Computer Networks

Lab Assignment 2

Ayush Priyadarshi MCA Shift 1 (Section A)

AIM: To create a network in CISCO PACKET TRACKER to study different network topologies: Bus, Star, Ring, Mesh and Tree.

THEORY:

Network topologies describe how devices are interconnected in a network. Here are brief definitions of the common ones:

Bus Topology

- **Definition:** Devices are connected to a single, shared cable.
- **Advantages:** Simple to implement, cost-effective.
- **Disadvantages:** Single point of failure, limited scalability.

Star Topology

- **Definition:** All devices are connected to a central hub or switch.
- **Advantages:** Easy to manage, fault isolation, scalable.
- **Disadvantages:** Central point of failure, expensive.

Ring Topology

- **Definition:** Devices are connected in a circular fashion, with each device acting as a repeater.
- **Advantages:** High bandwidth, reliability, fault tolerance.
- **Disadvantages:** Complex to implement, difficult to troubleshoot, single point of failure if the ring is broken.

Mesh Topology

- **Definition:** Every device is connected directly to every other device.
- **Advantages:** Highly reliable, fault tolerant, high bandwidth.
- **Disadvantages:** Expensive to implement, complex to manage, requires many cables.

Tree Topology

- **Definition:** A hierarchical structure where devices are organized in a tree-like fashion.
- **Advantages:** Scalable, easy to manage, fault isolation.
- **Disadvantages:** Can be complex to implement, requires a central point of control.

NETWORK DESIGN

DEVICES USED: PCs, Switch, Copper Straight-through cable, Copper crossover cable.

BUS TOPOLOGY:

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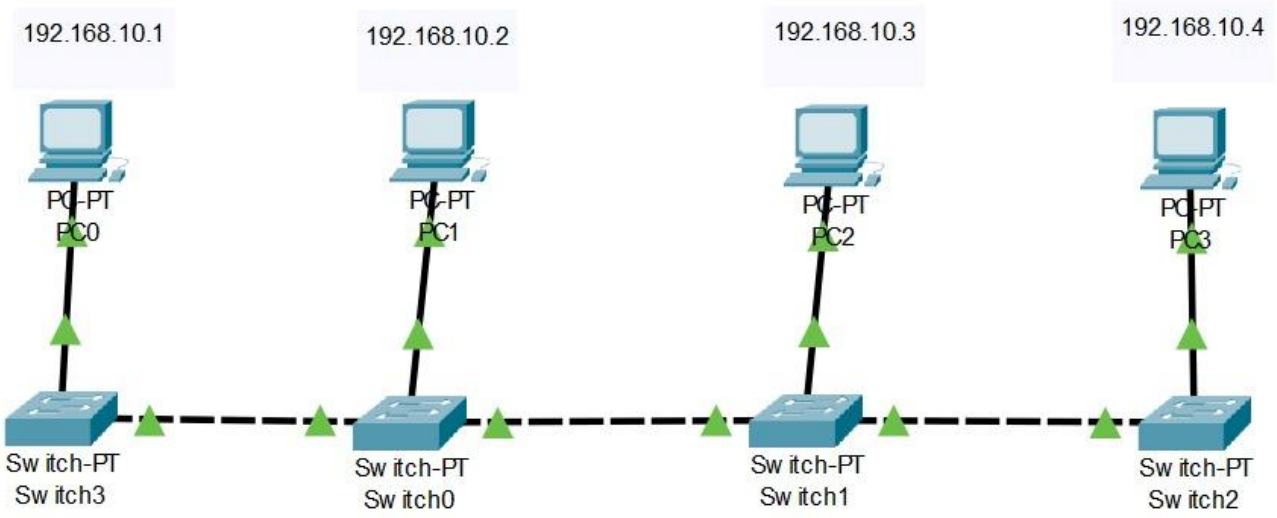


BUS TOPOLOGY

SETTINGS:

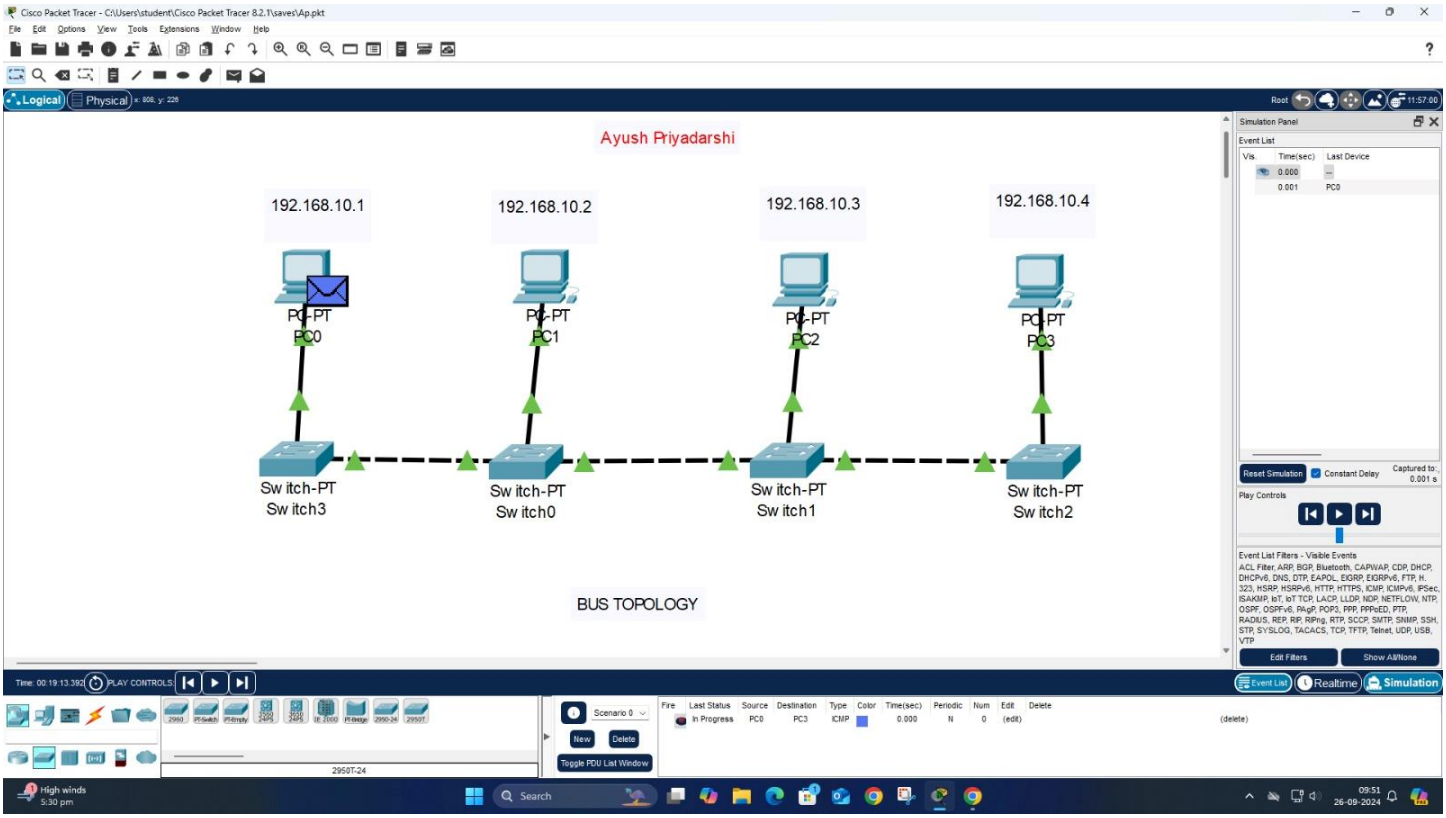
DEVICE NAME	IP ADDRESS	SUBNET MASK
PC0	192.168.10.1	255.255.255.0
PC1	192.168.10.2	255.255.255.0
PC2	192.168.10.3	255.255.255.0
PC3	192.168.10.4	255.255.255.0

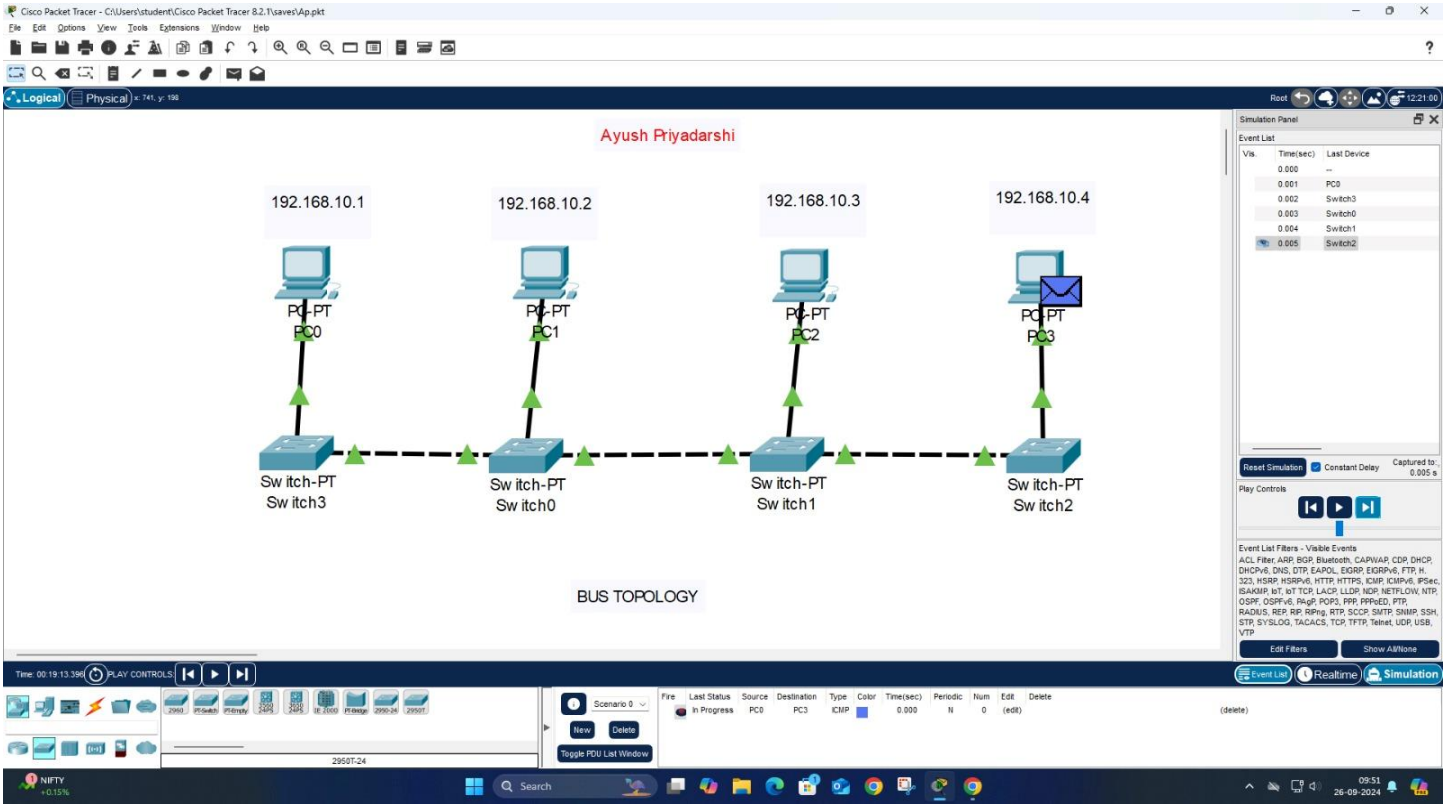
```
Cisco Packet Tracer PC Command Line 1.0

C:\>ping 192.168.10.4


Pinging 192.168.10.4 with 32 bytes of data:


Reply from 192.168.10.4: bytes=32 time<1ms TTL 128

Reply from 192.168.10.4: bytes=32 time<1ms TTL=128

Reply from 192.168.10.4: bytes=32 time=1ms TTL=128

Reply from 192.168.10.4: bytes=32 time<1ms TTL=128
```

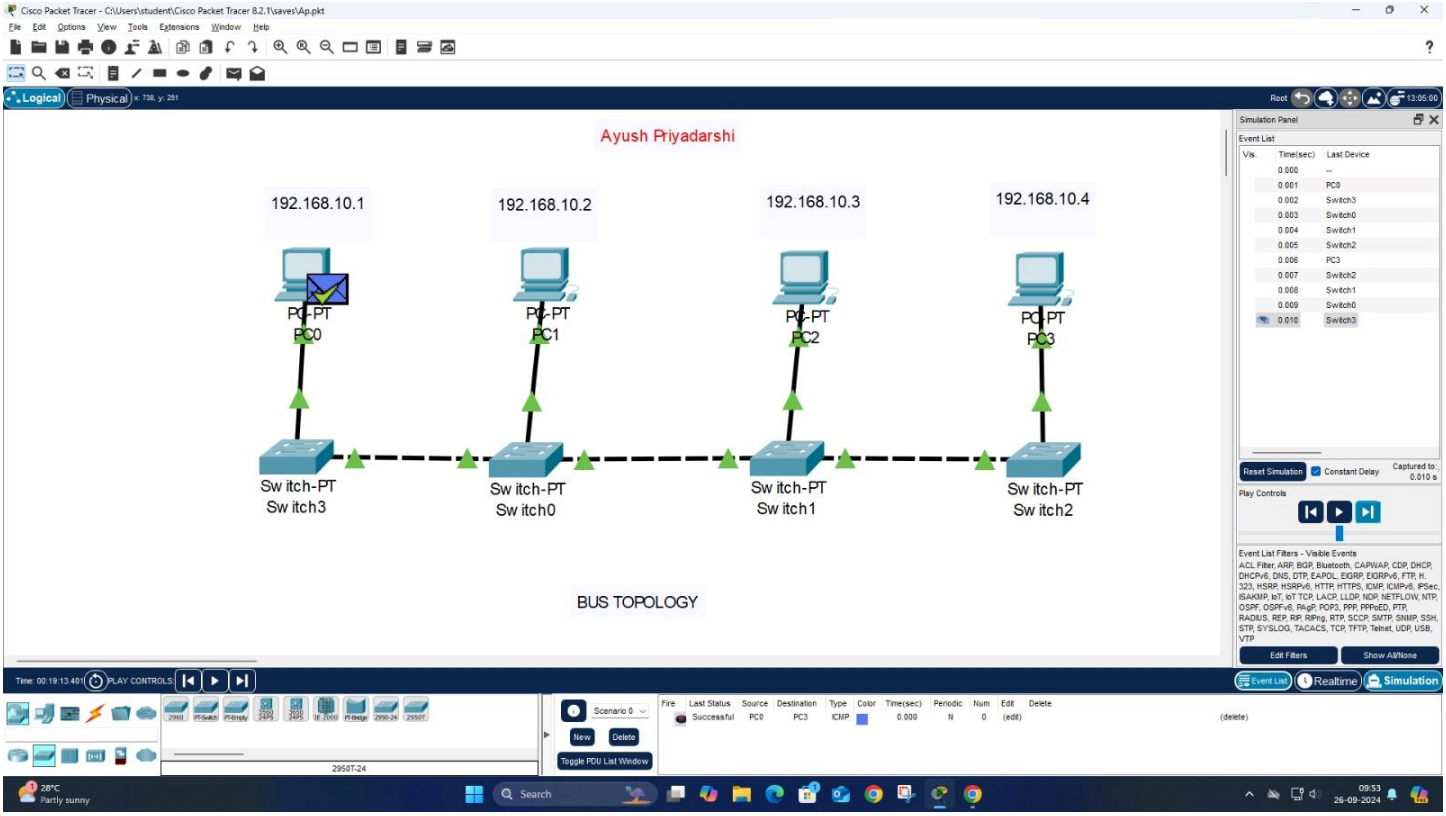
```
Ping statistics for 192.168.10.4:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\
```

SIMULATION

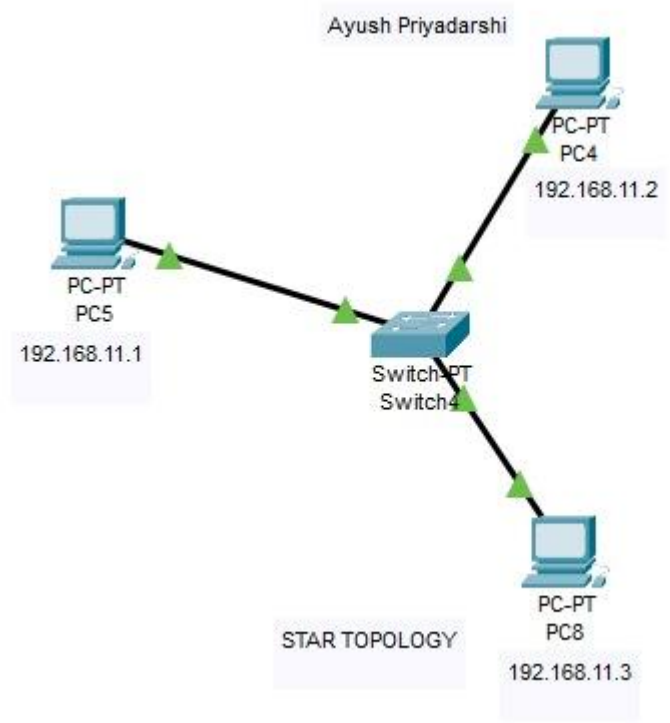
The given network follows the Bus Topology. Here the message is transmitted from PC0 addressed to PC4. The message is transmitted through each of the Switches coming in between to reach PC4. PC4 then sends an acknowledgement of successful transmission back to PC0. It again is transmitted through each of the switches to reach PC0 thus completing the transmission.




Ayush Priyadarshi
192.168.10.1
192.168.10.2
192.168.10.3
192.168.10.4
PC-PT PC0
PC-PT PC1
PC-PT PC2
PC-PT PC3
Sw itch-PT Sw itch3
Sw itch-PT Sw itch0
Sw itch-PT Sw itch1
Sw itch-PT Sw itch2
BUS TOPOLOGY


Ayush Priyadarshi
192.168.10.1
192.168.10.2
192.168.10.3
192.168.10.4
PC-PT PC0
PC-PT PC1
PC-PT PC2
PC-PT PC3
Sw itch-PT Sw itch3
Sw itch-PT Sw itch0
Sw itch-PT Sw itch1
Sw itch-PT Sw itch2
BUS TOPOLOGY

STAR TOPOLOGY



SETTINGS:

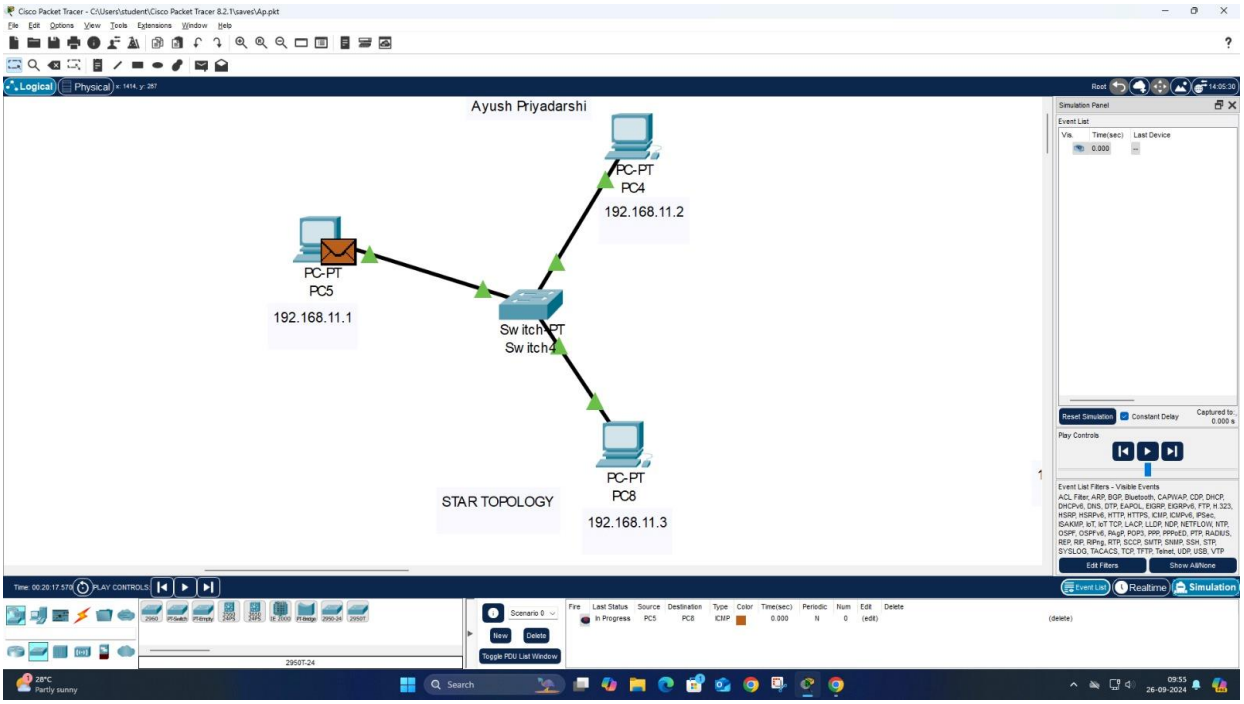
DEVICE NAME	IP ADDRESS	SUBNET MASK
PC5	192.168.11.1	255.255.255.0
PC4	192.168.11.2	255.255.255.0
PC8	192.168.11.3	255.255.255.0

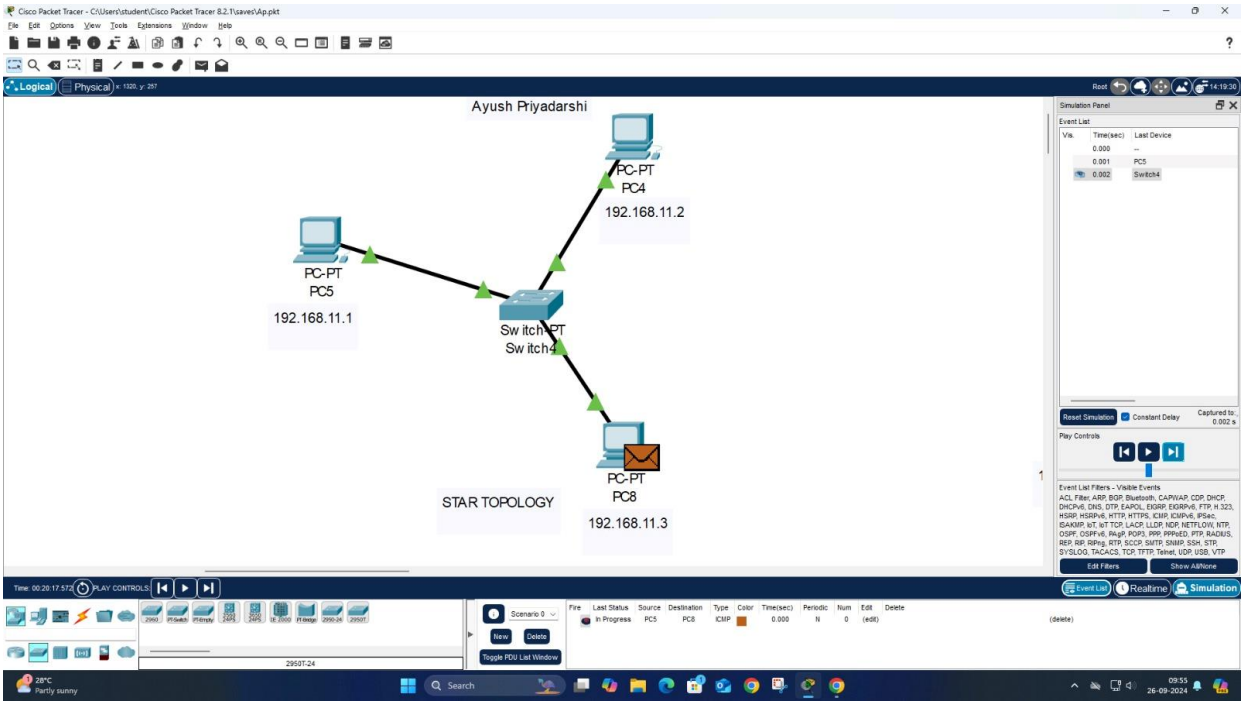
```
Cisco Packet Tracer PC Command Line 1.0

C:\>ping 192.168.11.3


Pinging 192.168.11.3 with 32 bytes of data:


Reply from 192.168.11.3: bytes=32 time<1ms TTL 128

Reply from 192.168.11.3: bytes=32 time<1ms TTL=128

Reply from 192.168.11.3: bytes=32 time=1ms TTL=128

Reply from 192.168.11.3: bytes=32 time<1ms TTL=128


Ping statistics for 192.168.11.3:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

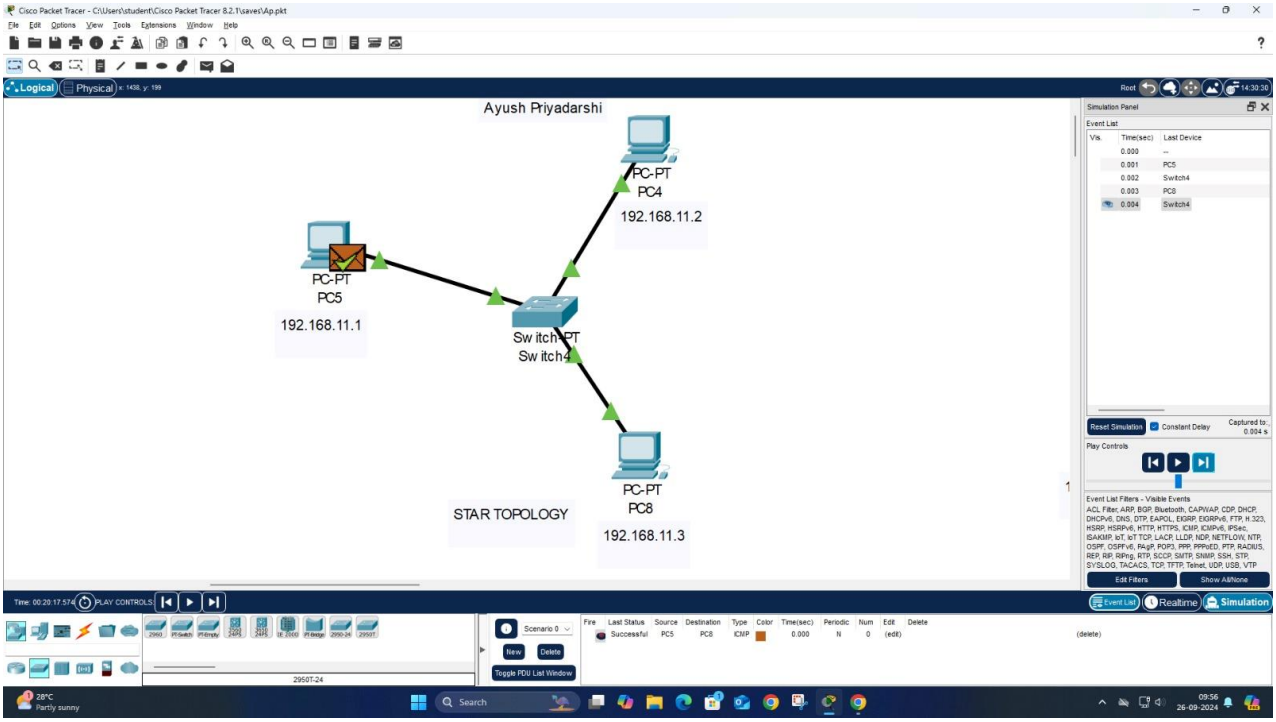
```
Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\
```

SIMULATION

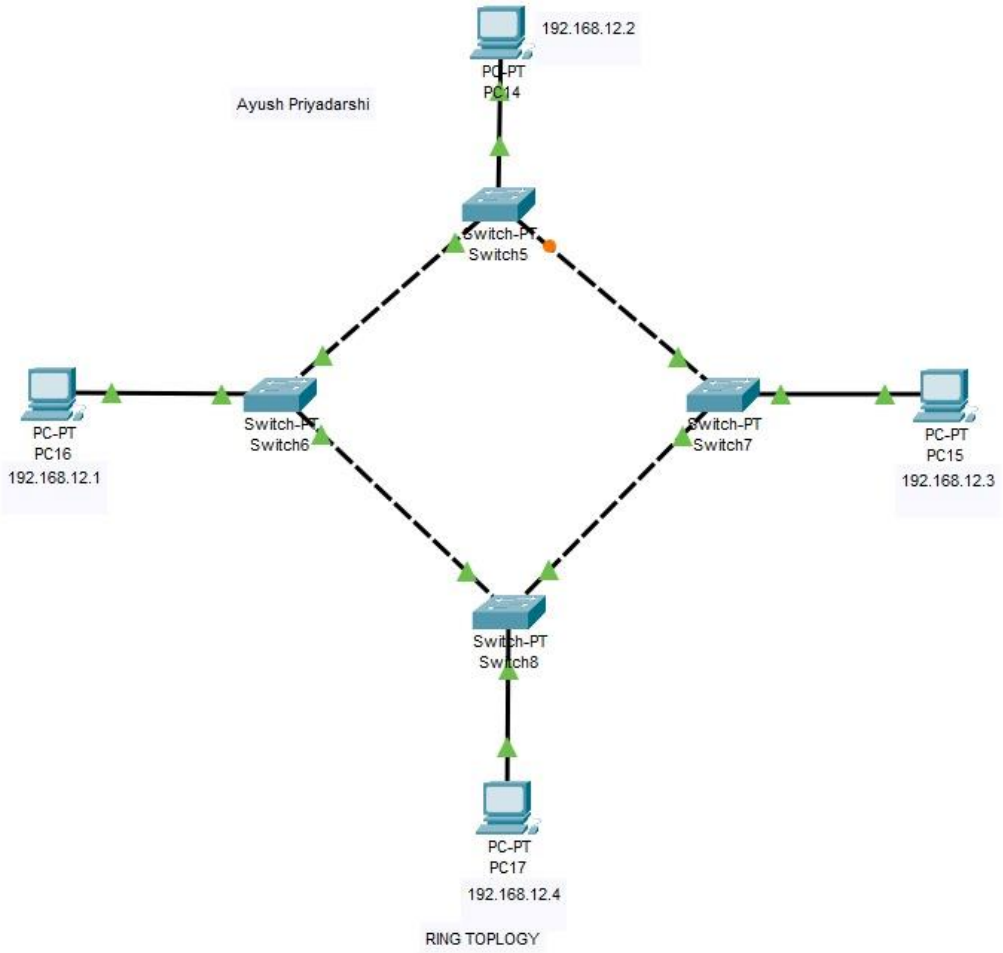
The given network follows the Star Topology. Here the message is transmitted from PC5 addressed to PC8. The message is transmitted through the central Switch to reach PC8. PC8 then sends an acknowledgement of successful transmission back to PC5. It again is transmitted through the central switch to reach PC5 thus completing the transmission.







RING TOPOLOGY



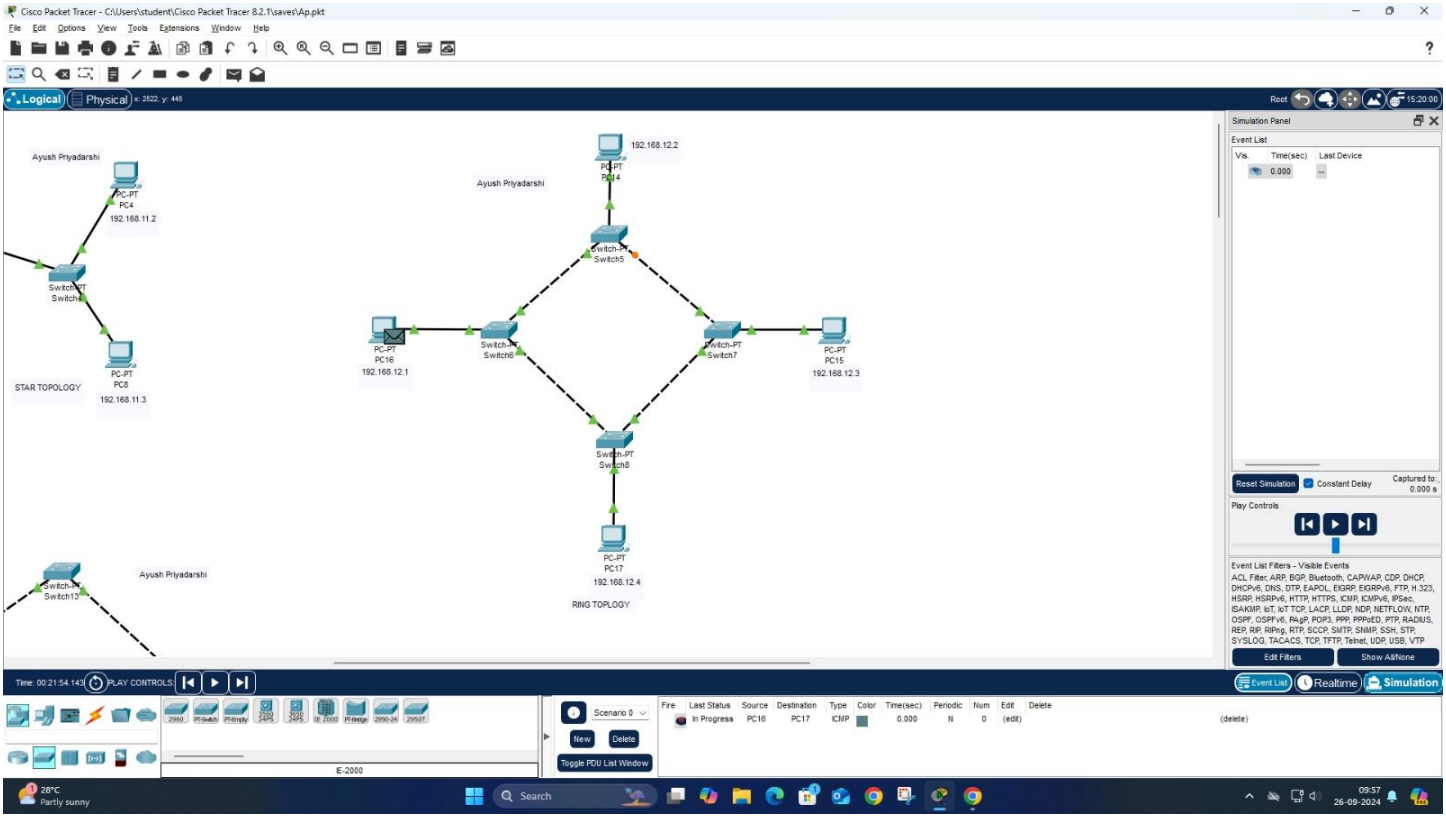
SETTINGS:

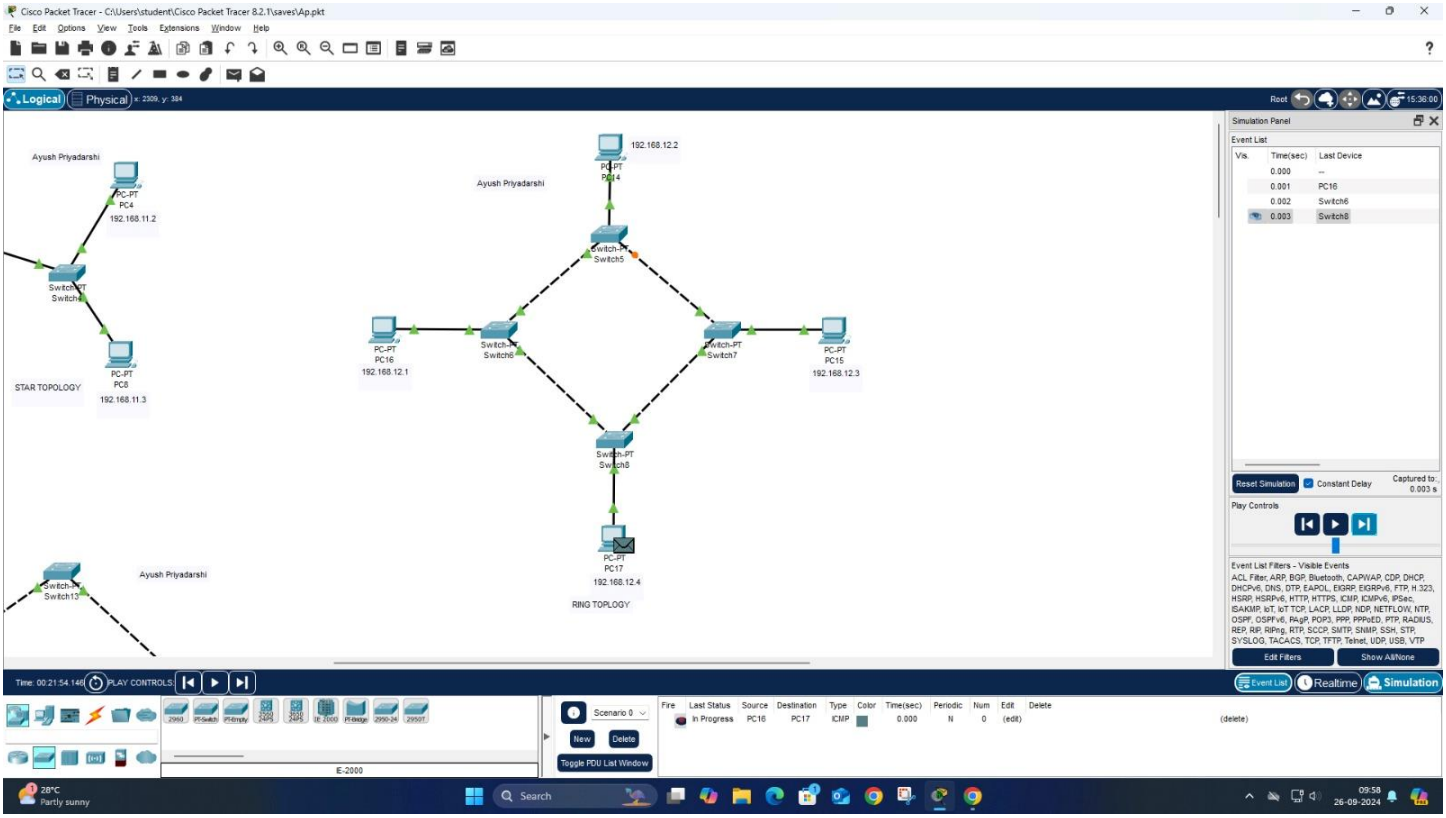
DEVICE NAME	IP ADDRESS	SUBNET MASK
PC16	192.168.12.1	255.255.255.0
PC14	192.168.12.2	255.255.255.0
PC15	192.168.12.3	255.255.255.0
PC17	192.168.12.4	255.255.255.0

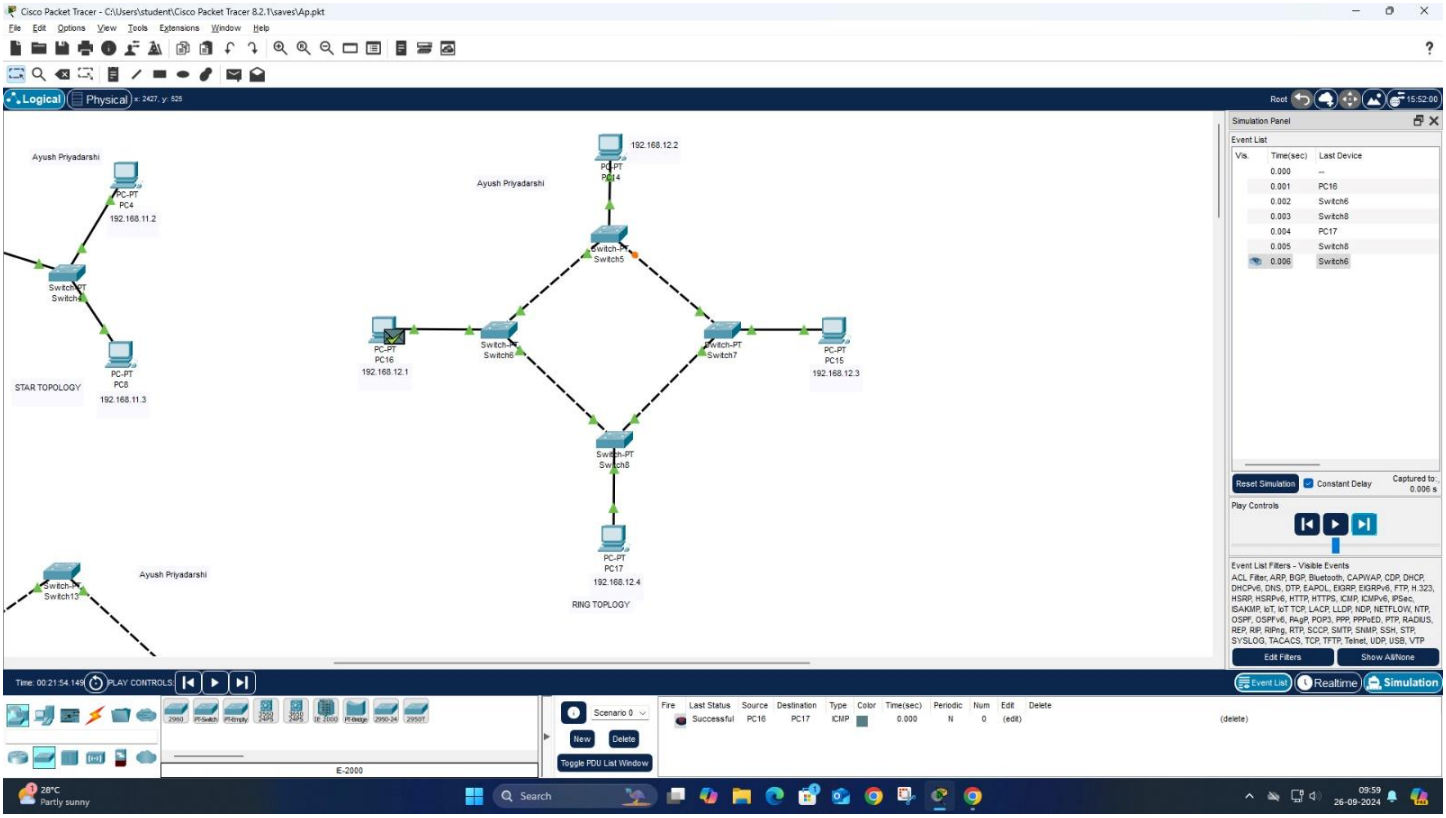
```
Cisco Packet Tracer PC Command Line 1.0

C:\>ping 192.168.12.3


Pinging 192.168.12.3 with 32 bytes of data:


Reply from 192.168.12.3: bytes=32 time<1ms TTL 128

Reply from 192.168.12.3: bytes=32 time<1ms TTL=128

Reply from 192.168.12.3: bytes=32 time=1ms TTL=128

Reply from 192.168.12.3: bytes=32 time<1ms TTL=128


Ping statistics for 192.168.12.3:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\
```

SIMULATION

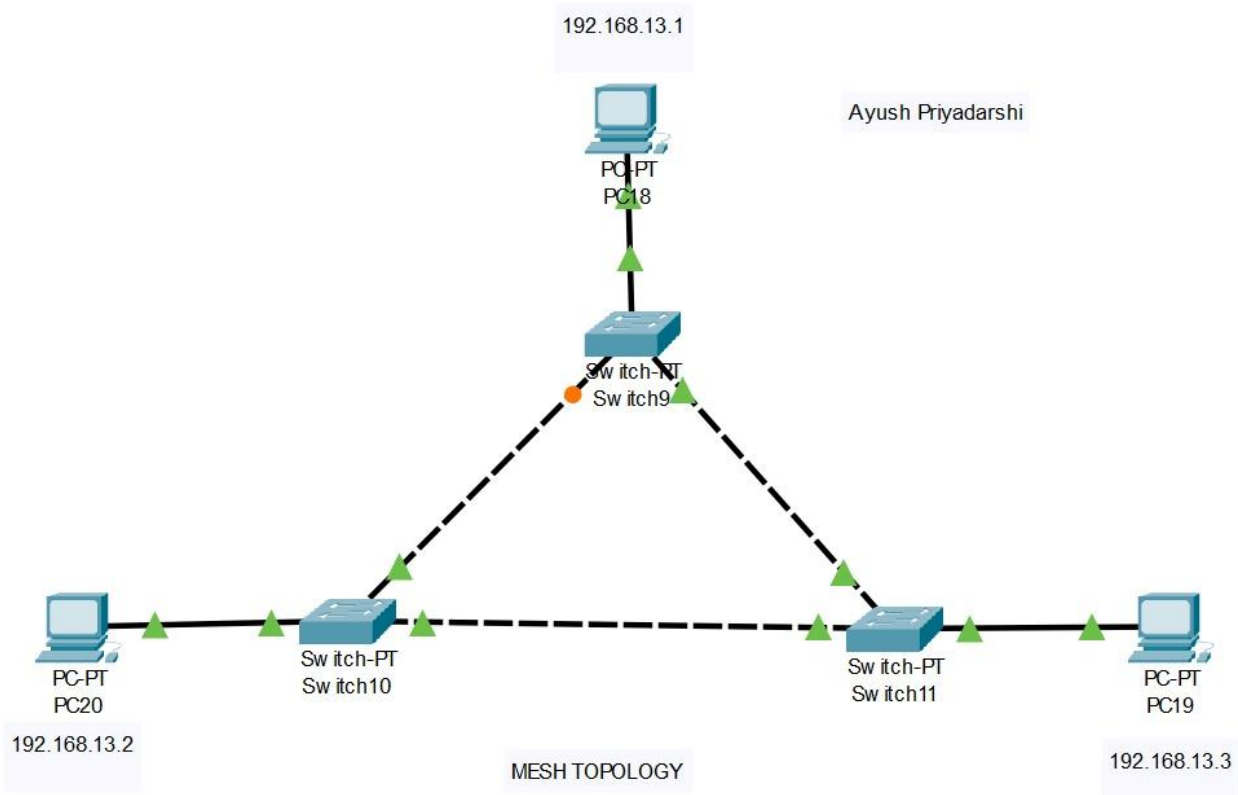
The given network follows the Ring Topology. Here the message is transmitted from PC16 addressed to PC17. The message is transmitted through Switch6 and Switch8 to reach PC17. PC17 then sends an acknowledgement of successful transmission back to PC16. It again is transmitted through Switch8 and Switch6 to reach PC16 thus completing the transmission.


Cisco Packet Tracer - C:\Users\student\Cisco Packet Tracer 8.2.1\saves\Ap.pkt
Ayush Priyadarshi
192.168.11.2
192.168.12.2
192.168.12.1
192.168.12.3
192.168.11.3
192.168.12.4
STAR TOPOLOGY
RING TOPLOGY
Simulation Panel
Event List
Reset Simulation
Play Controls
Edit Filters
Show All/None
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Search
26-09-2024


Cisco Packet Tracer - C:\Users\student\Cisco Packet Tracer 8.2.1\saves\Ap.pkt
Ayush Priyadarshi
192.168.11.2
192.168.12.2
192.168.12.1
192.168.12.3
192.168.11.3
192.168.12.4
STAR TOPOLOGY
RING TOPLOGY
Simulation Panel
Event List
Reset Simulation
Play Controls
Edit Filters
Show All/None
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Search
26-09-2024



MESH TOPOLOGY



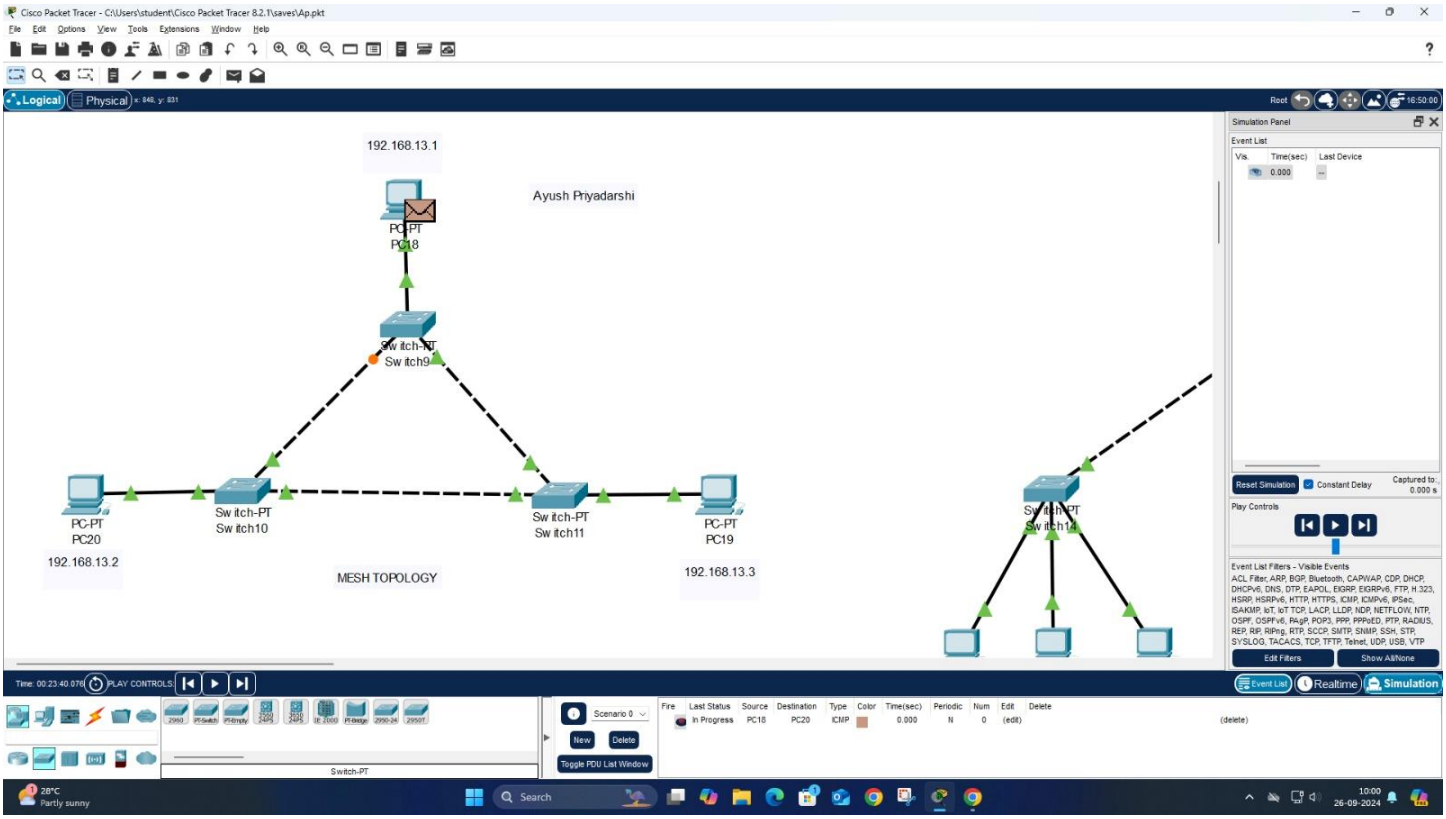
SETTINGS:

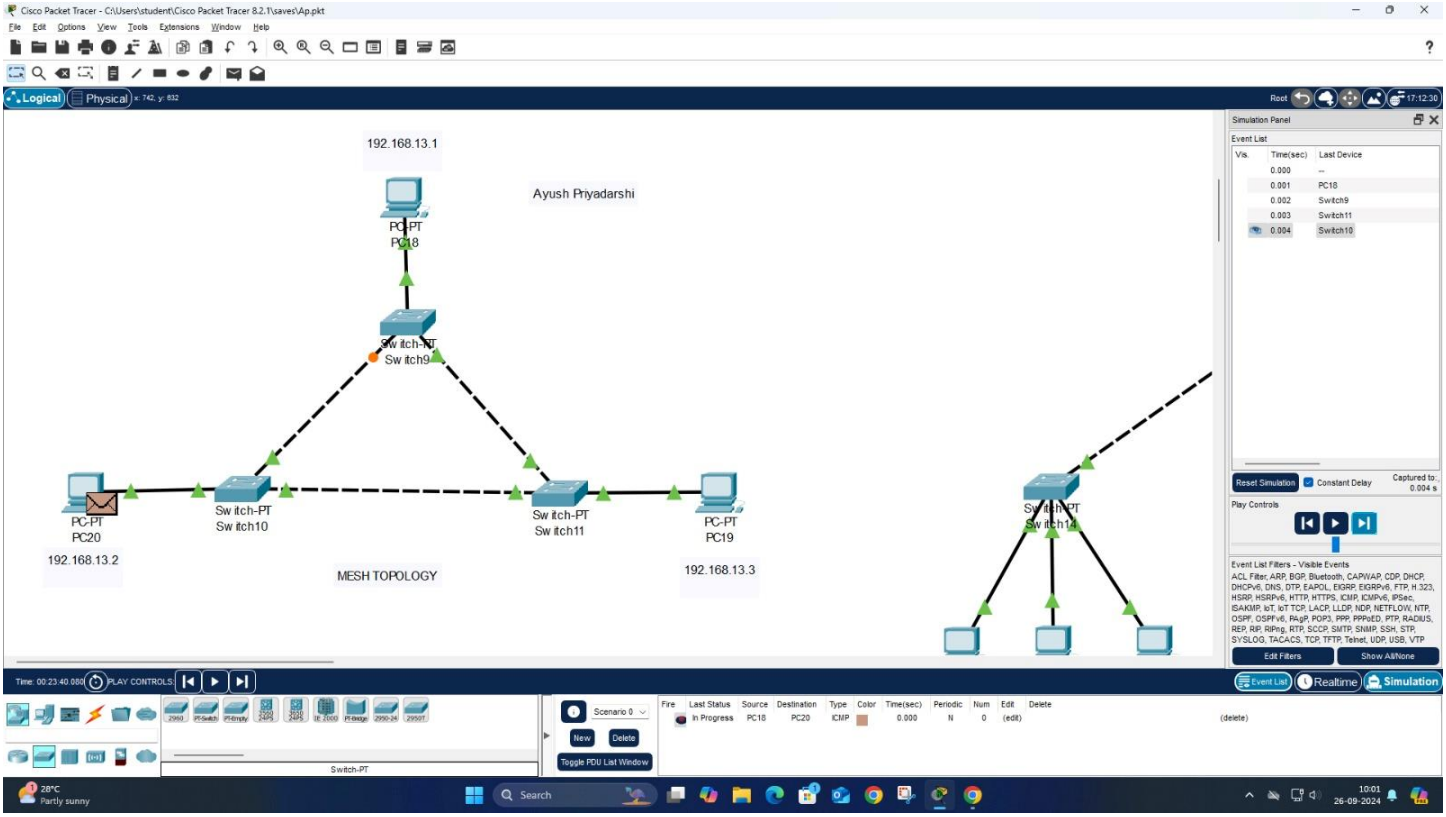
DEVICE NAME	IP ADDRESS	SUBNET MASK
PC18	192.168.13.1	255.255.255.0
PC20	192.168.13.2	255.255.255.0
PC19	192.168.13.3	255.255.255.0

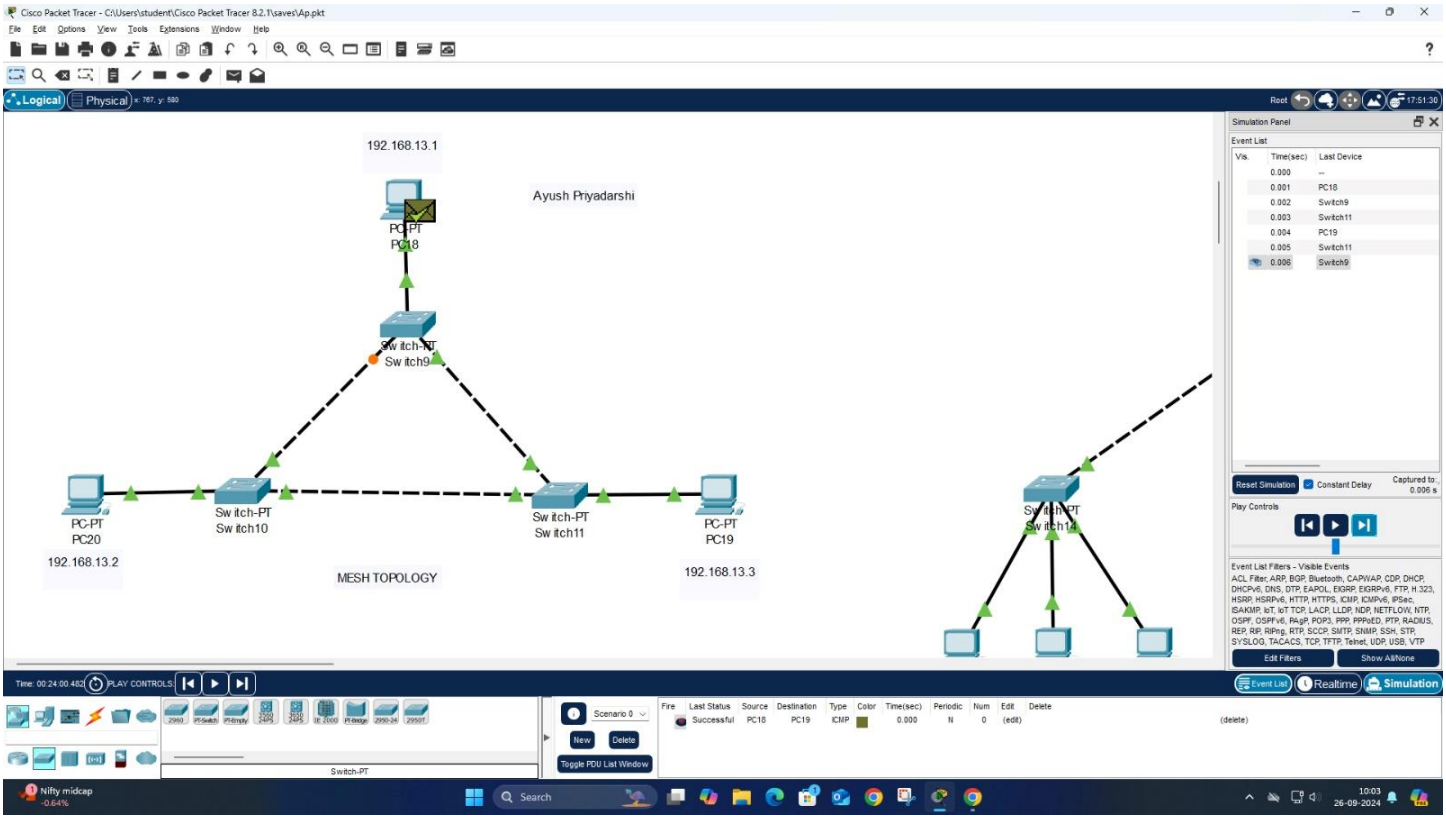
```
Cisco Packet Tracer PC Command Line 1.0

C:\>ping 192.168.13.3


Pinging 192.168.13.3 with 32 bytes of data:


Reply from 192.168.13.3: bytes=32 time<1ms TTL 128

Reply from 192.168.13.3: bytes=32 time<1ms TTL=128

Reply from 192.168.13.3: bytes=32 time=1ms TTL=128

Reply from 192.168.13.3: bytes=32 time<1ms TTL=128


Ping statistics for 192.168.13.3:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\
```

SIMULATION

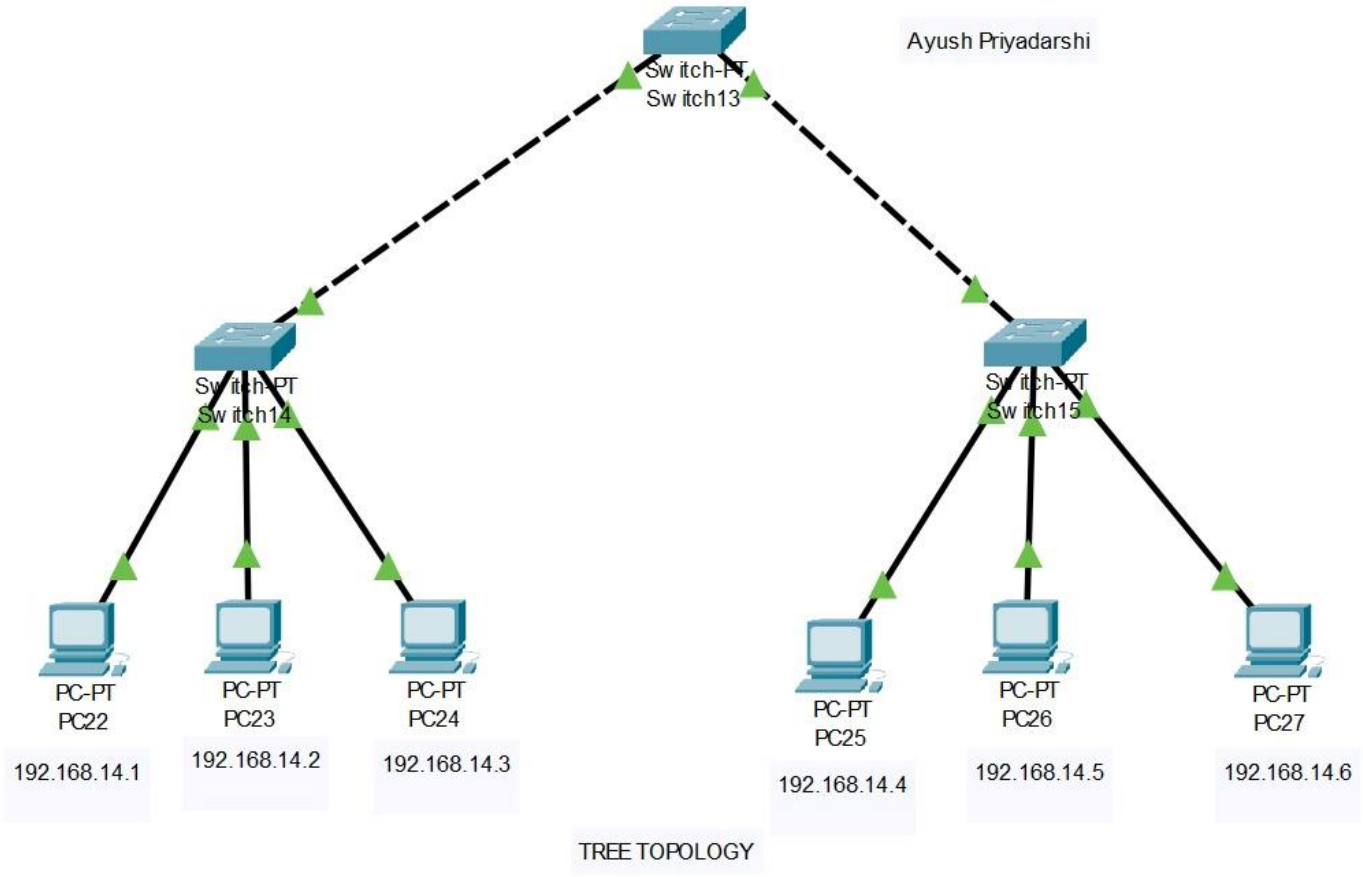
The given network follows the Mesh Topology. Here the message is transmitted from PC18 addressed to PC20. The message is transmitted through Switch9, Switch11 and Switch10 to reach PC20. PC20 then sends an acknowledgement of successful transmission back to PC18. It again is transmitted through Switch9, Switch11 and Switch10 to reach PC18 thus completing the transmission.


192.168.13.1
Ayush Priyadarshi
PC-PT
PC18
Switch-PT
Switch9
PC-PT
PC20
192.168.13.2
Switch-PT
Switch10
Switch-PT
Switch11
PC-PT
PC19
192.168.13.3
MESH TOPOLOGY
Switch-PT
Switch14


192.168.13.1
Ayush Priyadarshi
PC-PT
PC18
Switch-PT
Switch9
PC-PT
PC20
192.168.13.2
Switch-PT
Switch10
Switch-PT
Switch11
PC-PT
PC19
192.168.13.3
MESH TOPOLOGY
Switch-PT
Switch14



TREE TOPOLOGY



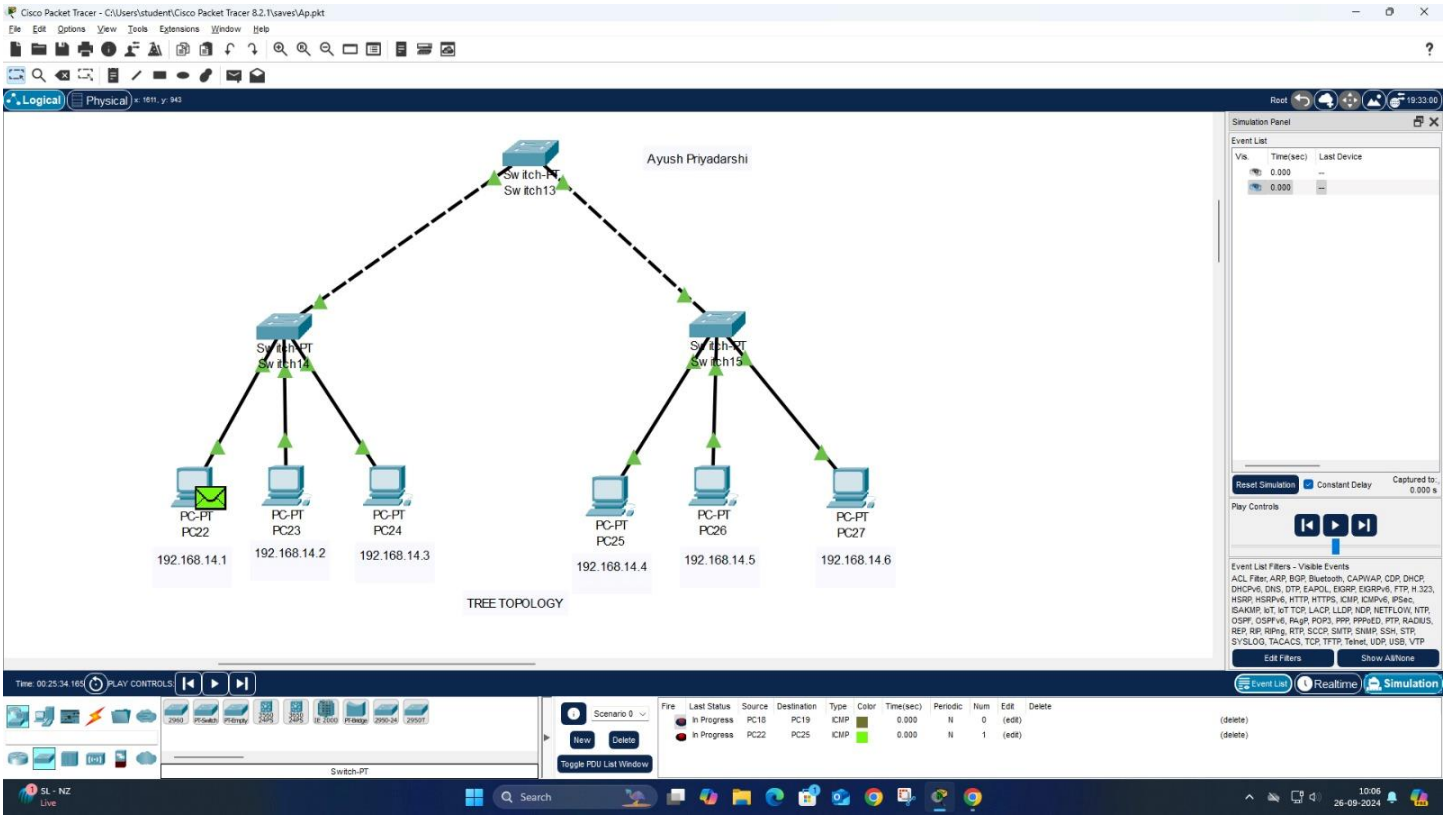
SETTINGS:

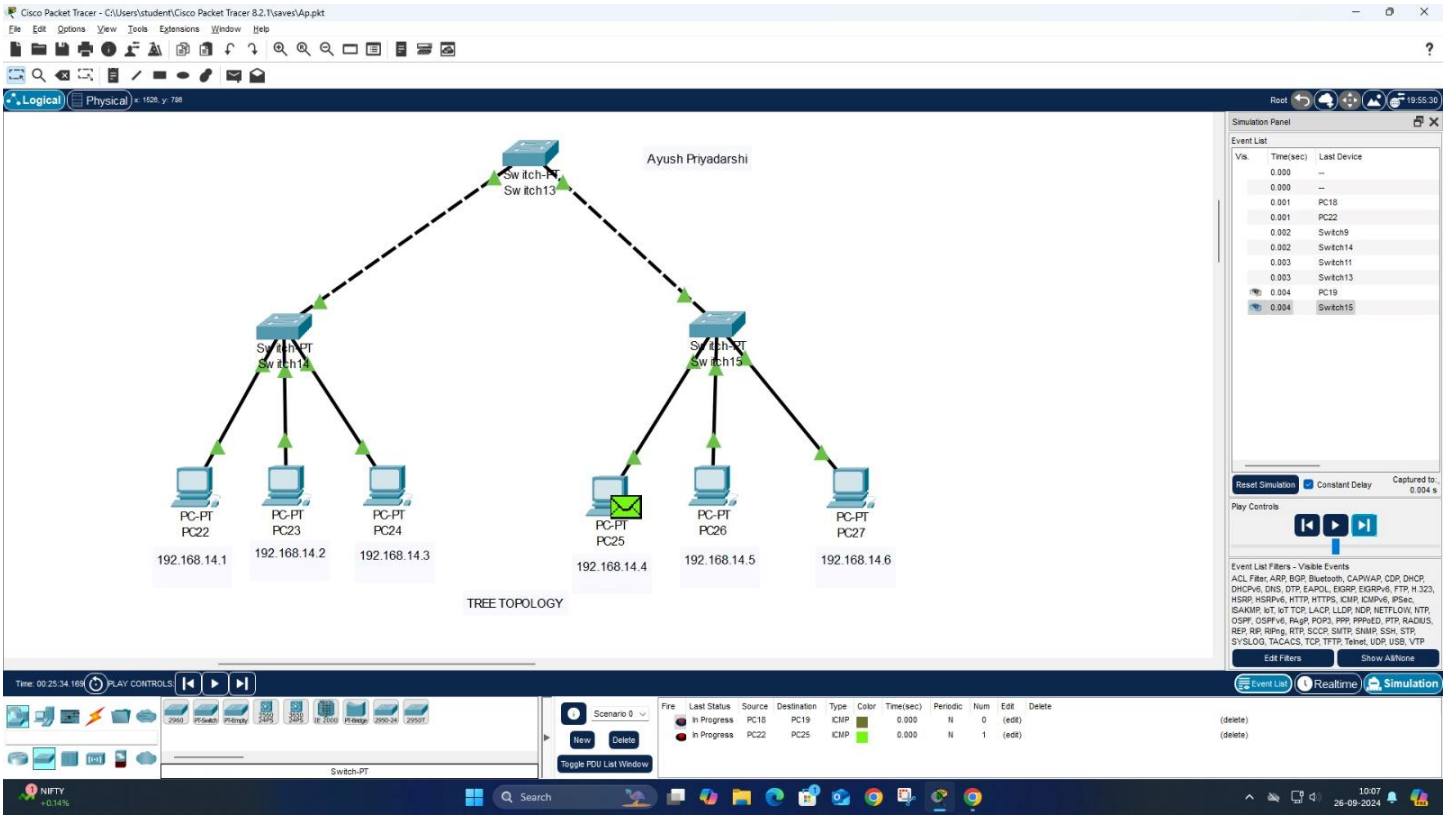
DEVICE NAME	IP ADDRESS	SUBNET MASK
PC22	192.168.14.1	255.255.255.0
PC23	192.168.14.2	255.255.255.0
PC24	192.168.14.3	255.255.255.0
PC25	192.168.14.4	255.255.255.0
PC26	192.168.14.5	255.255.255.0
PC27	192.168.14.6	255.255.255.0

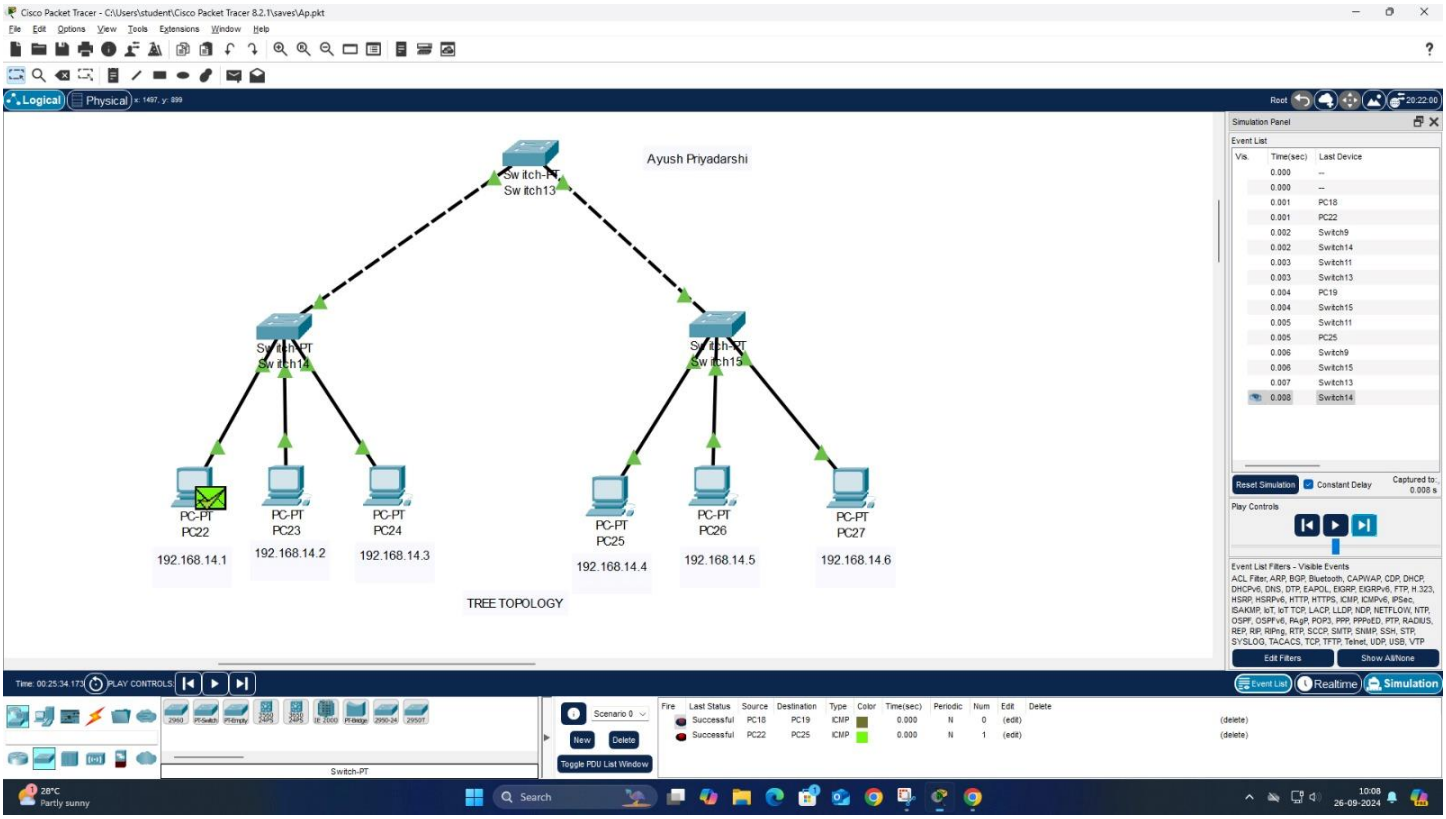
```
Cisco Packet Tracer PC Command Line 1.0

C:\>ping 192.168.14.3


Pinging 192.168.14.3 with 32 bytes of data:


Reply from 192.168.14.3: bytes=32 time<1ms TTL 128

Reply from 192.168.14.3: bytes=32 time<1ms TTL=128

Reply from 192.168.14.3: bytes=32 time=1ms TTL=128

Reply from 192.168.14.3: bytes=32 time<1ms TTL=128


Ping statistics for 192.168.14.3:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\
```

SIMULATION

The given network follows the Tree Topology. Here the message is transmitted from PC22 addressed to PC25. The message is transmitted through Switch14, Switch13 and Switch15 to reach PC25. PC25 then sends an acknowledgement of successful transmission back to PC22. It again is transmitted through Switch14, Switch13 and Switch15 to reach PC22 thus completing the transmission.


Ayush Priyadarshi
Switch-PT
Switch13
Switch-PT
Switch14
Switch-PT
Switch15
PC-PT
PC22
PC-PT
PC23
PC-PT
PC24
PC-PT
PC25
PC-PT
PC26
PC-PT
PC27
192.168.14.1
192.168.14.2
192.168.14.3
192.168.14.4
192.168.14.5
192.168.14.6
TREE TOPOLOGY


Ayush Priyadarshi
Switch-PT
Switch13
Switch-PT
Switch14
Switch-PT
Switch15
PC-PT
PC22
PC-PT
PC23
PC-PT
PC24
PC-PT
PC25
PC-PT
PC26
PC-PT
PC27
192.168.14.1
192.168.14.2
192.168.14.3
192.168.14.4
192.168.14.5
192.168.14.6
TREE TOPOLOGY



BUS, STAR, RING, MESH and TREE TOPOLOGY in a HYBRID NETWORK