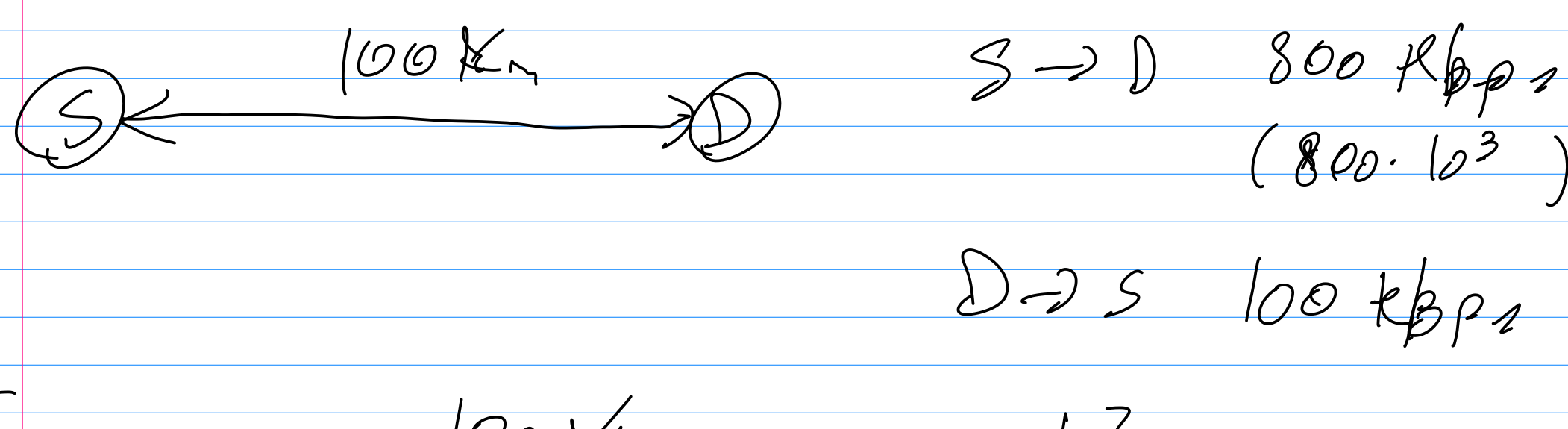


Canale: 100 Km	BW _{can} = 80 Kbps (frame)	BW _{acc} = 80 Kbps (ack)	Timer = 10 ms	Bad. = 10%
Frame = 1000 byte	R _{frame} = 9900 bps	ACK = 100 byte	STOP & WAIT	
TROVARE BW _{acc} (THROUGHPUT)				



$$T_{propagazione} = \frac{1000 \text{ byte}}{200.000 \text{ Kbps}} = \frac{10^2}{2 \cdot 10^5} = \frac{1}{2} \cdot 10^{-3} = 0,5 \cdot 10^{-3} \text{ s}$$

$$T_{inviato frame} = \frac{10000 \cdot 8 \text{ b}}{800 \cdot 10^3 \text{ bps}} = \frac{100}{10^3} = 0,1 \text{ s}$$

$$T_{inv. ACK} = \frac{100 \cdot 8 \text{ b}}{100 \cdot 10^3 \text{ bps}} = 8 \cdot 10^{-3} \text{ s}$$

$$T = 1 \cdot 10^{-3} + 0,1 + 8 \cdot 10^{-3} = 1 \cdot 10^{-3} + 100 \cdot 10^{-3} + 8 \cdot 10^{-3} = 109 \cdot 10^{-3}$$

$$\text{throughput} = \frac{9900 \cdot 8 \text{ b}}{0,109 \text{ s}} \approx \frac{79200 \text{ b}}{0,1 \text{ s}} = \frac{79200 \text{ b}}{10^{-1}} = 792 \cdot 10^3 \text{ Kbps}$$

$$8 \cdot 990 = 7920 = 79200 \cdot 10^{-1} = 79200 \frac{\text{b}}{\text{s}} = 792 \cdot 10^3 \text{ Kbps}$$

Stop and wait
Banda (BW) = 8 Mbit/s = $8 \cdot 10^6 \text{ bit/s}$
Ritardo (Rprop) = 10ms = 0,01s
Intestazione (I) = 10 byte = 80 bit (ACK)
Bwe = 5 Mbit/s = $5 \cdot 10^6 \text{ bit/s}$
Perdita = 1% (-2% considerando andata e ritorno)
Timer = 100 ms = 0,1 s
Frame (F) = ?
X = Payload
Frame = X + I

$$Bwe = \frac{X}{T}$$

$$T = 2 T_P + T_{inv, frame} + T_{inv, ACK} + 2\% \text{ timer}$$

$$T = 0,02 \text{ s} + \frac{X+I}{BW} + \frac{I}{BW} + 0,02 \cdot 100 =$$

$$= 0,02 \text{ s} + \frac{X+I}{BW} + \frac{I}{BW} + 0,002 \text{ s} =$$

$$= 0,022 \text{ s} + \frac{X+2I}{BW}$$

$$Bwe = \frac{X}{0,022 \text{ s} + \frac{X+2I}{BW}} =$$

$$\frac{X}{\left(\frac{0,022 \text{ s} \cdot BW + X + 2I}{BW} \right)}$$

$$Bwe = \frac{X \cdot BW}{0,022 \text{ s} \cdot BW + X + 2I}$$

$$X = \frac{Bwe}{BW} (0,022 \text{ s} \cdot BW + X + 2I) =$$

$$X = \frac{5}{8} (0,022 \text{ s} \cdot BW + X + 2I)$$

$$X = \frac{5}{8} 0,022 \text{ s} \cdot BW + \frac{5}{8} X + \frac{10}{8} I$$

$$\frac{3}{8} X = \frac{5 \cdot 0,022 \text{ s} \cdot BW + 10 I}{8}$$

$$X = \frac{5 \cdot 0,022 \text{ s} \cdot BW + 10 I}{3} =$$

$$= \frac{5 \cdot 50 \cdot 0,022 \text{ s} + 10 I}{3} =$$

$$= \frac{5,5 \cdot 10^6 \text{ b} + 10 I}{3} =$$

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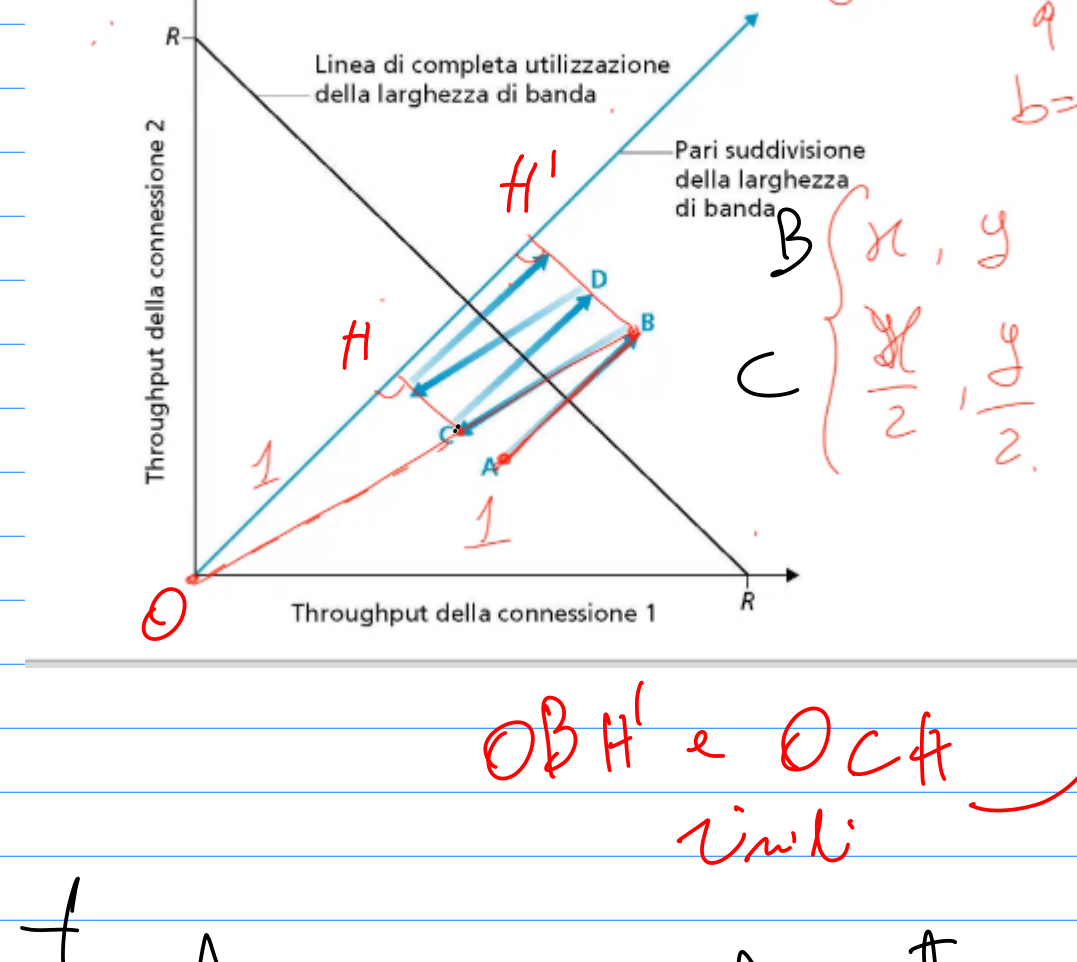
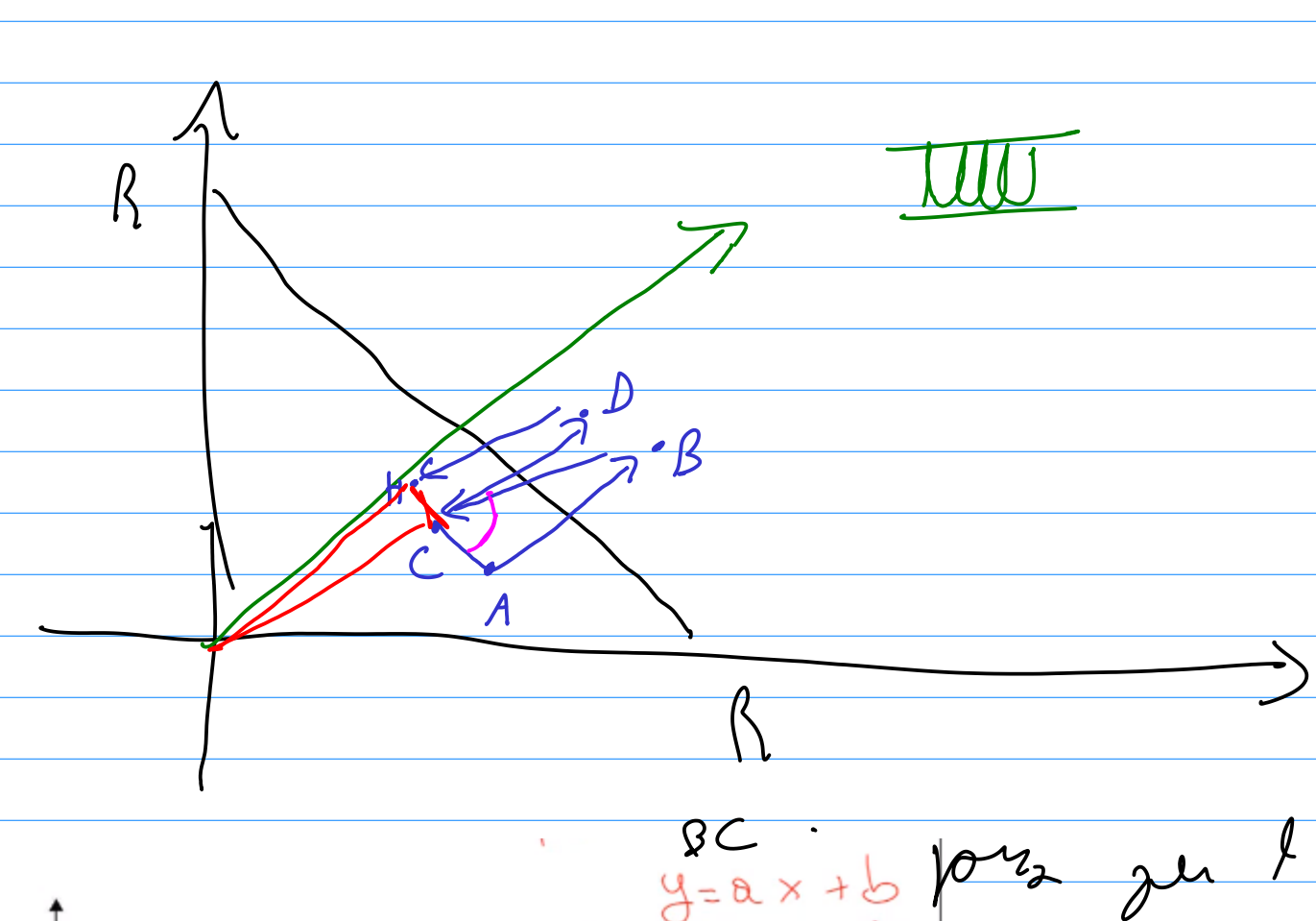
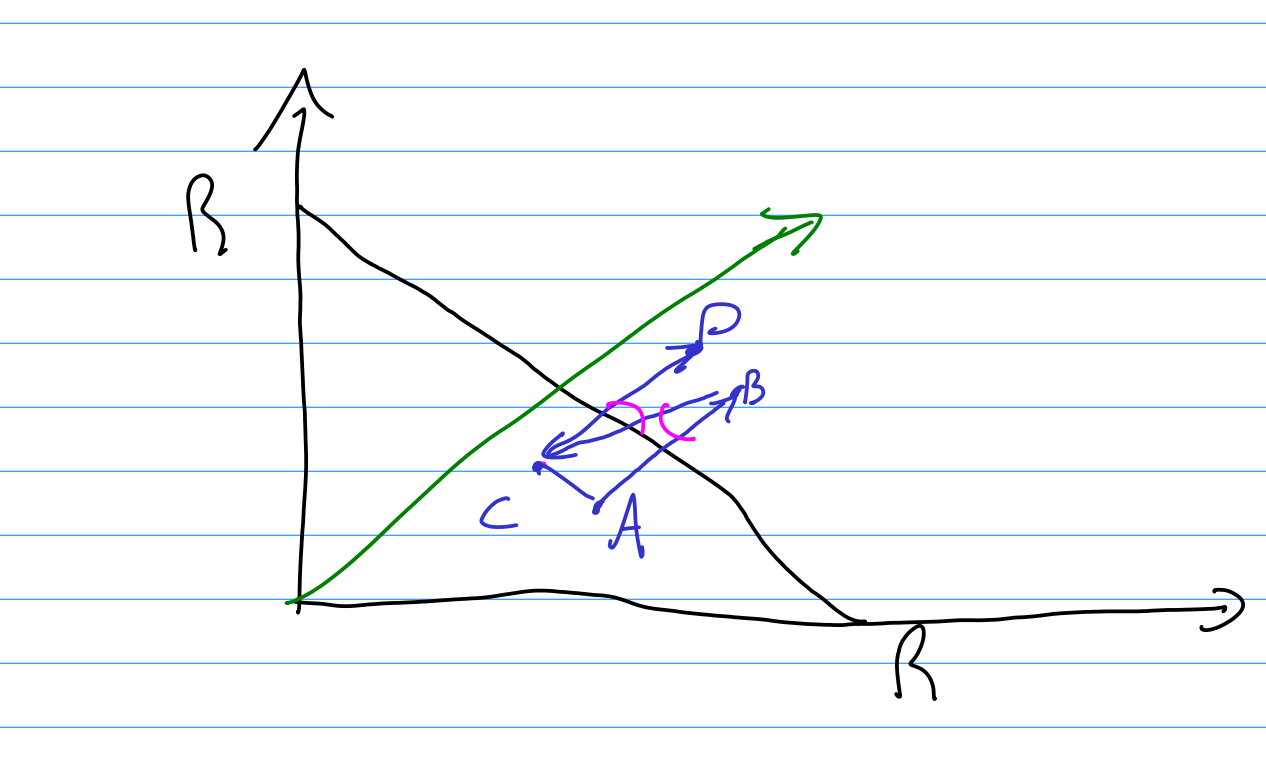
$$= \frac{5,5 \cdot 10^6 \text{ b} + 10 I}{3} =$$

$$= \frac{5,5 \cdot 10^6 \text{ b} + 10 I}{3} =$$

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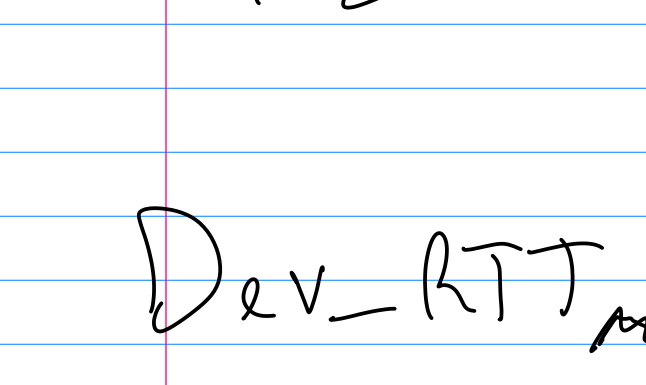


OB = 2 OC
C è a metà strada rispetto a A e D è a metà strada tra B e la retta

terzo esponenzialmente alla bisettrice

timer formula ricorsiva.

$$E_{minima_RTT_n} = (1-\alpha) \cdot E_{RTT_{n-1}} + \alpha \cdot Sample_RTT_n$$



$$\alpha = 0,125$$

Stima della varianza

$$Dev_RTT_n = (1-\beta) \cdot Dev_RTT_{n-1} + \beta \cdot |E_RTT_{n-1} - Sample_RTT_n|$$

$$\beta = 0,25$$

$$RTT_0 = E_RTT + 4 \cdot Dev_RTT$$

$$1^o \text{ Timeout} = 1 \text{ s}$$

Se timeout? timer -> raddoppia.

Cresce esponenziale