

Computer Network(CSC 503)

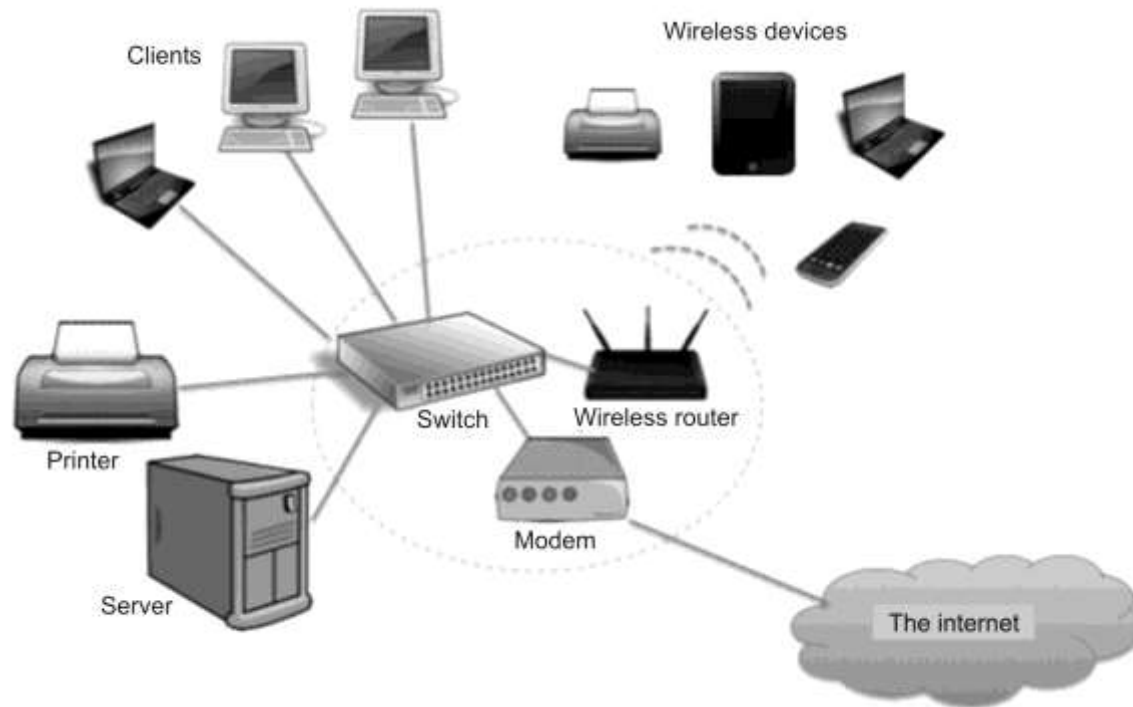
Shilpa Ingoley

Lecture 2

Module		Content	Hrs
1		Introduction to Networking	4
	1.1	Introduction to computer network, network application, network software and hardware components (Interconnection networking devices), Network topology, protocol hierarchies, design issues for the layers, connection oriented and connectionless services	
	1.2	Reference models: Layer details of OSI, TCP/IP models. Communication between layers.	

Introduction to Networking

- “Computer Network means a collection of autonomous computers interconnected by a Single technology.”

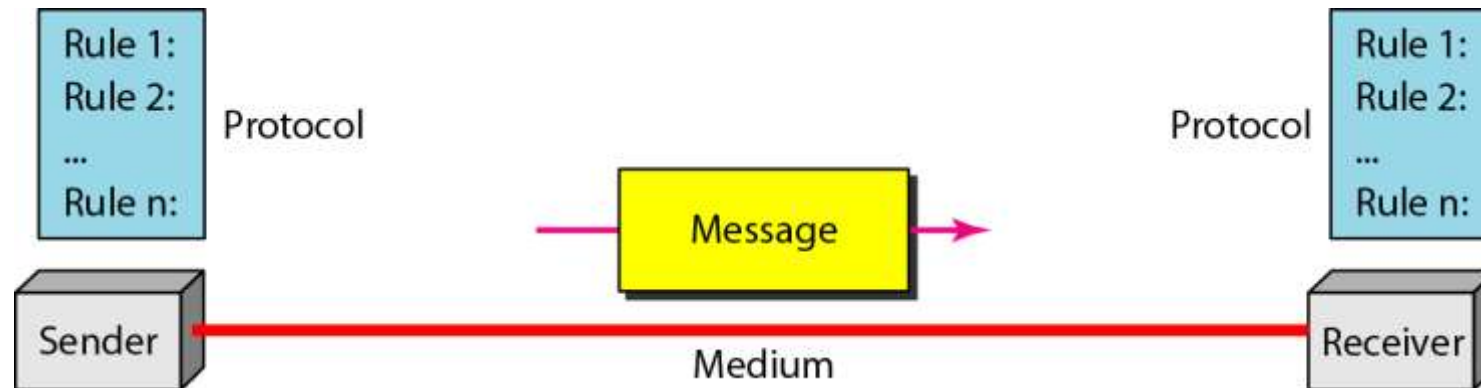


Two computers are said to be interconnected **if they are able to exchange information**. Computers can be connected using a copper wire, fiber optics, microwaves, infrared, and communication satellites

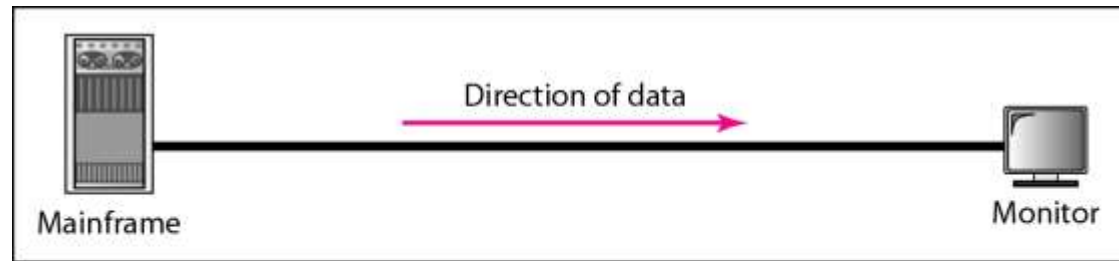
Computer network is an interconnection of the various computers **to share** the software, hardware, resources and the data **through a communication medium** between them.

Five Components of Data Communication

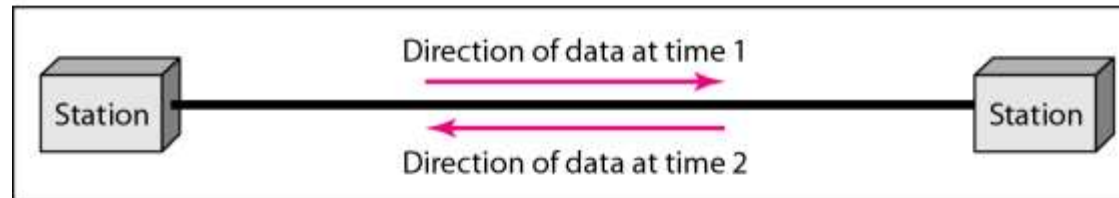
- Message: Information(data) to be communicated
- Sender
- Receiver
- Transmission medium: Physical path by which a message travels
- Protocol: A set of rules that govern data communication



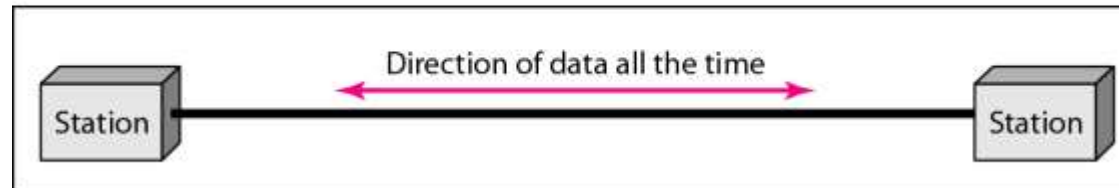
Direction of Data Flow



a. Simplex



b. Half-duplex



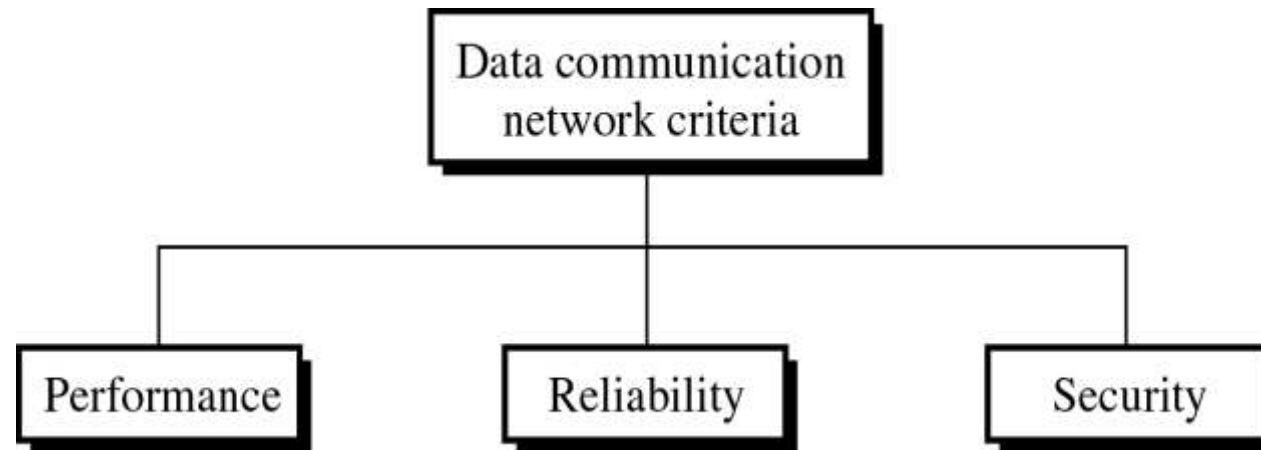
c. Full-duplex

Data Flow

- **Simplex**
 - Unidirectional
 - As on a one-way street
- **Half-duplex**
 - Both transmit and receive possible, but not at the same time
 - Like a one-lane road with two-directional traffic
 - Walkie-talkie, CB radio
- **Full-duplex**
 - Transmit and receive simultaneously
 - Like a two-way street, telephone network
 - Channel capacity must be divided between two directions

Network

- Network: A set of devices (nodes) connected by communication links
- Node: Computer, printer, or any device capable of sending and/or receiving data
- To be considered effective and efficient, a network must meet a number of criteria



Need of Networking

- Access to remote programs
- Access to remote databases
- Communication Media

Goals of Computer Networks

- Resource Sharing
- High Reliability
- Scalability
- Communication
- Saving Money

Network application

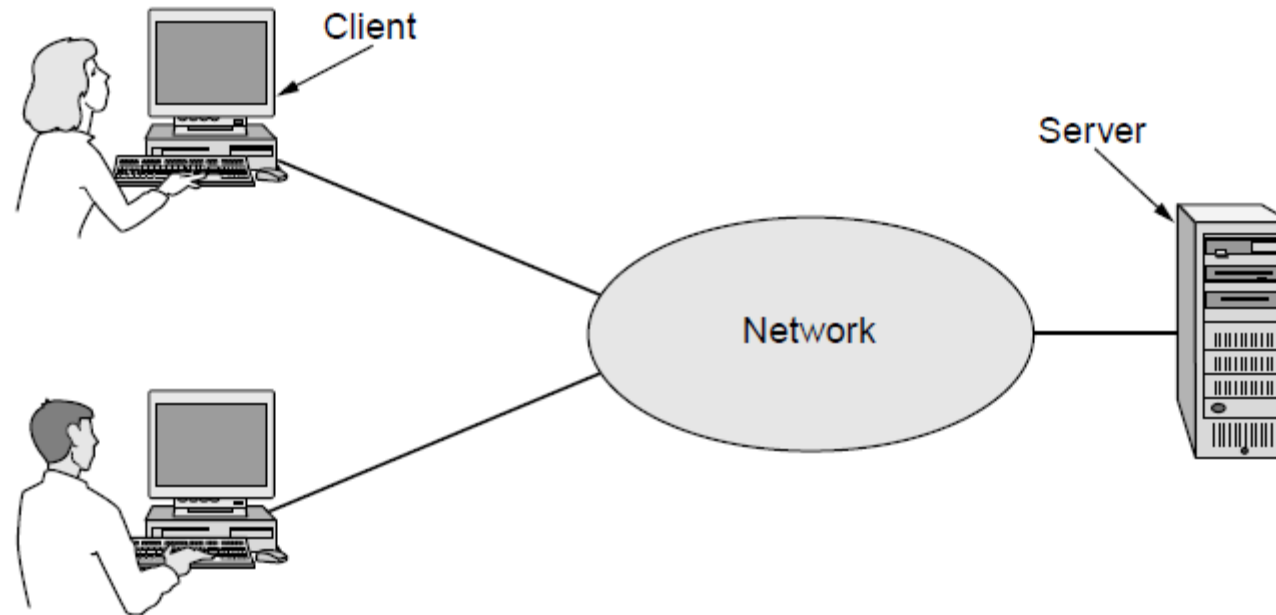
- **Business Applications**

- **Resource Sharing**
- **Server-Client model :**
- **Communication Medium**
- **eCommerce :**

- **Home Applications**

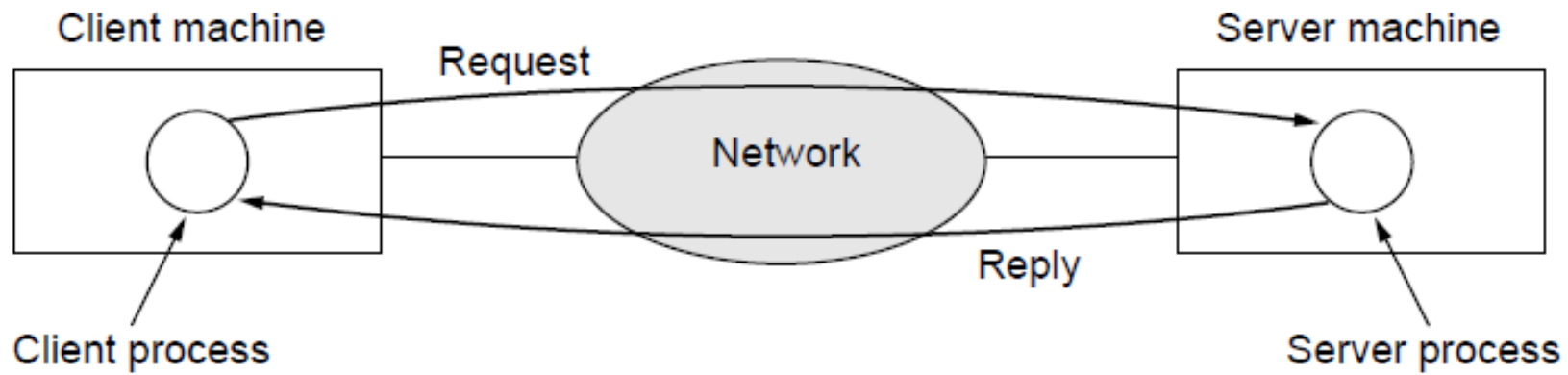
- **Access to remote information :**
- **Person-to-person communication :**
- **Interactive entertainment :**

Business Applications (1)

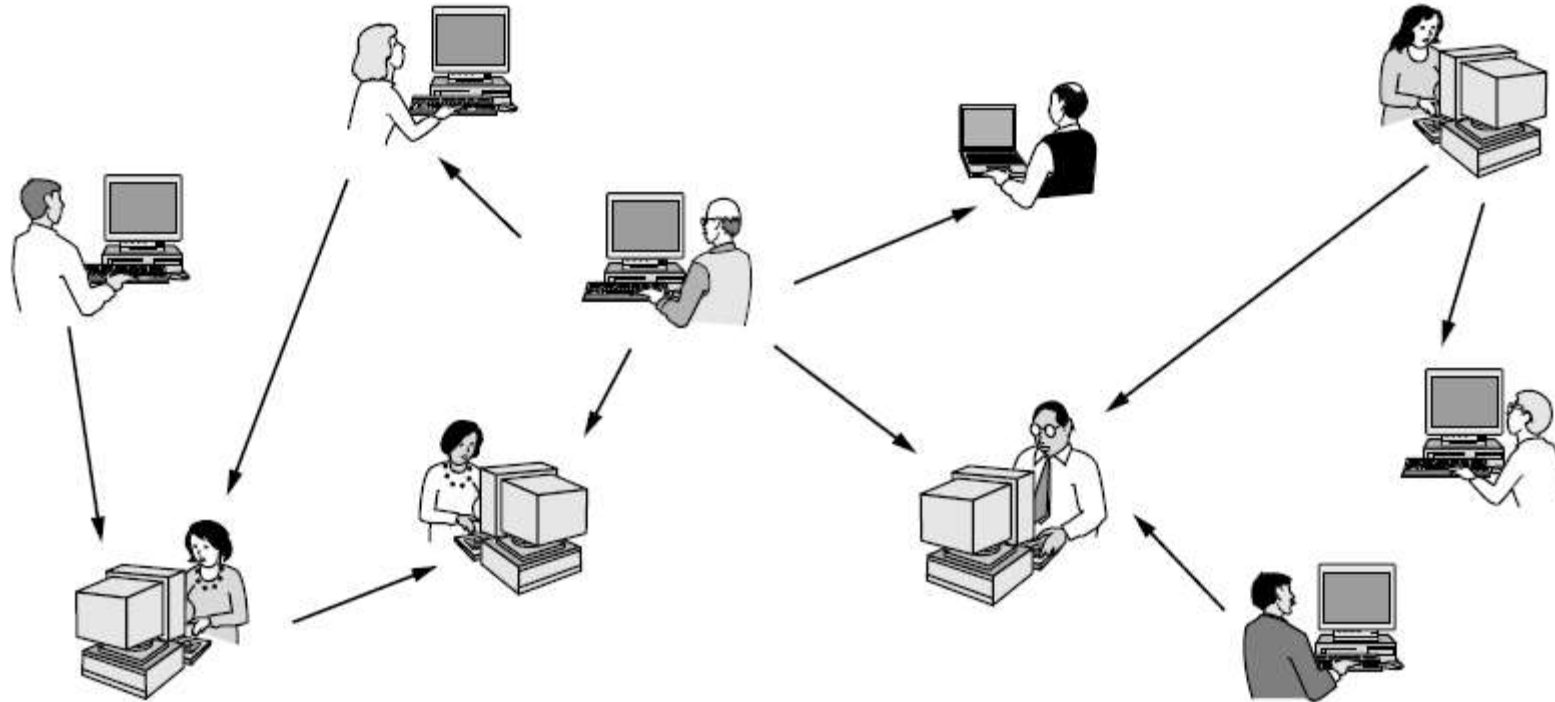


Business Applications (2)

The client-server model involves requests and replies



Home Applications (1)



In a peer-to-peer system there are no fixed clients and servers.

Home Applications (2)

Some forms of e-commerce

Tag	Full name	Example
B2C	Business-to-consumer	Ordering books online
B2B	Business-to-business	Car manufacturer ordering tires from supplier
G2C	Government-to-consumer	Government distributing tax forms electronically
C2C	Consumer-to-consumer	Auctioning second-hand products online
P2P	Peer-to-peer	Music sharing

Network software and hardware components

Hardware Components of n/w

- Server
- Workstations
- NICs
- Cabling and Connectors
- Shared resources and peripherals

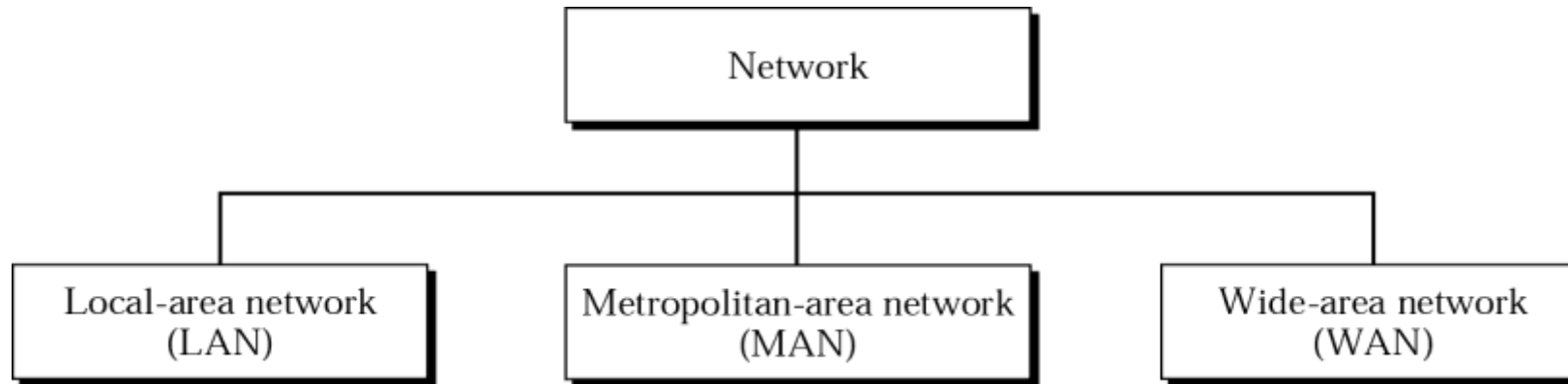
Software Components of n/w

- Network Operating System
- Core OS
- Client component
- NIC drivers
- Network applications

Interconnection networking devices

- Repeater
- Modems
- Hub
- Bridge
- Switch
- Routers
- Gateways

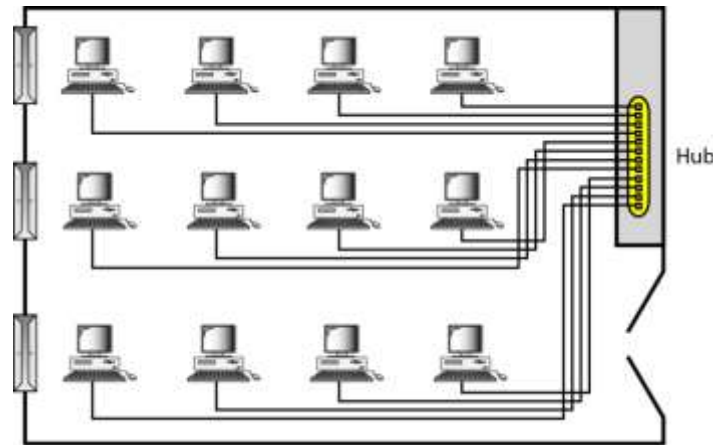
Categories of Networks



LAN(Local Area Network)

Definition: Two or more computers or communicating devices that are in a room, on a floor, in a building or in a campus if connected are said to be connected on LAN

- Usually privately owned
- A network for a single office, building, or campus \leq a few Km
- Common LAN topologies: bus, ring, star
- **Example:** An isolated LAN connecting 12 computers to a hub in a closet



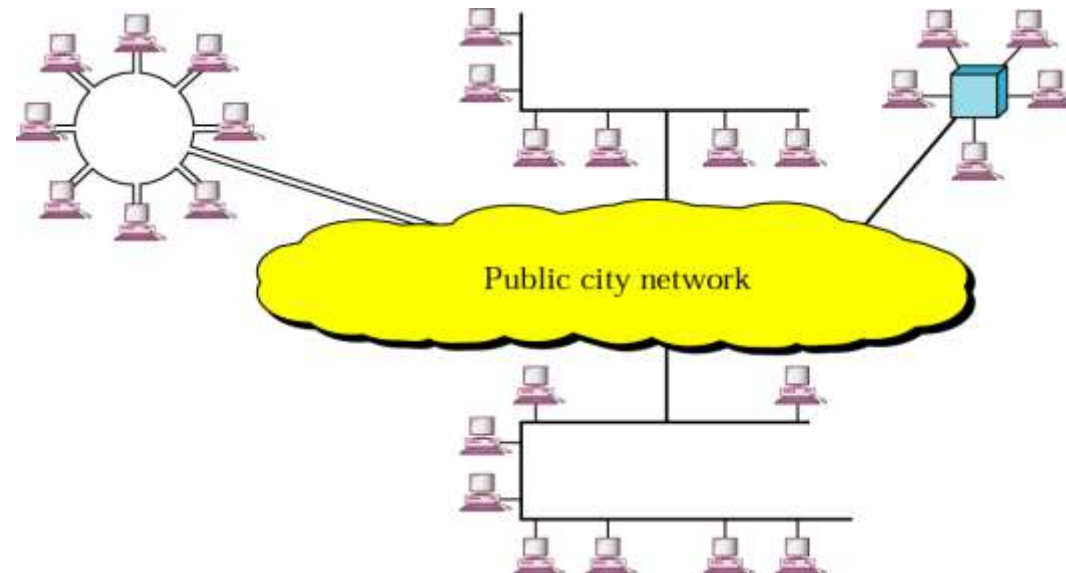
- LAN's enable the sharing of resources such as files or hardware devices that may be needed by multiple users
- Is very fast, with speeds from 10 Mbps to 10 Gbps
- Requires very little wiring, typically a single cable connecting to each device
- Has lower cost compared to MAN's or WAN's

Characteristics of LAN

- LAN should be capable of providing high bandwidth, high Speed, high capacity communication
- Owner of premises is owner of LAN, to connect two devices on LAN we don't lease links from service providers.
- Cost of deploying LAN should be cheap, equipment's used in LAN should be compact and powerful enough to provide high bandwidth, high speed high capacity communication.
- Size of your Campus defines size of your LAN, Largest LAN is Campus-Wide LAN.

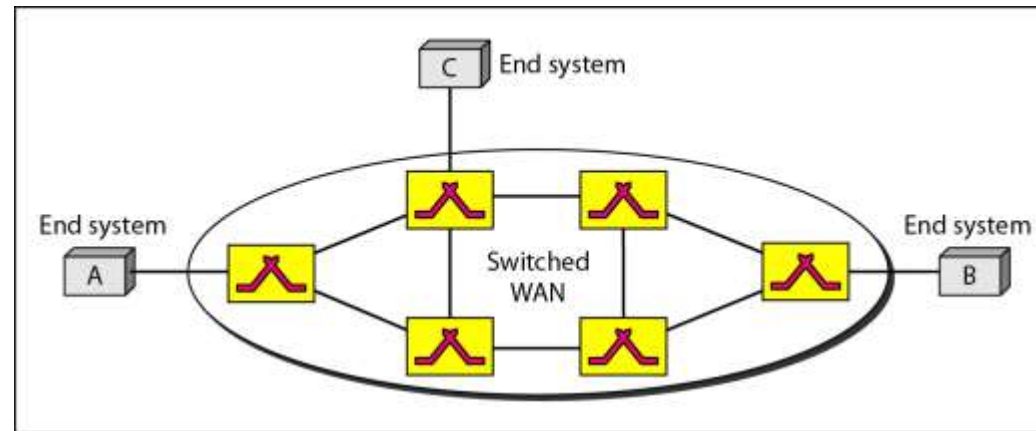
MAN (Metropolitan Area Network)

- Definition: Two or more computers or communicating devices or networks which are geographically separated but within the same metro city, if connected are said to be connected on MAN
- Designed to extend to an entire city
- Cable TV network, a company's connected LANs
- Owned by a private or a public company

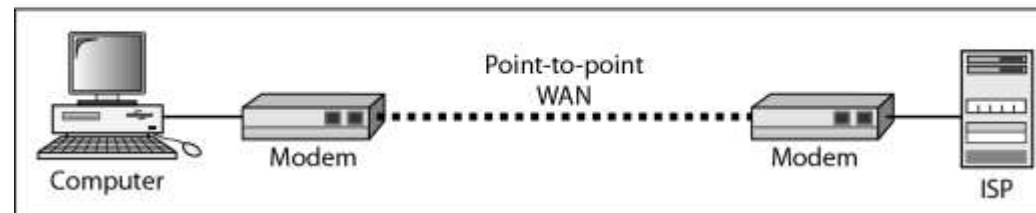


WAN(Wide Area network)

- Definition: Two or more computers or communicating devices or networks which are geographically separated but not within the same metro city, if connected are said to be connected on MAN
- Long distance transmission, e.g., a country, a continent, the world
- Enterprise network: A WAN that is owned and used by one company



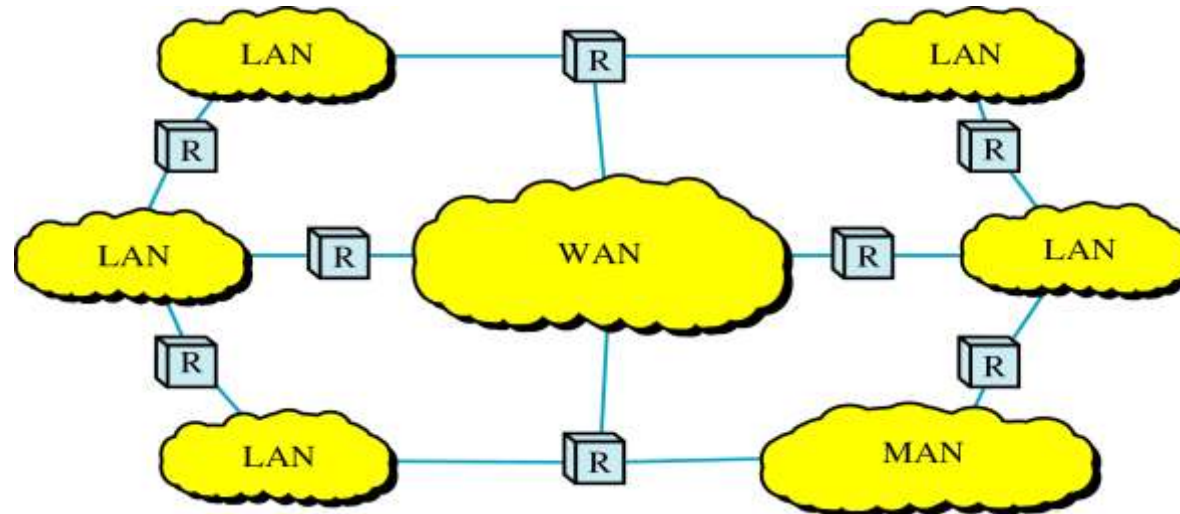
a. Switched WAN



b. Point-to-point WAN

Internetwork

- Internetwork (internet) : two or more networks are connected by internetworking devices
- Internetworking devices: router, gateway, etc.
- The Internet: a specific worldwide network



Internetwork Example

- A heterogeneous network : four WANs and two LANs

