

## Computer Network

A Process of Connecting Devices

## NETWORKS

- A network is a set of devices (often referred to as nodes) connected by communication links. A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.

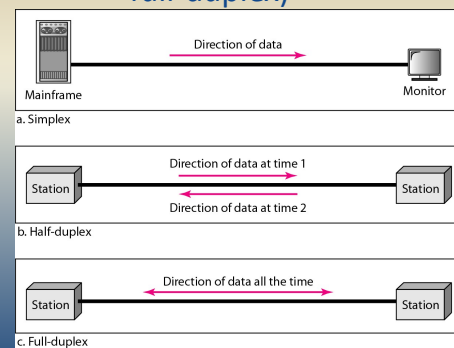
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## Network Criteria

- Performance
  - Mostly measured by throughput and delay
- Reliability
  - The frequency of failure
  - Recovery time from a failure
- Security
  - Protecting data from
    - unauthorized access
    - Damage

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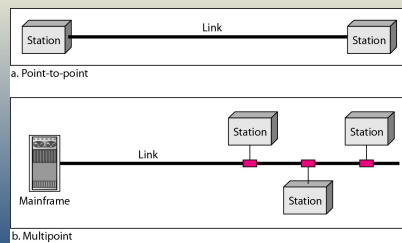
## Data flow (simplex, half-duplex, and full-duplex)



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## Type of Connection

- Point-to-Point
- Multipoint (multi-drop)



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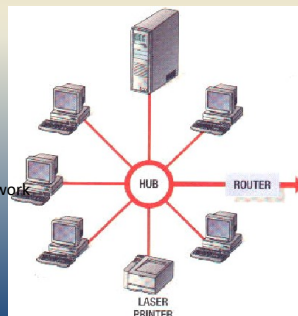
## Physical Topology

- Star topology
- Bus topology
- Ring topology
- Hybrid topology
- Mesh topology

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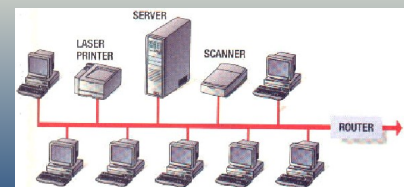
## STAR

- All nodes connect to a hub
  - Packets sent to hub
  - Hub sends packet to destination
- Advantages
  - Easy to setup
  - One cable can not crash network
- Disadvantages
  - One hub crashing downs entire network
  - Uses lots of cable
- Most common topology



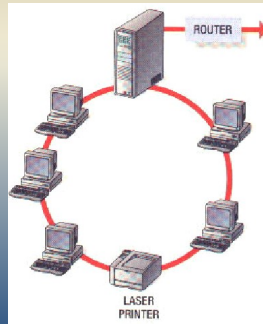
## BUS

- Also called linear bus
- One wire connects all nodes
- Terminator ends the wires
- Advantages
  - Easy to setup
  - Small amount of wire
- Disadvantages
  - Slow
  - Easy to crash



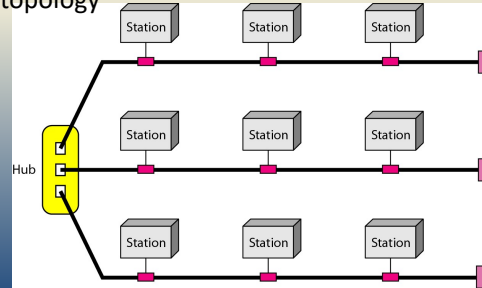
## RING

- Nodes connected in a circle
- Tokens used to transmit data
  - Nodes must wait for token to send
- Advantages
  - Time to send data is known
  - No data collisions
- Disadvantages
  - Slow
  - Lots of cable



## Hybrid Topology

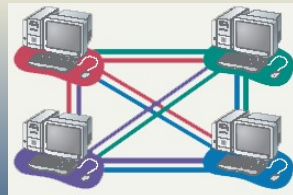
- Combination of two or more network topology



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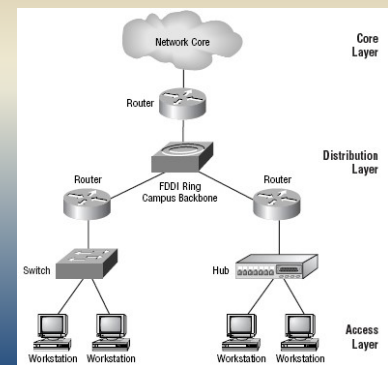
## MESH

- All computers connected together
- Internet is a mesh network
- Advantage
  - Data will always be delivered
- Disadvantages
  - Lots of cable
  - Hard to setup



## TREE

- Hierarchal Model
- Advantages
  - Scaleable
  - Easy Implementation
  - Easy Troubleshooting



## Categories of Networks

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

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## Personal Area Network (PAN)

- Very small scale network
- Range is less than 2 meters
- Cell phones, PDAs, MP3 players

## Local Area Network (LAN)

- Contains printers, servers and computers
- Systems are close to each other
- Contained in one office or building
- Organizations often have several LANS

## Campus Area Networks (CAN)

- A LAN in one large geographic area
- Resources related to the same organization
- Each department shares the LAN

### Metropolitan Area Network (MAN)

- Large network that connects different organizations
- Shares regional resources
- A network provider sells time

### Wide Area Networks (WAN)

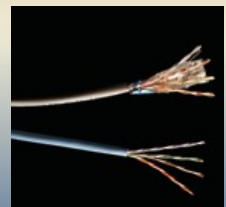
- Two or more LANs connected
- Over a large geographic area
- Typically use public or leased lines
  - Phone lines
  - Satellite
- The Internet is a WAN

### Network Media

- Links that connect nodes
- Choice impacts
  - Speed
  - Security
  - Size

### Twisted-pair cabling

- Most common LAN cable
- Called Cat5 or 100BaseT
- Four pairs of copper cable twisted
- May be shielded from interference
- Speeds range from 1 Mbps to 1,000 Mbps



### Coaxial cable

- Similar to cable TV wire
- One wire runs through cable
- Shielded from interference
- Speeds up to 10 Mbps
- Nearly obsolete

### Fiber-optic cable

- Data is transmitted with light pulses
- Glass strand instead of cable
- Immune to interference
- Very secure
- Hard to work with
- Speeds up to 100 Gbps



### Wireless Media

- Data transmitted through the air
- LANs use radio waves
- WANs use microwave signals
- Easy to setup
- Difficult to secure

### Internetwork

- An [Internetwork](#) is the connection of two or more distinct computer networks or network segments via a common routing technology.
- Any interconnection among or between public, private, commercial, industrial, or governmental networks may also be defined as an internetwork.

## Internetwork

- **Intranet**
  - An [intranet](#) is a set of networks, using the [Internet Protocol](#) and IP-based tools such as web browsers and file transfer applications, that is under the control of a single administrative entity.
  - Most commonly, an intranet is the internal network of an organization
- **Extranet**
  - An [extranet](#) is a network or internetwork that is limited in scope to a single organization or entity but which also has limited connections to the networks of one or more other usually, but not necessarily, trusted organizations or entities
  - by definition, an extranet cannot consist of a single LAN; it must have at least one connection with an external network.
- **Internet**
  - The [Internet](#) consists of a worldwide interconnection of governmental, academic, public, and private networks based upon the networking technologies of the [Internet Protocol Suite](#).
  - It is the successor of the [Advanced Research Projects Agency Network](#) (ARPANET) developed by [DARPA](#) of the [U.S. Department of Defense](#).
  - The Internet is also the communications backbone underlying the [World Wide Web](#) (WWW).

## Bandwidth

- Data rate measured in bits (not bytes) per seconds
- Kbps (Kilobits per seconds)
  - 125 chars/sec
- Mbps (Megabits per seconds)
  - 1,250 chars/sec
- Gbps (Gigabits per seconds)
  - 12,500 chars/sec

## Hub/Switch/Router

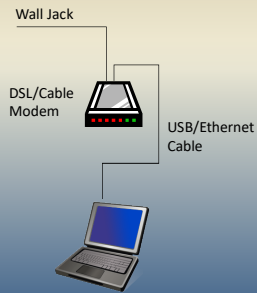
- To connect multiple segments of networks into a larger one
- Hub
  - A multiport repeater to enhance signal within the same LAN
- Switch
  - Like hub but with intelligent
  - Better performance
- Router
  - Forward packets from one LAN to another



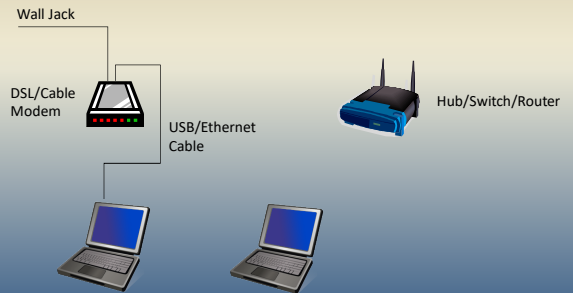
## Connecting to the Internet

- Requirement
  - A computer or PDA or cell phone
  - An account with an ISP (Internet Service Provider)
  - A modem (**mod**ulator/**de**modulator) for dial-up services or a NIC (Network Interface Card) for DSL/Cable services

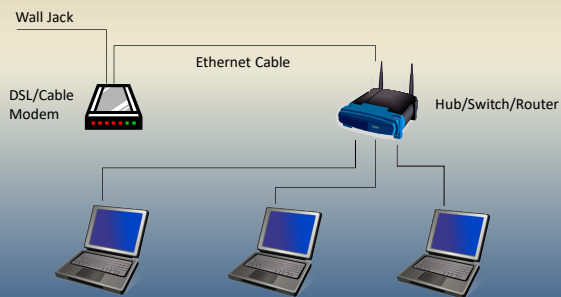
### Home Network (single machine)



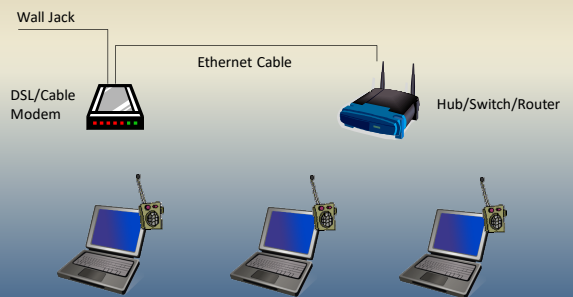
### Home Network (multiple machines)



### Home Network (multiple machines)



### Home Wireless Network





### What is a domain name

- Human friendly form of an Internet address
- Actual address is an Internet Protocol (IP) number
- System globally administered by ICANN
- Generic top level domains (gTLDs)
  - .com, .org, .net, .edu, .gov, .biz
- Country code top level domains (ccTLDs)

### Domain name registration in India

- open and closed domains
- open - .com, .org, .net, .info, .biz
- closed - .gov, .edu, .mil, .museum
- inDA administers .co.in space
- to register in .in space must be a commercial entity registered and trading in India..

### Domain Names and other business identifiers

- Trade Marks
- Personality Rights
- Place Names
- Tension with domain names
  - Reverse domain name hijacking
  - Cyber squatting

### Query Session

Asking is another way of Learning