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**Paper CCN**



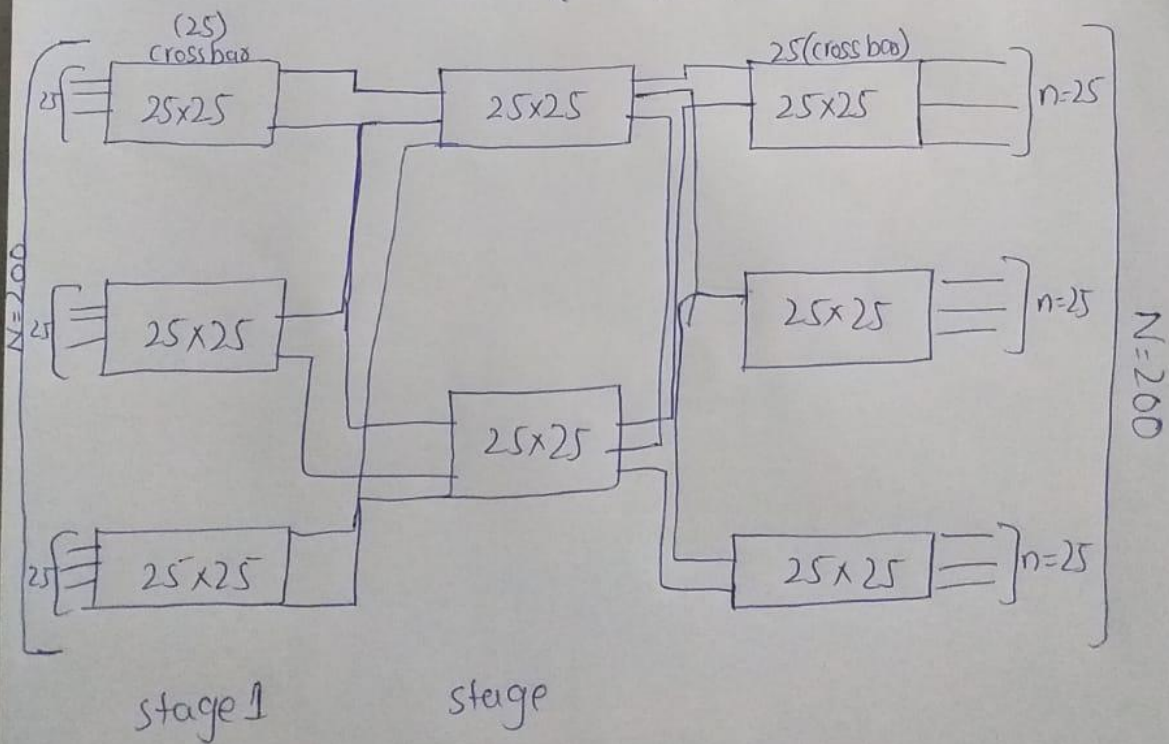
Reg #16590 (Muhammad ALi Khan)

Q1. We need a three stage space-division switch with  $N=200$ . We use 25 crossbars at the first and third stages

- What is the number of crossbars at the middle stage so that every mid-stage crossbar has equal inputs and outputs.
- Draw the configuration diagram and calculate the total number of cross points.
- calculate the total number of cross points using Clos criteria.

Ans:-

25 bars (bcz input & output equal)

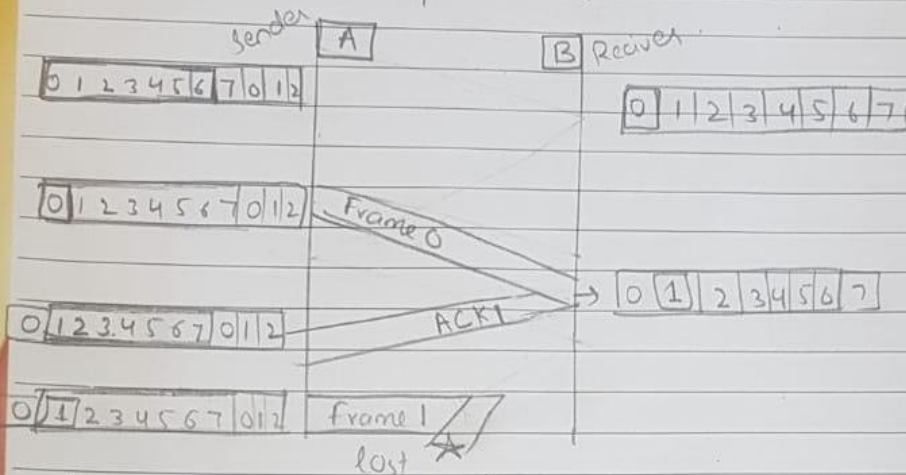


$$\begin{aligned} & \text{Total number of cross points.} \\ & = 25(25 \times 25) + 25(25 \times 25) + 25(25 \times 25) \\ & = 25(625) + 25(625) + 25(625) \\ & = 15,625 + 15,625 + 15,625. \end{aligned}$$

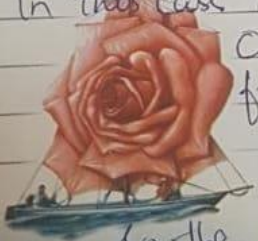
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(Q2) Explain & show graphically what will happen when frame 1 is lost using selective Repeat ARQ.



Let's assume no 1 is corrupted or lost  
So obviously the receiver will not send Acknowledgment for frame No. 1 either the frame is lost or Acknowledgment will be lost, it goes back in ARQ what the receiver will do. It is already received frame No. 0 but it discards this frame & the sender will retransmit all the frames in current window like 0 are repeated. In this case the receiver might have Acknowledged frame 0, but the sender will not send further frames because it knows that frame 1 is missing because the receiver would have sent negative Acknowledgment for frame 1. So the sender will retransmit frame 1 alone and as usual other frames will transmit.





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Q3) A digitized voice channel is made by digitizing a 4-KHz bandwidth analog voice signal. we need to sample the signal at twice the highest frequency. We assume that each sample requires 16 bits. What is the required bit rate?

Ans) The bit rate can be calculated as:  
$$2 \times 4000 \times 16 = 128000 \text{ bps}$$
$$= 128 \text{ Kbps}$$



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Q4) An ISP is granted a block of address starting with 10.100.10.0/16. The ISP needs to distribute these addresses to three groups of customers.

- 1) The first group has 46 customers, each 128 addresses
- 2) The second group has 128 " " each 128 "
- 3) The third group has 128 " " " 32 "
- 4) Design the sub blocks & find out how many addresses are still available after these allocations.

Ans) For this group each customer needs 128 addresses. This means that  $7 (\log_2 128)$  are needed to define each host. The prefix length is then  $32 - 7 = 25$ . The addresses are:

1<sup>st</sup> customer = 10.100.0.0/25      10.100.64.127/25  
2<sup>nd</sup> customer = 10.100.64.0/25      10.100.64.255/25

64<sup>th</sup> customer = 10.100.127.128/25      190.100.127.255/25

$$\text{Total} = 64 \times 128 = 8,192.$$

Group 2:- For this group, each customer needs 128 addresses. This means that  $7 (\log_2 128)$  bits are needed to define each host. The prefix length is then  $32 - 7 = 25$ . The addresses are





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1<sup>st</sup> customer = 10.100.64.0/25      10.100.64.127/25

2<sup>nd</sup> "      10.100.64.128/25      10.100.64.255/25

128<sup>th</sup> customer = 10.100.127.128/25

Total = 128 x 128 = 16,384

Group 3:-

For this group each customer needs 32 addresses  
This means that 5 ( $\log_2 32$ ) bits are needed to  
define each host. The prefix length is then  
 $32 - 5 = 27$ . The addresses are

1<sup>st</sup> customer = 10.100.32.0/27      10.100.32.63/27

2<sup>nd</sup> "      10.100.32.64/27      10.100.32.127/27

32 customer = 10.100.32.64/27      10.100.32.128/27

Total = ~~32~~ x 128 = 4,096

Number of granted addresses to the ISP = 65,536

" of allocated " by the ISP = 28,672

Number of Available addresses

36,864.





(Q5:-)

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