Experiment No. 7

Aim:

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

A. Theory:

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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. Instatic 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 factorfor 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 selectingthe best route, detecting route changes and discovering remote networks. However, because routers share updates, they consume more bandwidth than in static routing; therouters' CPUs and RAM may also face additional loads as a result of routing protocols. Finally, dynamic routing is less secure than static routing

Advantages:

1. The chief advantages of dynamic routing over static routing are scalability and adaptability. A dynamically routed network can grow more quickly and larger, andis able to adapt to changes in the network topology brought about by this growth or by the failure of one or more network components.

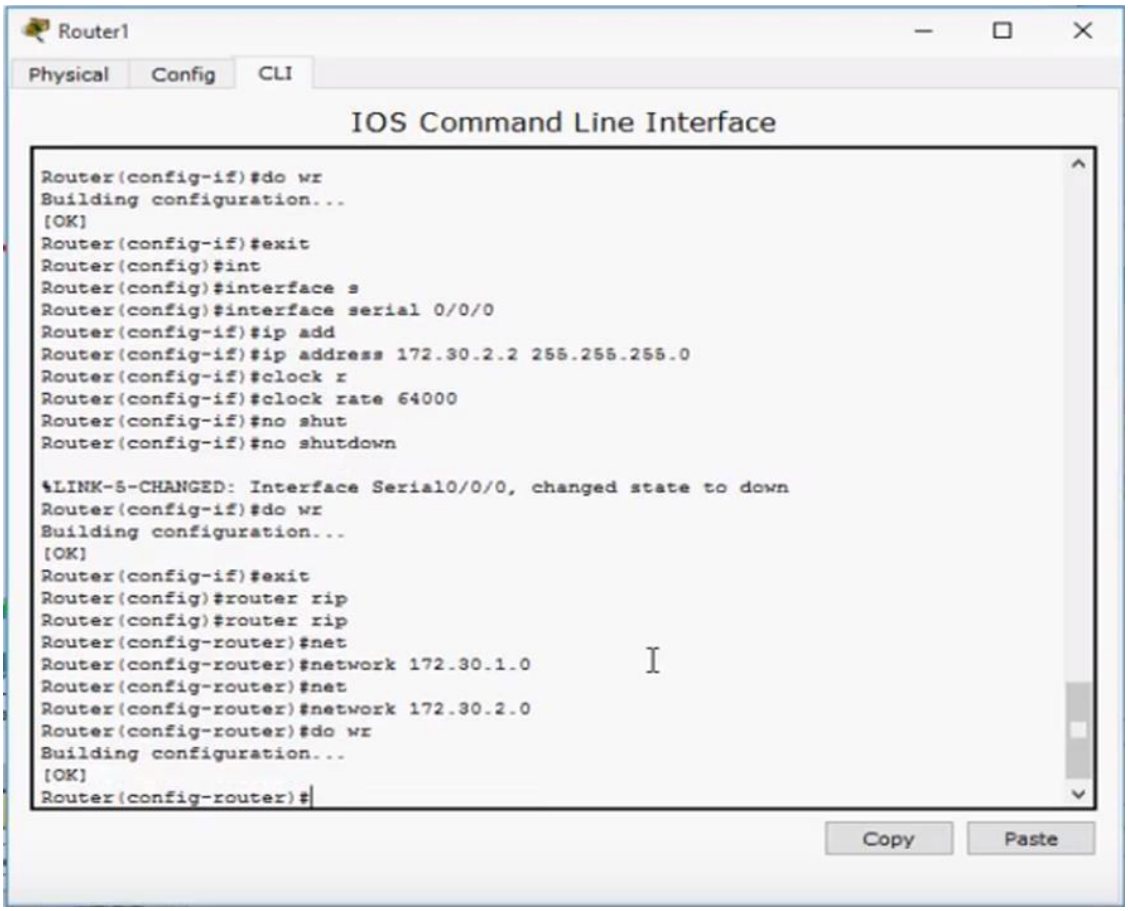
2. With a dynamic router protocol, routers learn about the network topology by communicating with other routers. Each router announces its presence, and the routes it has available, to the other routers on the network. Therefore, if you add anew router, or add an additional segment to an existing router, the other routers will gear 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

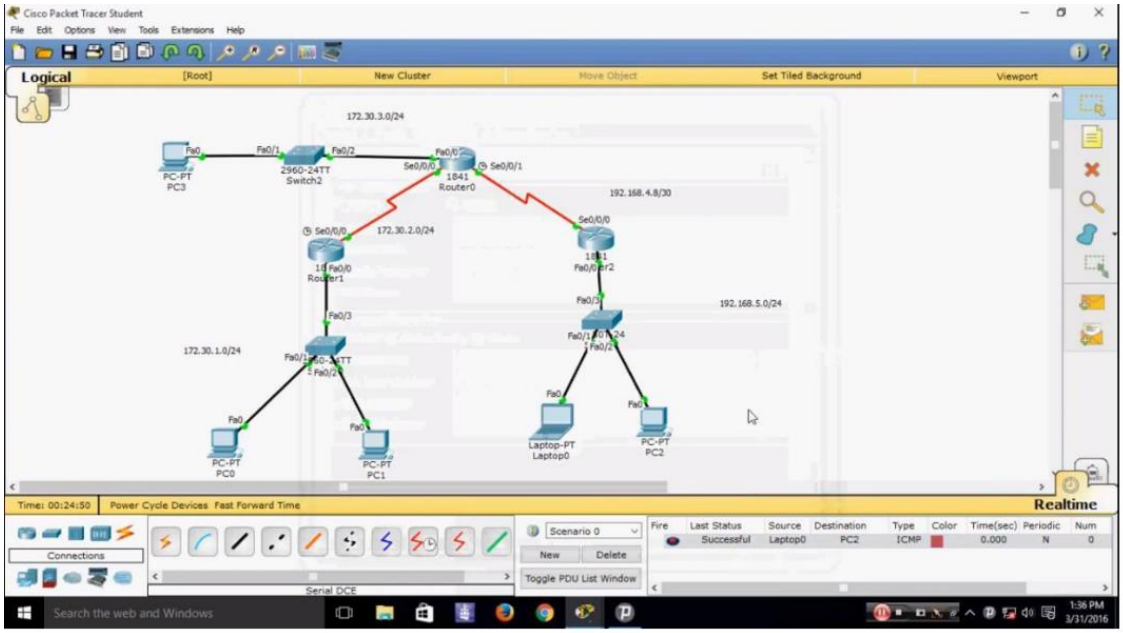
configuration of the router (or routers) that connect the segment that moved. This reduces the chance that errors will occur.

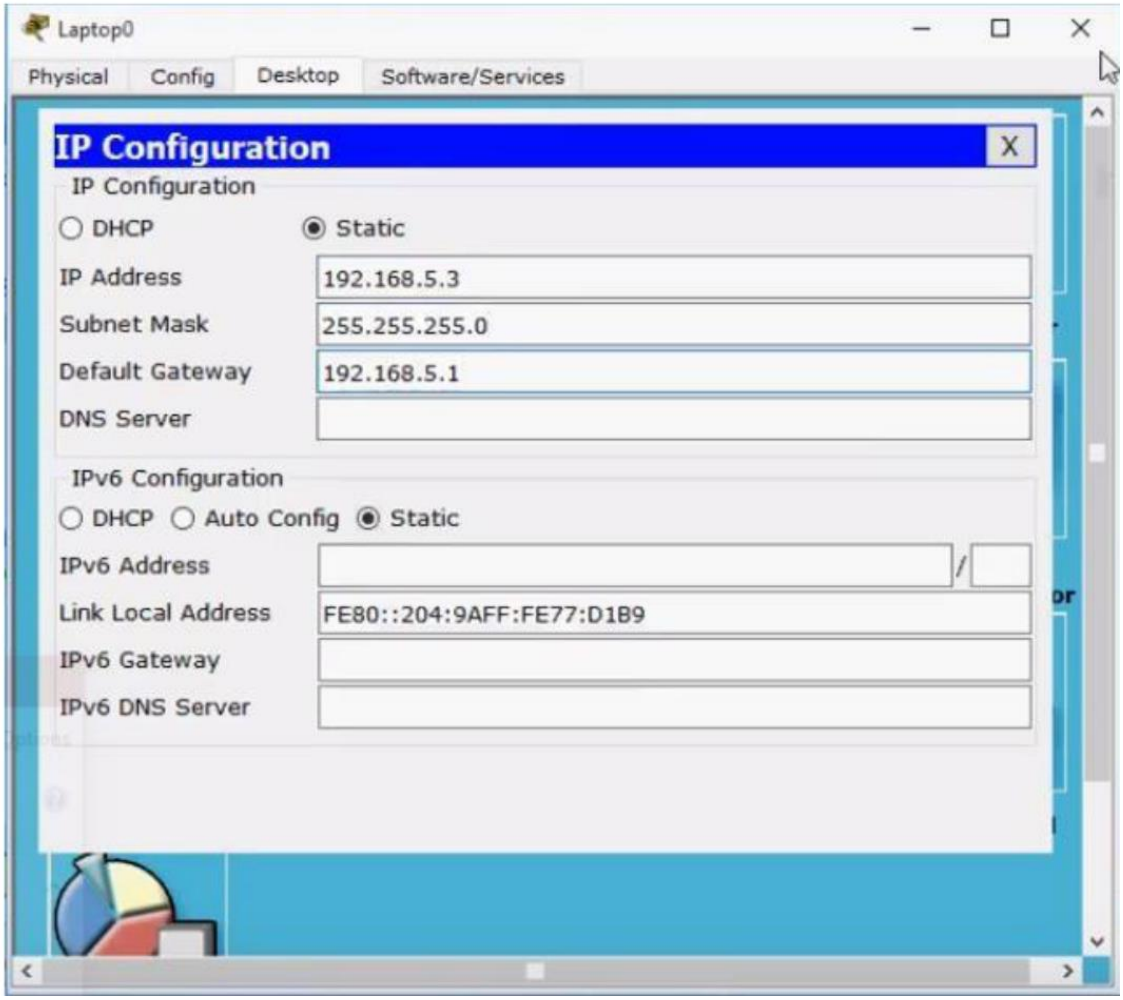
3. The ability to learn about changes to the network's configuration has implications beyond adding new segments or moving old ones. It also means that the networkcan adjust to failures. If a network has redundant paths, then a partial network failure appears to the routers as if some segments got moved (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 anetwork failure and a configuration change. Dynamic routing allows the network tocontinue functioning, perhaps in a degraded fashion, when partial failure occurs.

Disadvantages:

1. Routers resources are used (CPU cycles, Memory and Link bandwidth)
2. More administrator knowledge is required for configuration, verification and troubleshooting.




Cisco Packet Tracer Student
Logical
172.30.3.0/24
172.30.2.0/24
192.168.4.8/30
192.168.5.0/24
172.30.1.0/24
PC-PT PC3
2960-24TT Switch2
1841 Router0
Router1
Laptop-PT Laptop0
PC-PT PC2
PC-PT PC0
PC-PT PC1
Realtime


Laptop0
Physical
Config
Desktop
Software/Services
IP Configuration
IP Configuration
DHCP
Static
IP Address
192.168.5.3
Subnet Mask
255.255.255.0
Default Gateway
192.168.5.1
DNS Server
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::204:9AFF:FE77:D1B9
IPv6 Gateway
IPv6 DNS Server

B. Program:

1. Topology using Hub

1. Add PCs and Hub (both generic)
2. Connect them using FastEthernet cable
3. Configure the PCs IP addresses
4. Send the packet from one PC to another and trace its path
5. As hub is not an intelligent device it sends the packet to multiple devices
6. The destination device accepts the packet and sends acknowledgment while other devices reject it.
7. The acknowledgment is received and transfer is completed.

2. Topology using Switch

1. Add PCs and Switch (both generic)
2. Connect them using FastEthernet cable
3. Configure the PCs IP addresses
4. Send the packet from one PC to another and trace its path
5. As switch is an intelligent device it sends the packet to only the destination device
6. The destination device accepts the packet and sends acknowledgment
7. The acknowledgment is received and transfer is completed.

3. Static routing

1. Add PCs and Switch (both generic)
2. Connect them using FastEthernet cable
3. Add Routers (generic) and connect them to switch using FastEthernet cable
4. Connect the Routers to each other using Serial cable
5. Configure the PCs IP addresses :
    I. Assign IP address to each PC
    II. Add Gateway IP address to send local network traffic to other networks

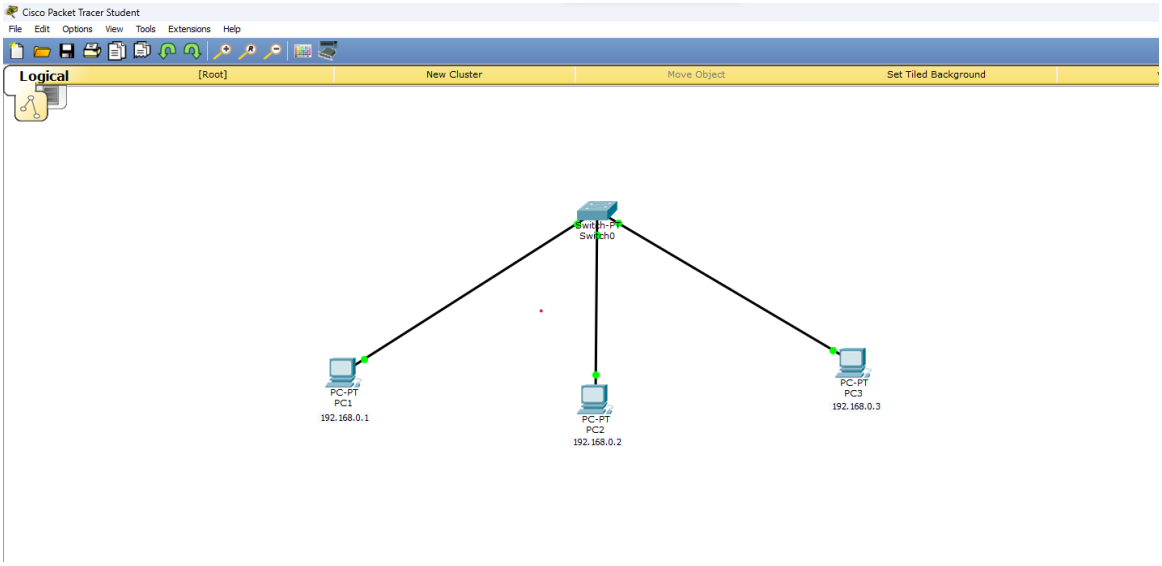
6. Configure the Router's IP addresses :
    I. Add IP address to Ethernet Cable and Serial Cables
    II. To configure Routing, go to static routing and add network address, mask and next hop for each router
7. Send the packet across network and trace its path

4. Dynamic routing

1. Add PCs and Switch (both generic)
2. Connect them using FastEthernet cable
3. Add Routers (generic) and connect them to switch using FastEthernet cable
4. Connect the Routers to each other using Serial cable
5. Configure the PCs IP addresses :
    I. Assign IP address to each PC
    II. Add Gateway IP address to send local network traffic to other networks
6. Configure the Router's IP addresses :
    I. Add IP address to Ethernet Cable and Serial Cables
    II. To configure Routing, go to RIP routing and add the network addresses for gateway, and neighboring routers.
7. Send the packet across network and trace its path

C. Output and findings:

Switch:



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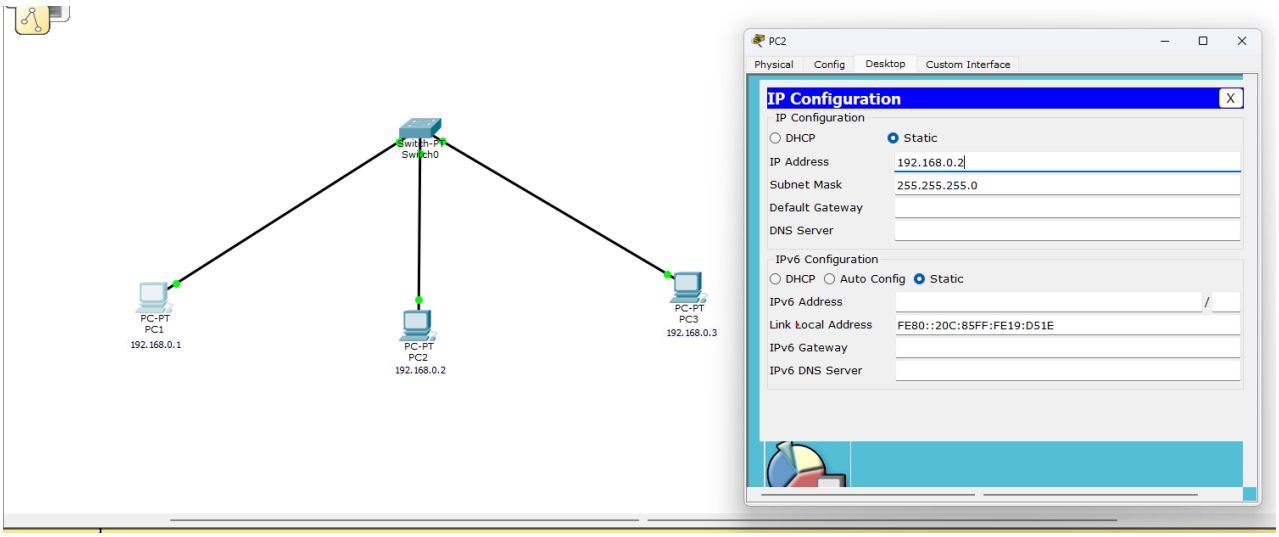
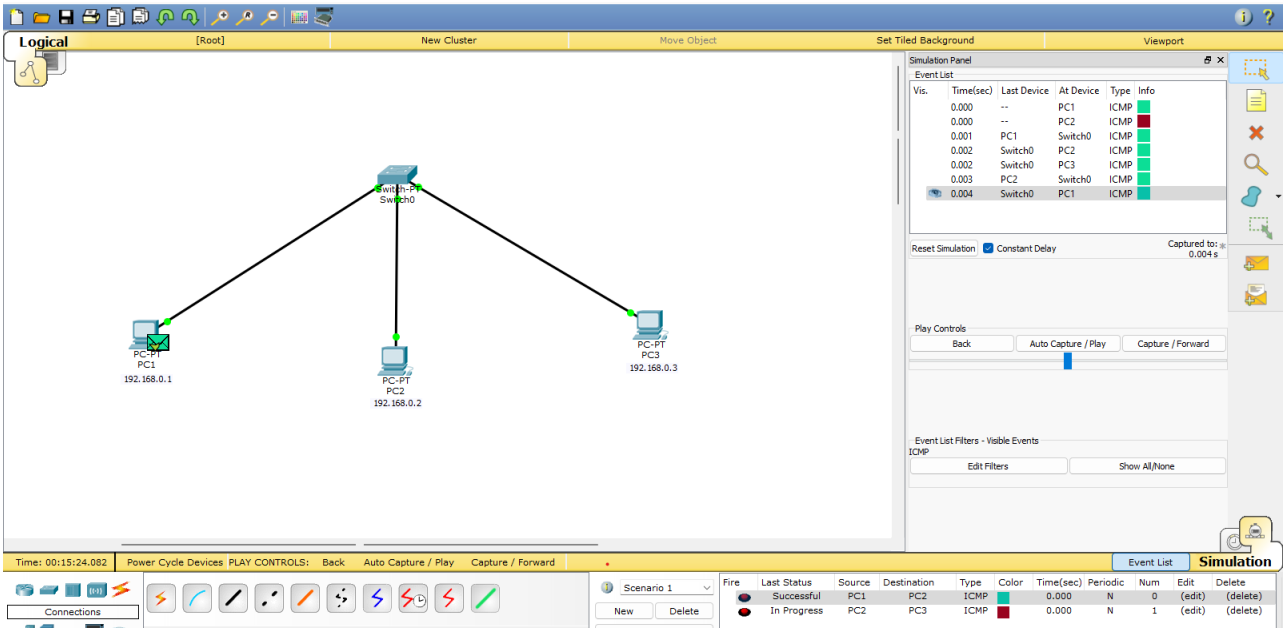
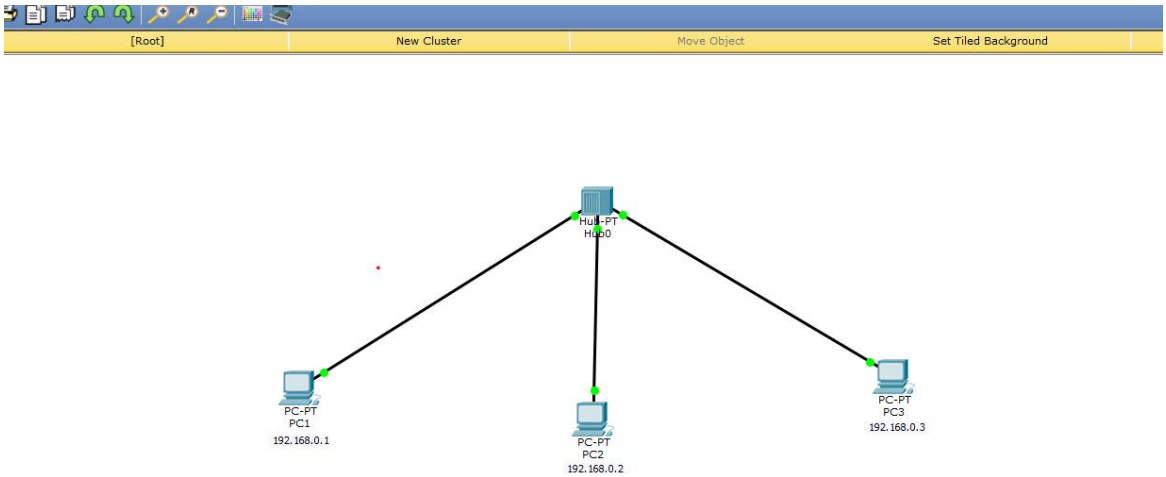
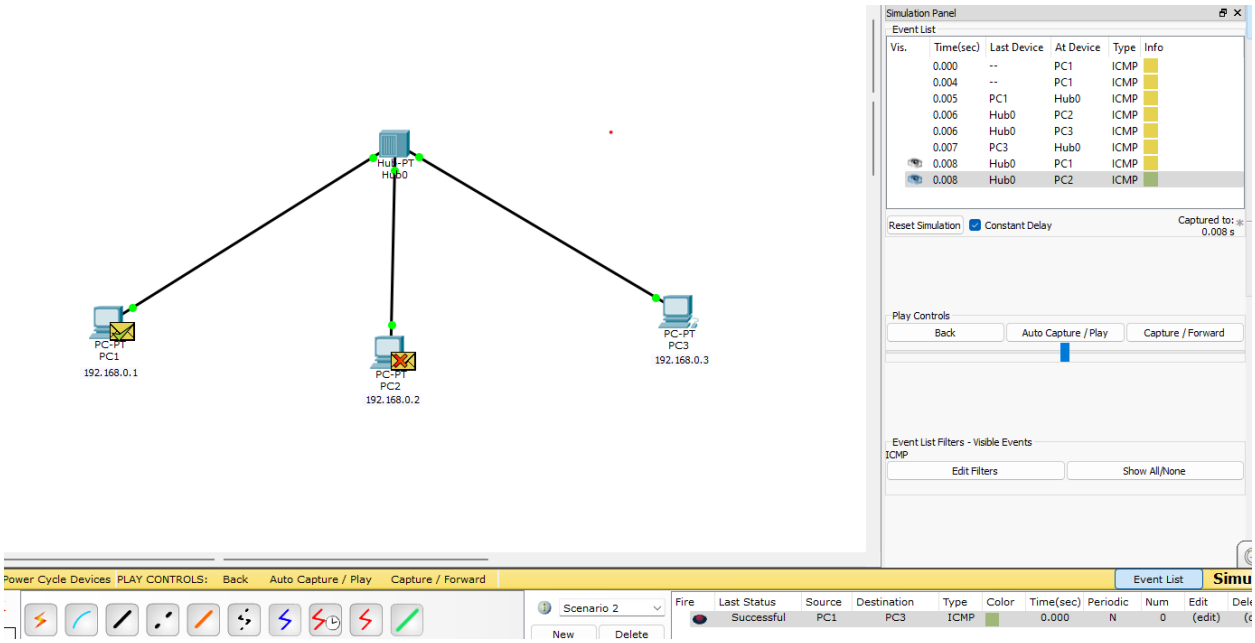




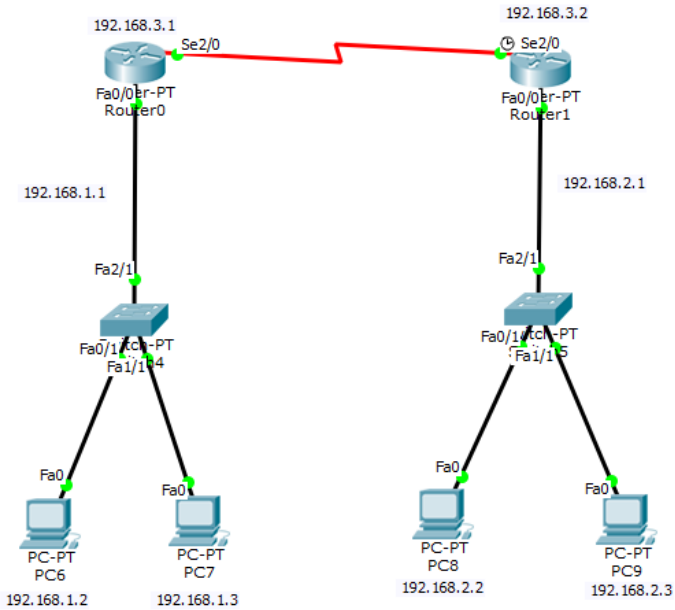
Hub:



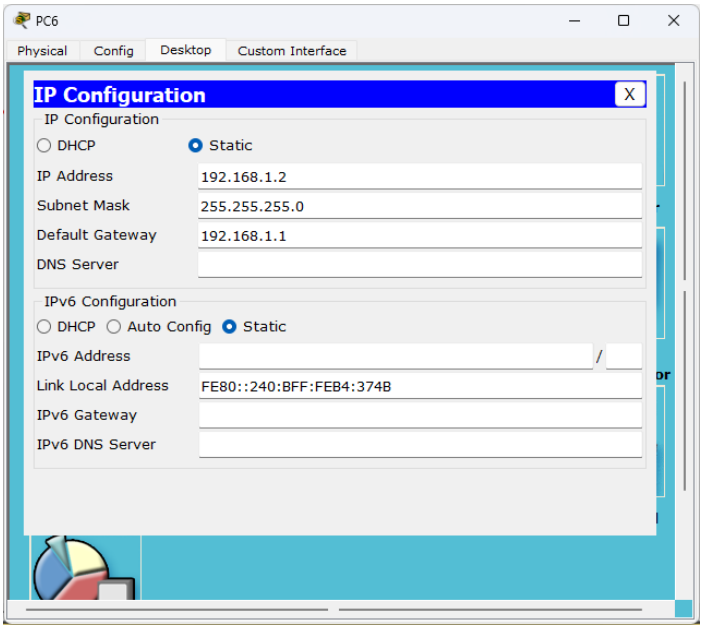


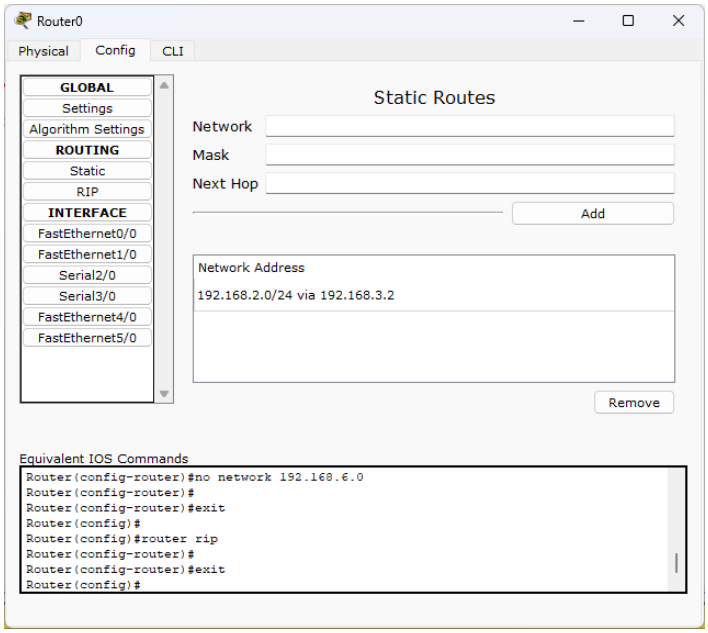
Static Routing:

1. Network

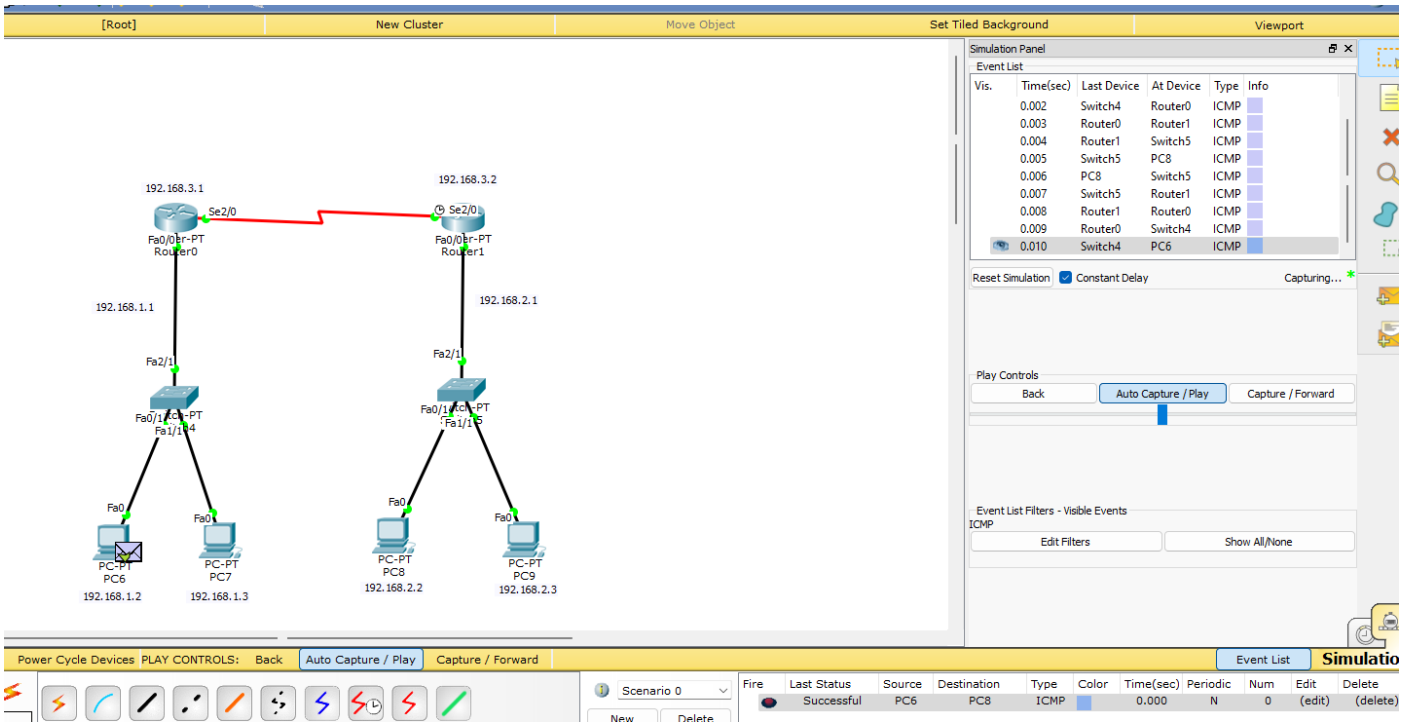


2. Configuration



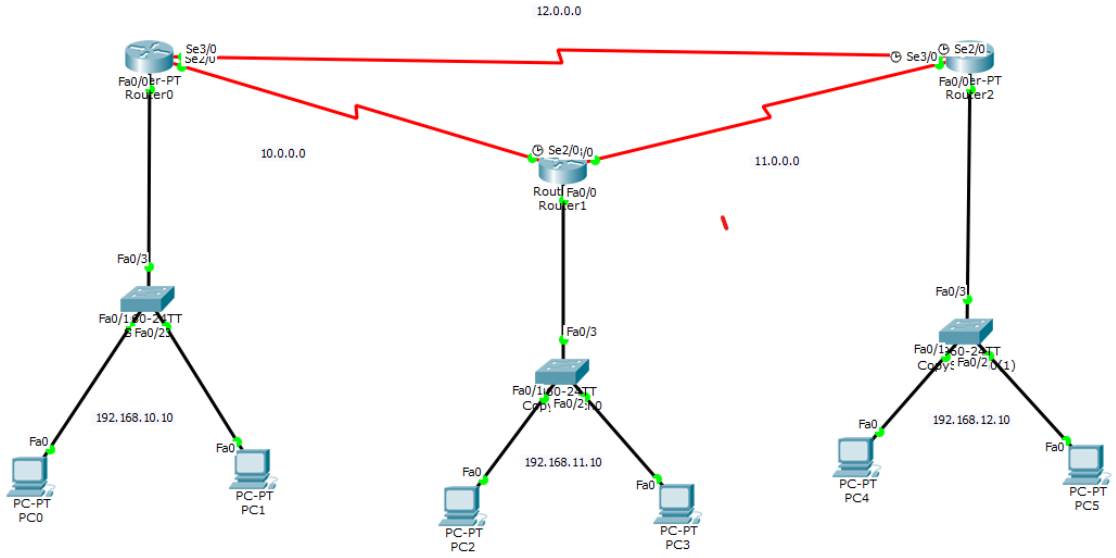


3. Simulation



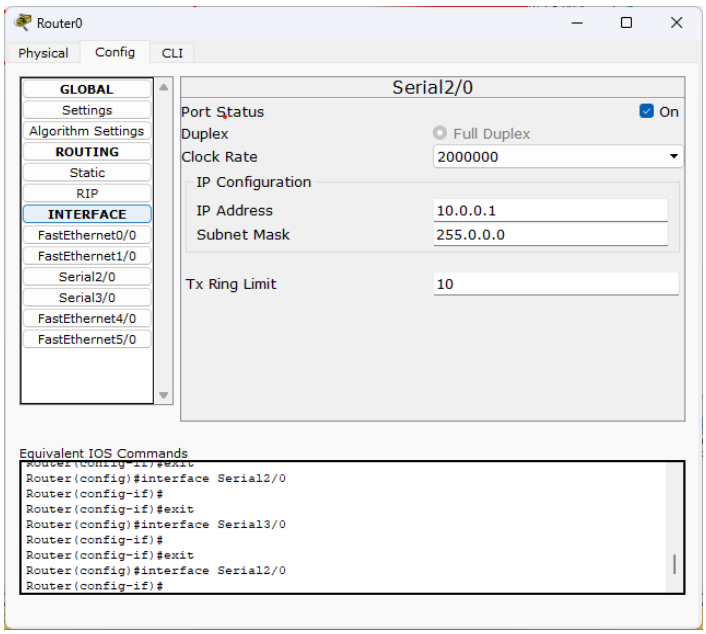
Dynamic Routing:

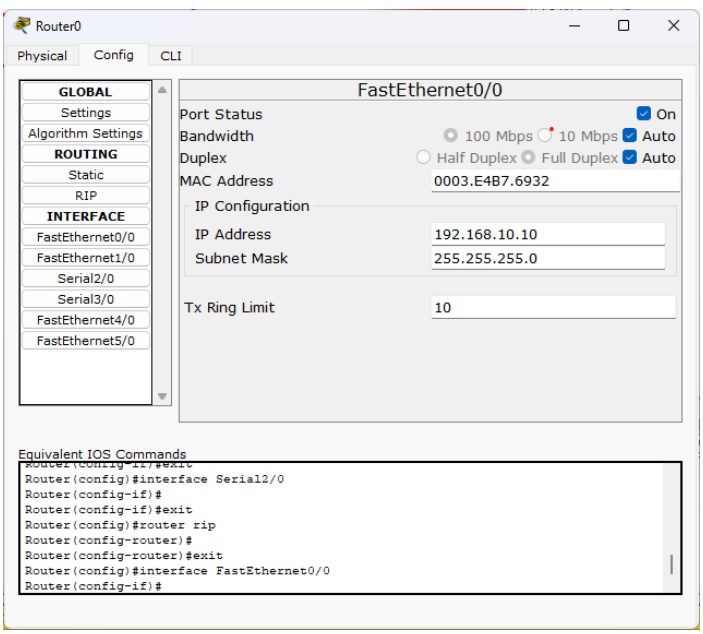
1. Network



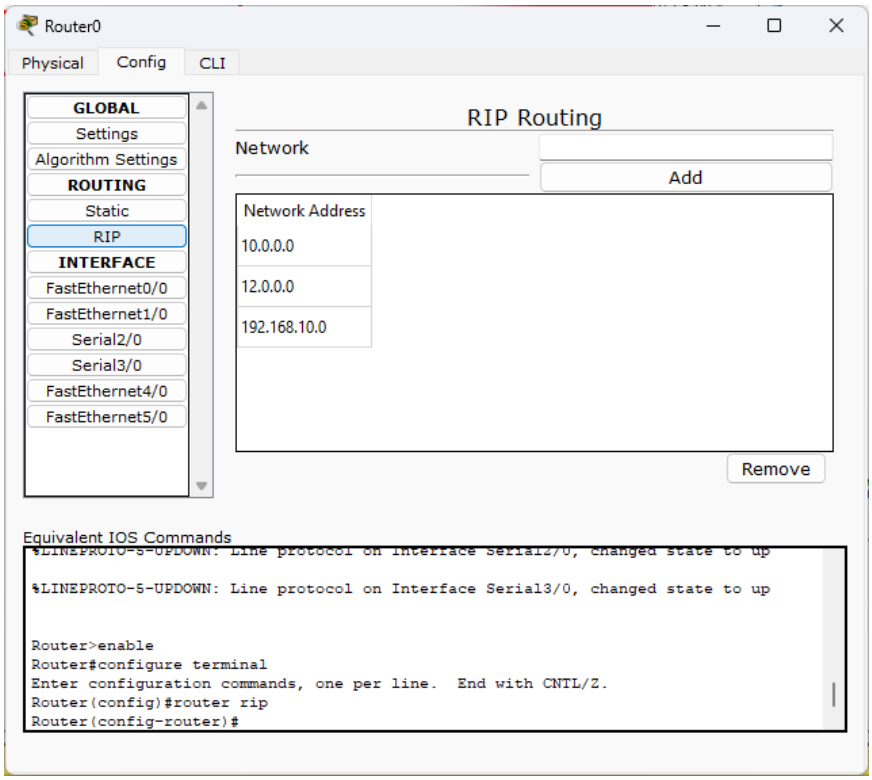
2. Configuration

Network:

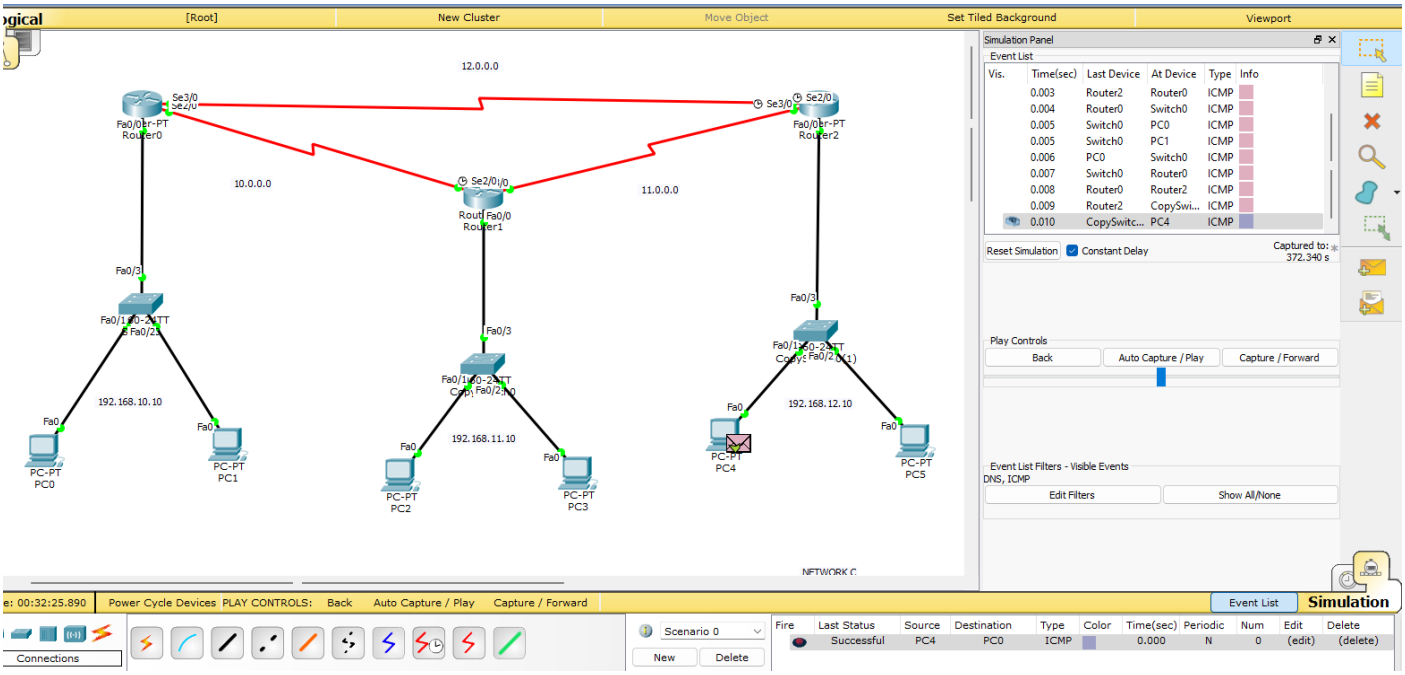




RIP:



3. Simulation



D. Conclusion

Thus we have successfully implemented networks for hub, switch and understood their working. We have implemented both static and dynamic routing networks and observed the difference between them where dynamic routing chooses the shortest path.