


FORMULE EX BANDA 

Stop & Wait:

Formule:

$$T_f = \frac{I+P}{Bw}$$

$$T_{HACK} = \frac{I}{Bw} =$$

$$Bw = \frac{P}{T_f + T_a + 2LT + RTT}$$

$$\hookrightarrow \frac{I+P}{Bw} + \frac{I}{Bw} + 2LT + 2T_p$$

Esercizio:

$$BANDA = 8 \text{ Mbps.} = 8 \cdot 10^6 \text{ bps}$$

$$(T) \text{ Ritardo Propagazione} = 10 \text{ ms} = 10^{-2} \text{ s} \quad 1 \text{ ms} \rightarrow 1 \cdot 10^{-3} \text{ s} \text{ siccome sono } 10 \text{ ms } 1 \cdot 10^{-2} \text{ s}$$

$$\text{Intestazione} = 10 \text{ byte} = 80 \text{ bit}$$

$$\text{Banda Effettiva} = 5 \text{ Mbps} = 5 \cdot 10^6 \text{ bps}$$

$$\text{Timer} = 100 \text{ ms} = 10^{-1} \text{ s}$$

$$\text{Perdita} = 0.01 (L)$$

Ritardo trasmissione frame? ①

Ritardo trasmissione HACK! ②

Payload? ③

① Per risolvere devo ottenere P

Stop & Wait

$$BW_e = \frac{P}{T_e}$$

$$T_e = 2T_p + T_a + T_f + T_c$$

$$T_p = \frac{L}{V}$$

$$T_a = \frac{I}{BW}$$

$$T_f = \frac{I+P}{BW}$$

$$T_c = (Perdita + Perdita) \cdot t$$

$$\text{Banda (BW)} = 80 \text{ Mbps} = 8 \times 10^7 \text{ bps}$$

$$\text{Ritardo di Propagazione (Tp)} = 10 \text{ ms} = 10^{-2} \text{ s}$$

$$\text{Intestazione (I)} = 100 \text{ byte} = 800 \text{ bit}$$

$$\text{Payload} = 900 \text{ byte} = 7200 \text{ bit}$$

$$\text{ACK} = 200 \text{ byte} = 1600 \text{ bit}$$

$$\text{Timer} = 200 \text{ ms} = 2 \cdot 10^{-1} \text{ s}$$

$$\text{Perdita} = 0.03$$

$$\text{Perdita} = 0.02$$

BW_e Banda effettiva?

$$T_c = (0.03) \cdot 2 \cdot 10^{-1} = 0.006 = 6 \times 10^{-3}$$

$$T_f = \frac{8000 \text{ bit}}{8 \times 10^7 \text{ bps}} = 1 \times 10^{-4} \text{ s}$$

$$T_a = \frac{800 \text{ bit}}{8 \times 10^7 \text{ bps}} = 1 \times 10^{-5} \text{ s}$$

$$T_e = 2.6 \times 10^{-2} \text{ s}$$

$$\Rightarrow BW_e = \frac{P}{T_e}$$

$$\hookrightarrow \frac{7200}{2.6 \times 10^{-2}} = 276 \cdot 10^5$$

Go BACK - N

$$BW_e = \frac{P}{2 \cdot T_p + T_g + T_a}$$

$$T_g = \frac{8800}{10^7} = 8.8 \cdot 10^{-4} \text{ s}$$

$$T_a = \frac{8000}{10^7} = 8 \cdot 10^{-4} \text{ s}$$

Ritardo Propagazione = 10 ms $\rightarrow 10^{-2} \text{ s}$

Banda (BW) = 10 Mbps $\rightarrow 10^7 \text{ bps}$

Intestazione (I) = 100 byte $\left. \begin{array}{l} 800 \text{ b} \\ 8000 \text{ b} \end{array} \right\} 8800 \text{ bit}$

Dimensione Payload = 1000 byte $\left. \begin{array}{l} 800 \text{ b} \\ 8000 \text{ b} \end{array} \right\}$

Window (W) = 20

$$BW_e ? = \frac{8000}{8.8 \times 10^{-4} + 8 \times 10^{-4} + 2 \times 10^{-2}}$$



$$Bw_e = \frac{P}{T_e}$$

$$T_y = \frac{I+P}{Bw}$$

$$T_p = \frac{L}{V} \quad 0,5$$

$$T_a = \frac{I}{Bw}$$

Window (W) : 5

Banda Width (BW) = 12 Mbit/s =

Intestazione (I) = 100 byte 800 bit

Payload (P) = 800 byte 7200 bit

Lunghezza Canale (L) = 300 km = 10^5 m

Velocità del segnale (V) = $\frac{200.000}{5,300}$ km/s $2 \cdot 10^5 \frac{m}{s}$

Lunghezza di Banda effettiva?

$$T_p = \frac{1 \times 10^5 \text{ m}}{2 \times 10^5 \frac{m}{s}} = \frac{1}{2} s < 0,5 s$$

$$T_y = \frac{28000 \text{ bit}}{12 \times 10^6 \frac{bit}{s}} = \frac{2}{3000} = 6 \times 10^{-4}$$

$$T_a = \frac{2800}{12 \times 10^6} = \frac{2}{30.000} = 6,6 \times 10^{-5}$$

$$Bw_e = \frac{7200}{8,2 \times 10^{-5}} =$$

Verfahren

$$f(x) = 101101\ 0000$$

$$G(x) = 11011$$

$$|b| = 5 - 1 = 4$$

Correggere Aggiungere
i resti di divisione

$$101101\ 0000$$

$$11011$$

$$011011\ 0000$$

$$11011\ 0000$$

$$000000\ 0000$$

\rightarrow Corretto \checkmark

Stop & Wait

Lunghezza di Banda = 100 Mbps

Ritardo di Propagazione = 1400 ms

Payload = 8000 B

Intestazione = 1000 B

Perdita 1% Andata

1% Ritorno

$t = 10 \mu s$

Ack = 1000 B

Banda che Rimane

$$BW_c = \frac{P}{T_c}$$

$$\begin{aligned} 10^8 \frac{bit}{s} \\ 14 \times 10^{-5} s \\ 72.000 bit \\ 8000 bit \end{aligned}$$

8000 bit

$$T_p = 2 \cdot (\text{Ritardo}) \cdot t = 28 \times 10^{-4}$$

$$T_u = \frac{I}{BW} = \frac{1000 bit}{10^8} = 8 \times 10^{-3} s$$

$$T_f = \frac{80000 bit}{10^8 \frac{bit}{s}} = 8 \cdot 10^{-4} s$$

$$BW_c = \frac{72.000}{28 \times 10^{-4} + 8 \times 10^{-3} + 8 \times 10^{-4}} = \frac{72 \times 10^3}{2,8 \approx 3} = 11$$