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Question No. 1 (a): Briefly describe the layers

~~in the~~ In the internet model are the network support layers?

Ans): There are three network support layers in the internet model which is

a): Physical (Cable, RS45)

b): Data link (MAC)

c): Network (Routers, IP)

a): Physical: it transmits signals over media.

b): Data link: Translates binary into signals and allow upper layers to access media.

c): Network: This layer determines how data is sent to the receiving device, it's responsible for packet forwarding, routing and addressing.

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Question No. 1 b) :- Describe three types of transmission impairment.

Ans) :-

There are three types of transmission impairments:

- 1) :- attenuation
- 2) :- delay distortion
- 3) :- Noise

1) :- Attenuation :- The impairment is caused by the strength of signals that degrades with distance over a transmission link.

2) :- Delay distortion :-

Delay distortion is a major reason for the timing jitter problem, where the receiver clock deviates from the incoming signal in a random fashion so that an incoming signal might arrive earlier or later.

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3) Noise: Impairment occurs when a unwanted signal is inserted between transmission and reception.

Question No. 1 c):

What does the Shannon Capacity have to do with communications?

Ans):

Shannon information Capacity has long been used as a measure of the goodness of electronic communication channels. It specifies the maximum rate at which data can be transmitted without error if an appropriate code is used.

Question No. 1 d): Compare and Contrast flow control and error control?

Ans): Flow Control and error Control are the control mechanism at data link layer and data layer. Whenever the

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Sends the data to the receiver these two mechanism helps in proper delivering of the reliable data to the receiver.

The main difference b/w the flow control and error control is that the flow control observes the proper flow of the data from sender to receiver, on the other hand the error control observes that the data delivered to the receiver is error free and reliable.

Question No. 1 e): Explain Piggybacking and its usefulness. In what layer of ~~OSI~~ OSI it is used and why?

Ans): In Piggybacking, the sender sends a data packet along with the acknowledgment if any acknowledgment needs to send at the time of transmission of the data packet.

The usefulness of the piggybacking is better use of bandwidth.



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(Question No 1(e) Continue):

The underlying cable and intermediate switches, router, etc will be less loaded.

In reliable communication, each packet has an acknowledgment from the receiver. SCTP protocol is one of the examples of a reliable transport layer protocol in the OSI model. piggybacking is an optimization method for the utilization of underlying network capacity.

Question No. 1(f): Brief HDLC w.r.t Station types, transfer modes frame types supported and flag field purpose?

Ans): High-Level Data Link Control (HDLC) is a group of communication protocols of the data link layer for transmitting data bit points or nodes.

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Three HDLC Station types

i) primary station:

Has the complete control of the link. the primary station sends commands to the secondary station.

ii) Secondary station:

Secondary station sends responses.

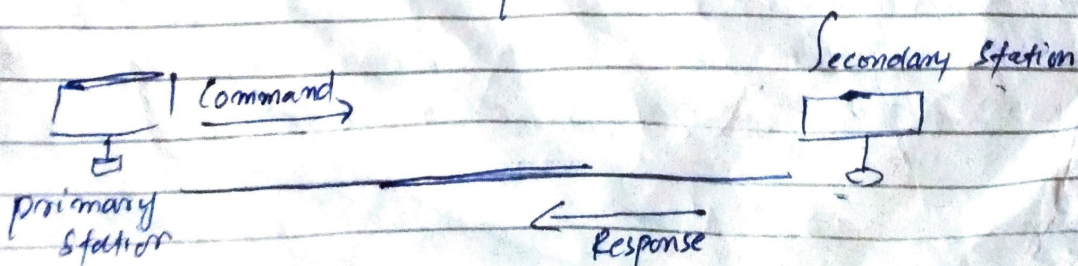
iii) Combined station:

which acts either as a primary or a secondary, depending upon the nature and direction of the transmission. it sends both command and responses.

Transfer modes:

HDLC has two types of transfer modes.

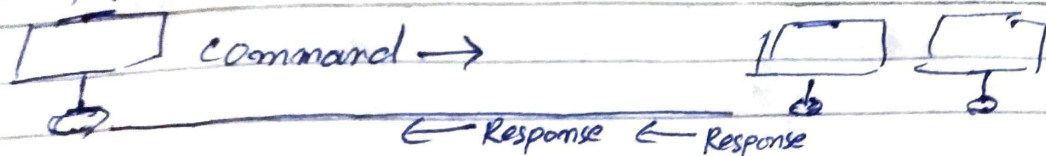
1) Normal response mode (NRM):



point to point communication.

Primary Station

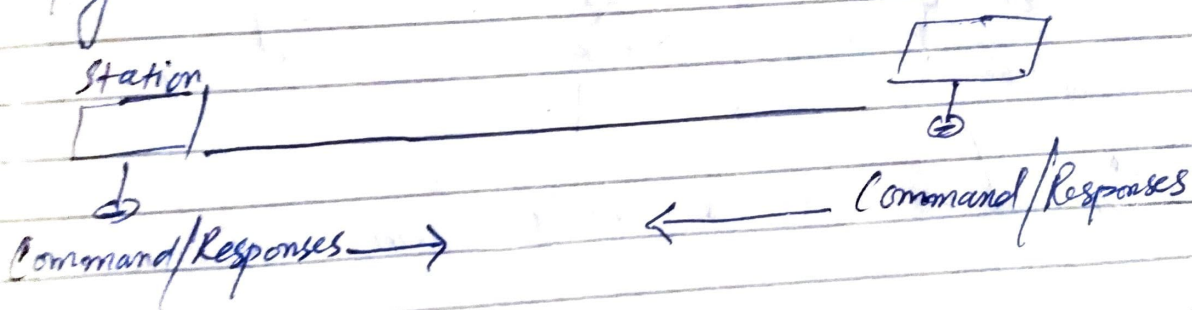
Secondary Stations



Multipoint Communications

In the above example there are two types of station primary sends commands and secondary station can respond to receive commands.

Asynchronous Balanced Mode; (ABM)



In Asynchronous the Configuration is balanced each station can both send commands and respond to commands only used in point to point communication.

HDLC frame: HDLC is a bit-oriented protocol where each frame contains upto six fields. the structure varies according to the frame type.

The fields of HDLC frame are

Flag:: 8-bit sequence marks beginning and end of frame.
bit pattern 01111110.

Address Contains address of Receiver.
1 byte to Serial.

Control:: 1 or 2 bytes containing flow and error control info.

Payload:: Carries data from network layer.

FCS:: 2 byte or 4 byte frame Check Sequence for error detection.

Flag field purpose::

HDLC is data link protocol which uses a unique bit sequence to delimit the start and end of each PDU transported by the data link layer. Service the flag sequence is a unique 8-bit sequence of the form 01111110.

Question No. 1 (g): Brief the protocols for noiseless channels?

Ans):

1) Simplest protocol:

it has no flow or error control. it is a unidirectional protocol in which data frames are traveling in only one direction - from sender to receiver. the data link layer of the receiver immediately removes the header from the frame and hands the data packet to its own network layer, which can also accept the packet immediately.

2): Stop-and-wait protocol:

if data frames arrive at the receiver site faster than they can be processed, the frames must be stored until their use. In stop and wait protocol the sender sends one frame, stops until it receives confirmation from the receiver, and then sends the next frame.

Question No. 1 (h):

What is differential encoding? Also explain the difference b/w NRZ-L and NRZI. and name the coding schemes of multilevel binary and bi-phase.

Ans):

Differential encoding: Bit Streams going through the many communications circuits in the channel can be unintentionally inverted. Most signal processing circuits can not tell if the whole stream is inverted. This is also called phase ambiguity. Differential encoding is used to protect against this possibility.

NRZ-L: In NRZ-L encoding, the polarity of the signal changes only when the incoming signal changes from a 1 to a 0 or from a 0 to a 1.

NRZ-Inverted: transition at the beginning of bit interval = bit 1 and NO transition at beginning of bit interval

= bit 0 or viceversa.

Biphase ~~Encoding~~ Names and multive level binary:

~~Biphase manchester~~
~~Manchester~~
~~BB/BB Encoding~~
~~BB/bT Encoding~~

- Unipolar
- Polar
- Bipolar
- Multilevel
- Multi-transition

Question No. 2 i) i:

Ans: Before using the destination address in an intermediate or the destination node, the packet goes through error checking that they help the node find the corruption (with a high probability) and discard the packet. Normally,

the upper layer protocol will inform the source to resend the packet

Question No. 2 J):

Ans):

Solution:

$$(8/100)s = 0.008s = \boxed{8ms} \rightarrow \text{Ans.}$$

Question No. 2 K):

Ans):

Sol:

$$C = B \times \log_2(1 + \text{SNR})$$

$$100 \times 10^3 = 4 \times 10^3 \log_2(1 + \text{SNR})$$

$$\log_2(1 + \text{SNR}) = 25$$

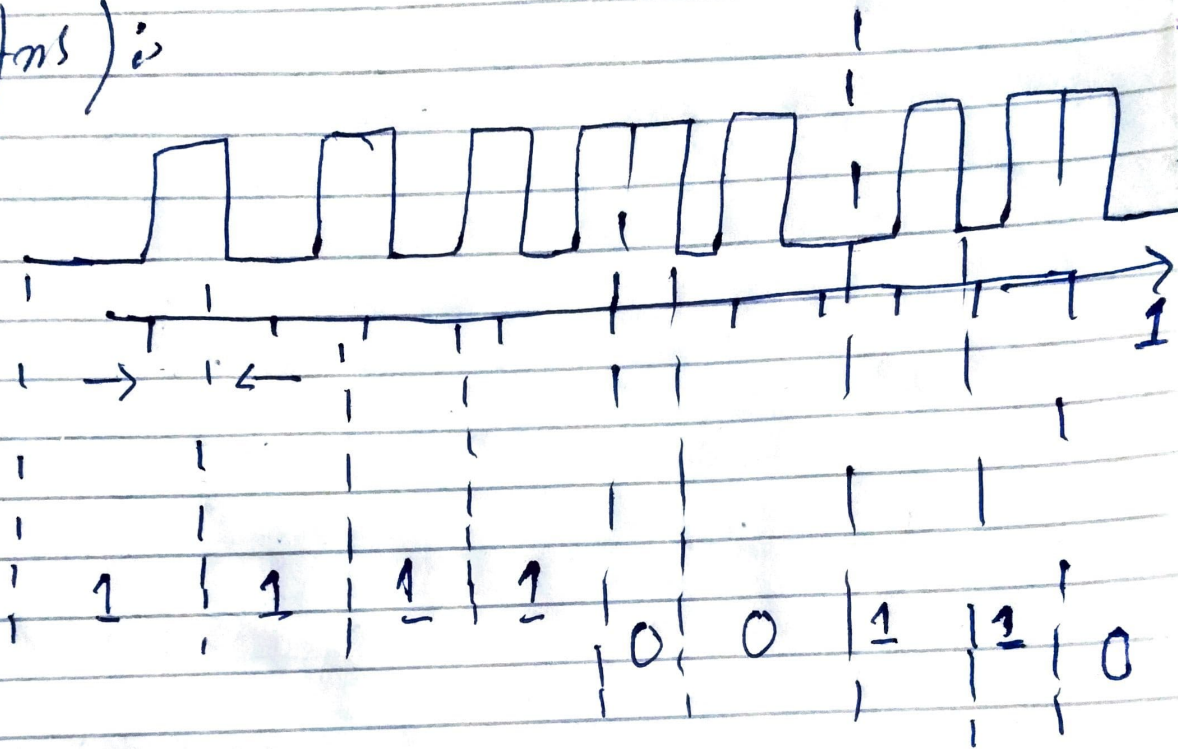
$$1 + \text{SNR} = 2^{25}$$

$$\boxed{\text{SNR} = 2^{25} - 1 = 33,554,431}$$

$$\boxed{\text{SNR}_{dB} = 10 \log_{10}(33,554,431) \approx 75 \text{ dB}}$$

Question no. 3(I):

Ans) :



the bit stream is

111100110