Lab Assignment 03

Computer Network

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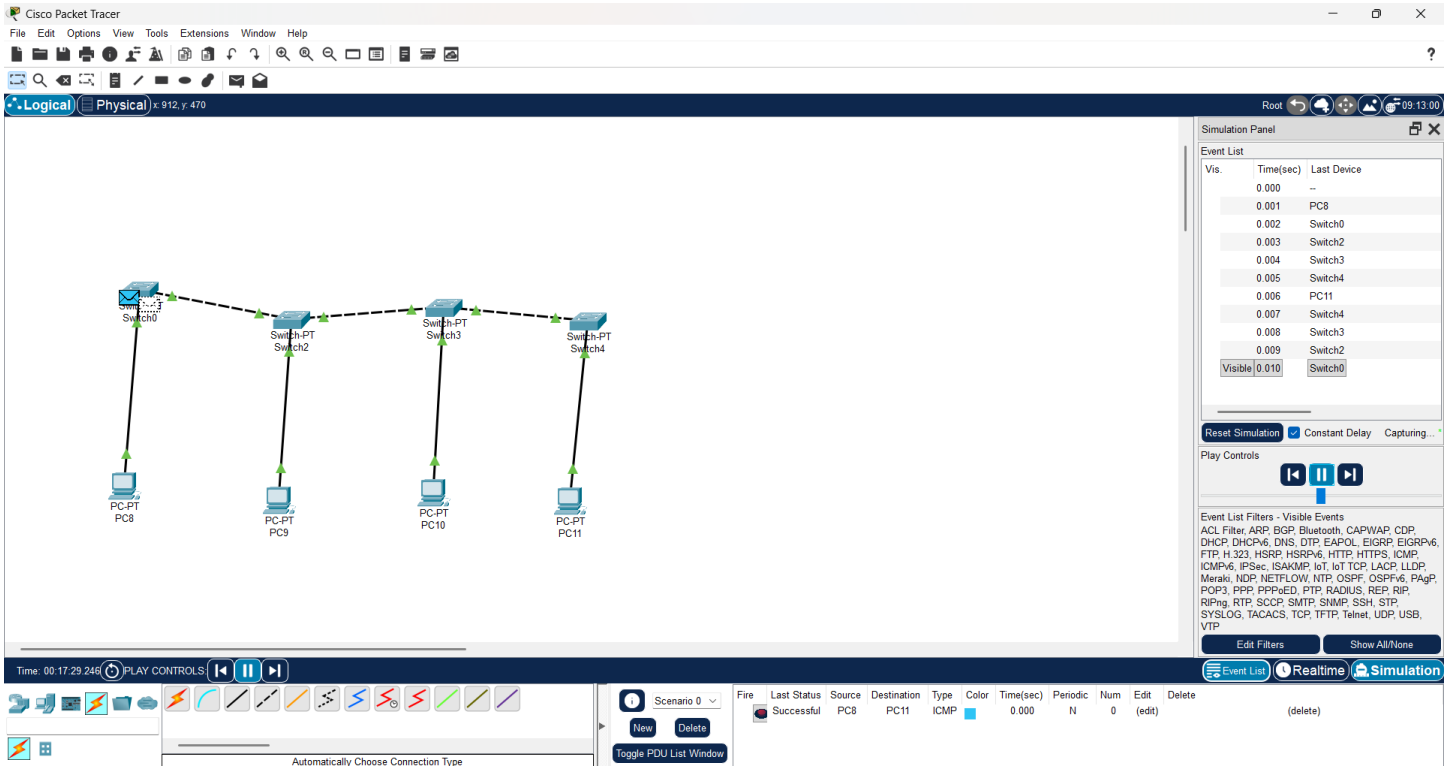
AIM: Implement different LAN topologies using Network Simulator.

1. Bus Topology



IP address to PCs

192.168.0.1 for PC0

192.168.0.2 for PC1

192.168.0.3 for PC2

192.168.0.3 for PC3

Components used:

2 Computers + 2 Laptops

Switches - > 2960-24TT (x 4)

Description:

Bus topology is a network setup in which all devices are connected to a single cable, called the bus. Data sent by a device travels along the bus in both directions until it reaches the intended recipient.

Pros

Efficient for small networks, Easy installation, Cost effective, No need for a central device, Flexible for temporary setups

Cons

Difficult troubleshooting, Performance issues as devices increase, Limited cable length, Low scalability, Security concerns

2. Mesh Topology

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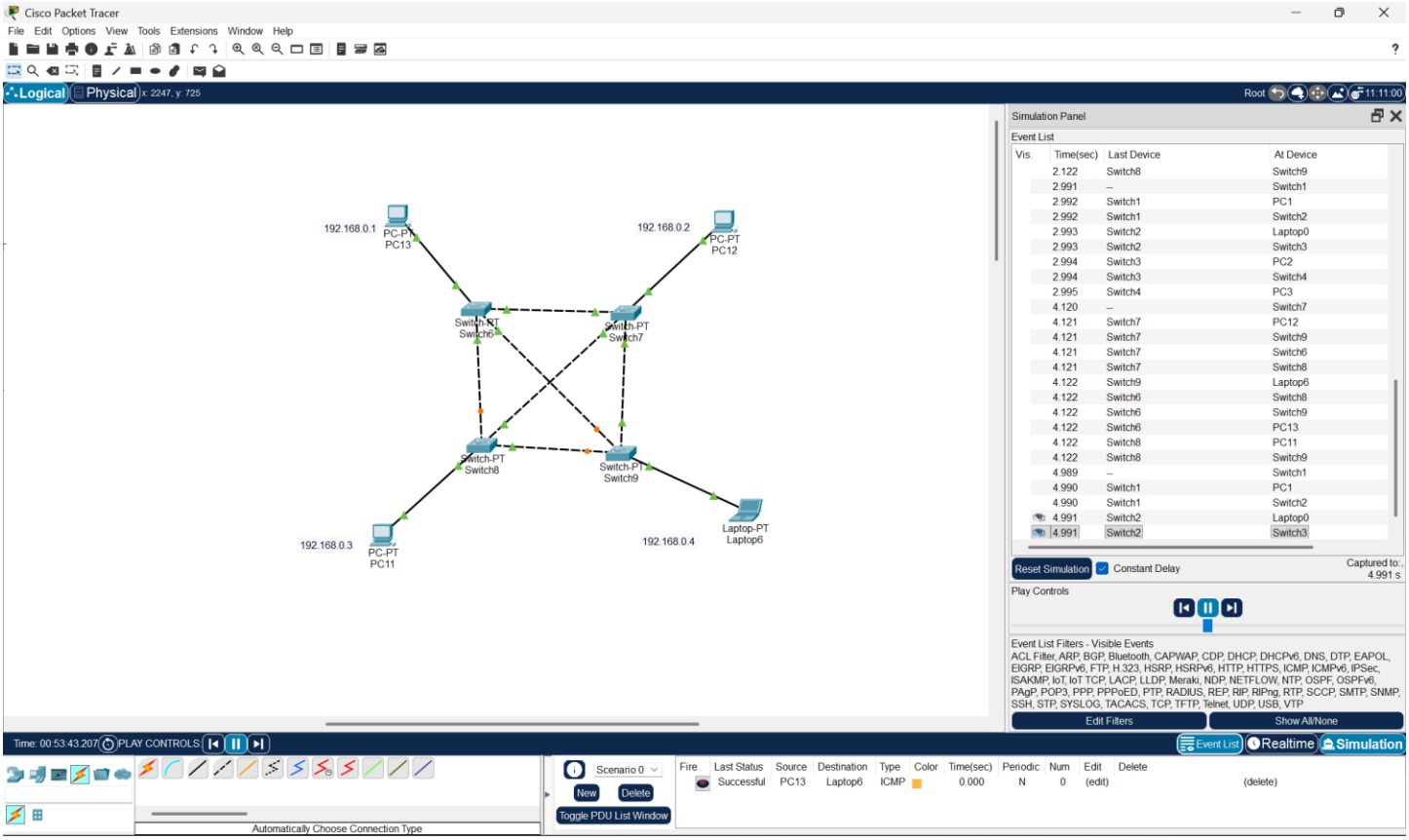

IP address.

192.168.2.1 for pc0

192.168.2.2 for pc1

192.168.2.3 for pc2

192.168.2.4 for pc3

Components used:

3 Computers + 1 Laptops

Switches - > switch-PT (x 4)

Description:

Mesh topology is a network setup where every device is directly connected to every other device. Data can travel along multiple paths, ensuring high reliability and fault tolerance.

Pros

High reliability, Fault tolerance, Easy to detect and troubleshoot problems, Supports high traffic, Ensures dedicated connections

Cons

Expensive to implement, Requires more cabling, Complex installation and configuration, Difficult to scale, Time-consuming maintenance

3. Ring Topology

IP address.

192.168.2.1 for pc0
192.168.2.2 for pc1
192.168.2.3 for pc2
192.168.2.4 for pc3

Components used:

2 Computers + 2 Laptops

Switches - > switch-PT (x 2) + switch-PT (x 2)

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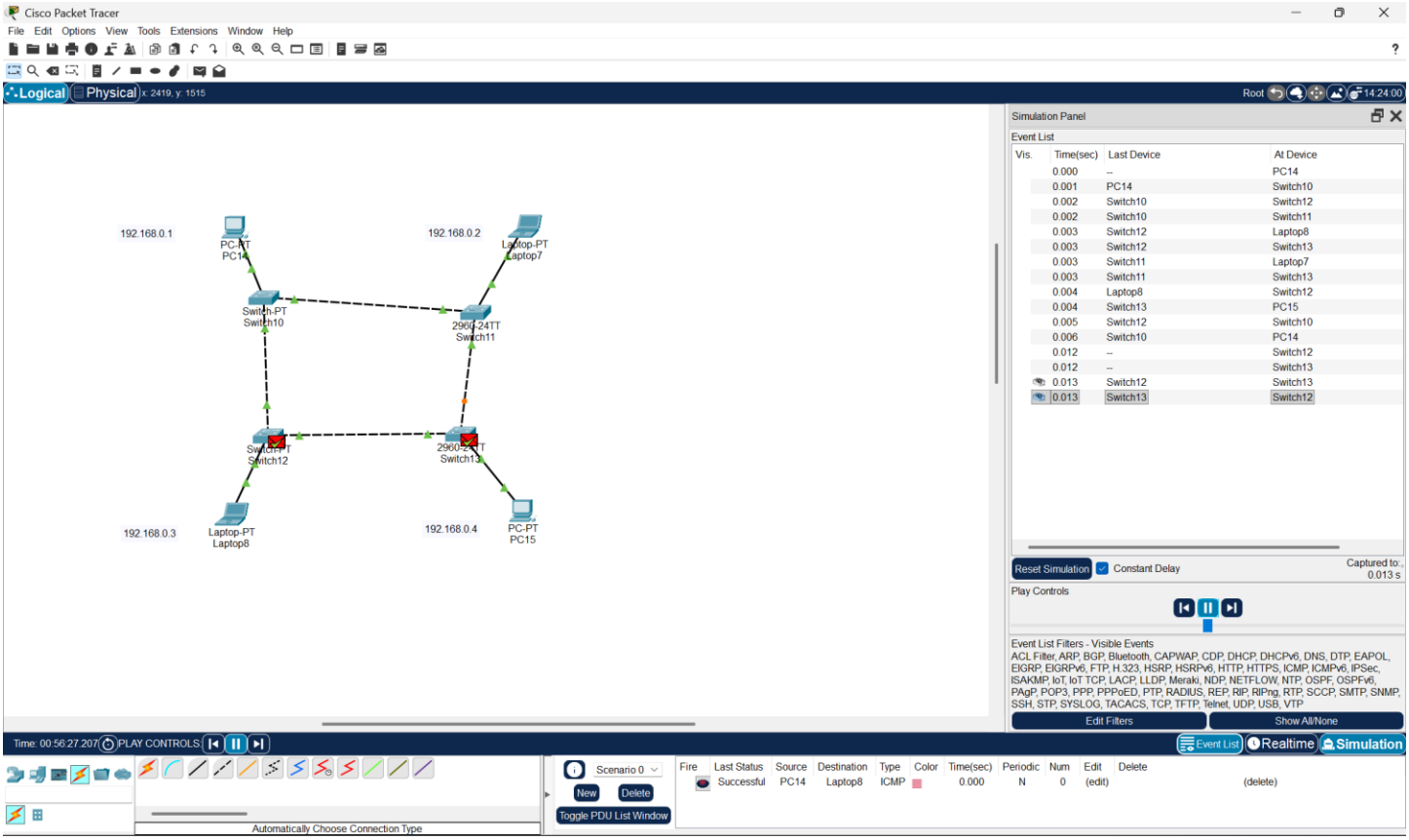

Description:

Ring topology is a network setup where each device is connected to exactly two other devices, forming a closed loop or ring. Data travels in one direction (or sometimes both), passing through each device until it reaches its destination.

Pros

Efficient data transfer, Easy to install and reconfigure, Reduces chances of data collision, Equal access for all devices, Suitable for small to medium networks

Cons

Failure of one device can affect the whole network, Troubleshooting can be difficult, Adding or removing devices disrupts the network, Slower compared to some topologies, Limited scalability

4.Star Topology

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IP address.

192.168.2.1 for pc0

192.168.2.2 for pc1

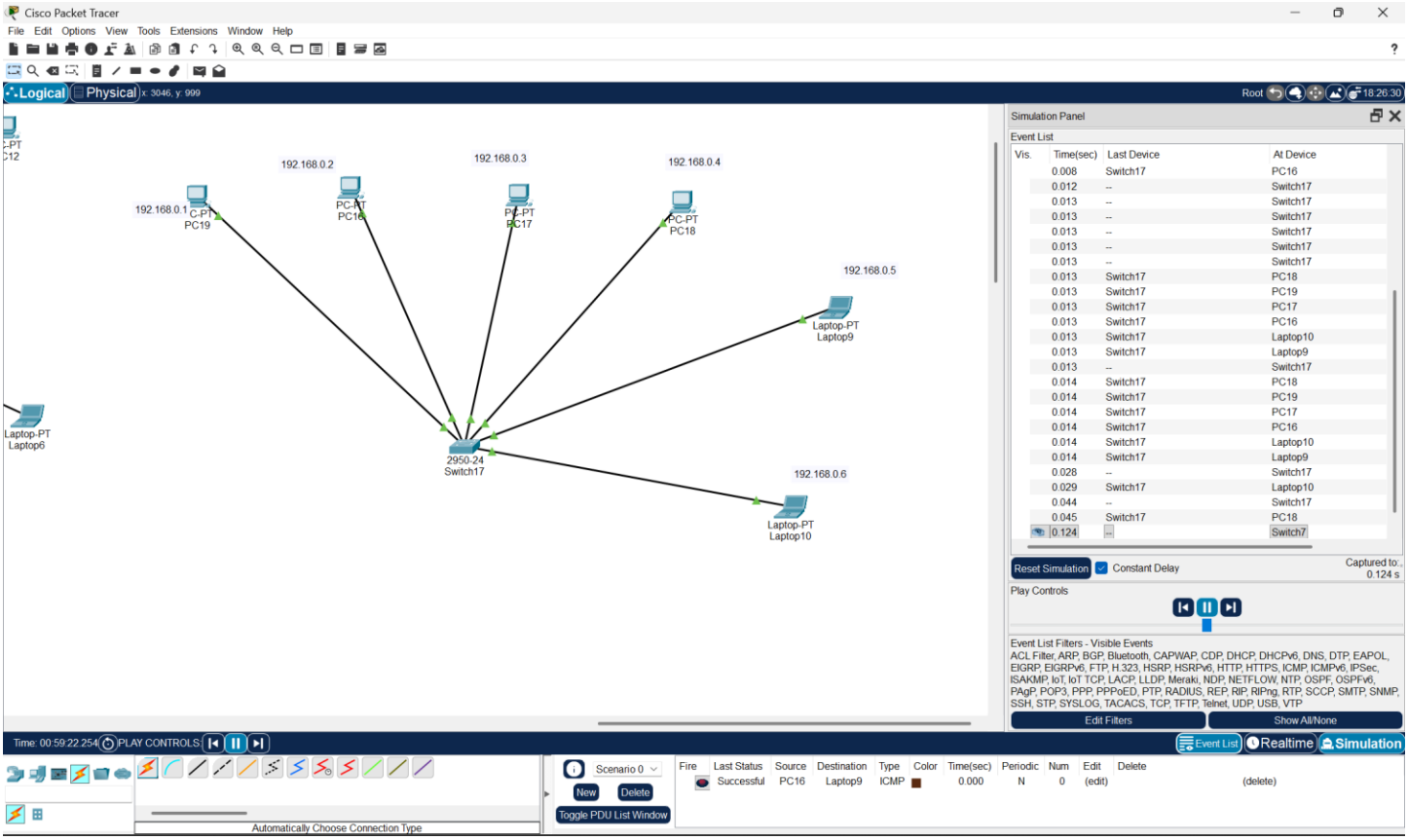
192.168.2.3 for pc2

192.168.2.4 for pc3

Components used:

4 Computers + 2 Laptops

Switches - > 2950-24 (x 1)



Description:

Star topology is a network setup where all devices are connected to a central device (such as a hub, switch, or router). Each device has its own dedicated connection to the central node, which manages data transmission between devices.

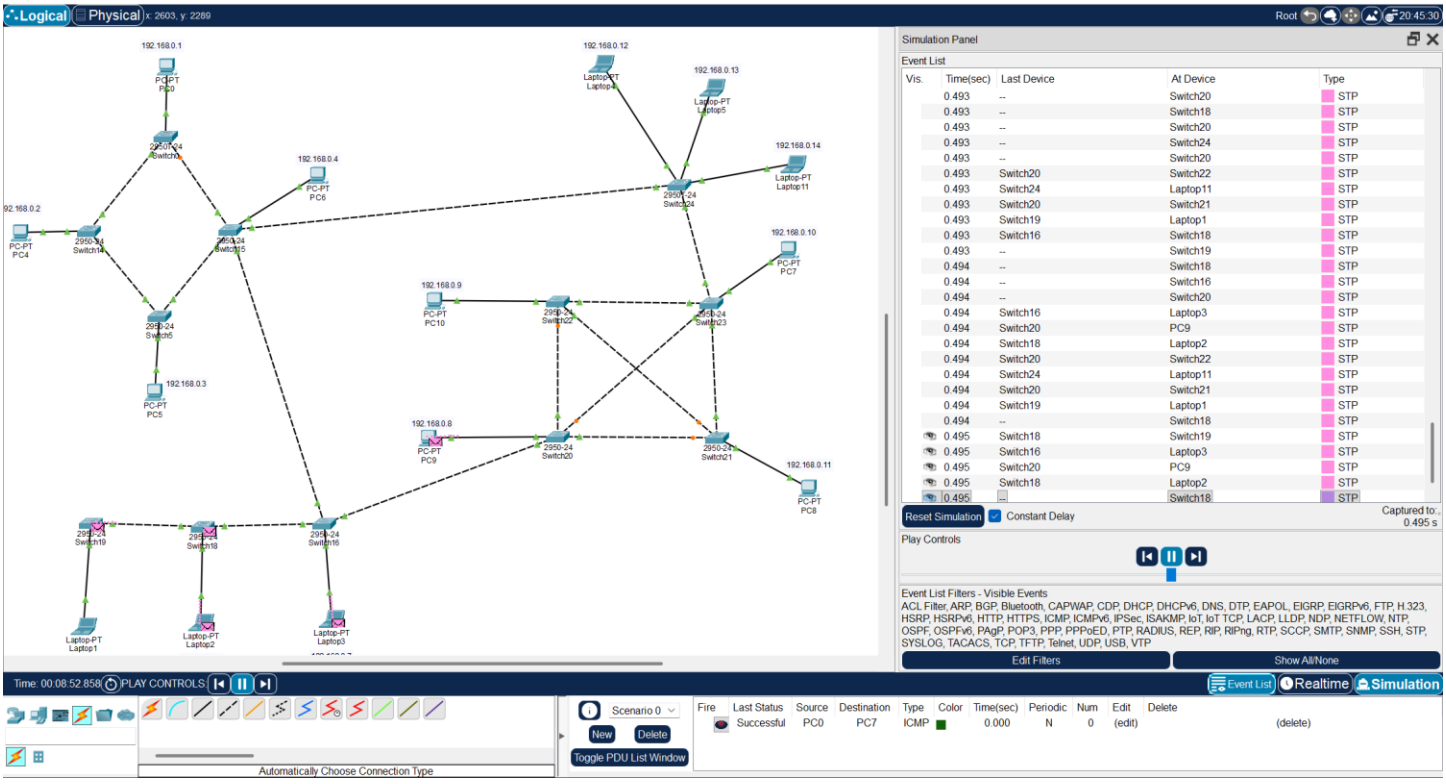
Pros

Easy to install and manage, Failure of one device does not affect the rest of the network, Easy to add or remove devices without disruption, Centralized management simplifies troubleshooting, High performance due to dedicated connections

Cons

Failure of the central device brings down the entire network, Requires more cabling, Higher installation cost due to extra hardware, Performance depends heavily on the central device, Limited scalability if the central hub or switch has few ports

5. Hybrid Topology



Devices Used

8 Computers + 6 Laptops

Switches – 2950-24 (x 12)

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Description

- This is a hybrid topology made by combination of Ring Topology , Star Topology , Bus Topology , Mesh Topology
- In this PC1 , PC2 , PC3 , PC4 each are connected with different switches and those switches are connected by each other making it a Ring structure.
- Laptop5 , Laptop6 , Laptop7 each are connected with different 2950-24 switches and those switches are connected in a line making Bus topology structure.
- PC8, PC9 , PC10 , PC11 each four are connected with different switches and those switches are connected with each other making sure that each pair should be directly connected. So they are making mesh topology structure.
- And Laptop12 , Laptop13 , Laptop14 are making star topology structure.
- Each four Different topology here

Pros

- **Scalable:** It is highly scalable, allowing easy integration of new devices or components without disturbing the existing architecture.
- **Flexible**: Very flexible, as it can adapt to various network environments and can be built according to organizational needs while maximizing available resources.
- **Reliable**: Provides better fault tolerance; if one node fails, it can be isolated without affecting the rest of the network.
- **Effective**: The biggest strength is that it combines the advantages of multiple topologies (e.g., fault tolerance of star, reliability of ring) while minimizing weaknesses

Cons

- **Complexity:** Managing hybrid topology is challenging because multiple topologies are linked together. It requires skilled design, efficient installation, and careful configuration.
- **Expensive:** Hybrid topology is costly to set up and maintain due to advanced devices, more cabling, and hubs/switches needed for interconnecting different networks.