Answer on Question#39316 - Math - Other

A 25 Kbps satellite link has a propagation delay of 400 ms. The transmitter employs the "go back n ARQ" scheme with n set to 10. Assuming that each frame is 100 bytes long, what is the maximum data rate possible?

A) 5 Kbps

B) 10 Kbps

C) 15 Kbps

D) 20 Kbps

Solution

The transmission delay t_{tr} for sending the packet is equal to $t_{tr}=\frac{L}{C}=\frac{100\cdot 8}{25000}=0.032$ seconds and $t_{ack}=0.4$ seconds. Let t_{ack} be the time until satellite receives an acknowledgment for a sent packet. In the time interval $T=t_{tr}+t_{ack}=0.032+0.4=0.432$ we have that satellite sends a packet of length L. The average (transmission) rate (in bits per seconds) with which satellite sends data to endpoint is a function of n.

Let $N_0=\frac{t_{ack}}{t_{tr}}=\frac{0.4}{0.032}=12.5\approx 13$ be the maximum number of packets satellite can send while waiting for an ACK. The rate $x(n)$ at which satellite sends packets to enpoint as a function of n is given by

$$x(n)=\left\{\begin{array}{ll}\frac{nL}{T}=\frac{10\cdot 800}{0.432}\approx 18519\,bps, & n\leqslant N_0+1\\ C=25000\,bps, & n>N_0+1\end{array}\right\}$$

. Thus, $x(10)\approx 20\,Kbps$.

Answer

D)