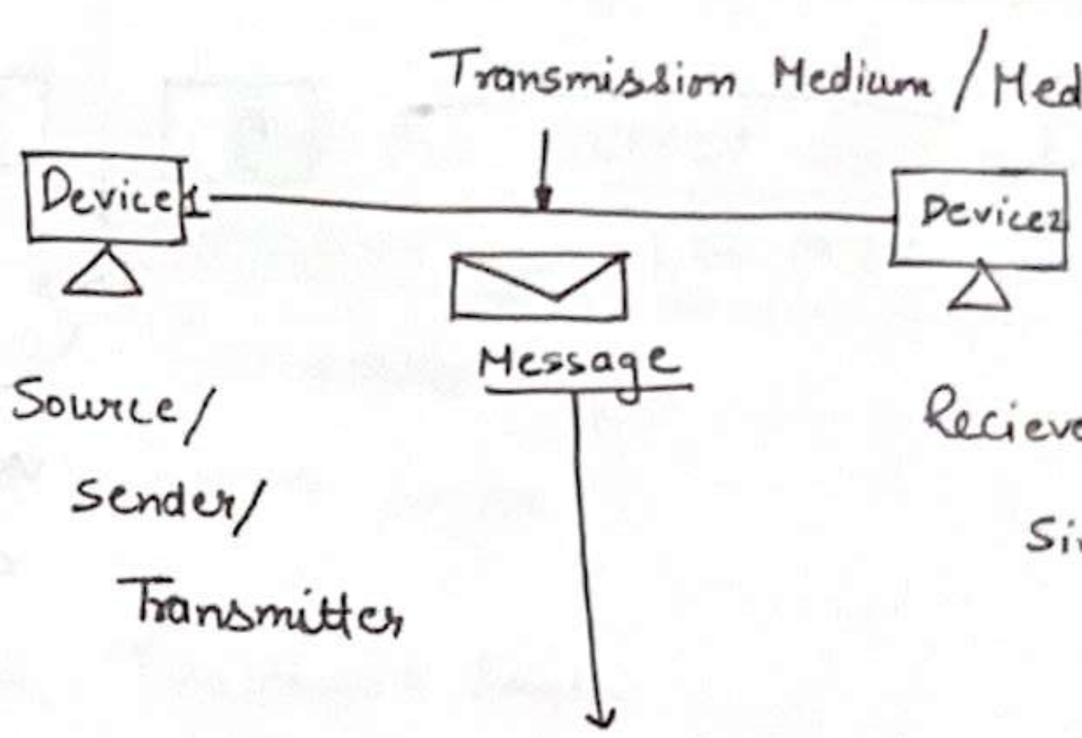
5/5/2024

Data Communication & Networking

Data Communication System →



PDU {Protocol Data Unit

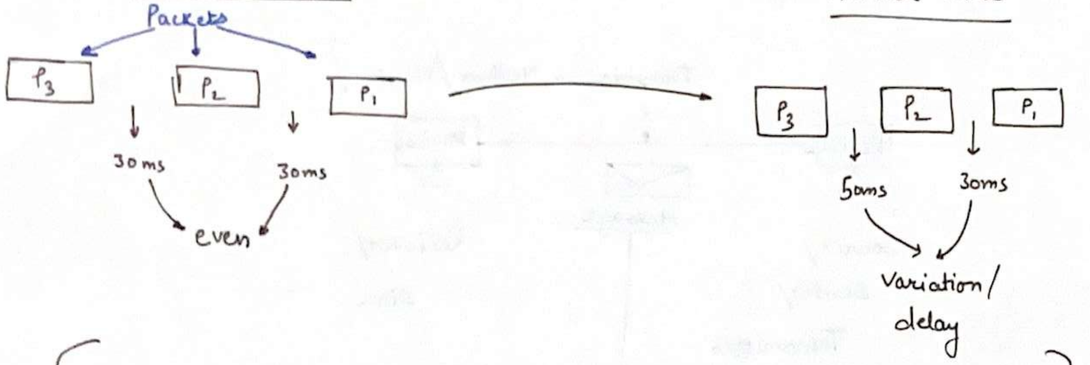
- DLL ⟶ Frame (Fixed Size / Variable Size)
- N/w Layer ⟶ Datagram
- (Note: packets are used at network layer)
- Trampport L. ⟶ Segment

{ The exchange of data / Message between two devices through a transmission media is called as Data Communication System. }

Fundamental Characteristics of Data Comm" System :→ {AT ⊽J}

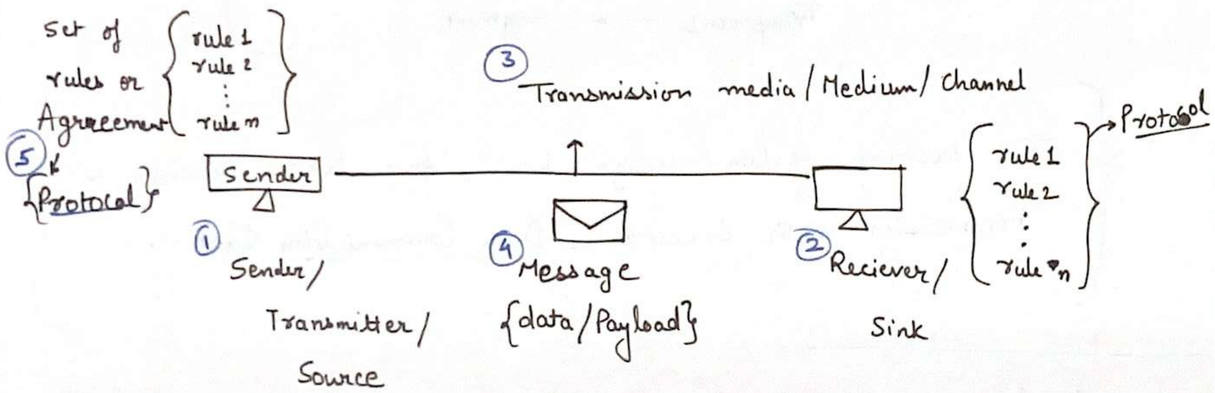
- Accuracy
- Timeliness {Real time transmission}
- Delievery → should done to correct destination.
- Jitter

Jitter



{ Variation or delay in packets arrival time is Jitter }

Components of DCOS :→



{ Protocol's key elements = 3 {Syntax, Semantics, Timing} }

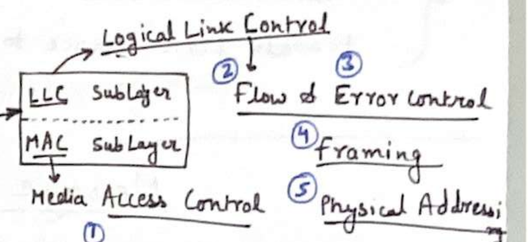
{ Protocol → Set of rules that govern the Communication }

{ netiquette attiquette
~~netiquette~~ → ~~attiquette~~ over Internet }

Extra ⇒

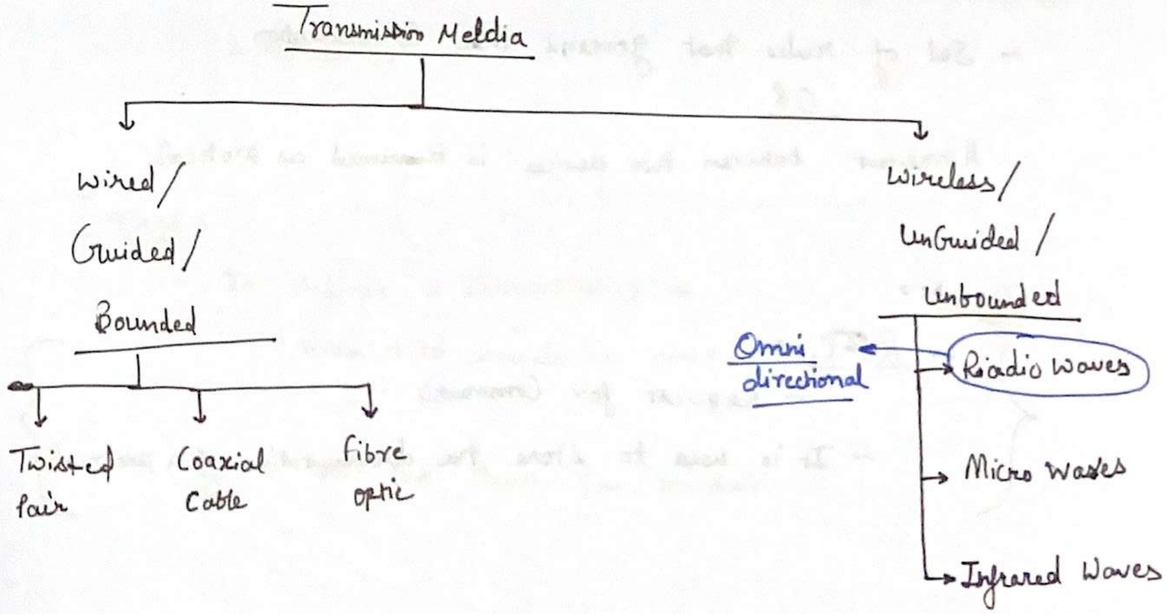
OSI Model :→
- → Open System Interconnection
- → 1984
- → developed by ISO {International Organisation for Standardisation}
- → Before this TCP/IP model was there → 1983

User ↔
7. Application Layer
6. Presentation Layer
5. Session Layer
4. Transport Layer
3. N/w Layer
2. Data Link Layer
1. Physical Layer



Transmission Media / Medium

– Works at / Responsibility of Layer 1 {Physical Layer}



Twisted Pair { wire colors → BOBG {Blue, Orange, Brown, Green}

→ UTP :→ Unshielded Twisted Pair

→ STP → Shielded Twisted Pair

→ SSTP

{ Transmission Media is the physical path through which data travels from source to destination }

Message

- Information that needs to be communicated is termed as Message.

Protocol { What, How, When } ↳ of comm^n

- Set of rules that governs thoe Communication

OR

Agreement between two devices is termed as protocol.

Extra:→

- RFC →
  - Request for Comments
  - It is used to store the documentation of a protocol

Key elements of a protocol

- Syntax
- Semantics
- Timings

English:→ Subject + V, (s/es) + obj → Structure / format

{ Extra Note:→ Syntax & Semantic is responsibility of presentation Layer {layer 6} }

Syntax →

- Syntax means structure or format of data.

OR

- Arrangement of data in a particular order → Syntax

Semantics →

sub + v, + obj
he → +s

- It tells the meaning of each section of bits means,
- It tells what action / decision to be taken based on the interpretation

Timings →

- It defines 2 characteristics :→
  - When data should be sent
  - How fast data can be sent.

Transmission Mode / Data Communication Mode / Directional Mode

- It tells direction of flow of Data
- Works at Physical Layer / Bottom / Lowest Layer / Layer-1

① — Simplex Mode

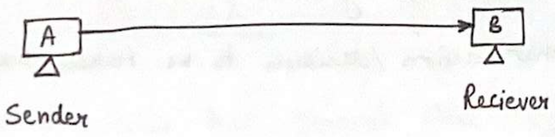
② — Half Duplex Mode

③ - Full Duplex Mode / Duplex Mode

- def^n
  - Transmission Mode defines the direction of flow of data
  - eg → A ⟶ B
    - A to B

Simplex Mode

One way - Direction
{unidirectional}



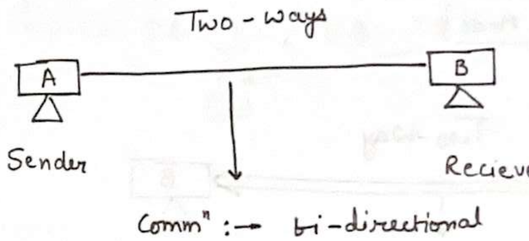
In Simplex Mode:→

- Comm^n is uni-directional
- Sender can send data but cannot recieve data.
- Reciever can recieve data but cannot send data.

Simplex Mode Examples:→

- Keyboard / Mouse inputs to CPU.
- Scanner inputs to CPU & Monitor
- CPU outputs to Monitor
- Monitor outputs to printer.
- Television, Radio, CB (Citizen Band) Radio
- FM Reciever.

Half-duplex Mode



Comm^n :→ bi-directional (both-sides)

Condition :→ But in one-direction at a time.

- Channel Capacity (Band Width)
  - Shared :→ No ✗
  - Either, Sender : 100%
  - Or, Reciever : 100%

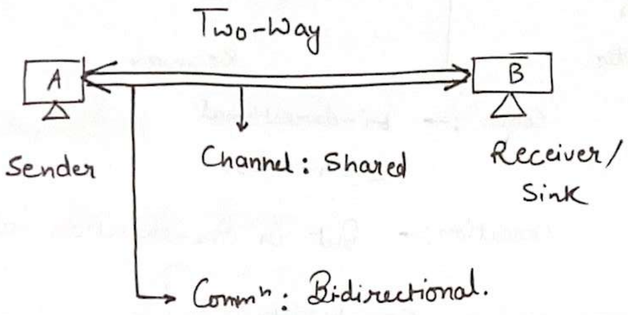
Example →

- Walkie-Talkie / Hand-held transceiver
  - Inventor : Donald Hings
- Browser (Web Browsing) Or networking
- Hub

Half-duplex Mode:→

- Comm^n is → bi-directional but in one direction at a time
- Channel capacity (Bandwidth) is not shared b/w Communicating devices.
- In half-duplex mode both sender & Reciever can Send/Recieve data but one at a time.

Full-duplex Mode:→
{Duplex Mode}



In Full Duplex Mode:

- Both Sender & Receiver can Send/Receive data at same time / Simultaneously / Continously

Example → {Public Switch Telephone Network}

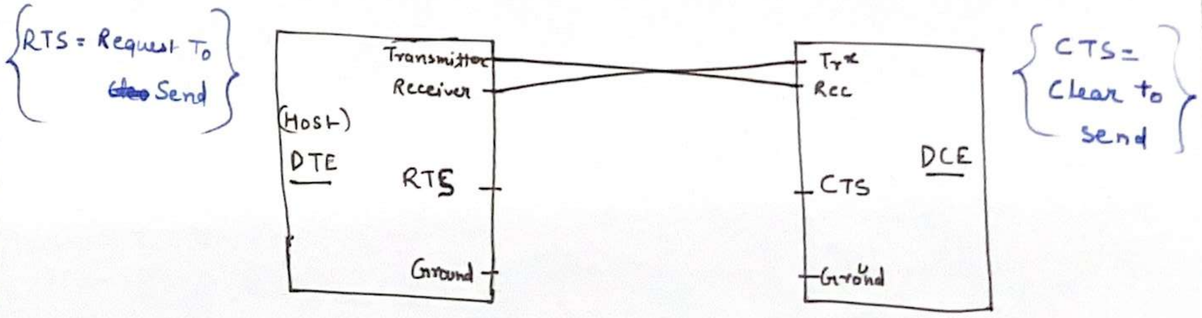
- Telephone {PSTN is an Example of: Circuit Switching}
  {Connection ORiented}
  {Works on Physical Layer}
- Mobile Phone

** - Connection Establishment in TCP → Transmission Control Protocol
{Transport Layer Protocol}
{TCP, UDP, SCTP}

** - RS232
{Recommended Standard}
→ developed by: EIA {Electronic Industry Association}
→ Use → To Connect a DTE with DCE

{Data Terminal Equipment} PC ←Connect→ MODEM {Data Comm^n Equipment}
DTE ←Connect→ DCE

** → Serial Port (COM Port) Communication Port
→ DB-9, DB-25
↓
Pins



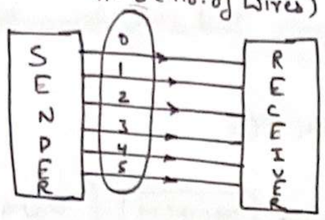
(Host) DTE sends RTS to DCE
↓ Ready
DCE sends CTS to DTE
↳ Permission to send

Used in Serial Communication / Transmission in Full Duplex Mode
{bits will be send one by one}

Data Transmission

{Multiple bit at a time}

- Parallel Transmission
  - n = 6 (no. of wires)



{One bit at a time}

- Serial Transmission
  - Asynchronous
  - Synchronous
  - Isochronous