Experiment – 2.1

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Semester: 5th
Date of Performance: 12/09/2022
Subject Name: Computer Networks Lab
Subject Code: 20CSP-342

1.Aim/Overview of the Practical

Implementation of Dynamic Routing using 4 routers.

2. Task to be Done

Implementation of Dynamic Routing using 4 routers.

3. Application

Requirements:

- PC
- Cisco Packet Tracer Software

4. Theory:

Dynamic routing, also called adaptive routing, is a process where a router can forward data via a different route for a given destination based on the current conditions of the communication circuits within a system The term is most commonly associated with data networking to describe the capability of a network to 'route around' damage, such as loss of a node or a connection between nodes, so long as other path choices are available. Dynamic routing allows as many routes as possible to remain valid in response to the change.

Dynamic routing is known as a technique of finding the best path for the data to travel over a network in this process a router can transmit data through various different routes and reach its destination on the basis of conditions at that time of communication circuits.

Dynamic routers are smart enough to take the best path for data based on the condition of the present scenario at that time of the network. In case one section fails in the network to transfer data forward dynamic router will use its algorithm (in which they use routing protocols to gather and share information of the current path among them) and it will re-route the previous network over another network in real-time. And this amazing capability and functionality to change paths in real-time over the network by sharing status among them is the key

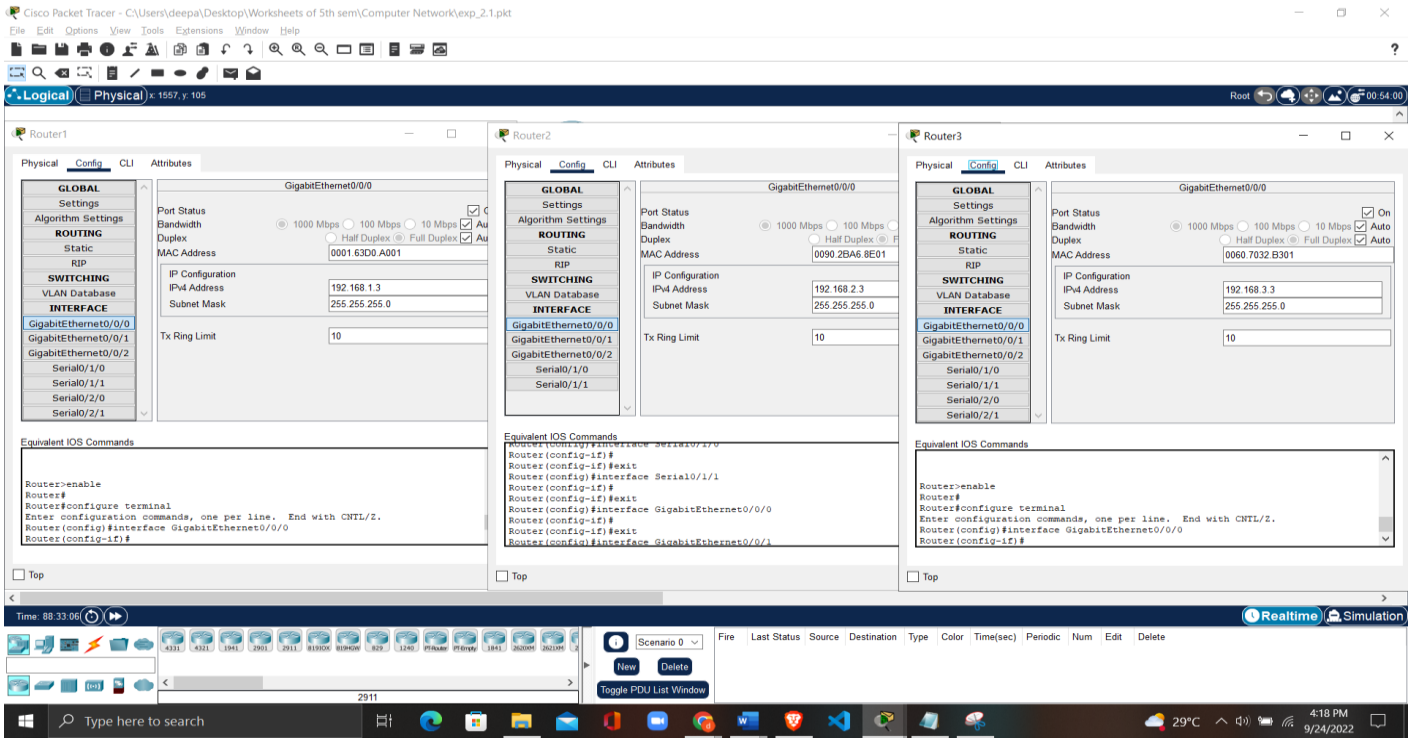
functionality of Dynamic Routing OSPF (open shortest path first) and RIP are some protocols used for dynamic routing.

5. Steps for the practical/ Result/ Output:

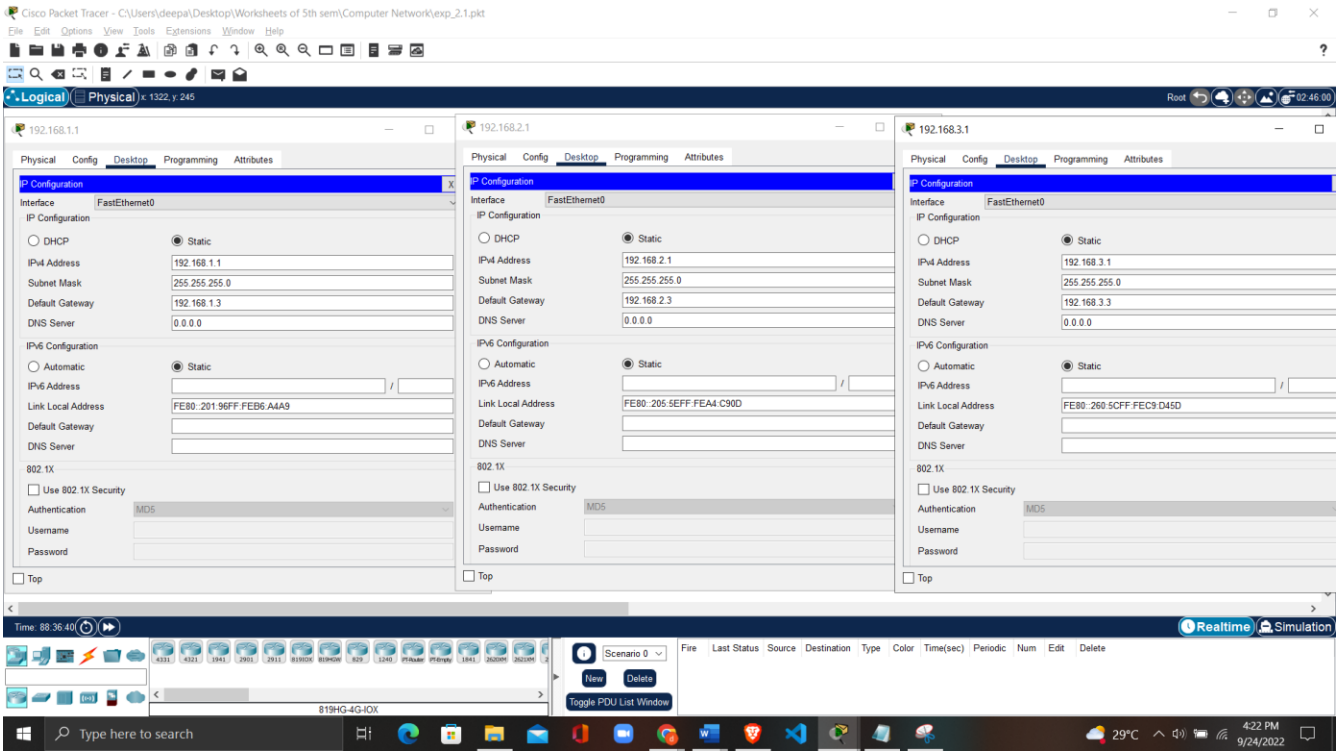
a. Create three networks with separate sets of two end devices (PCs), and a network device, Switch(2960-24TT) and a Router (ISR4331) alongside these sets of PC-Switch-PC connections. Insert another router in the top-middle to form a Rhombus like structure of the routers.

b. Create link between PCs-Switch using the automatic wire selection, and a Gigabit Ethernet connection (Switch Gig 0/1, Router Gig 0/0/0) using the straight through wire selection between Switch and Routers for the 3 networks.

c. Provide IP configuration to PCs according to the network as shown in the screenshot and rename them with same. Router should be provided with IP addresses corresponding to the network it is connected to. Router->Config->Gigabit 0/0/0-> IP of 198.168.1.3/ IP of 198.168.2.3/ IP of 198.168.3.3. Switch ON the interfaces.

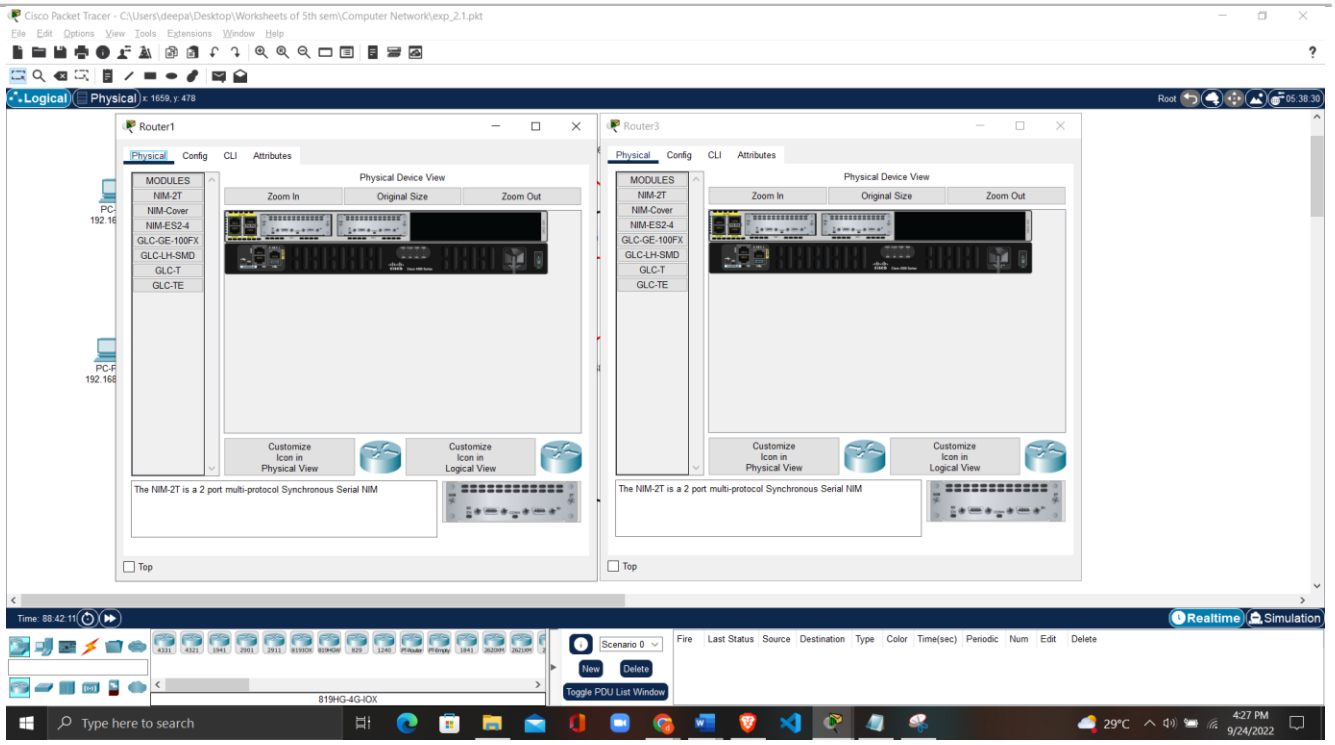


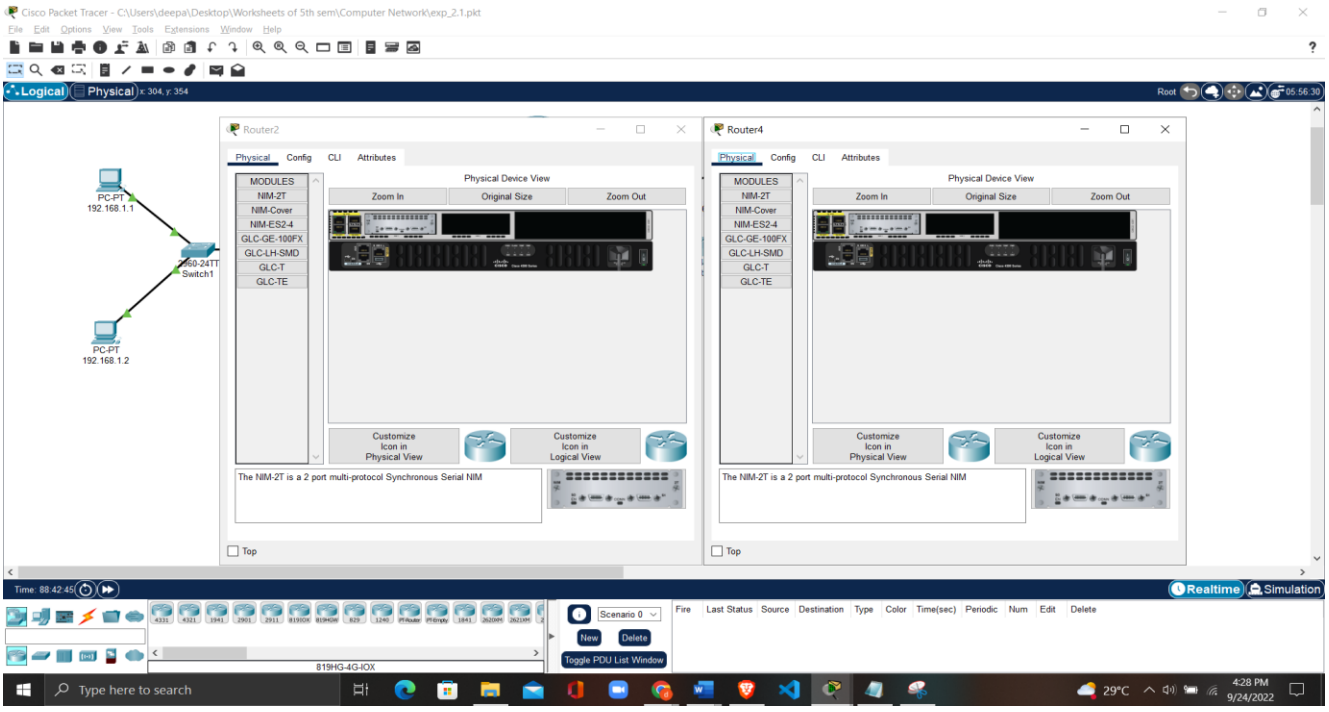
d. Put IP of Router's corresponding ethernet connection to the respective PCs default gateway option in IP configuration, for switches to recognize the gateway according to the given configuration.



e. We need to add Serial port in the Routers by clicking and zoom in, switch it OFF and add a Serial port (Synchronous Serial NIM 2T port) from bottom left corner in the router. Switch it ON again.

The Router-1 and Router-3 contains 2 Serial ports whereas the Router-2 and Router-4 contains 1 Serial port only.





f. Create Serial connection (Serial 0/1/0 and Serial 0/1/1) using the Serial DTE wire selection between Router 1-2, 4-3 and 2-3, 1-4.

Connection A- Add another Serial port in Routers 1,3 and create Serial connection (Serial 0/2/0) using the Serial DTE wire selection between them.
Connection B- Create a Gigabit Ethernet connection (Router1 Gig 0/0/1, Switch3 Gig 0/2) using the straight through wire selection between Switch3 and Router1.
The connection between the routers is also a network so we have 8 networks in total.

g. Provide IP configuration to Router connections according to the network then switch ON the interfaces.
   Network 4: Router 1-2: Serial 0/1/0 – 192.168.4.1/192.168.4.2
   Network 5: Router 2-3: Serial 0/1/1 – 192.168.5.1/192.168.5.2
   Network 6: Router 4-3: Serial 0/1/0 – 192.168.6.1/192.168.6.2
   Network 7: Router 1-4: Serial 0/1/1 – 192.168.7.1/192.168.7.2
   Network 8: Router 1-3: Serial 0/2/0 – 192.168.8.1/192.168.8.2
   For Router1 Gig 0/0/1, Switch3 Gig 0/2- provide IP address in Router1 for network 3 as 192.168.3.4.

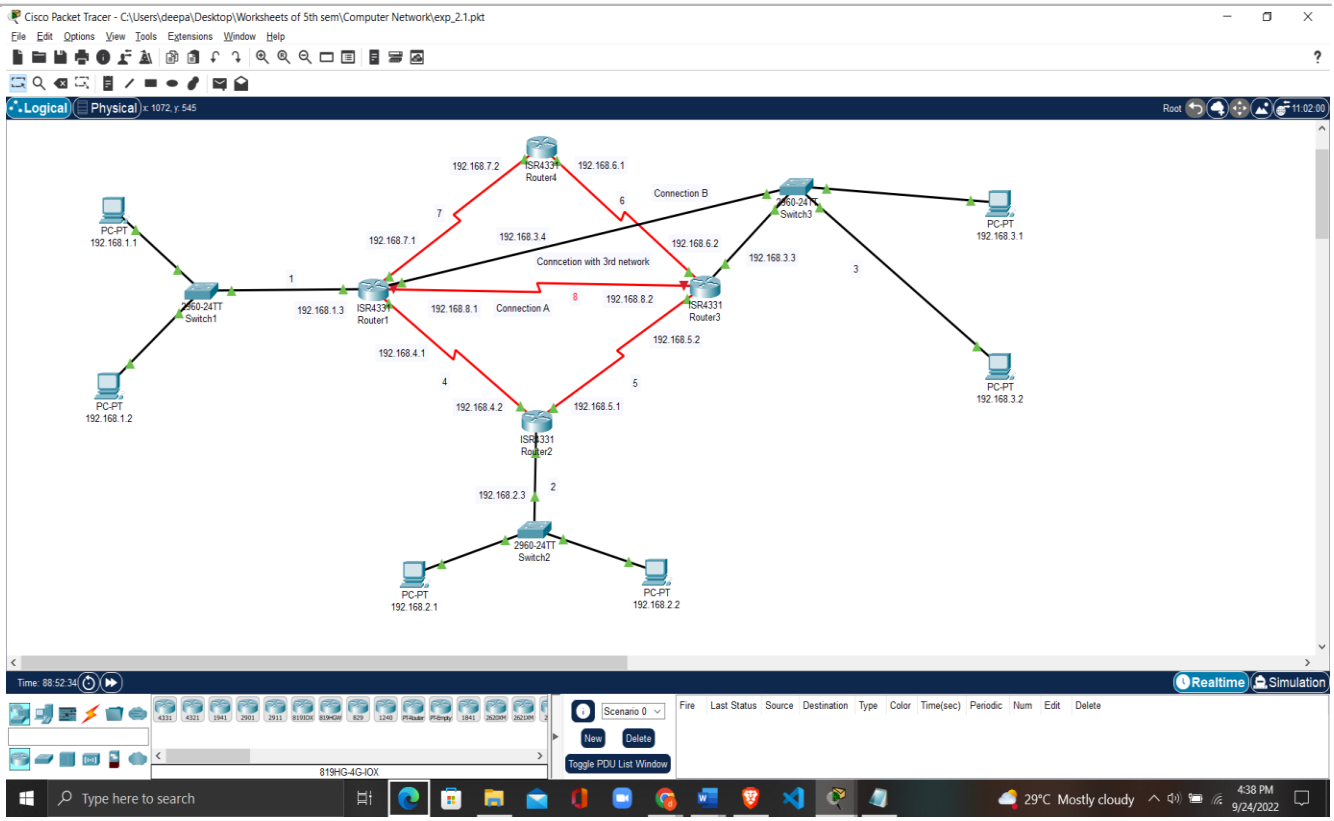
h. Implement dynamic routing, i.e., providing various path options for packet to travel over the network. Router->Config->Routing->RIP. Put the values of the IP for Network, that the router is directly connected to.

i. Router->Config->Routing->RIP

	Router 1	Router 2	Router 3	Router 4
Network	192.168.1.0 192.168.3.0 192.168.4.0 192.168.7.0 192.168.8.0	192.168.2.0 192.168.4.0 192.168.5.0	192.168.3.0 192.168.5.0 192.168.6.0 192.168.8.0	192.168.6.0 192.168.7.0

RIP Routing table

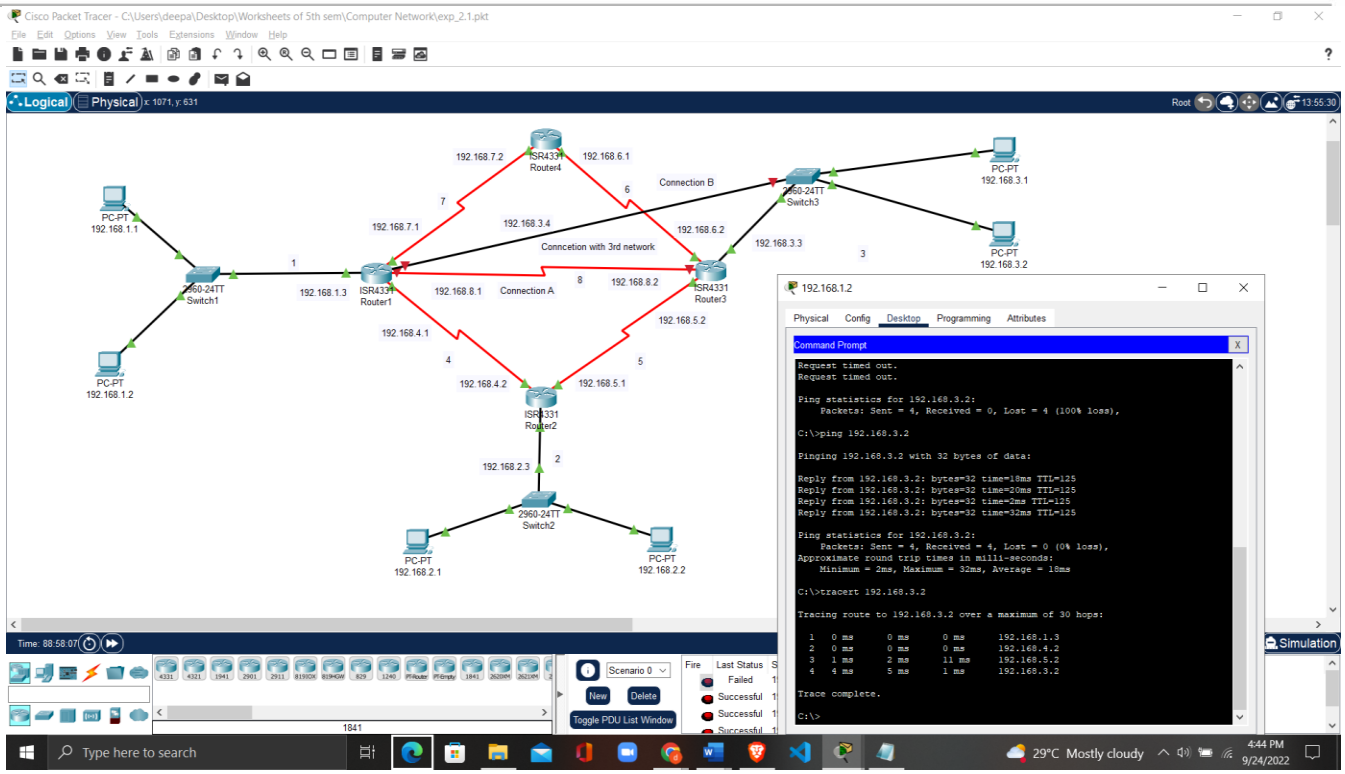
j. Now select the message option and drop on sender and receiver and devices one by one. Firstly, between PCs in a network, then PC to same network router and then PCs to neighbor routers. See that all other packets are sent successfully.



k. 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.

l. Use tracert command to trace route between two end devices **(192.168.1.2 to 192.168.3.2)** in the following cases:

Case 1. When connection A and B are OFF.



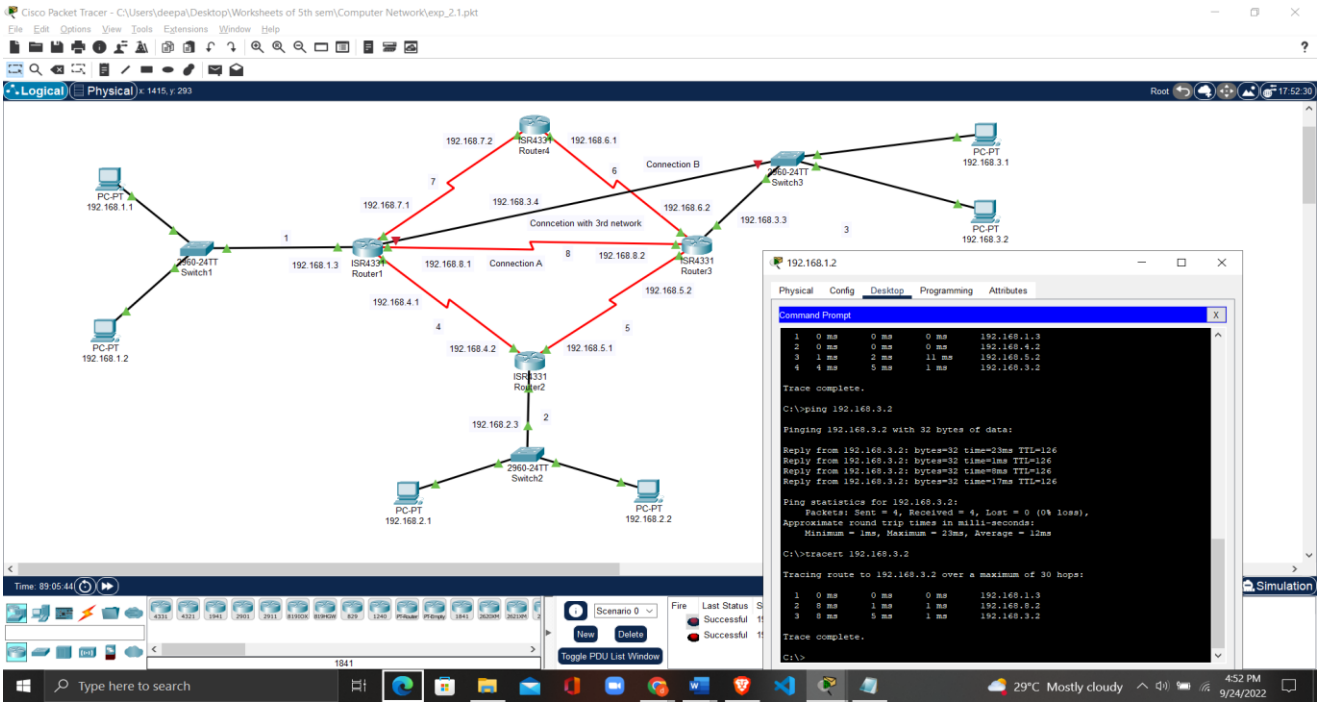
192.168.1.2

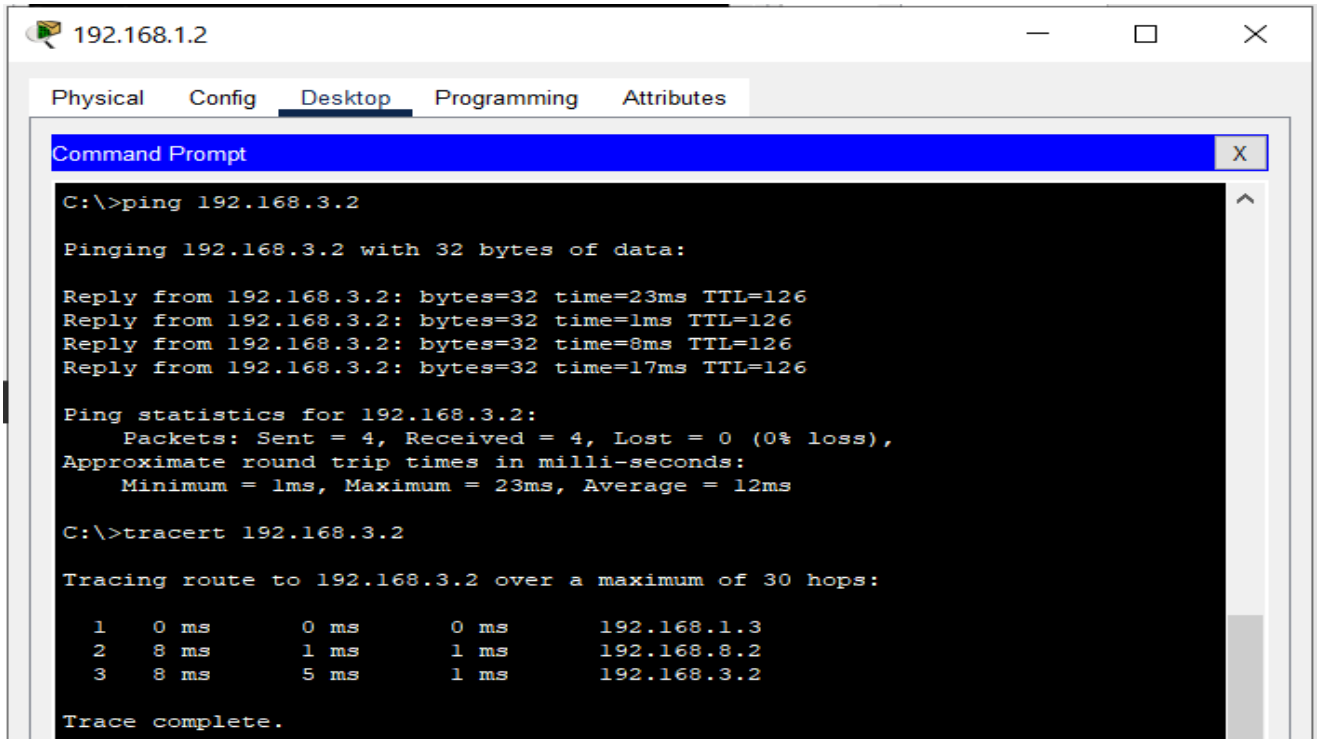
Physical Config Desktop Programming Attributes

Command Prompt

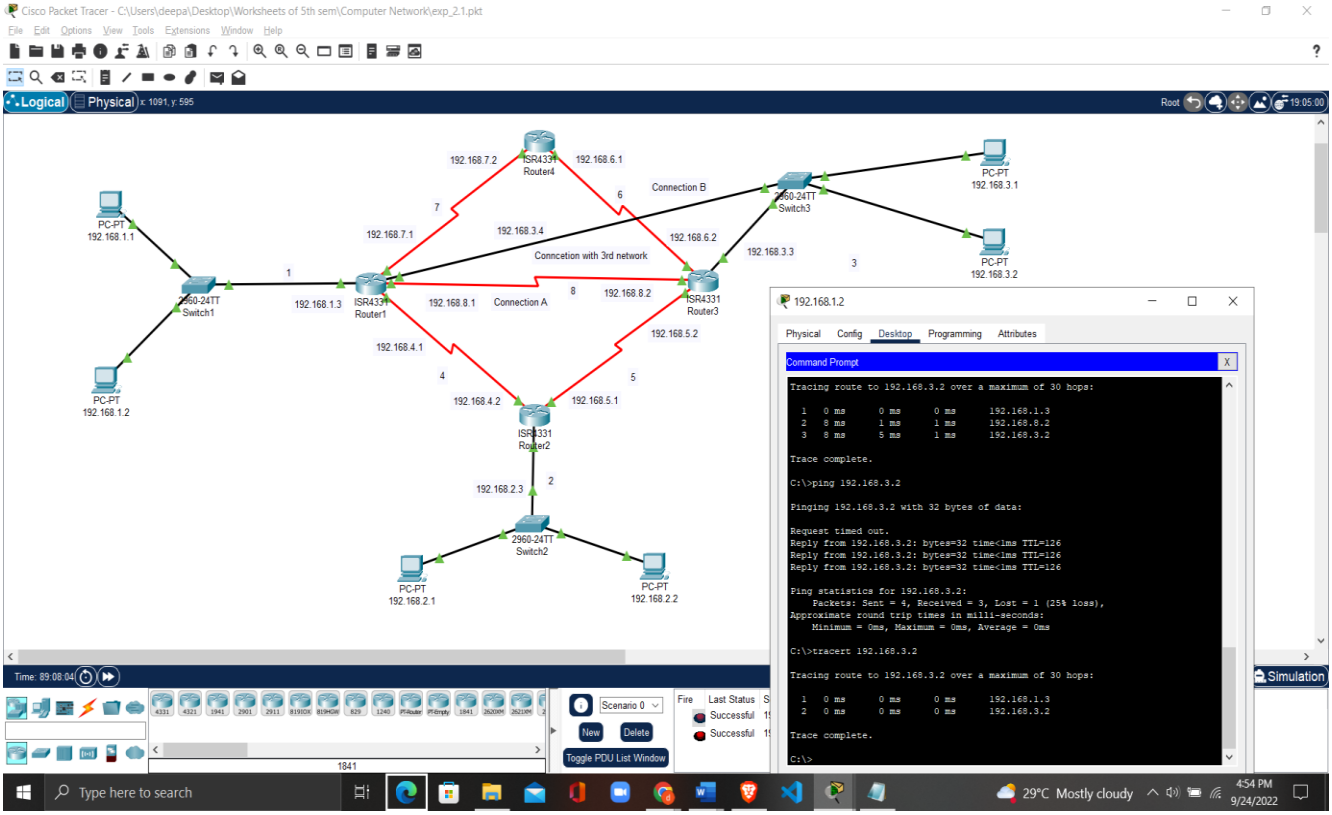
```
C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=18ms TTL=125
Reply from 192.168.3.2: bytes=32 time=20ms TTL=125
Reply from 192.168.3.2: bytes=32 time=2ms TTL=125
Reply from 192.168.3.2: bytes=32 time=32ms TTL=125

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 32ms, Average = 18ms

C:\>tracert 192.168.3.2

Tracing route to 192.168.3.2 over a maximum of 30 hops:

  1    0 ms       0 ms       0 ms       192.168.1.3
  2    0 ms       0 ms       0 ms       192.168.4.2
  3    1 ms       2 ms       11 ms      192.168.5.2
  4    4 ms       5 ms       1 ms       192.168.3.2

Trace complete.
```

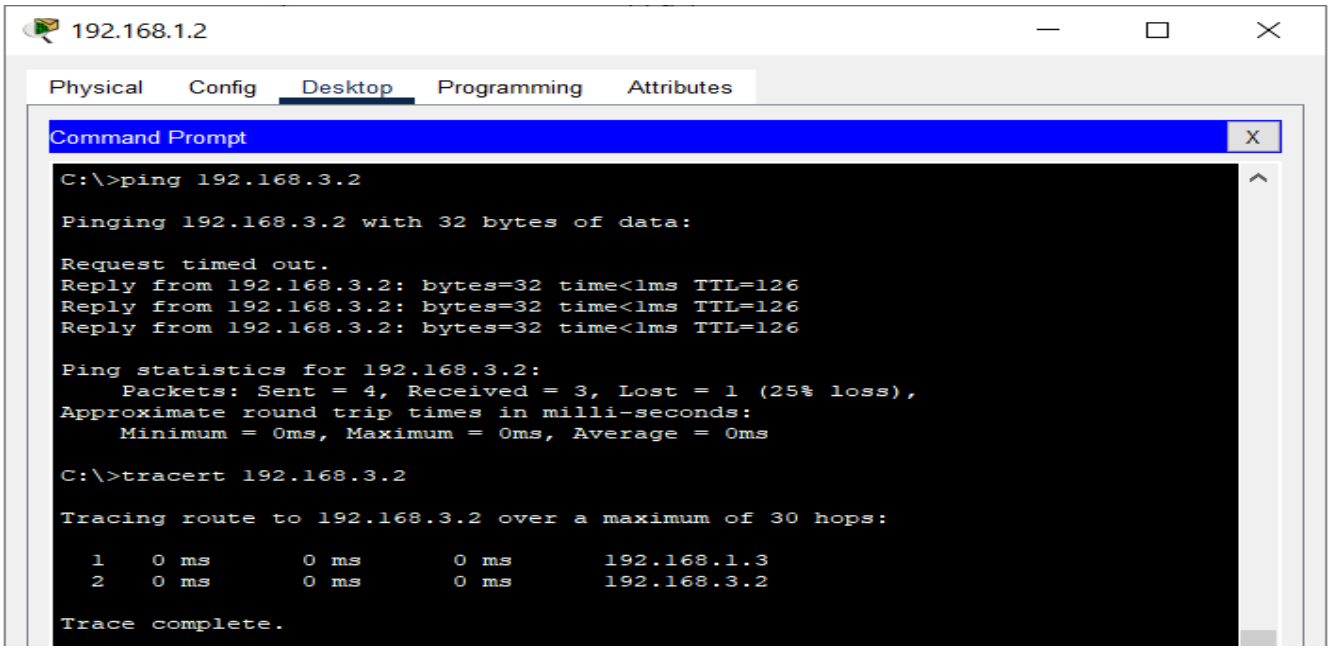
Case 2. When connection A is ON and B is OFF.





Case 3. When connection A and B are ON.





Learning Outcomes:

1. How Dynamic routing is created
2. To successfully understand the basic networking concepts.
3. To learn about working on Cisco Packet Tracer.
4. To build a computer network and implement dynamic routing of packets.

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.			