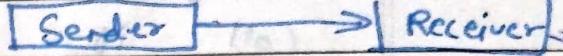


Transmission Mode

① Simplex Mode.

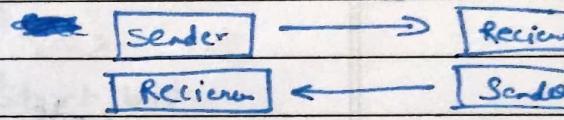
↳ Single directional



② Half-Duplex.

↳ One at a time., at a time one

e.g. Walky talky. will be sender and
another will be receiver.

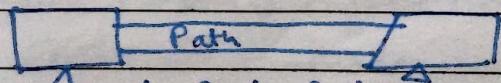


③ Full-duplex



④ Serial Transmission Mode.

Bit by bit data transfer.



↳ used in

① USB

(i) Bit transfer rate is high.

Universal Serial

(ii) Data transfer rate is low.

Bus



clock cycle

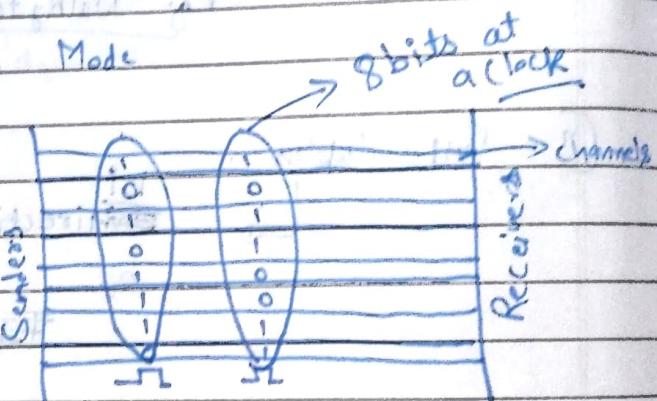
In serial transmission data is transferred bit by bit. For each bit transmission separate clock is required. This type of transmission is used for to cover long distance. Bit transfer rate is very high.
eg. USB, SATA, COM etc

(5)

Parallel transmission Mode



In this mode multiple bits can be transmitted at a single clock. For this type

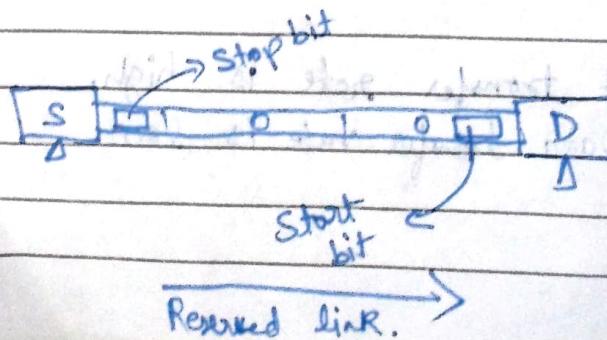


of transmission bandwidth of the link is divided into multiple channels. This transmission is used to cover short distance.

eg. PATA, ~~LPT~~ - Line point terminal

(6)

Synchronous Transmission.



responsible for

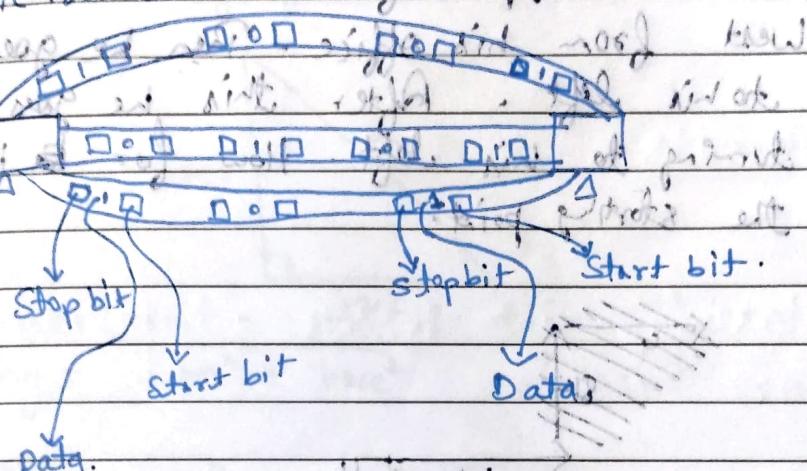
In this transmission data is transmitted through the reserved link. While, if data is has single start and stop bit, it is called data over head, is very less.

eg. ISDN.

Integrated Service
Digital Network.

ISDN - two.

(2) Asynchronous transmission.



→ In this transmission data packets can be transferred through multiple link because each data packet has information about source and destination. This type of transmission is slower than synchronous transmission.

→ In this transmission data packets can be transferred through multiple link because each data packet has information about source and destination. This type of transmission is slower than synchronous transmission.

Transmission Devices

→ Repeater

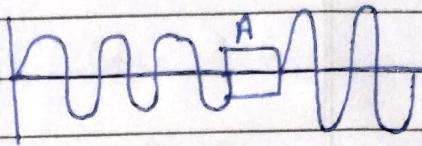
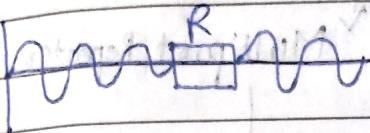
→ Layer 1 device

→ Used in wired or wireless

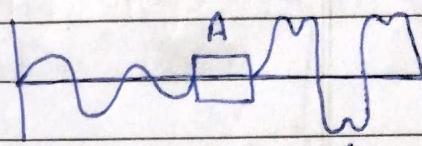
→ Amplifier

→ Layer 1 device

→ Used in wired or wireless.

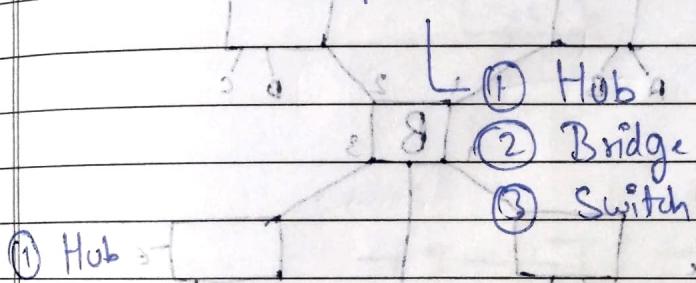


(not a step by step possibility)
↓
↓ down for analog signal

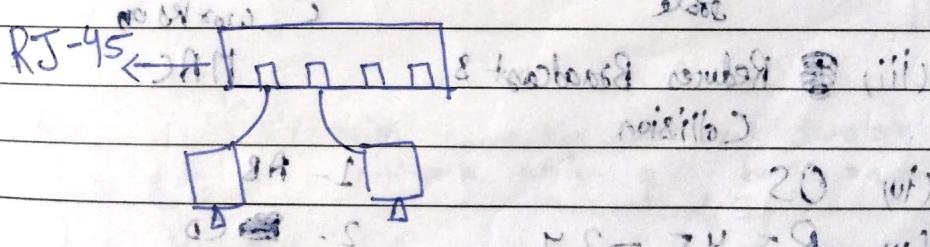


(Distorted
Signal)

MAU - Multiple Access Unit



First device used as ~~MAU~~ MAU (i)



(i) MAU

(ii) RJ-45 — 4, 8, 16, 24

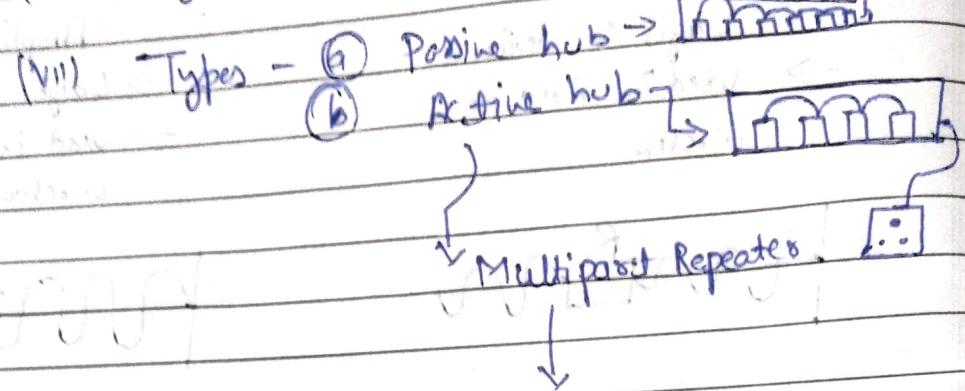
(iii) Speed 10 Mbps

(iv) Half Duplex

(v) Heavy broadcast & collection

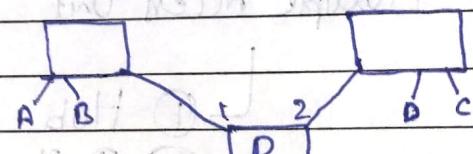
(finding destination address)

(VII) Layer -1 device (Physical layer device)



Multipoint Repeater is used for fixing problems of weak signals.

② Bridge



(i) Layer 2 device

(ii) Creates MAC table

(iii) Reduces Broadcast Collision

(iv) OS

(v) RJ-45 - 2,4

1 - AB

2 - CD

3 - EF

4 - GH

Switch - Advance form of Bridge.

↳ OS based.

↳ RJ-45 (4, 8, 16, 24, 48)

↳ Full Duplex off.

↳ Speed Enhanced

Normal speed available 100Mbps, 1Gbps, 10Gbps.
High speed available 10Gbps, 40Gbps.

↳ Types - (i) Managed Switch.

Category (ii) Unmanaged Switch

(MS)

(US)

↓
Can be
(Can be
Configured)
(Can't be Configured)

↳ Switch - L2 — MAC → frame.
Layer 2

↓
MAC T.

↓
Same Net.

— L3 — IP → Packets → Routing T.
Layer 3

↓
Diff. Diff.
Network.

Router. (Establish connection between two or more network which are based on different subnet of IP.)

↳ L3

↳ Routing T.

↳ IP address

↳ Port - Serial, Ethernet, Console, ISDN

↳ Types - (i) Modem Router

(ii) Demodulator Router.

firewall (in most routers) object

↳ Data filtration for security

↳ Multiple layers (Used in)

↳ L2 / L3 / L4 / L7 P - C8

↳ Port - Ethernet / WLAN

↳ Inbound / Outbound rule.

Types (i) Application based firewall
(ii) Hardware based firewall

(1) Software Firewall
(2) OS based (Manageable)

(i) Inbound rule
(blocking) (allowing) traffic

modem → LAN → S1 → object

↓
LAN

↓
switch

T setting → switch → RT → S1

↓
object

→ out router customer network (ISP)

traffic no need via wireless router
S1 to modem

→ out router
customer network (ISP)

Networking

• 1000.3 Transmission of Modulated Signal

- 1000.3 direct mod. wireless

Guided media

- Guided media of wireless

① Coaxial Cable

(i) Used in T.V cable

(ii) BNC connectors

(iii) EMI very less

(iv) Types RG 58 (thin) & RG 59 (thick)

- 1000.8 (V) RG 58 → Thick coaxial cable

→ 10_b

width of merging stages is

(i) 500 m distance cover

(ii) 10 mbps speed

(VI) RG 59 (shorter cable?)

10_b

① 200m distance cover

② 10 mbps

② fibre optic cable

(i) Fiber Glass LED

(ii) Light Signal LASER

(iii) Dist - Km / miles

(iv) Speed - 100 Gbps

(v) No EMI Electromagnetic Interference

(vi) Total Internal Reflection

(vii) Type - ① Single mode - Single Ray
(Range is long)

② Multimode - Multiple Ray

(Range is short)

(viii) Connector - SC, ST, ~~FC~~ SMA

(ix) 90 Kg tension can be observed.

(x) Splicing

(xi) Temperature - (-40 \leftrightarrow 70°)

③ Twisted pair Cable

(i) Used in LAN

(ii) Copper wire used \rightarrow 8 (4 pairs)

(iii) Distance coverage \rightarrow 100m

(iv) Speed 1 Gbps

(v) Connector - RJ-45, RJ-11

Type \downarrow
8 pins

\downarrow
4 pins

(vi) ~~STP~~ Shielded (STP) 8 \uparrow Unshielded (UTP)

(vii) UTP - High EMI

(viii) STP - Low EMI

(ix) Pairs - G B O B

Green Brown Orange Blue

↓ ↓ ↓ ↓
WG WB BO BO WB

Color Code is given

by TIA/EIA

Given by

(TIA/EIA)

(X) Pattern - 568A

568B

568A

568B

1 WG

2 G

3 BO

4 B

5 WB

6 O

7 WB

8 B

1 O

2 WG

3 BO

4 B

5 WB

6 G

7 WB

8 B

Networking

(i) Straight Over cable.

↳ Dissimilar device

↳ Hub to PC

↳ Switch to PC

A — A

B — B

(ii) Crossover cable.

↳ Similar device

↳ Hub to PC, S-S, PC - PC

↳ A — B

(iii) Roll over cable.

↳ Configuration

A/B — opposite

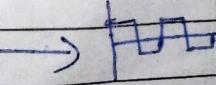
Unguided media

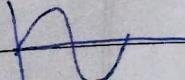
↳ Media - wave

↳ Data signal

↳ Carrier signal

↳ Types of Signal:

↳ Digital → 

↳ Analog → 

Data transmission ~~information~~

Range \rightarrow 3Hz - 300 GHz

↳ (Radio / Microwaves)

→ Transmission of signal depends on Network

Model \rightarrow OSI model

↳ for knowing how

Communication is done

→ OSI model

This model is used to represent the communication at all network infrastructure using different media devices and topology. All processes are categorized into different layers.

This model was standardized by ISO International Standard Organization in 1984. It has 7 layers.

- ① Physical layer
- ② Data link layer
- ③ Network layer
- ④ Transport layer
- ⑤ Session layer
- ⑥ Presentation layer
- ⑦ Application layer

(OSI model)

Sender

Receiver

AL — Data

AL

Upper
layer

PL — Data

PL

PL

SL — Data

SL

SL

TL — Segment

TL

middle
layer

NL — Pocket

NL

NL

DL — Frame

DL

DL

PL — Bits/Signals

PL

PL

Encapsulation

Decapsulation

Networking

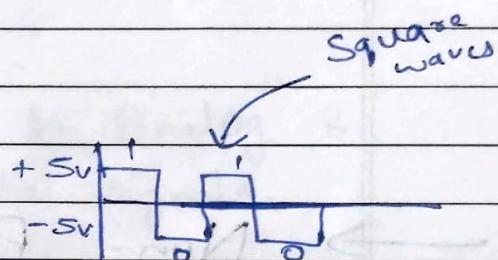
OSI model

Physical layer

- Media Accessing
- Bits Synchronization
- Data flow
- Signaling
- Devices - Hub, Repeater, Amplifier

→ Signaling

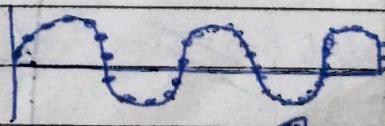
Digital signal.



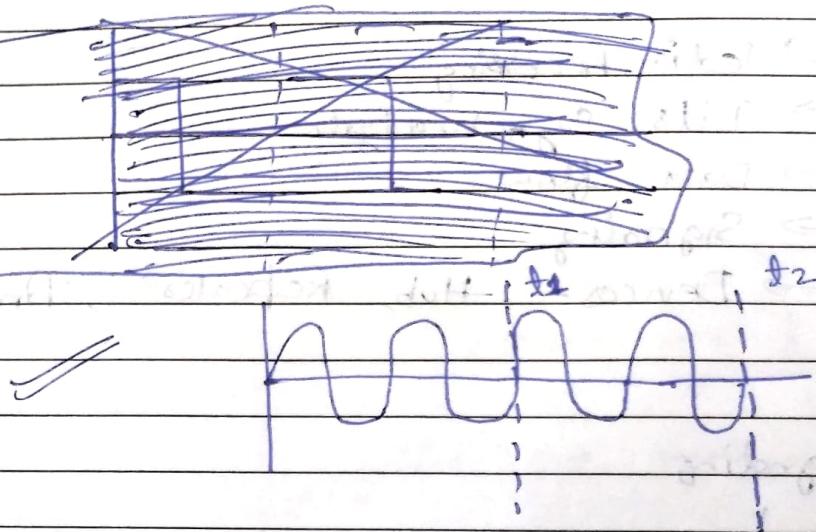
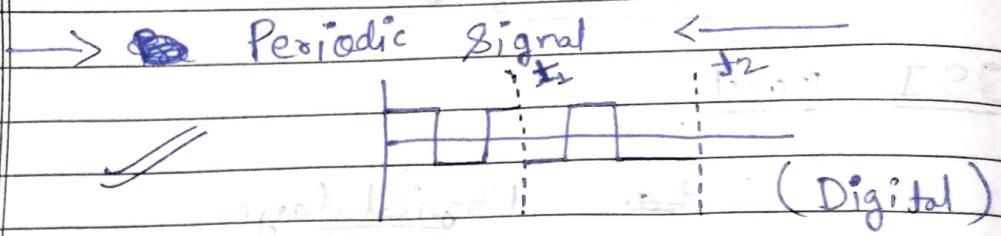
- ↳ Square waves
- ↳ Discontinuous flow of electricity
- ↳ Carries only 2 values $\{0 - 1\}$
- ↳ Covers short distance
- ↳ eg. Computer, ISDN lines

Analog Signal

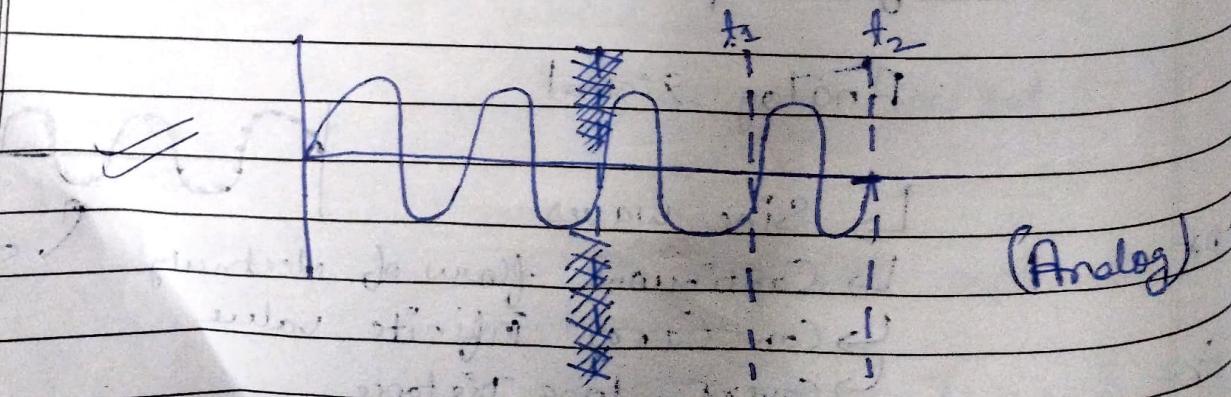
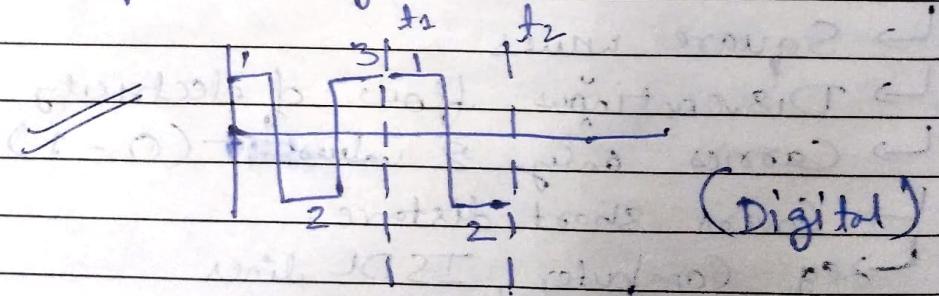
- ↳ Sine waves
- ↳ Continuous flow of electricity
- ↳ Can carry infinite value
- ↳ Covers long distance
- ↳ eg. Leased line



sine waves.



→ Non-Periodic Signal. ←
A-periodic Signal



Kanhiya

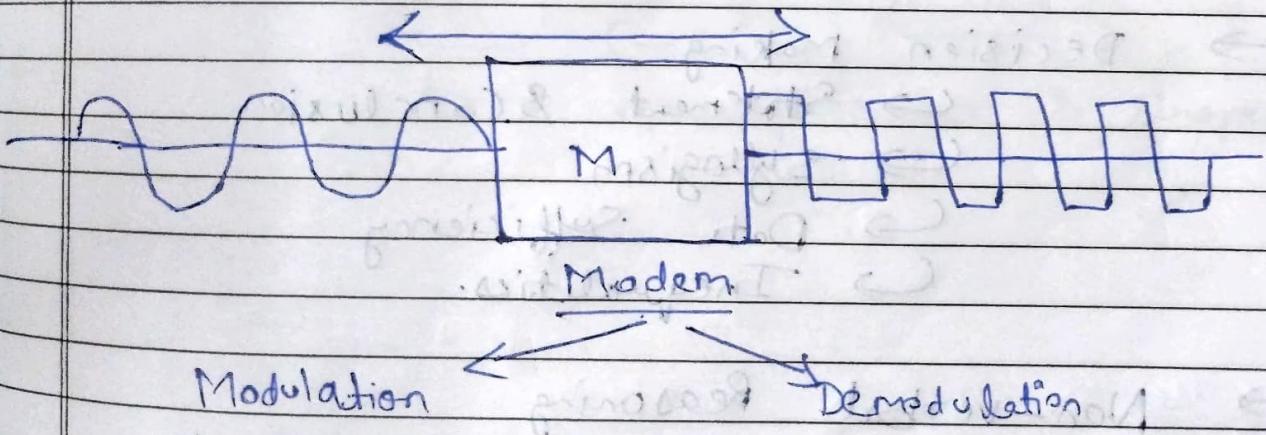
→ Periodic Signal.

↳ In a single unit of time no. of cycles are equal in case of Analog & Digital signal it is called periodic signal.

→ Aperiodic Signal / Non-periodic Signal

↳ In a single unit of time no. of cycles are unequal in case of Analog & Digital signal it is called Aperiodic / Non-periodic signal.

→ Modem → Converts Digital to Analog & Analog to Digital signals.



(Modem - Modulator - Demodulator)

This is a device that is used for conversion of analog signal to Digital signal Vice-versa. It works at physical layer of OSI model.

e.g. ADSL, VDSL, HDSL

~~Answers~~

next topic → (Analog Signal Properties)

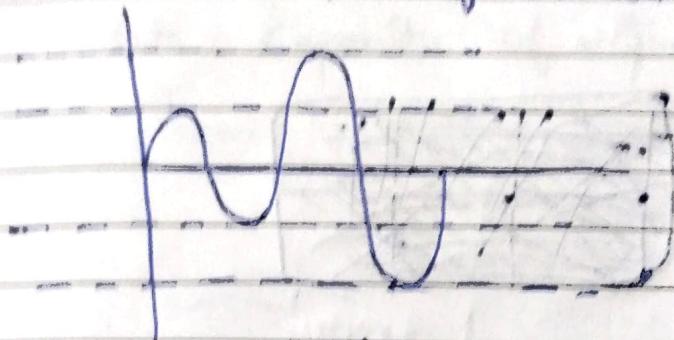
Networking

Analog Signal

Time

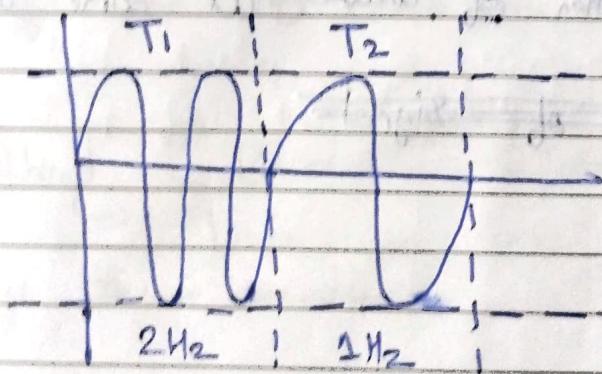
(i) Amplitude

→ Peak of the wave.



(ii) Frequency

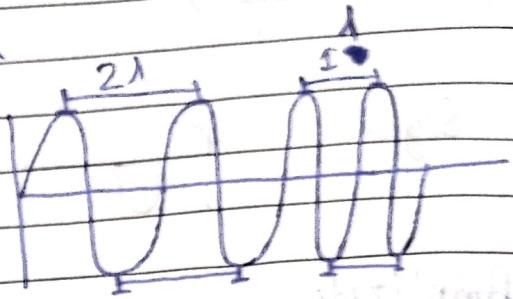
→ No. of cycle per unit of time



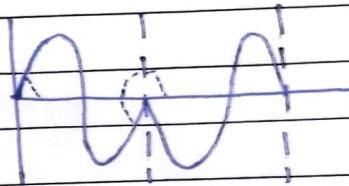
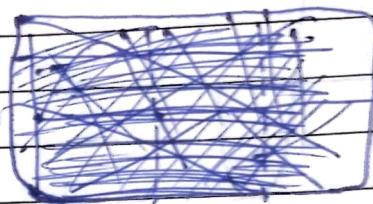
(iii) Wavelength (λ)

→ Distance between two peaks.

Wavelength



(iv) Phase



Generation of wave at some angle

~~Variation of Signal~~

→ Broadband

Bandwidth

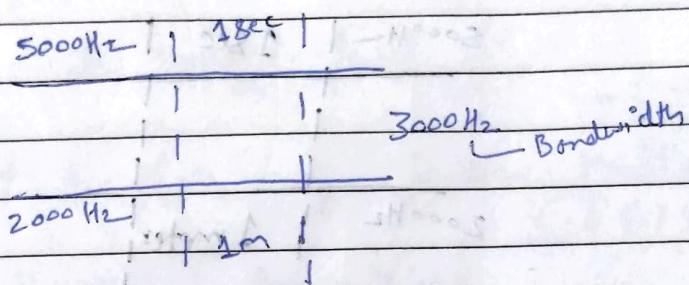
5000 Hz

2000 Hz

Bandwidth

Range of frequency of media

- (i) The difference between the max frequency and min frequency of media is called Bandwidth.
- (Throughput) → The amount of data transferred in one unit time and one unit media is called the throughput.
- Actual data capacity of a link is throughput.



- (i) Baseband → When we pass one signal through the broadband.
- (ii) Broadband → Broadband is slow compared to baseband.
- When we pass multiple signals through the broadband.

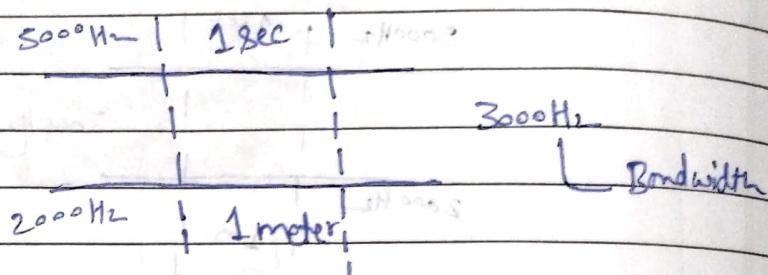
- Channel → In digital form (i)
- (iii) Channel is called as the division of bandwidth.
- (iv) Guardband is present.
- During the division of bandwidth there are some frequency ranges are reserved they are called as guardband.

Link

→ Bandwidth

It represents total capacity for transmission of data of a media it is measured in Hz (Analog) & Kbps (Digital)

for example



→ Throughput

It is the measurement of data transmission capacity of a link but it is evaluated at segment of media in a unit of time

→ Baseband

(.) Used with digital signal

(.) Time division multiplexing is used

(.) It is bidirectional transmission by using time division multiplexing (TDM) technology

(.) Used for short distance transmission

(.) Entire bandwidth is utilized for single transmission;

eg. ~~10BaseT~~

10 Base T

→ ~~Serial port~~

~~Ethernet~~

↓
10mbps
Twisted pair cable based.

→ Broadband 100M

(.) Used with analog Signal

(.) Works on frequency Division Multiplexing (FDM)

(.) Uni directional transmission.

(.) Long distance signaling.

(.) Bandwidth is divided into multiple channels

eg. Radio Station, Internet connection,
fibre optic.

~~AB~~ Networking

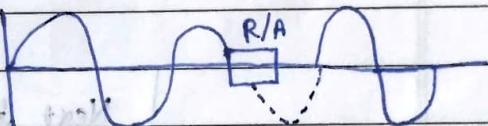
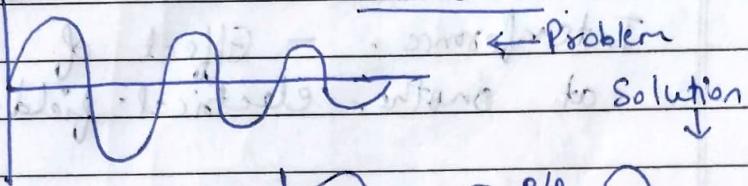
Signal Impairments

It represents the problems that occurs during the transmission of data signal through media. It may cause of slow & poor transmission.

Types of Impairments

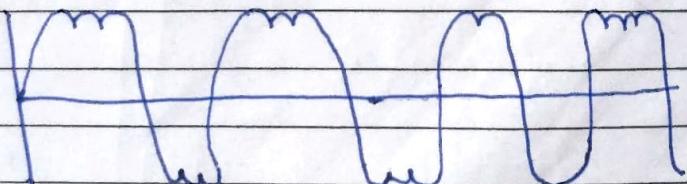
(i) Attenuation - It represents the loss of energy of data signal during it's transmission. The reason behind it is the resistance of the media. To remove this issue/problem, Repeater, or Amplifier is used.

Attenuation



(ii) Distortion - The change of shape of data signal is known as distortion.

It mostly occur with composite signal. To remove this problem ~~proper~~ channel should be created in the bond width.



Distortion

(iii) Noise :- This is the representation of different regions that affect the data signal. These regions can be

① Cross talk. - It means

Overlapping of data from one channel to another channel or effect of high energy media at low energy media.

② Thermal - If a media is

passed through a heavy heated area it disturbs the movement of electrons.

③ Impulse - Means discharge of high energy like thundering.

④ EMI - Electromagnetic Interference. - Effect of one electrical field at another electrical field.

Next Topic → Digital Data → Digital Signal