コンピュータネットワーク特論レポート 2

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1 Since the probability of a frame beign received undamaged is 0.8, after 10 transmissions, 2 out of the 10 frames will be in error, and those two frames will require re-transmission. After those 2 frames are re-transmitted, at least 1 out of the two frames will be in error and will therefor require another transmission. So to get the entire timing through an average of 13 times is required.

2 propagation time $= 20\ ms$, bit rate $= 2\ Kbps$, No. of transmittable bits(r)

$$\begin{aligned} r &= 20 \times 10^-3 \times 2 \times 10^3 \\ &= 40 bits \\ &= 5\ bytes \end{aligned}$$

To ensure an efficiency of at least 50% for the stop-and-wait protocol, the frame size should range from 2.5 bytes to 5 bytes

3 throughput(TP)=receive window/ round trip time
data rate $=128 \times 10^3$bps frame size=512 bytes =4096 bits
receive window =frame size(in bits) $\times$ n, where n= window size
round trip time=2 $\times$ 270 ms + transmission time
transmission time $=\frac{frame\ size(in\ bits) \times n}{data\ rate}$
ack frame size assumed to be 0

case n=1
transmission time $=\frac{4096 \times 1}{128 \times 10^3} = 0.032$s
TP=$\frac{4096) \times 1}{0.54+0.032} = 7.161$Kbps

case n=7
transmission time $=\frac{4096 \times 7}{128 \times 10^3} = 0.224$s
TP=$\frac{4096) \times 7}{0.54+0.224} = 37.529$Kbps

case n=15
transmission time $=\frac{4096 \times 15}{128 \times 10^3} = 0.48$s
TP=$\frac{4096) \times 15}{0.54+0.48} = 60.235$Kbps

case n=127
transmission time $=\frac{4096 \times 127}{128 \times 10^3} = 4.064$s
TP=$\frac{4096) \times 127}{0.54+4.064} = 112.987$Kbps

4 propagation speed $=\frac{2}{3} \times 3 \times 10^8 = 2 \times 10^8$
T1 data rate =1.544 Mpbs total time required for propagation over 10 Km cable(t)$=\frac{10\times10^3}{2\times10^8} = 5 \times 10^-5$ s
Amount of data that can fit into cable $=1.544 \times 10^6 \times 5 \times 10^-5 = 77.2$ bits