



Network Definition

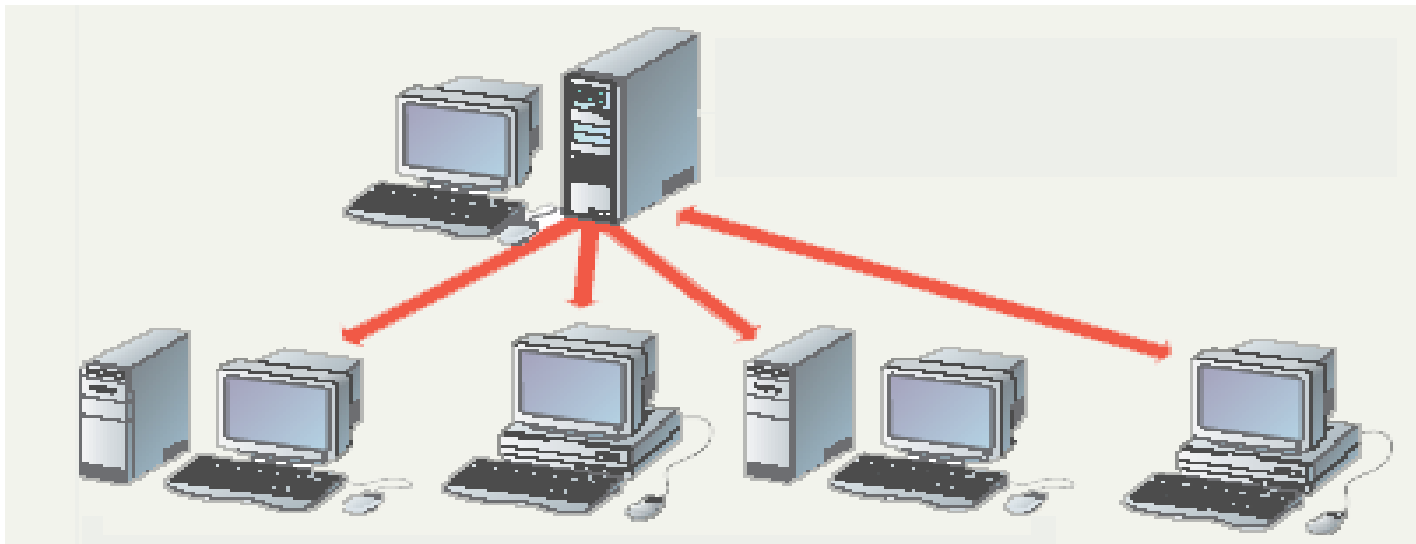
- Set of technologies that connects computers
- Allows communication and collaboration between users

The Uses of a Network

- Simultaneous access to data
 - Sharing Data
 - Access can be limited
 - Sharing files stored on a server
 - Sharing Expensive Software

The Uses of a Network

- Sharing expensive peripheral devices
 - Printers and faxes are common shares
 - Reduces the cost per user



The Uses of a Network

- Personal communication
 - Email
 - Instantaneous communication
 - Conferencing
 - Tele conferencing
 - Videoconferencing
 - Audio-conferencing
 - Data-conferencing
 - Voice over IP
 - Phone communication over network wires

The Uses of a Network

- Sharing Internet Connection
 - Single high speed connection support faster browsing
- Easier data backup
 - Backup copies data to removable media
 - Server data backed up in one step

Common Network Types

- 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

Common Network Types

- Metropolitan Area Network (MAN)
 - Large network that connects different organizations
 - Shares regional resources
 - A network provider sells time

Common Network Types

- 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

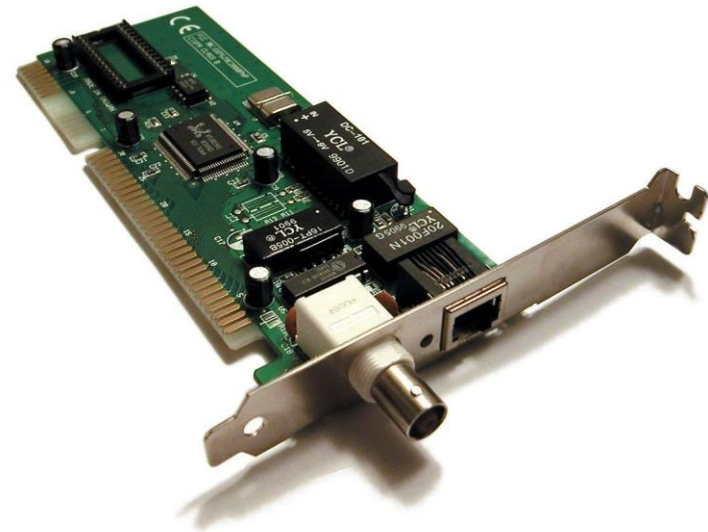
Node

A node is a basic unit used in networking.

- ▶ Nodes are devices or data points on a larger network.
- ▶ Devices such as a personal computer, cell phone, or printer are nodes.
- ▶ When defining nodes on the Internet, a node is anything that has an IP address.

NIC (Network Interface Card)

- ▶ It is a hardware device that is attached to a computer to enable it to communicate over the network .
- ▶ The NIC has a ROM chip that contains a unique number, which is the hardware address . This hardware address uniquely identifies a computer on the network.



SERVER

- ▶ A **server** is a computer equipped with specific programs and/or hardware that enables it to offer services to other computers (clients) on its network.
- ▶ There are different types and capabilities of servers.
- ▶ Server can be dedicated or nondedicated.
- ▶ Dedicated server is reserved for serving as server. It is generally used in large networks.
- ▶ Non dedicated server act both as server as well as platform.

Types of Server

- ▶ **File Server** is a server that contains files which are made accessible to other clients on the network. A file server has the sole responsibility for storing and managing a set of files, which are made accessible to other computers. These files are shared among clients in the network by allowing access without having to physically transfer the accessed files to their local systems.
- ▶ **Print Server** is a server which has a dedicated printer connected to it which is accessible by other clients through it on the same network. Other clients on the network can print work to this printer through this print server.
- ▶ **Web Server** is a server equipped with HTTP (Hypertext Transfer Protocol) that serves web pages in response to requests submitted by clients.
- ▶ **Application Server** stores and manages all applications between an organization's users and its databases or backend business applications.

Types of server (Contd.)

- ▶ **PROXY SERVER** server sits between a client program (typically a Web browser) and an external server (typically another server on the Web) to filter requests, improve performance, and share connections.
- ▶ **MAIL SERVER** move and store mail over corporate networks (via LANs and WANs) and across the Internet.
- ▶ **FTP SERVER** makes it possible to move one or more files securely between computers while providing file security and organization as well as transfer control.
- ▶ **LIST SERVER** offer a way to better manage mailing lists, whether they be interactive discussions open to the public or one-way lists that deliver announcements, newsletters or advertising.
- ▶ **TELNET SERVER** enables users to log on to a host computer and perform tasks as if they're working on the remote computer itself.

Network Media

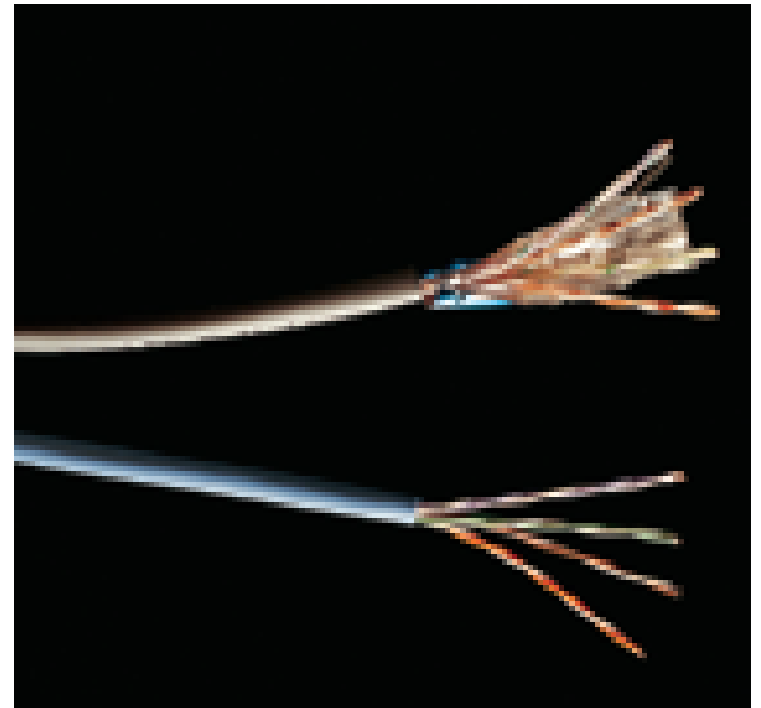
- Links that connect nodes
- Wired or Wireless
- Choice impacts
 - Speed
 - Security
 - Size

Wire Based Media

- Coaxial cable
 - Similar to cable TV wire
 - One wire runs through cable
 - Speeds up to 10 Mbps
 - Nearly obsolete

Wire Based Media

- Twisted-pair cabling
 - Most common LAN cable
 - Called Cat5 or 100BaseT
 - Four pairs of copper cable twisted
 - Speeds range from 1 Mbps to 1,000 Mbps



Wire Based Media

- Fiber-optic cable
 - Data is transmitted with light pulses
 - Glass strand instead of cable
 - Very secure
 - Speeds up to 100 Gbps



Wireless Media

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

MODEM

- ▶ It is an electronic device that converts the digital signals of a computer into an analog form so that they can travel over a telephone line.
- ▶ At the destination, the receiving modem converts the analog signals back into their digital form so that the destination computer understands them.
- ▶ Modems are used for connecting computers to the Internet.
- ▶ Modems are connected to a computer and a telephone line



Repeaters

- ▶ A **repeater** is an electronic device that receives a signal and retransmits it.
- ▶ Repeaters are used to extend transmissions so that the signal can cover longer distances



Network Hardware

- Hubs

- Used to connect multiple devices in a network. (LAN)
- Has many ports in it. A computer is connected to the network through these ports.
- When a data frame arrives at a port, it is broadcast to every other port, without considering whether it is destined for a particular destination or not.
- Slow and not secure



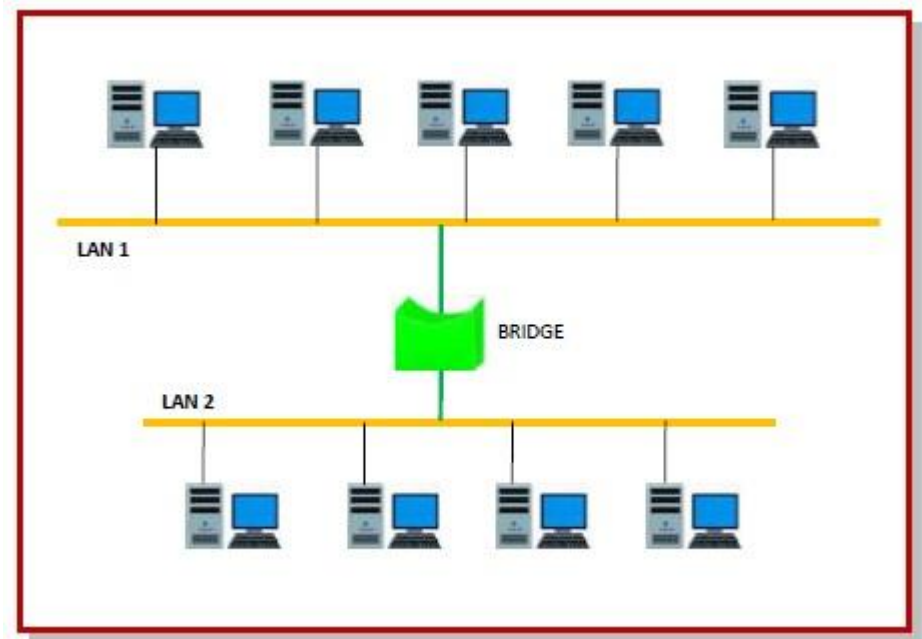
Network Hardware

- Switches
 - Replacement for hubs as more intelligent
 - Has capability to inspect data packets
 - Also determines source and destination
 - Only intended node receives transmission
 - Fast and secure



Network Hardware

- Bridges
 - Connects two or more LANs together
 - Similar functions as switches
 - On receiving a data frame, the bridge consults a database to decide whether to pass, transmit or discard the frame.



Network Hardware

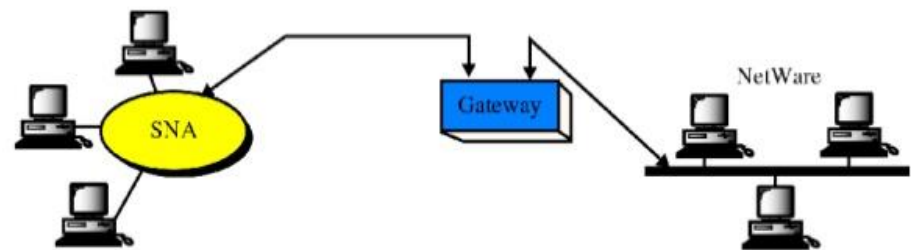
- Router
 - Connects two or more similar LANs together(wired or non wired)
 - Connect internal networks to the Internet



Network Hardware

- Gateway
 - Connects two dissimilar networks
 - Converts one protocol to another

A gateway



SNA network (IBM)
Netware network (Novell)

How Networks Are Structured

- Client/Server network
 - Nodes and servers share data roles
 - Nodes are called clients
 - Servers are used to control access
 - Server is the most important computer

How Networks Are Structured

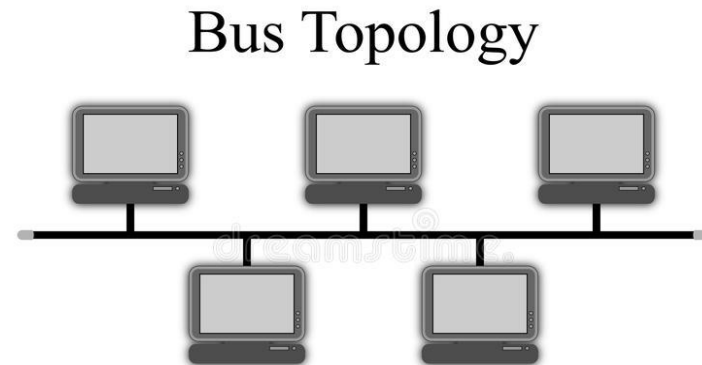
- Peer to peer networks (P2PN)
 - All nodes are equal
 - Nodes access resources on other nodes
 - Each node controls its own resources
 - Most modern OS allow P2PN
 - Distributing computing is a form

Network Topologies

- Topology
 - Logical layout of wires and equipment
 - Choice affects
 - Network performance
 - Network size
 - Network collision detection
 - Several different types

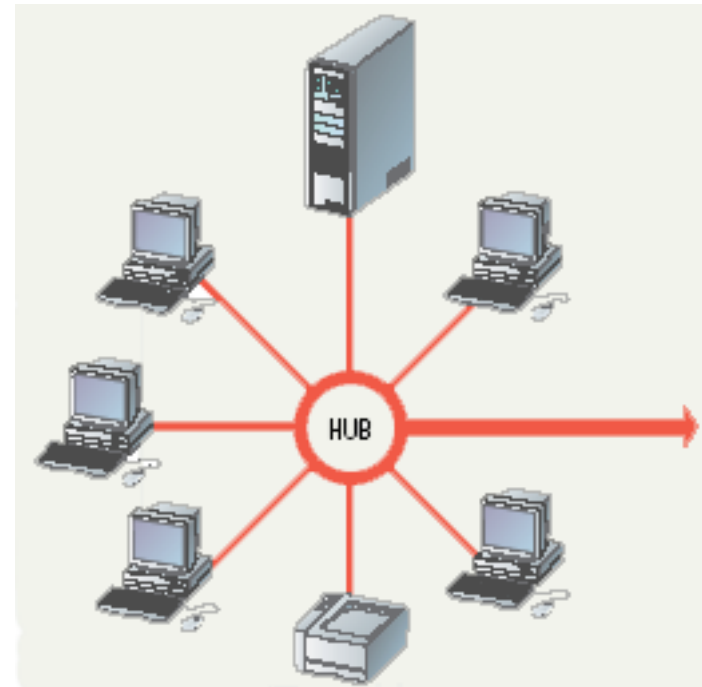
Network Topologies

- Bus topology
 - 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



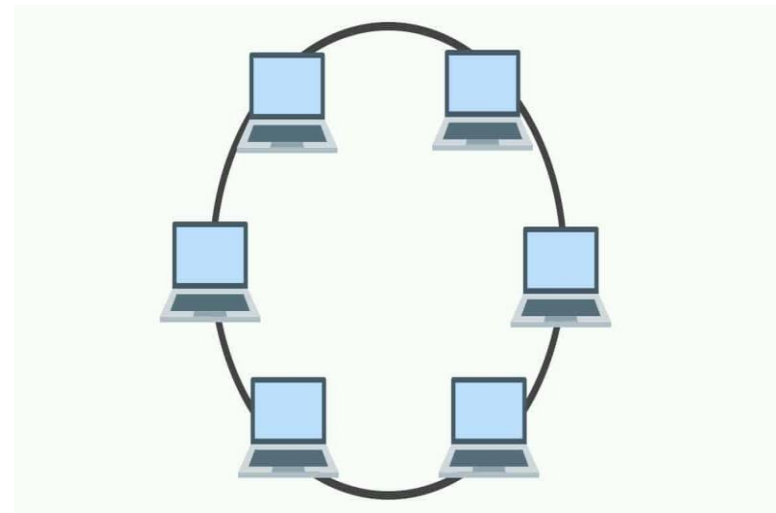
Network Topologies

- Star topology
 - 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



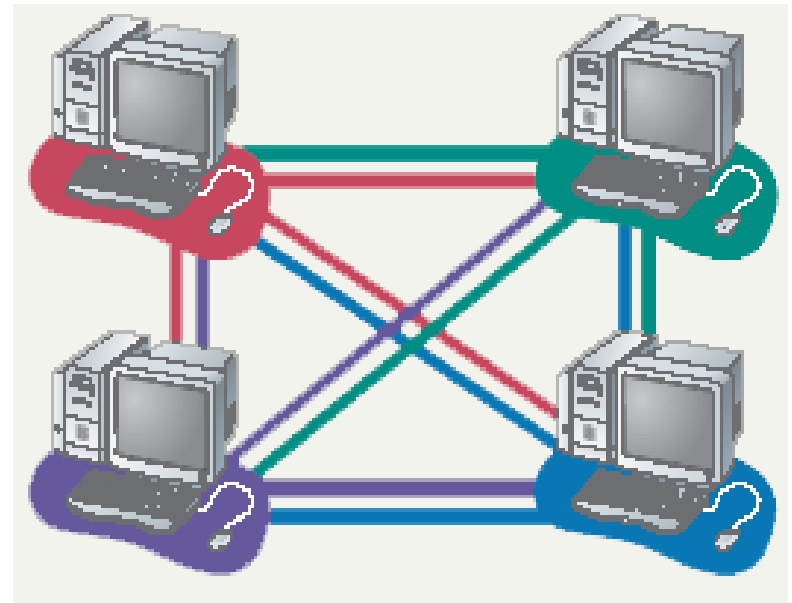
Network Topologies

- Ring topology
 - Nodes connected in a circle
 - Message travel in one direction
 - Advantages
 - Time to send data is known
 - No data collisions
 - Disadvantages
 - Slow
 - Lots of cable



Network Topologies

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



Network Topologies

□ Tree Topology

- Features of both bus and star
- Main cable seems like stem of tree and star network as branches
- Advantages:
 - Easy to extend
 - Error detection and correction is easy
- Disadvantages
 - Not good for small networks
 - Depends on main cable

