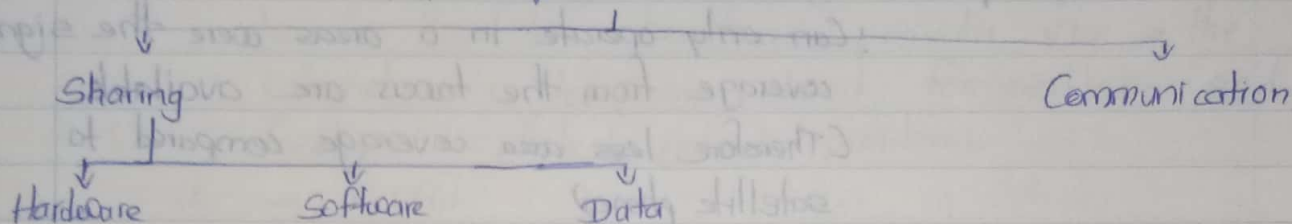


Unit 7 Computer Networks

Computer network is a collection of computers and other hardware devices connected together so that users can share hardware, software and data as well as electronically communicate with each other.

Main Purpose of networks



Advantages of networks

- Can share common hardware like scanners and printers.
- Can share application softwares with a network license, which can be purchased less expensively and which needs to be installed and updated on only one computer.
- Can share data through common databases or collaboration tools to create and review documents.
- Exchange files among the network users and over the internet.
- Can email, videoconference, IM among the members of the network.
- Can connect several home computer devices located within a home.

eg: P2P TV - TV, Phone, Computer.

Applications which are based on networks

1) Internet.

- The largest network in the world.

Network of various networks and individual users.

2) Telephone Service

1) POTS Network (Plain Old Telephone Service)

- The telephone networks used in landline phone connections.
- One of the 1st networks.
- Mostly, a wired network.

ii) Mobile phones

- The wireless network for communication.
- Various communications are available, which enables intra network and internetwork communication.

eg - Mobitel, Dialog

- Can be either cellular phones or satellite phone. (or a dualmode)

Cellular phones: Uses cell ~~towers~~ towers.

: Can only operate in areas where the signal coverage from the towers are available.

(Therefore less area coverage compared to satellite phones)

: Less expensive than satellite phones

Satellite phones: Uses satellites which are located in the space. Therefore more coverage than cell phones

: Expensive due to the technology

3) Global Positioning System (GPS)

- Uses satellites and a receiver to determine the exact geographic location of the receiver.
- Commonly found in vehicles (cars) and smart phones.
- Can be used to obtain navigation assistance and to know or share the own location.
- Enables location based services

eg: Google maps, uber, pickme, finder, tripadvisor

- Handheld GPS devices are more accurate than the embedded GPS apps in mobile phones and cars. eg - Garmin, Magellan

4) Monitoring Systems

- Helps to monitor status or location of individuals, vehicles and objects.

- RFID based systems

: To locate inventory, livestock, objects within a specific area coverage

: Suitable for objects located in a small coverage.

- GPS based systems

Suitable to locate objects in a wider coverage of area

eg: locating the parcel delivered by a courier service

: Vehicle location in Uber, pickme.

- Electronic health monitors

: Reads different signs like weight, blood sugar, etc and transfer those to a healthcare provider via a the internet or a telephone network for evaluation and feedback to detect potential problems.

eg - FitBit:

5) Videoconferencing

- Use of communications technology for real time, face to face meetings between individuals located in different places.

- Dedicated videoconferencing devices are available for large business video conferences.

- Tele Presence video conferencing

: A technology which allows a person to feel as if they were present at the meeting, to give the appearance of being present or to have an effect. ~~at the place~~

6) Telecommuting

: Enables individuals who work at home to communicate to their workplace and Clients via communication technologies.

- Saves time, reduces traffic and pollution due to reduced travelling, provides flexibility and convenience.

7) Business process outsourcing and branch networking

- Enables to ^{establish} ~~locate~~ a branch or outsource at a ~~location~~ ^{location} other than the headoffice, and communicate among them using networks

8) Remote freelance working

- Where people who require their work to be done and the people who wish to work for others from a remote location connect. (Self employed or hired for work by different employers for certain assignments)
- The person who offers the project chooses the person to work based on their bids for the work, they wish to offer.

9) Crowd Sourcing

- Where data from different individuals are collected to identify or collect information regarding a topic.
- eg: Google crowdsourcing

10) Collaborative Computing

- An interactive multimedia conferencing application that enables multiple parties to collaborate on textual and graphic documents.

11) Telemedicine

- Use of Communication technology to provide medical information and services.

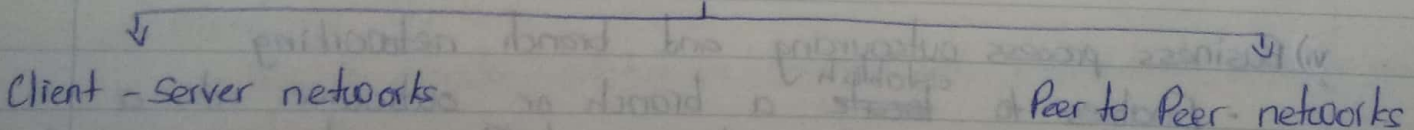
eg - Tele surgery, Remote diagnosis, Remote consultations

Network Characteristics

Network Architecture

The way networks are designed to communicate

Network Architecture



Client-server networks

- Where one computer operates as the server computer. A server computer is a computer dedicated to processing client requests.
- Clients ~~computers~~ are the devices on the network that requests and utilizes network resources.

Peer-to-peer networks (P2P)

- Central server is not used.
- All computers on the network work at the same functional level.
- Users have direct access to the computers and other devices in the network.
- Less complicated and less expensive than client-server networks.
- P2P home network
 - : PCs connect and communicate via network cabling and other networking hardware.
 - A network switch is used to connect the devices.
- Internet P2P network.
 - : PCs connect and communicate via the internet.
 - : Content is exchanged over the internet directly between users.
 - Network switch is replaced by the internet.

Network size and coverage areas

Network types based on size and coverage.

- 1) PAN
- 2) ^H LAN
- 3) LAN
- 4) MAN
- 5) WAN

	PAN	HAN	LAN	MAN	WAN
Meaning	Personal Area Network	Home Area Network	Local Area Network	Metropolitan Area Network	Wide Area Network
Coverage	Single room	House	One building (100m/300ft)	25km - 40km	Whole world
Technology used.	Short distance wireless data communication eg - Bluetooth, WiFi	Short distance wireless communication & UTP Cables (network cables)	Wired: UTP, fiber, twisted pair Wireless: WiFi	Wired: Cable Wireless: 4G, Satellite, Microwave	Wired: Fiber Wireless: Satellite
Examples	Connectivity between phone, PC and printer through WiFi.	IoT TV Dialog TV (Sharing internet connection)	Network within an organization in one workplace.	Branch networks of banks	Internet
Ownership	Individual Smallest type of network. Connect personal devices of an individual.	Members of the family	Organization The network administrator can add or remove devices to and from the network.	Multi Party : Outdoor devices like satellite - Telecommunication Company CA rental is paid by the organization : Internal device (computers) - Organization	Multi party Complicated Ownership (Individuals, Organizations Govts.)

Intranet

- A network within the organization, which can be accessed only by the members of the organization (Maybe through a wifi connection or VPN)

eg - KPMG

Extranet

- A network within the organization, to which certain outside parties are allowed.

eg - CRIB, SLA

Networking Hardware

1) Hardware required to create a network.

i) Network adapter

- Used to connect a PC to a network or the internet.
- AKA network interface Card (NIC) when the adapter is in the form of an expansion card.
- Adapter must match the type of network being used
eg - WiFi, Bluetooth, Ethernet.
- Are often inbuilt into portable computers.

2) Modem

- Used to connect a computer to a network over telephone lines
- Not common currently (USB Dongles are used for 3G/4G data)

3) Wireless Access point.

- A device used to grant network access to wireless client devices

Other hardware

- Router
- PCs / other client devices.
- Switch

Alisa

Unit 8 Internet and its services

Internet is a collection of separate but interconnected networks accessed daily by millions of people using a variety of devices to obtain information, disseminate information, access entertainment or communicate with others.

Arpanet

This was the technical foundation of internet

ARPA - Advanced Research Projects Agency Network

Founded in 1969 by US Defense department.

The world wide web

It is the collection of web pages available through the internet.

WWW and internet are not the same. WWW is one of the services received from internet.

Proposed by Tim Berners-Lee in 1989

* Internet and WWW are not owned by any person, business or organization. But the individual networks and web pages which make up the internet and WWW, have owners.

Members of Internet Community.

1) Users - People who use the internet

2) Internet Service Providers (ISPs)

- Businesses which provide access to the internet, normally

for a charge.
eg - SCL, Dialog

3) Internet Content Providers

- Institutions and individuals who supply the information that is available on the internet
eg - Businesses, schools, govt, individuals.

4) Application service providers (ASP)

- Businesses that provide access to web-based applications
 - Remote sites that can be accessed through a web browser (web based application)
- eg - Gmail, MS office 365

5) Infrastructure Companies

- Own or operate the physical structure of the internet.

6) Hardware and software companies.

7) The govt and other organizations.

- Internet society (ISOC) - [An international organization that promotes internet use and access]
- Internet Corporation for assigned names and numbers (ICANN)
[An NGO that is responsible for allocating IP addresses and managing the domain name system - Systems]
- Worldwide web Consortium (W3C)
[Develop web standards, protocols and guidelines]

* Internet is not free. People have to pay for internet services.
Free services are available in exchange for providing contact information or viewing advertisements.

* A single entity doesn't control the internet.
Sometimes govt.s regulate the internet use within its country but still full control cannot be taken.

Setup to use internet

1) Determining the type of devices you will use to access the internet

eg - Desktops, notebook, tablet

- Mobile devices

- Gaming devices.

2) Selecting the type of connection desired.

i) Dialup Connections Vs Direct Connections

- Dialup Connection: To connect to the ISP a specific Telephone number has to be entered into the computer [T.P. No will be provided by the ISP]

: Through this the connection can be made whenever required only.

- Direct Connection: No such procedures required.

: Directly connected to the ISP all the time.

* Conventional dial up.

- Uses a modem which is connected to the telephone line.

- Inexpensive h/w, ease of setup and use, widespread availability.

- Slow connection speed.

- Rarely used currently.

Bandwidth transferred
- The amount of data from one point to another in a network in a given period of time.

* Methods of direct connection.

i) Cable

- Very fast connection.

- Same infrastructure as a cable television

- Available wherever cable TV access is available

ii) DSL - Digital Subscriber Line

- Connection through the telephone line

- Less speed than Cable (But currently speeds are being developed)

- Widely available.

iii) Satellite

- Slower and more expensive.
- Suitable for rural areas which don't have 'access to other options
- Uses 3 satellite dishes.

- At the internet service providers
- One at the space
- One attached to the the property.

iv) Fixed wireless

- Similar to satellite internet. But instead of satellite dishes radio transmission towers are used.

- Dialog home broadband
- SLT 4G/LTE broadband.

v) Broadband over fiber (BOF)

- New type of connection

- Fiber optic cables are used for connections

- AKA fiber to the premises (FTTP)

- High speed internet

- eg - SLT FTTx

vi) Mobile wireless

- The internet connection used with mobile devices which is connected to the internet through a mobile phone network.

- eg - 3G/4G connections

vii) WiFi Hotspots. (WiFi - Wireless Fidelity)

- Where a location that has direct internet access allows other users to connect to the internet connection

wirelessly.

- 3) Deciding on the internet service provider to be used.
- Factors that determine the ISP
 - Type of device [eg: PC-SLT, Mobiles, Mobitel]
 - Type of internet Connection. [eg: Fixed wireless-SLT, Mobile wireless-Mobitel]
 - Geographical location.
 - Factors to consider when choosing an ISP
 - Speed of the connection
 - Price of the connection
 - Availability [some connections may not be available in rural areas]
 - Type of connection
 - Reliability

Services of internet / Uses of internet

i) WWW

2) Online Communications

Types

i) Instant messaging (IM) - Real time messaging

eg - Skype, whatsapp

ii) Voice over internet Protocol (VoIP)

- Making telephone calls over the internet

eg - Viber calls,

a) PC to PC calls

- A special program that can be used to make voice calls from one PC to another.

b) Home VoIP setups

- Conventional phones, a VoIP adapter and a broadband

modem can be used to make VoIP calls to any phone.

iii) Discussion groups

eg - forums, blogs, newsgroups

iv) Chat rooms

- Multiple users chat in real time.

v) Videoconferencing (Two-way)

vi) Webinars (One-way)

vii) Blogs

3) Social Networking

- Create a community of individuals with common interest.

eg - Google+, Facebook, Youtube, Flickr, LinkedIn.

4) E commerce

- Performing financial transactions through internet

eg - Online banking.

- Should perform these transactions through a secured web page (https://)

• Online shopping.

- Buying goods and services through internet

eg - eBay, Amazon

- COD, Credit Card payments.

• Online auctions

• Online investing

- Buying & selling securities through internet.

5) Online Entertainment.

- Online music: Live radios

Online music stores (legally download & listen music)
eg - Gaana, Saavn

- Online TV: Live tv

: video on Demand (VOD)

- Online Gaming

- Web based games, online multiplayer games;

6) Online News, reference and information.

- Online news

- : Through websites of newspapers, news channels, etc.
- : Regularly updated

- Reference sites

- : Provide access to specific types of useful information

eg - encyclopedias, directories, dictionaries, maps

10) Online education

- Online education

Definition: Using the internet to facilitate learning

g) Web based training (WBT)

- Instruction delivered via the web

eg - Corporate training, online tutorials

b) Distance learning.

- taking classes from another location, other than the actual place where the class happens.

- Advantages

- Flexible, upto date material, immediate feedback, time saving

- Disadvantages

- Technology requirement, lack of face to face contact.

Problems related to internet usage.

Censorship issues

- Where access to certain web contents are blocked.

- Can be done by individuals, schools, govt, etc.

- Done through internet filtering

- eg - Blocking access to social media, (Govt offices)

Web browsing privacy

- The activities in a certain website is stored through cookies

- cookies; small files stored on the user's hard drive by a web server.

- Cookies can be used to

- : to track web activity

- : Add functionality to web site (eg: Recommended for you options)

- Cookie data can be viewed and deleted.

Web bugs / web beacon

- Small usually invisible, images on a web page that transmits data to a web server.

- Difficult to spot or stop.

Spyware

- Software that transmits data secretly through the user's internet connection

Adware

- ~~Box~~ also supported by onscreen advertising

- Mostly observed in free programs.

Email Privacy

Unless an email is encrypted it is not private.

Employers and ISPs have access to the e-mail you send through those organizations.