COMPUTER NETWORKS-1

- Components of Netwoks(Client,Server etc)
- Network Devices(Switch,hub,Router,Bridge etc)
- Cloud(types of Cloud)
- IOT*(Enabling and Challenges ,Risks)

DEFINITION OF COMPUTER NETWORK

- Two or more computing devices connected to one another in order to exchange information or share resources, form a computer network.

ADVANTAGES OF NETWORKS

- Share resources- e.g. We can share one printer with many computers which are connected to each other because it would be expensive to buy printer for each computer
- Share Storage- we can access files from any computer on the network.
- Share Software- we can install software on a centralized main system rather than installing it on every computer.

DISADVANTAGES OF NETWORK

- Networking is a complex setup. We may need to hire a network specialist.
- File security becomes more important because many users can access same file.
- If files and resources are saved central main system and if that computer fails then every computer in the network becomes idle.

COMPONENTS OF COMPUTER NETWORK

- A computer network is not formed by joining two computer with a wire.

Various components are:

- **Hosts /Nodes/workstation** – means computers which are connected to the network.
- **Server-** it is just a powerful computer with more processing power and more memory. It is the main computer in a network.. It has the files or resources which are requested by the client computer.
- **Client-** It is a computer that requests for file or service from a server.
- **Network Hardware-** to control network traffic, a network require some hardware devices. E.g. NIC,HUB,Switch,Router etc
- **Network services-** DNS,VoIP etc.
- **Software-means** networking protocols, network operating system (it is for a network devices such as router,switch etc that can handle networking tasks.
- **Communication** channels- through which nodes in a network interact with each other. It an be wired or wireless

DNS-DOMAIN NAME SYSTEM

- **DNS-** is the phonebook of the internet. Human access information online through domain names like zeenetwor.com or ndtv.com.

Web broswers interact through internet protocol(IP) addresses. DNS translates domain names to IP addresses so browsers can load internet resources

TYPES OF NETWORK

Main Criteria for Network

- Based on Geographical Spread
- Based on components roles
- Based on Communication Channel

TYPES OF NETWORK BY GEOGRAPHICAL SPREAD

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

TYPES OF NETWORK BY COMPONENTS ROLES

- **P2P-(Peer to Peer)** – Every computer in a peer to peer network is equal.
- There is no main server means no single computer is given charge of networking operations.
  - Each computer can play role of client or server.
  - Computers in P2P networking are often called non dedicated servers.
  - P2P is use in home networks or small companies.
  - P2P network can have maximum 10 computers

TYPES OF NETWORK BY COMPONENTS ROLES

- **Client Server Networks- (Master –Slave Network)**

- Bigger companies prefer centralized control of network
- Client computer is dependent on server..
- Data is backed up on main server.
- A dedicated server is used to help client to access data, software and hardware resources.
- There many be many servers e.g. file server-for file related requests, modem server, a server for printing etc.

TYPES OF NETWORK BASED ON COMMUNICATION CHANNELS

- **Wired Communication Channels-**
  - Twisted Pair Cables
  - Coaxial Cable
  - Optical Fiber Cable
- **Wireless Communication Channels**
  - Infrared
  - Microwave
  - Radiowave
  - Satelite

NETWORK DEVICES/HARDWARE

- **NIC-Network Interface Card)-** It is a network card, it is present in every computer .A computer need nic to connects with a network. It is like a gateway of computer to network.
  - **NIC is also called Terminal Access Point(TAP) or network interface Unit.**
  - **Each NIC has MAC Address (Media Access Control)**
  - **MAC ADDRESS-is also called physical address. It is Assigned during manufacturing of card. It is a 6 byte address .**

  E.g. 19:b7:e5: 6t:g6:d4.

  first three bytes (19:b7:e5) are manufacturer id and last three bytes (6t:g6:d4) are nic card number. Every mac address is unique for each card.

  Mac Address is used to identify a device in a network

NETWORK DEVICES/HARDWARE

- **Wifi card- it is a adapter with built in wireless radio and antenna.**
- **Most common wifi cards are pci express wifi cards**
- **. It fits into motherboard. It allows us to connect to a network wirelessly.**

NETWORK DEVICES/HARDWARE

- **HUB-** it is also called Concentrator- It is ia hardware device use dot connect several computer together.
- **It sends data to all nodes in the network, specified node accept data and other ignore it. It is of two types.**
  - **Active Hubs- it electrically amplify signal as data /signal moves from one connected computer to another.**
  - **Passive Hubs-allow the data or signal to pass from one computer to another without any changes.**

NETWORK DEVICES/HARDWARE

- **Switch-** It is a device that is used to divide network into sub-networks(subnet to prevent traffic overloading.
- It **does not send data to all nodes like hub instead a switch create a temporary connection** between the source and the destination and terminate the connection once the conversation is done.
- LANs which are segmented through switch are called switched LANs
    - Switches data directed only to intended port
- Hubs and Switches are used to exchange data within a local area network.
- These are not used to exchange data outside their own network
- To exchange data outside their own network , a device needs to be able to read IP addresses which is ROUTER

NETWORK DEVICES/HARDWARE

- **Bridge-** This device is used to link two separate network together.
- This device is smart enough to know that which computer is in which network.
- It can only handle networks that follow same protocols.
- It uses physical means mac address.

NETWORK DEVICES/HARDWARE

- **Router-** It is responsible for forwarding data from one network to different network.
- It works like a bridge but can handle different protocols.
- Routers are used to connect networks
- Hub/Switch are used to create networks
- To exchange data outside their own network , a device needs to be able to read IP addresses which is ROUTER

NETWORK DEVICES/HARDWARE

- **GATEWAY** - It is a device that connects **dissimilar networks**.
- In entriprises a gateway often acts as a proxy server and a firewall.
- Proxy Server- it is a machine that is not actually a server but appears as a server
- **Firewall-** a system designed to prevent unauthorized access to or from a private network.

NETWORK DEVICES/HARDWARE

- **ACCESS POINT (WIRELESS ACCESS POINT)** -

- WAP is a hardware device that establishes connection (by broadcasting wireless signals) of computing devices on wireless LAN with a fixed wire network.
- ACCESS POINT device has approx. 150 feet range (home based APs).
- Wifi routers can function as access points but not all access points can work as routers.

CLOUD

- **Collection of servers is called 'CLOUD' but in modern days "cloud" refers to internet.**
- **Cloud computing is internet based computing, where shared resources , software ad information are provided to remote computers and other devices on demand.**

Types of CLOUD- according to their needs

1. **Private clouds- are for exclusive use by a single organization.**
2. **Public Clouds- are for use by multiple organization on a shared basis and hosted and managed by third party service provider.**
3. **Community clouds-are distributed systems created by integrating the services of different clouds to address the specific needs of an industry, a community, or a business sector.**

In community cloud, the infrastructure is shared between organization which have shared concern or tasks.

IOT (INTERNET OF THINGS)

- **It is a** technology that connects the things (watches, fridge, tv, bulb etc) to the internet over wired or wireless connections that enables them to collect and exchange data making them responsive.

ENABLING TECHNOLOGIES FOR IOT

- **RFID(Radio frequency identification)-**this technology is designed to use radio waves to read and capture information stored on a tag which is attached to an object. A rfid reader read with rfid tag.
  - **Usage-**can be used to track pets,vehicle, merchandise etc
- **Sensors-is** a device that is able to detect physical changes(temperature,pressure etc) in environment . E.g. smoke sensor, motion sensor etc
- **Smart technologies**-smart controllers can connect with smart devices and act upon them. E.g. turning off the fan, stop a vehicle,lock/unlock a door,adjusting temp of oven etc
- **Software-** provides solutions for connecting , taking actions and solving issues that may arise in products

DEVICES THAT CAN FORM IOT

- ANY DEVICE THAT HAVE **RFID TAG** CAN BE A PART OF IOT.

Examples :

- HOME APPLIANCES (FRIDGE, COOKES, HEATERS, TV ETC).
- WEARABLES (CLOTHES, WATCHES ETC),
- VEHICLES,
- FACTORIES,
- AGRICULTURE,
- FOOD(SENSORS FOR MONITORING THE CONDITION OF FOOD)

CHALLENGES AND RISKS

- IOT has made many things easier and possible but there are security challenges to IOT like **cyber attacks, hackers** etc