ST. XAVIER'S COLLEGE

Maitighar, Kathmandu

(Affiliated by Tribhuvan University)

(Department of Computer Science)

Business Data Communication and Networking [IT 240]

Lab Report 3

DIFFERENT NETWORK TOPOLOGIES AND ROUTER CONFIGURATION

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LAB 3: LAB REPORT ON DIFFERENT NETWORK TOPOLOGIES AND ROUTER CONFIGURATION IN CISCO PACKET TRACER

OBJECTIVE

- To understand and demonstrate different network topologies and router configuration in Cisco Packet Tracer.

THEORY

- **Network Topologies:** The term Topology refers to the way in which the various nodes or computers of a network are linked together. It describes the actual layout of the computer network hardware. It defines how different network devices are arranged and how they communicate with each other.
    - **Bus Topology:** Bus topology uses a single cable which connects all the included nodes. The main cable acts as a spine for the entire network which is generally a coaxial cable or a twisted pair cable. One of the computers in the network acts as the computer server.
    - **Ring Topology:** Ring topology is a network configuration where each device is connected directly to two other devices forming a circular pathway for data to travel. Here, data travels in one direction until it reaches its destination. It is simple and efficient but can be prone to network issues if one device fails disrupting the whole network.
    - **Star Topology:** It is a network topology where each network device is connected directly to a central hub or switch. All data of the network passes through the central point which manages and controls the flow of data. It is generally used in an ethernet network and is known for its simplicity and ease of troubleshooting.
    - **Mesh Topology:** In a mesh topology, every device is connected to every other device, creating multiple paths for data. This redundancy ensures reliability and fault tolerance. It is generally used in which reliability and redundancy are critical.
- **Routers:** Routers are networking devices that forward data packets between computer networks. They operate at the OSI Model's Network Layer (Layer 3) and are essential for connecting different networks together. They use routing tables to determine the best path for data transmission. Routers examine the destination IP address of incoming packets and forward them to the next hop on the path towards their destination.

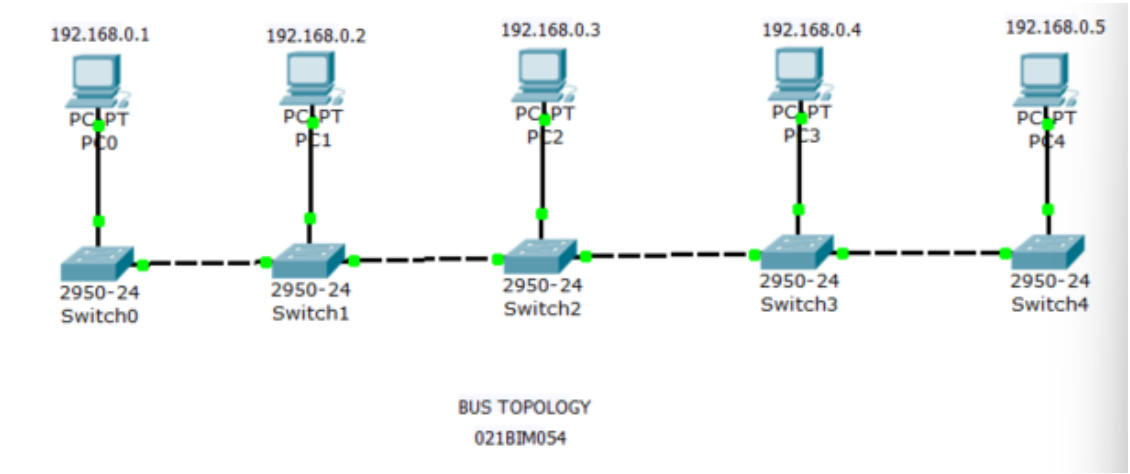
WORKING PROCESS

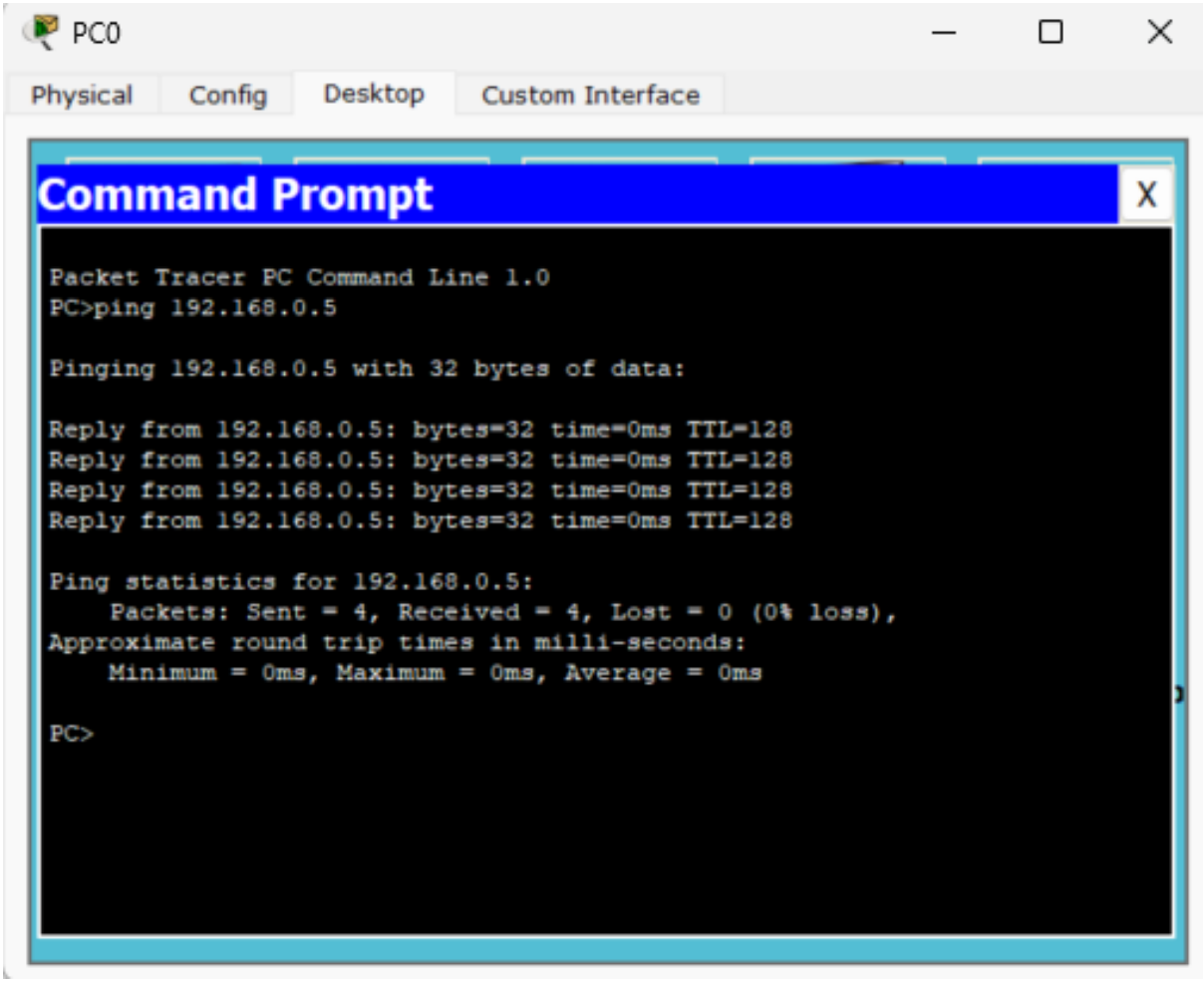
Steps for Topology:

i. **Open Cisco Packet Tracer:** Launch the Cisco Packet Tracer application on your computer.
ii. **Select Topology:** Choose which topology to create.
iii. **Select Devices:** Choose the devices you want to connect to in the topology. For example, you can use PCs as endpoints and a switch or hub as the central connection point.
iv. **Connect Devices:** Connect each device to the central switch or hub using Suitable Connection wires.
v. **Configure Devices:** Configure the IP addresses of the devices if you want them to communicate with each other. Use the device configuration options to set IP addresses, and subnet masks.
vi. **Test Connectivity**: After setting up the connection and configuring devices, you can test connectivity between devices by sending ping requests or accessing shared resources.

1. BUS Topology

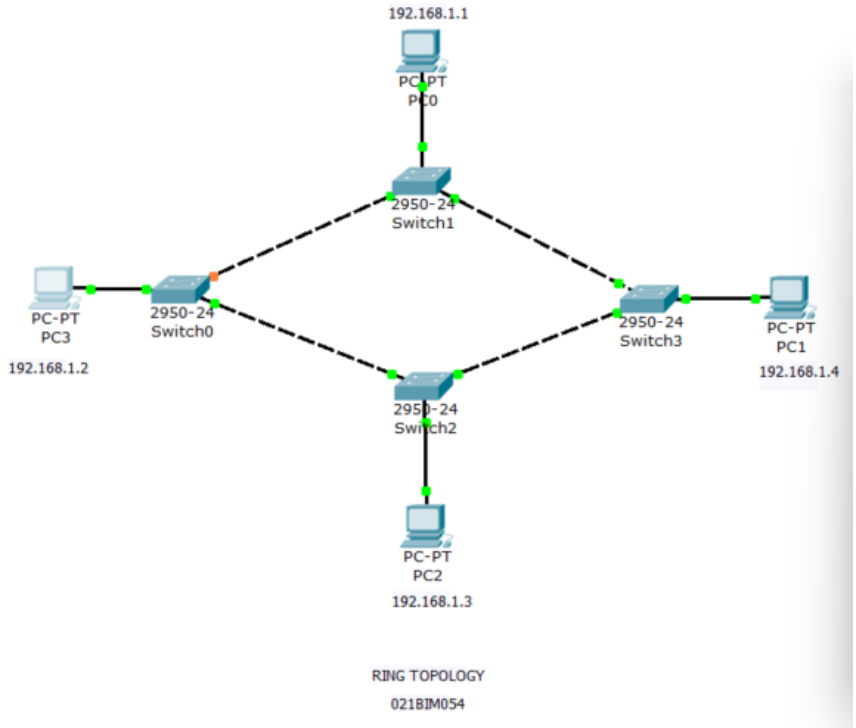
In a bus topology, all devices are connected to a switch which are interconnected, or all devices are connected to this central wire. The physical layout of a bus network consists of a single cable, typically an Ethernet cable, that runs along the devices.

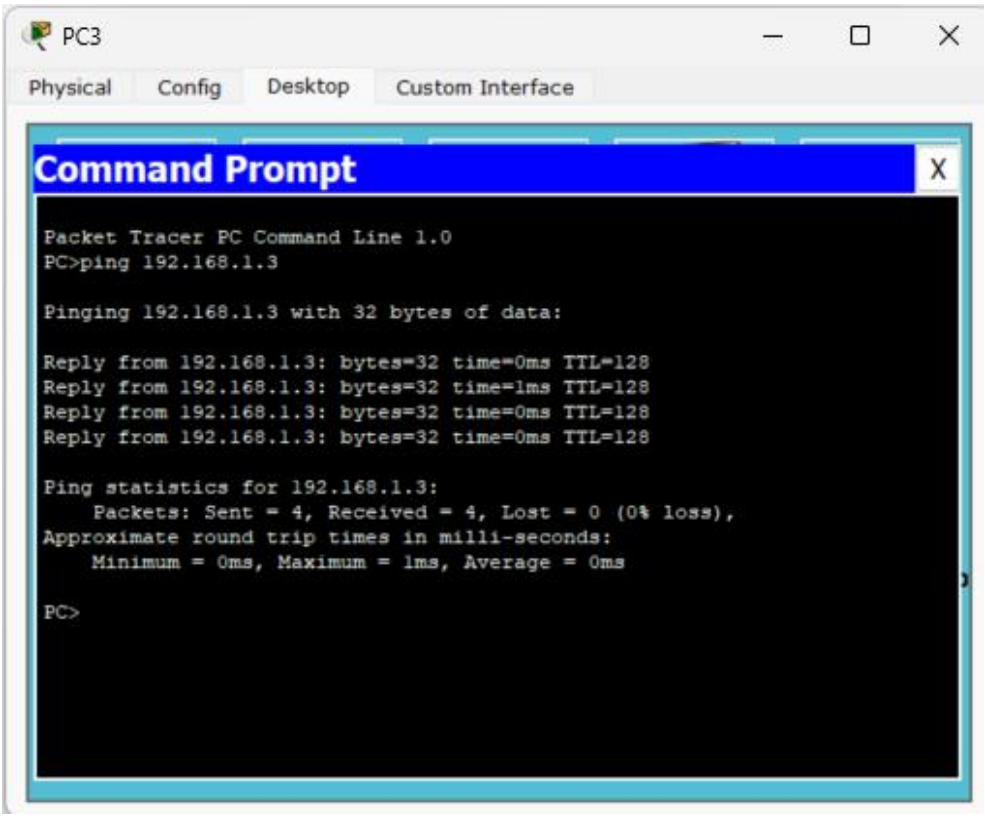




2. Ring Topology

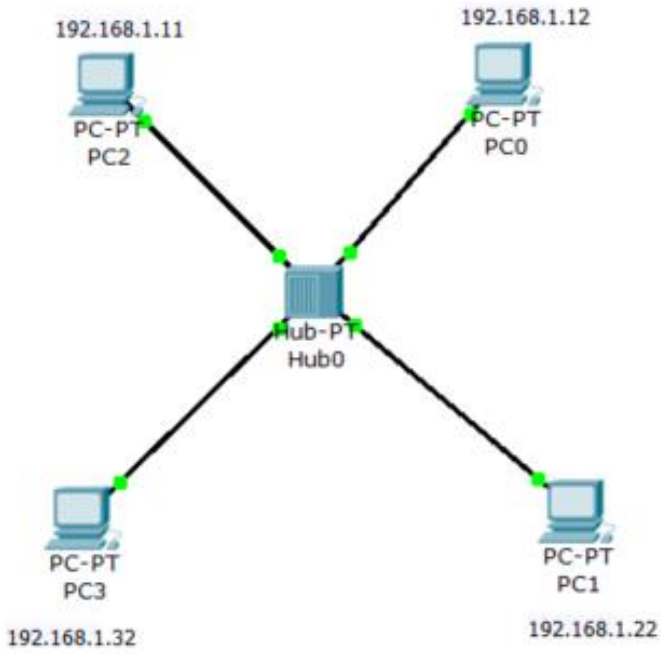
In a ring topology in Cisco Packet Tracer, devices are connected in a circular manner, forming a closed loop. Every end-device is connected to a switch which is connected to two other switches and forms a closed loop.





3. Star Topology

In a star topology in Cisco Packet Tracer, devices are connected to a central hub or switch, forming a star-like configuration.



Star Topology

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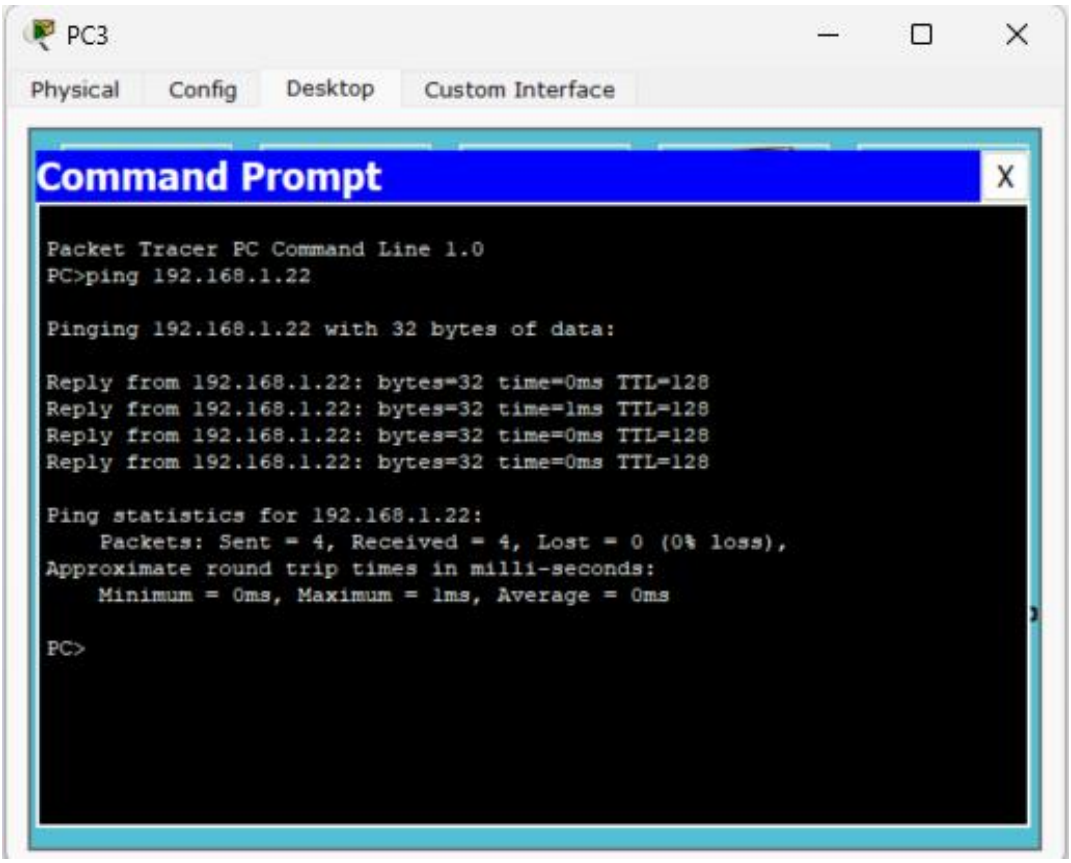
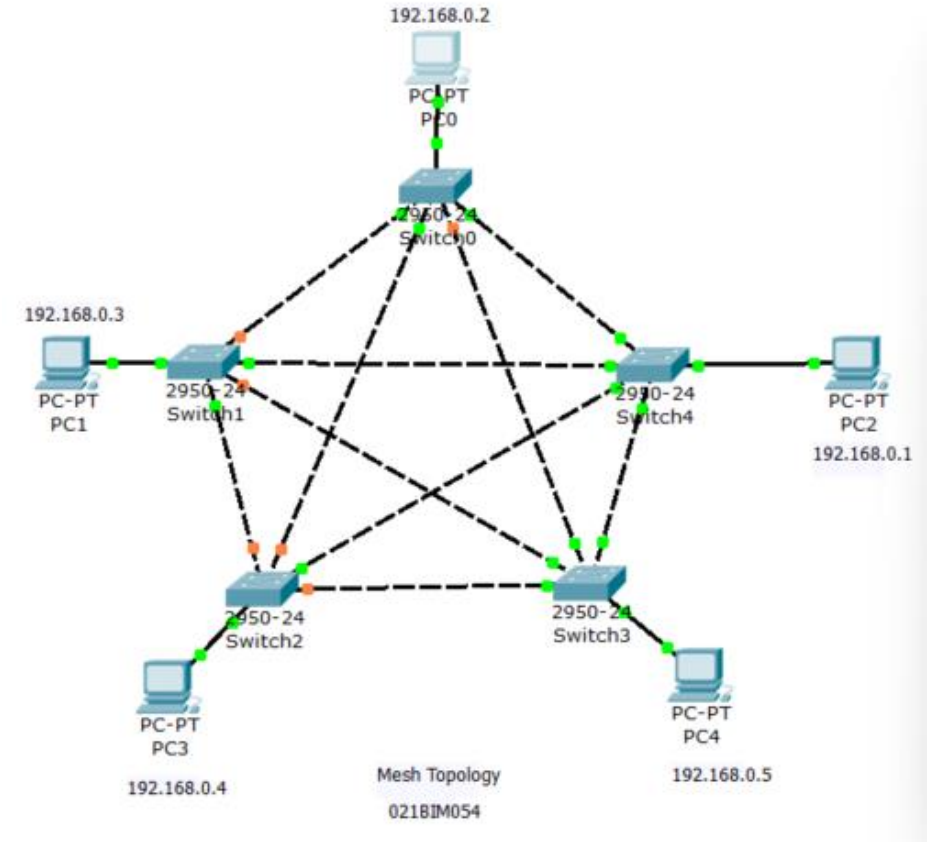
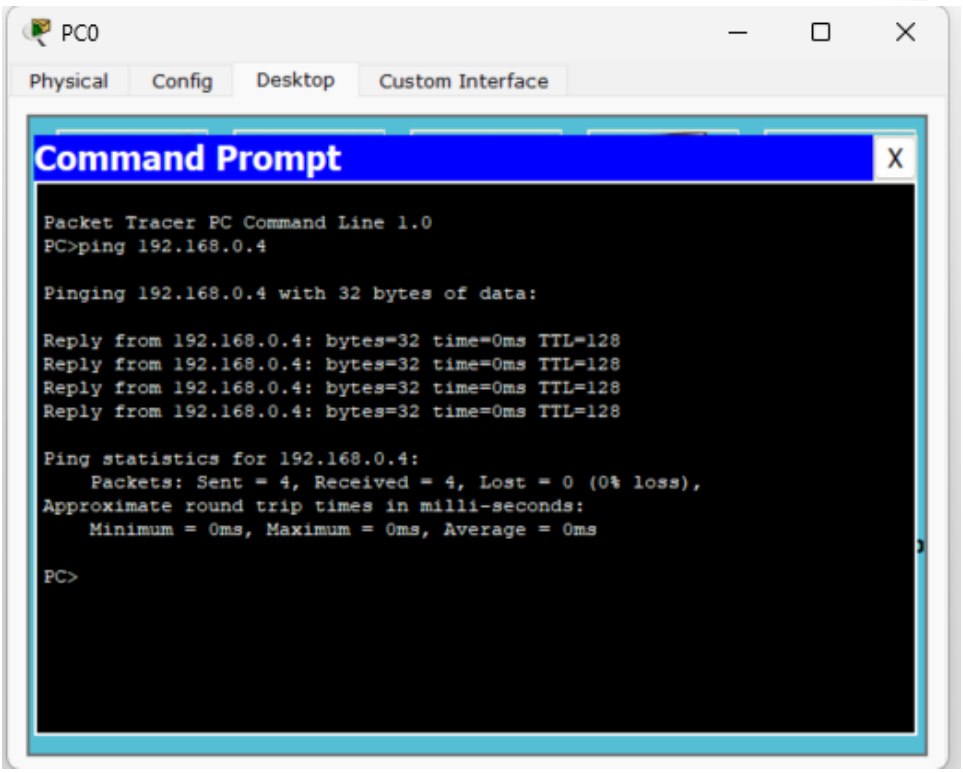


4. Mesh Topology

In a mesh topology in Cisco Packet Tracer, each device is connected to every other device in the network, creating a highly redundant network. Each end-device is connected to a switch which is connected to every switch in the network.

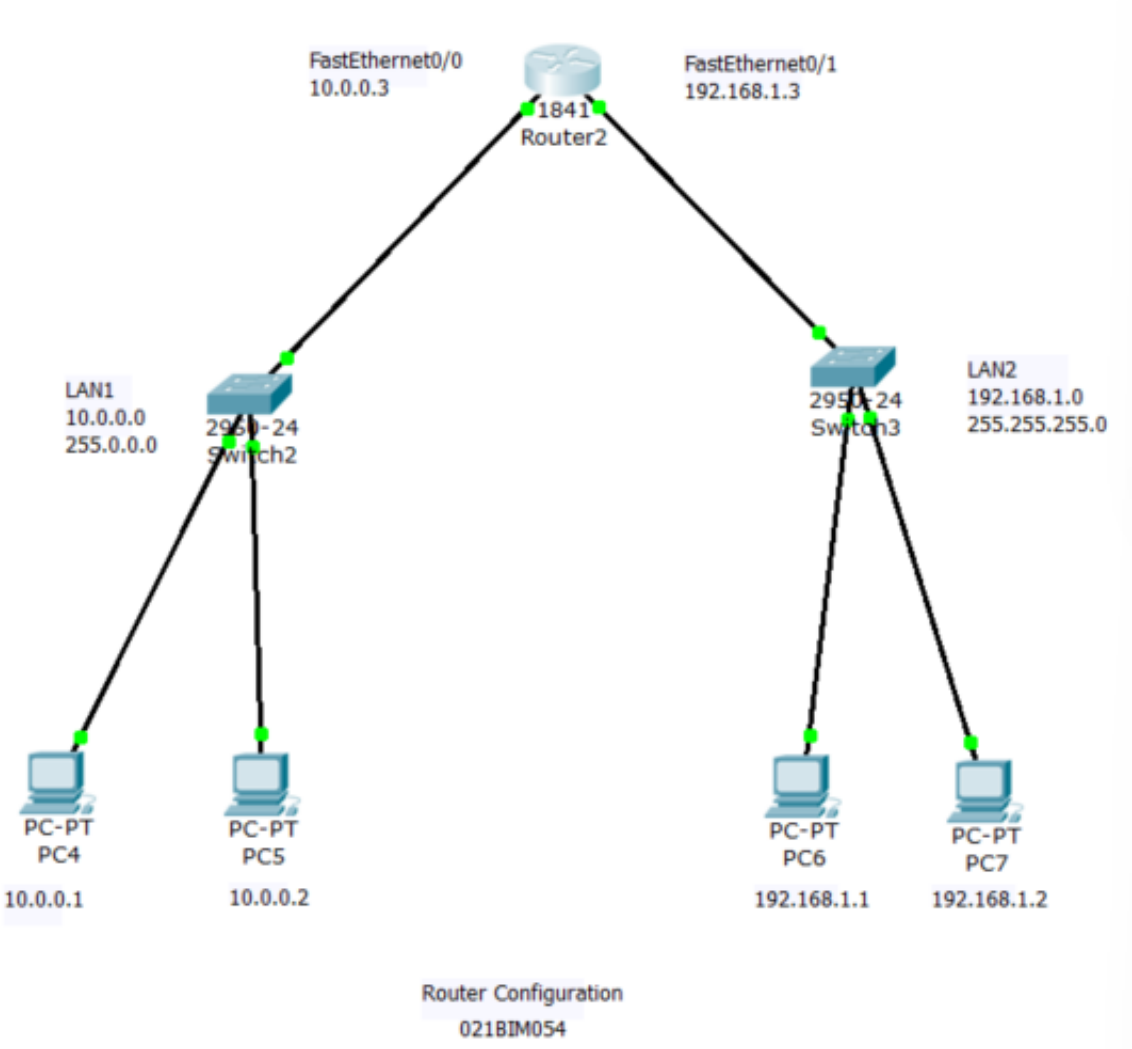


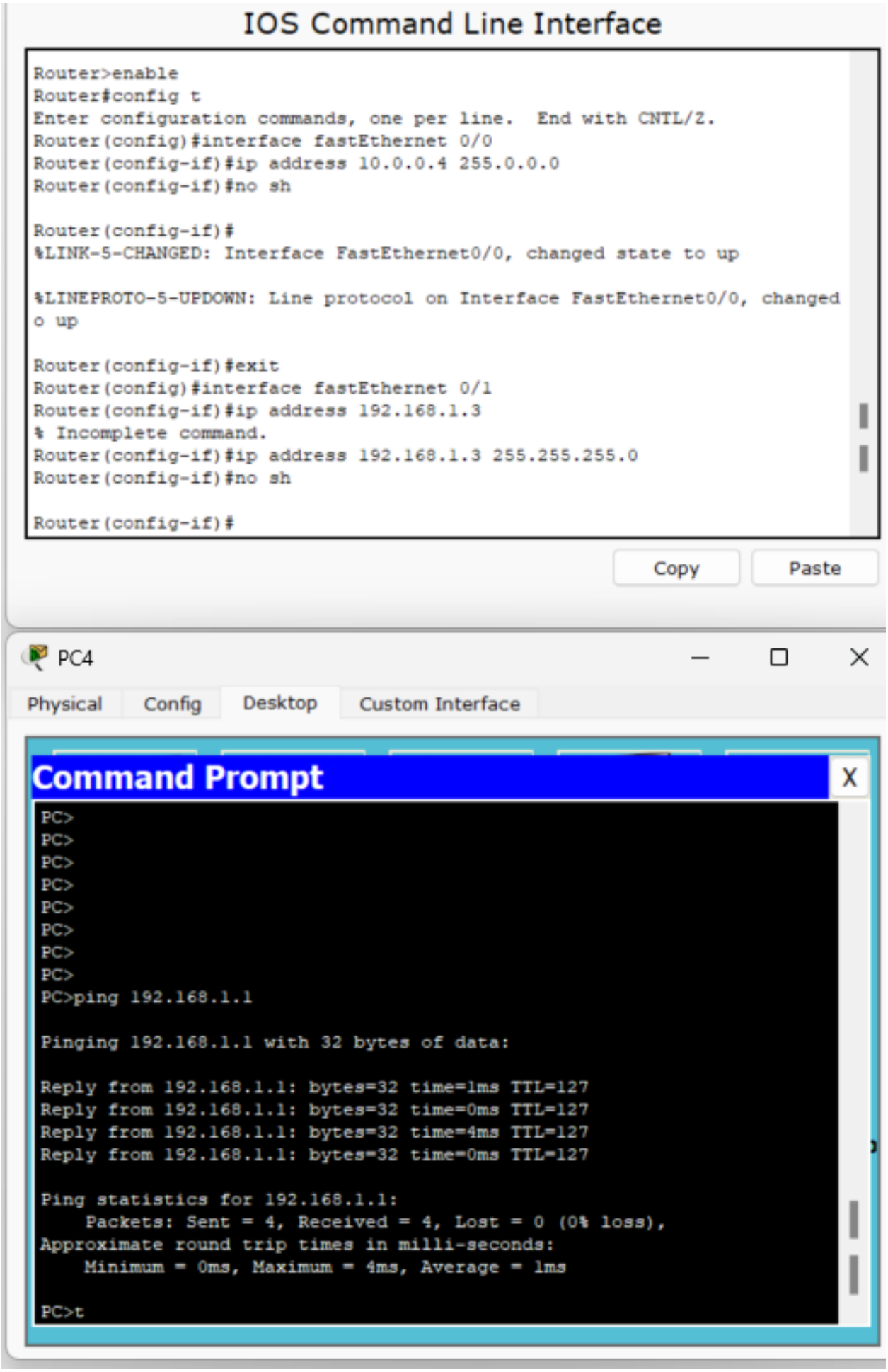


Router Configuration

Routers are used to connect different networks together. To configure a router in Cisco Packet Tracer, follow these steps:

1. Open Cisco Packet Tracer and add a router to the workspace.
2. Click on the router to select it, then click on the CLI (Command Line Interface) tab at the bottom of the screen.
3. Use the following commands to configure the router:
   i. enable: Enter privileged EXEC mode.
   ii. configure terminal: Enter global configuration mode.
   iii. interface <interface>: Select the interface to configure.
   iv. Ip address <Ip address> <subnet mask>: Set the IP address and subnet mask for the interface.
   v. no shutdown: Enable the interface.
   vi. exit: Exit interface configuration mode.




IOS Command Line Interface
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip address 10.0.0.4 255.0.0.0
Router(config-if)#no sh
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
o up
Router(config-if)#exit
Router(config)#interface fastEthernet 0/1
Router(config-if)#ip address 192.168.1.3
% Incomplete command.
Router(config-if)#ip address 192.168.1.3 255.255.255.0
Router(config-if)#no sh
Router(config-if)#
Copy
Paste
PC4
Physical
Config
Desktop
Custom Interface
Command Prompt
X
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>ping 192.168.1.1
Pinging 192.168.1.1 with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time=1ms TTL=127
Reply from 192.168.1.1: bytes=32 time=0ms TTL=127
Reply from 192.168.1.1: bytes=32 time=4ms TTL=127
Reply from 192.168.1.1: bytes=32 time=0ms TTL=127
Ping statistics for 192.168.1.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 4ms, Average = 1ms
PC>t

CONCLUSION

In this lab, we designed various network topologies, configured devices with Ip address and subnet mask, tested the connectivity by pinging them, and configured router to enable communication between two networks.