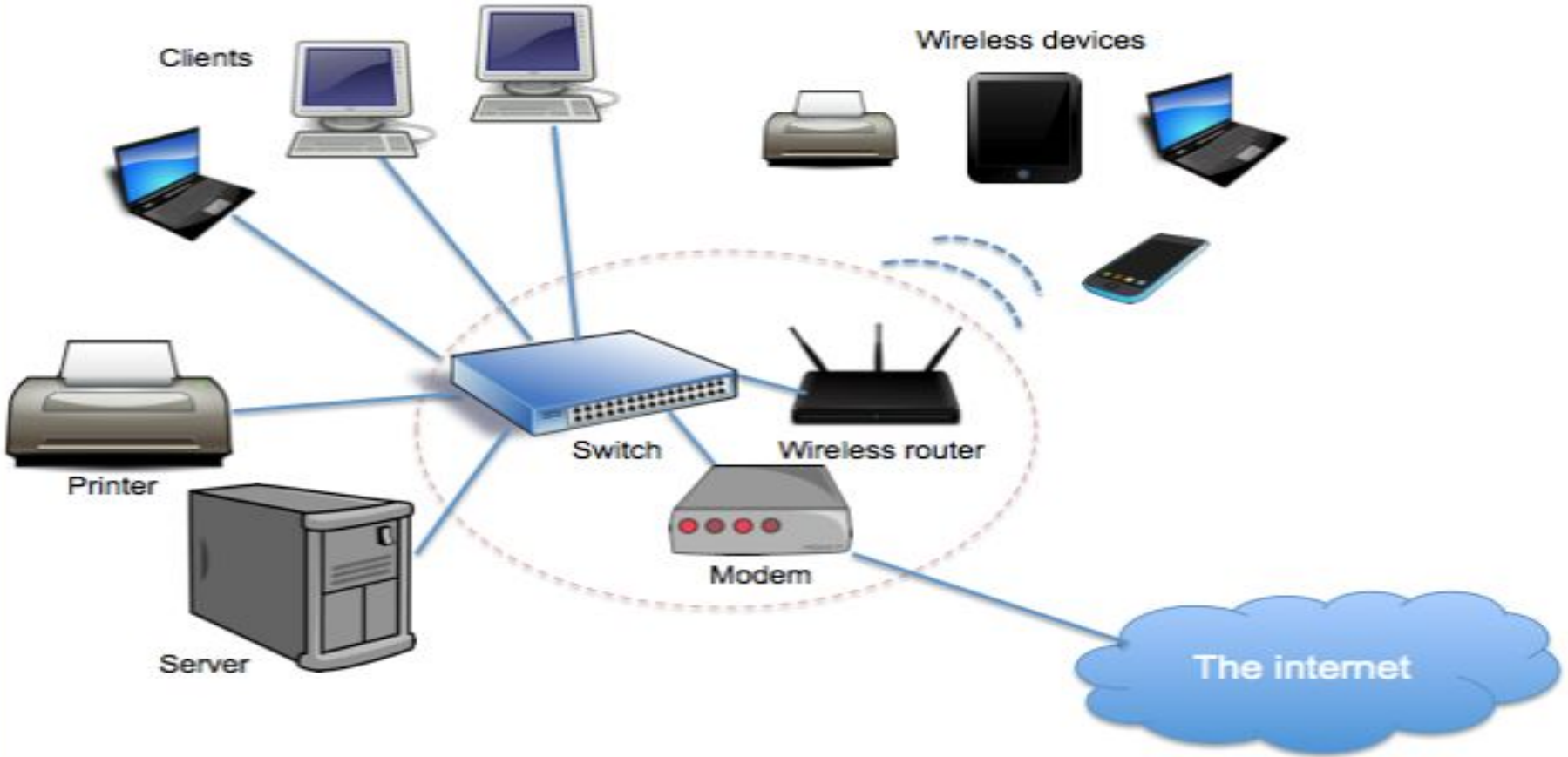
Networks

Computer Networking By KST

What is Network?

- Network is a collection of computer and other electronic devices that use common network protocols to share resources with each other over a network medium

Networking


Clients
Wireless devices
Printer
Switch
Wireless router
Modem
Server
The internet

Network Resources

- Hardware Resources
- Software Resources
- Server (Service Provider)
- Client (Service Request)
- Workstation
- Node/Host

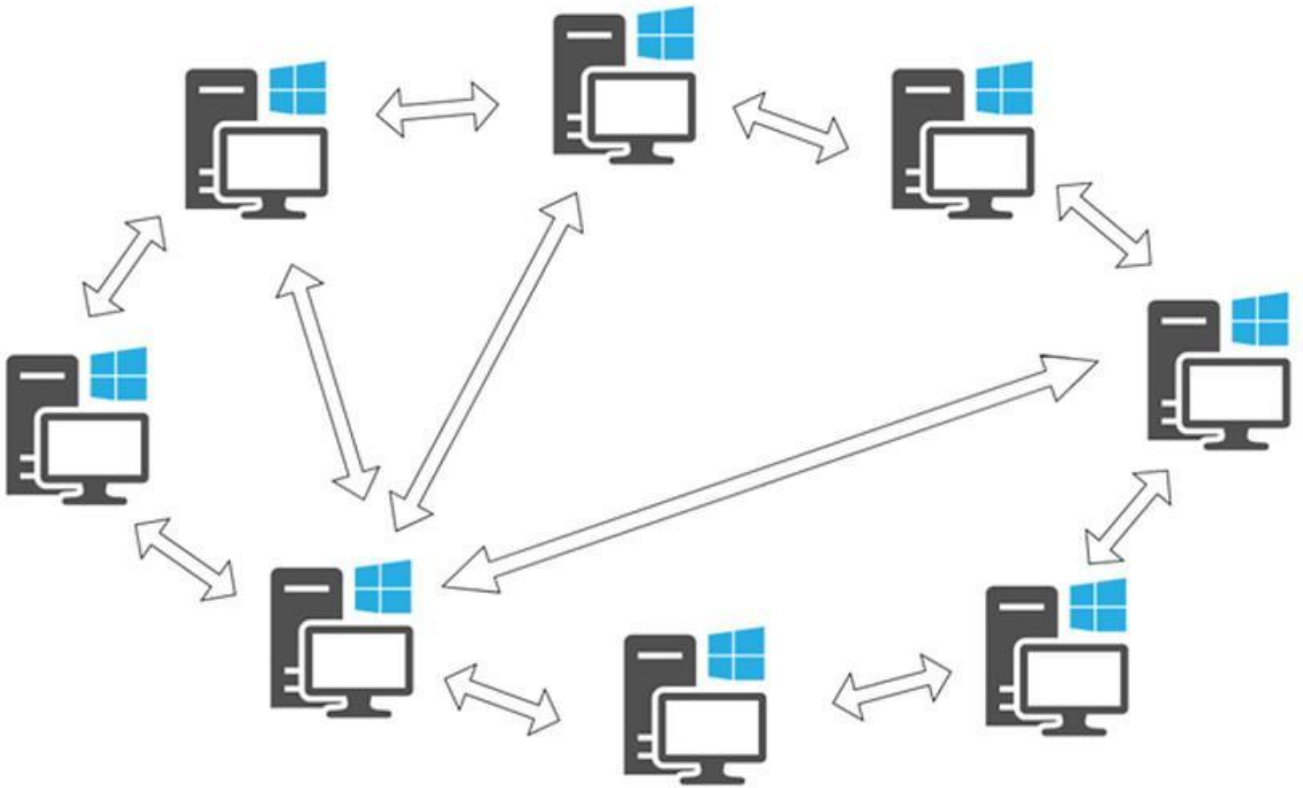
Network Category

- LAN (Local Area Network)
- MAN (Metropolitan Area Network)
- WAN (Wide Area Network)
- PAN (Personal Area Network)

Network Level

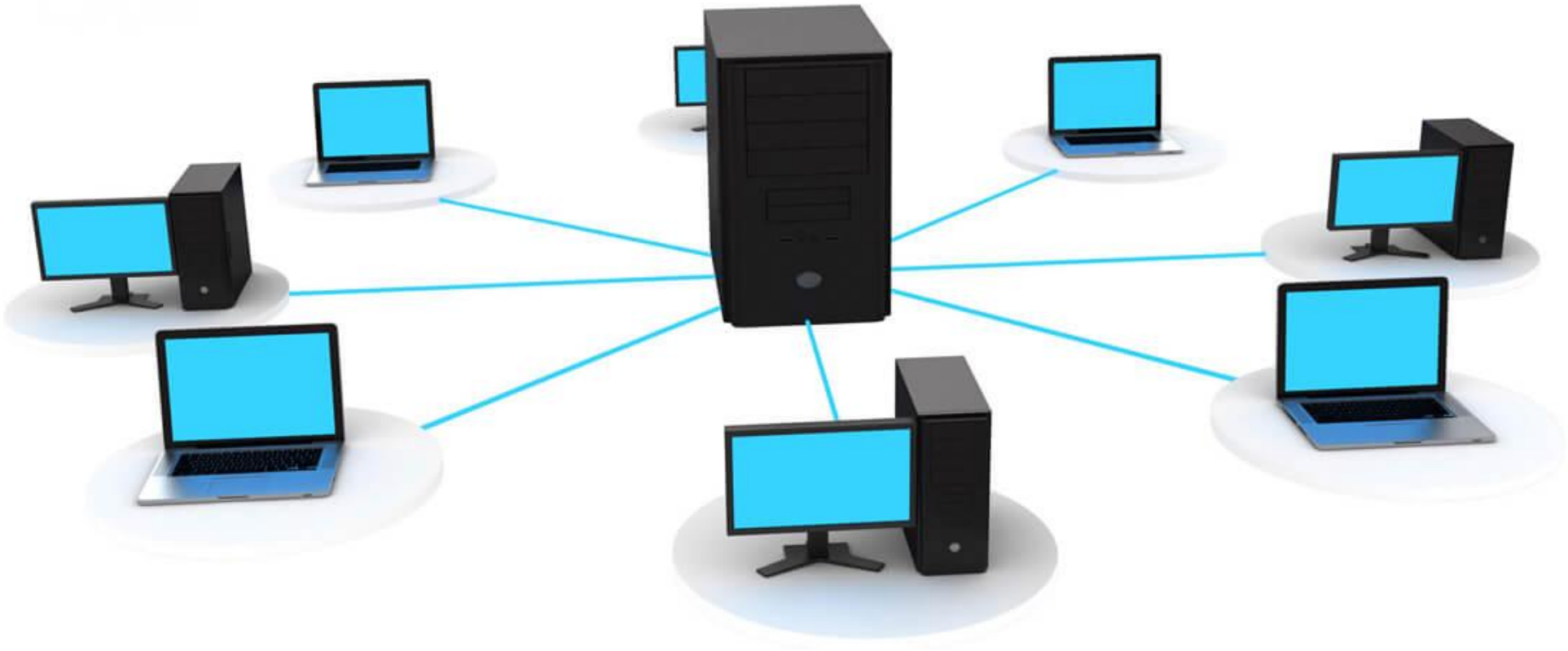
- Peer to Peer Network (Share Level Security)
- Server-Based Network (User Level Security)

Peer to Peer Network



A simulation of a peer-to-peer network

Server-Based Network



Network Devices

- Network Interface Card (NIC)
- Switch
- Hub
- Router
- Firewall (Hardware, Software)
- Repeater
- Bridge

Network Media

- Bounded Media (Cabling Network)
- Unbounded Media (Wireless Network)

Network Topology

- Physical Topology
- Logical Topology

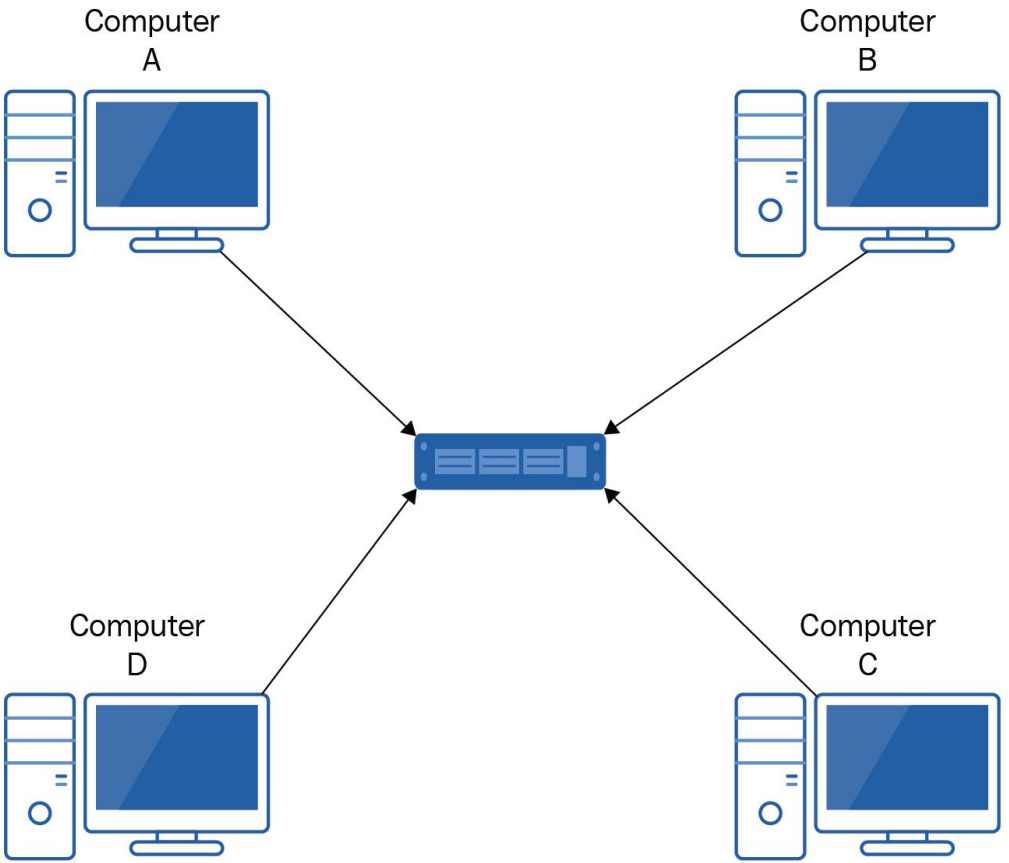
Physical Topology

- Star Topology
- Bus Topology
- Mesh Topology
- Ring Topology
- Wireless Topology

Logical Topology

- Token Passing Media Access
- CSMA/CD
- CSMA/CA
- CSMA (Carrier Sense Multiple Access Collision Detection Avoidance)

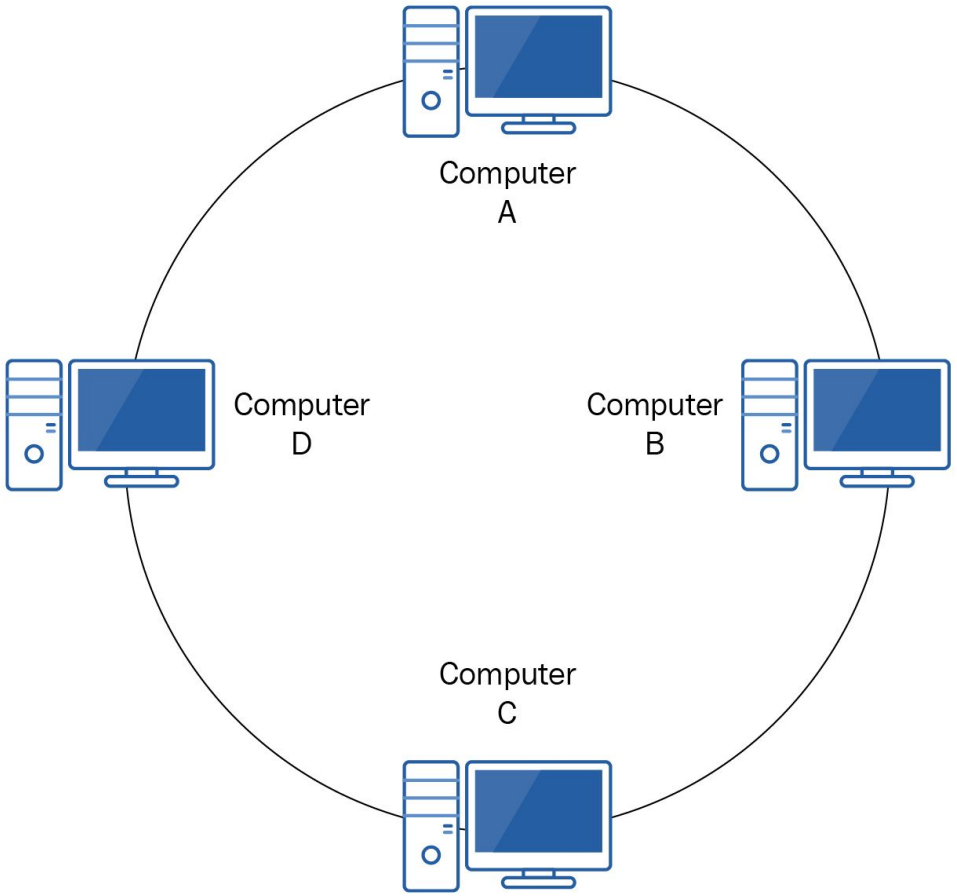
Star Topology



Star Topology

- Use Permanent Network
- Use CSMA/CD Method
- Speed 10Mbps, 100Mbps, 1000Mbps
- More Cable but more reliable
- Easy troubleshooting and Add or Remove Node

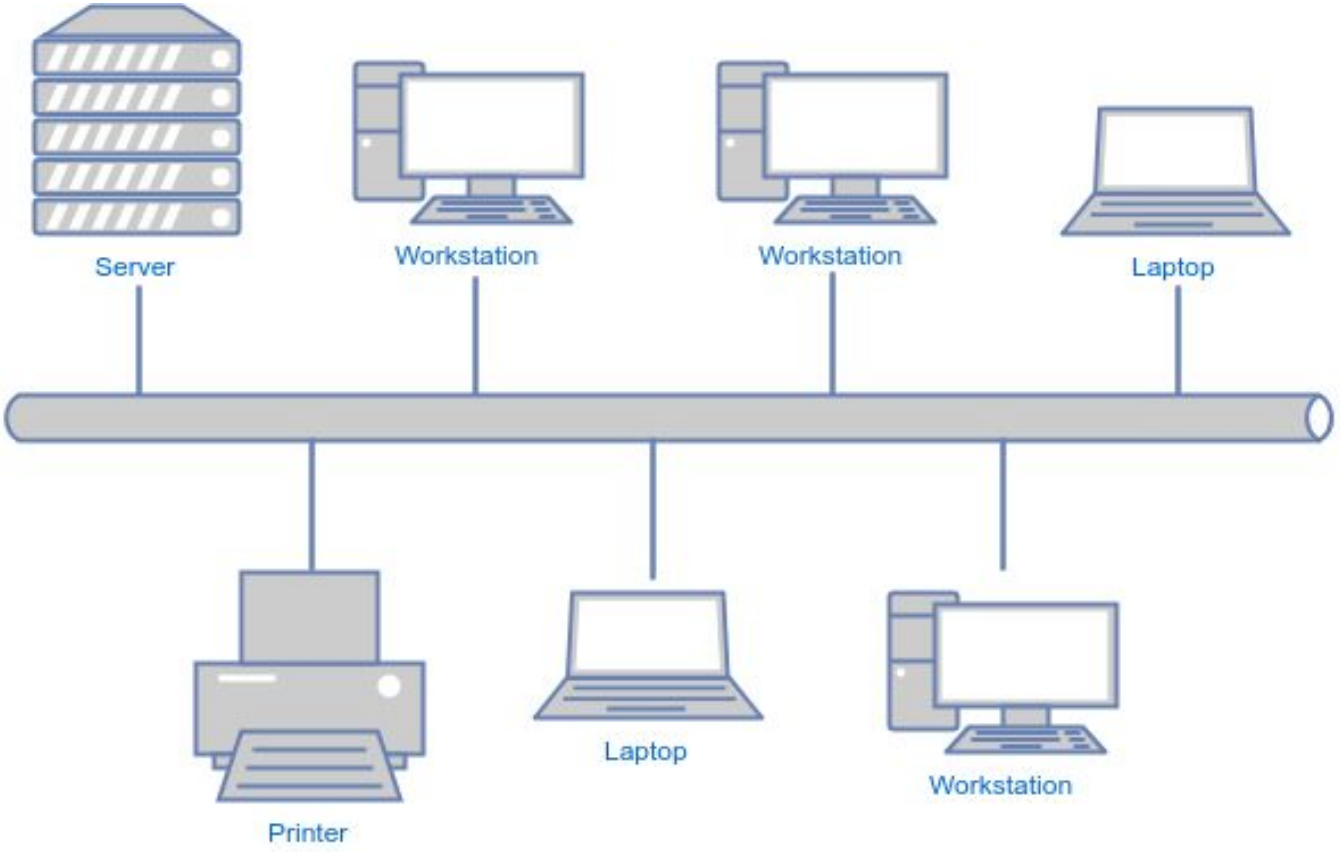
Ring Topology



Ring Topology

- Use Circular Function
- Use Token-Passing Media Access Method
- Use Single Router and Single User
- Speed 4Mbps to 16Mbps
- Difficult Troubleshooting and Add or Remove Node

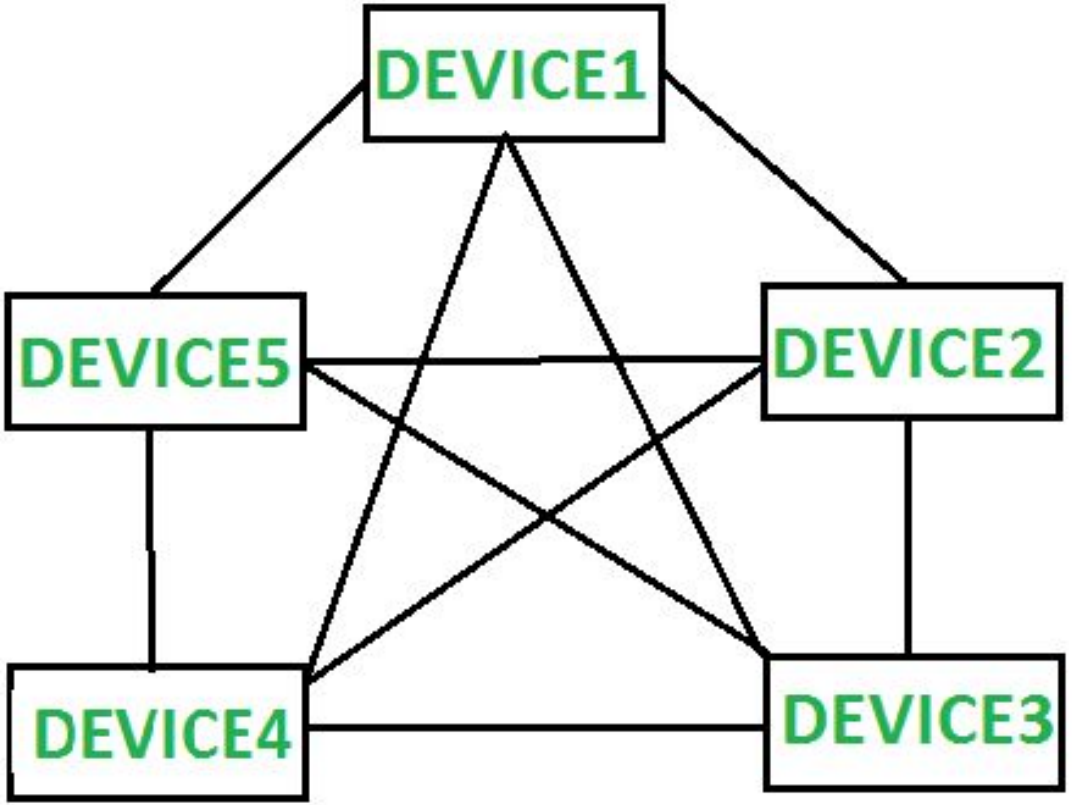
Bus Topology



Bus Topology

- Use Simple Design, Less Cable
- Speed 10Mbps
- Use Bidirectional and Multi-Users
- Easy Troubleshooting

Mesh Topology



Mesh Topology

- More expensive, but more reliable
- Use WAN Link connection
- Difficult Troubleshooting and Add or Remove Node

Network Media And Connector

- Coaxial Cable (Thin, Thick)
- Fiber Optic Cable
- Twisted-Pair Cable
- Unshield Twisted-Pair Cable (UTP Cable)

Thin Coaxial Cable (10 Base 2)

- Use Bus Network
- Maximum Speed 10Mbps
- Maximum Distance 185m
- BNC Connector

Thick Coaxial Cable (10 Base 5)

- Use Bus Network (Backbone)
- Maximum Speed 10Mbps
- Maximum Distance 500m
- BNC Connector and Transceiver

Fiber Optic Cable

- Speed 10Gbps and up
- SC Connector
- ST Connector
- MT-RJ Connector
- LC Connector

Twisted-Pair Cable

- STP (Shield Twisted-Pair Cable)
- Use in Ring Network
- Max length 100m
- Speed 16-1000 Mbps

Unshield Twisted-Pair Cable (UTP)

- Use in Star Network
- Max Length 100m
- Speed 10,100,1000Mbps
- 10 = Ethernet Network
- 100 = Fast Ethernet Network
- 1000 = Gigabit Ethernet Network

Unshield Twisted Pair Cable Installation

- TIA/EIA (Telecommunication Industries Association and Electronic Industries Alliance)

Unshield Twisted Pair Cable Installation

TIA/EIA	Type A	Type B
RJ-45 pin		
1	White/Green	White/Orange
2	Green	Orange
3	White/Orange	White/Green
4	Blue	Blue
5	White/Blue	White/Blue
6	Orange	Green
7	White/Brown	White/Brown
8	Brown	Brown

Straight-through Cable

- Node to Switch
- Node to Hub

Crossover Cable

- Node to Node
- Switch to Switch
- Hub to Hub

Rolled Over (Console) Cable

- Snode to Router (Management)

Numbering Systems

- Decimal (base 10)
- Binary(base 2)
- Octal (base 8)
- Hexadecimal (base 16)

Decimal (Base 10)

- Deci (10)
- Decade (10 years)
- 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
- Base 10

Binary (Base 2)

- Bi = 2
- 0, 1
- Base 2
- Computer or Electronic Devices working on it.

Octal numbers (Base 8)

- Octa = 8
- Base 8
- Octagon
- 0, 1, 2, 3, 4 ,5 ,6 ,7

Hexadecimal (Base 16)

- Hexa = 6
- Hexagon = 6 faces
- Decimal = 10
- Hexadecimal = 16
- 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

Network Types

- Unicast System
- Multicast System
- Broadcast System

Classful Network Architecture

- The IPv4 classification system is known as a classful network architecture broken down into five sections:
- Classes A, B and C are commonly used.

Protocols

- Protocols
  - Protocols are the rules and procedures for communicating
- Network Protocols
  - TCP/IP (Transmission Control Protocol/ Internet Protocol)
  - NetBEUI (Net BIOS Extended User Interface)
  - IPX/SPX (Internet Packet Exchange/ Sequence Packet Exchange)

Classful Network Architecture

Class	IP Range (1st Octet)	Default Subnet Mask	Network ID/Host ID	Network Possible	Usable Addresses
A	0 - 126	255.0.0.0	Net.Host.Host.Host	2*7=128	2*24 – 2 = 16,777,214
B	128 - 191	255.255.0.0	Net.Net.Host.Host	2*14 = 16,384	2*16 – 2 = 65,534
C	192 - 233	255.255.255.0	Net.Net.Net.Host	2*21 = 2097,151	2*8 – 2 = 254
D	224 - 239	N/A	N/A	N/A	N/A
E	240 - 255	N/A	N/A	N/A	N/A