

## **EXPERIMENT NO.: 07**

**AIM:** To design and simulate the environment for Dynamic routing using Cisco packet tracer.

### **THEORY:**

Dynamic routing is a networking technique that provides optimal data routing. Unlike static routing, dynamic routing enables routers to select paths according to real-time logical network layout changes. In dynamic routing, the routing protocol operating on the router is responsible for the creation, maintenance and updating of the dynamic routing table. In static routing, all these jobs are manually done by the system administrator. Dynamic routing uses multiple algorithms and protocols. The most popular are Routing Information Protocol (RIP) and Open Shortest Path First (OSPF). The cost of routing is a critical factor for all organizations. The least expensive routing technology is provided by dynamic routing, which automates table changes and provides the best paths for data transmission.

Typically, dynamic routing protocol operations can be explained as follows:

1. The router delivers and receives the routing messages on the router interfaces.
2. The routing messages and information are shared with other routers, which use exactly the same routing protocol.
3. Routers swap the routing information to discover data about remote networks.
4. Whenever a router finds a change in topology, the routing protocol advertises this topology change to other routers.

Dynamic routing is easy to configure on large networks and is more intuitive at selecting the best route, detecting route changes and discovering remote networks. However, because routers share updates, they consume more bandwidth than in static routing; the routers' CPUs and RAM may also face additional loads as a result of routing protocols. Finally, dynamic routing is less secure than static routing.

- Advantages:
  - The chief advantages of dynamic routing over static routing are scalability and adaptability. A dynamically routed network can grow more quickly and larger, and is able to adapt to changes in the network topology brought about by this growth or by the failure of one or more network components.
  - With a dynamic router protocol, routers learn about the network topology by communicating with other routers. Each router announces its presence, and the routes it has available, to the other routers on the network. Therefore, if you add anew router, or add an additional segment to an existing router, the other routers

will hear about the addition and adjust their routing tables accordingly. You don't have to reconfigure the routers to tell them that the network has changes. Similarly, if you move a network segment, the other routers will hear about the change. You only need to change the configuration of the router (or routers) that connect the segment that moved. This reduces the chance that errors will occur.

- The ability to learn about changes to the network's configuration has implications beyond adding new segments or moving old ones. It also means that the network can adjust to failures. If a network has redundant paths, then a partial network failure appears to the routers as if some segments got moved (they are now reached via alternate paths), and some segments have been removed from the network (they are now unreachable). In short, there's no real difference between a network failure and a configuration change. Dynamic routing allows the network to continue functioning, perhaps in a degraded fashion, when partial failure occurs.

- Disadvantages:**

- Routers resources are used (CPU cycles, Memory and Link bandwidth)

The screenshot shows a window titled "Router1" with three tabs: "Physical", "Config", and "CLI". The "CLI" tab is selected and displays the "IOS Command Line Interface". The interface shows the following configuration commands being entered:

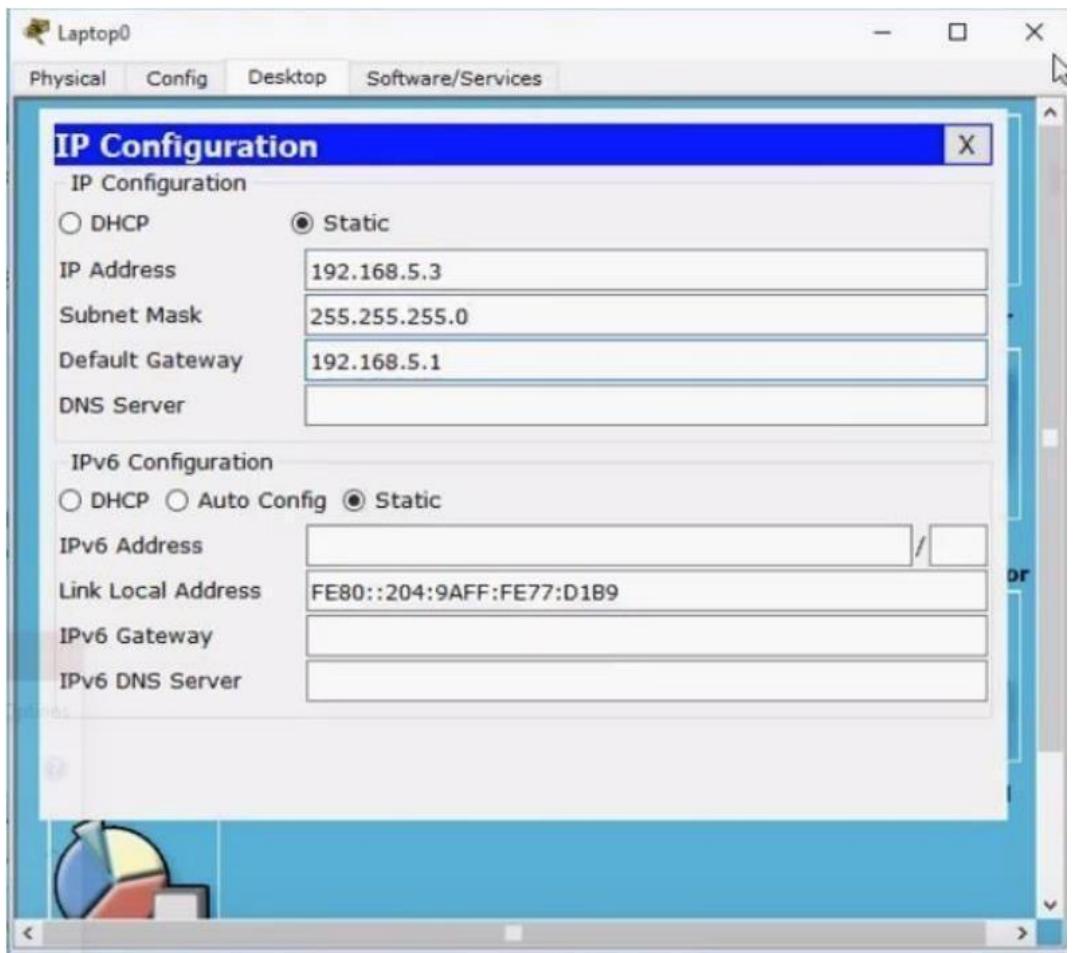
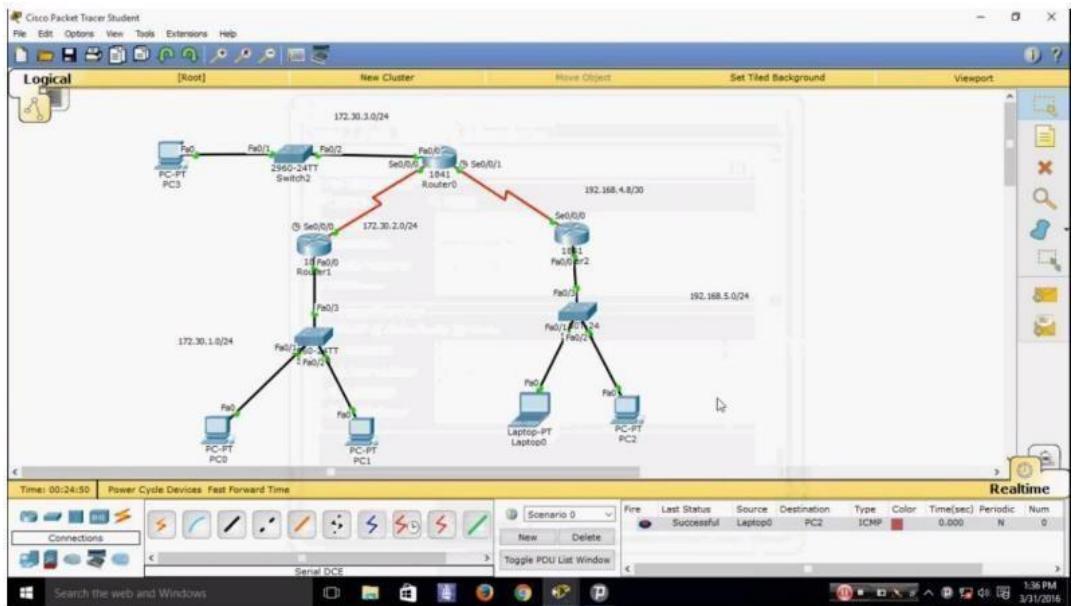
```
Router(config-if)#do wr
Building configuration...
[OK]
Router(config-if)#exit
Router(config)#int
Router(config)#interface s
Router(config)#interface serial 0/0/0
Router(config-if)#ip add
Router(config-if)#ip address 172.30.2.2 255.255.255.0
Router(config-if)#clock r
Router(config-if)#clock rate 64000
Router(config-if)#no shut
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#do wr
Building configuration...
[OK]
Router(config-if)#exit
Router(config)#router rip
Router(config)#router rip
Router(config-router)#net
Router(config-router)#network 172.30.1.0
Router(config-router)#net
Router(config-router)#network 172.30.2.0
Router(config-router)#do wr
Building configuration...
[OK]
Router(config-router)#[
```

At the bottom right of the CLI window, there are "Copy" and "Paste" buttons.

- More administrator knowledge is required for configuration, verification and troubleshooting

Name: Tiya Nathwani  
Roll No.: 2411134  
Batch: 23



Name: Tiya Nathwani  
Roll No.: 2411134  
Batch: 23

## **PROGRAM:**

- **Topology Using Hub:**

1. Add the components: 3 PC-PT, 1 Hub Generic.
2. Connect the PCs to the Hub using the Copper straight through wire using FastEthernet.
3. Configure the IP addresses of each PCs in the topology.
4. Pass the file from one PC to another and check if the file is getting successfully transferred.
5. It may take some time for the connection to be established, therefore if it shows failure, wait for a while or recheck your configuration.

- **Topology Using Switch:**

1. Add the components: 3 PC-PT, 1 Switch Generic.
2. Connect the PCs to the Switch using the Copper straight through wire using FastEthernet.
3. Configure the IP addresses of each PCs in the topology.
4. Pass the file from one PC to another and check if the file is getting successfully transferred.
5. It may take some time for the connection to be established, therefore if it shows failure, wait for a while or recheck your configuration.

- **Static Routing:**

1. Add the components: 4 PC-PT, 2 Switch Generic, 2 Router Generic.
2. Connect the PCs 1 and 2 to Switch 1 using a copper straight through wire using FastEthernet and do the same for PCs 3 and 4 to Switch 2.
3. Connect the Switches 1 and 2 to the Routers 1 and 2 respectively using a copper straight through wire using FastEthernet.
4. Connect the Routers 1 and 2 to each other using a Serial cable using Serial.
5. Now configure the IP addresses of each PC.
6. Configure FastEthernet and Serial interface IP addresses.
7. Pass the file from one PC from a Router to another PC of another Router and check if the file is getting successfully transferred.
8. It may take some time for the connection to be established, therefore if it shows failure, wait for a while or recheck your configuration.

- **Dynamic Routing:**

1. You can perform dynamic routing for two or more PCs.
2. Add the components: 4 PC-PT, 2 Switch Generic, 2 Router Generic.
3. Connect the PCs 1 and 2 to Switch 1 using a copper straight through wire using FastEthernet and do the same for PCs 3 and 4 to Switch 2.
4. Connect the Switches 1 and 2 to the Routers 1 and 2 respectively using a copper straight through wire using FastEthernet.

**Name: Tiya Nathwani**

**Roll No.: 2411134**

**Batch: 23**

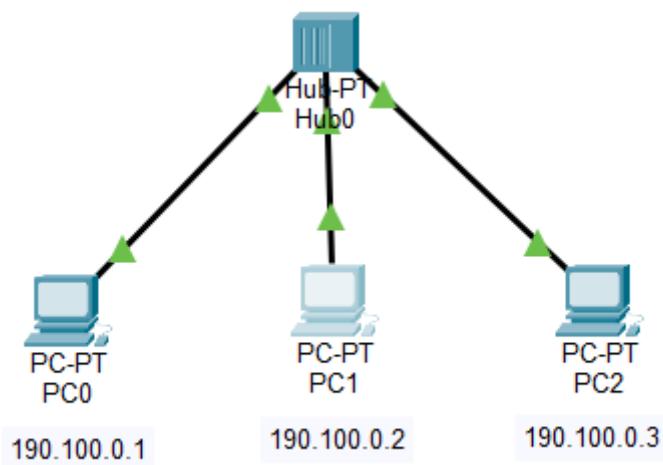
5. Connect the Routers 1 and 2 to each other using a Serial cable using Serial.
6. Now configure the IP addresses of each PC
7. Configure FastEthernet and Serial interface IP addresses.
8. Now another step here is to configure the RIP routing in the configuration of each Router. Put the network addresses of all the other connections in the topology.
9. Pass the file from one PC from a Router to another PC of another Router and check if the file is getting successfully transferred.
10. It may take some time for the connection to be established, therefore if it shows failure, wait for a while or recheck your configuration.

Name: Tiya Nathwani  
Roll No.: 2411134  
Batch: 23

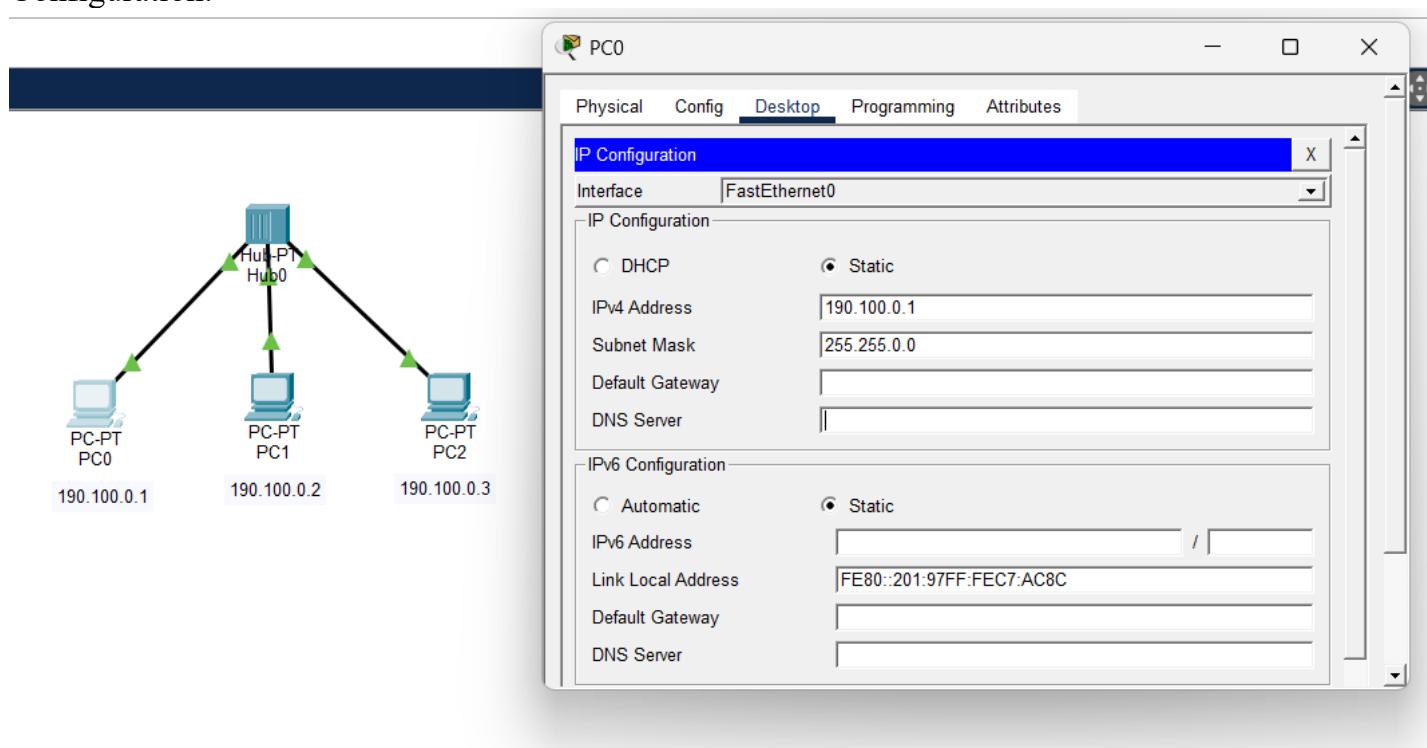
## OUTPUT AND FINDINGS:

- Topology Using

Hub: Topology:

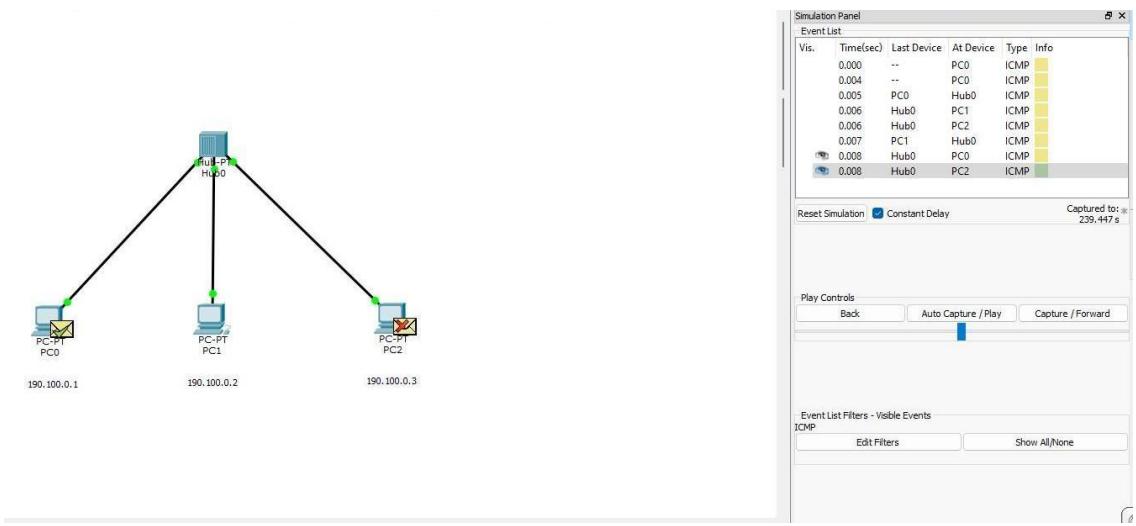


Configuration:



**Name: Tiya Nathwani**  
**Roll No.: 2411134**  
**Batch: 23**

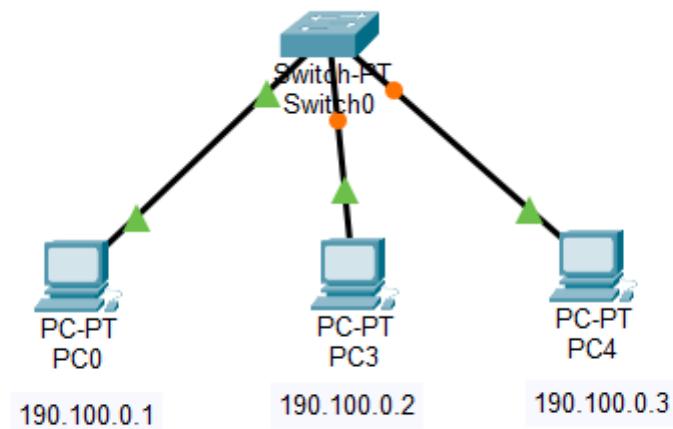
### File Transfer:



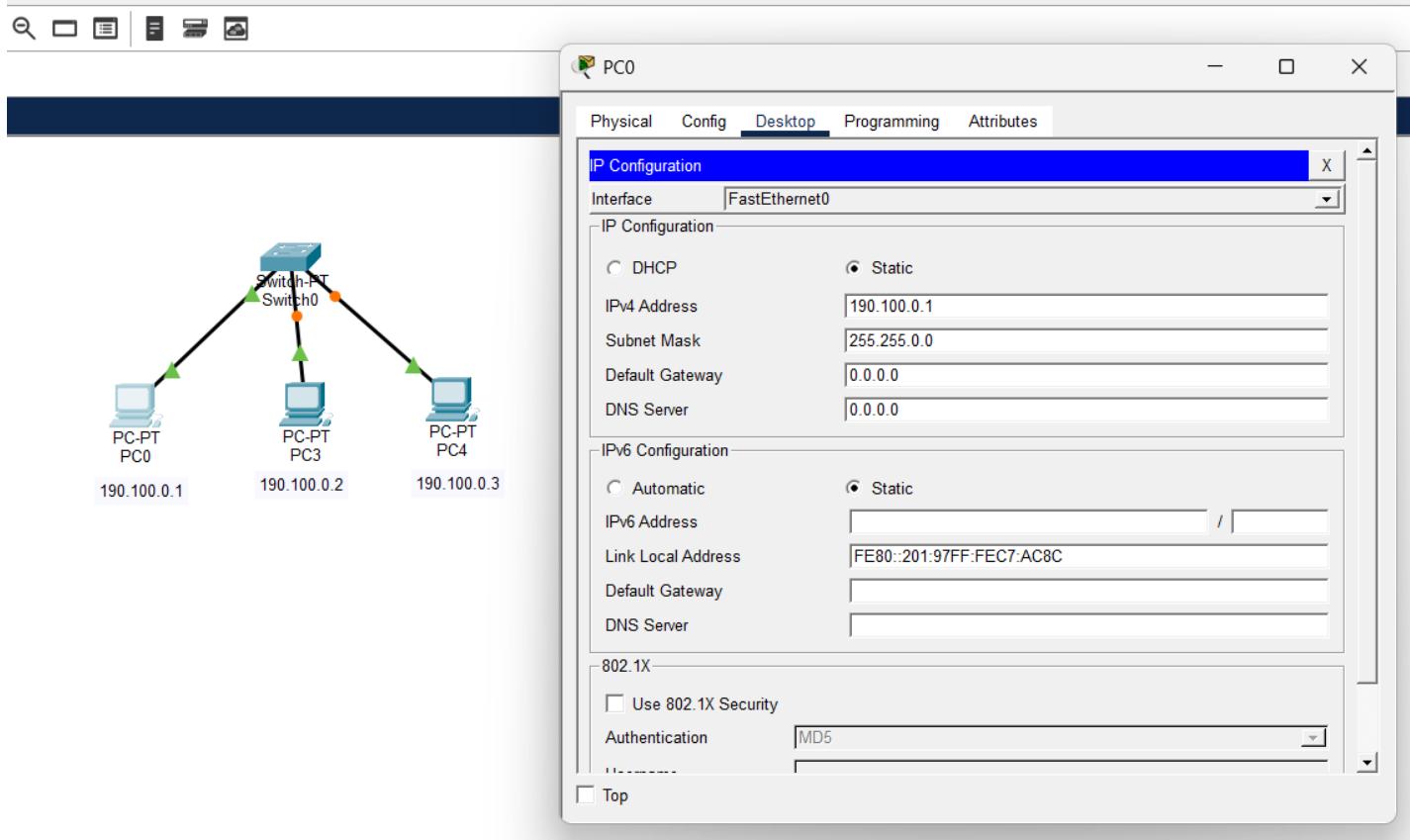
Name: Tiya Nathwani  
Roll No.: 2411134  
Batch: 23

- Topology Using

Switch: Topology:

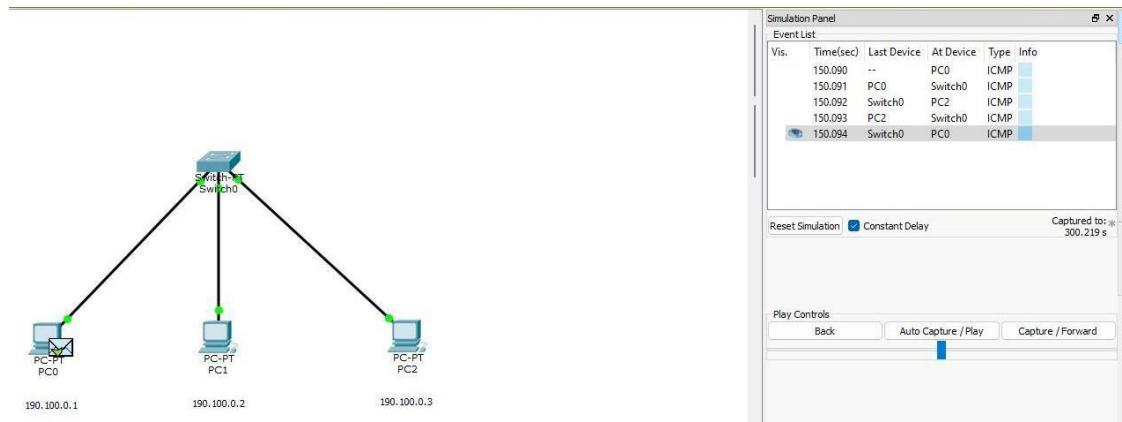


Configuration:



**Name: Tiya Nathwani**  
**Roll No.: 2411134**  
**Batch: 23**

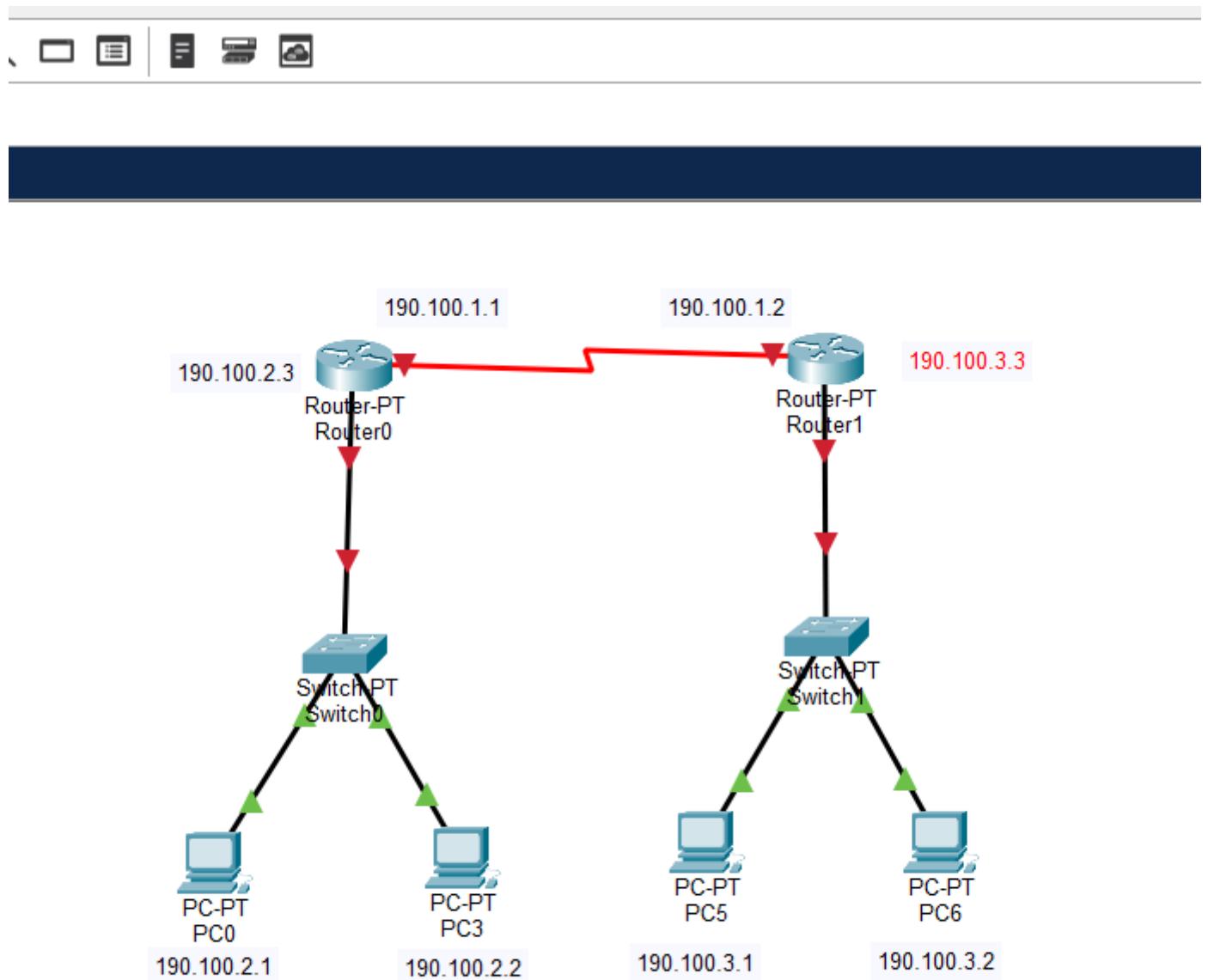
### File Transfer:



Name: Tiya Nathwani  
Roll No.: 2411134  
Batch: 23

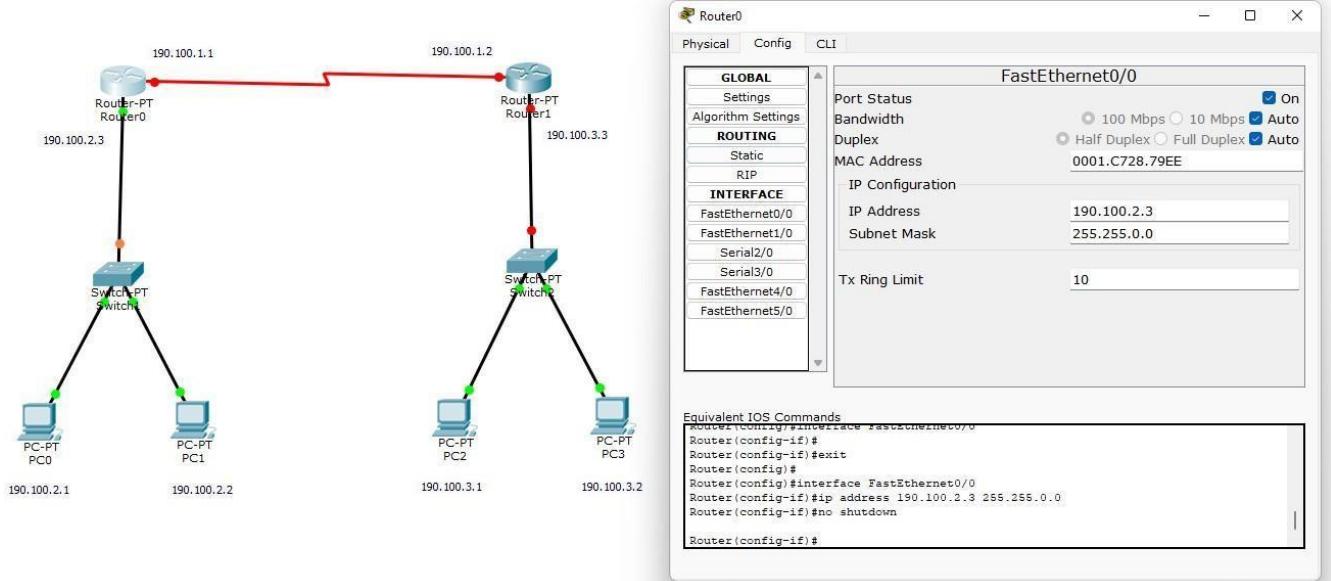
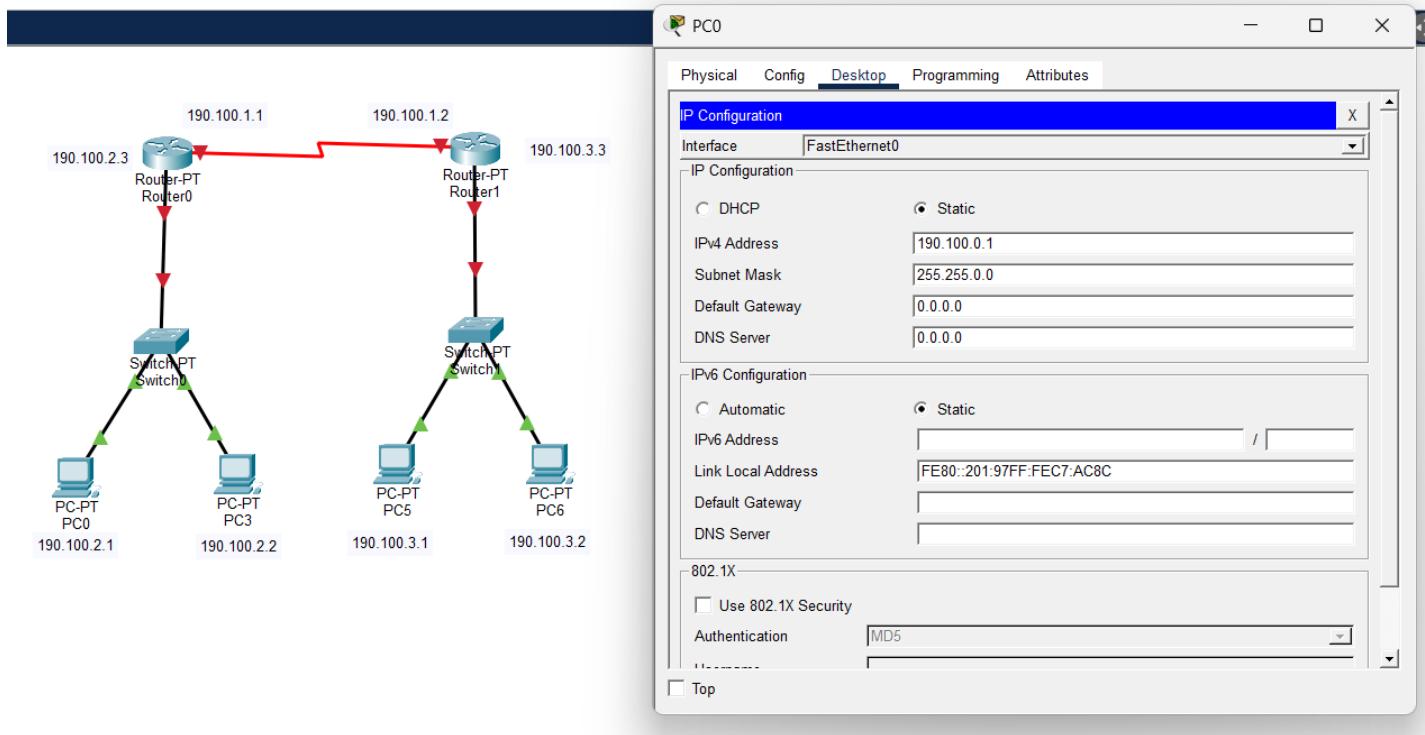
- Static

Routing: Topology:

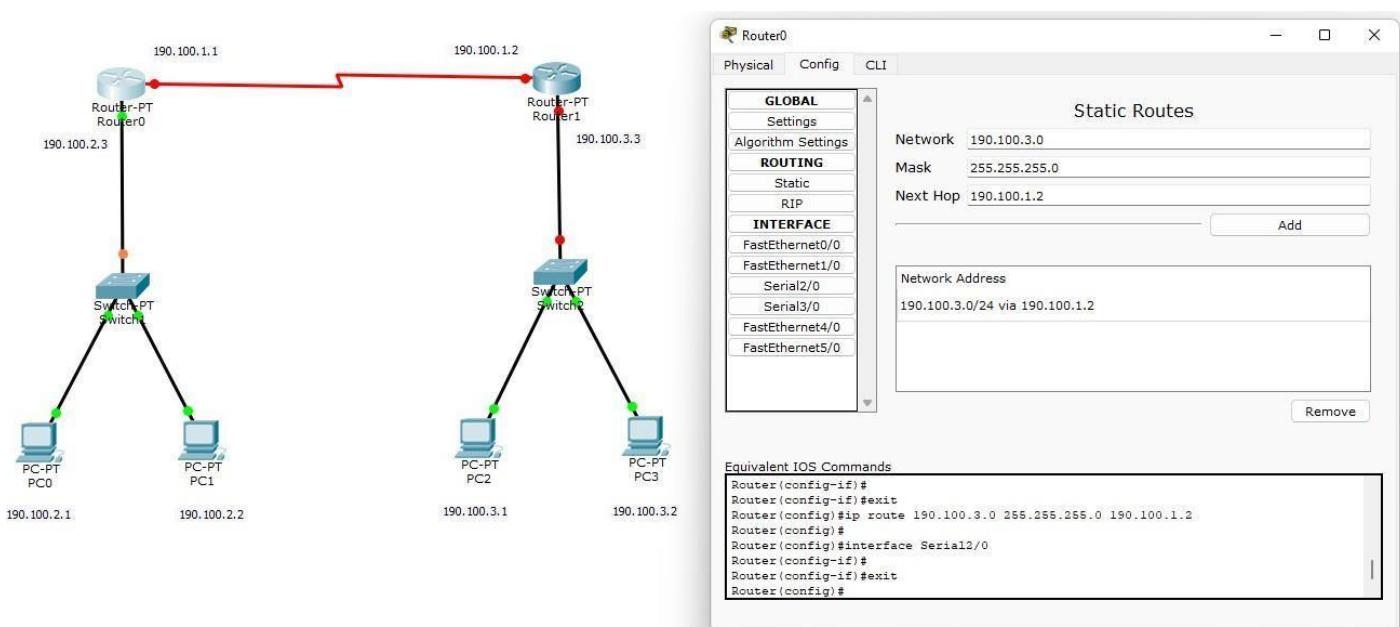
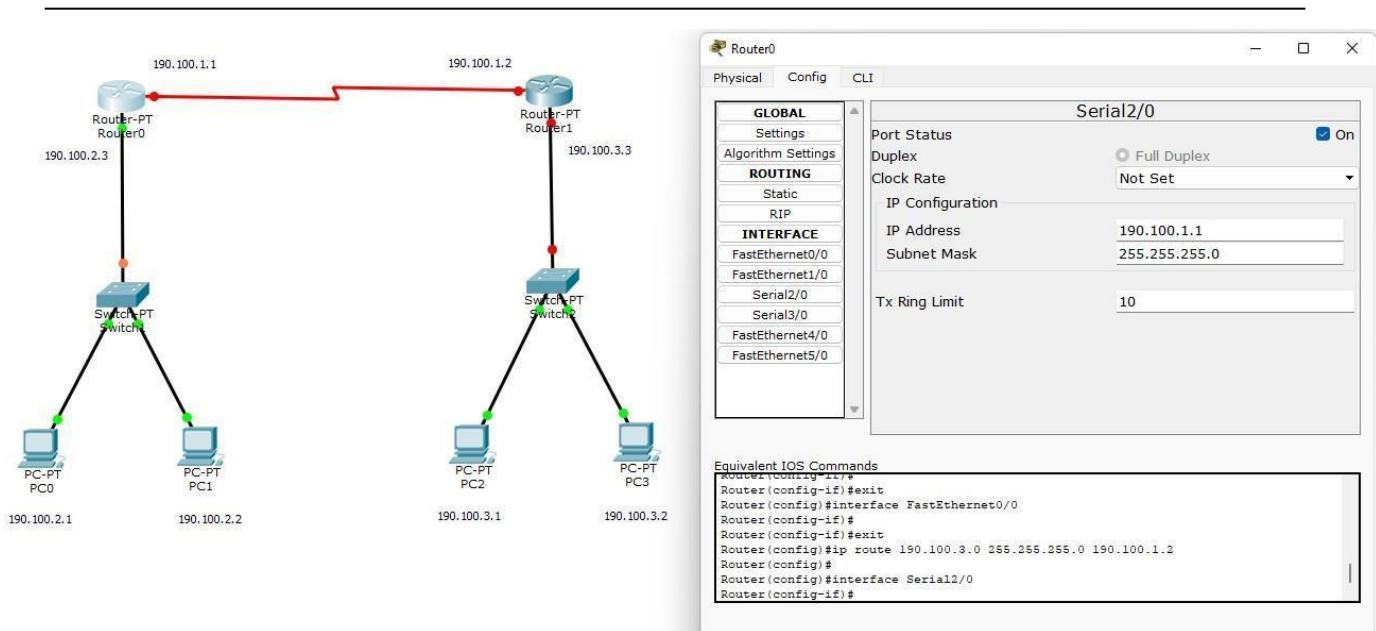


Name: Tiya Nathwani  
 Roll No.: 2411134  
 Batch: 23

## Configuration:

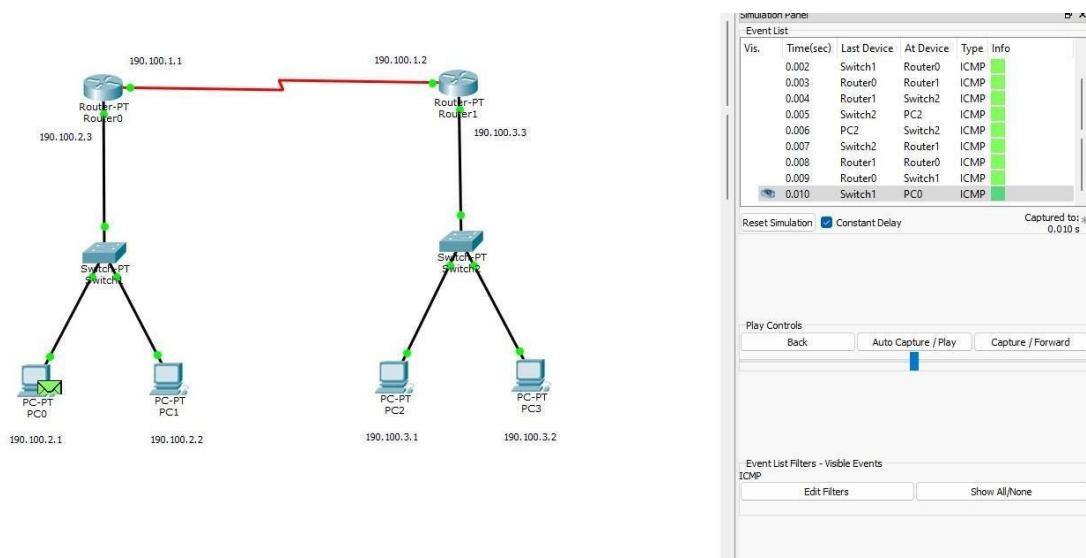


Name: Tiya Nathwani  
 Roll No.: 2411134  
 Batch: 23



Name: Tiya Nathwani  
 Roll No.: 2411134  
 Batch: 23

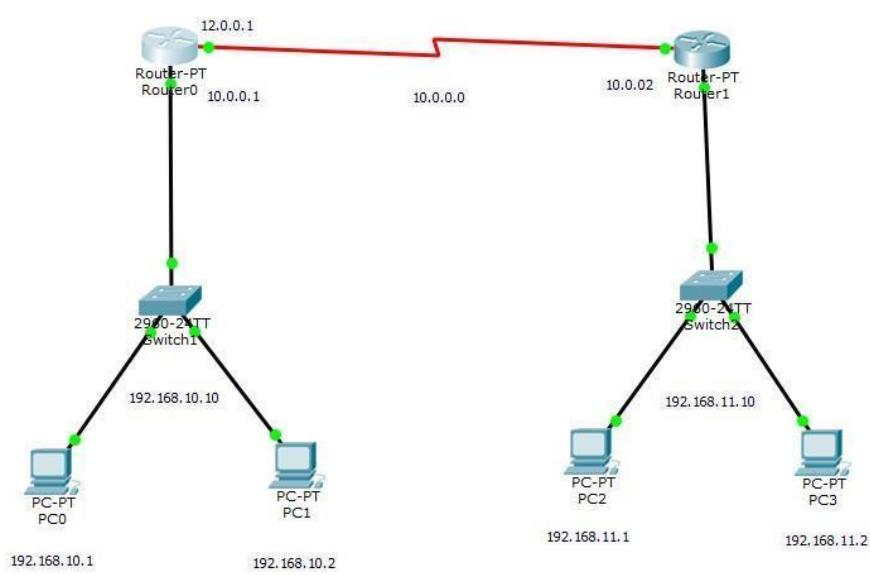
File Transfer:



- Dynamic Routing:

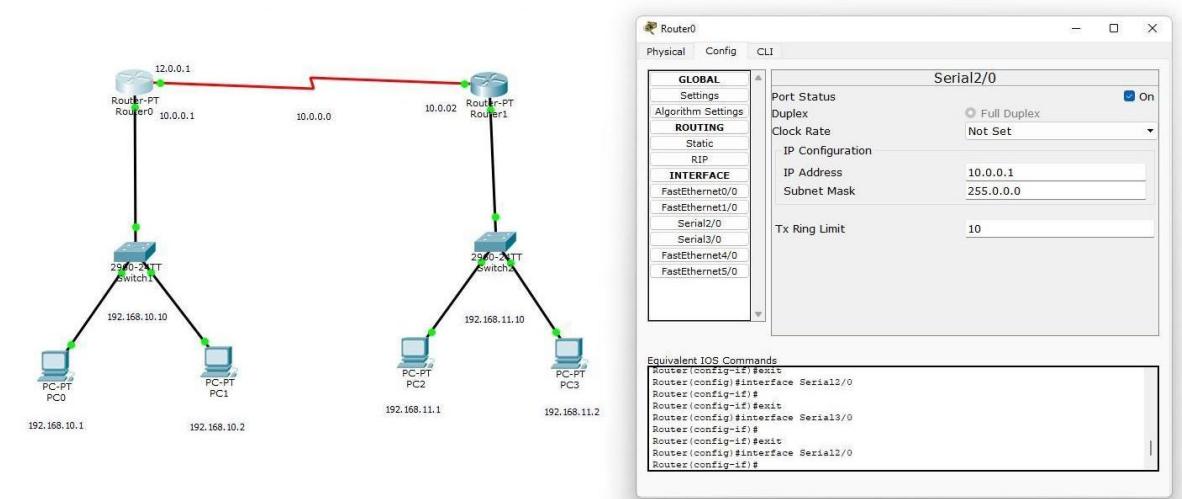
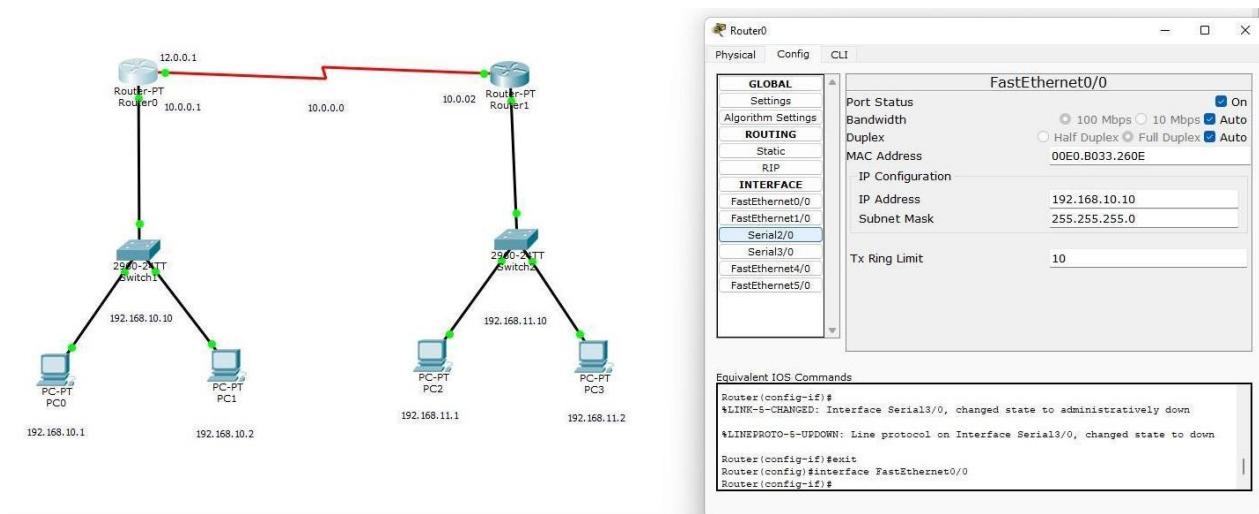
For Two Routers:

Topology:

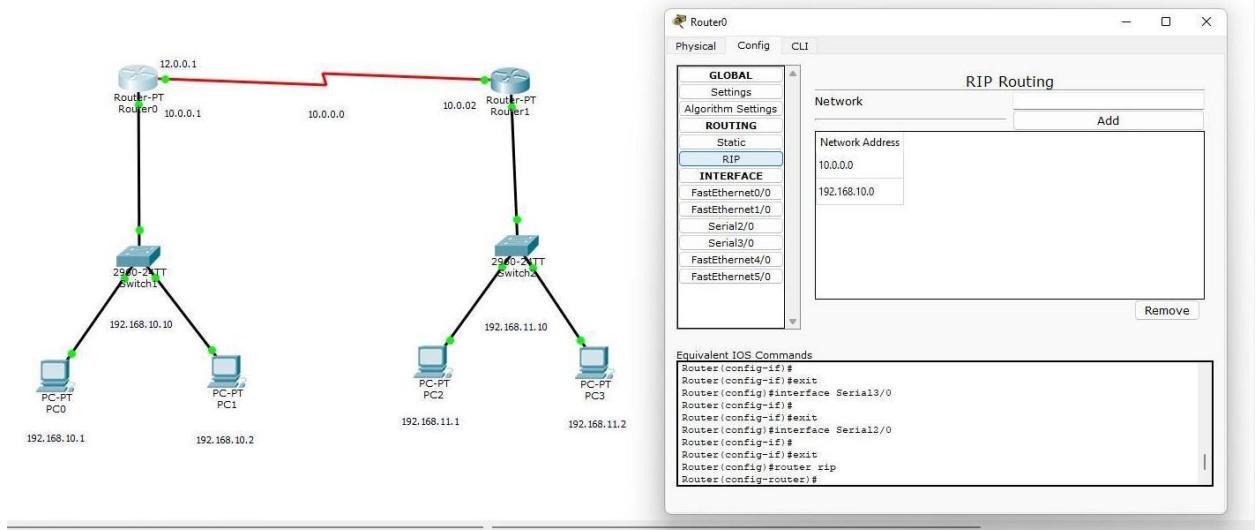


Name: Tiya Nathwani  
 Roll No.: 2411134  
 Batch: 23

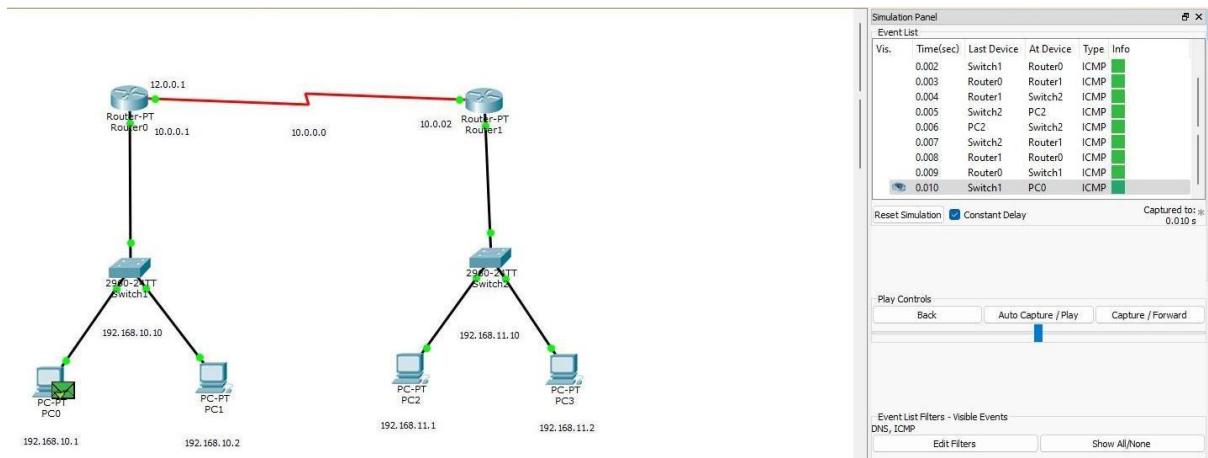
## Configuration:



Name: Tiya Nathwani  
 Roll No.: 2411134  
 Batch: 23



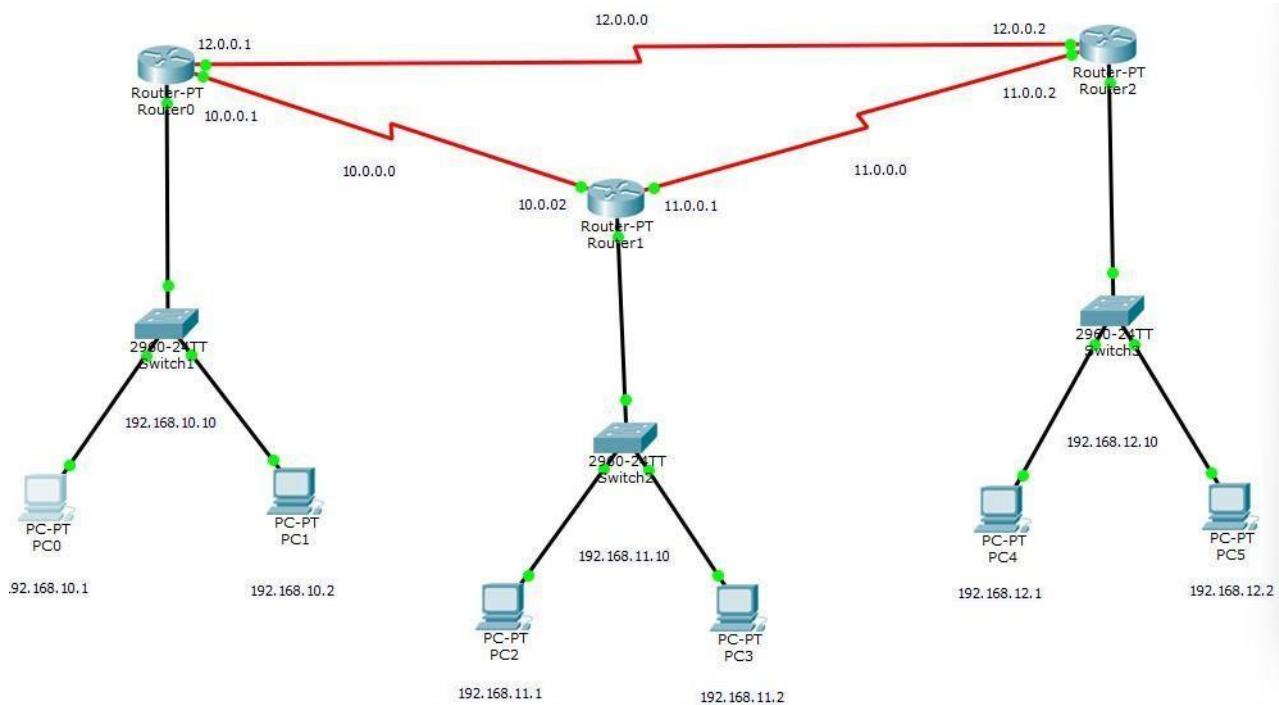
## File Transfer:



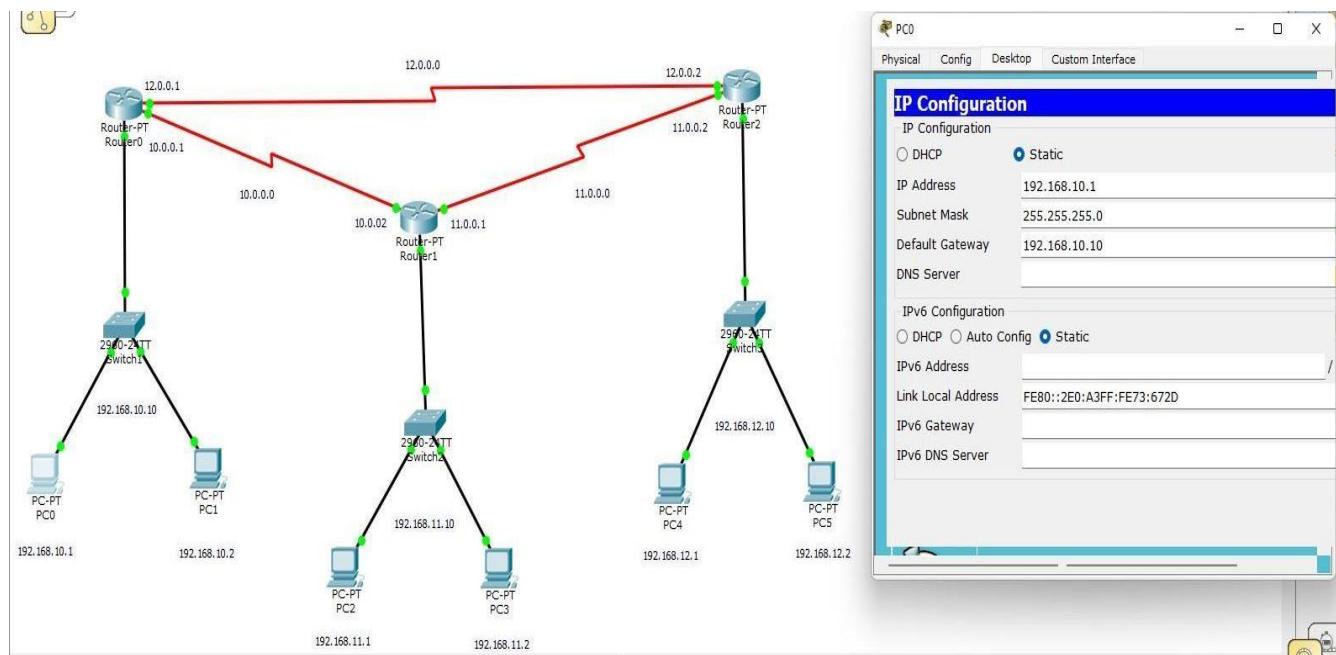
Name: Tiya Nathwani  
 Roll No.: 2411134  
 Batch: 23

### For Three Routers:

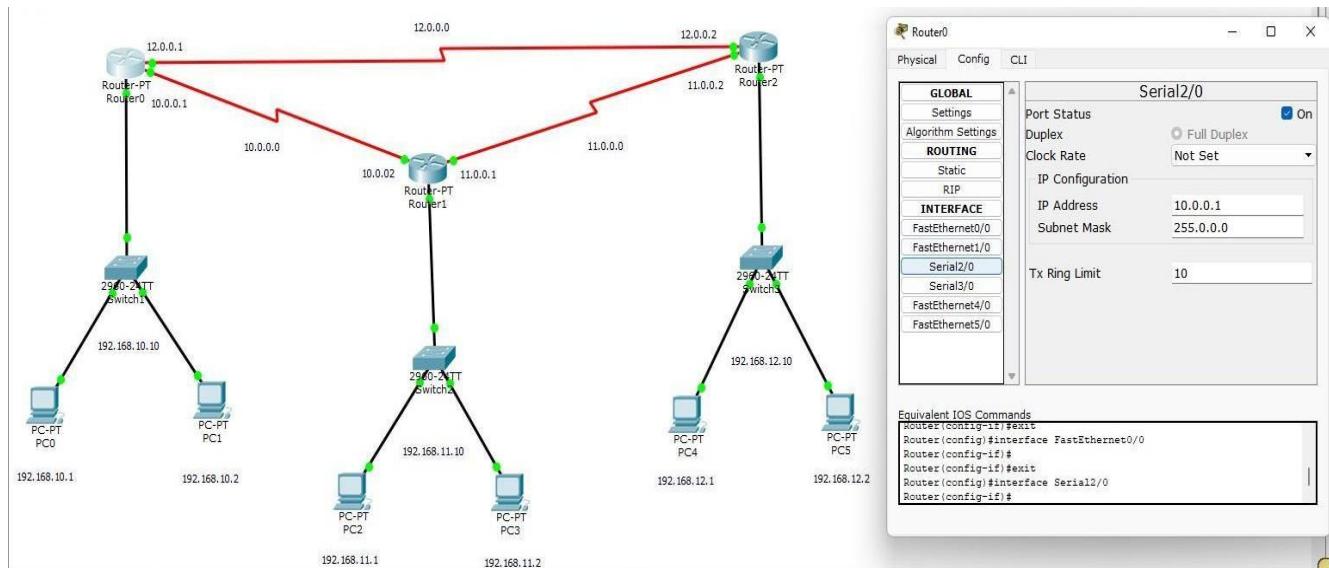
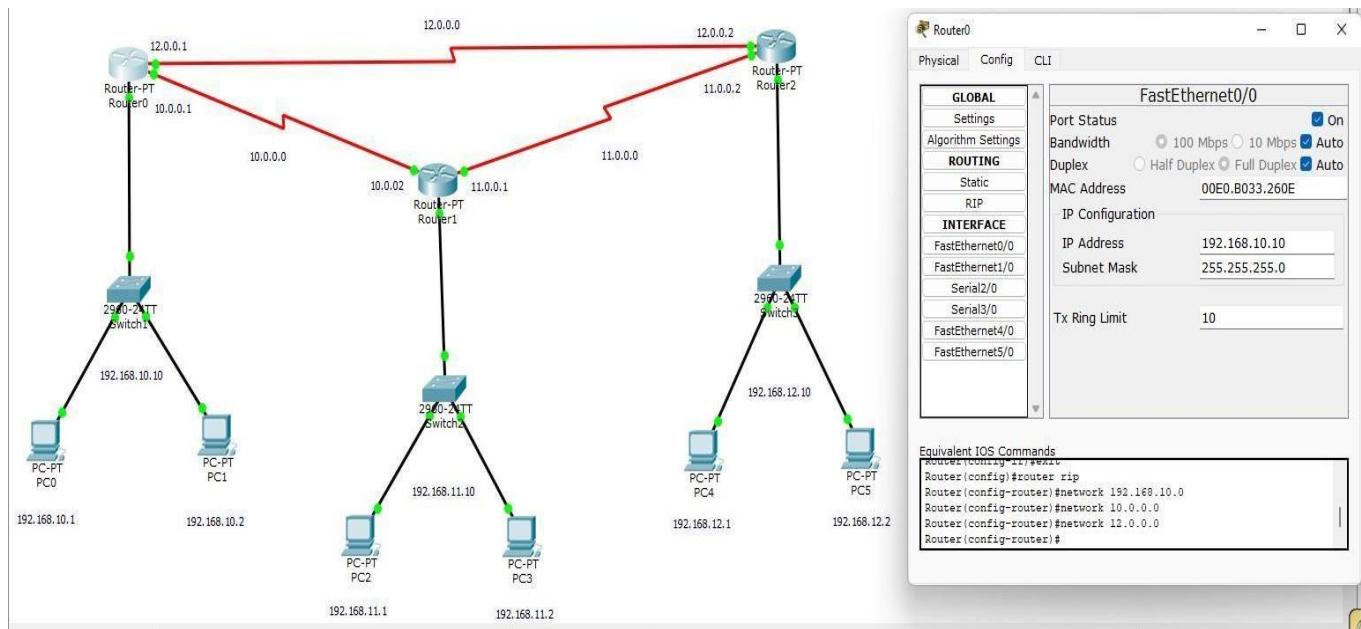
Topology:



Configuration:

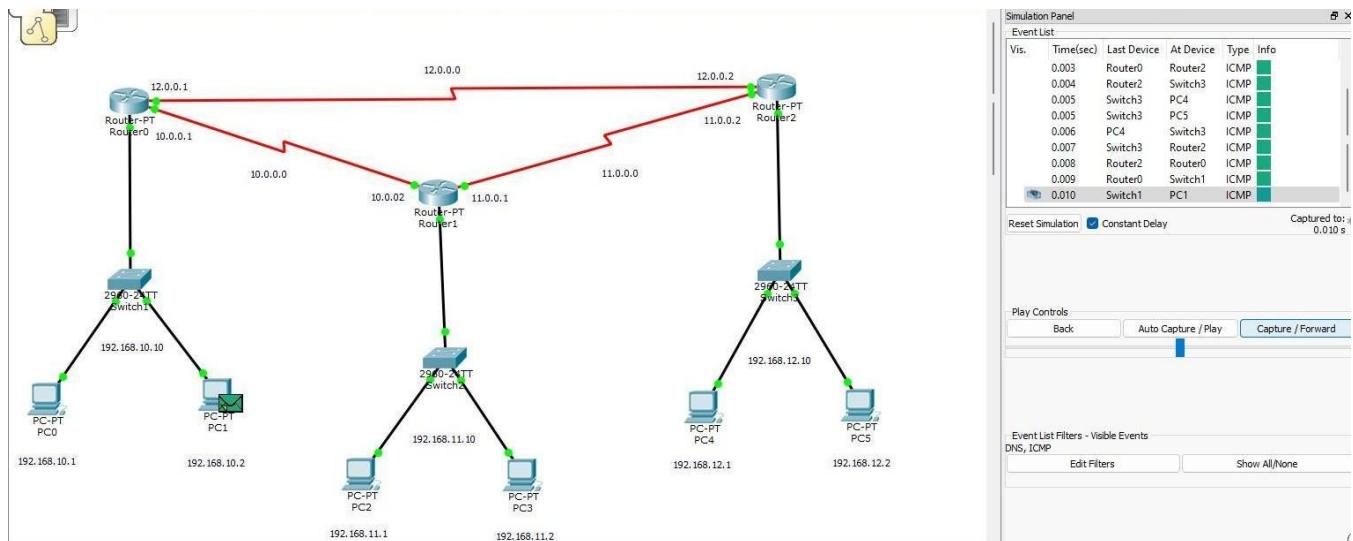
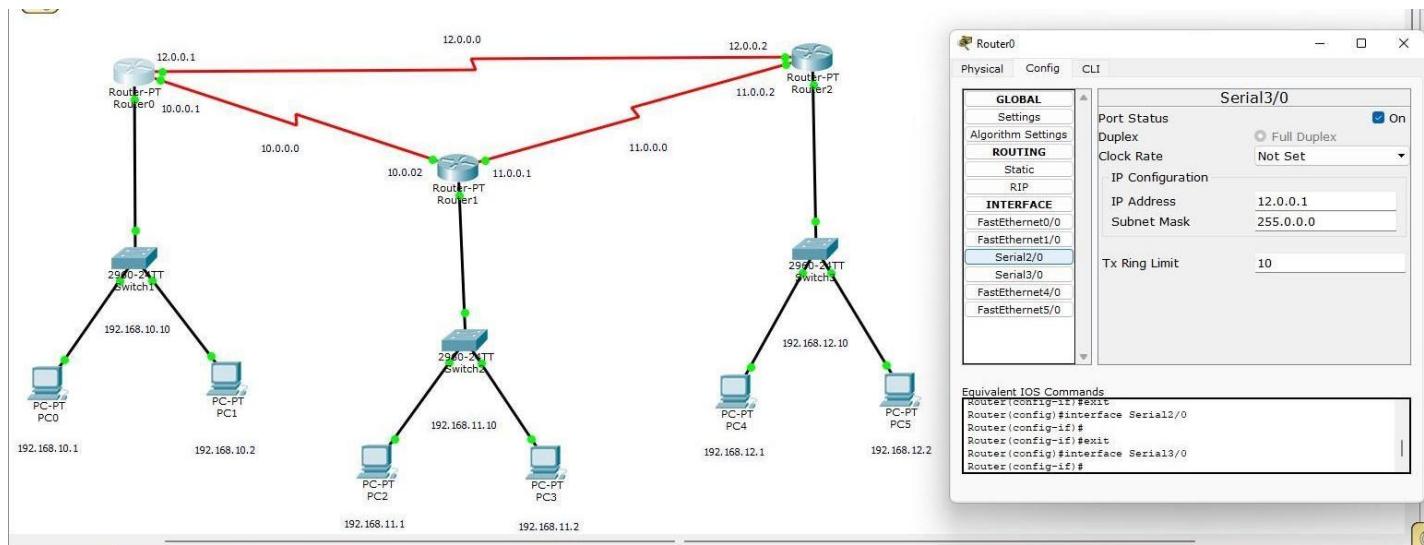


**Name: Tiya Nathwani  
Roll No.: 2411134  
Batch: 23**



Name: Tiya Nathwani  
 Roll No.: 2411134  
 Batch: 23

## File Transfer:



**CONCLUSION:** Thus, we have successfully studied and designed an environment for switch, hub, static routing and dynamic routing in Cisco Packet Tracer.