

19ECE311 - COMPUTER NETWORKS

ASSIGNMENT-1 & 2

NAME: K.V.ABHISHEK

ROLL NO: AM.EN.U4ECE22018

DATE: 28/4/2025

AIM: To Simulate different network topologies using Cisco Packet Tracer software.

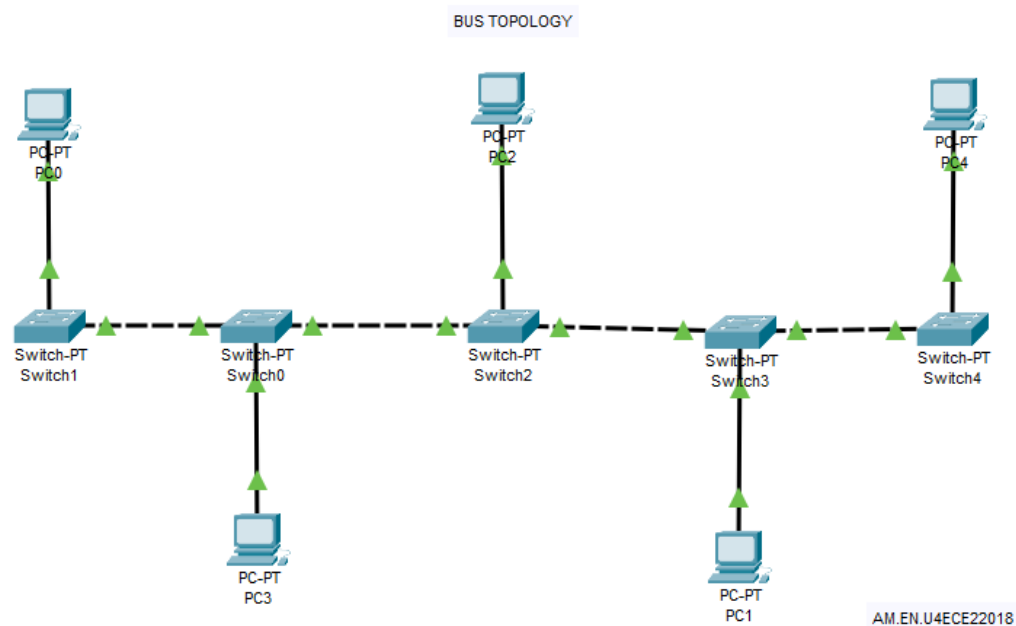
QUESTIONS:

1. Create all the topologies discussed in class in Cisco Packet Tracer (CPT).
 2. Create 3 LAN networks connected via a single Router (CPT). Choose appropriate router, connection and configure it. Each LAN network is configured via Tree, Star and Ring topologies respectively.
-



Q1. Create all the topologies discussed in class in Cisco Packet Tracer (CPT).

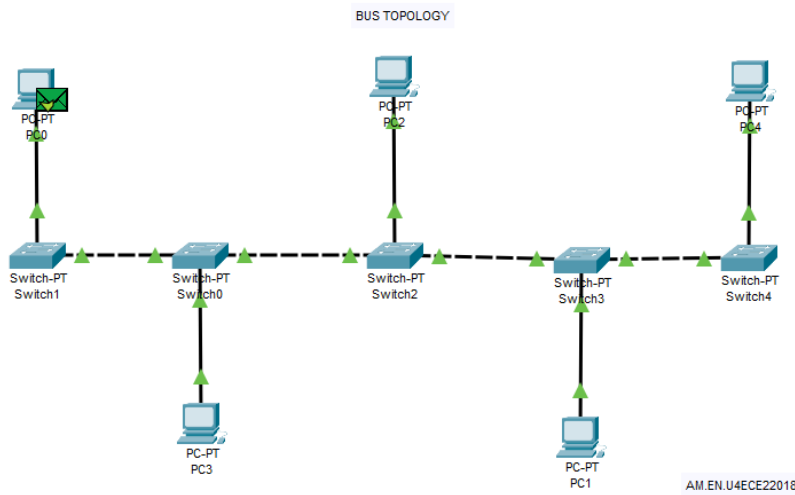
- i. Bus
- ii. Ring
- iii. Star
- iv. Mesh
- v. Tree


i. BUS TOPOLOGY:



➤ Simulation:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	PC2	ICMP		0.000	N	0	(edit)	



Event List		
Vis.	Time(sec)	Last Device
	0.003	Switch0
	0.003	Switch0
	0.004	Switch2
	0.004	Switch2
	0.005	Switch3
	0.005	Switch3
	0.005	PC2
	0.006	Switch4
	0.006	Switch2
	0.007	Switch0
	0.008	Switch1
	0.008	--
	0.009	PC0
	0.010	Switch1
	0.011	Switch0
	0.012	Switch2
	0.013	PC2
	0.014	Switch2
	0.015	Switch0
	0.016	Switch1

Reset Simulation ☒ Constant Delay Captured to: 0.016 s

Play Controls

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H, 323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IoT, IoT TCP, LACP, LLDP, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPTP, PPTPv6, PTP, RADIUS, REP, RIP, RIPv2, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, ...

➤ Command Prompt:

```

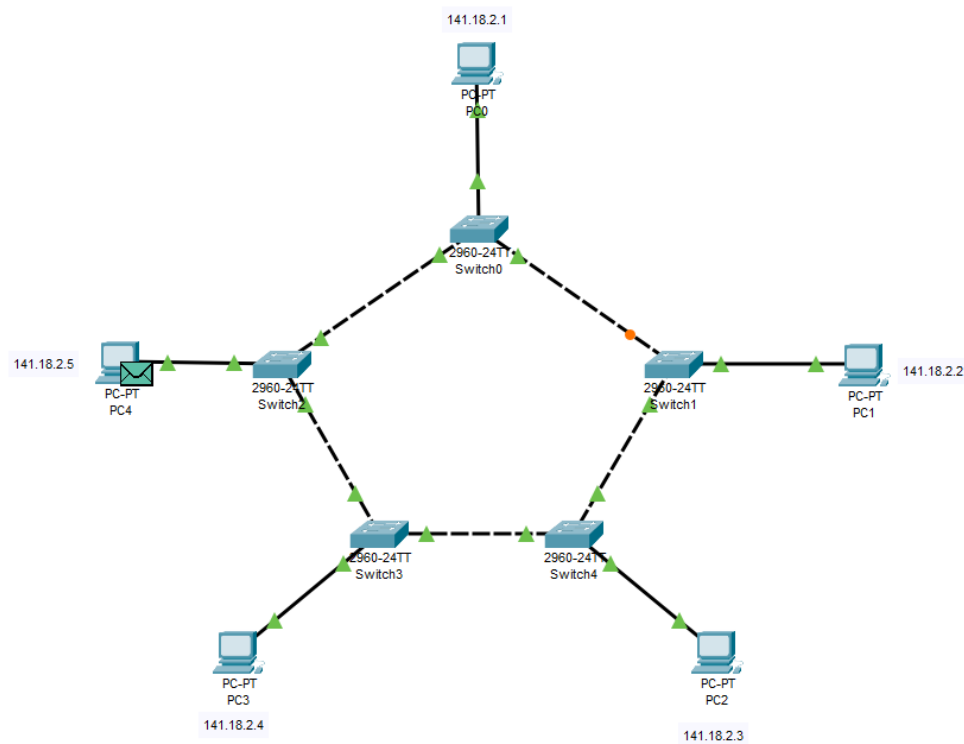
PC2
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 141.214.0.21

Pinging 141.214.0.21 with 32 bytes of data:

Reply from 141.214.0.21: bytes=32 time=12ms TTL=128
Reply from 141.214.0.21: bytes=32 time=6ms TTL=128
Reply from 141.214.0.21: bytes=32 time=6ms TTL=128
Reply from 141.214.0.21: bytes=32 time=6ms TTL=128

Ping statistics for 141.214.0.21:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 12ms, Average = 7ms
  
```

ii. RING TOPOLOGY:



➤ Simulation

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC4	PC2	ICMP		0.000	N	0	(edit)	

(delete)

```
graph TD
    S0[2960-24TT Switch0] --- S1[2960-24TT Switch1]
    S1 --- S4[2960-24TT Switch4]
    S4 --- S3[2960-24TT Switch3]
    S3 --- S2[2960-24TT Switch2]
    S2 --- S0
    PC0[PC-PT PC0 141.18.2.1] --- S0
    PC1[PC-PT PC1 141.18.2.2] --- S1
    PC2[PC-PT PC2 141.18.2.3] --- S4
    PC3[PC-PT PC3 141.18.2.4] --- S3
    PC4[PC-PT PC4 141.18.2.5] --- S2
```

Vis.	Time(sec)	Last Device
	0.000	--
	0.008	--
	0.009	PC4
	0.010	Switch2
	0.011	Switch3
	0.012	Switch4
	0.013	PC2
	0.014	Switch4
	0.015	Switch3
	0.016	Switch2
	0.796	--
	0.799	Switch1
	0.802	--
	0.803	Switch0
	0.804	--
	0.804	--
	0.804	--

Reset Simulation

☒ Constant Delay

Captured to: 0.804 s

Play Controls

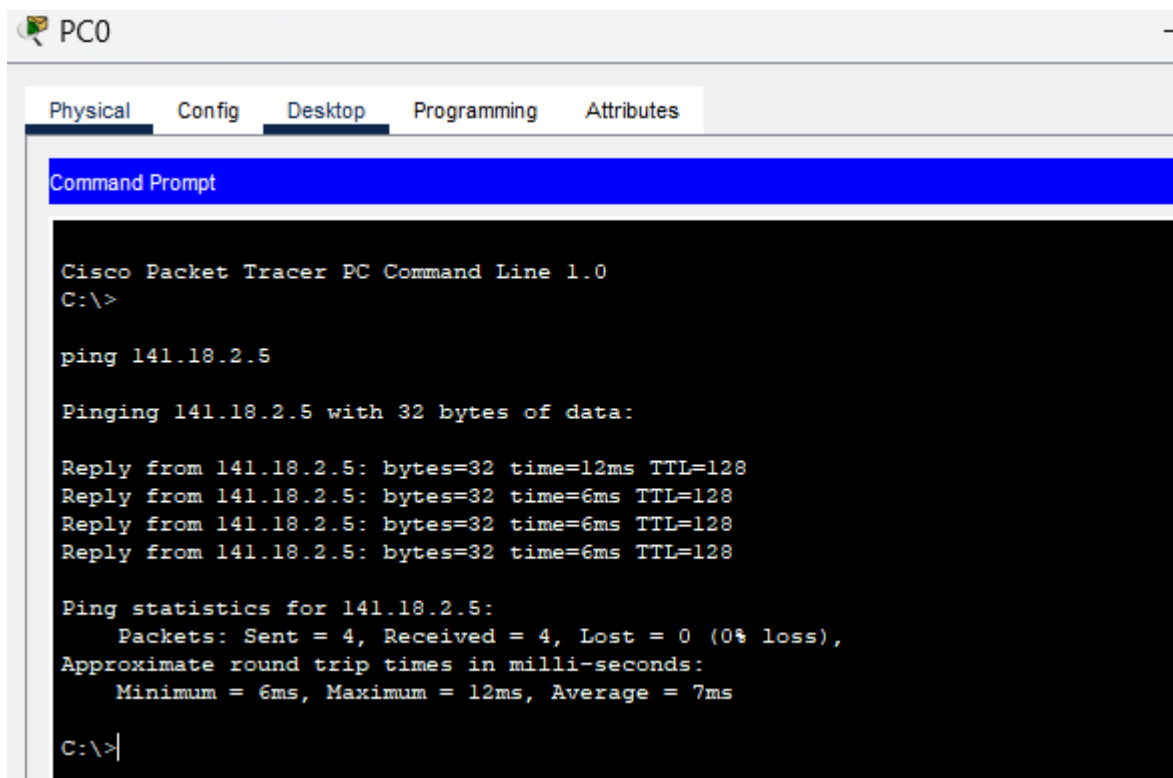
Event List Filters - Visible Events

ACL Filter, Bluetooth, CAPWAP, CDP, DHCPv6, DTP, EAPOL, EIGRPv6, FTP, H.323, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, PSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPFv6, Rstp, RSTP, PPP, PPPoE, PTP, RADIUS, REP, RRP, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters

Show AllNone

➤ Command Prompt:



The screenshot shows the 'PC0' window in Cisco Packet Tracer. The 'Desktop' tab is selected, and the 'Command Prompt' application is open. The command prompt displays the output of a 'ping 141.18.2.5' command. The output shows four successful replies from 141.18.2.5 with 32 bytes of data, times of 12ms, 6ms, 6ms, and 6ms, and a TTL of 128. The ping statistics for 141.18.2.5 are also shown: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), and Approximate round trip times in milli-seconds: Minimum = 6ms, Maximum = 12ms, Average = 7ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>

ping 141.18.2.5

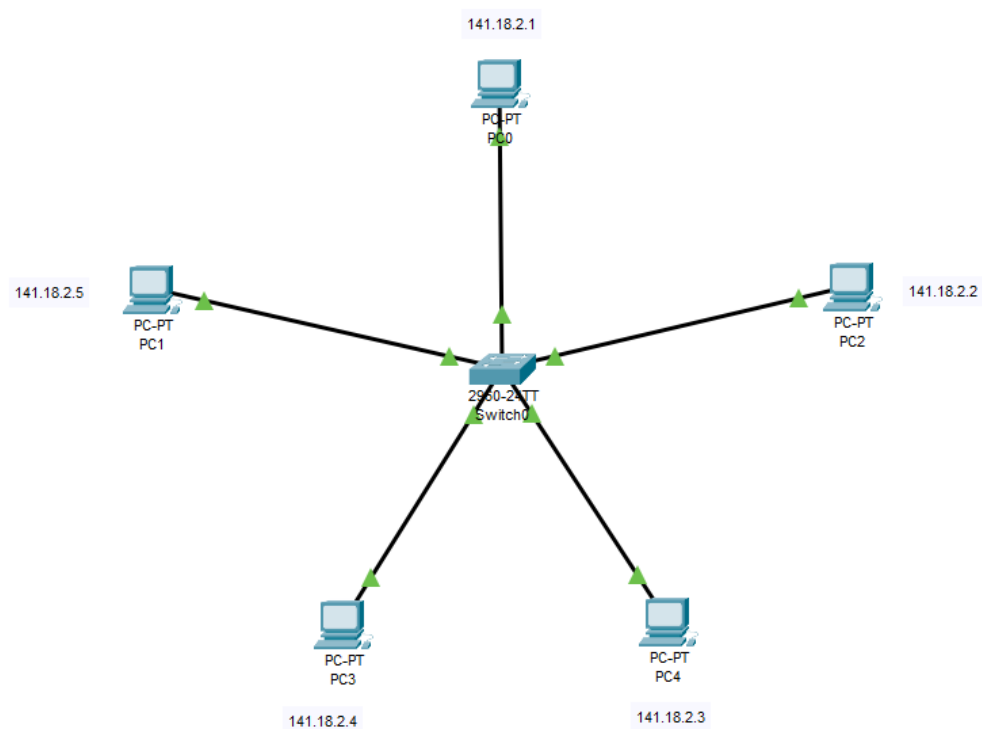
Pinging 141.18.2.5 with 32 bytes of data:

Reply from 141.18.2.5: bytes=32 time=12ms TTL=128
Reply from 141.18.2.5: bytes=32 time=6ms TTL=128
Reply from 141.18.2.5: bytes=32 time=6ms TTL=128
Reply from 141.18.2.5: bytes=32 time=6ms TTL=128

Ping statistics for 141.18.2.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 12ms, Average = 7ms

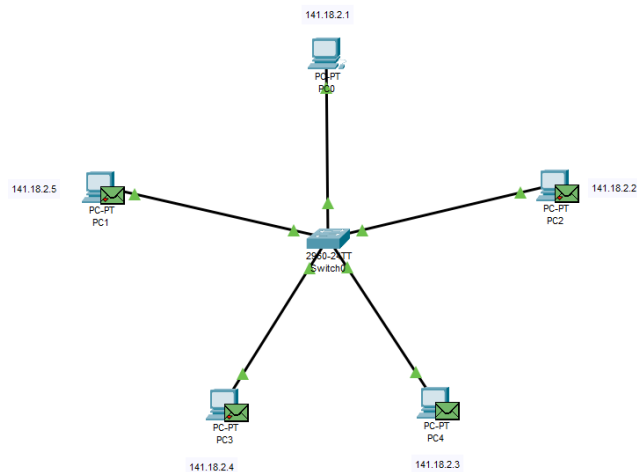
C:\>|
```

iii. STAR TOPOLOGY:



➤ Simulation

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	PC4	ICMP		0.000	N	0	(edit)	(delete)



Simulation Panel

Event List

Vis.	Time(sec)	Last Device
	0.000	--
	0.000	--
	0.001	PC0
	0.002	Switch0
	0.002	Switch0
	0.002	Switch0
	0.002	Switch0

Reset Simulation ☒ Constant Delay Captured to: 0.002 s

Play Controls

Event List Filters - Visible Events

ACL, Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, RADIUS, POP3, PPP, PPTP, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telet, UDP, USB, VTP

Edit Filters Show All/None

➤ Command Prompt:

PC1

Physical Config **Desktop** Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>
ping 141.18.2.4

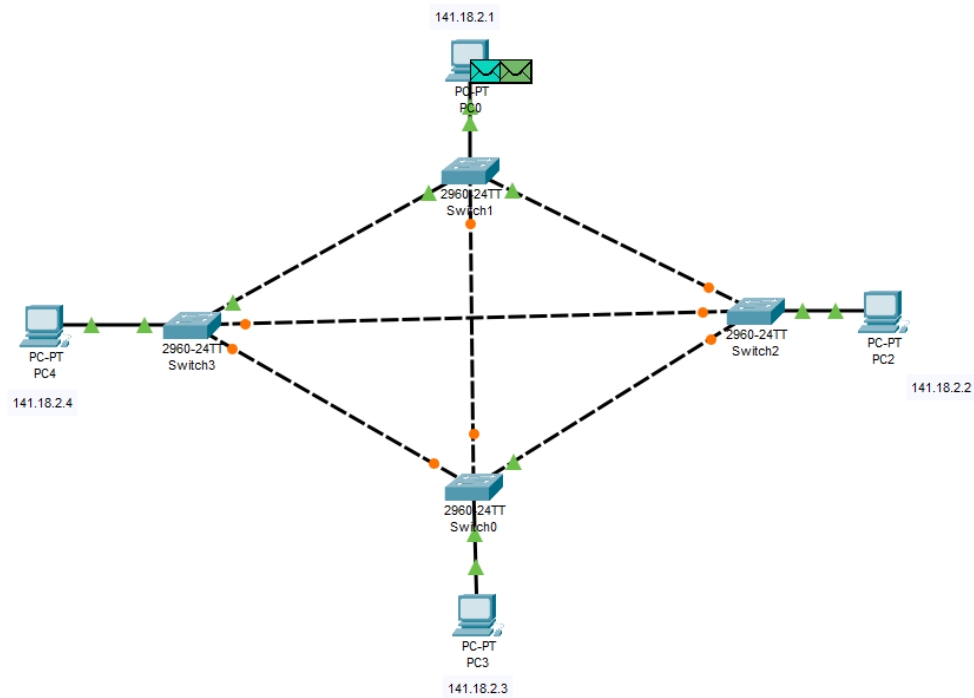
Pinging 141.18.2.4 with 32 bytes of data:

Reply from 141.18.2.4: bytes=32 time=8ms TTL=128
Reply from 141.18.2.4: bytes=32 time=4ms TTL=128
Reply from 141.18.2.4: bytes=32 time=4ms TTL=128
Reply from 141.18.2.4: bytes=32 time=4ms TTL=128

Ping statistics for 141.18.2.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 8ms, Average = 5ms

C:\>|
```

iv. MESH TOPOLOGY:



➤ Simulation

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC4	PC3	ICMP		0.000	N	0	(edit)	

(delete)

Simulation Panel

Vis	Time(sec)	Last Device
	0.000	--
	0.001	PC0
	0.002	Switch1
	0.003	Switch3
	0.004	Switch0
	0.005	PC3
	0.006	Switch0
	0.007	Switch3
	0.008	Switch1

Reset Simulation ☒ Constant Delay Captured to: 0.000 s

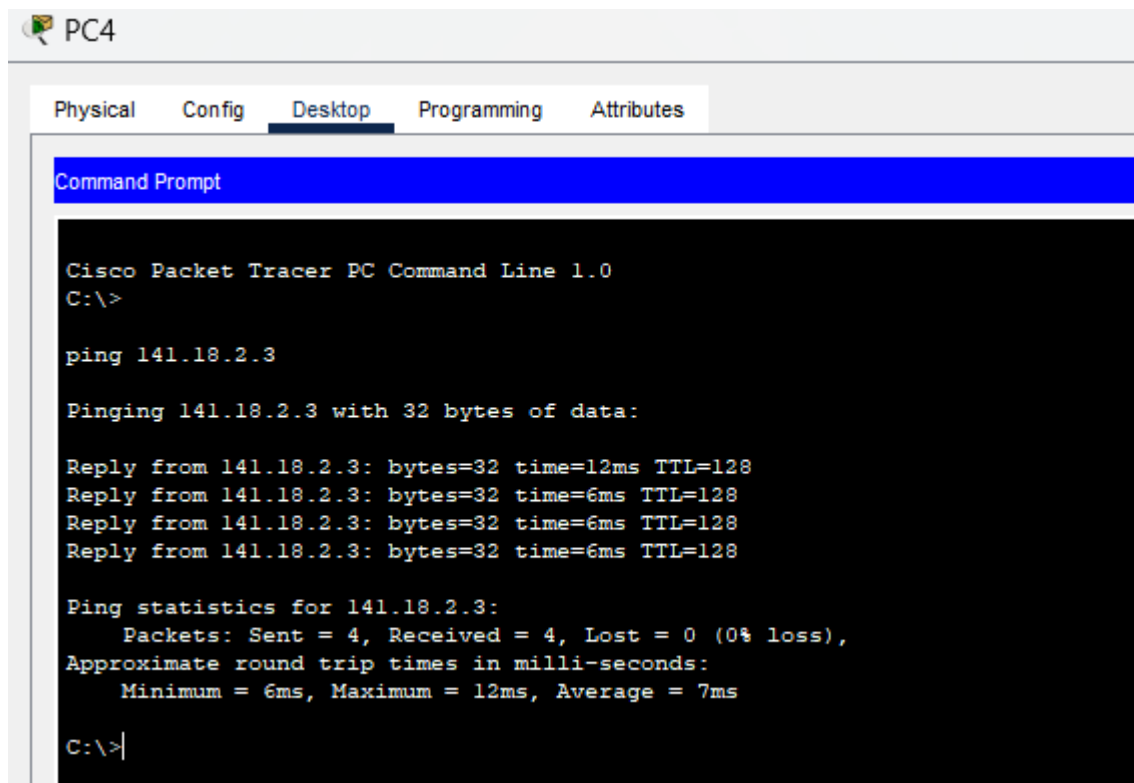
Play Controls

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H, 323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, RAGP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPv2, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show All/None

➤ Command Prompt:



The screenshot shows the 'PC4' window in Cisco Packet Tracer. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The text in the command prompt is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>

ping 141.18.2.3

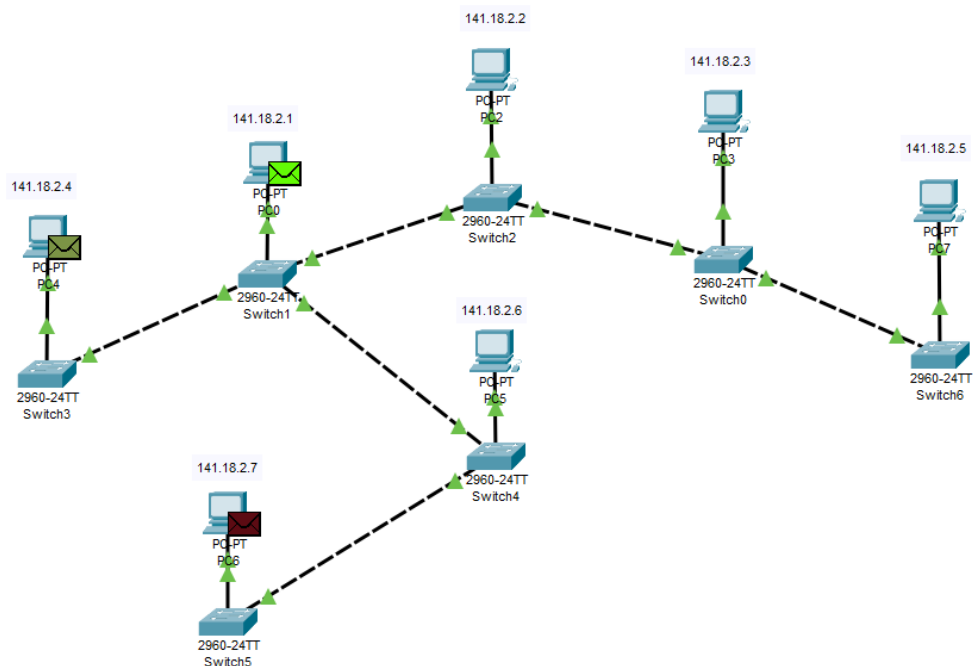
Pinging 141.18.2.3 with 32 bytes of data:

Reply from 141.18.2.3: bytes=32 time=12ms TTL=128
Reply from 141.18.2.3: bytes=32 time=6ms TTL=128
Reply from 141.18.2.3: bytes=32 time=6ms TTL=128
Reply from 141.18.2.3: bytes=32 time=6ms TTL=128







Ping statistics for 141.18.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 12ms, Average = 7ms

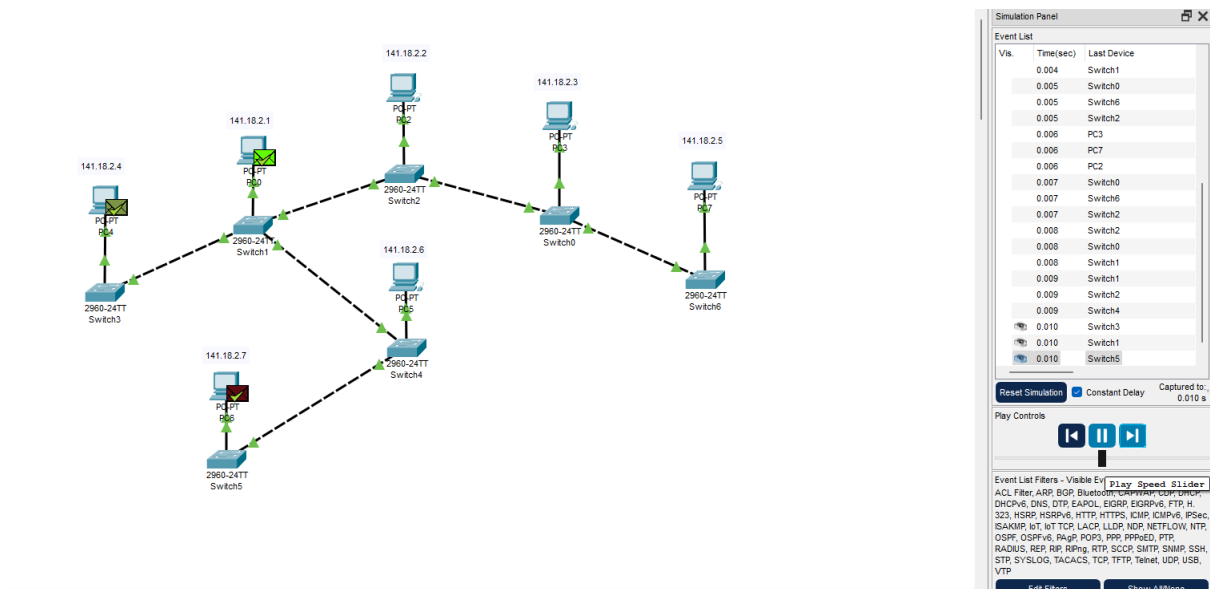
C:\>|
```

v. TREE TOPOLOGY:

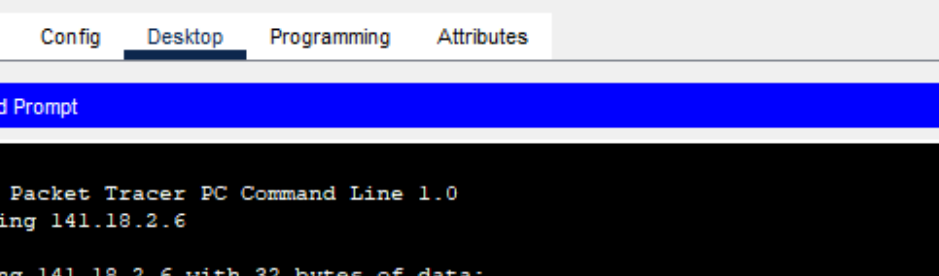


➤ **Simulation**

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	In Progress	PC4	PC3	ICMP		0.000	N	0	(edit)	(delete)
	In Progress	PC0	PC7	ICMP		0.000	N	1	(edit)	(delete)
	In Progress	PC6	PC2	ICMP		0.000	N	2	(edit)	(delete)



➤ **Command Prompt:**



The screenshot shows a PC4 interface with a menu bar containing 'Physical', 'Config', 'Desktop', 'Programming', and 'Attributes'. The 'Desktop' tab is selected. Below the menu bar is a blue header for the 'Command Prompt'. The command prompt window has a black background and displays the following text:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 141.18.2.6

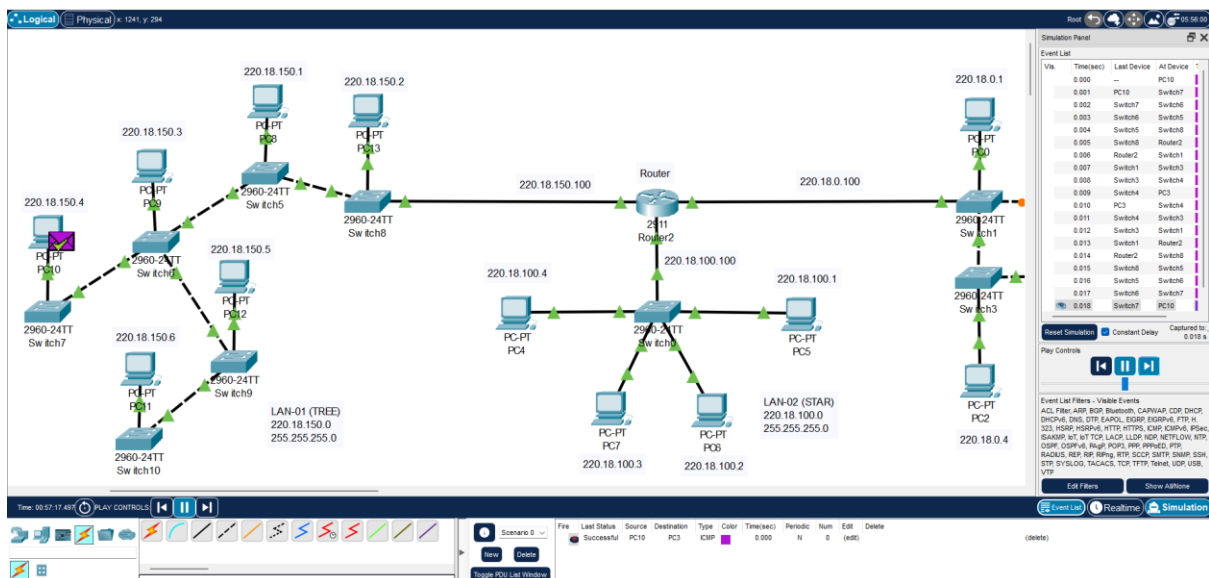
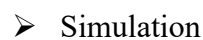
Pinging 141.18.2.6 with 32 bytes of data:

Reply from 141.18.2.6: bytes=32 time=17ms TTL=128
Reply from 141.18.2.6: bytes=32 time=8ms TTL=128
Reply from 141.18.2.6: bytes=32 time=8ms TTL=128
Reply from 141.18.2.6: bytes=32 time=8ms TTL=128

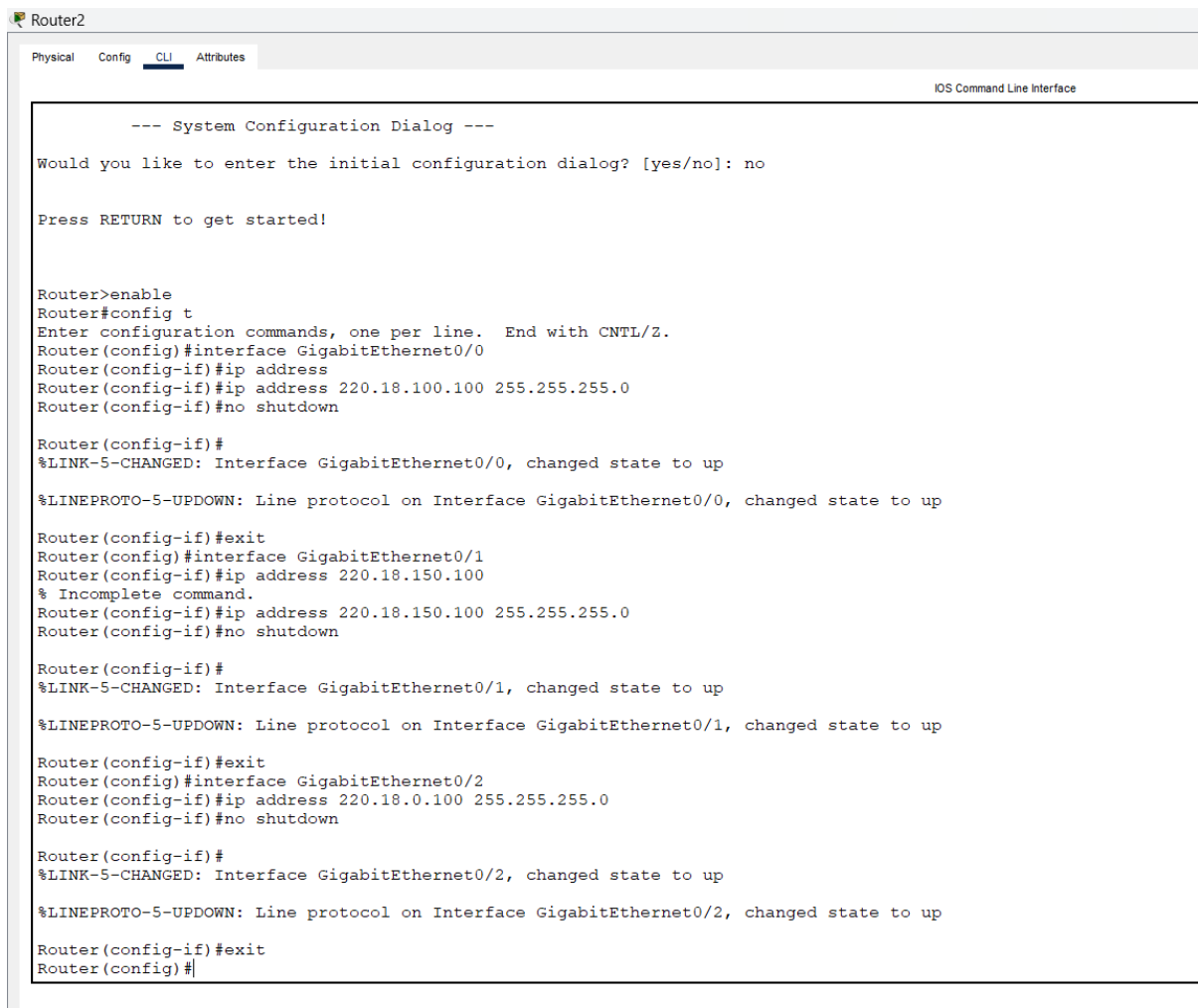
Ping statistics for 141.18.2.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 17ms, Average = 10ms

C:\>|
```


- 3 LAN network – (Tree, Star, Ring)
- Topology



➤ CLI commands (Configuration)



Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address
Router(config-if)#ip address 220.18.100.100 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 220.18.150.100
% Incomplete command.
Router(config-if)#ip address 220.18.150.100 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

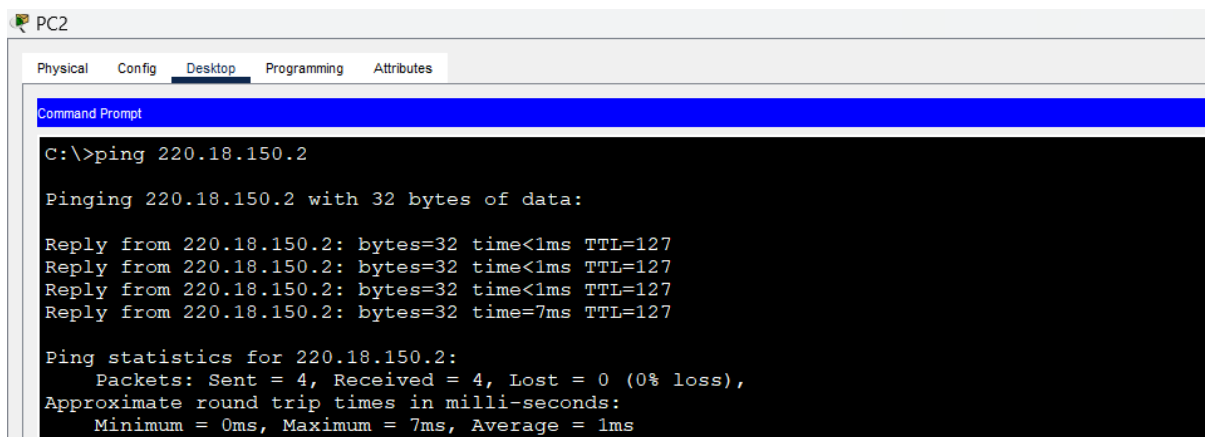
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/2
Router(config-if)#ip address 220.18.0.100 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

Router(config-if)#exit
Router(config)#
```

➤ Command Prompt (Realtime) – PC from LAN-03 (Ring)



PC2

Physical Config **Desktop** Programming Attributes

Command Prompt

```
C:\>ping 220.18.150.2

Pinging 220.18.150.2 with 32 bytes of data:

Reply from 220.18.150.2: bytes=32 time<1ms TTL=127
Reply from 220.18.150.2: bytes=32 time<1ms TTL=127
Reply from 220.18.150.2: bytes=32 time<1ms TTL=127
Reply from 220.18.150.2: bytes=32 time=7ms TTL=127

Ping statistics for 220.18.150.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 7ms, Average = 1ms
```

```

C:\>ping 220.18.100.3

Pinging 220.18.100.3 with 32 bytes of data:

Reply from 220.18.100.3: bytes=32 time<1ms TTL=127
Reply from 220.18.100.3: bytes=32 time<1ms TTL=127
Reply from 220.18.100.3: bytes=32 time<1ms TTL=127
Reply from 220.18.100.3: bytes=32 time<1ms TTL=127

Ping statistics for 220.18.100.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 220.18.0.3


Pinging 220.18.0.3 with 32 bytes of data:

Reply from 220.18.0.3: bytes=32 time<1ms TTL=128
Reply from 220.18.0.3: bytes=32 time<1ms TTL=128
Reply from 220.18.0.3: bytes=32 time<1ms TTL=128
Reply from 220.18.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 220.18.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

```

➤ Command Prompt (Realtime) – PC from LAN-02 (Star)

 PC6

Physical Config **Desktop** Programming Attributes

Command Prompt

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 220.18.150.1

Pinging 220.18.150.1 with 32 bytes of data:

Reply from 220.18.150.1: bytes=32 time<1ms TTL=127
Reply from 220.18.150.1: bytes=32 time<1ms TTL=127
Reply from 220.18.150.1: bytes=32 time<1ms TTL=127
Reply from 220.18.150.1: bytes=32 time<1ms TTL=127

Ping statistics for 220.18.150.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 220.18.0.2

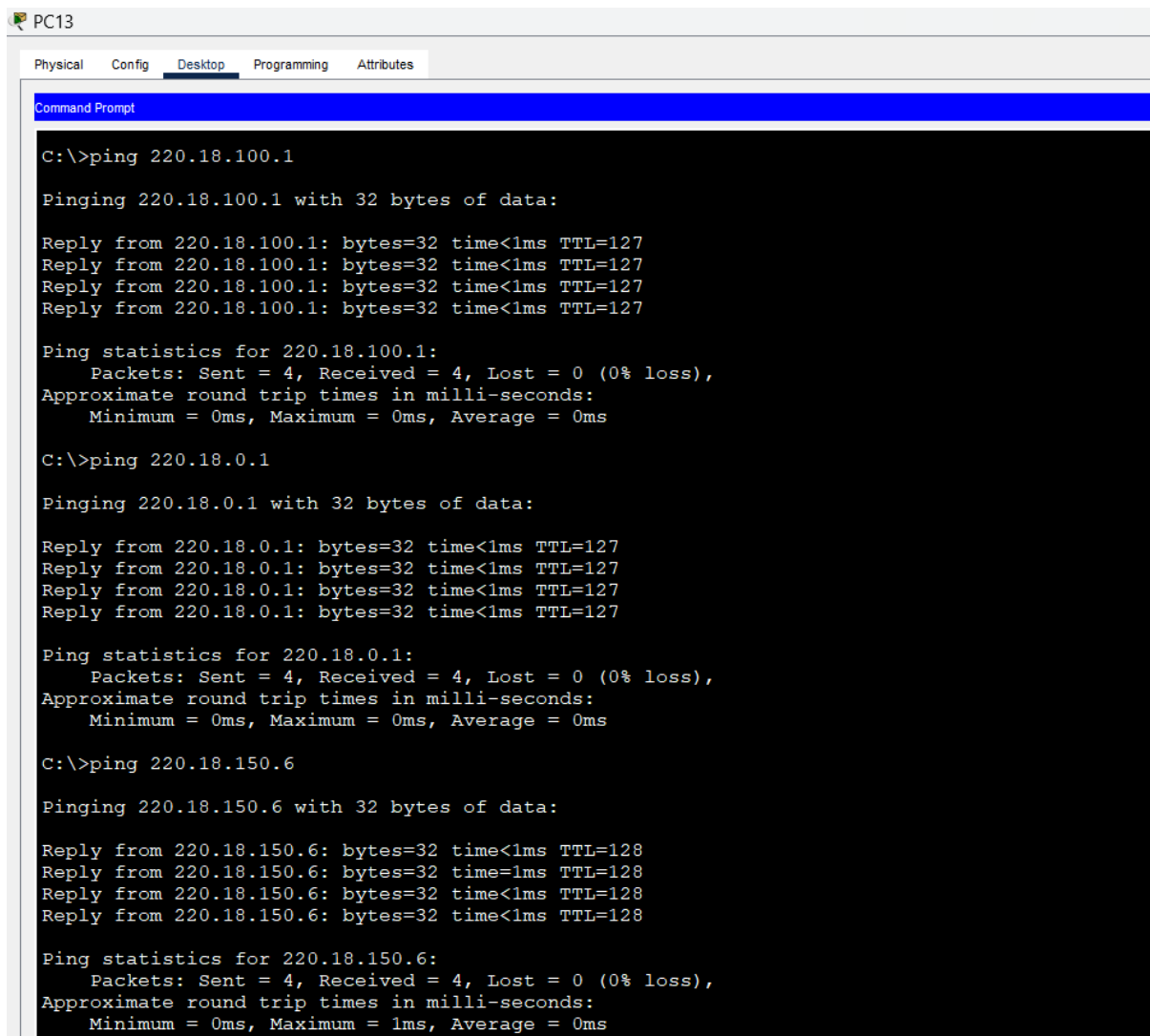
Pinging 220.18.0.2 with 32 bytes of data:

Reply from 220.18.0.2: bytes=32 time<1ms TTL=127
Reply from 220.18.0.2: bytes=32 time<1ms TTL=127
Reply from 220.18.0.2: bytes=32 time<1ms TTL=127
Reply from 220.18.0.2: bytes=32 time<1ms TTL=127

Ping statistics for 220.18.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

```

➤ Command Prompt (Realtime) – PC from LAN-01 (Tree)



```
C:\>ping 220.18.100.1

Pinging 220.18.100.1 with 32 bytes of data:

Reply from 220.18.100.1: bytes=32 time<1ms TTL=127
Reply from 220.18.100.1: bytes=32 time<1ms TTL=127
Reply from 220.18.100.1: bytes=32 time<1ms TTL=127
Reply from 220.18.100.1: bytes=32 time<1ms TTL=127

Ping statistics for 220.18.100.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 220.18.0.1

Pinging 220.18.0.1 with 32 bytes of data:

Reply from 220.18.0.1: bytes=32 time<1ms TTL=127
Reply from 220.18.0.1: bytes=32 time<1ms TTL=127
Reply from 220.18.0.1: bytes=32 time<1ms TTL=127
Reply from 220.18.0.1: bytes=32 time<1ms TTL=127

Ping statistics for 220.18.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

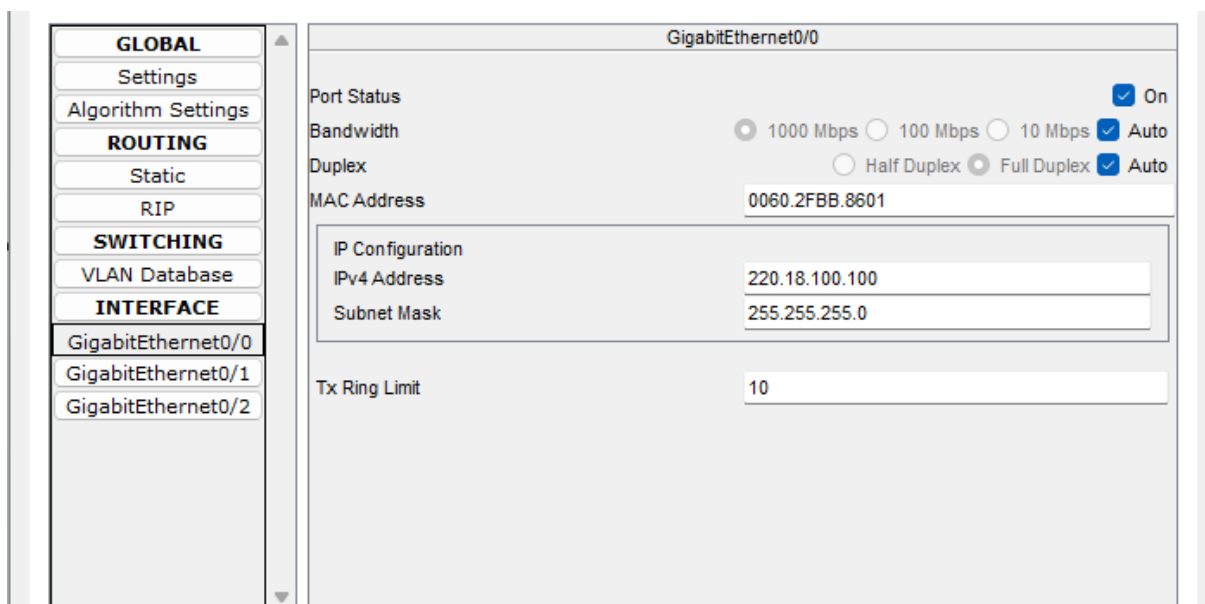
C:\>ping 220.18.150.6

Pinging 220.18.150.6 with 32 bytes of data:

Reply from 220.18.150.6: bytes=32 time<1ms TTL=128
Reply from 220.18.150.6: bytes=32 time<1ms TTL=128
Reply from 220.18.150.6: bytes=32 time<1ms TTL=128
Reply from 220.18.150.6: bytes=32 time<1ms TTL=128

Ping statistics for 220.18.150.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

➤ GigabitEthernet Configuration



GigabitEthernet0/0	
Port Status	<input checked="" type="checkbox"/> On
Bandwidth	<input checked="" type="radio"/> 1000 Mbps <input type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto
Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto
MAC Address	0060.2FBB.8601
IP Configuration	
IPv4 Address	220.18.100.100
Subnet Mask	255.255.255.0
Tx Ring Limit	10

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

GigabitEthernet0/2

GigabitEthernet0/1

Port Status

☒ On

Bandwidth

☒ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex

☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address0060.2FBB.8602

IP Configuration

IPv4 Address220.18.150.100

Subnet Mask255.255.255.0

Tx Ring Limit10

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

GigabitEthernet0/2

GigabitEthernet0/2

Port Status

☒ On

Bandwidth

☒ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex

☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address0060.2FBB.8603

IP Configuration

IPv4 Address220.18.0.100

Subnet Mask255.255.255.0

Tx Ring Limit10

INFERENCE:

Utilizing Cisco Packet Tracer (CPT) to design and simulate different network topologies was a useful hands-on experience in learning actual network designs and their behaviours.

Constructing all the topologies discussed in the first part—Bus, Star, Ring, Mesh, and Tree—allowed visualization of how devices talk to each other and how the topology of a network affects its performance, scalability, and fault tolerance. This made it possible to replicate fault identification and gain a thorough understanding of the drawbacks of various topologies.

In the second half, the creation of a network with three independent LANs (each with Tree, Star, and Ring topology respectively) and linking them together through a single router illustrated the real-world incorporation of various networks into an extended interconnected network. The selection of suitable routers, switches, and connection types was crucial and this emphasized the need for correct device selection according to network needs. Moreover, setting up the devices helps understand the importance of proper IP addressing, network segmentation, and routing to facilitate smooth communication among different LANs.

Cisco Packet Tracer is a useful simulation program for learning about the design, configuration, and troubleshooting of multiple network topologies in a safe, virtual format. It underlined the building blocks of networking and helped understand computer networking in relation to real world applications.

RESULT:

In this experiment, various network topologies including Bus, Star, Ring, Mesh, and Tree were successfully created and simulated using Cisco Packet Tracer. Three different LANs, each following Tree, Star, and Ring topologies respectively, were connected through a single router. Proper IP addressing and router configuration enabled both intra-LAN and inter-LAN communication without errors. The simulation verified successful packet transmission across different networks, demonstrating the practical application of network design principles and reinforcing the understanding of topology selection, network configuration, and device connectivity in a controlled environment.