Data Communications

• OSI Model :-

⇒ OSI Stands for open System Interconnetion. It is a 7 layer architeture with each layer having specific factionality to perform

⇒ The OSI model created in 1884 by ISO, is a reference framework that explains the process of transmitting data between computers. It is divided into seven layer that work together to carry out specialized network juntions, allowing for a more systematic approach to networking

(From sender) → Application layer ↑
↓ Presentation layer ↑
↓ Session layer ↑
↓ Transport layer ↑
↓ Network layer ↑
↓ data link layer ↑
↓ Physical layer ← (From reciever)

⇒ The transfer goes from application layer to physical layer in sender

⇒ The transfer takes place from physical layer to application layer in receiver.

• Open System :-

⇒ A Computer System where user access is not controlled by the same people responsible for its contents

⇒ Open System mean an environment in which system access is not controlled by the person who are responsible for the content of electronic records that are on the system

- Clased Systems :-

⇒ A Computer System Whose user access is controlled by the some people resposible for its contents

⇒ Clased system means an environment in which system access is controlled by the person who is responsible for the Content of electronic records that are on the system.

- Layers :-

1) Application layer :- Apps create the data
2) Presentation layer :- Data is formatted & encrypted
3) Session layer :- Connections are established & managed
4) Transport layer :- Data is broken into segments for reliable delivery.
5) Network layer :- Segments are packaged into packets and routed.
6) Data link layer :- Packets are framed and sent to the next device.
7) Physical layer :- Frames are converted into bits and transmitted physically.

Oct 16, 2024

Data link layers

Framing — Controls how data is placed (Media access control, Error detection)

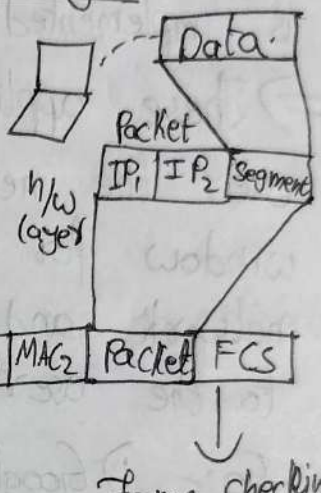
Control of Media (MAC)

Carrier Sense Multiple Access

LAN (cable, optic, air) ↑↓ CSMA (CA)

Data link layer

Physical layer



⇒ MAC :- Media access control

Networking of data communications :-

Protocals and Standards	
Data communications	Networking
Components	LANs & WANs
Data representation	Distribution process
Data flow	Criteria structure

✡ 7 layers

1) Application layer :-

⇒ At the very top of the OSI reference model stack of layer, we find the application layer which is implemented by the network application

⇒ These application produce the data to be transfered over the network. This layer also server as a window for the application services to access the network and for displaying the recieved information to the user.

Eg :- 1) Google Mosila → FTP [File transfer protocal]

2) Skype → Web surfing [HTTP/HTTPS]

3) Email → SMTP [Simple Mail Transfer Protocal]

4) Virtual terminal → Telnet

2) Presentation layer :-

⇒ Presentation layer is also called as transmition layer

⇒ The data from the application layer is extracted here manupulated as per the required format to transmit over network

Functions :-

→ Translation :- for example, ASCII to Binary

→ Encryption / Decryption :-

- Data encryption translates the data into another form or code

- The encrypted data is known as the cipher text & the decrypted data is known as plain text.
- Key value is used for encrypting as well as decrypting data

→ Compression :-
- Reduces the number of bits that need to be transmitted on the network.

3) Session layer :-

→ Authentication :-
- The layer allows the two process to establish, Use, and terminate a connection.

→ Authorisation :-
- The layer allows a process to add checkpoints that are considered synchronization points in the data.
- These synchronization points helps to identity the error so that the data is re-synchronized properly, and data loss is avoided

→ Session Managment / Dialog Controll :-
- The session layer allows a system to start Communication with each other in hay-duplex or full duplex

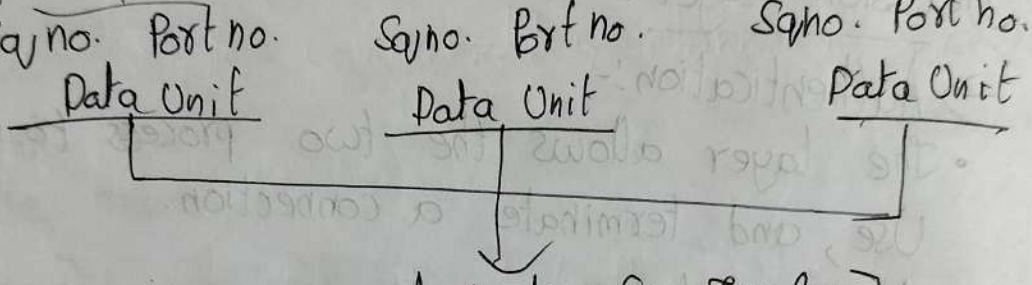
★ Note :- - All the above 3 layers are integrated a single layer in the TCP/IP model as the "Application layer"
- These are also known as "Upper layer" or "software layer"

C TCP/IP model :- Transimition Control protocal / Internet Protocal

4) Transport layer:-

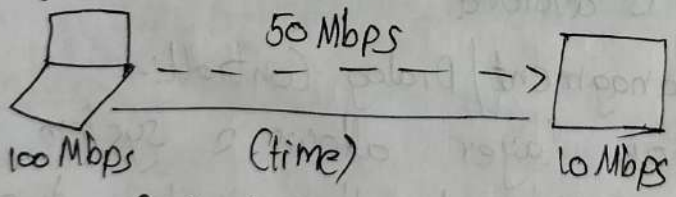
- The transport layer provides services to the application layer and takes services from network layer. The data in transport layer is formed as segments
- It is responsible for the end-end delivery of the complete message.

☆→ Segmentation:-



☆→ Flow Control:-

It ensures the file which is getting transmitted in mbps speed from the sender end control the flow of file for the receiver end which may have less or more Mbps



large file & large time

☆→ Error Control:-

(D.U1) (D.U1)
(D.U2) ⟹ [Error]
(D.U3) (D.U3)

It will automatically repeat request.

→ Protocall:-
orientation transmission → TCP [Transmission Control protocall]
Connected transmission → UDP [User Datagram Protocall]

5) Network Layer :-

- The network layer works for the transmission of data from one host to other located in different networks. It also takes care of packet routing i.e. selection of the to transmit the packet, from the number of router available.

→ Functions :-

① Routing :- The network layer protocals determine which route is suitable from source to destination. This function of network layer is known as routing

② Logical addresing :- To identify each device internet work uniquely, the network layer defines an addresing scheme. The sender and reciever IP address are placed in the header by the network layer
↓
[IPV4 & IPV6]

6) Data link layer :-

→ Framing :-

Framing is a junction of the data link layer It provides a way for a sender to trasmit a set of bits that meaning to the receiver. This can be accomplished by attaching special bit pattern to the begining and of the frame

→ Physical Addressing :- After creating frames, the data link layer adds physical address of the sender and/or receiver in header each frame

→ Error Control:-
The data link layer provides the mechanism of error control in which it detects and retransmits damaged or last frames

→ Flow Control:-
The data rate must be constant on both sides else the data may get corrupted.

→ Access Control:-
When a single communication channel is shared by Multiple devices.

Oct 17, 2024

1) Application layer :- Network Applications
File transfer → FTP (File transfer protocal)
Web surfing → HTTP/s (Hypertext transfer protocal secure)
Emails → SMTP (Simple mail transfer Protocal)
Virtual Terminal → Telnet

2) Presentation layer :- Translation (SSL - Secure Sockets layer)
↓
Data Compression
↓
Encryption/Decryption

Eg:- ASCII → EBCDIC

3) Session layer :-

1) Physical layer :-

⇒ It's main role is to handle the physical connection b/w devices in a network

Transmission of raw data (Converts data into electrical, optical, or radio signals for transmission over physical media)

↓

Physical Medium (Defines characteristics of physical medium used for transmission)

↓

Data rate (determines speed of data)

↓

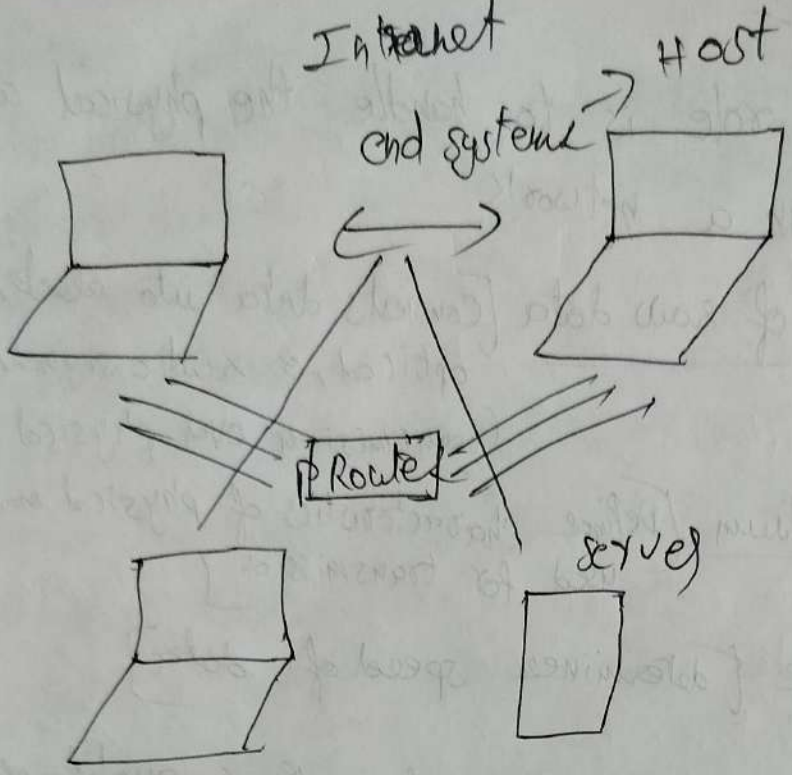
Signal strength (Manages strength & quality of signal)

↓

Topology :- (Defines the physical layout of devices in the network)

~~⇒ It's job is to b~~

⇒ It is responsible for actual transmission of data over the physical medium, defining how devices connect & communicate at hardware level



LAN [Local area network] :-

⇒ Usually for an office and a building or a Campus ~~limit~~

⇒ Limited access for few kilometers

⇒ Single transmition media

⇒ Topology used are ring, bus, star

MAN [Metro politan area Network] :-

⇒ Designed to extend over a city

⇒ It may be a single network or a connection of LANs

⇒ Private company ownership

Ex:- Private telephone operators or cable operators

WAN (Wide area Network):-

⇒ Owned by a single company
⇒ Connection of network is also possible for large geographical area

Eg:- Country, Continent wise

Intranet:-

⇒ A network within the network is called intranet

Ex:- A LAN within the LAN

Internet:-

⇒ Interconnection of two or more networks

Network Devices & Components

* Four major components

1. End point
   ⇒ PCs, servers, Printers, Phones etc
2. Interconnection
   ⇒ NIC cards, Media, Connectors
3. Switches
   ⇒ Connects endpoints to the local area network (LAN)
4. Routers
   ⇒ Connect multiple LANs to form Internetworks
   ⇒ Choose best path between LAN & Wide area Networks (WAN)

Oct 28

Minor Components

1) NIC :- Network Interface Card
2) HUB :- Distribution
3) Firewall :- Securing Networks
4) Repeater :- Regenerating Signals
5) Modem :- Inway/Outway to network Convesion

Network edge and Core

End Systems of Hosts
(end point of the n/w)
Server client

Network Core

Connection of different network segments or the body part

Switching → Circuit
→ Packets (data gram, Virtual circuit)
→ message

Switching :- The process in which the message is transfered from Sender to Receiver

Circuit Switching :-

1) Circuit establishment
2) Data transfering
3) Circuit dis connection