-- ANALOG AND DIGITAL DATA TRANSMISSION--

* Data -entities that convey meaning or information.
* Signals- electric or electromagnetic representation of data.
* Transmission -communication of data by the propagation and processing of signals.
* Signaling- physical propagation of signal along suitable medium.

Analog and Digital data

- Examples of analog data are audio and video.
- To produce a picture on the screen, an electron beam scans across the surface from left to right and top to bottom. The amount of illumination produced at any point is proportional to the intensity of the beam as it passes that point. At the end of each scan line, the beam is swept rapidly back to left (horizontal retrace) when the beam reaches the bottom, it is swept rapidly back to the top.
- Beam produces a total of 483 horizontal lines at a rate of 30 complete scans of the screen per second.
- To avoid flickers no of scans =60 per second.
- At the first go scans 1,3,5,7....
  & second go 2,4,6,8.....
- Human sensitive to space rather than time.
- 42 lines are lost during vertical retrace.
  Thus, horizontal scanning frequency= (483+42)*(30scans/second)=15750 lines/second.
  or 63.5 micro second/line. Horizontal retrace= 11micro second.
  Scanning per video line= 52.5 micro second.
- Ratio of width to height of a TV is 4:3.
  Hence bit rate = 483*4/3=640(horizontal resolution)
  -640/2 =320 cycles of the wave in 52.2 microsecond
  Thus maximum frequency = 6MHz
- The lower limit corresponds to dc or zero frequency, where dc component corresponds to avgs illumination of the scene.
  Bandwidth= 6-0=6MHz.

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- Analog transmission is means of transmitting analog signals without regard to their content. Analog signals may represent analog or digital data.
- Amplifiers- it increases strength of signals without changing shape of the signals. Its defect is it also amplifies noise which creates disturbance.
- Digital transmission is concerned with the content of the signal. It can be transmitted only a limited distance before attenuation.
- Repeater receives the digital signal and recovers the pattern of 1s and 0s and retransmits a new signal.
- Distortion- affected to high frequency i.e. digital transmission.

Advantage of digital transmission over analog transmission

1. Digital technology:-the advent of large scale integration (LSI) and very large scale integration technology has caused a continuing drop in cost ands size

2. Data integrity: - with the use of repeaters rather than amplifiers, the effect of noise and other signals are not impairments are not cumulative. Thus it is possible to transmit data longer distances.

3. Capacity utilization: complete utilization of channels by high degree of multiplexing which is easily and cheaply available with digital (time division).

4. Security and privacy: encryption technique can be readily applied to digital data and to analog data that have been digitized.

5. Integration: by treating both analog and digital digitally, all signals have the same form and can be treated similarly.

------- Transmission Impairments---------

-Receiver may receive different signals i.e. transmitted from sender due to various transmission impairments

-Impairments are: 1. Attenuation and attenuation distortion
2. Delay distortion
3. Noise

-Attenuation: the strength of signals falls off with distance over any transmission medium.

-For guided media, reduction in strength is generally exponential. For unguided media reduction in strength is more complex function of distance. Attenuation is increasing function of frequency. Hence affects digital signals most.

-Delay distortion: occurs because velocity varies with frequency of propagating signals in guided media, the velocity tends to be highest near the central frequency and fall off towards the two edges of the band. Various frequency component will arrive at the receiver at different times resulting in phase shift

Between the different frequency and received signals get distorted. Most affected by critical data.

- Noise: received signal will consist of the transmitted signal, modified by the various distortions imposed by the transmission medium and additional unwanted signal that are somehow inserted in the medium.

- Different types of noises are:-

1. Thermal noise
2. Intermodulation noise
3. Cross talk
4. Impulse noise