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Q2 Explain & show graphically what will happend when Frame1 is lost using selective-Repeat ARQ.

Ans In selective Repeat ARQ, only The erroneous or lost Frames are retransmitted while correct frames are received and buffered.

The receiver while keeping track of sequance number, buffers the frames in memory & sends NACK for only frames which is missing or damaged.

•The sender will send/retransmit packet for NACK is received.

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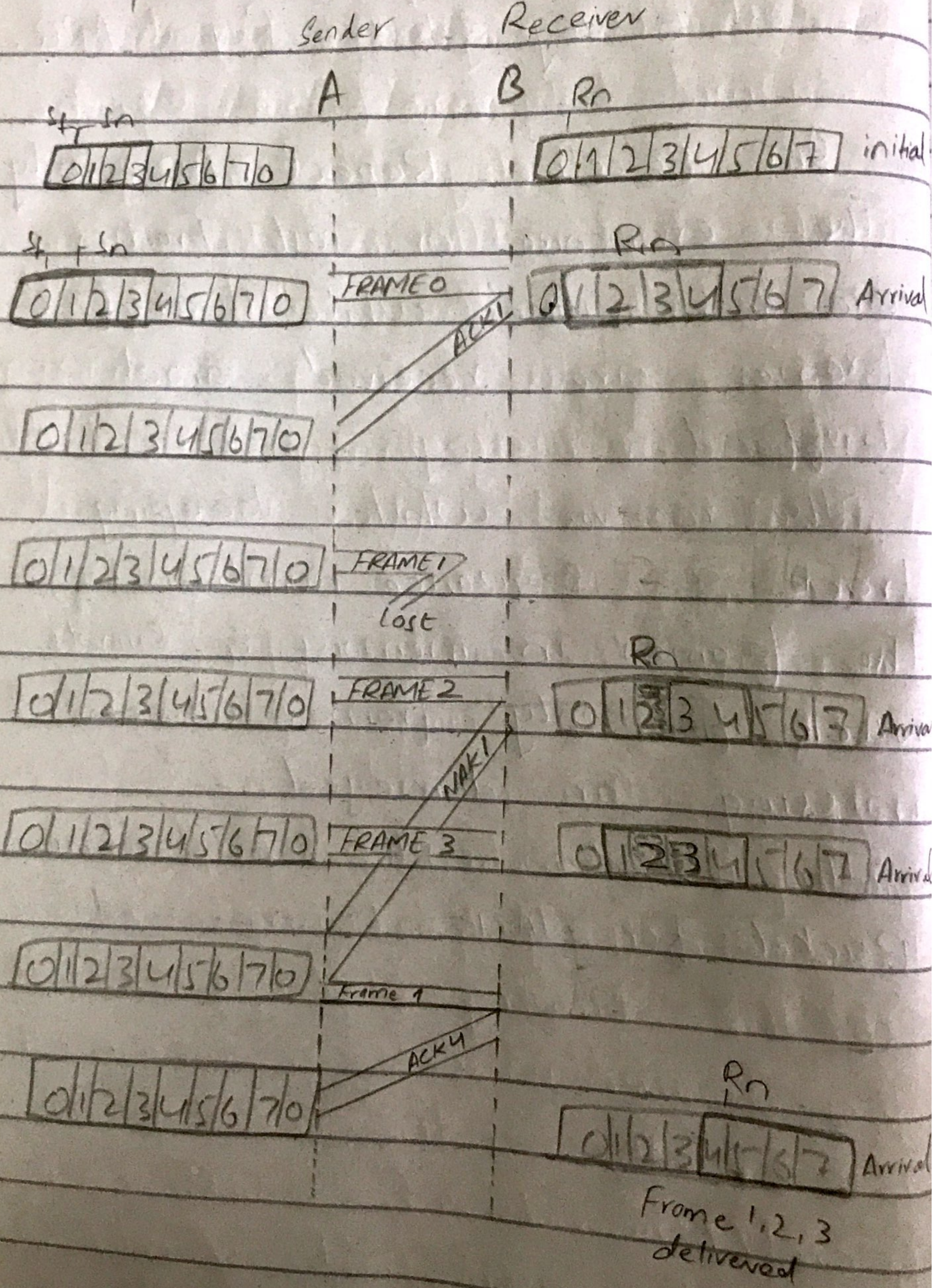
## GRAPH:



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$Q_3$ A digitized voice channel is made by digitizing a 4-KHz bandwidth analog voice signals. we need to sample the signals at twice the highest frequency. we assume that each sample required 16 bits. what is the required bit rate?

Ans

Given the message signals Bandwidth.

$B = 4MHz$.

we know that.

$B = 2f_m$.

so, $f_m = \frac{4Mz}{2} \Rightarrow f_m = 2MHz$.

Given that simple the signals at twice the higest foequency.

so, the sampling frequency is.

$f_s = 2f_m$

$f_s = 2 * 2MH_z$

$f_s = 4MHz$.

So also given that

Each sample required 16 bits

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So, the Bit depth is 16 bits.
And the number of channels is only one which is the voice channel.
Bit rate is given by.

Bit Rate (R) = Sampling frequency * Bit depth * No. of Channels.

Bit Rate (R) = 4MHz * 16 * 1.

Bit Rate (R) = 64 mbps or 64000 kbps.

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Q4 An ISP is granted a block of address starting with 10.100.10.0/16. The ISP need to distribute these adresses to three groups of customers as follows.

Ans.

Subblock 1 network adress (128 custom 128 adresses each): 10.100.10.0/18.

Subblock 2 network adress (64 customers 128 adresses each): 10.100.64.0/19.

Subblock 3 network adress (128 customers 32 adresses each): 10.100.96.0/20.

Explanation:

we start allocating the adress space with the largest block to the smallest.

The ISP has been granted a total of 216 = 65536 adresses.

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The first block will contain:
$128 \times 128 = 16384$ addresses in total.
To allocate this, the subnet mask of the subblock must be $32 - \log_2 16384 = 18$. Thus the first adress in this block is 10.100.10.0/18 and the last adress is 10.100.63.255/18.

The second block will contain $128 \times 64 = 8192$ adress. The subnet mask is $32 - \log_2 8192 = 19$.
The first adress in this block is 10.100.64.0/19 & the last address will be 10.100.95.255/19.

The third block will contain $128 \times 32 = 20$ address. The subnet mask is $32 - \log_2 4096 = 20$.
The first address in this block is 10.100.96.0/20 & the last address will be 10.100.111.255/20.

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After allocating a total of

16384+8192+4096=28672 addresses, the subnet will have 65536−28672 = 36864 addresses left ~~unused~~ unused.

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Q5 Below shows a part of an internet with two routers connection three LANs. Each device has a pair of addresses for each connection.

Ans It may be obvious that each router must have a seprate physical address for each connection it may. The computer with logical address A and physical address 10 needs to send a packet to the computer with logical address P & physical address 95. The sender encapsulate its data in a packet at the network layer & add two logical distination address. The network layer, however, needs to find the physical address of the next hop before & packet can be delivered. The network layer consults its rounting table & finds the logical address of the next hop (router 1).

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Another protocal, address Resolution protocol finds the physical address of router 1 that corresponds to its logical address (20). Now the network layer passes this address to the data link layer, which in turn, encapsulate the packet with physical destination address 20 & physical source address 10.
The router decapsulate the packet from the frame to read the logical destination address P. Since the logical destination address does not match the router's logical address, the router knows that the packet needs to be forwaded. The router consults it routing table & ARP to find the physical destination address of the next hop (router 2) create a new frame, encapsulates the packet & send it to router 2.

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FIGURE: