
Experiment – 1.3

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Subject Name: Computer Networks Lab

Subject Code: 20CSP-342

1.Aim/Overview of the Practical

Configure and understand the working of routers, switches and hubs.

2. Task to be Done

Configure and understand the working of routers, switches and hubs.

3. Application

Requirements:

- PC
- Cisco Packet Tracer Software

4.Theory:

Following should be done to understand this practical.

1. Repeater: Functioning at Physical Layer. A repeater is an electronic device that receives a signal and retransmits it at a higher level and/or higher power, or onto the other side of an obstruction, so that the signal can cover longer distances. Repeater have two ports, so cannot be use to connect for more than two devices

2. Hub: An Ethernet hub, active hub, network hub, repeater hub, hub or concentrator is a device for connecting multiple twisted pair or fiber optic Ethernet devices together and making them act as a single network segment. Hubs work at the physical layer (layer 1) of the OSI model. The device is a form of multiport repeater. Repeater hubs also participate in collision detection, forwarding a jam signal to all ports if it detects a collision.

3. Switch: A network switch or switching hub is a computer networking device that connects network segments. The term commonly refers to a network bridge that processes and routes data at the data link layer (layer 2) of the OSI model. Switches that additionally process data at the network layer (layer 3 and above) are often referred to as Layer 3 switches or multilayer switches.

4. Bridge: A network bridge connects multiple network segments at the data link layer (Layer2) of the OSI model. In Ethernet networks, the term bridge formally means a device that behaves according to the IEEE 802.1D standard. A bridge and switch are very much alike; a switch being a bridge with numerous ports. Switch or Layer 2 switch is often used interchangeably with bridge. Bridges can analyze incoming data packets to determine if the bridge is able to send the given packet to another segment of the network.

5. Router: A router is an electronic device that interconnects two or more computer networks, and selectively interchanges packets of data between them. Each data packet contains address information that a router can use to determine if the source and destination are on the same network, or if the data packet must be transferred from one network to another. Where multiple routers are used in a large collection of interconnected networks, the routers exchange information about target system addresses, so that each router can build up a table showing the preferred paths between any two systems on the interconnected networks.

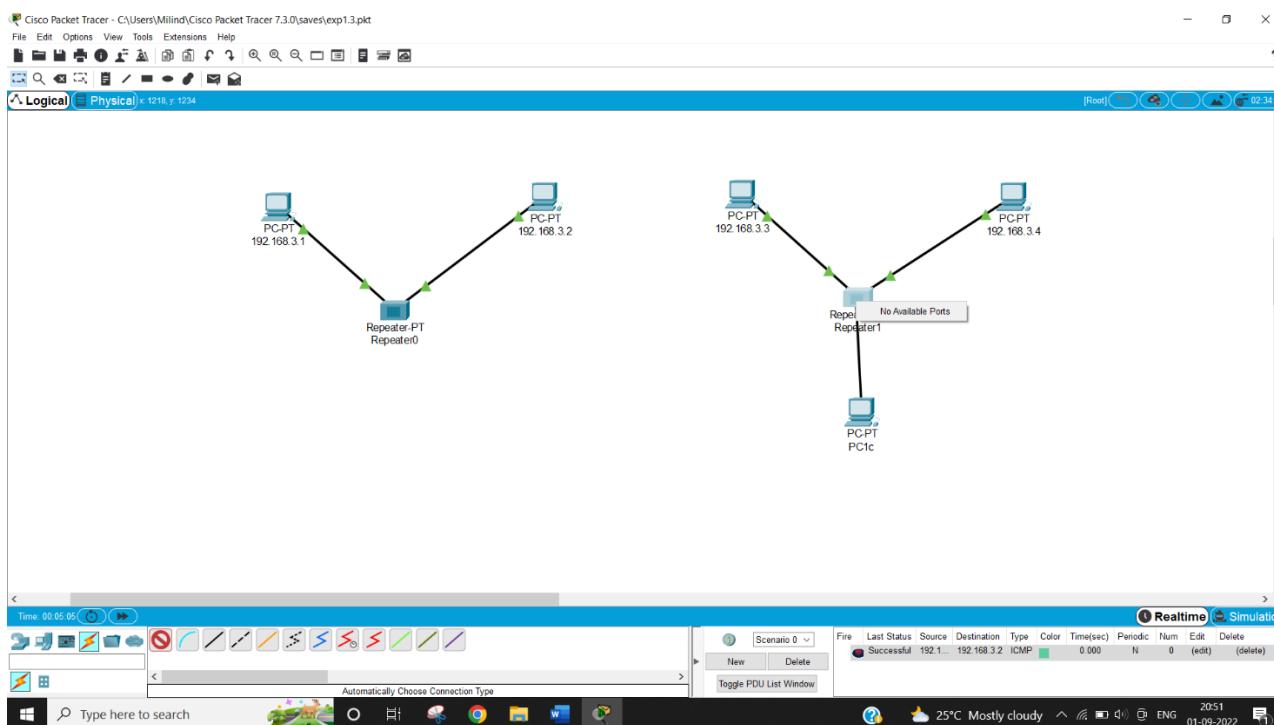
6. Gate Way: In a communications network, a network node equipped for interfacing with another network that uses different protocols.

- A gateway may contain devices such as protocol translators, impedance matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires the establishment of mutually acceptable administrative procedures between both networks.
- A protocol translation/mapping gateway interconnects networks with different network protocol technologies by performing the required protocol conversions

5. Steps for the practical/ Result/ Output:

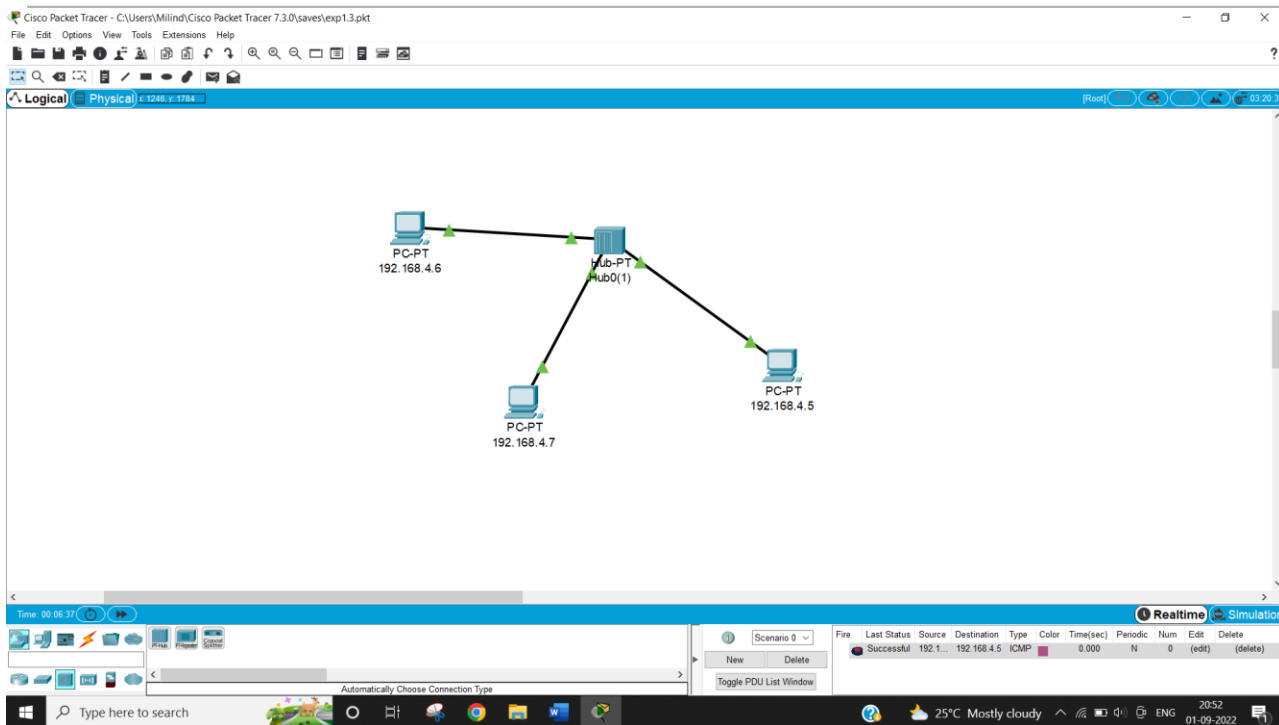
- 1)
 - a. Open the Cisco packet tracer software and login using your credentials.
 - b. In real-time environment, select two end devices(PCs) and a network device(Repeater: from Hubs option)
 - c. Establish a connection using the automatic wire selection and provide IP configuration to PCs and rename them with same.
 - d. Now select the message option and drop on sender and receiver and devices one by one. Message is sent successfully.

- e. Try to connect another end device(PC) to the repeater via automatic cable connection. This fails as the repeater has no more available ports. It supports one input and one output only.

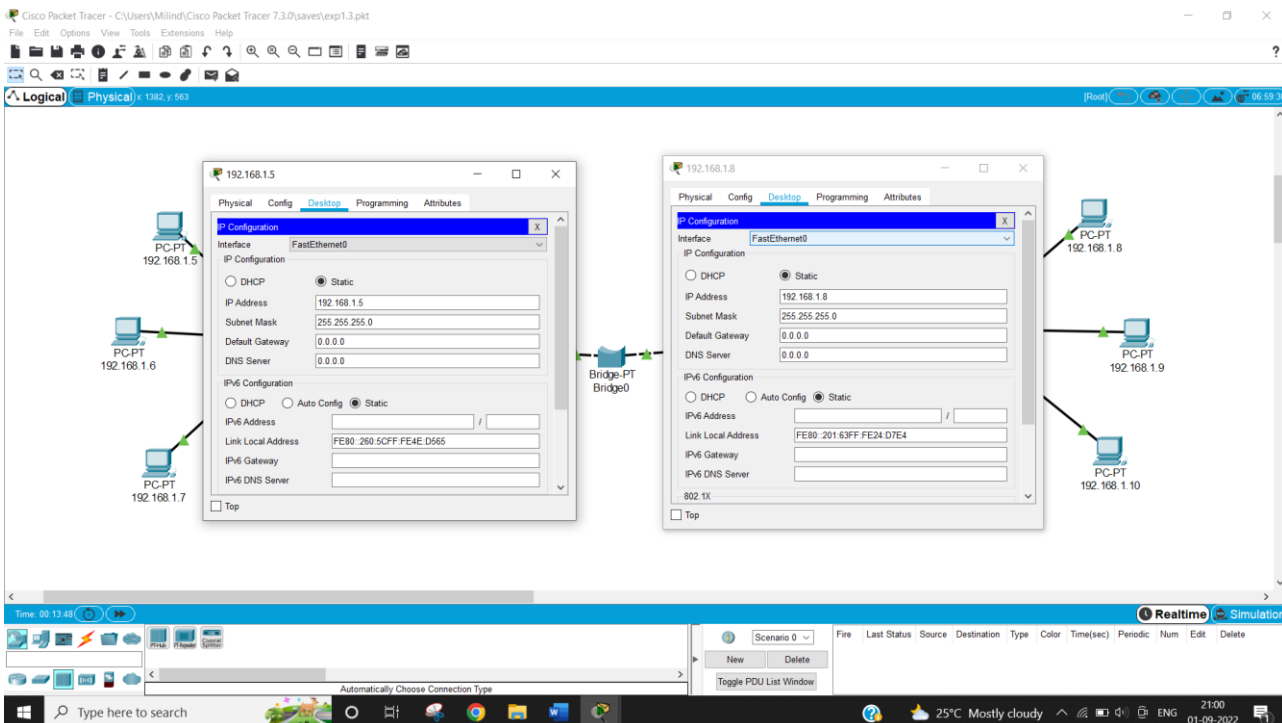
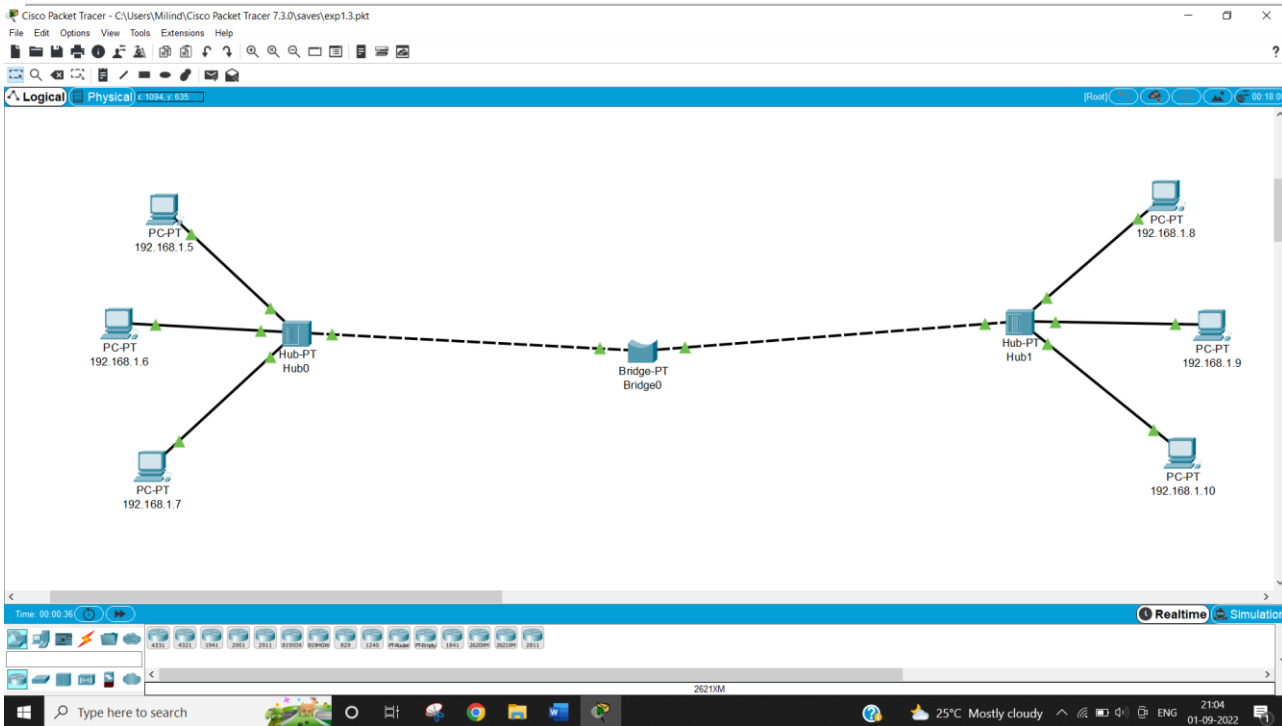


2)

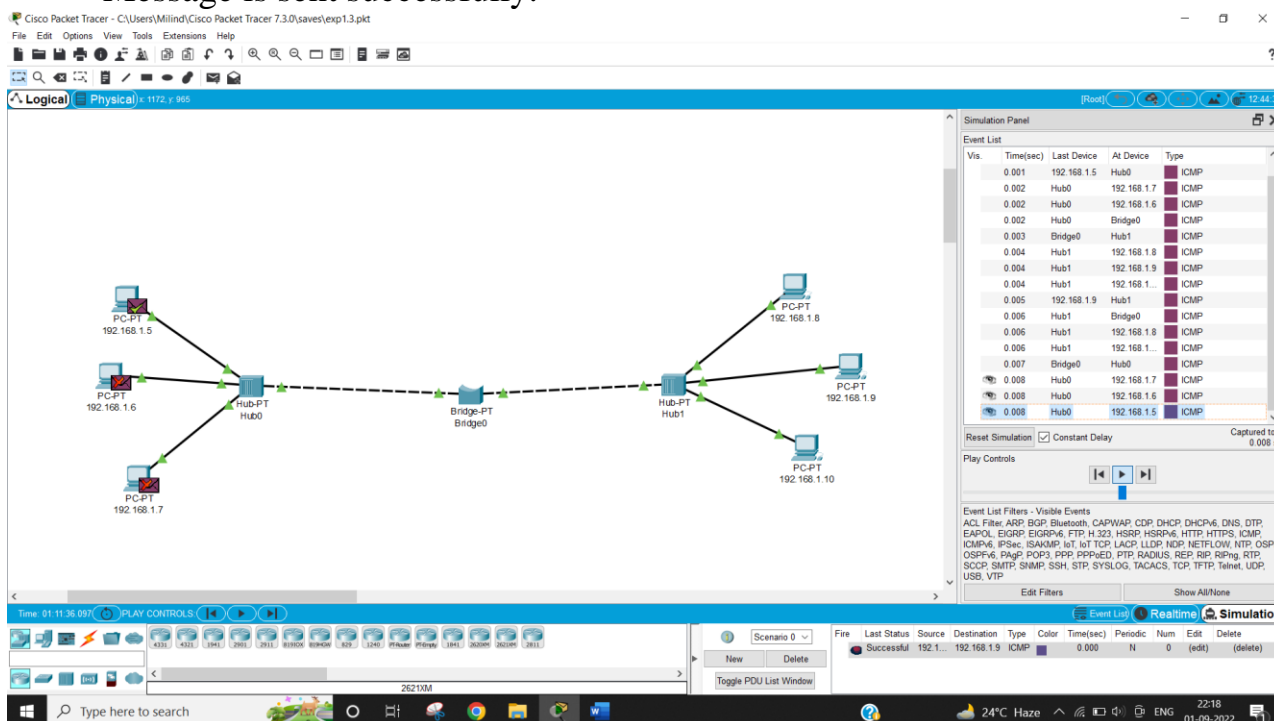
- Create another computer network of three other end devices(PCs), and select a network device, Hub.
- Establish a connection using the automatic wire selection and provide IP configuration to PCs and rename them with same.
- Now select the message option and drop on sender and receiver and devices one by one. Message is sent successfully.



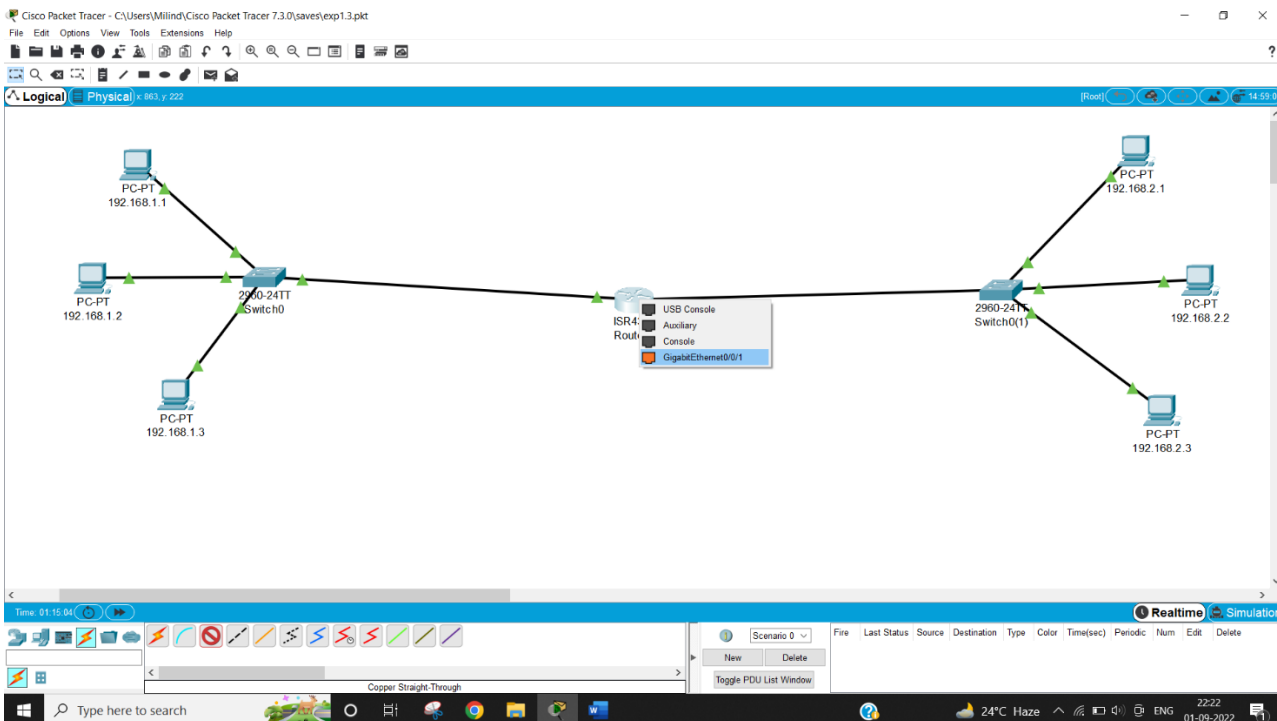
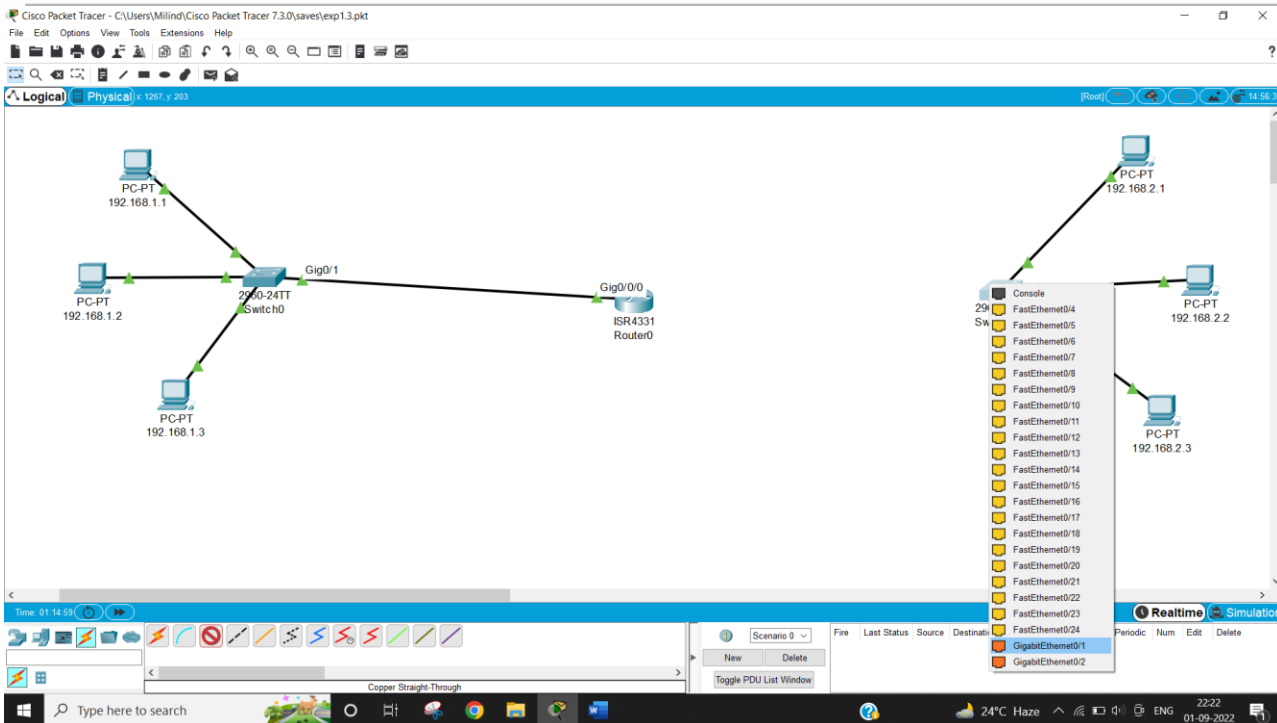
- 3)
- Create a computer networks with two separate sets of three end devices(PCs), and a network device, Hub.
 - Add a network device (Bridge: from Switches option) in between these two sets of star topologies of PC-Hub-PC connections.
 - Establish a connection using the automatic wire selection and provide IP configuration to PCs and rename them with same. IP of the PCs should be within the same network only. Once all devices are connected wait for some time for bridge to boot.



- d. Now select the message option and drop on sender and receiver and devices one by one. Message is sent successfully.



- 4)
- Create two computer networks with two separate sets of three end devices(PCs), and a network device, Switch.
 - Add a network device (Router) in between these two sets of PC-Switch-PC connections. Router works on network layer that enables two different networks to communicate.
 - Establish a connection using the straight through wire selection. Select Gigabit Ethernet option in Switch Gig 0/1 and in Router Gig 0/0/0 for one network, on other network, select Switch Gig 0/2 and Router Gig 0/0/1 connections. This is done to avoid default fast ethernet for switch and Gigabit for Router.



- d. Provide IP configuration to PCs and rename them with same. IP of the PCs should vary in both the networks. Here Router should be provided with IP addresses corresponding to the network it is connected to. Router->Config->
- Gigabit 0/0/0-> IP of 198.168.1.4
 - Gigabit 0/0/1-> IP of 198.168.2.4
 - Switch ON both the interfaces.

The image shows two side-by-side screenshots of the Router0 configuration interface. The left screenshot shows the configuration for GigabitEthernet0/0/0, and the right screenshot shows the configuration for GigabitEthernet0/0/1. Both interfaces are configured with the same settings: Port Status is On, Bandwidth is 1000 Mbps, Duplex is Full Duplex, MAC Address is 0001.436A.5101, IP Address is 192.168.1.4 (left) and 192.168.2.4 (right), Subnet Mask is 255.255.255.0, and Tx Ring Limit is 10. The Equivalent IOS Commands section shows the commands to configure the interfaces.

Router0 Configuration - GigabitEthernet0/0/0

Port Status: ☒ On
 Bandwidth: ☒ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto
 Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto
 MAC Address: 0001.436A.5101
 IP Configuration:
 IP Address: 192.168.1.4
 Subnet Mask: 255.255.255.0
 Tx Ring Limit: 10

Router0 Configuration - GigabitEthernet0/0/1

Port Status: ☒ On
 Bandwidth: ☒ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto
 Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto
 MAC Address: 0001.436A.5102
 IP Configuration:
 IP Address: 192.168.2.4
 Subnet Mask: 255.255.255.0
 Tx Ring Limit: 10

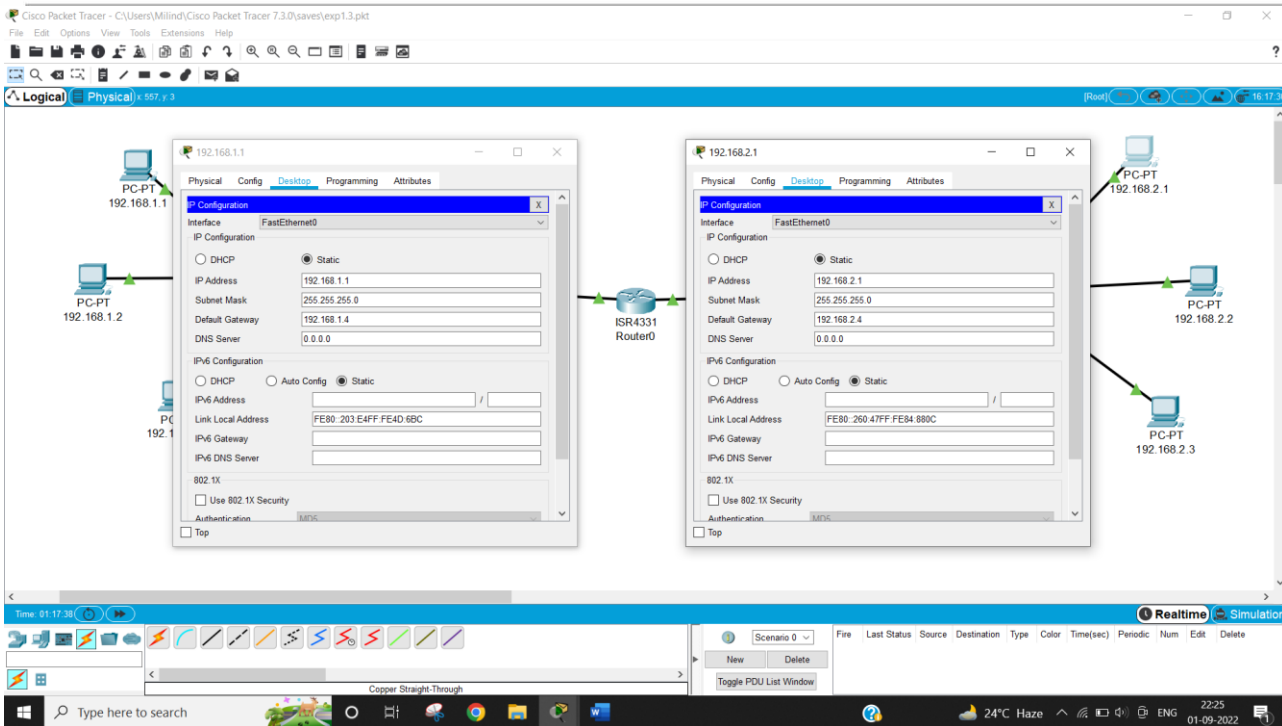
Equivalent IOS Commands

Router(config-if)#
 Router(config-if)#exit
 Router(config)#interface GigabitEthernet0/0/0
 Router(config-if)#
 Router(config-if)#exit
 Router(config)#interface GigabitEthernet0/0/0
 Router(config-if)#

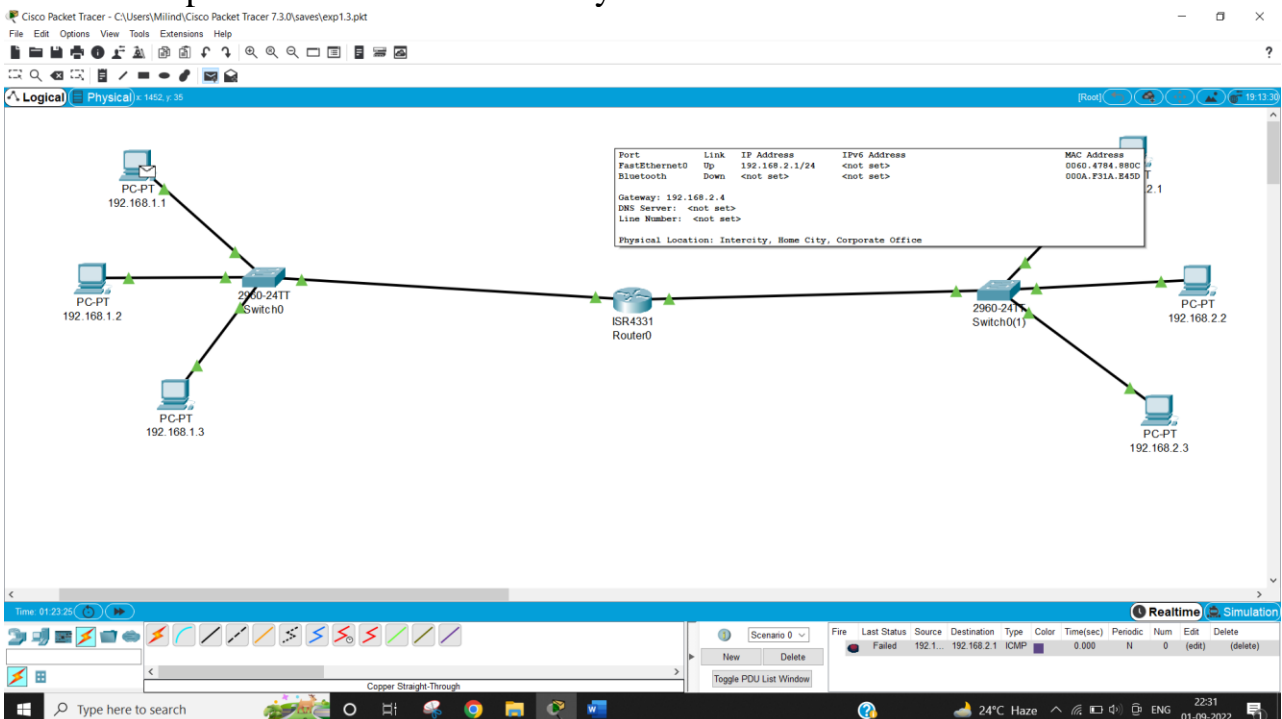
Router(config-if)#
 Router(config-if)#exit
 Router(config)#interface GigabitEthernet0/0/0
 Router(config-if)#
 Router(config-if)#exit
 Router(config)#interface GigabitEthernet0/0/1
 Router(config-if)#

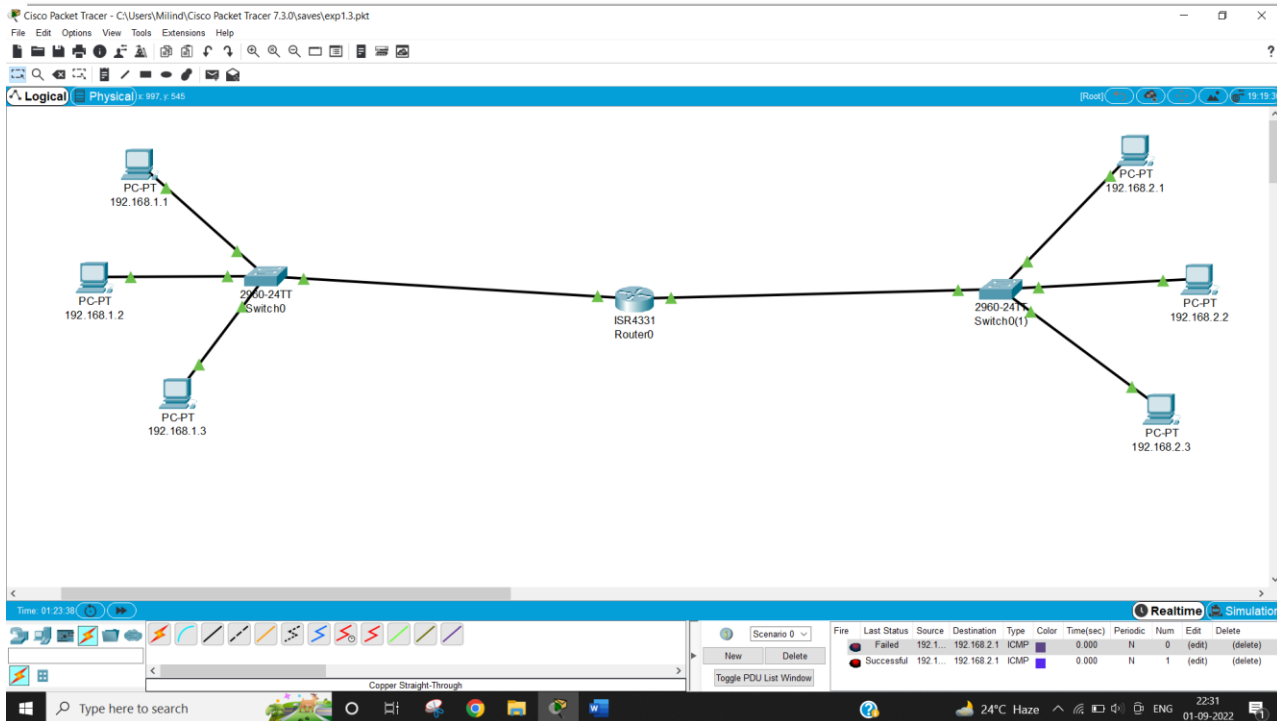
- e. Put IP of Router's corresponding ethernet connection in the PCs default gateway option in IP configuration. This is for switches to recognize the gateway to send message in another network.

PC-> Desktop->IP Config->Default gateway->192.168.1.4 in left networks,
192.168.2.4 in right networks.



- f. Now select the message option and drop on sender and receiver and devices one by one. First packet will get failed because connection was not yet configured. Thereafter all other packets are sent successfully.





g. Try pinging PCs in different networks through command prompt ->

- PC-> Desktop->Command prompt ->
- ping <IP address of another network PC>
- Four packets are sent out of which first packet shows Request timed out as connection was not yet configured. Rest all are successful thereafter.

192.168.1.2

Physical Config Desktop Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.3: bytes=32 time=1ms TTL=127
Reply from 192.168.2.3: bytes=32 time<1ms TTL=127
Reply from 192.168.2.3: bytes=32 time=10ms TTL=127

Ping statistics for 192.168.2.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 3ms

C:\>
```

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Learning Outcomes:

- To successfully understand the basic networking concepts.
- To learn about working on Cisco Packet Tracer.
- To build a basic computer network using the components in a network.

Evaluation Grid (To be created as per the SOP and Assessment guidelines by the faculty):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.			
2.			
3.			