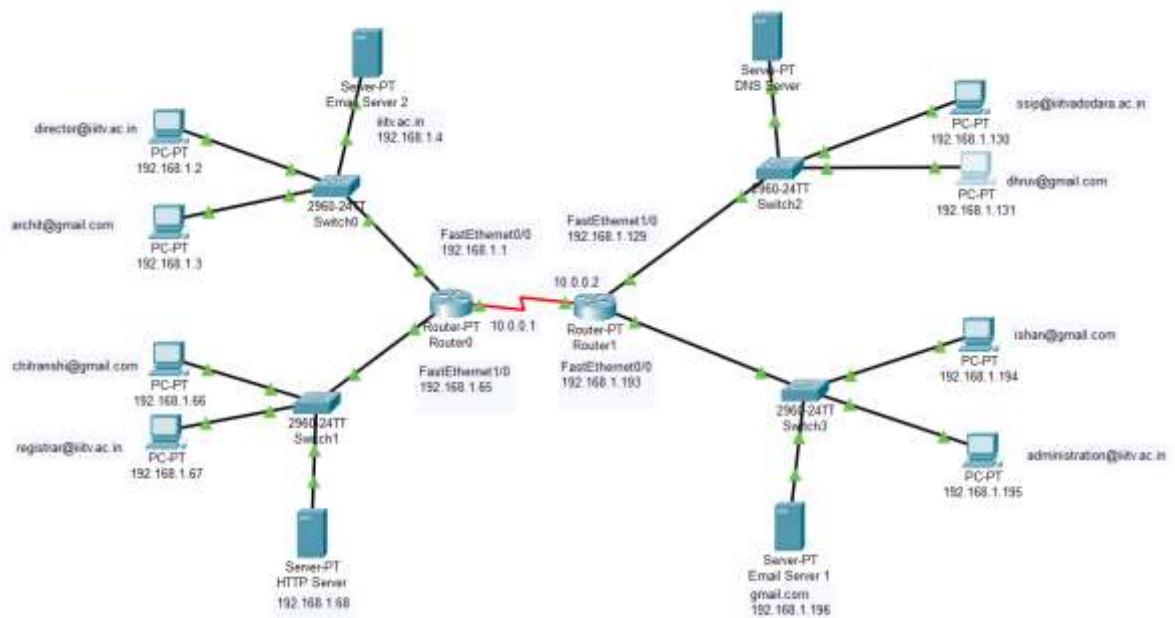
## 1. Define and differentiate between a server and a router.

A **server** is a computer **program or a device** that provides functionality for called clients which are other programs or devices. Servers can provide various functionalities called services. These services include **sharing data or resources** among multiple clients, or performing computation for a client. It accepts and responds to requests made over a network.

Routers are networking devices operating at layer 3 or a network layer of the OSI model. They are responsible for receiving, analysing, and forwarding data packets among the connected computer networks. When a data packet arrives, the router inspects the destination address, consults its routing tables to decide the optimal route and then transfers the packet along this route.

**2. Make a complex network (as discussed in lab) with multiple PCs, servers (HTTP and Mail), switches and routers. The network should have a minimum of 4 subnets with IP address subnetting. Each server may be in different subnet. Demonstrate transfer of emails between two different domains (eg: gmail and yahoo). Also show the response of HTTP request from a PC that is in different subnet from the HTTP server.**

The network is shown in the figure below.



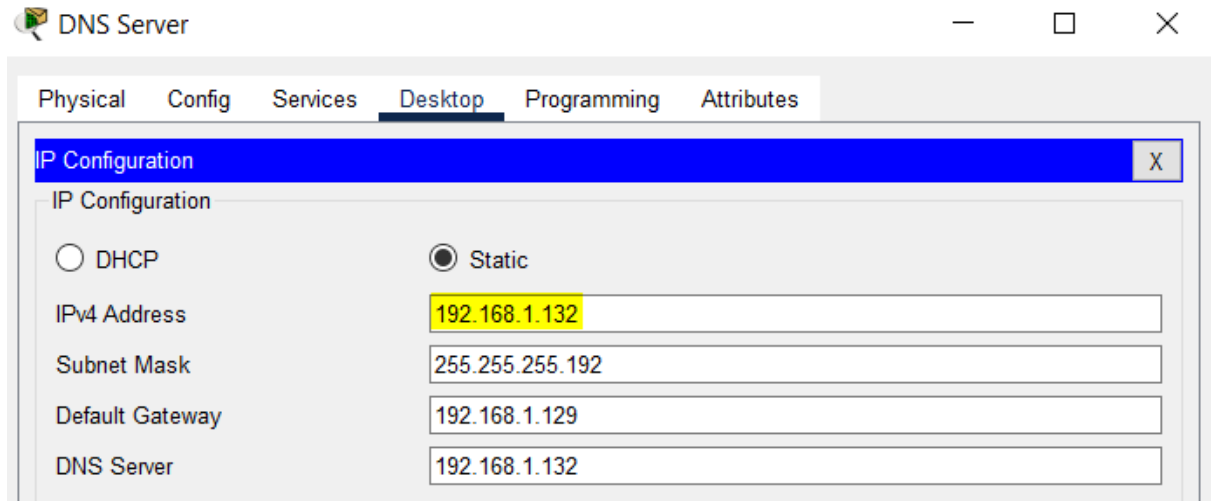
Here, I have used the domain 192.168.1.0 and created four subnets using the subnet mask 255.255.255.192 or /26.

The subnet ranges are:

- 192.168.1.0 – 192.168.1.63
- 192.168.1.64 – 192.168.1.127
- 192.168.1.128 – 192.168.1.191
- 192.168.1.192 – 192.168.1.255

The first and last address of each subnet are not used as they are reserves for network and broadcast address respectively.

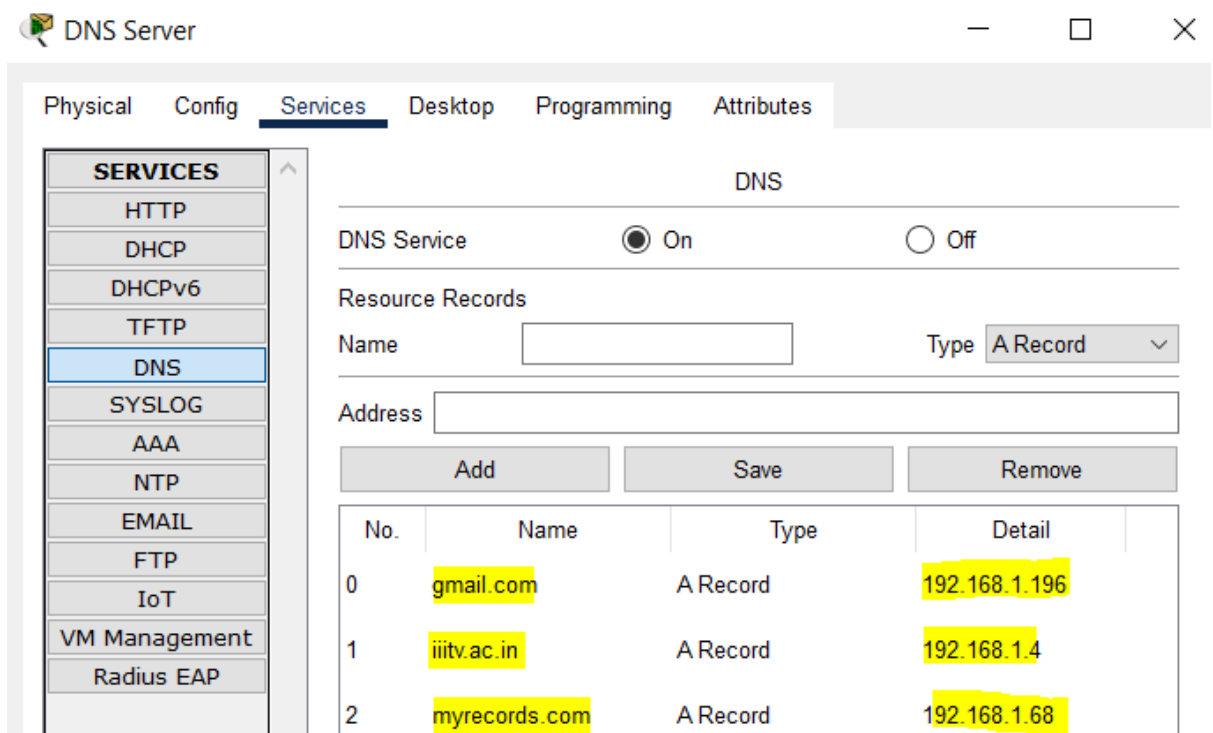
- Setting up the servers.
  - The DNS server:** It is setup in the subnet 192.168.1.128 – 192.168.1.192. The IP configuration of the DNS server is shown below.



The screenshot shows the 'DNS Server' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is active, showing the following settings:

Setting	Value
IP Configuration	Static
IPv4 Address	192.168.1.132
Subnet Mask	255.255.255.192
Default Gateway	192.168.1.129
DNS Server	192.168.1.132

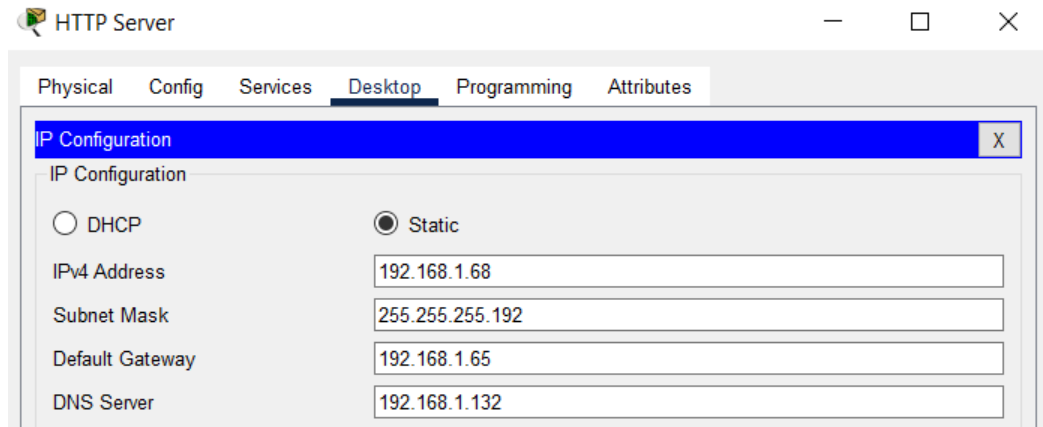
The other server addresses(set-up in next steps) and domain names are added in the DNS server.



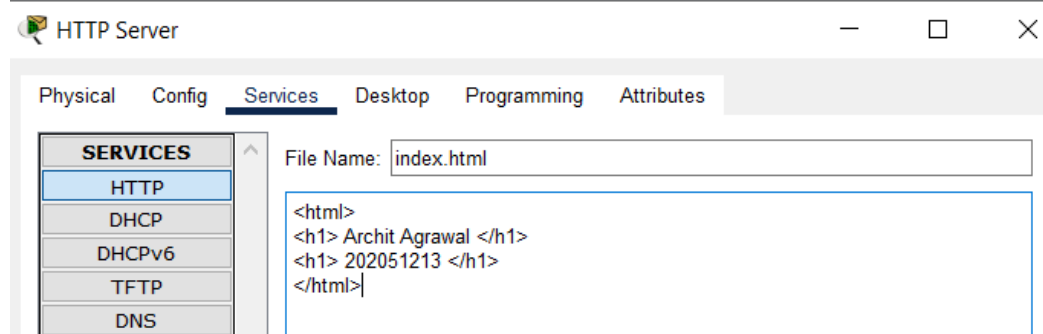
The screenshot shows the 'DNS Server' configuration window with the 'Services' tab selected. The 'DNS' service is enabled, and the following resource records are listed:

No.	Name	Type	Detail
0	gmail.com	A Record	192.168.1.196
1	iiitv.ac.in	A Record	192.168.1.4
2	myrecords.com	A Record	192.168.1.68

- b. The HTTP Server:** It is setup in the subnet 192.168.1.64 – 192.168.1.127. The IP configuration of the DNS server is shown below.

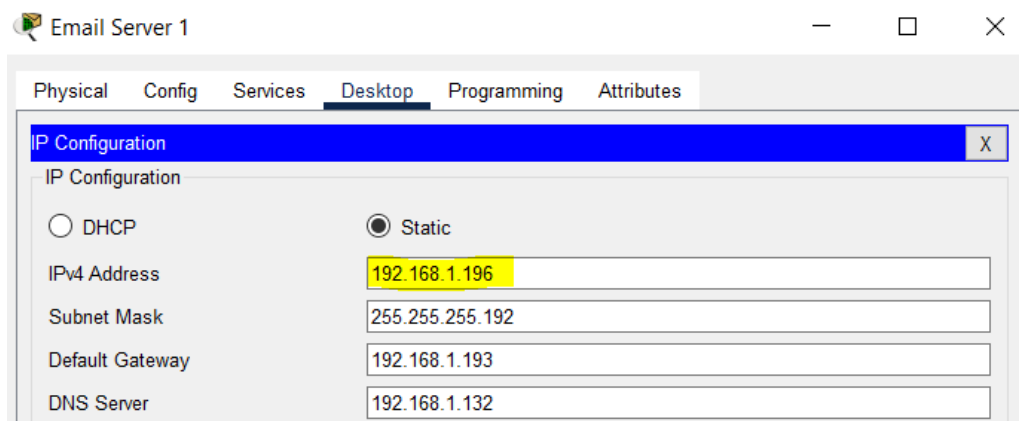


A webpage is set-up in the server that will be displayed on browser on hitting the IP or domain-name of this server.

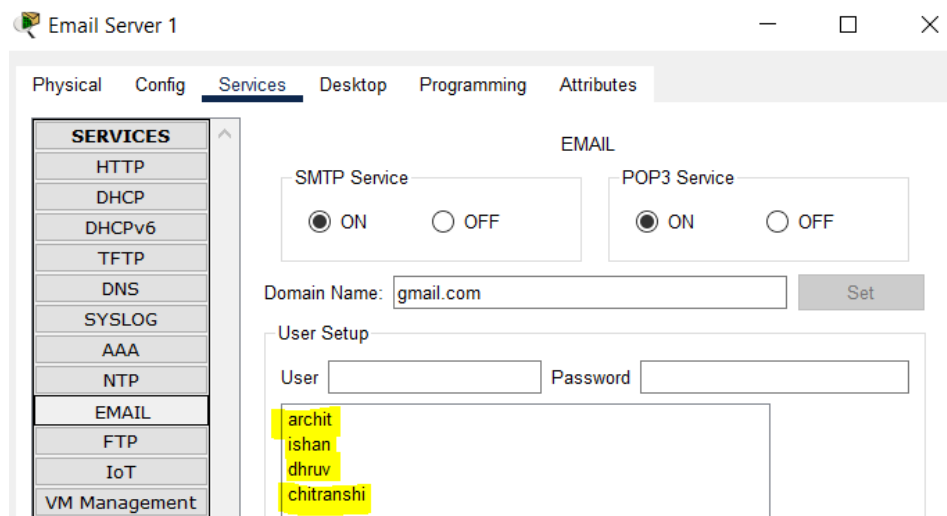


- c. The Email Server 1 (domain name: gmail.com):** It is setup in the subnet 192.168.1.192 – 192.168.1.255.

The IP configuration of the DNS server is shown below.

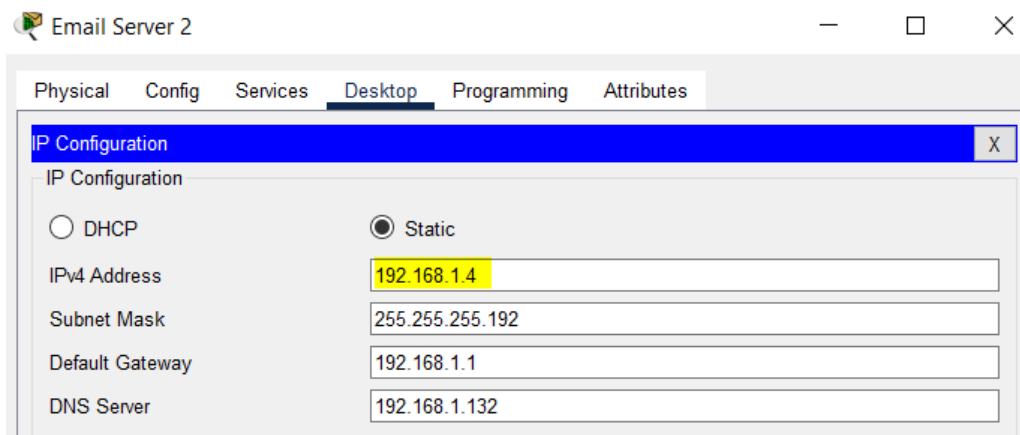


Some email accounts are added in this server.

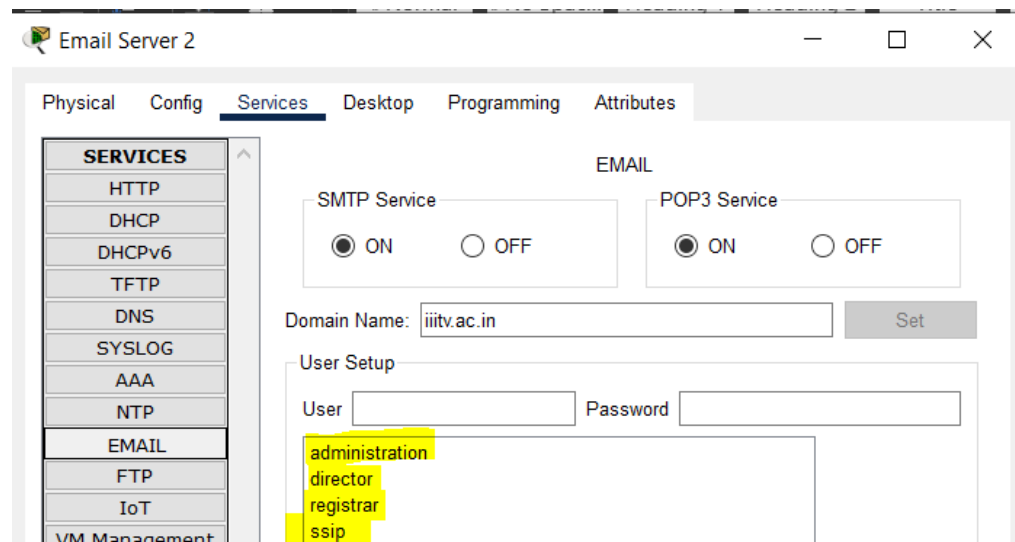


**d. The Email Server 2 (domain name: iiitv.ac.in):** It is setup in the subnet 192.168.1.0 – 192.168.1.63.

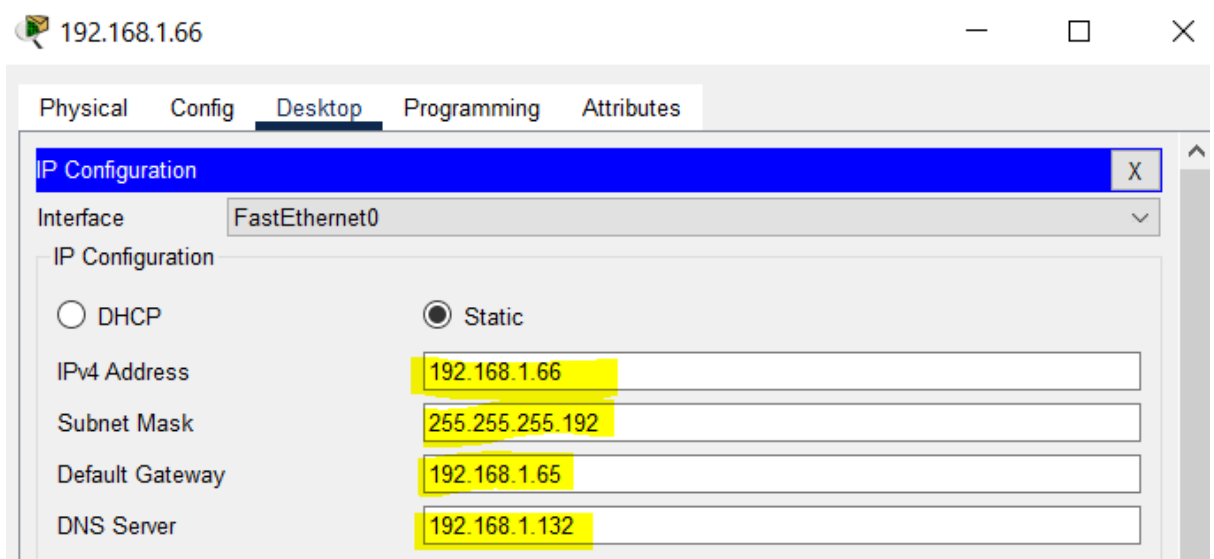
The IP configuration of the DNS server is shown below.



Some email accounts are added in this server.

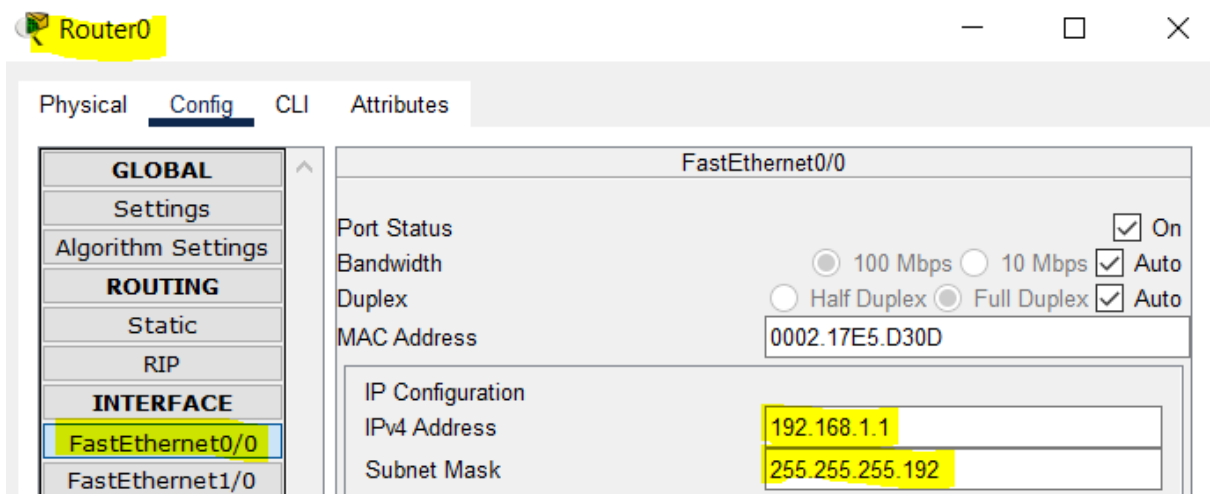


- Configuring the IP's for each PC.
  - a. Each PC will have a unique IP in the subnet range of the subnet to which it belongs.
  - b. Each PC will use the subnet mask 255.255.255.192 or /26.
  - c. Each PC will have a default gateway address that will depend on the IP address of the router to which it is connected.
  - d. Each PC will have a DNS Server address which will be 192.168.1.132, the IP address of DNS Server.



The IP address of each PC is written under the PC in the network image.

- Configuring the Router. Each router will use the subnet /26.



Router0

Physical Config CLI Attributes

**GLOBAL**

Settings

Algorithm Settings

**ROUTING**

Static

RIP

**INTERFACE**

FastEthernet0/0

FastEthernet1/0

FastEthernet1/0

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0040.0B1D.9028

IP Configuration

IPv4 Address 192.168.1.65

Subnet Mask 255.255.255.192

Router1

Physical Config CLI Attributes

**GLOBAL**

Settings

Algorithm Settings

**ROUTING**

Static

RIP

**INTERFACE**

FastEthernet0/0

FastEthernet1/0

FastEthernet0/0

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0004.9A19.1D56

IP Configuration

IPv4 Address 192.168.1.193

Subnet Mask 255.255.255.192

Router1

Physical Config CLI Attributes

**GLOBAL**

Settings

Algorithm Settings

**ROUTING**

Static

RIP

**INTERFACE**

FastEthernet0/0

FastEthernet1/0

FastEthernet1/0

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 00E0.A347.4D25

IP Configuration

IPv4 Address 192.168.1.129

Subnet Mask 255.255.255.192



- Configuring the Serial Port of routers for inter-router connection. Each router uses a subnet mask /30 because it has a maximum of 3 devices connected to it (two switches and another router).

The image shows two screenshots of router configuration windows, one for Router0 and one for Router1. Both windows are in the 'Config' tab and show the configuration for the Serial2/0 interface. The configuration includes Port Status (On), Duplex (Full Duplex), Clock Rate (2000000), IP Configuration (IPv4 Address: 10.0.0.1 for Router0 and 10.0.0.2 for Router1, Subnet Mask: 255.255.255.252), and Tx Ring Limit (10).

**Router0 Configuration:**

- Port Status: ☒ On
- Duplex: ☐ Full Duplex
- Clock Rate: 2000000
- IP Configuration:
  - IPv4 Address: 10.0.0.1
  - Subnet Mask: 255.255.255.252
- Tx Ring Limit: 10

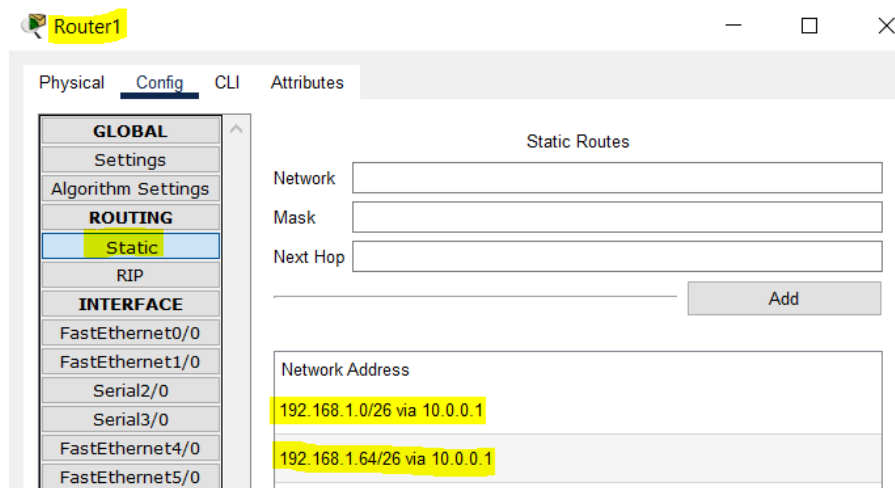
**Router1 Configuration:**

- Port Status: ☒ On
- Duplex: ☐ Full Duplex
- Clock Rate: 2000000
- IP Configuration:
  - IPv4 Address: 10.0.0.2
  - Subnet Mask: 255.255.255.252
- Tx Ring Limit: 10

- For both routers, adding the networks connected to the other network in the static routing table.

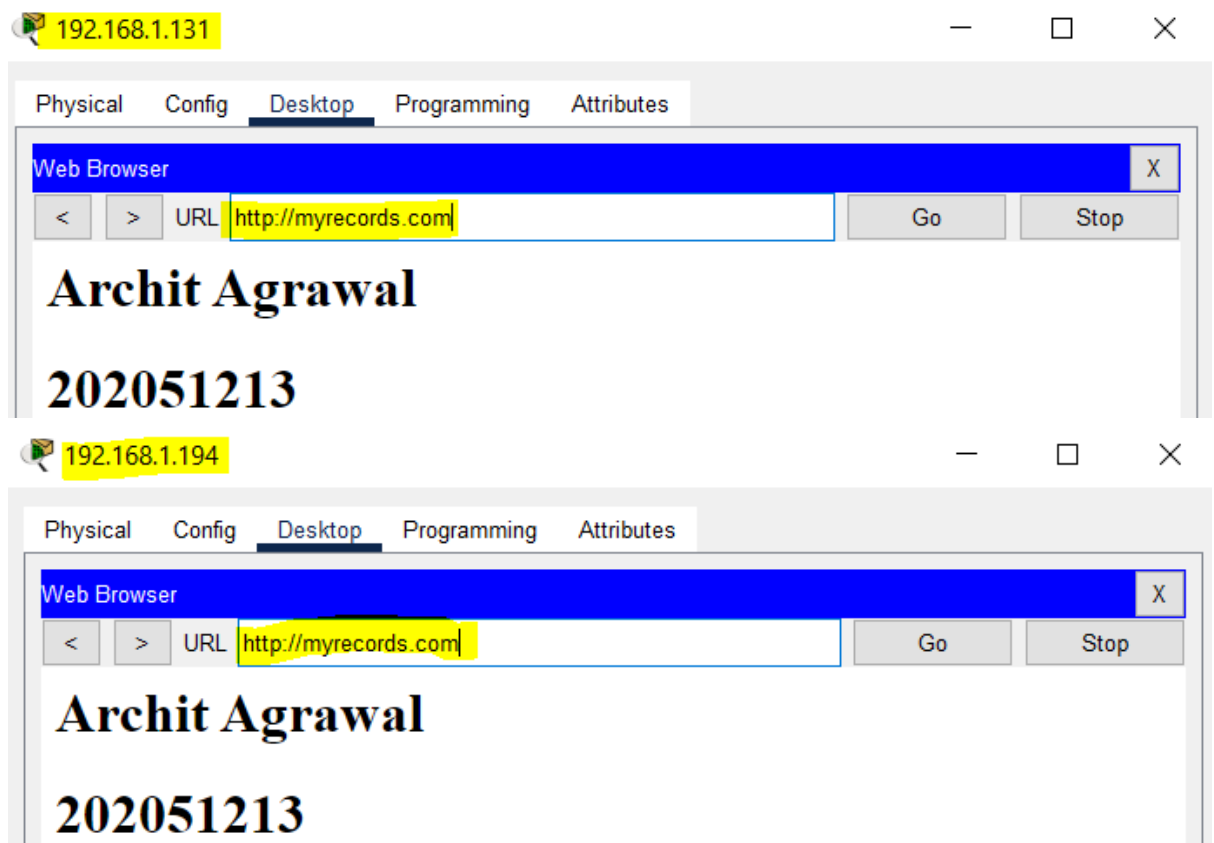
The image shows a screenshot of the Router0 configuration window, specifically the 'Static Routes' section. The configuration includes Network, Mask, and Next Hop fields, and an 'Add' button. The static routes are listed below:

Network Address
192.168.1.128/26 via 10.0.0.2
192.168.1.192/26 via 10.0.0.2



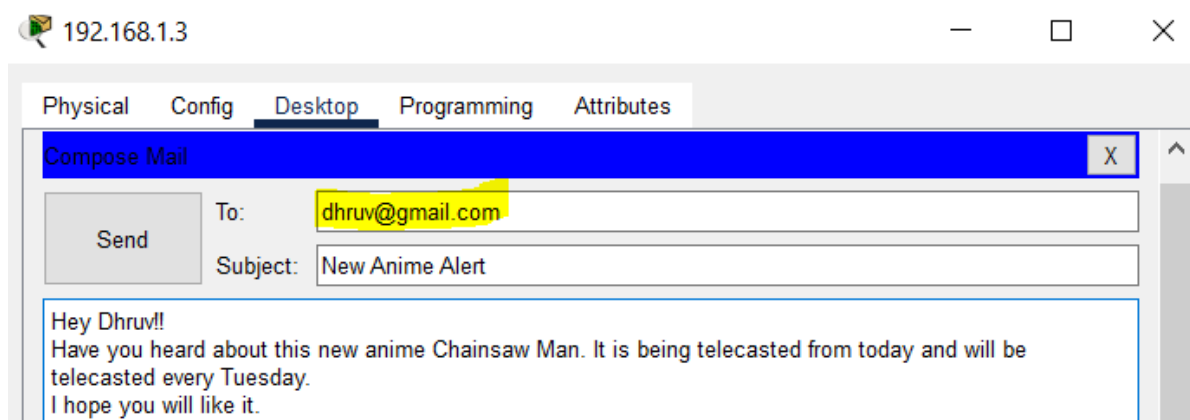
- The network is configured, now we can check if the servers are connected properly or not.
  - a. Checking the HTTP server by hitting its domain name from a computer on each subnet.

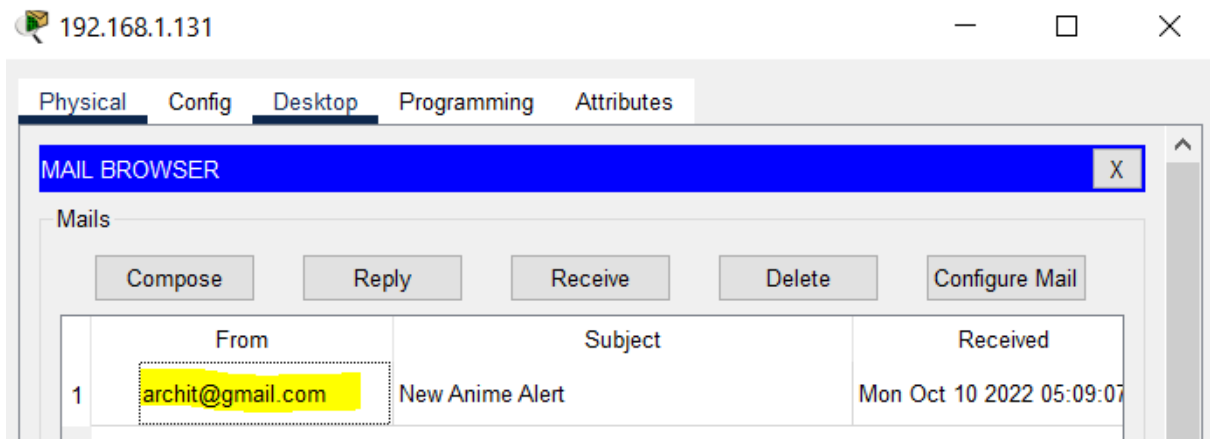




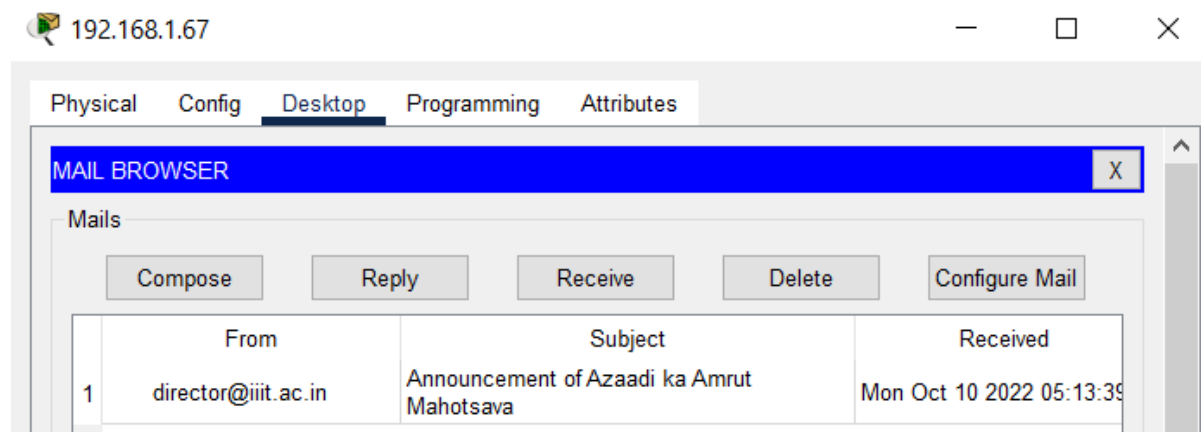
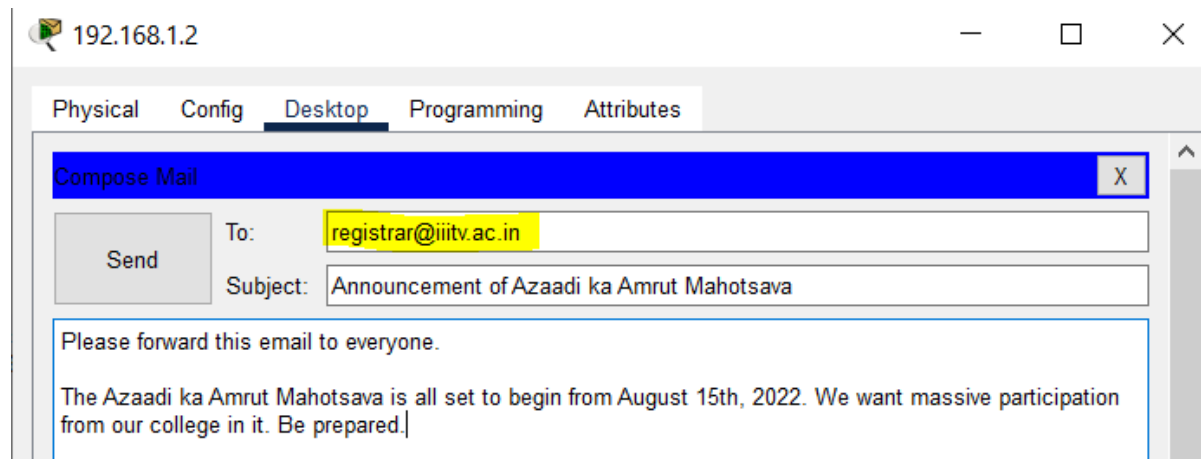
b. Checking email server by sending emails intra-domain and inter-domain. An email account is logged on each PC. The account that is logged on a PC is written near it in the network figure.

⇒ gmail.com to gmail.com (archit@gmail.com to dhruv@gmail.com)

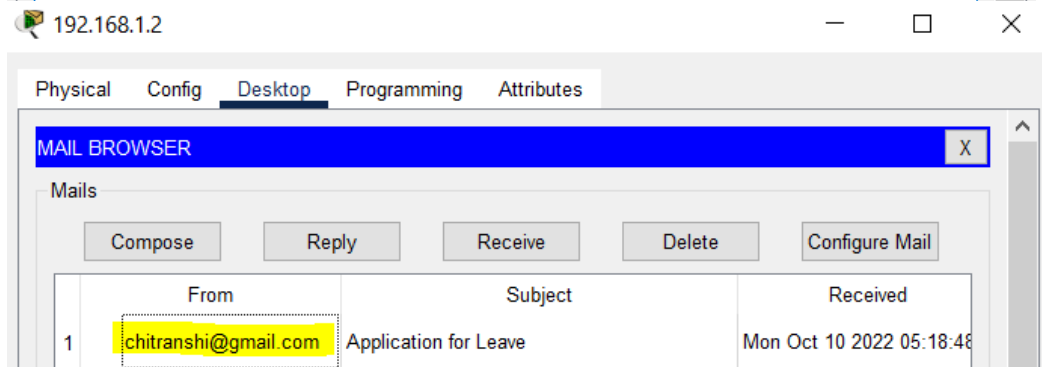
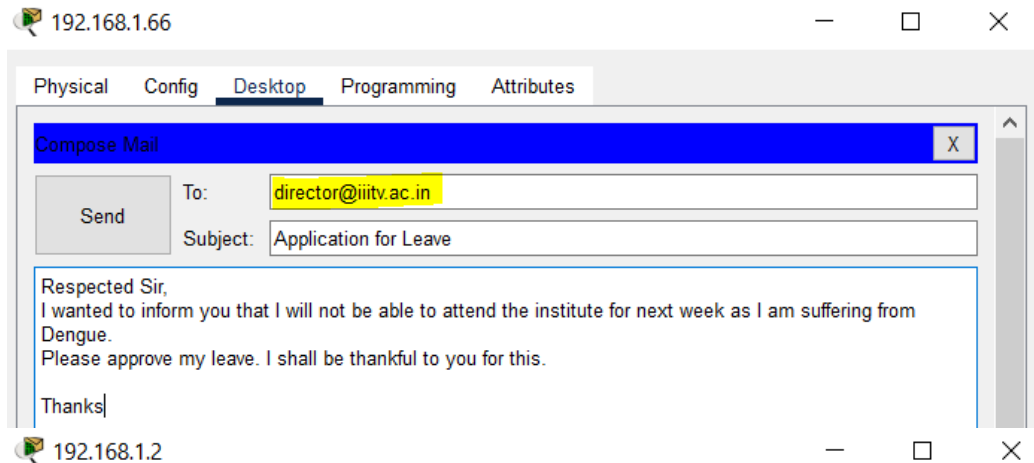




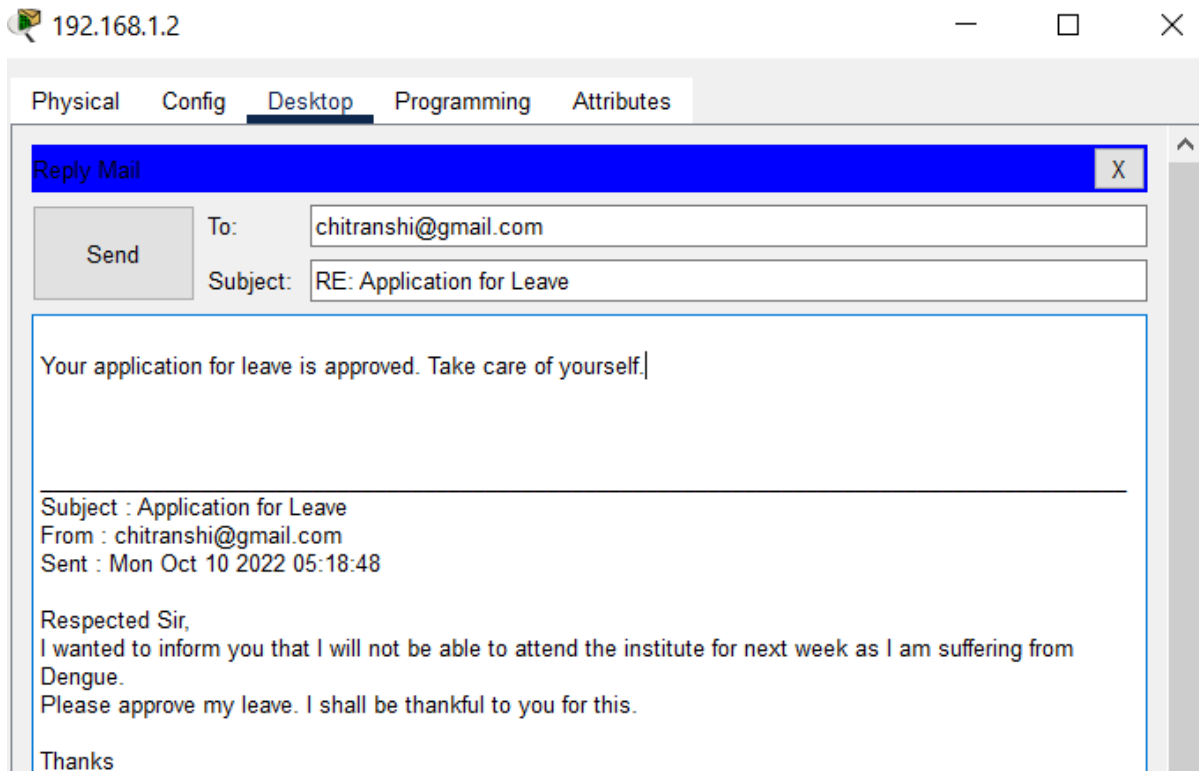
⇒ iiitv.ac.in to iiitv.ac.in (director@iiitv.ac.in to registrar@iiitv.ac.in)

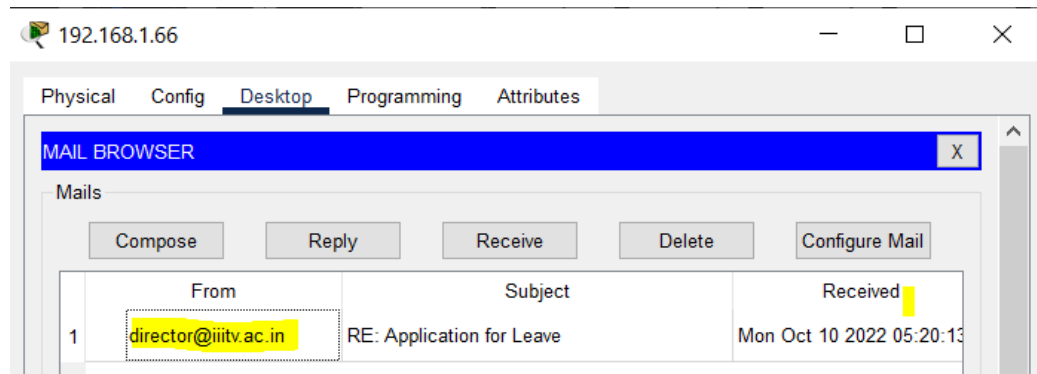


⇒ gmail.com to iiitv.ac.in (chitranshi@gmail.com to director@iiitv.ac.in)



⇒ iiitv.ac.in to gmail.com (director@iiitv.ac.in to chitranshi@iiitv.ac.in)





- c. Since the emails are sent properly and also by hitting the domain name of webserver, webpage is loaded, hence, the DNS server is working properly.