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Semester :- 4th Section :- A

Q1: Briefly describe the services provided by data link layer.

→ Data link layer:-

- The second layer of OSI (open system Interconnection) is said to known as Data link layer.
- In a program, it acts as a protocol layer across a physical link to move the data in and out.
- It transfers the data between the network and it detects the errors in a physical layer that may occurs.
- Data link layer consist of a frames; It receives the data and divides it manageable units from the network layer.
- Each of the frame consists of both physical addresses of the source and destination machines.
- It is reasonable to provide reliable data transfers across the one physical link with in network.

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- These are two major services. They are
- logical link control (LLC)
- Media Access control (MAC)

Q: Compare and contrast:

- Byte oriented and Bit oriented protocols.

i: **Byte Oriented Protocol:-**

In this field ory can be arbitrary numbes of long. bits So if the field only needs 64 possible values, it can be only 6 bits long. They can be typically used in hardware where bandwidth is an important consideration. This will allow tighter packing of data.

ii: **Bit Oriented Protocol:-**

In this field up to 8-16bits is giveo double byte They are typically used in softwates so as it is easy to process thom. This will be loose packing of data compare to bit oriented protocol.

- Byte stuffing and Bit stuffing:

→ **Byte stuffing:-**

a mechanism to convert a message formed of a sequence of bytes that may contain reserved values such as frame delimeter, into another byte sequence that does not contain the reversed values.

→ **Bit stuffing:-**

A mechanism of inserting one or more non-information bits into a message to be transmitted, to break up the message sequence, for synchron-ization purpose.

"The two common approaches are:-"

Byte-stuffing: A byte is a stuffed in a message to differentiate from deliniter. This is also called character-oriented farming.

Bit-stuffing: A pattern of bits of arbitrary length is stuffed into message to differen-tiate from deliniter.

- Flow control and error control:

Flow Control	Error control

Flow control and error control are the control mechanism at data link layer and transport layer. whenever the sends data to receiver thes two mechanisms helps in proper delivering of reliable data to receiver. The main difference between the flow control and error control is that **Flow Control** observes proper flow of dtata from sender to receiver on the other hand **error control** observes that data delivered to receiver is error free and reliable.

- **HDLC and PPP:**

The major difference between HDLC and PPP is that HDLC is bit oriented control protocal, while PPP is character oriented control. The HDLC and PPP are crucial data link layer protocols used in WAN (wide area network) where HDLC can be implemented with PPP for efficient results. HDLC describes the encapsulation technique employed on data in the synchronous serial data link. On other hand, PPP protocol deals with encapsulation of data transported in point-to-point links and it could be synchronous or asynchronous.

- **Comparison between Go-Back-N protocol and Selective repeat protocol:-**

	GO-Back-N protocol	Selective Repeat protocol
1:	In GO-Back-N protocol control, if sent frame are find suspected then all frames are re-transmitted from lost packet to last packet transmitter.	In Selective Repeat protocol only those frames are retransmitted which are found suspected.
2:	Sender size window in GO-Back-N protocol is N.	Sender size window in Selective Repeat protocol is N.
3:	Receiver window size in GO-Back-N protocol is 1.	Receiver window size in selective Repeat protocol is N.
4:	GO-Back-N protocol is less complex.	Selective Repeat protocol is more complex.
5:	In GO-Back-N protocol niether sender nor at receiver need sorting.	In selective Repeat protocol, receiver side needs sorting to sort the frames.
6:	In GO-Back-N protocol, type of acknowledgment is cumulative.	In Selective Repeat protocol type of acknowledge is individual.

- Comparison between circuit-switched network and packet-switched network:

	Circuit Switching	Packet switching
1)	In circuit switching there are Data transfer and connection released	In packet switching directly data transfer takes place.
2)	In circuit switching each data unit know the entire path address which is provided by the source	In packet switching each data unit just know the final destination address intermediate is decided by the router.
3)	In circuit switching data is processed at source system only.	In packet switching data is processed at all intermediate node including source system.

Q Compare space division and time division switches!

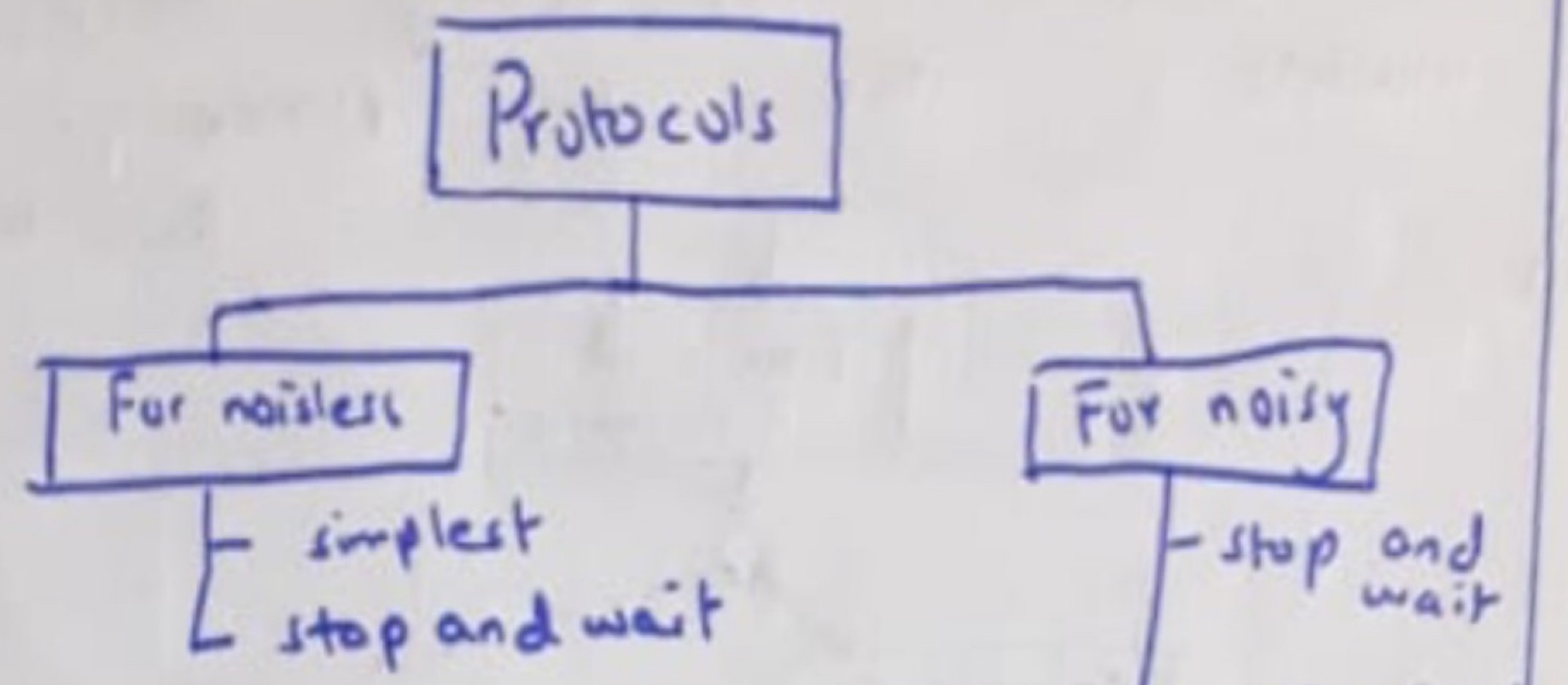
Space division:- In space-division switch, the path from one device to another is specially seperate from other paths. The inputs and outputs are connected using a grid of electronic micro switches.

Time division:-

In a time division switch the input are divided in time using TDM. A control unit sends the input to the correct output device.

8 Explain the protocals for noiseless and noisy channels?

Ans



Noiseless channel:-

An idea channels in which no frames are lost, duplicated or corrupted is regarded as noiseless channel.

simplest protocol:-

1. In simplest protocol there is no flow control and error control mechanism. It is unidirectional protocol in which data frames travel only one direction

stop and wait:-

2. The simplest retransmission protocol is stop and wait.

- If no error occurs in the transmission station B sends a positive acknowledgement to station A.
- The sender which sends one frame and then waits for an acknowledgment before process is known as stop and wait.

Noisy channels:

Consider the normal situation of a communication channel that makes errors. Frames either damaged or lost completely.

stop and wait Automatic Repeat Request:-

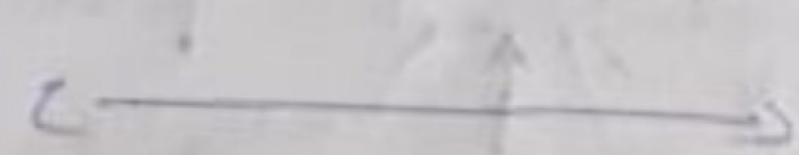
- In a noisy communication channel, if a frame is damaged in transit the recieved hardware will detect this when it computes the checksum.
- If a damaged frame is recieved, it will be discarded and transmitter will retransmit the same frame after recieving a proper acknowledgment.

Sequence numbers:-

- The sequence numbers are based on modulo-2 arithmetic.
- stop and wait ARQ is the simplest mechanism for error and flow control.

Q Explain piggybacking in HDLC.

Ans The reciever waits until its network layer passes in the next data packet - The delayed acknowledgment is then attached to this outgoing data frame. This technique of temporily delaying the acknowledgments so that it can be hooked with next outgoing data frame is known as piggybacking.



Q Explain blocking in a switched network.

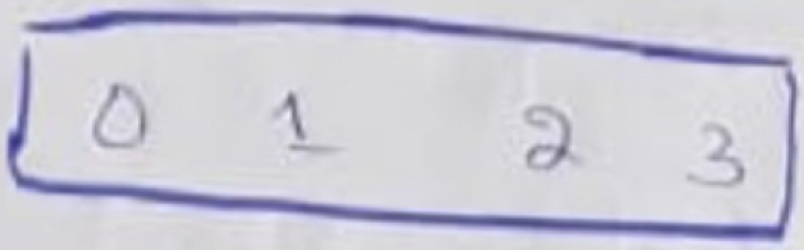
Ans In multistage switching, blocking refers to time when one output cannot be connected to an output because there is no path available between them - all the possible intermediate switches based on the clos criteria.

Q6

1) Before a sends any frames.

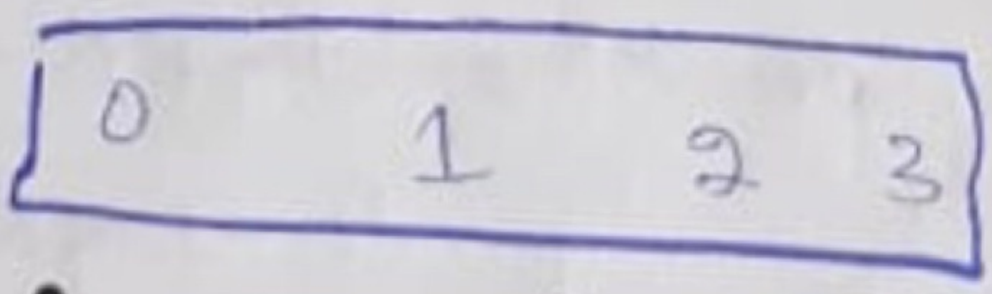
Ans Before A sends any frames.

Sender:-



window of PDU that may be transmitted : 4 bit window.

Reciever:-



2) After A sends frame 0, 1, 2 and recieves acknowledgment from B for 0 and 1,

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Sender:-

A has shrunck its windows as it has transmitted three PDUs but has recieved ack for 2 PDU's hence it is keeping copy of one PDU.

0 1 | 2 [3 4 5] 6.

Acknowledgment recieved for two bits.

Reciever:-

0 1 | 2 [3 4 5] 6

Reciever has recieved all data hence the window remains in 4 bit size.

» After sends frame 3, 4, & 5 and B acknowledge 4 and the Ack is recieved;

Sender:-

0 1 2 3 4 | 5 [6 7 0] 1

Acknowledge recieve by two bits

Reciever:-

0 1 2 3 4 | 5 [6 7 0] 1

Q List three techniques of digital to digital conversion?

Ans Three techniques of digital to digital conversion: line coding, Blocking coding and scrambling. Line coding is always needed, blocking and scambling may or may not be needed

Line coding::

Line coding is the process of converting digital data to digital signals. At the sender digital data are encoded in to a digital signal at the reciever, the digital data are recreated by decoding the digital signals. Line coding converts a sequence of bits to a digital signal.

At the sender, digital data are encoded in to a digital signal at the reciever the digital data are recreated by decoding the digital signal.

Distinguish between a signal element and a data element?

Data elements:

A data element is the smallest entity that can represent a piece of information.

- Data elements are what we need to send.
- Data elements are being carried

signal element: A signal element is the smallest unit of a digital signal

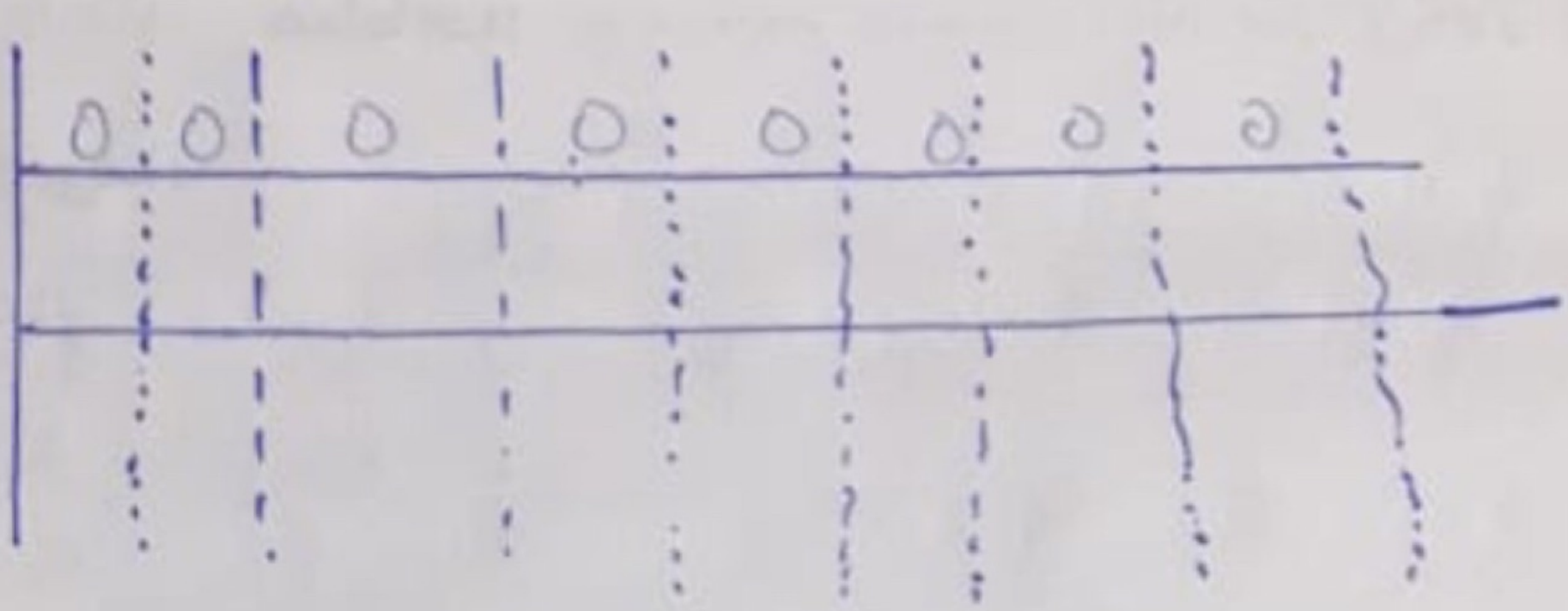
- signal elements are what we can send.
- signal elements are the carriers.

Distinguish between data rate and signal rate?

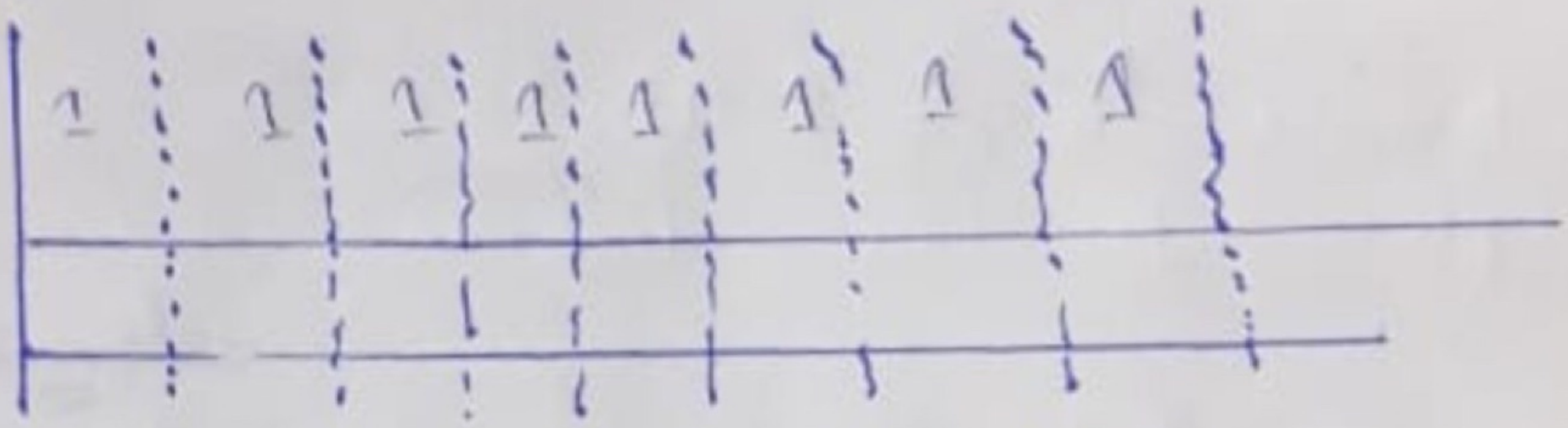
Data rate: Number of data elements transmitted per second.

signal rate: Number of signal elements transmitted per second.

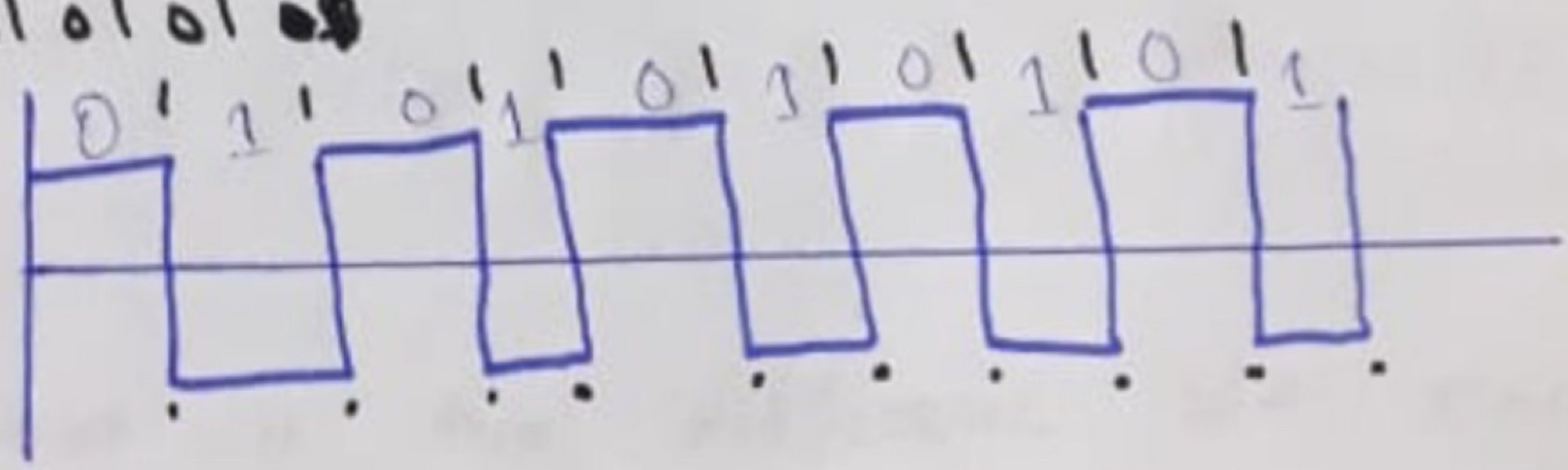
b) 00000000



a) 11111111



c) 01010101

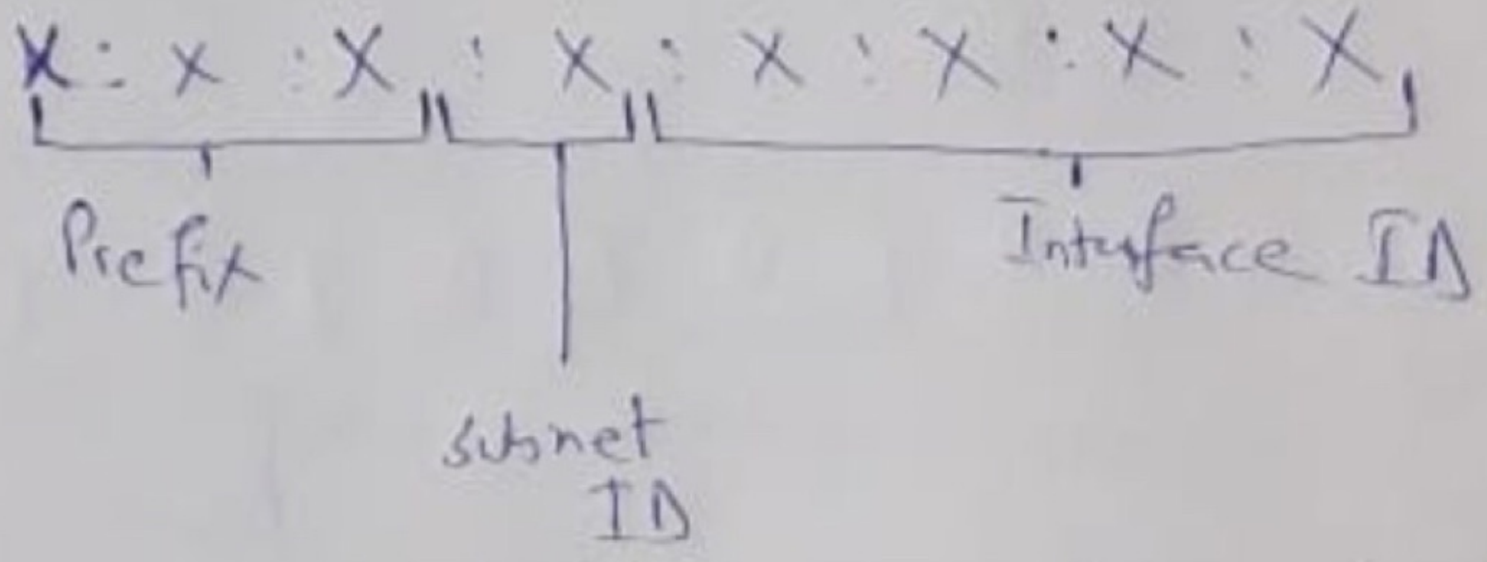


Q11 what is the number of bits in an IPV4 address. -- -- ---- . . in an IPV6 addres

Answer:.

An IPV6 address is 128 bits in length and consists of eight, 16-bits fields with each field sounded by a colon. Each field must contain a hexadecimal number in contrast to the dotted-decimal notation of IPV4 addresses.

Example:.



Q12 What is the difference b/w classful addressing and classless addressing in IPV4?

Ans The main difference between classful and classless addressing is that classless addressing allows allocating IP addresses more (17)

efficiently than classful addressing. Every device in a network has an IP address. An IP address consist of 32 bits. Every 8 bit is an octet and they are seperated by a dot.

3 List the classes in classful addressing and define ..... broadcast or reserved!

ns The 32-bit IP address is divided into to five sub classes. These are.

- Class A
- class B
- class C
- class D
- class E.

Each of these classes has a valid range of IP addresses.

Classes A, B and C are used for unicast communication.

- class D is for multicast communication.
- Class E address are reserved for special purpose.

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subnet mask is made by setting network bits to all 1's and setting host bits to all 0's within a given network two host addresses are reserved for special purpose and cannot be assigned to host. The "0" address is assigned a network address and "255" is assigned to a broadcast address and they cannot be assigned to host.

Q) what is a mask in IPv4 addressing
what is a default mask in IPv4 addressing?

Ans An IP address has two components, the network address and the host address.

A subnet mask seperates the IP address A in to the network and host addresses subnetting further divides the host part of an IP address in to a subnet and host address. If additional subnet is needed. use the subnet calculator to retrieve subnetwork information from IP address and subnet mask.

It is called subnet mask because it is used to identify network address of an IP address by performing a bit wise. And operation on the network.

A subnet mask is 32 bit number that makes an IP address and divided the IP address in to network address and host address.

Q1: ~~what is a mask in IPv4 addressing? what is a default mask in IPv4 addressing?~~ NO 15 :-

Ans An address in slash notation (CIDR) contain all information we need about the block: the first address (Network address, the number of address and the last address. These pieces of information can be found as following:

- The number of addresses in the block can be found as: $N = 2^{32-n}$ in which n is the prefix length and N is the number of addresses in the block. The first address in the block can be found by adding the addresses with the network mask.

If one of the addresses is: 6167.199.170.82, then;

The prefix length is 27, we must keep the first 27 bits as it is and change the remaining bits (5) to 0s.

=> The five bits affect only the last byte

=> The last byte is 01010010

=> Changing the last five bits to 0s we get 01000000 or 64

=> The network address is 167.199.170.64/27

what is NAT, How can NAT help in address depletion,

NAT is a mechanism in TCP/IP network that allows to replace your local address with a white (public) address. NAT was developed to deal with the IP extaustion problem and to prevent the appearence of the IP black market.

Q7 what is the address space in 16 bit addresses?

Ans One address, addresses one byte- Using 16 bits you can write 65536 addresses (from 0 to 65536: that's 65536 different addresses), and address 65536 bytes. 65536 bytes is 64 kb.

Q.8 An address space has a total of 1024 addresses. How many bits are needed to represent an address?

Ans Addressing with a 1024-word page requires 10 bits because $1024 = 2^{10}$ Since logical address space consists of $8 = 2^3$ pages, the logical addresses must be $10+3 = 13$ bits. Similarly, since there are $32 = 2^5$ physical pages, physical addresses are $5+10 = 15$ bits long.

Q change the following IP addresses?

a) 129.14.6.8

129

2	129	
2	64	1
2	32	0
2	16	0
2	8	0
2	4	0
2	2	0
2	1	0
	0	

129 (in decimal) = 10000001

14

2	14	
2	7	0
2	3	1
2	1	1

14 (in decimal) 0000 1110

8 :-

2	8	
2	4	0
2	2	0
2	1	0

8 (in decimal) = 00001000

6 :-

2	6	
2	3	0
2	1	1

6 (in decimal) : 00000110 (in binary).

So in binary conversion, the IP address 129.14.6.8 becomes.

10000001. 00001110. 00000110. 00001000

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2a change the following IP addresses from binary notation to dotted decimal notation;

a) 01111111 . 1111 0000 . 01100111 . 01111101 :.

Ans (127. 240 . 103. 125)

b) 1 0101111 . 11000000 . 11111000. 00011101

Ans (175. 192. 248. 29)