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P6. a. $d_{prop} = m/s$　　b. $d_{trans} = L/R$

c. $d = m/s + L/R$　　d. 刚到链路上

e. $d_{trans} < d_{prop}$　所以该比特在链路中传播中

f. $d_{trans} > d_{prop}$　该比特已经到达了目的路由器

~~g. $m/s = L/R = \frac{120}{56000} = \frac{m}{2.5\times10^8}$ $= 5.36\times10^5$ m~~

g. $m = \frac{L}{R}\cdot s = \frac{150\times8}{10\times10^6}\cdot 2.5\times10^8 = 3\times10^5$ m

P7. $t_1 = \frac{56\times8}{64\times10^3} = 7\times10^{-3}$ s $= 7$ ms

$t_2 = \frac{56\times8}{100\times10^6} = \frac{2.24\times10^{-4}}{5}$ s　　$= 0.0448$ ms

$T = t_1 + t_2 + t_3 = 17.0448$ ms

P25. a. $R\cdot t_{prop} = 5\times10^6 \cdot \frac{2\times10^4\times10^3}{2.5\times10^8} = 4\times10^5$ bit

b. $t_{prop} = \frac{2\times10^7}{2.5\times10^8} = 0.8\times10^{-1} = 0.08$ s

$\therefore L_{max} = t_{prop}\cdot R = 5\times10^6\times8\times10^{-2} = 4\times10^5$ bit

c. 链路比特最大值

d. $d_1 = \frac{2\times10^7}{4\times10^5} = 50$ m，不比一个足球场长

e. $d_1 = \frac{m}{R\cdot t_{prop}} = \frac{m}{R\cdot\frac{m}{s}} = \frac{s}{R}$

①

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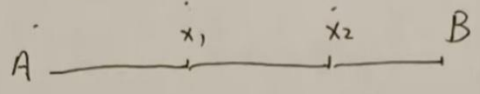
P33. $n = \frac{F}{S}$ $t = \frac{80+S}{R}$



$\therefore F_{tot} = \frac{F}{S} \cdot (80+S) = \frac{80F}{S} + F$ bit

$t_1 = \frac{F_{tot}}{R} = \frac{80F}{RS} + \frac{F}{R}$

$t_2 = \frac{80+S}{R} \times 3 = \frac{3S+240}{R}$ $\frac{2S+160}{R}$

$T = t_1 + t_2 = \frac{3}{R}(S+80) + \frac{80F}{RS} + \frac{F}{R}$ $\frac{3S}{R} + \frac{80F}{RS} + \frac{F}{R} + \frac{240}{R}$

$\geq \frac{F}{R} + \frac{240}{R} + 2\sqrt{\frac{240F}{R^2}} = \frac{F}{R} + \frac{240}{R} + \frac{2\sqrt{15F}}{R}$

$T = \frac{1}{R}(\frac{80F}{S} + F + 2S + 160)$

$= \frac{1}{R}(\frac{80F}{S} + 2S + 160 + F)$

$\geq \frac{1}{R}(\sqrt{160F} + 160 + F)$

(当且仅当 $2S^2 = 80F$

$S = 2\sqrt{10F}$ 时 "=" 成立)

$\therefore S = 2\sqrt{10F}$

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