4ta Clase 5/9/2025

75.43 Introducción a los Sistemas Distribuidos
73.33 Redes y Teleprocesamientos I
TA048 Redes

Tema: Capa de Transporte (II)

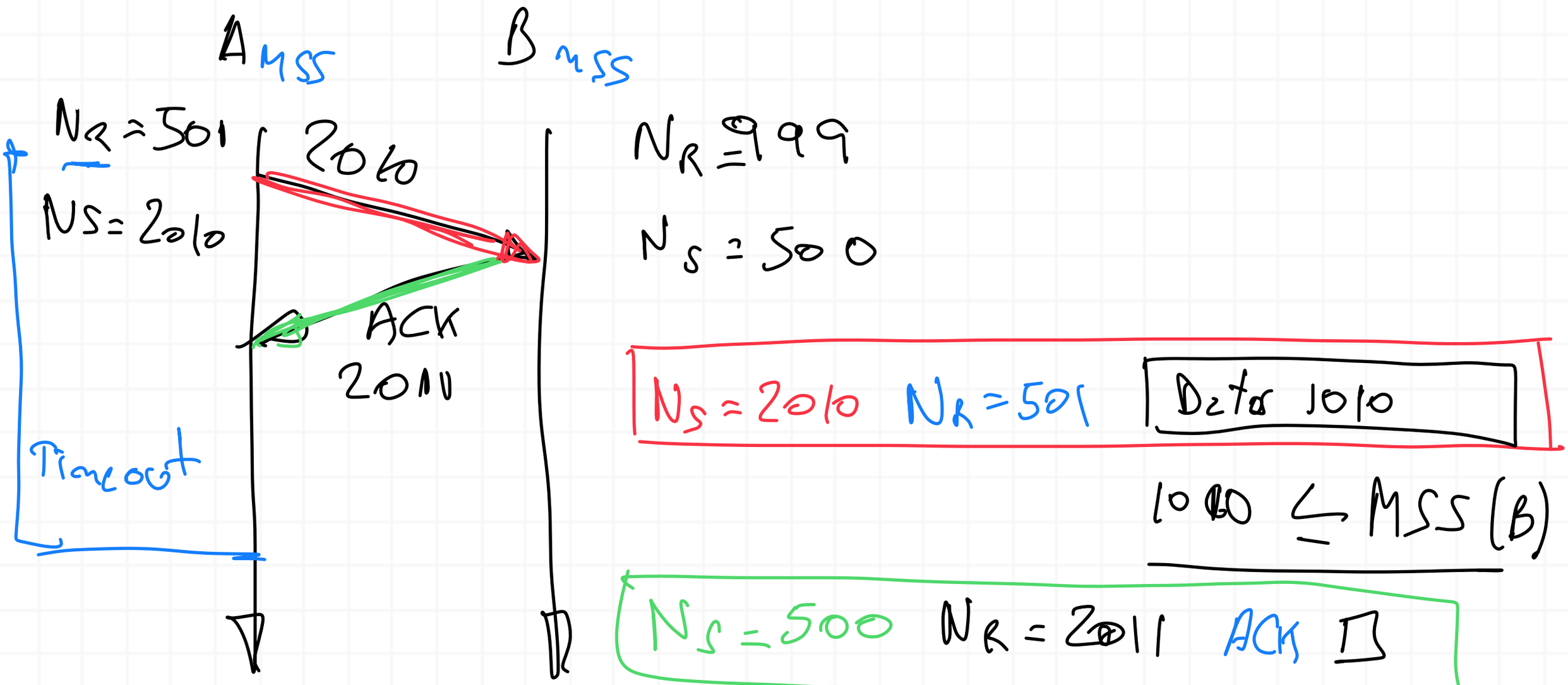
Capítulo 3 (desde 3.4 hasta el final) de *Computer Networking : A Top-Down Approach James Kurose and Keith Ross. Publisher: Pearson Edition: 8th, 2021.*

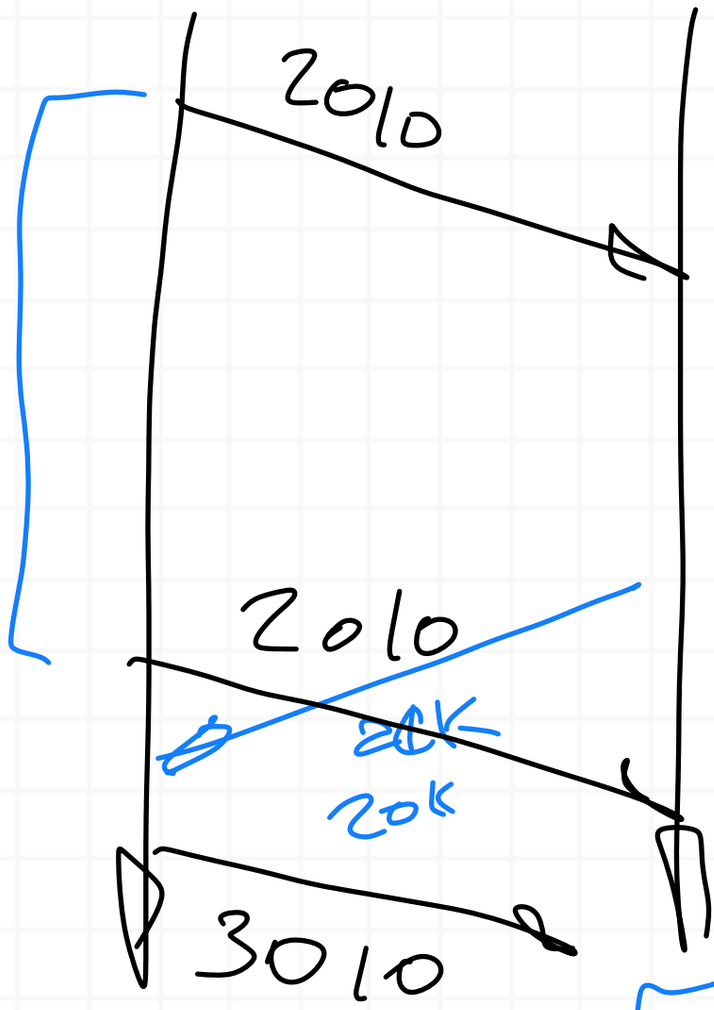
Dr. Ing. J. Ignacio Alvarez-Hamelin

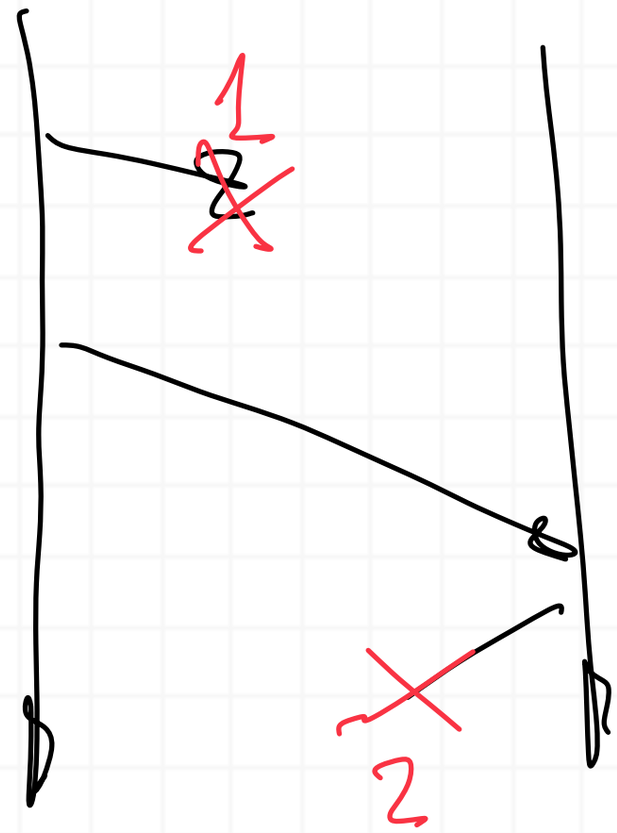
TCP (Transport Control Protocol)

- Segmentos: ¿cómo se numeran?
- *Timeout:* ¿cómo se calcula?
- Transmisión confiable: ¿cómo se logra?

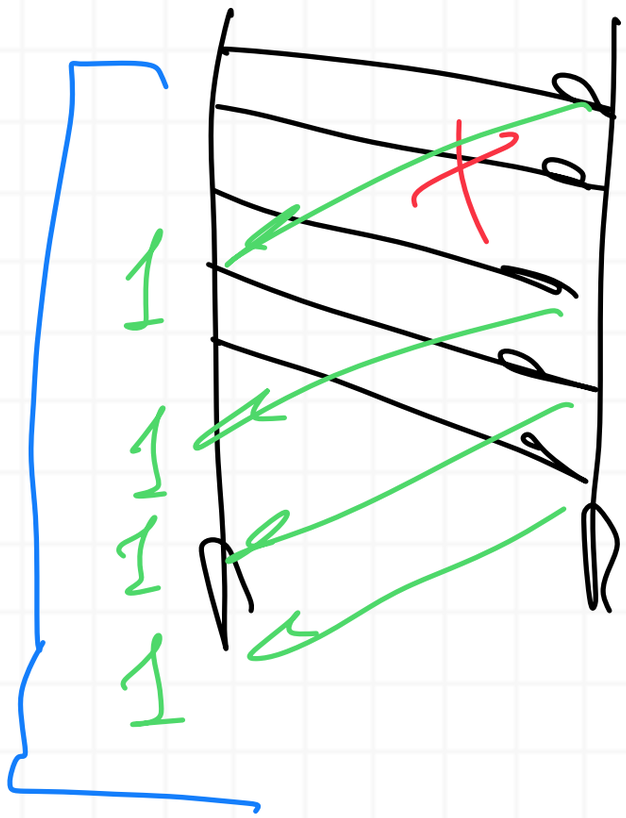
MSS




2010
2010
20K
20K
3010


1
2
2

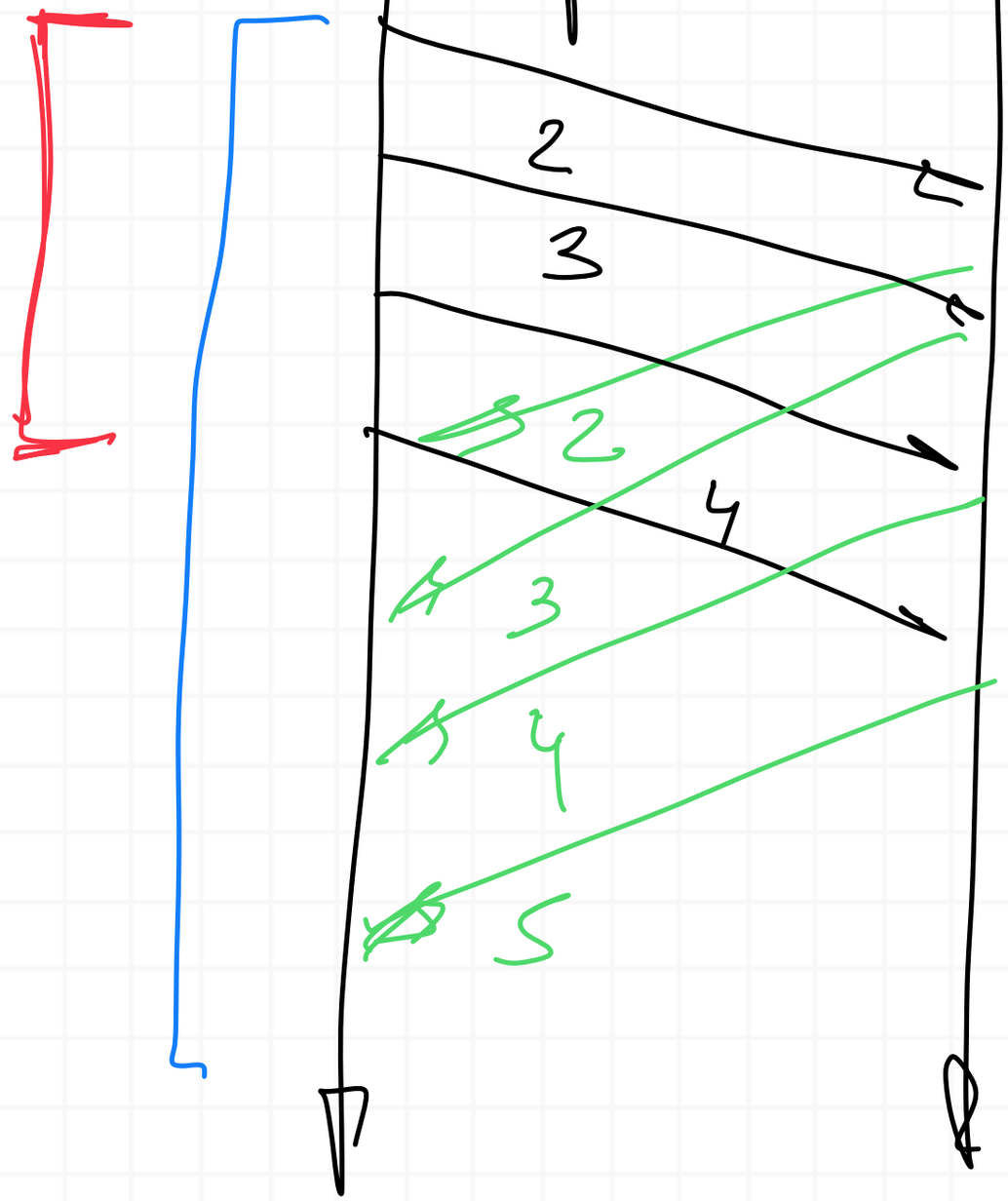
1
2
3
4
5
4
3
2
1


1
1
1
1
1

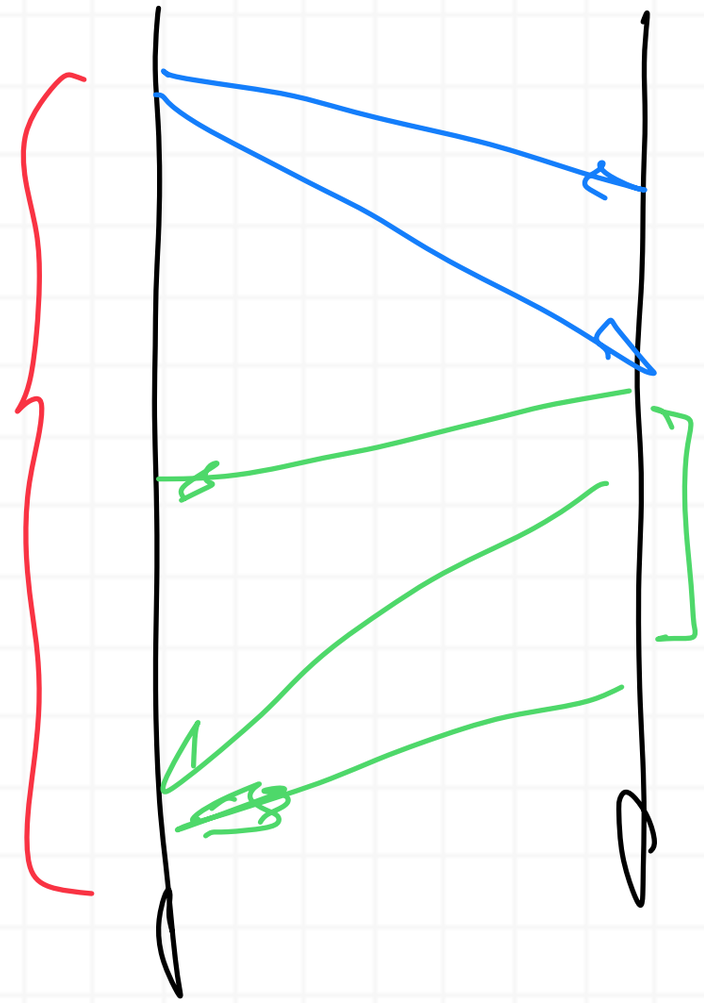
RTT

$\forall\ j \geq 4$

$j = 4$



?



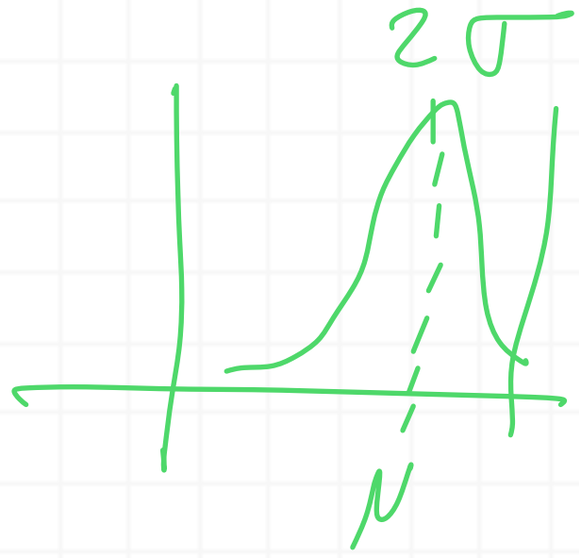
Cálculo de timeout

$$T_{(i)} = RTT_{(i)} \cdot \alpha + T_{(i-1)} \cdot (1-\alpha) \qquad \alpha = \frac{1}{8}$$

$$DT_{(i)} = |RTT_{(i)} - T_{(i)}| \cdot \beta + DT_{(i-1)} \cdot (1-\beta) \qquad \beta = \frac{1}{4}$$

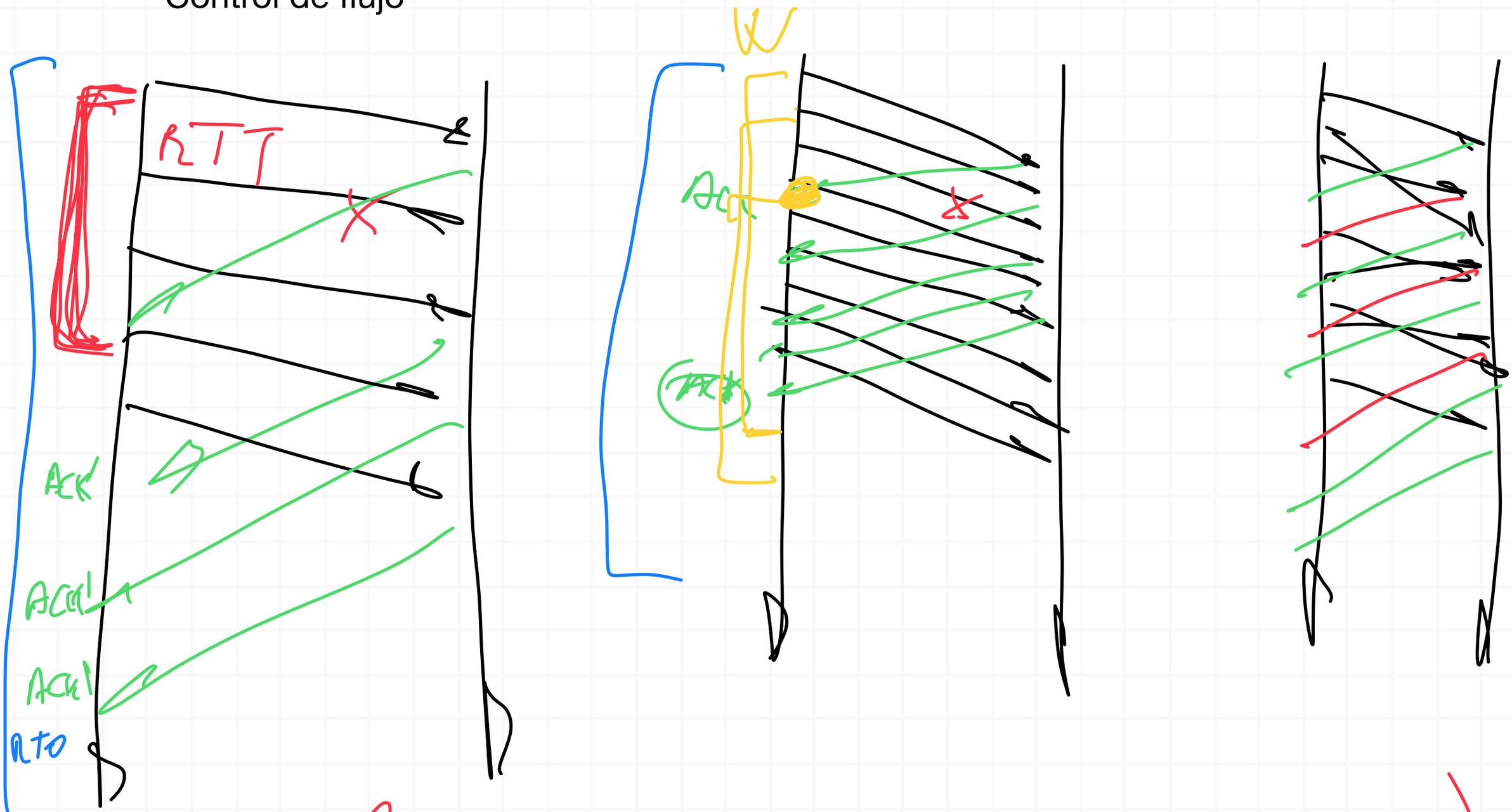
$$RTO_{(i)} = T_{(i)} + 4\, DT_{(i)}$$

~~Modelo Poissoniano~~



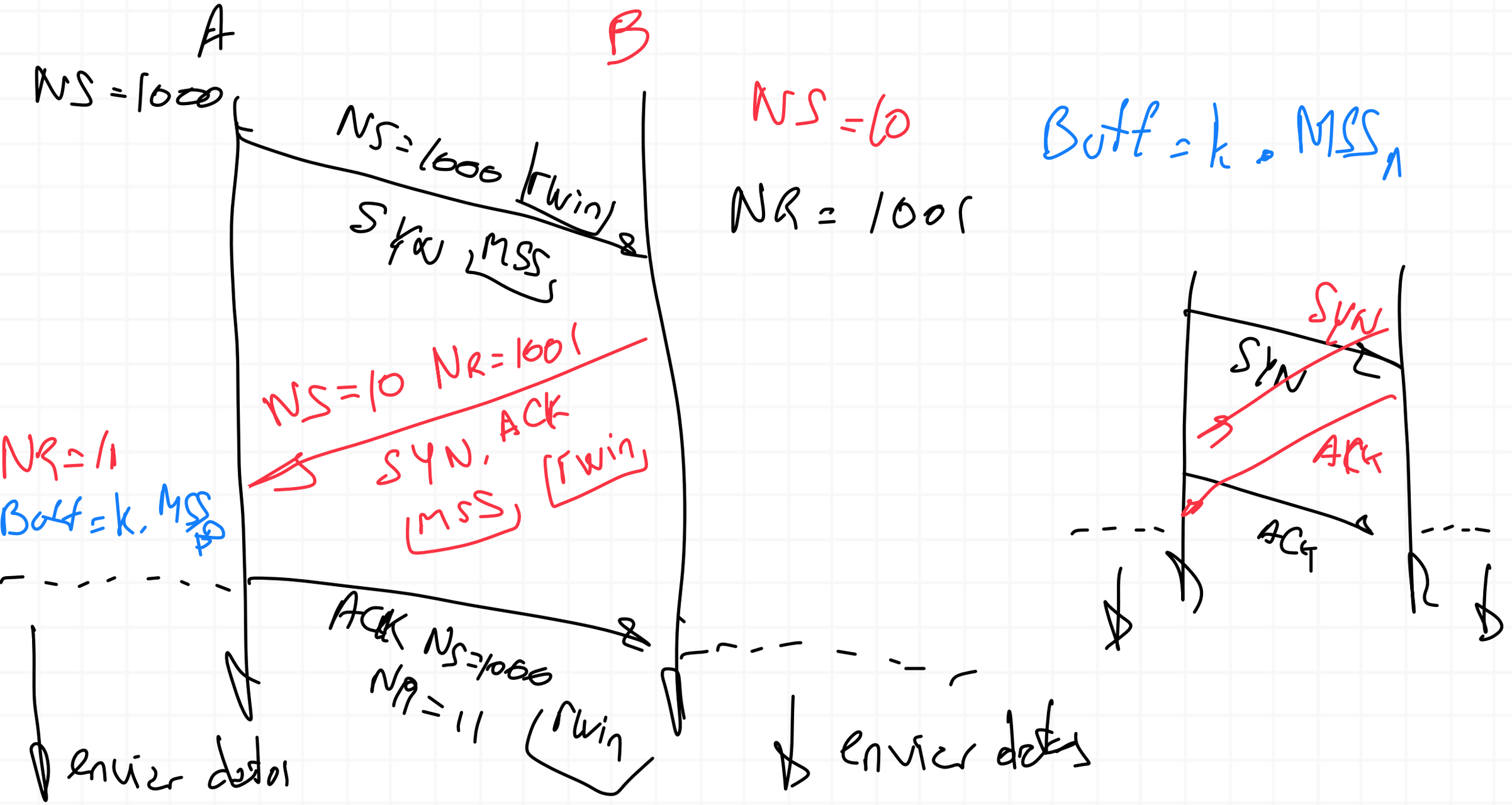
Análisis de escenarios:

- *Timeout*
- *Fast Retransmit* y *Fast-Recovery*
- Control de flujo



$W = f(RTT, throughput, MSS, rwin)$

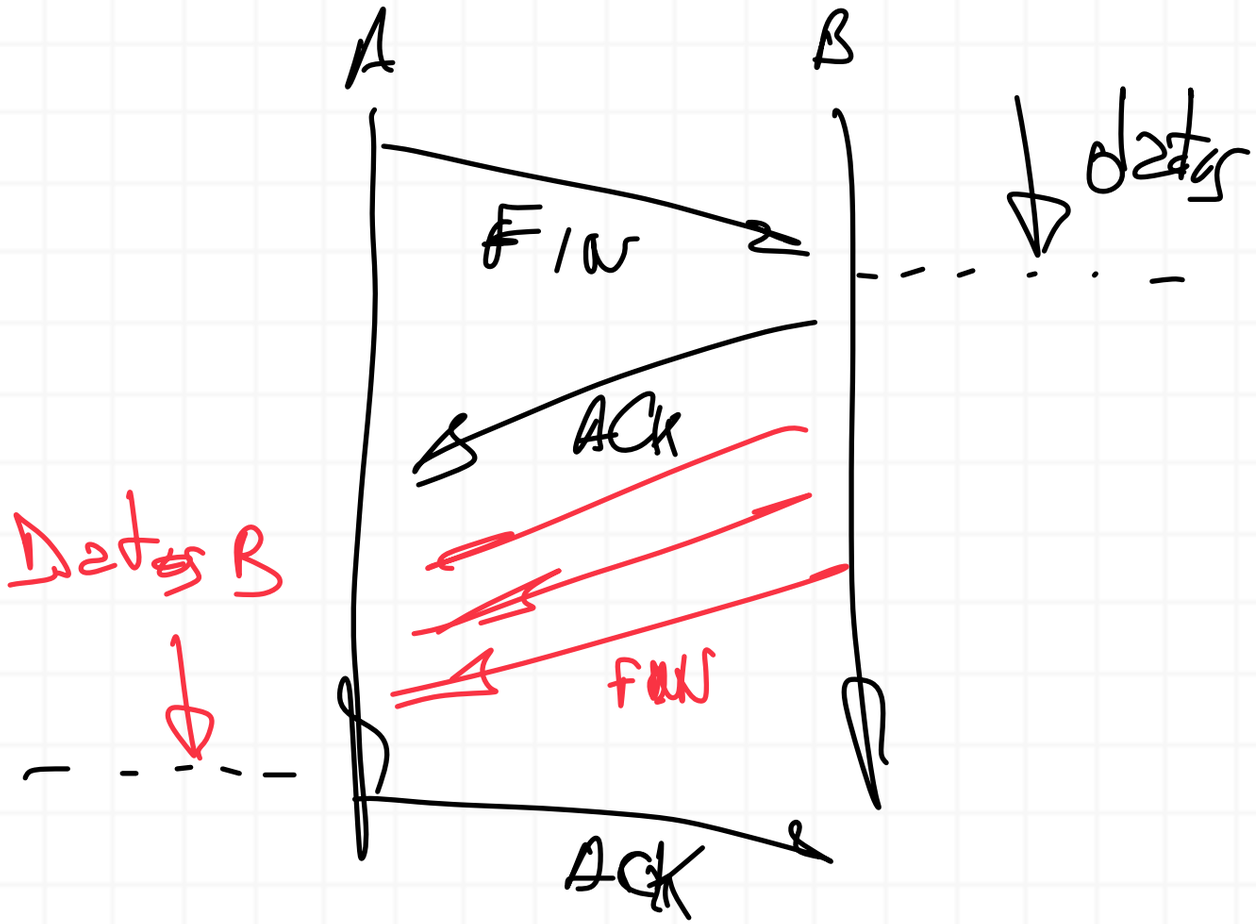
Establecimiento de la conexión y desconexión



NS=10

NR=1001

$Buff = k \cdot MSS_A$


A
B
FIN
Datos
ACK
Datos B
FIN
ACK

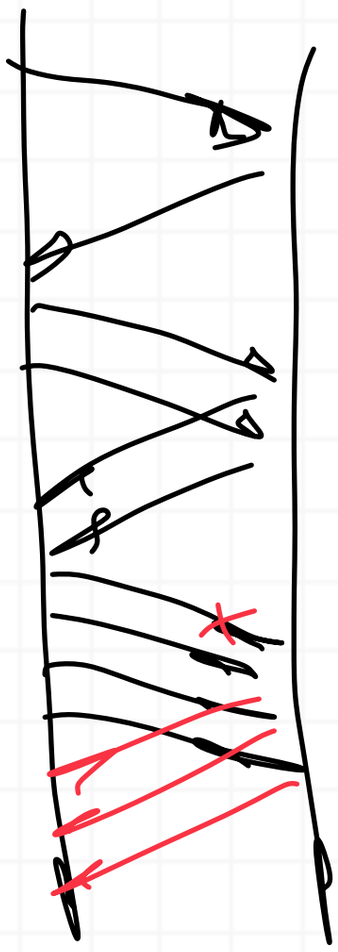
$$W = \min\left(rwind, cwind\right)$$

$cwind = 1\,MSS$ [bytes]

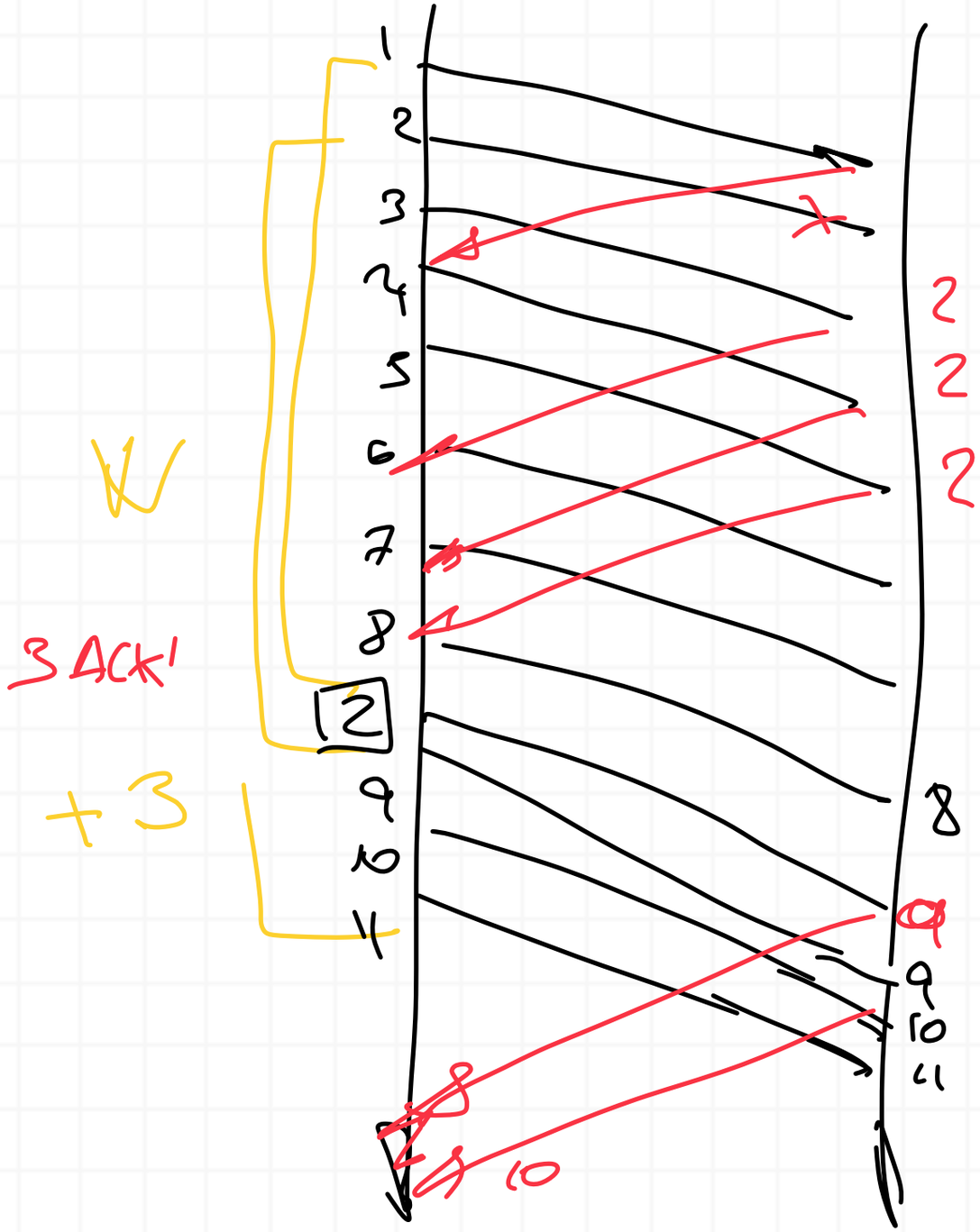
$ssthress = 65535$ [bytes]

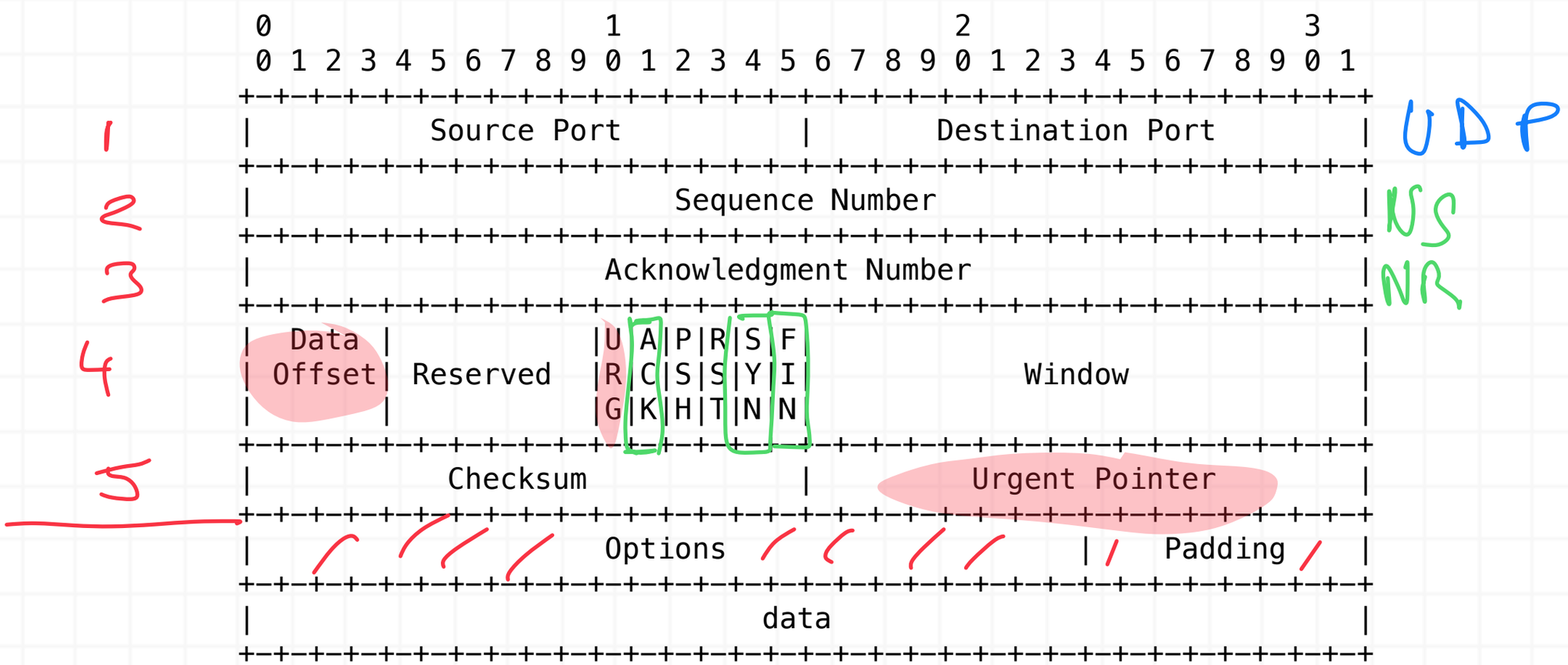
$cwin < ssthres \Rightarrow$ slow start

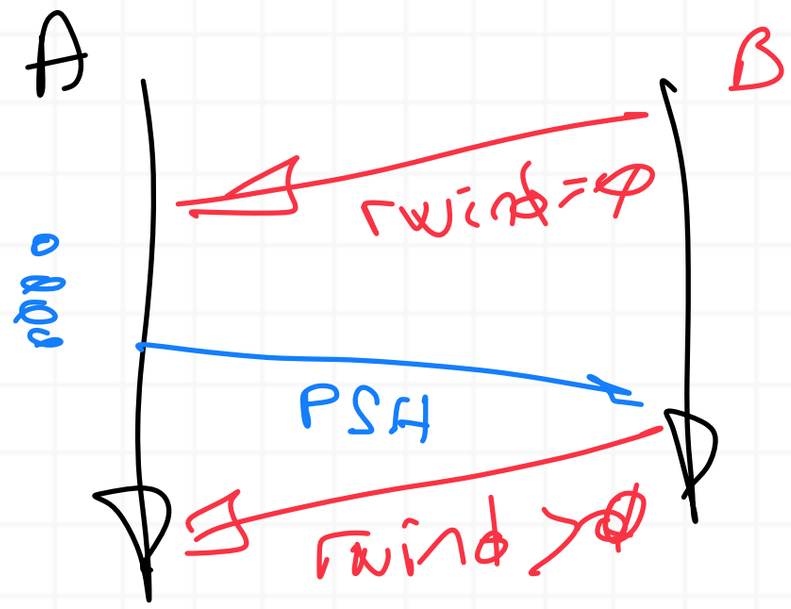
$cwin \geq ssthres \Rightarrow$ congestion avoidance



$$cwind(i) = \frac{cwind(i-1)}{2}, \quad ssthress = cwind(i)$$


1
2
3
4
5
6
7
8
2
9
10
11
2
2
2
8
9
9
10
11
8
10
3 ACK!
+3


0 1 2 3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
Source Port
Destination Port
Sequence Number
Acknowledgment Number
Data Offset
Reserved
U A P R S F
R C S S Y I
G K H T N N
Window
Checksum
Urgent Pointer
Options
Padding
data


A
B
SEQ
rwind=0
PSH
rwind>0

Próxima clase: Capítulo 4, hasta *4.3.3 IPv4 Addressing* inclusive.