

1. Identify different applications of data communication networks.  
Give different types of data communication networks that are used in these applications.
2. Understand the concept of layering and structure of ~~ISO~~ reference model of or OSI and hence with functionality of each layer and hence explain
  - a) Significance of layering
  - b) Significance of interface
  - c) What layer is responsible for source to destination delivery of packets across multiple network links.
  - d) Give function of application layer.
3. Differentiate between/among:
  - a) Network layer delivery and transport layer delivery
  - b) Port address, Logical address and Physical address.
4. What is peer-to-peer process.

## Assignment-2

Study following concepts/definitions:

Analog and Digital Data

Analog and Digital Signal

Periodic and Non periodic signal

Periodic composite signal and non periodic Composite signal.

Digital signal: Two level and more than two level

Bit rate and baud rate

Bit length.

Base band transmission and broad band transmission.

Do the following problems and submit:

a) Assume we need to download text documents at a rate of 100 pages per minute. What is required bit-rate of channel? (1.636 Mbps)

b) A digitized voice channel is made by digitizing a 4-KHz band width ~~of~~ analog voice ~~channel~~ signal. Assume each sample requires 8 bits. What is required bit rate? (64 kbps)

c) What is the required band width of a low pass channel if we need to send 1 Mbps by using base band transmission. Minimum band width is  $\approx \text{bit rate}/2 = 500 \text{ kHz}$ . We need to transmit in a low pass channel with frequency between 0 and 500 kHz.

Assume, we use first, ~~our~~ 3rd and 5th harmonic -  
(2.5 MHz)

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## Assignment - 3

B.Tech, 6th Sem

- \* Signals travel through transmission media. Transmission media are not perfect. Therefore signal at the beginning of media is not same as the signal at the end of the medium. This happens by virtue of transmission impairments. The causes of impairment are: Attenuation, Distortion and Noise.

Students are advised to go through Transmission impairments in detail. Further they are advised to solve following problems and submit:

- Signal at the beginning of cable is  $-1.5$  db and has a power of  $2$  mW. What is the power of signal at  $5$  km? ( $1.4$  mW)
- The power of signal is  $10$  mW and power of noise is  $1$   $\mu$ W; What is value of SNR and SNR<sub>db</sub>? ( $10,000, 40$ ).

- \* Data rate limits for noiseless and noisy channel are determined by Nyquist bit rate and by Shannon's Channel Capacity. Students are expected to understand the concepts and ~~answer~~ solve following problems and submit:

- A telephone line normally has a b.w. of  $3000$  Hz ( $300-3300$  Hz) assigned for data communications. SNR is usually  $3162$ . Find channel capacity. If we want to send data at a faster rate; how that can be done? ( $34,860$  bps).

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## Assignment - 3 (Contd)

- d) Assume  $SNR_{db} = 36$  and channel B.W. is 2 MHz. Calculate channel capacity
- e) Assume channel with 1 MHz b.W. The SNR of this channel is 63. What calculate appropriate bit rate and Signal level. (6 Mbps)

One important ~~the~~ issue in networking is performance of the network. Quality of Service determines network performance. There are some parameters which <sup>that</sup> deter have been designated for determining performance of the network. The <sup>effective</sup> parameters <sup>that may be considered</sup> are:

- (i) Band width
- (ii) Throughput
- (iii) Latency (Delay)
- (iv) Propagation Time
- (v) Queuing Time
- (vi) Band width delay product
- (vii) Jitter.
- (viii) Transmission time

Students are advised to understand these concepts clearly and their effect on QoS thoroughly and solve the following:

- (8) Calculate propagation  $t_p$  and Transmission  $t_t$  if the distance between two points is 12000 km. (50ms)
- (9) For a message 2.5 Kbyte, ~~the band width~~ calculate propagation  $t_p$  and Transmission  $t_t$ . The b.W. of n.w. is 1 Gps. Assume distance between sender and receiver is 12000 km and <sup>signal</sup> light travels @  $2.4 \times 10^8$  m/s. (50ms, 0.020ms)

References :

1. Data communication and Networking  
Behrouz A. Forouzan
2. Data Communications, Computer networks  
and open Systems  
Fred Halsal
3. Video Lecture given on Institute  
website (ECE DeptH.)