

# Networks ch 3 HW

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P1

a) A $\rightarrow$ S	467	23
b) B $\rightarrow$ S	513	23
c) S $\rightarrow$ A	23	467
d) S $\rightarrow$ B	23	513

e) yes

d) No

P3

$$\begin{array}{r} 01010011 \\ + 01100100 \\ \hline 01110000 \end{array}$$

$$\text{Sum} = 00101110$$

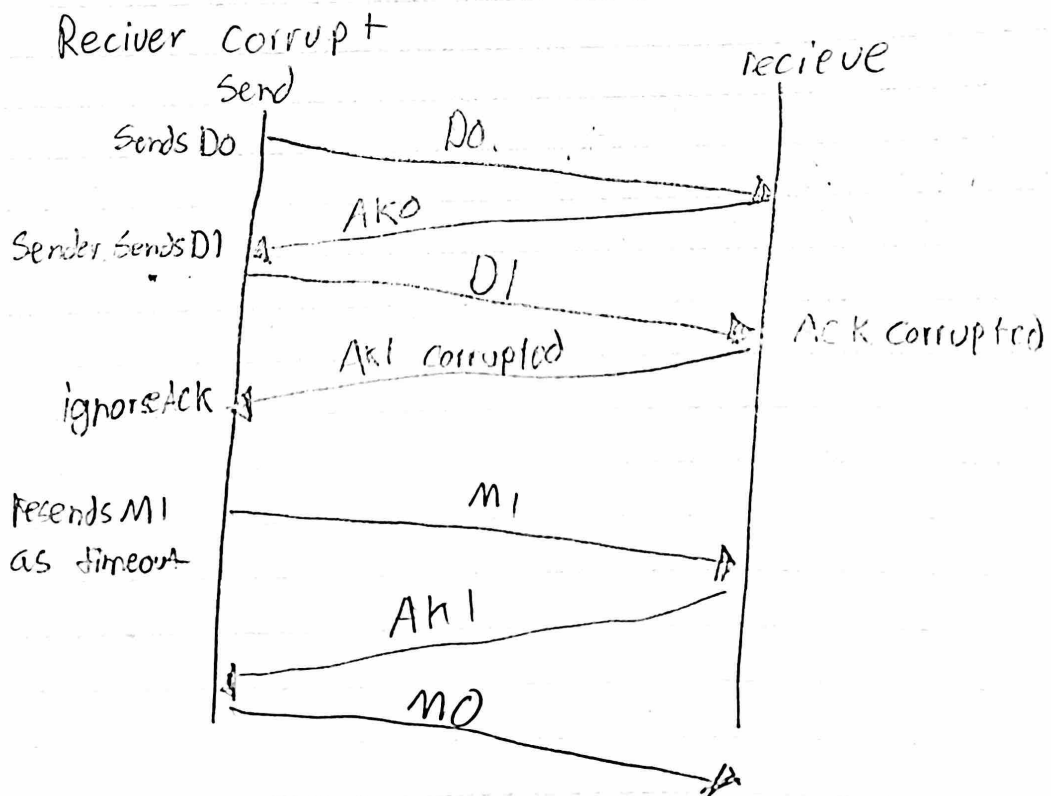
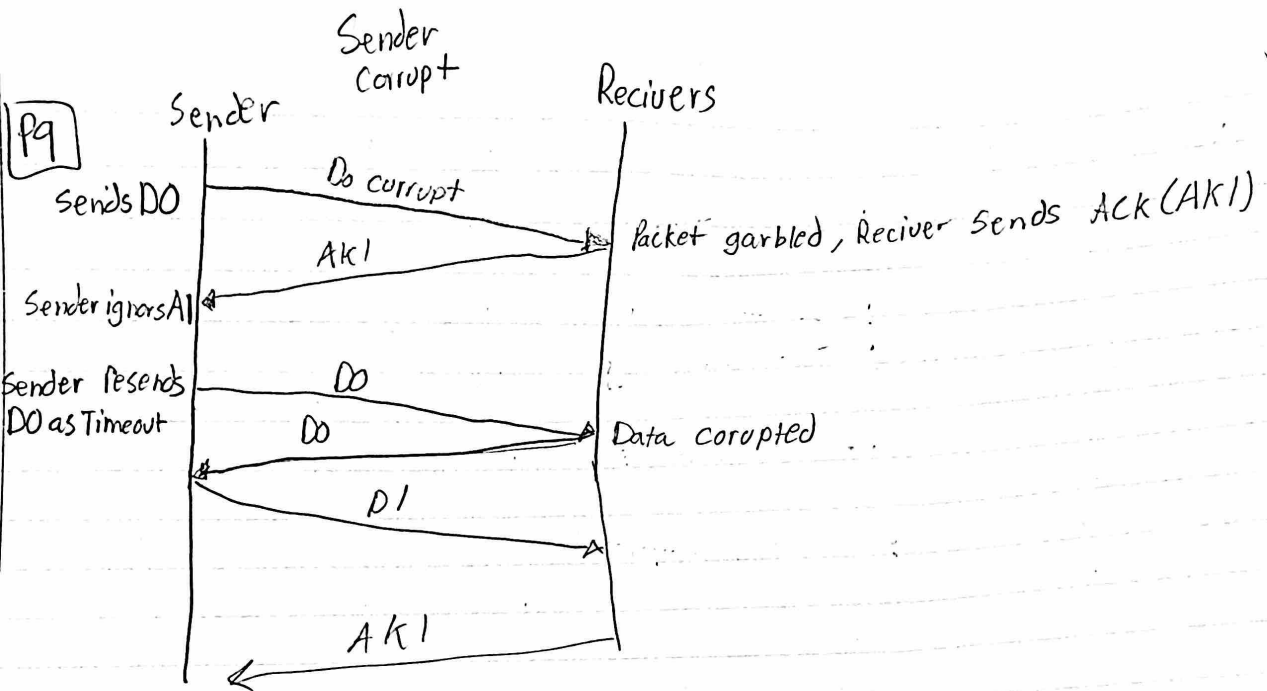
$$\sim \text{Sum} = \text{checksum} = \underline{11010001}$$

$$1's \text{ comp} = 11010001$$

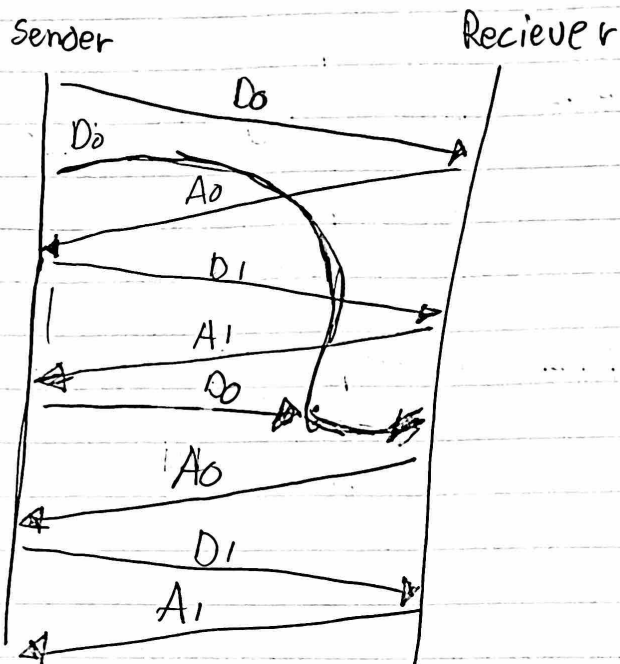
- if sum has all 1's, then error
- if sum contains more 1's than 0's, then error

P5

- 1's complement of sum is considered checksum. So when checksum is used to detect errors, the errors remain in under cover.
- if two 16-bit words are added, then there is a scope for flipping zeros and 1's. If bits are flipped, sum will be same and can't detect error.



P13



P15  $D_{trans} = \frac{L}{R} = \frac{1500 \times 8 \text{ bits/packet}}{109 \text{ bits/sec}} = 12 \text{ ms} \approx 0.012 \mu\text{s}$

calculate window size channel Util is greater than 98%

channel Utilization =  $N \times \frac{\frac{L}{R}}{\frac{L}{R} + RTT}$

$\frac{98}{100} = N \times \frac{0.012}{30 + 0.012}$

$N = 2450.98$

P22 a) Case 1: Assume receiver is  $K$  & acknowledged all  $K-1$  packets. Window range is  $[K, K+N-1]$

Case 2: senders window range is  $[K, K+N-1]$   
the senders range is  $[K-N, K-1]$

b) the Ack field will be  $[K-N, K-1]$

So all possible values of Ack field are  
btwn  $K-N-1$  &  $K-1$

P23 The Sequence Number space must  
be twice as large as the window ( $2w$ )

P24 a) T  
b) T  
c) T  
d) T