



ondia

The logo for 'ondia' is centered on a white background. The word is written in a lowercase, rounded sans-serif font. The letters 'o', 'n', and 'd' are a medium purple, while 'i' and 'a' are a darker blue. A light blue and teal graphic element is positioned behind the 'd'. The background features four purple triangular accents in the corners, pointing towards the center.



Introduction to Networks

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1 What's a Network?

What's a Network?



A **network** is two or more computer systems linked together by some form of the transmission medium that enables them to share information





What's a Network?



Provides services like:

- Access to shared files/folders
- Access to printers/scanners
- Email applications
- Database applications
- Web applications
- Voice over IP (VoIP)
- Multimedia conferencing





What's a Network?



Features of Computer Network

- **Performance** → Response time
- **Data Sharing**
- **Backup**
- **Reliability** → No failures!
- **Security** → Keep data safe!
- **Scalability** → New systems can be added
- **Software and hardware compatibility**



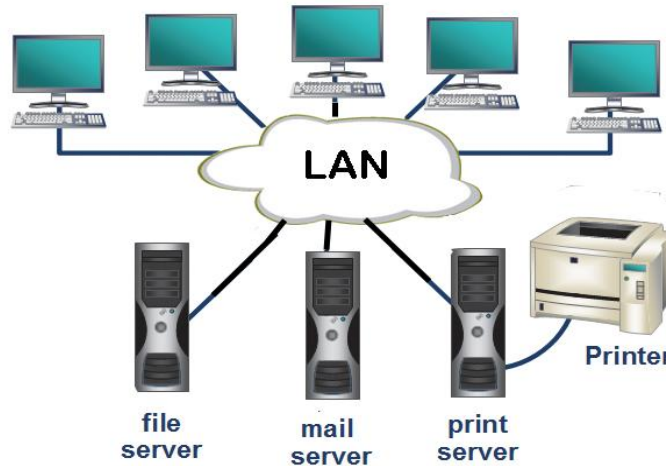
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Local Area Network (LAN)

Local Area Network (LAN)



A LAN is a **local** network



- Could be as small as two computers or large, with thousands of devices connected
- Usually restricted to spanning a particular geographic location



A company in a single building is considered as LAN





A company consisting of multiple buildings in the same area is considered as LAN





Local Area Network (LAN)



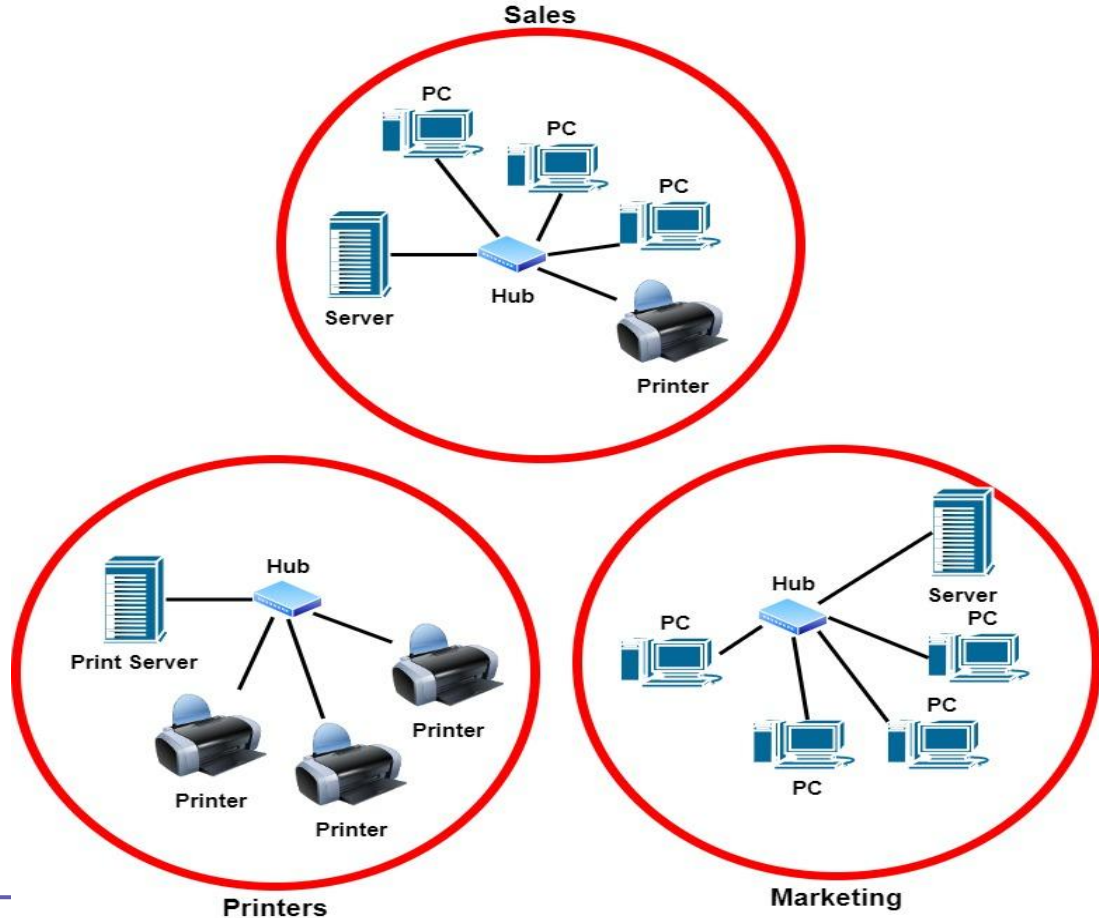
LAN's size and the distance a LAN can span is not restricted

But it's best to split a big LAN into smaller logical zones known as **workgroups** to make administration easier

Local Area Network (LAN)



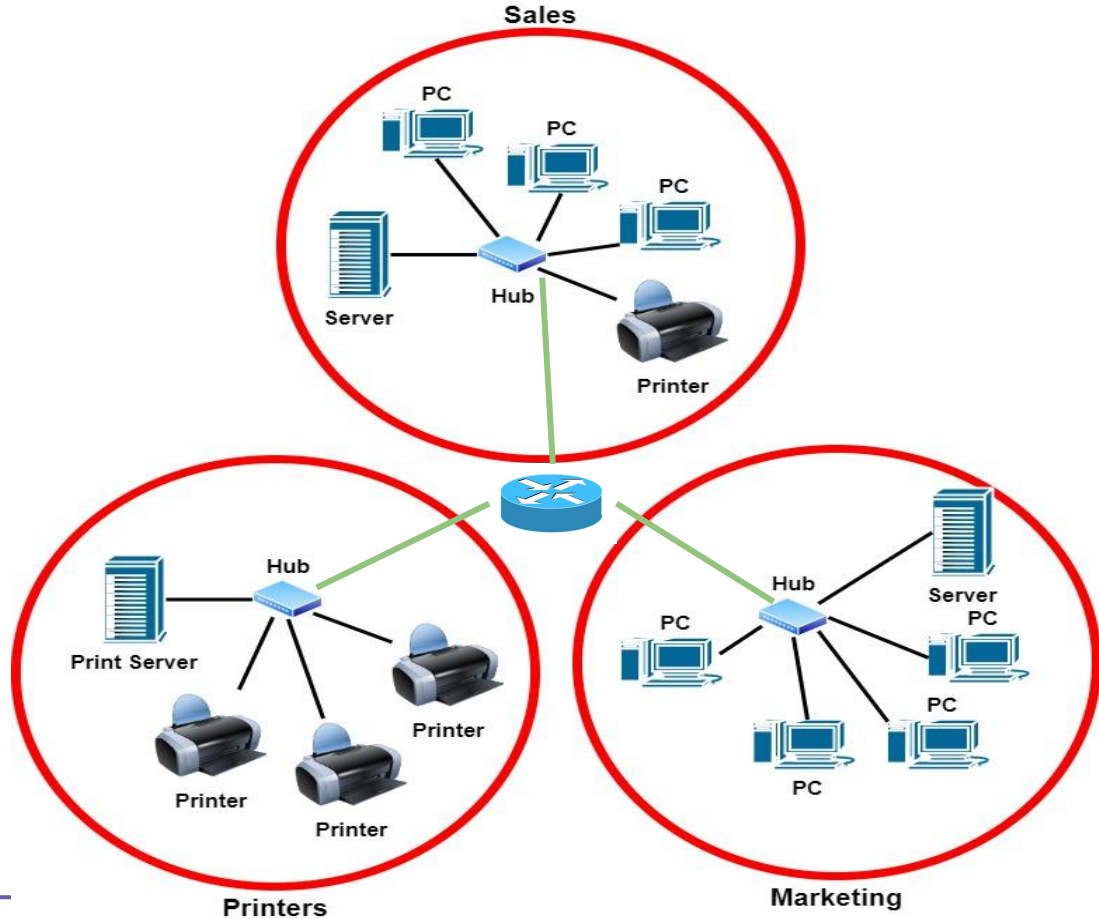
3 LANs, each has its own workgroup



Local Area Network (LAN)



A LAN with 3 workgroups







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Common Network Components

Common Network Components





- **Node** 
 - A point or joint where a connection takes place
 - Can be a computer or device
- **Station**  A node on a wireless network

- PC
- Laptop
- Server
- Smartphone
- Printer
- Router
- Switch
- etc.

Some examples of Node

Common Network Components



- **Host** 
 - Requires IP Address
 - Can be a client or server
- **Workstation** 
 - Powerful computer designed for technical or scientific applications
 - Used by one person at a time

Common Network Components





- **Server** → A powerful computer used to store files and run programs centrally
- **Client** → A device that makes request to a server

- Web Server
- Proxy Server
- Mail Server
- Print Server
- Application Server
- DNS Server
- File Server
- Telephony Server

Common types of servers

Common Network Components

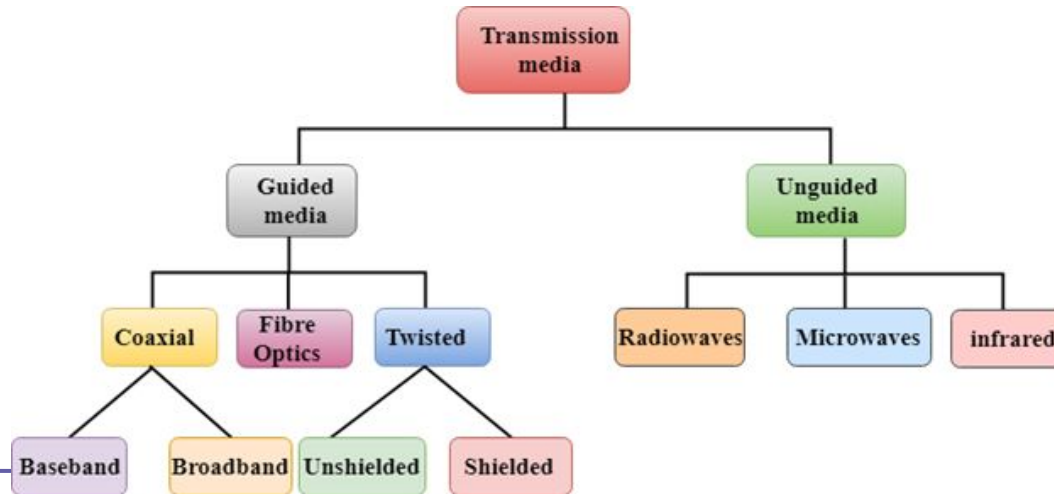


- **Segment**  - Refers to a specific physical region of a network
 - Typical usage is to describe the link between a computer and a switch
 - Another usage is to refer to a region of the network where all the nodes use the same type of transmission media
- **Backbone**  A fast link between other segments of a network

Common Network Components



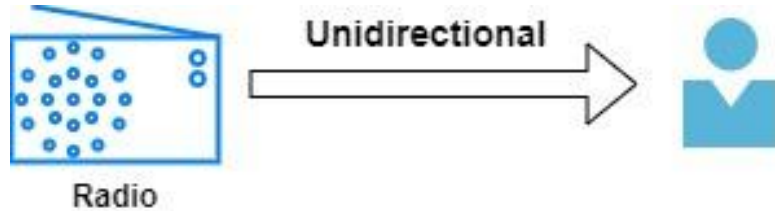
- **Transmission Media** →
 - A communication channel between **nodes** that carries the information from the sender to the receiver
 - Data is transmitted through the electromagnetic signals



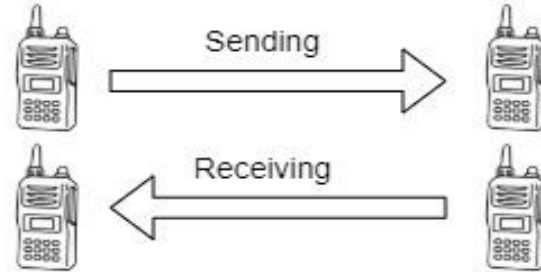
Cable Properties



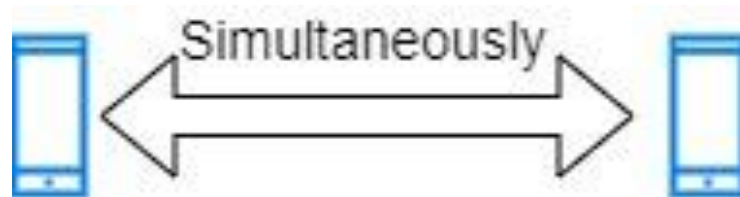
Simplex



Half-duplex



Full-duplex





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Wide Area Network (WAN)



Wide Area Network (WAN)



A **WAN** is a collection of computers and devices connected by a communications network over a wide geographic area

WANs are commonly connected either through the Internet or special arrangements made with phone companies or other service providers

The **Internet** is considered the **largest WAN** in the world



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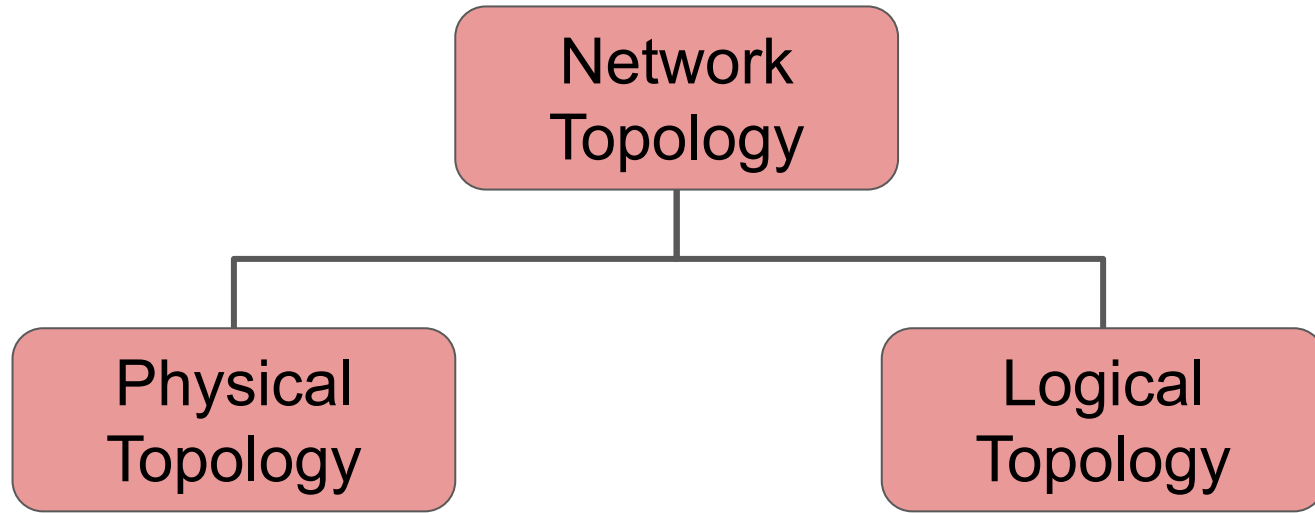
Network Topology



Network Topology



Network topology is the description of the arrangement of **nodes** and **connections** in a network





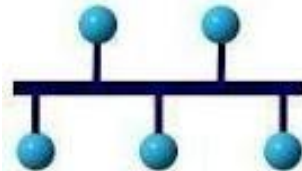
Network Topology



A **physical topology** details how devices are physically connected

Depends on:

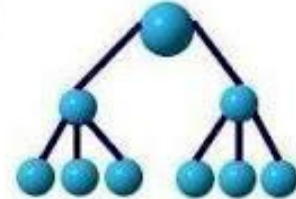
- Office layout
- Troubleshooting techniques
- Cost of installation
- Type of cable used



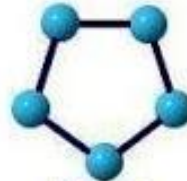
Bus



Star



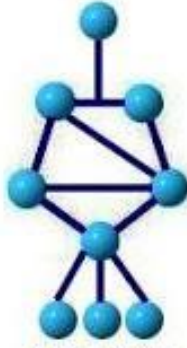
Tree



Ring



Mesh



Hybrid



Network Topology



Logical topology describes the way in which a network transmits information from network/computer to another

It's not the way the network looks or how it is laid out



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Physical Network Topologies

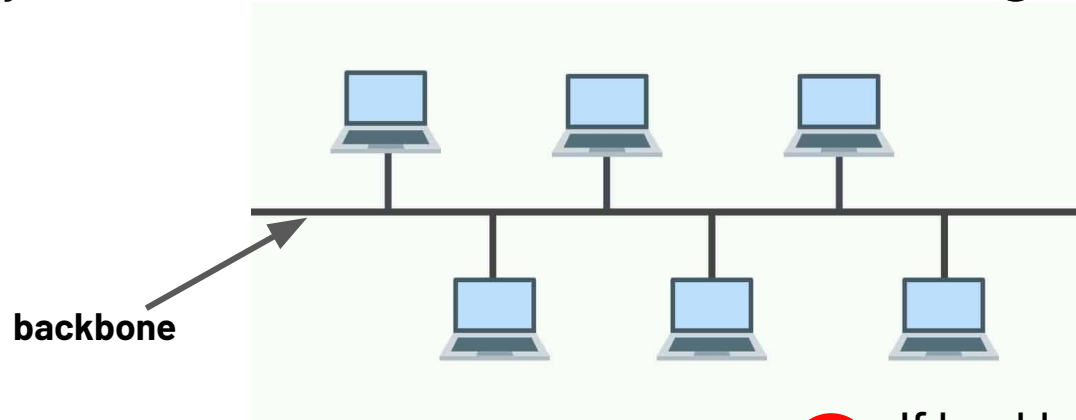


Physical Network Topologies



Bus Topology:

Every node is connected in series along a linear path



Keeps the layout simple



Cost effective



If backbone fails entire network goes down



Decreased network performance



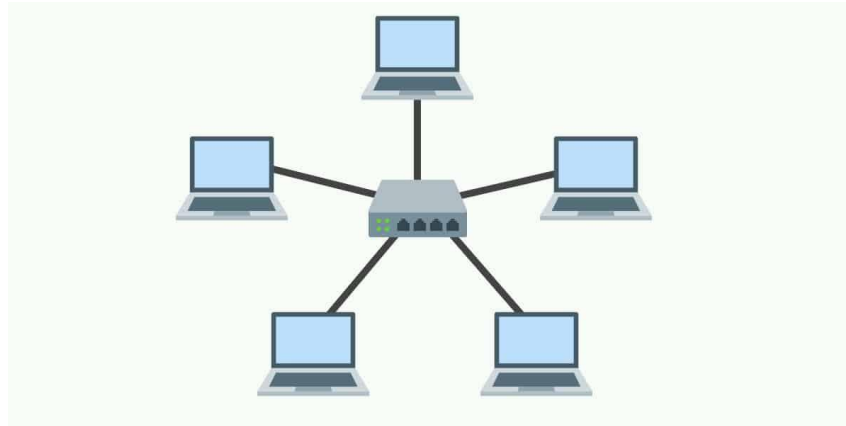
Not scalable

Physical Network Topologies



Star Topology:

Every node in the network is connected to one central switch



Easy to manage



Requires fewer cables



If central switch fails entire network goes down



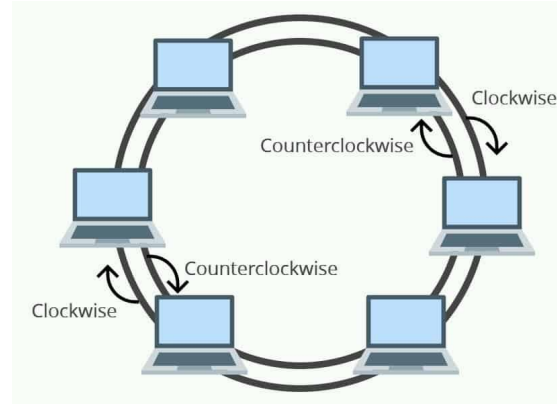
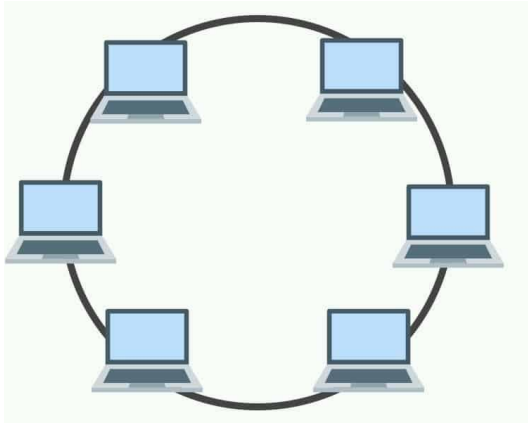
Performance is up to central switch

Physical Network Topologies



Ring Topology:

Every node is connected to each other in a circular format.



- ✓ Low risk of packet collision
- ✓ Easy to install

- ✗ Vulnerable to failure
- ✗ The more devices added the more communication delay
- ✗ To make changes the network should be shut down

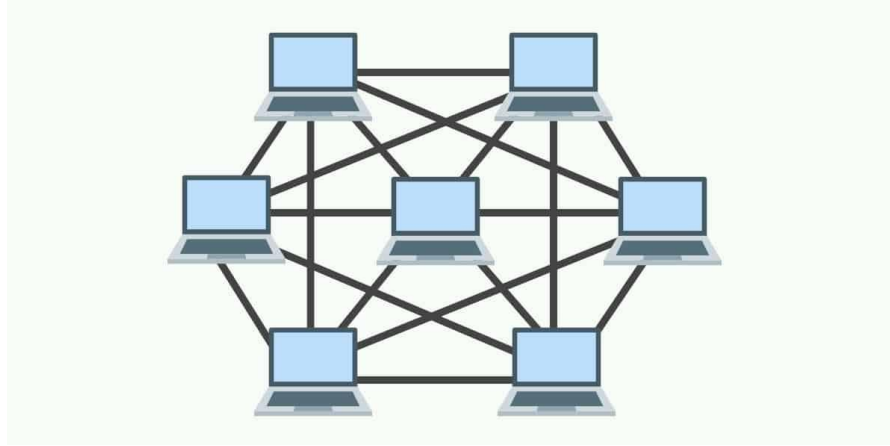


Physical Network Topologies



Mesh Topology:

A point-to-point connection where nodes are interconnected



Reliable



Configuration is complex



Expensive

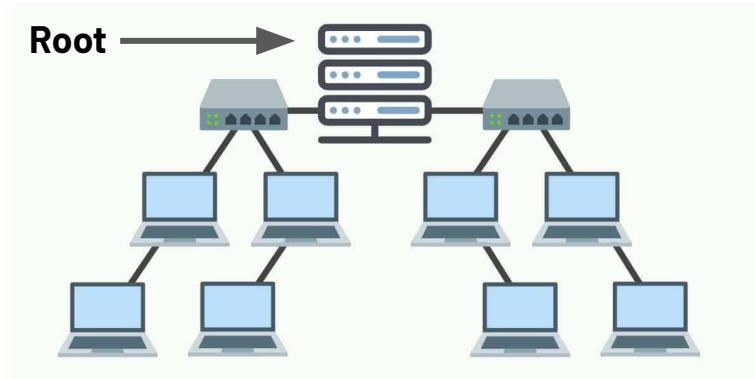


Physical Network Topologies



Tree (Hierarchy) Topology:

A network structure that is shaped like a tree with its many branches



Scalable



Hard to maintain



Manageable



If root fails entire network goes down

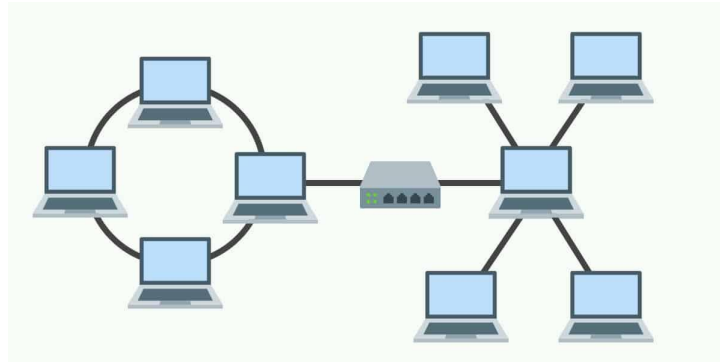


Physical Network Topologies



Hybrid Topology:

A combination of two or more types of physical or logical network topologies working together within the same network



Flexibility



Quite complex



Can be quite costly



THANKS!

Any questions?

