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Section	**B**
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Question: 1 1. **In a block of addresses, we know the IP address of one host is 101.10.11. X / ID4+5. What are the first address (network address) and the last address (limited broadcast address) in this block?** (Note: X is the sum of your ID e.g. if your ID is 12345, X = 15, ID4+5 is the sum of 4th and 5th digit of your roll number e.g. 4+5 = 9)

Answer: 1

Solving the following numerical problem:

Let Id=14728

X=sum of id=22

Then

the IP address of one host is 101.10.11.22/31

- **What are the first address (network address)**
  The first address in the block can be found by setting the rightmost
  32 – *n* bits to 0s

  The binary representation of the given address is
  11001101 00010000 00100101 00100111
  If we set 32–28 rightmost bits to 0, we get
  11001101 00010000 00100101 0010000

  0r
  101.10.11.32

- **the last address (limited broadcast address)**

  The last address in the block can be found by setting the rightmost
  32 – n bits to 1s.

  The binary representation of the given address is

11001101 00010000 00100101 00100111
If we set 32 – 28 rightmost bits to 1, we get
11001101 00010000 00100101 00101111

Question 2 Take your Roll No as decimal notation, now convert it to Binary notation. Draw the graph

of the NRZ-L scheme using the binary notation of your roll no as data stream, assuming

that the last signal level has been positive.

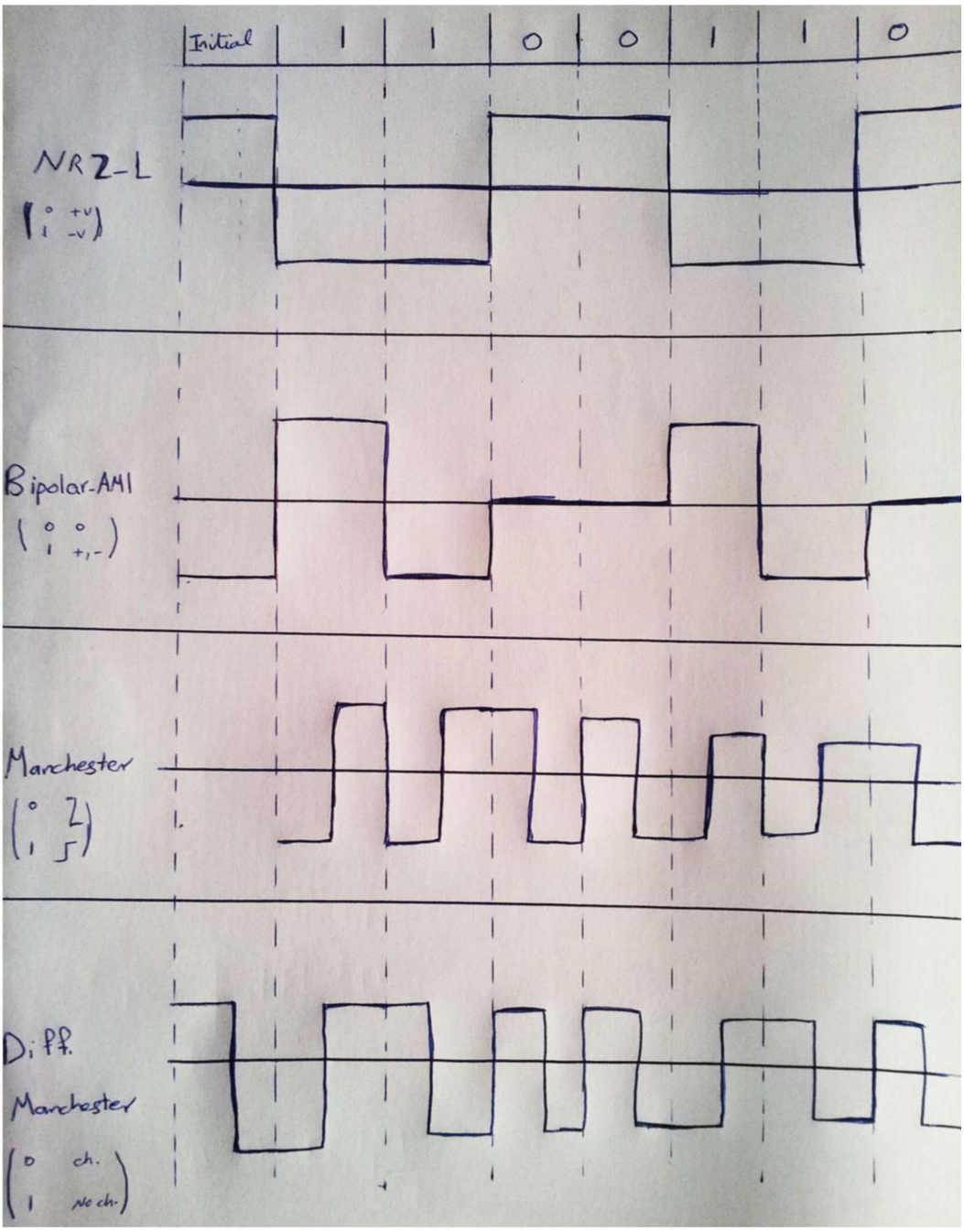
(Note: If your ID is 12345 convert it to binary and solve)

Solution

Let id =14728

Converting it into binary

14728=011100110001000



Question-3 Two neighboring nodes (A and B) use a sliding-window protocol with a 3-bit sequence

number. As the ARQ mechanism, go-back-N is used with a window size of ID last

Assuming A is transmitting and B is receiving, show the window positions for the following

succession of events: Before A sends any frames After A sends frames 0, 1, 2, 3, 4 and receives acknowledgment from B for 0, 1 and 2 After A sends frames 5, 6 and B acknowledges 5 and the ACK is received by A

(Note: If ID last > 5 then ID last / 2 e.g. if your ID is 12344 then IDlast=4, if ID is 24389 then IDlast = 9 so 9/2 = 4 so

solution

a. Before A sends any frames

System A - Initial

IDlast = 9

System B - Initial

IDlast=4

b.

System A sends 3 frames F0, F1, F2

System B receives 3 frames F0, F1, F2

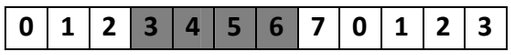
No acknowledgments received

No acknowledgments sent

System A

IDLAST=4

System B



window size is 4

c.

System A receives RR3 from B

System B sends RR3

Question 4 An ISP is granted a block of addresses starting with 160 . (X) . (ID3+4) . 0/16

The ISP needs to distribute these addresses to three groups of customers as follows:

a. The first group has 16 customers; each needs 64 addresses.

b. The second group has 64 customers; each needs 32 addresses.

c. The third group has 64 customers; each needs 16 addresses.

Design the sub-blocks and find out how many addresses are still available after these allocations.

Solution:

Suppose id=14728

X=sum of id=22

Know

Address is 160.22.29.0/16

1 The first group has 16 customers; each needs 64 addresses

Group 1

For this group, each customer needs 64 addresses. This means that 8 (log2256) bits are needed to define each host. The prefix length is then 32 - 8 =24. The addresses are

1st Customer: 2nd Customer:

64th Customer: 190.100.63.0/24 190.100.63.255/24 Total =64 X 24 =1536

Group2 For this group, each customer needs 32 addresses. This means that 7 (10g2 128) bits are needed to define each host. The prefix length is then 32- 7 =25. The addresses are

1st Customer: 160.22.29.0/16

Total =32X 128 = 4096

For this group, each customer needs 64 addresses. This means that 6 (logz 64) bits are needed to each host. The prefix length is then 32 - 6 =26. The addresses are

1stCustomer: 160.22.29.0/16

2nd Customer: 160.22.29.0/16

64 Customer: 160.22.29.0/16 Total =128X 16 =2048
