

9/9/2022

Communication and networking technology

⇒ Wide Area Network (WAN)

- it will be used by an organization to connect different branches
- Not owned by the organization
- they take it on lease from "Public Switched Telephone Network"
- Transmission medium - fibre optic cable
- Transmission within WAN will be from switch to switch
- Each switch connects a branch, and no end-systems connected to WAN.

Benefits of WAN:-

- A 'job' could be run on a remote computer
- anything stored on a remote computer can be accessed
- message can be sent electronically to a user on a remote computer.

⇒ Local Area Network (LAN)

- used by an organization for a single branch
- owned by the organization
- there will be many LANs at one branch
- Transmission medium - twisted pair cable or WIFI
- LAN contains a device which allows connection to other networks
- end-systems can be connected.

Benefits of LAN:-

- Expense of installing application software on each PC could be saved by installing the software on the server connected to the LAN
- Managers in organizations could use e-mail to communicate with staff
- 'paper-less office' became a possibility where files were to be stored in digital form on a file server rather than as papers

⇒ Client-server model

- Companies have individual LANs connected to a company-wide WAN. The individual LAN might have an application server attached and a powerful central computer connected to WAN as a server.

all pcs can access the application server attached to the LAN directly and all LANs can access the server (central computer) connected to WAN. Server provides services/applications which may be requested by clients.

→ Thin Client

- Chooses an application to run on the server, provides input and receives output from the app.

→ Thick Client

- Chooses an app, carries out some processing ^{on the server} before running the app and carries out some processing after receiving output from the app. Possibly downloads the app from the server.

~~File sharing~~ File sharing

⇒ Bit streaming

- a sequence of bits, over a communication path (internet), transfer of data at high speed, requires fast broadband connection, requires some form of buffering, bits arrive in the same order as sent.

→ Advantages

- No need to wait for a whole file to be downloaded
- No need to store large files on user's computer
- No special software required, just the browser.

→ Disadvantages

- video hangs if slow internet
- video hangs if inadequate buffering capacity

On demand bit streaming

- any pre-recorded video tape converted to bit streaming format
- this conversion is called encoding, these encoded files are uploaded to a dedicated server.
- The link for the encoded video is placed on a website, when the user clicks on the link it downloads the encoded video then broadcast it to the user as and when they want. can be paused.

Real Time Bit streaming

- an event is captured live by a camera, the camera is connected to a computer, which encodes the video and then this encoded feed is uploaded from the computer to the streaming server via cable / high speed internet. From the server all users can access the encoded video. The video cannot be paused.

Twisted pair and coaxial

Copper Cable Benefits

- less expensive to install
- easier to install
- easier to make terminations
- has been around for years

Fibre Optic Cable Benefits

- Greater bandwidth
- transmit over long distance
- Greater security (cannot tap into)
- consumes less power.

Internet

- it stands for Interconnected Networks
- massive network of computer devices
- uses TCP/IP protocol.

WWW

- collection of webpages
- http/ protocols used to transmit data.
- web pages written in HTML
- URLs specify the location of webpage

Gateway - A device used between two dissimilar LANs. The device is required to convert data packets from one protocol to another. Gateway would either first connect to a router or have the capability to act as a router.

Server - handles printing, file storage, delivery of web pages.

Benefits of using Client-server model

- Files and resources are centralised
- user needs username and pwd to access network
- centralised back-up
- Clients can be less powerful machine, so less expensive to buy.

Server - a computer program running to serve the requests of other programs, the "clients".

Client - a system that accesses a service made available by a server. Clients send requests to the server and receive response.

How internet works - when you want to send a message or receive from another computer, the TCP/IP protocols are what make the transmission possible. Your request goes out hits the DNS along the way to find the target server, The DNS points the request in the right direction.

Router - small physical device that joins multiple networks together

Web server - A server might have a software running on it
ex. FTP server or email server. which allows it to act as a web server.

DNS - when data is sent over internet the data does not know where the target server is so it hits the DNS and the DNS gives it directions. It also turns a user friendly name like google.com into an IP address.

⇒ Topology

PSTN

→ a collection of world's interconnected voice-oriented public telephone networks. PSTN improves internet's long distance infrastructure. ISPs pay these PSTN to get the better long distance infrastructure and share the circuits among many users through packet switching. Internet users don't have to pay usage tolls to anyone other than their ISPs.

⇒ Radio Waves

- Uses: TV ~~remotes~~ ^{broadcast}, Communication between satellites, ~~remotes~~
- Travels large distance, less interference.
- low frequency

⇒ Microwaves

- Used in point to point communication, this allows nearby microwave equipment to use the same frequencies.
- it can carry a lot of information as high frequency
- limited to line of sight propagation, cannot pass around hills or mountains.

⇒ Infrared

- Used in TV remotes
- very high frequency
- bad penetration
- high bandwidth.

⇒ Bitrate

- amount of data being passed within a given time

→ kbps, Mbps

- High number indicates high speed or high quality

⇒ Satellite

- Uses = data communications, scientific applications, weather analysis.
- requires unobstructed line of sight for satellite transmission
- must travel in straight lines
- GEO = above upper Van allen belt
= used for long distance telephone comm.
- MEO = between lower and upper Van allen belt
= Maps (GPS)
- LEO = below lower Van allen belt
= mobile phone networks

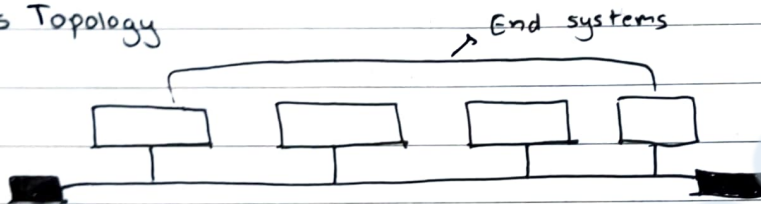
⇒ Network Topologies

- Simplex
- half duplex
- Full duplex

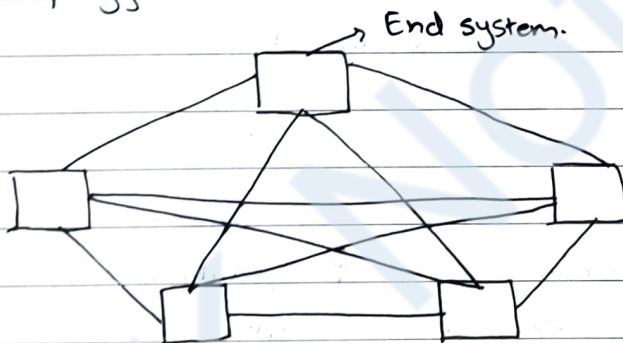
→ Type of messages

- Broadcast one to all
- Multicast one to many
- Unicast one to one

⇒ Bus Topology



⇒ Mesh Topology



⇒ Cloud Computing

- provision of computing services usually via the internet.
- An organisation can choose to establish its own "private cloud"

⇒ Private Cloud

- The organisation takes full responsibility for creating and managing the cloud installed on-site and connected to a private network
- or third party creates and manages the cloud but connected to public net
- or third party creates and manages and also can access the network

⇒ Public Cloud

- Created, Managed and Owned by third party cloud service provider
- The services provided by a cloud are familiar ones provided by file servers. The provision is established using large mainframe computers or server farms.