# **Department of Computer Science & Engineering**

# Practical file submitted in partial fulfillment for the evaluation of

Computer Networks Lab

(CIC-355)



# **VIVEKANANDA INSTITUTE OF PROFESSIONAL STUDIES - TECHNICAL CAMPUS**



# **Grade A++ Accredited Institution by NAAC**

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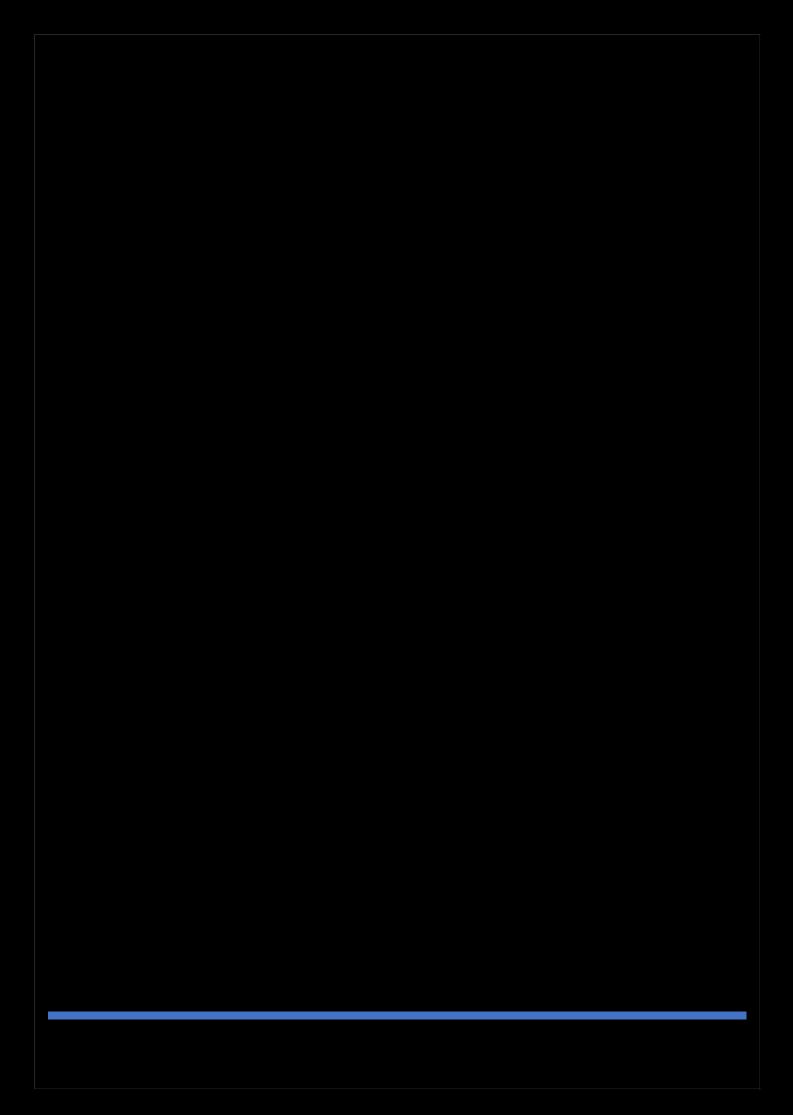
Affiliated to GGSIP University, Delhi; Recognized by Bar Council of India and AICTE

An ISO 9001:2015 Certified Institution

# **SCHOOL OF ENGINEERING & TECHNOLOGY**

# **INDEX**

S.No	EXP.	Date	Marks			Remark	Updated Marks	Faculty Signature
			Laboratory Assessment (15 Marks)	Class Participation (5 Marks)	Viva (5 Marks)			
1	Introduction to cisco packet tracer and							
	implementation of topology							
2	Configuration of DHCP and DNS server							
3	Configuration of single router							
4	Configuration of WAN using two routers							
5	Static routing using 3 routers							





Introduction to cisco packet tracer and implementation of topology

#### **THEORY-**

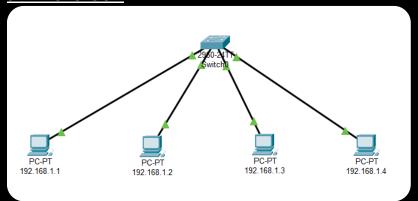
#### PROCEDURE-

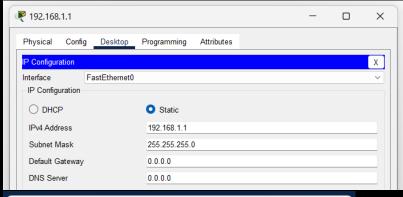
1) Initial Setup:

Open Cisco Packet Tracer and sign in with your account (only required for the first-time setup).

- 2) Star Topology:
  - a. Place a 2960 switch on the workspace.
  - b. Add multiple PCs and connect them to the switch using copper straight-through cables.
  - c. Double-click each PC, go to Desktop  $\rightarrow$  IP Configuration, and assign an IP address. Ensure all PCs are on the same network.
  - d. Rename each PC according to its IP address for clarity.
  - e. On any PC, open Command Prompt and use the ping command to check connectivity with other PCs.
- 3) Mesh Topology:
  - a. Place five PCs on the screen, each with a 2960 switch.
  - b. Connect each PC to its respective switch using copper straight-through cables.
  - c. Use copper crossover cables to interconnect the switches, forming a mesh topology.
  - d. Assign IP addresses to each PC and test the connection by pinging other devices.

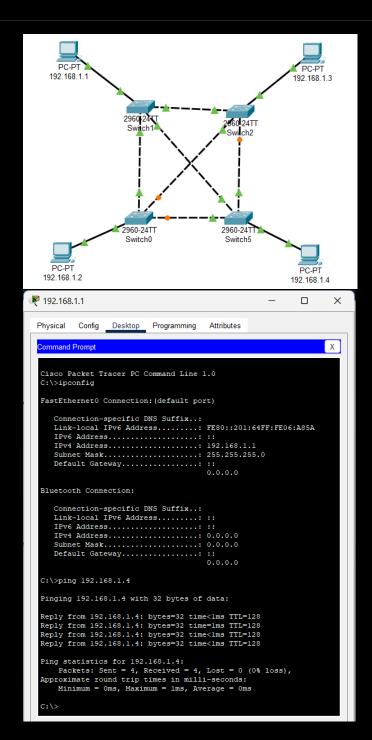
#### 1) STAR TOPOLOGY-

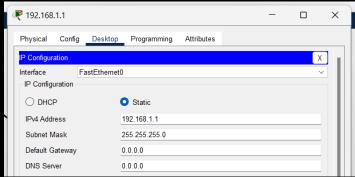


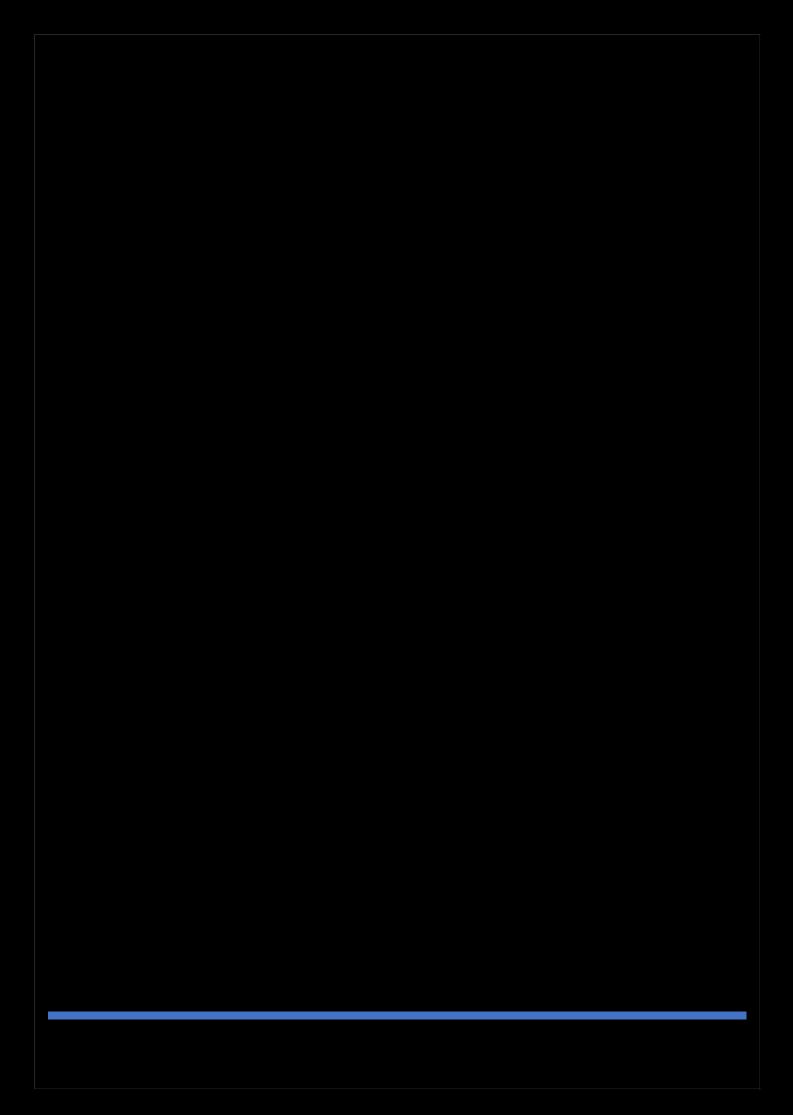




## 2) MESH TOPOLOGY-









To implement DHCP in a network topology using Cisco Packet Tracer.

#### **THEORY-**

#### PROCEDURE-

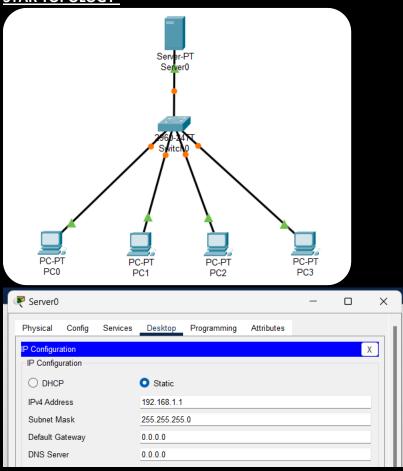
#### 1) Star Topology:

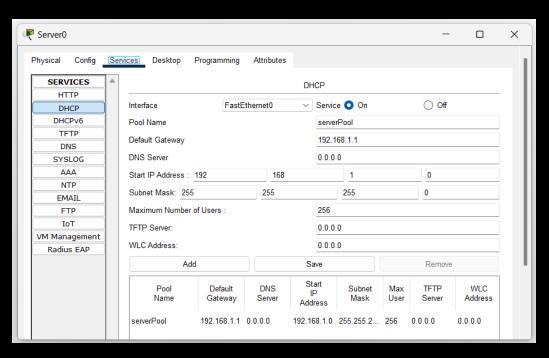
- a. Build a star topology (refer to Experiment 1 for steps).
- b. Add a server and connect it to the switch using a copper straight-through cable.
- c. Assign a static IP to the server.
- d. Double-click the server, go to Services  $\rightarrow$  DHCP, and enable the DHCP service. The starting IP address and subnet mask will auto-fill.
- e. On each PC, change the IP configuration to DHCP. The server should now assign IPs automatically.
- f. Test connectivity by pinging any PC on the network.

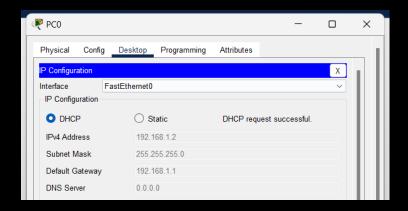
#### 2) Mesh Topology:

- a. Build a mesh topology (refer to Experiment 1 for steps).
- b. Place a server and an additional switch, connecting the server to the switch using copper straight-through cables.
- c. Use copper crossover cables to connect the new switch to the existing network switches.
- d. Assign a static IP to the server.
- e. Double-click the server, enable the DHCP service in the Services tab.
- f. Set each PC to DHCP and verify that the server assigns IPs automatically.
- g. Test the connection by pinging across devices.

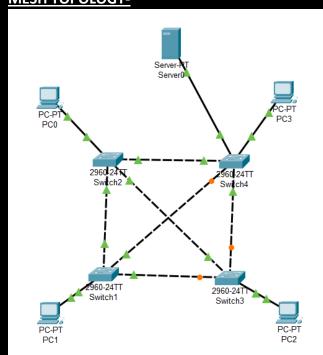
## 1) STAR TOPOLOGY-

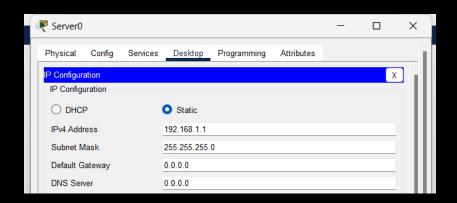


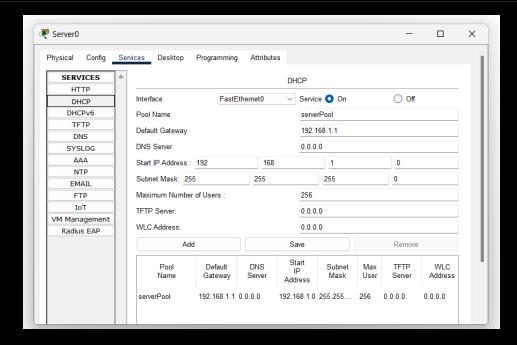


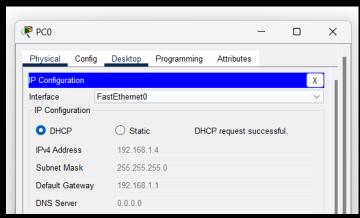


## 2) MESH TOPOLOGY-









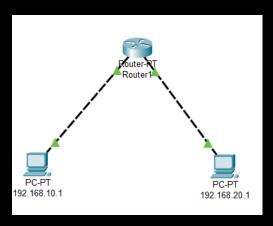
#### AIM-

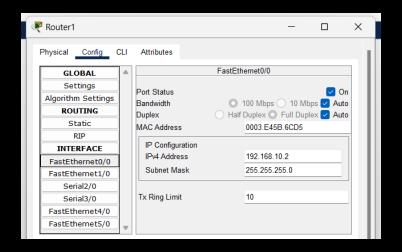
To configure a single router in a network.

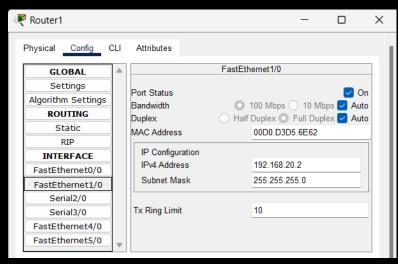
#### **THEORY-**

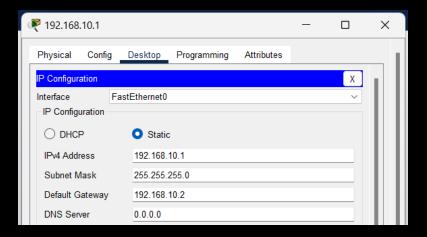
#### **PROCEDURE-**

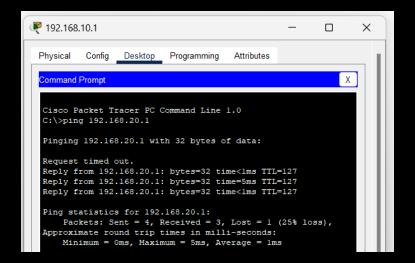
- 1. Place a Router-PT on the workspace and connect it to a switch using a copper straight-through cable.
- 2. Connect multiple PCs to the switch using copper straight-through cables.
- 3. Double-click the router, go to Config  $\rightarrow$  Interface  $\rightarrow$  FastEthernet0/1 (or FastEthernet0/0):
  - a. Enable the interface by checking "On".
  - b. Assign an IP address and subnet mask.
- 4. Repeat the process for other interfaces if needed (e.g., FastEthernet0/2).
- 5. Assign static IPs to each PC by double-clicking them, going to Desktop → IP Configuration, and entering the IP and subnet mask.
- 6. Test connectivity by using the Command Prompt on a PC and pinging other PCs.











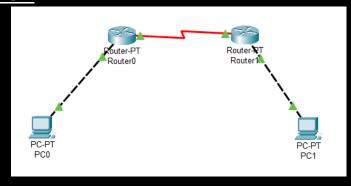


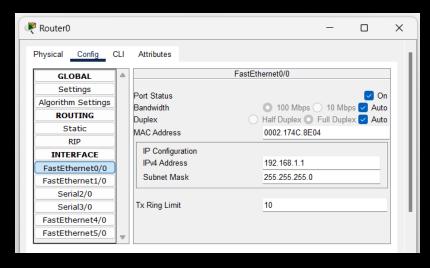
To configure WAN between two routers using Router-PT.

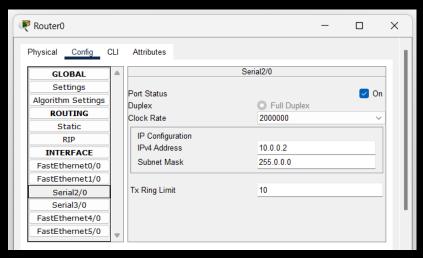
#### **THEORY-**

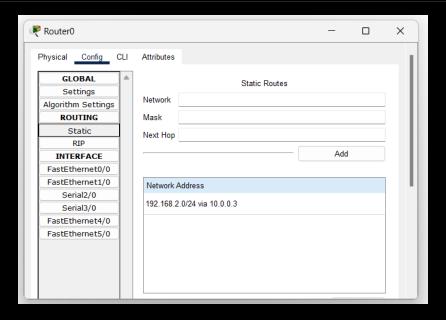
#### PROCEDURE-

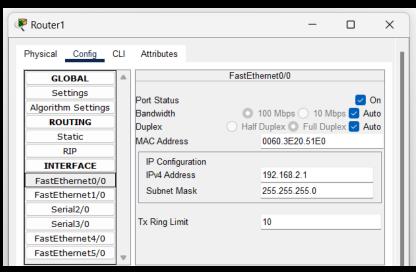
- 1. Place two Router-PT devices and connect them using a serial DCE cable.
- 2. Connect each router to its respective switch using a copper straight-through cable, and then connect PCs to the switches.
- 3. Double-click each router, go to Config  $\rightarrow$  Interface  $\rightarrow$  Serial0/0/0 (or Serial0/0/1): a. Enable the interface by checking "On".
  - b. Assign an IP address and subnet mask. c. On one router, set the clock rate for the serial connection.
- 4. For LAN communication, configure the FastEthernet interfaces:
  - a. Go to Config  $\rightarrow$  Interface  $\rightarrow$  FastEthernet0/1 and assign an IP address. b. Ensure the interface is enabled by checking "On".
- 5. On each router, go to Config  $\rightarrow$  Routing and set static routes to allow communication between networks by entering the destination network, subnet mask, and next hop.
- 6. Test the WAN connection by pinging between PCs connected to different routers.

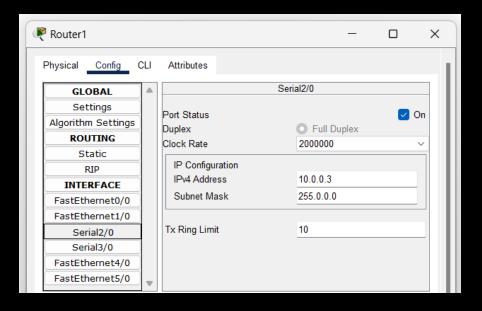


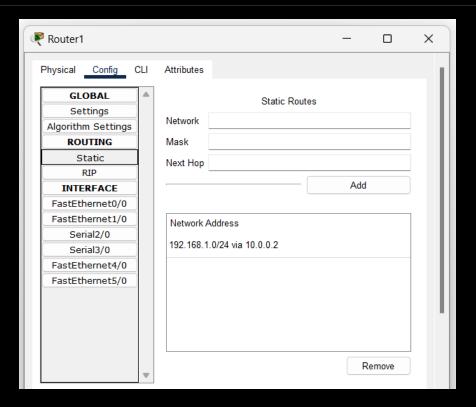


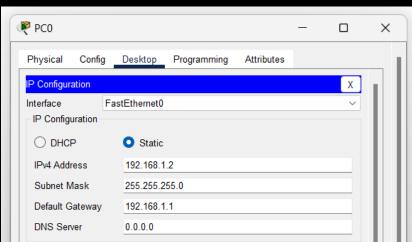


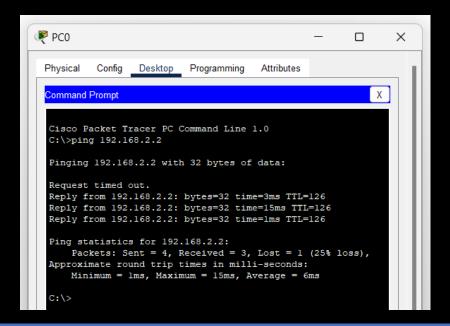


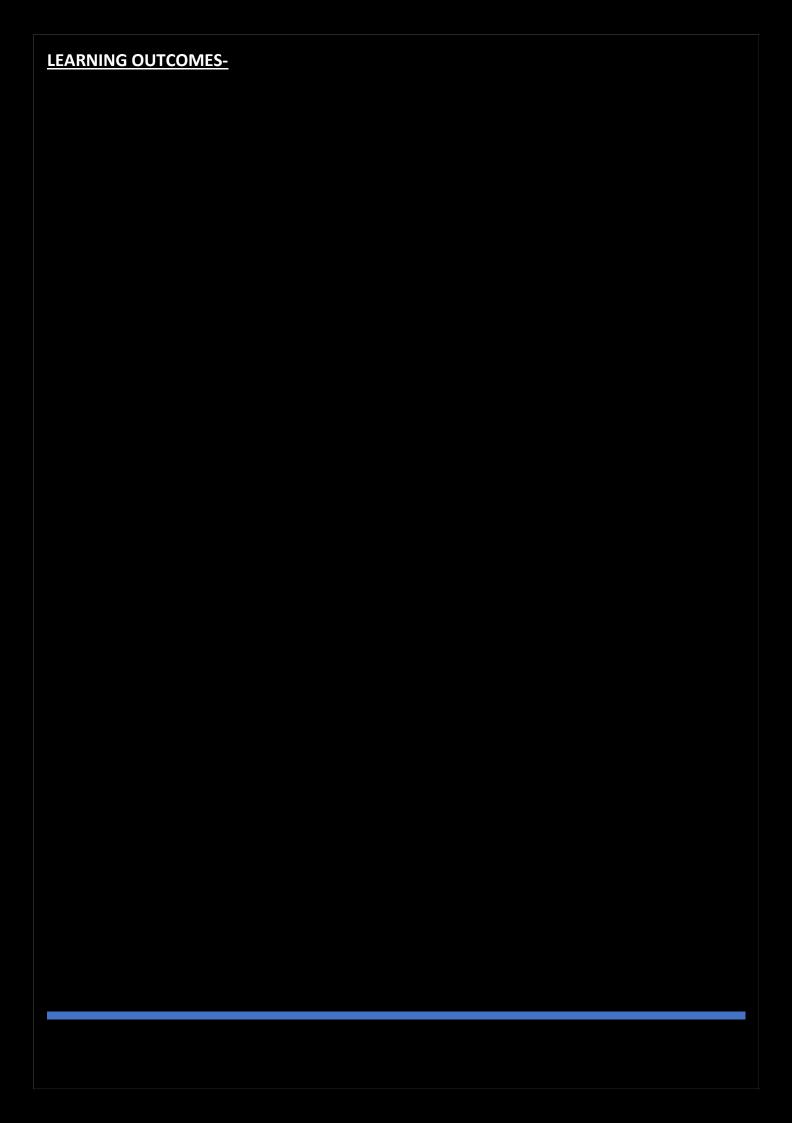












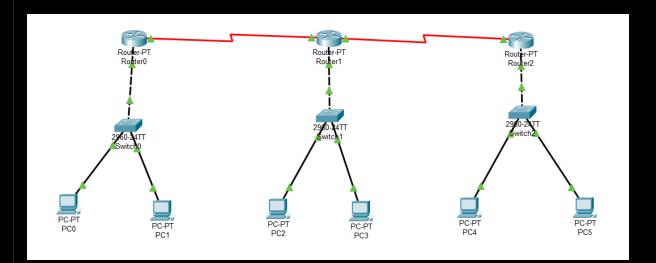


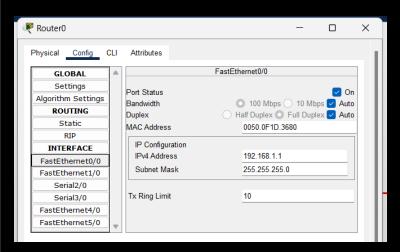
To configure static routing between three routers using Router-PT.

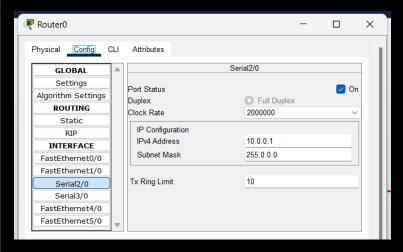
#### **THEORY-**

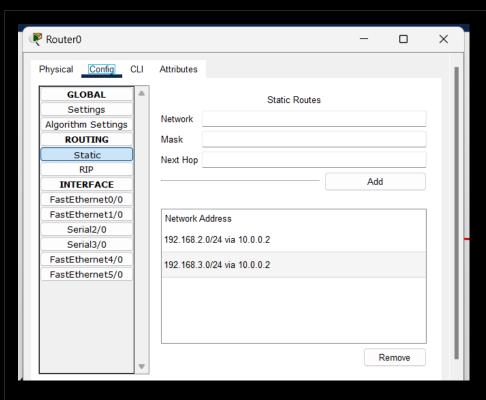
#### PROCEDURE-

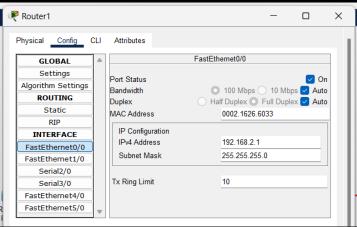
- 1. Place three Router-PT devices on the workspace and connect them using serial DCE cables.
- 2. Connect each router to its respective switch using copper straight-through cables, and connect PCs to each switch.
- 3. For each router, go to Config  $\rightarrow$  Interface  $\rightarrow$  SerialO/O/O (or relevant interface) and assign IP addresses, subnet masks, and set the clock rate for one of the routers in each serial connection.
- 4. Configure the FastEthernet interfaces for LAN communication:
  - a. Go to Config  $\rightarrow$  Interface  $\rightarrow$  FastEthernet0/1 on each router and assign an IP address.
  - b. Ensure the interface is enabled by checking "On".
- 5. Configure static routes on each router by going to Config  $\rightarrow$  Routing  $\rightarrow$  Static and adding routes to other networks with the destination network, subnet mask, and next hop.
- 6. Assign static IPs to each PC and test the network by pinging across the devices connected to different routers.

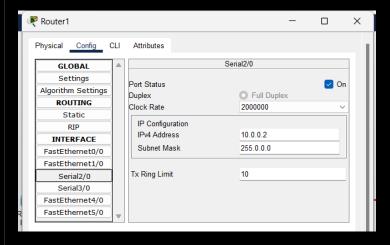


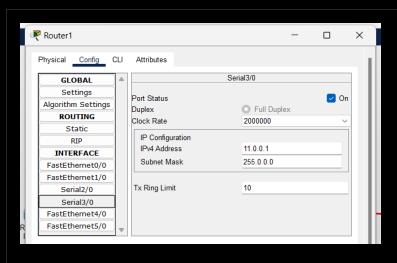


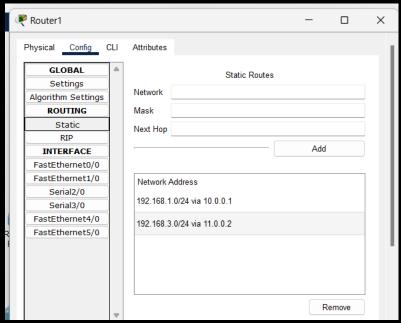


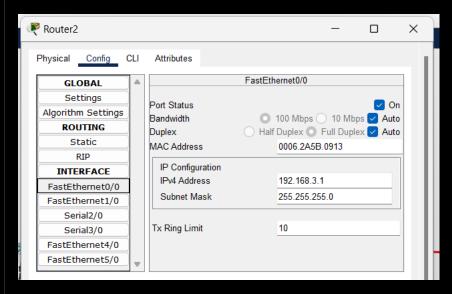


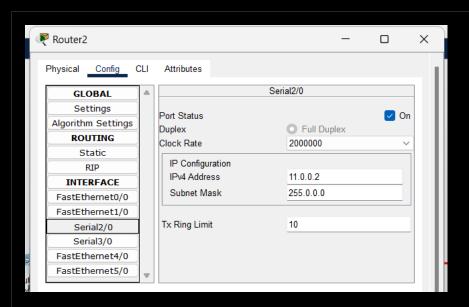


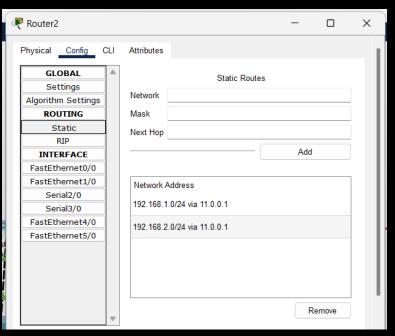


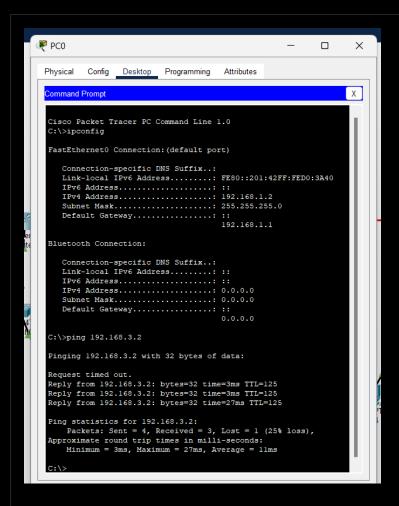














To implement the Dynamic Routing Protocols: RIP, IGRP using Cisco Packet Tracker.

## **Theory:**

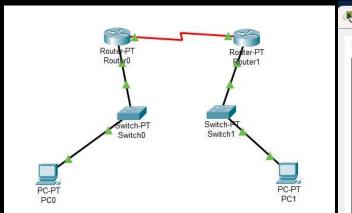
#### PROCEDURE-

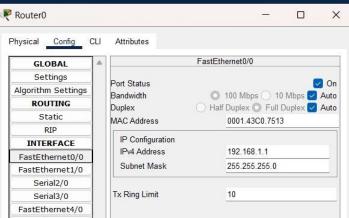
#### For RIP Implementation:

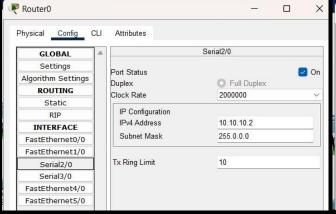
- 7. Open Cisco Packet Tracer and create a network topology with multiple routers.
- 8. Connect routers using appropriate cables (e.g., serial or Ethernet).
- 9. Click on each router and enter the CLI (Command-Line Interface).
- 10. Enter global configuration mode: enable then configure terminal.
- 11. Enable RIP on each router: router rip.
- 12. Define the version of RIP: version 2 (if using RIP v2).
- 13. Configure network statements for connected networks: network [network address].
- 14. Exit RIP configuration: exit.
- 15. Verify RIP routing table: show ip route.
- 16. Test the RIP configuration by pinging from one router to another.

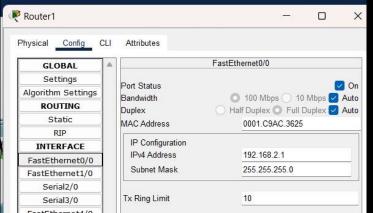
#### For IGRP Implementation:

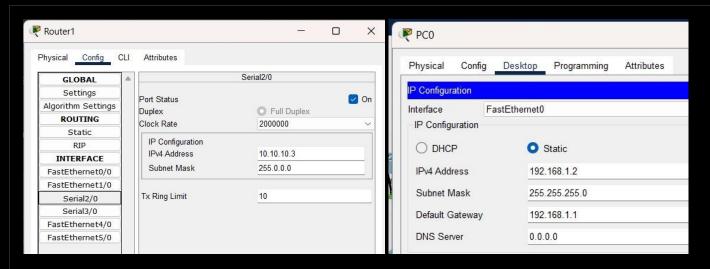
- 1. In Cisco Packet Tracer, add multiple routers and connect them.
- 2. Access the router's CLI by clicking on the router.
- 3. Enter global configuration mode: enable then configure terminal.
- 4. Enable IGRP: router igrp [AS number] (e.g., router igrp 100).
- 5. Define networks for IGRP: network [network address].
- 6. Exit IGRP configuration: exit.
- 7. Verify IGRP routing table: show ip route igrp.
- 8. Test IGRP by pinging from one router to another.
- 9. Monitor routing updates: show ip protocols.

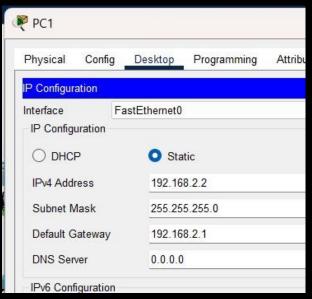












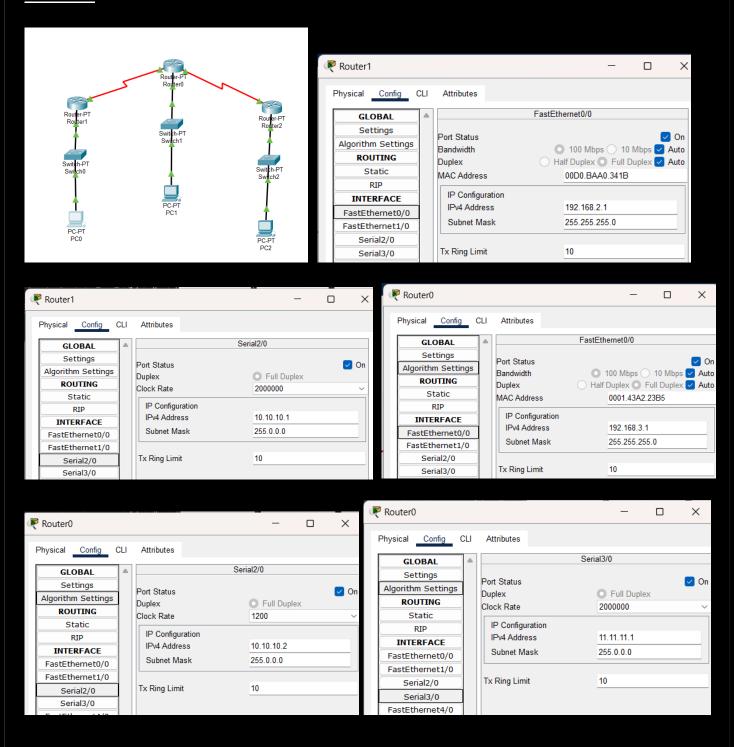
#### AIM-

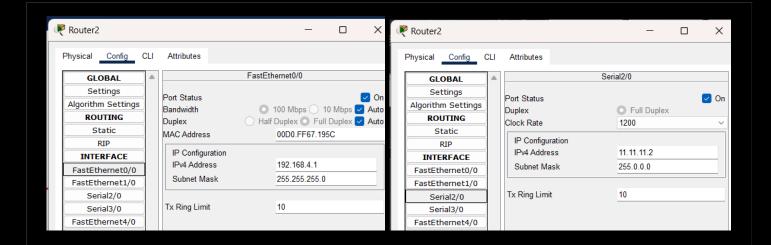
To construct multiple router networks and implement the EIGRP Protocol.

#### PROCEDURE-

- 1. Place multiple routers (e.g., Router-PT1, Router-PT2) and connect them using serial or Ethernet cables.
- 2. On each router, configure interfaces with IP addresses and subnet masks (e.g., Router-PT1: 192.168.1.1/24, Router-PT2: 192.168.2.1/24).
- 3. On each router, enter global config mode: configure terminal.
- 4. Enable EIGRP on each router with the command: router eigrp <AS\_number>.
- 5. Define the networks to participate in EIGRP by using network <network address> <wildcard mask>.
- 6. On each router, verify EIGRP configuration with show ip eigrp neighbors and show ip route.

- 7. Test inter-router connectivity by pinging between devices on different networks.
- 8. Optionally, configure EIGRP settings like passive interfaces, delay, or bandwidth for optimization.







To implement the Network Address Resolution (NAT) using Cisco Packet Tracker.

### Theory:

#### **PROCEDURE-**

- 1. Place a router and switch, then connect PCs to the switch with copper straight-through cables.
- 2. On the router, configure **FastEthernet0/1** (inside) and **FastEthernet0/0** (outside) interfaces with IP addresses and subnet masks.
- 3. On the router CLI, enter global config mode: configure terminal and set interfaces with ip nat inside and ip nat outside.
- 4. Define a NAT pool with ip nat pool NAT\_POOL 203.0.113.2 203.0.113.10 netmask 255.255.255.248.
- 5. Create an access list with access-list 1 permit 192.168.1.0 0.0.0.255 to match internal IPs.
- 6. Enable NAT with ip nat inside source list 1 pool NAT\_POOL.
- 7. Assign static IPs to PCs (e.g., 192.168.1.x/255.255.255.0) and set the default gateway to 192.168.1.1.
- 8. Test connectivity by pinging between PCs and verify NAT with show ip nat translations on the router.



