Unit - 1

1) Data Communication:

* Data communications is the process of exchanging data between two devices via some transmission medium such as wire cable is known as data communication

* This data sharing can be local or remote.

* The data communication system depends upon on four fundamental charaterstics, they are

1. Delivery: The system must deliver data to correct destination

2. Accuracy: The system must deliver the data accurately

3. Timeliness: The system must deliver data in timely manner

Jitter - Jitter refers to the variation in the packet arrival time.

Data representation:

- Text
- Audio
- Video
- Number
- Images

a) Networks:

* A network is a set of devices connected by communication links.

* A set of devices is reffered as nodes.

* A node can be computer, Printer or any other device capble of sending and receiving data generated by other nodes on the network

3) Network types:

* LAN
* WAN
* MAN

LAN:

* Local Area Network is a group of computers connected to each other in a small area such as buildings, Office etc.

* LAN is used for connecting two or more personal computer

* It is less costly to build. The hardwares are inexpensive such as hubs, network adapters and ethernet cables

* The data transfer in LAN is extermely faster

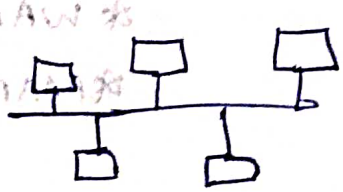
* IEEE 802 LAN is Popularly Used Shared medium.

* LAN has tramission capacity of more than 1 MBPS.

* The geographical coverage of LAN is less than 5 square kilometers

* Low error rates.

eg: Modem



WAN:

* WAN provides a long distance transmission of data.

* Network that covers a larger area such as city, state, country or world.

* WAN contains host and collection of Machines. All the hosts are connected each other.

* WAN is quite bigger than LAN

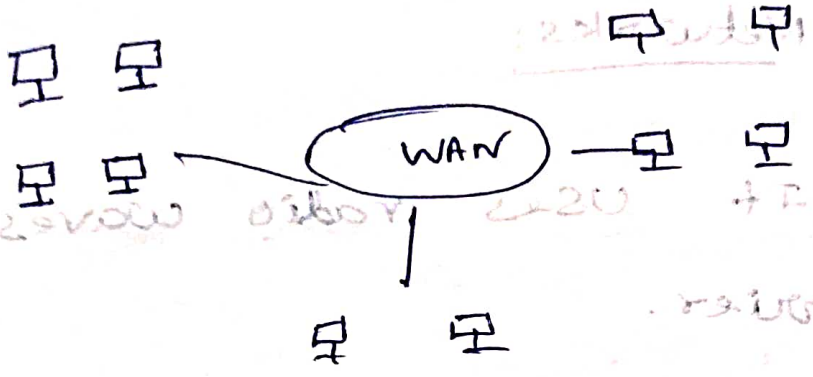
* It is widely used in the field of Business, government and education.

* WAN can be either point to point WAN or switched WAN

* WAN is highly cost effective.

* Low speed transmission.

* Error rate is high.



MAN:

* MAN covers a geographical area of 50 km.

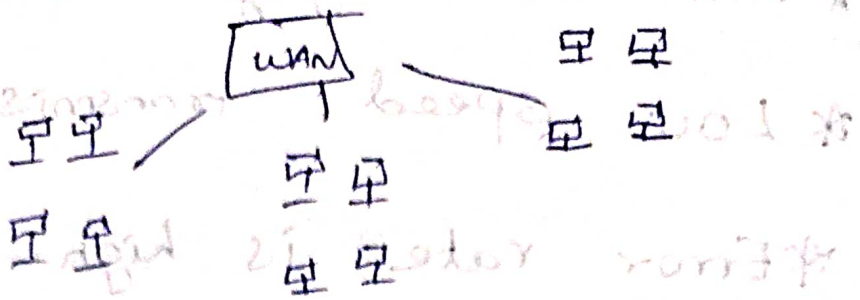
* It uses technologies similar to LAN.

* Transmission speed is moderate

* communication medium for MAN are optical fibre, cables.

* Transfer rates is from 34 to 150 Mbps.

* Bus topology is used for designing MAN.



Wireless Networks:

* It uses radio waves as it's carrier.

* There is no use of cables and optical fibers.

* The backbone network usually uses cables.

* Moderate transmission speed

* Covers a larger geographical area.

* It uses expensive equipment to built a wireless network

* Network towers, bluetooth wifi are the example for wireless net

4) TCP / IP protocols:

* The Internet architeture is sometimes called as TCP / IP protocols

* TCP stands for transimission control protocol

* IP stands for Internet protocol.

* TCP/IP model is a set of protocol that allows communication across multiple diverse of network.

* TCP/IP is normally four layered.

* Layers of TCP/IP are Application layer, Transport layer, Internet layer and host to network layer.

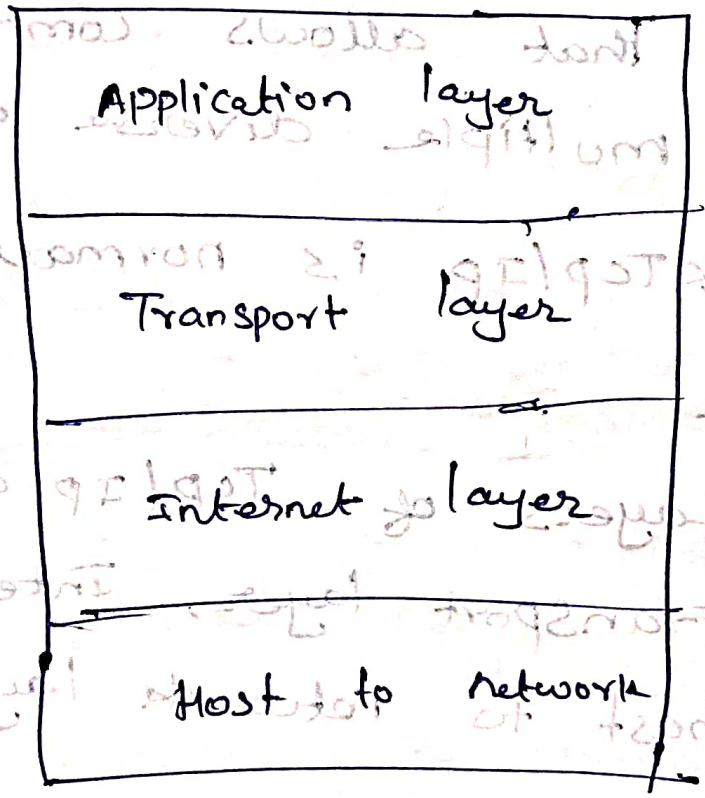
* Host to network layer is also called physical layer or data link layer.

* The application layer in TCP/IP are equated which is the combination of session layer and presentation layer in OSI

* TCP/IP defines two protocols they are TCP and UDP.

* User Datagram protocol is a connectionless protocol.

* UDP is used in application that requires quick reliable delivery.



Application layer:

* Application layer includes all the process and services that use the transport layer to deliver data

* The most widely used Application protocols are TELNET, FTP, SMTP SNMP.

*FTP is used for interactive File transfer.

*SMTP delivers the electronic Mail

Transport layer:

* Application programs send data to transport layer.

* Transport layer is designed to choose either TCP or UDP based on the service required.

* Transport layer provides peer entities on the src and destin

* It converts the incoming bytes to discrete messages and passes each message to the internet layer.

Internet layer:

* The internet network level protocols handle Machine to Machine communication,

* IP, ARP, ICMP are some of the Internet layer protocols.

* Internet layer: moves data from one host to another if the hosts are on different networks.

a) Addressing: Determine the route to deliver data to destin

b) fragmentation: Breaks the data into pieces because intervening network cannot handle large messages.

Host to Network:

* This layer is also called network interface layer.
* This layer is same as physical layer and Data link layer in OSI Model.
* Host to network layer cannot define any protocol.
* It is responsible for accepting and transmitting IP datagrams.

5) OSI Model:

* The OSI model was created by ISO in 1984
* OSI is known as Open System interConnection.
* OSI Modeling is widely used in networking
* OSI model is seven layered.

* OSI Model provides peer to peer services

* OSI Model also provides Standards for communication

physical layer:

* physical layer is the lower layer of the OSI Model.

* It is responsible for physical connection between devices.

* The physical layer contains information in the form of Bits.

* Bits are responsible for transmitting individual bits from one node to the next

functions of physical layer:

Data rate: physical layer defines the duration of bits. which is called as data rate or transimisson rate

Synchorinization Bits:

The transmission rate and receiving rate must be same. This is done by synchronizing clocks at sender and receiver.

Representation of Bits:

* Bits are represented by eletrical or optical signals.

Data link layer:

* Data link layers are responsible for the node to node message delivery.

* The main function of this layer is to make sure the data transfer error-free.

functions:

i) Framing:

* It is function of data link layer

* The frames received from network layer is divided into manageable data units called frames

Physical addressing:

*After creating frames, the data link layer adds physical addresses to header of sender and receiver.

~~ERROR~~ ~~Flow~~ Control:

*The data link layer provides a mechanism of error control which detects the error and retransmits the damaged or lost frame.

Flow Control.

*The data rate must be constant on both side.

*Else the data may get corrupted.

*Thus, flow control coordinates the data before sending.

Access Control:

* when multiple devices are connected in some link, the data link layer decides which device has control link.

Network layer:

The network layer is responsible for the delivery of packets from the source to destination.

functions:

Routing:

The network layer choose the suitable router to deliverg the packet from src to destination.

Logical addressing:

physical addressing in data link layer adds, physical address Logical address adds, the logical address to headers of sender and receiver

Session Layer:

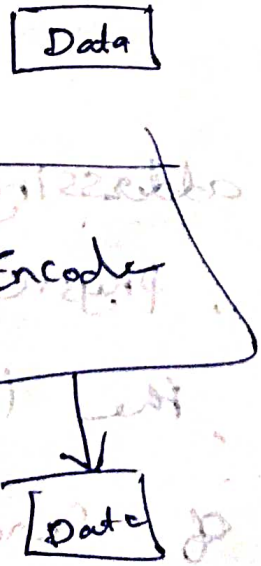
* The Session layer is network dialog controller

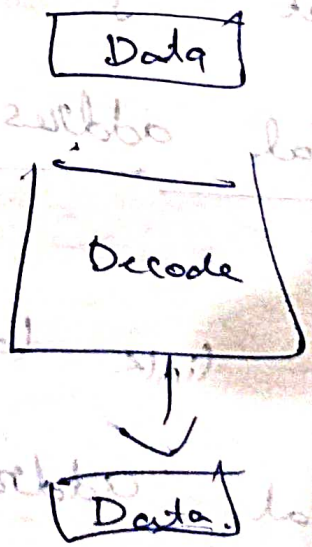
* Dialog controller in session layer allows to start communication with each other in half-duplex or full-duplex.

* session establishment
* session maintaince
* session termination.

Presentation layer:

* It deals with syntax and semantics of the information.





i) Translation
ii) Compression.
iii) Encryption

6) Sockets:

* Sockets provides a programming interface for network communication in computer networks.

* Sockets offer a standard mechanism for device to device communication over a network.

Socket types:-

TCP

UDP.

Socket Functions:

- Socket Creation - Intailize 'socket()' using this function
- Binding - 'Bind()' function used to associate a specific Network such as IP address and port Number.
- Listening - 'Listen()' is used to indicate Socket is ready for Incoming connections
- Accepting - 'Accept()' function is used to socket to server and client
- Connection - 'Connect'

Data Transfer:

Send()

Receive()

Socket Communication Models:

client-Server model

peer to peer model.

Error Handling:

error programming in Socket can be implement using C, C++, python, Java and others.

7. HTTP:

* It is a standard web transfer protocol

* Hyper TEXT transfer protocol

* It is used for client to Server communication.

HTTP Messages:

GET - used to get client data from Server.

POST - used to Store

PUT - used to update

DELETE - used to Delete.

PATCH - Similar to put.

LINK - Create a link from one document to another.

UNLINK - Remove a link from one document to another.

HTTP Response

200 (OK) - Success Response

401 (Unauthorize) - Negative Response.

400 (Bad Request) - Error in Request

403 (Forbidden) - authorized.

429 (Too Many Request).

502 (Bad gateway)

Email protocols:

SMTP:

* Simple Mail transfer protocol
* It is operates on port 25 default
* SMTP uses TCP/IP Models.
* SMTP is used for sending outgoing email message from client to server.

POP3:

* POP3 is also known as post office protocol.
* POP3 is used for reterivirg mails from server.
* It operates on port 110 by default.
* The email client connects to the server, It downloads message to local system.

IMAP:

* IMAP is also known as Internet Mail Access protocol.

* IMAP is more powerfull and more complex.

* IMAP supporsts the following modes for accessing e-mail messages.

i) online Mode

ii) offline Mode

iii) Disconnected mode.

* IMAP is used for accessing and Managing email messages stored on a mail Server.

8) DOMains.

Com - Commercial organization

gov - government

edu - Educational organization

mil - Miltary group

org - non Profit organization

net - network Support group.