Answer on Question#39345 - Math - Other

Frames of 1000 bits are sent over a 10^6 bps duplex link between two hosts. The propagation time is 25ms. Frames are to be transmitted into this link to maximally pack them in transit (within the link).

What is the minimum number of bits (i) that will be required to represent the sequence numbers distinctly? Assume that no time gap needs to be given between transmission of two frames.

(A) i=2

(B) i=3

(C) i=4

(D) i=5

Solution

Transmission delay for 1 frame $t_{tr}=\frac{1,000}{10^6}=10^{-3}s=1ms$. Propagation time $T=25ms$. The sender can almost transfer $\frac{T}{t_{tr}}=\frac{25}{1}=25$ frames before the first frame reaches the destination.

The number of bits needed for representing 25 different frames $i\geqslant\log_2 25\approx 4.6439$.

Answer

(D)

Suppose that the sliding window protocol is used with the sender window size of 2^i where is the number of bits identified in the earlier part and acknowledgments are always piggy backed. After sending 2^i frames, what is the minimum time the sender will have to wait before starting transmission of the next frame? (Identify the closest choice ignoring the
frame processing time.)

(A) 16ms

(B) 18ms

(C) 20ms

(D) 22ms

Solution

Size of sliding window $n=2^5=32$. Transmission time for a frame $t_{tr}=1ms$. Total time taken for n frames $t_t=32ms$. The sender cannot receive acknowledgment before round trip time which is $t_{rt}=m\cdot T\geqslant t_t,\ m=2,\ t_{rt}=50ms$. After sending n frames, the minimum time the sender will have to wait before starting transmission of the next frame $t_w=t_{rt}-t_t=50-32=18ms$.

Answer

(B)