INTRODUCTION TO COMPUTER NETWORKS

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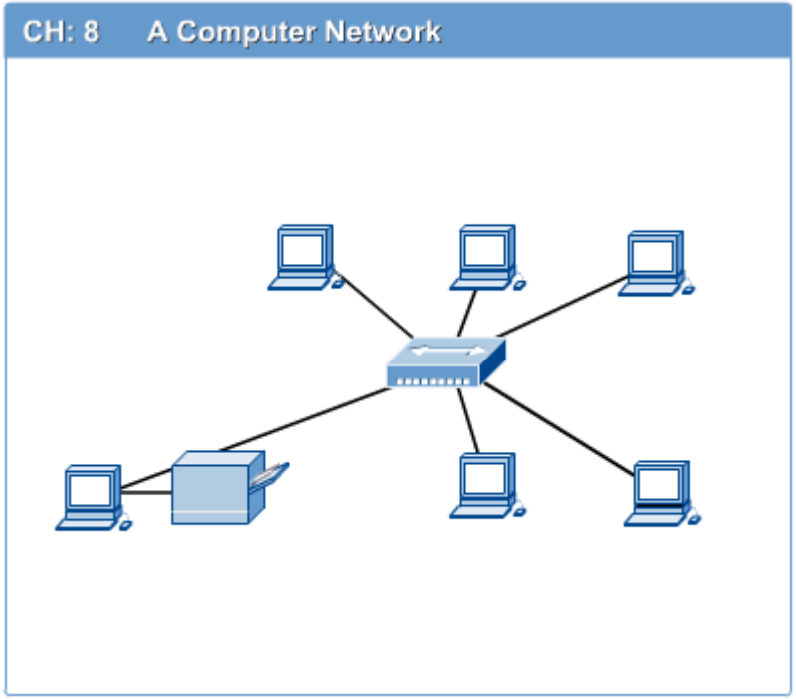
INTRODUCTION

- A computer network is a group of computers that shares information across wireless or wired technology.

- The computers can be geographically located anywhere.

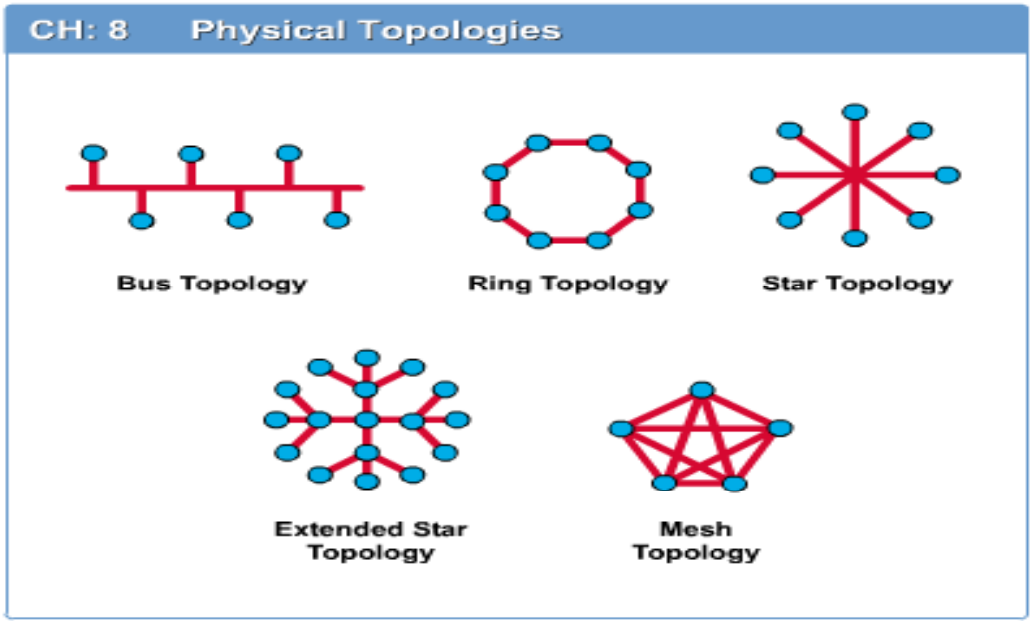


Applications of Networks

- Resource Sharing
  - Hardware (computing resources, disks, printers)
  - Software (application software)
- Information Sharing
  - Easy accessibility from anywhere (files, databases)
  - Search Capability (WWW)
- Communication
  - Email
  - Message broadcast
- Remote computing
- Distributed processing (GRID Computing)

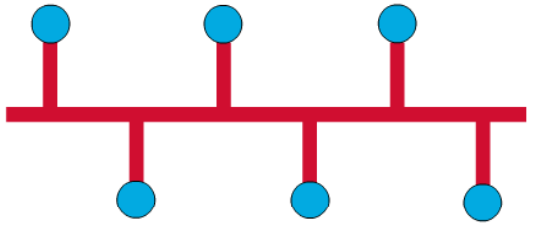
Network Topology

- The network topology defines the way in which computers, printers, and other devices are connected.



Bus Topology

- Commonly referred to as a linear bus, all the devices on a bus topology are connected by one single cable.Uses a trunk or backbone to which all of the computers on the network connect.



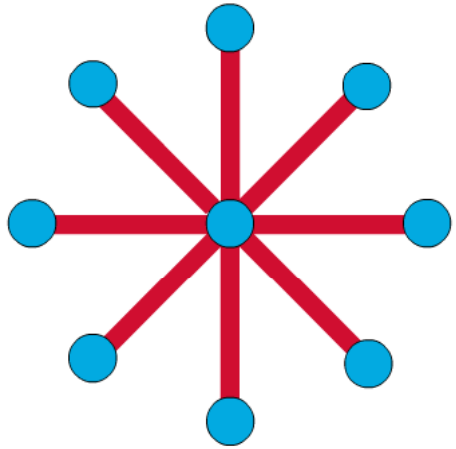
Advantages

- Cheap and easy to implement
- Require less cable
- Does not use any specialized network equipme...

Disadvantages

- Network disruption when computers are added or removed
- A break in the cable will prevent all systems from accessing the network.
- Difficult to troubleshoot.

Star Topology



- All computers/devices connect to a central device called hub or switch. Each device requires a single cable .point-to-point connection between the device and hub.
- Hub is the single point of failure

Advantages

- Easily expanded without disruption to the network
- Cable failure affects only a single use
- Easy to troubleshoot and isolate problems

Disadvantages

- Requires more cable
- A central connecting device allows for a single point of failure
- More difficult to implement

Tree Topology

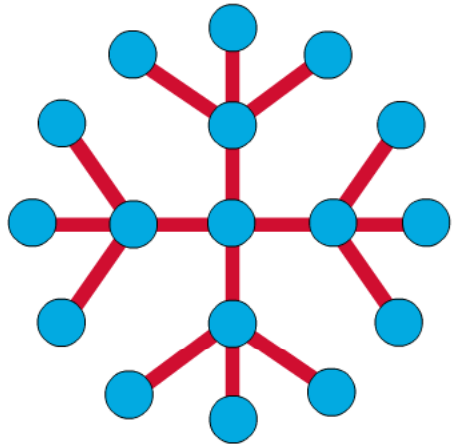
- A tree topology combines characteristics of linear bus and star topologies.

Advantages

- Point-to-point wiring for individual segments.
- Supported by several hardware and software venders.

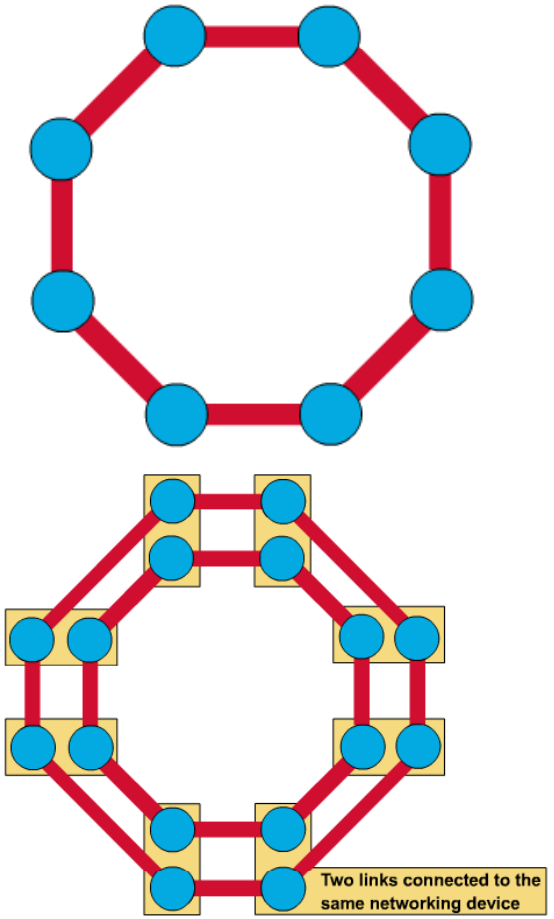
Disadvantages

- Overall length of each segment is limited by the type of cabling used.
- If the backbone line breaks, the entire segment goes down.
- More difficult to configure and wire than other topologies.



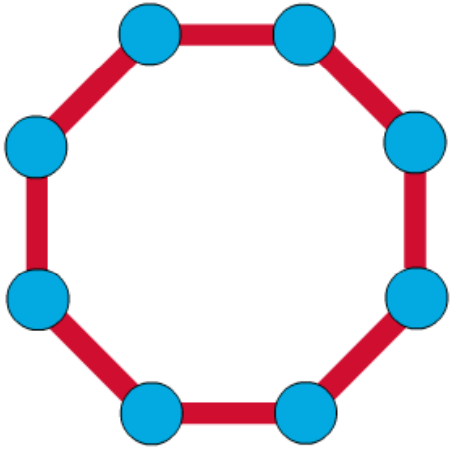
Ring Topology

- A frame travels around the ring, stopping at each node. If a node wants to transmit data, it adds the data as well as the destination address to the frame.
- The frame then continues around the ring until it finds the destination node, which takes the data out of the frame.
  - Single ring – All the devices on the network share a single cable
  - Dual ring – The dual ring topology allows data to be sent in both directions.



Ring Topology

- Typically FDDI, SONET or Token Ring technology are used to implement a ring network

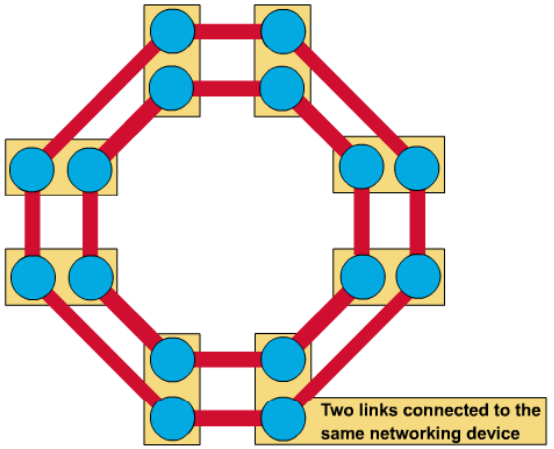


Advantages

- Cable faults are easily located, making troubleshooting easier
- Ring networks are moderately easy to install

Disadvantages

- Expansion to the network can cause network disruption
- A single break in the cable can disrupt the entire network.

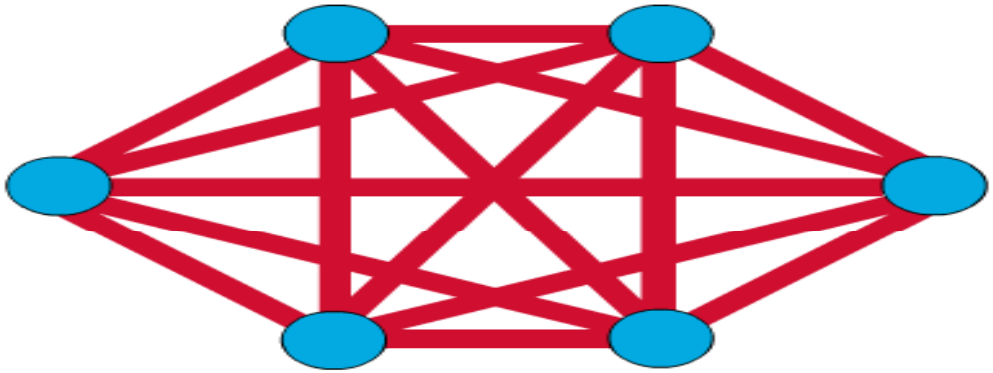


Mesh Topology

- The mesh topology connects all devices (nodes) to each other for redundancy and fault tolerance.
- It is used in WANs to interconnect LANs and for mission critical networks like those used by banks and financial institutions.

Disadvantage

- Implementing the mesh topology is expensive and difficult.

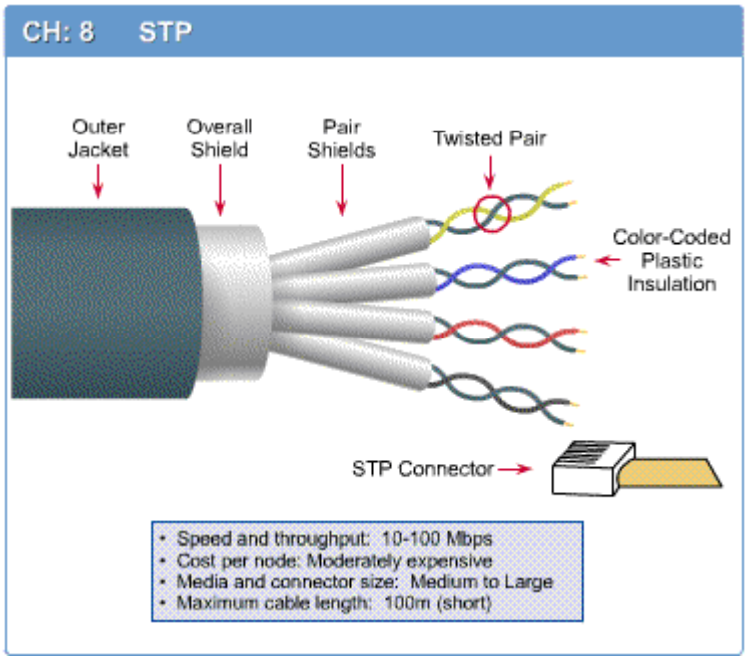


Network Components

- Physical Media
- Interconnecting Devices
- Computers
- Networking Software
- Applications

Networking Media

- Networking media can be defined simply as the means by which signals (data) are sent from one computer to another (either by cable or wireless means).

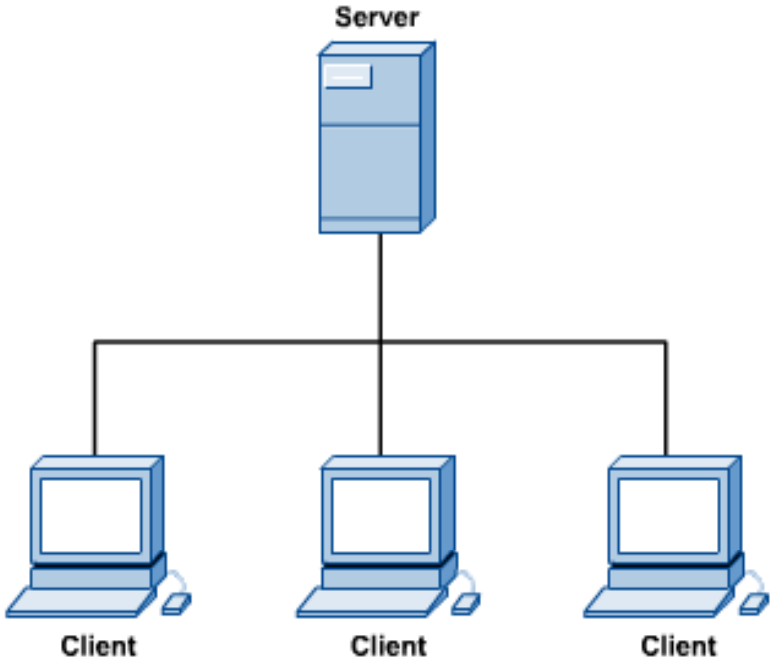


Networking Devices

- HUB, Switches, Routers, Wireless Access Points, Modems etc.

Computers: Clients and Servers

- In a client/server network arrangement, network services are located in a dedicated computer whose only function is to respond to the requests of clients.
- The server contains the file, print, application, security, and other services in a central computer that is continuously available to respond to client requests.



Types of Networks

- Local Area Networks
- Metropolitan Area Networks
- Wide Area Networks
- Wireless Networks
- Home Networks
- Internetworks

Interprocessor distance	Processors located in same	Example
1 m	Square meter	Personal area network
10 m	Room	Local area network
100 m	Building	
1 km	Campus	
10 km	City	Metropolitan area network
100 km	Country	Wide area network
1000 km	Continent	
10,000 km	Planet	The Internet

Applications

- E-mail
- Searchable Data (Web Sites)
- E-Commerce
- News Groups
- Internet Telephony (VoIP)
- Video Conferencing
- Chat Groups
- Instant Messengers
- Internet Radio

Scope of Research

- Security in computer networks
- Bandwidth improvement for data communication over networks
- Better Data rates

Assignment 1

- Why star topology is most commonly used topology?
- List real life application of Hybrid networks.