Tutorial 6 Computer Networks

Q.1 An analog signal has a bit rate of 8000 bps and a baud rate of 1000. How many data elements are carried by each signal elements? How many signal elements are required?

Q.2 Suppose an application entity generates 2904 bytes of data. Suppose also that by the time this data arrives at the data link layer, 96 bytes of header information has been added. At the data link layer, the maximum frame size is 1518 bytes, of which 18 bytes are its header.

 (a) How many frames will be used?

 (b) How many total bytes must be transmitted?

 (c) What percentage of the transmitted bits are from the application layer?

Q.3 A network with bandwidth of 10 Mbps can pass only an average of 15,000 frames per minute with each frame carrying an average of 8,000 bits. What is the throughput of this network?

Q.4 What is the propagation time if the distance between the two points is 48,000 ? Assume the propagation speed to be 2.4×10^8 meter/second in cable.

Q.5 What are the propagation time and the transmission time for a 5-MB (megabyte) message (an image) if the bandwidth of the network is 1 Mbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 meter/second.

Q.6 What are the propagation time and the transmission time for a 2.5-kbyte message (an e-mail) if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 meter/second.

Q.7 What is the total delay (latency) for a frame of size 5 million bits that is being sent on a link with 10 routers each having a queuing time of 2 micro s and a processing time of 1 micro s. The length of the link is 2000 Km. The speed of light inside the link is 2×10^8 m/s. The link has a bandwidth of 5 Mbps. Which component of the total delay is dominant? Which one is negligible?