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Subject:

CCN

Instructor:-

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Q1- Briefly describe.

(a) Briefly describe the layers in the internet model are the network support layers?

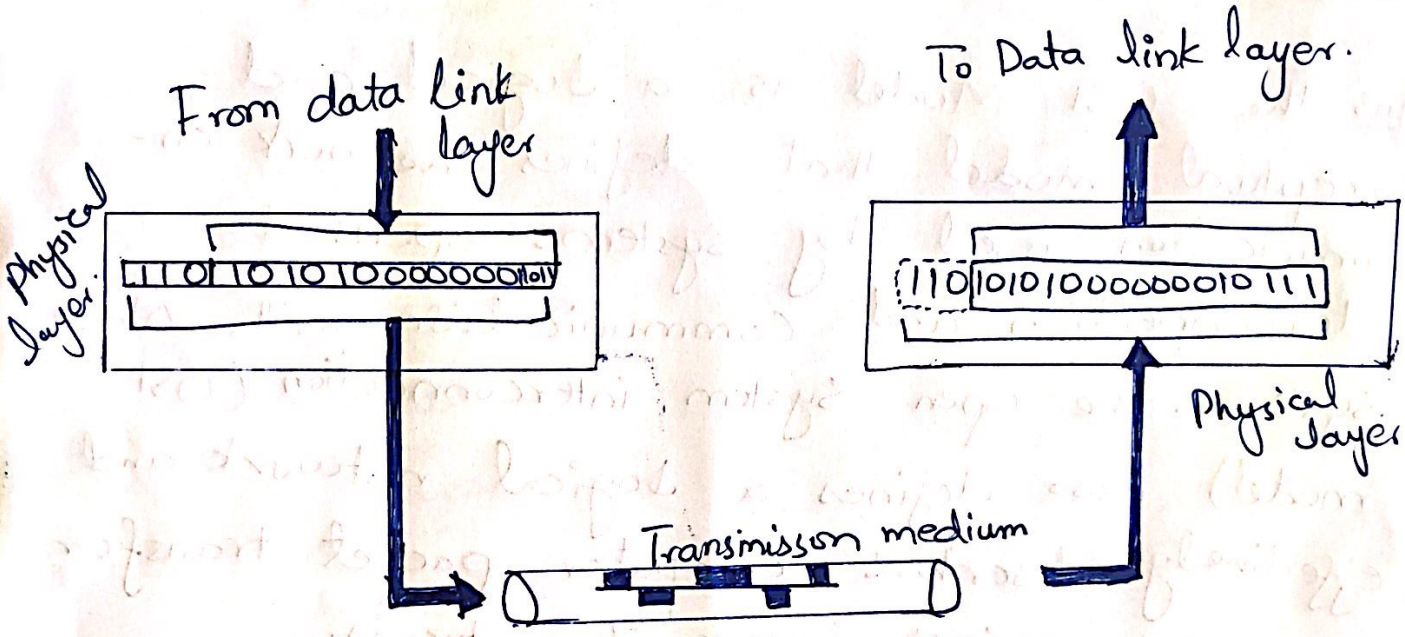
Ans The OSI Model is a logical and conceptual model that defines network communication used by systems opens to interconnection and communication with other systems. The open system interconnection (OSI model) also defines a logical network and effectively describes computer packet transfer by using various layers of protocols.

* Functions of each layer in the OSI Model:-

- Physical layer.
- Data Link layer.
- Network layer.
- Transport Layer.
- Session layer.
- Presentation layer.
- Application layer.

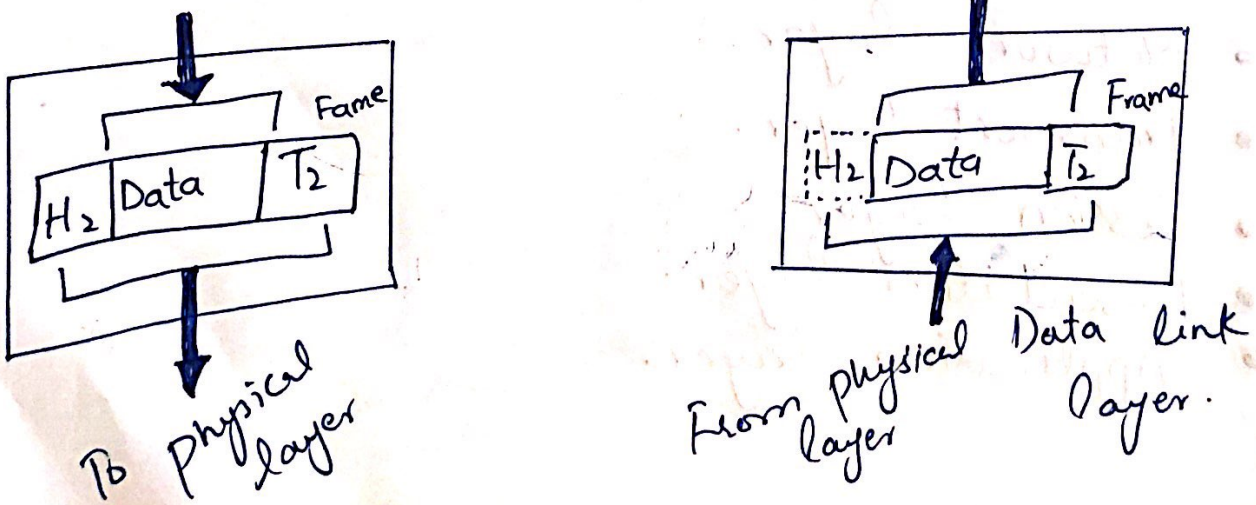
- **Physical Layer:-**

The physical layer is responsible for movements of individual bits from one hop (node) to the next.



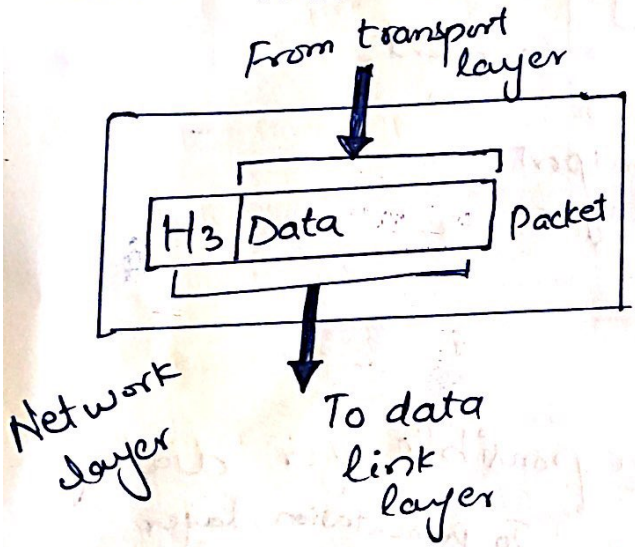
- **Data link layer:-**

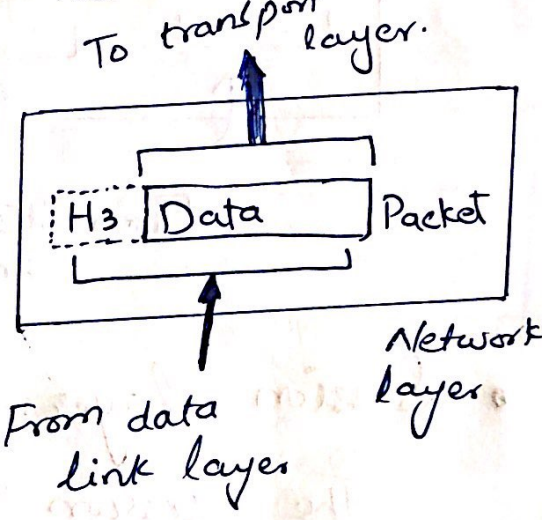
The data link layer is responsible for moving frames from one hop (node) to the next.



- Network Layer:-

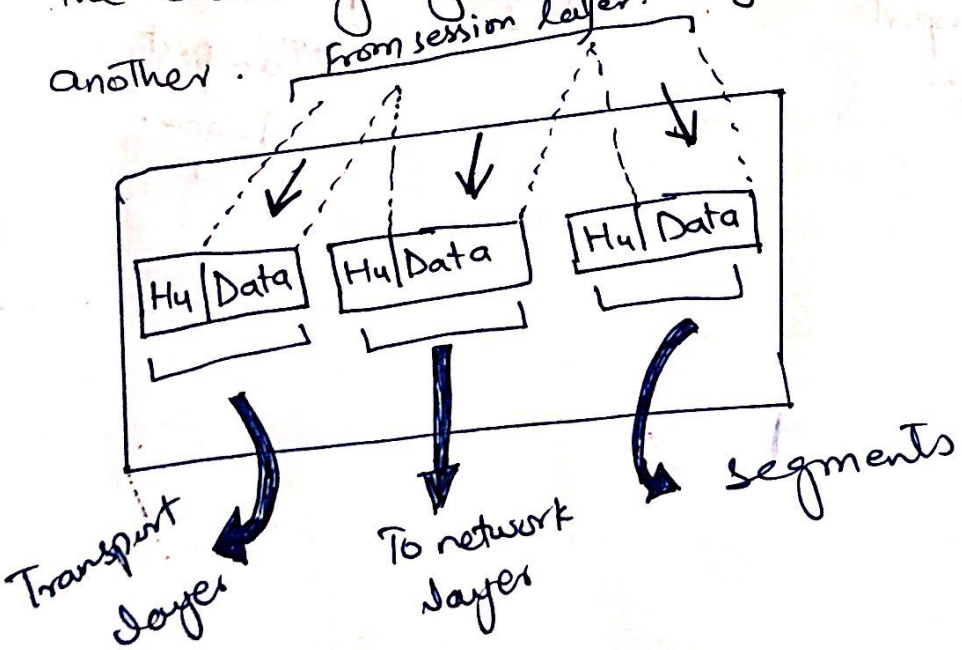
The network layer is responsible for the delivery of individual packets from the source host to the destination host.

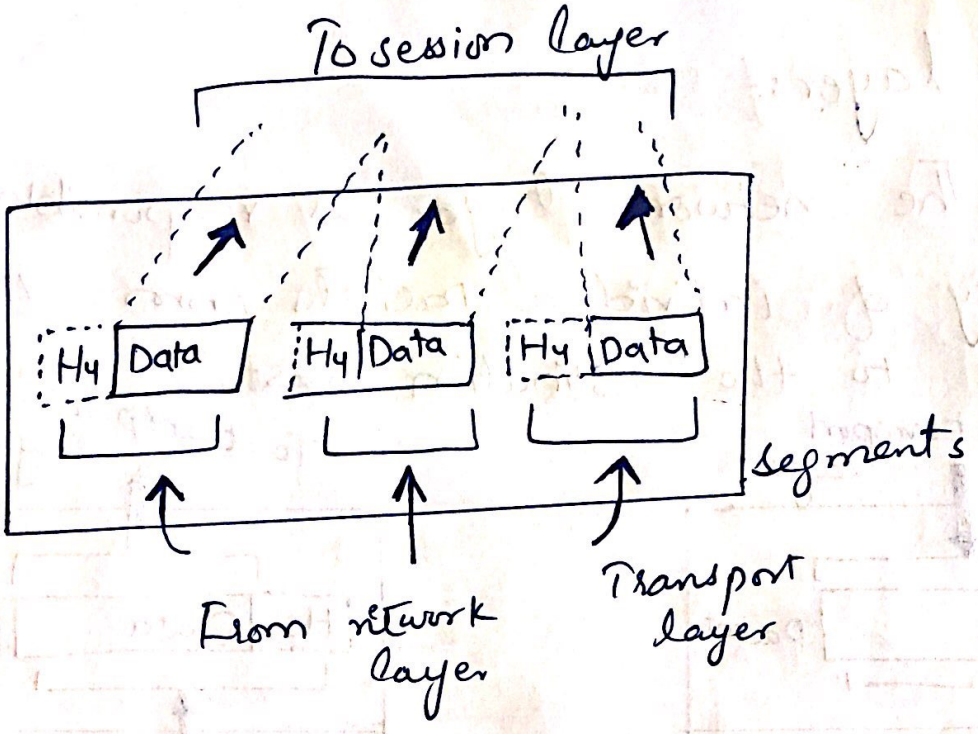




- Transport layer:-

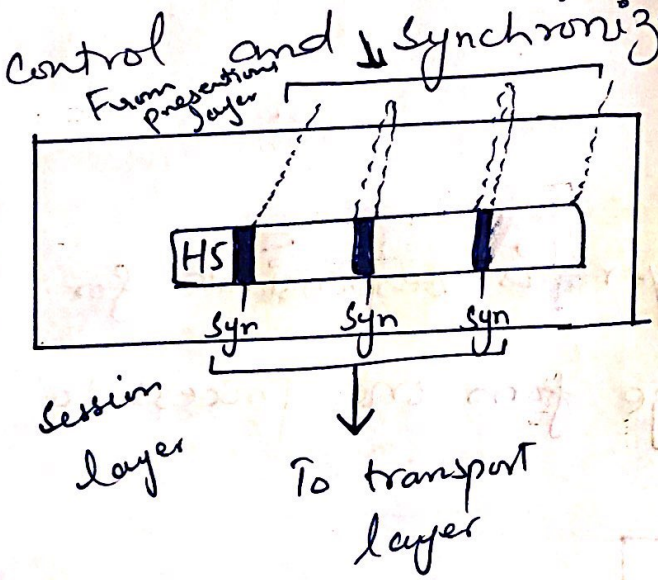
The transport layer is responsible for the delivery of a message from one process to another.

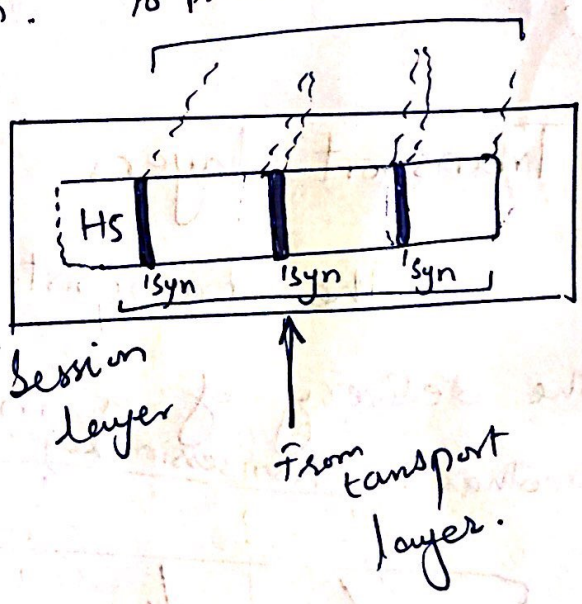




- **Session layer:-**

The session layer is responsible for dialog control and synchronization.





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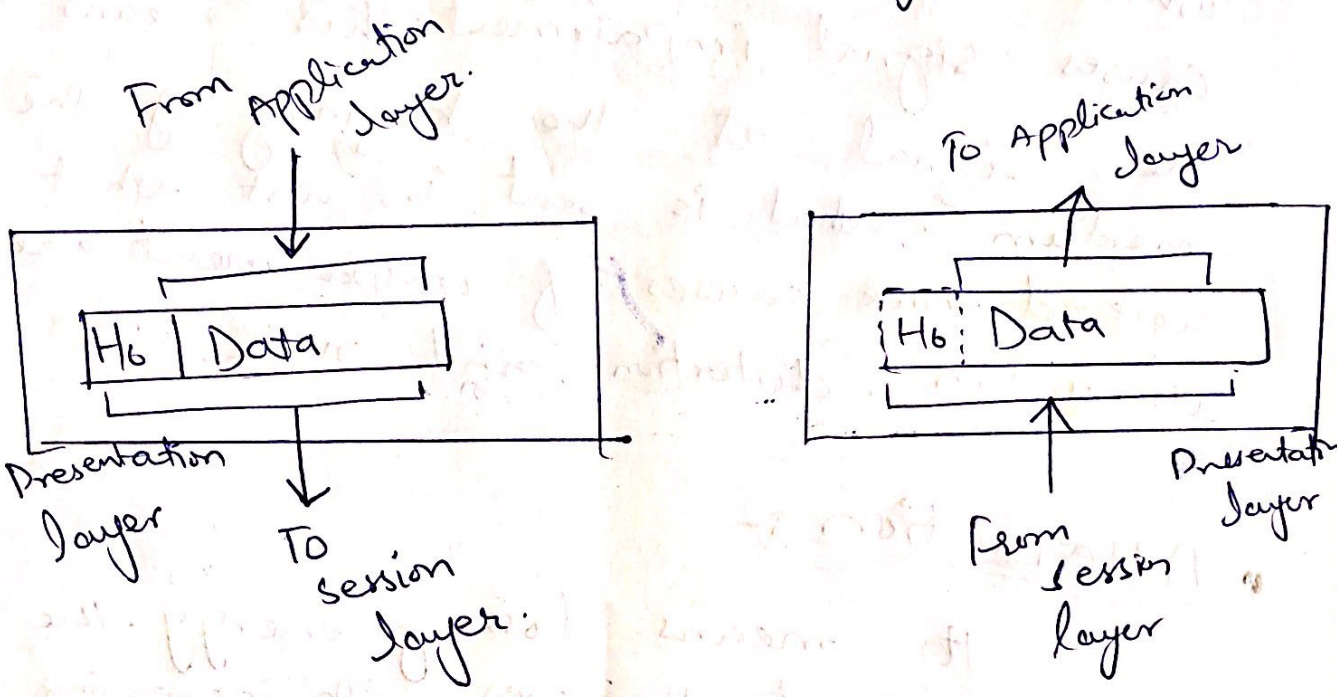
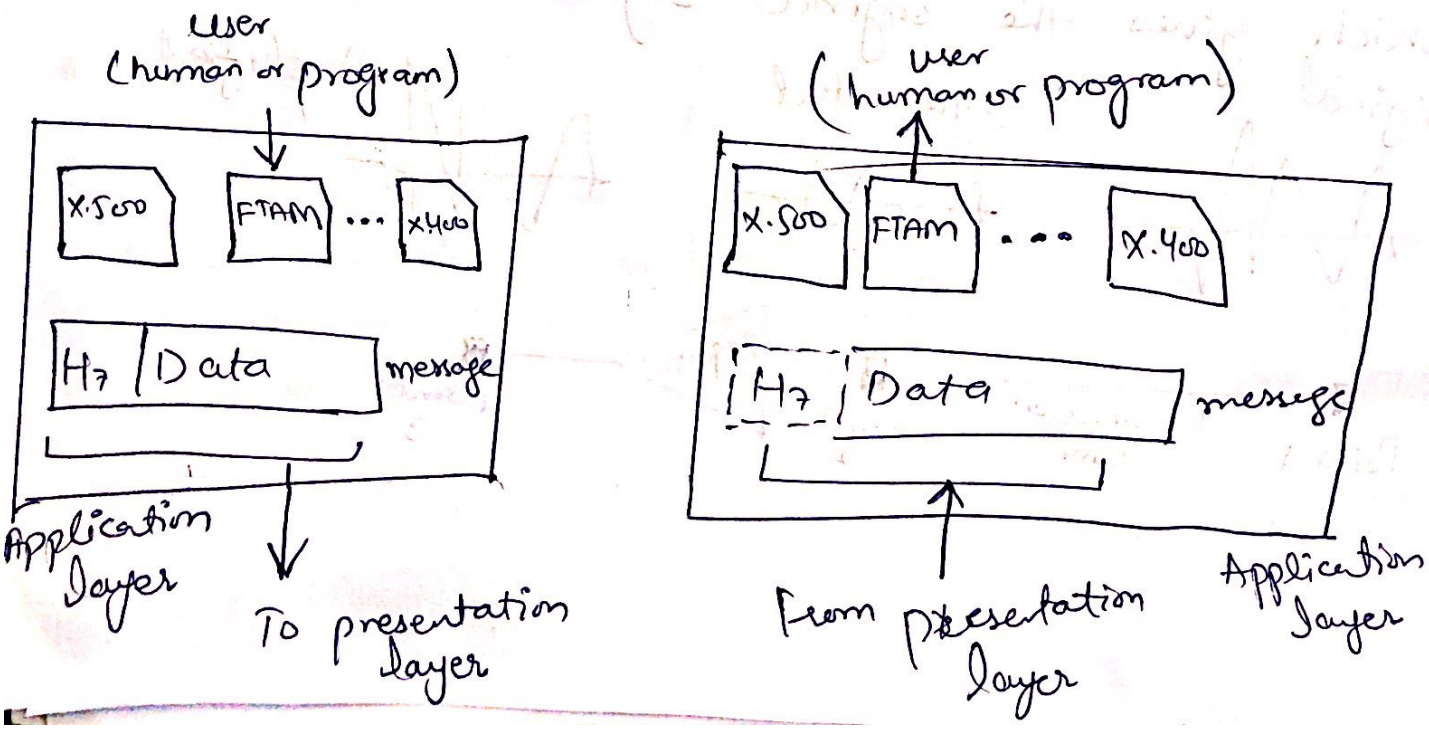
- **Presentation layer:-**

The presentation layer is responsible for translation, compression and encryption.



- **Application layer:-**

The application layer is responsible for providing services to the user.

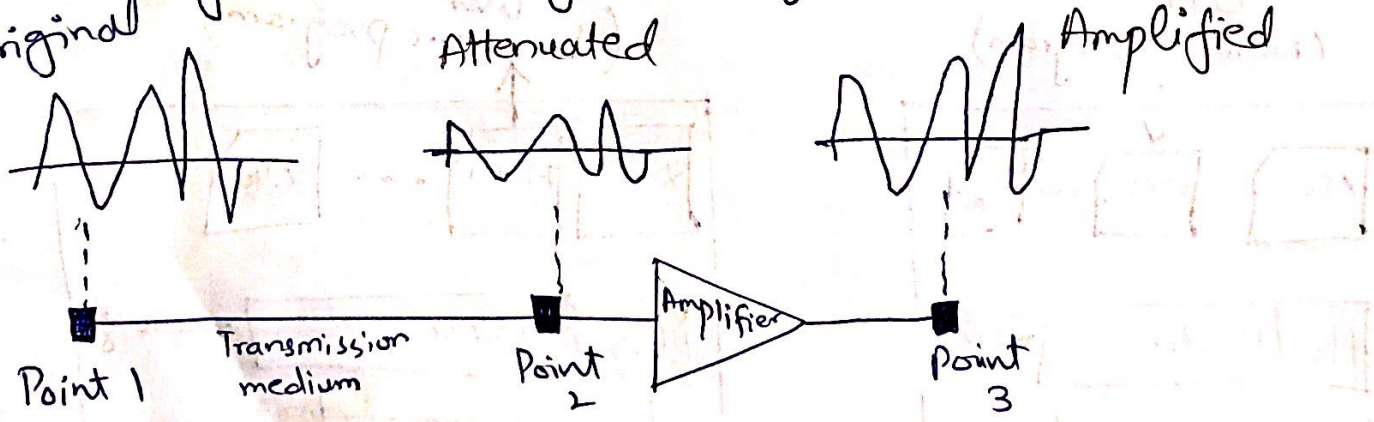


Q1(b) Describe three types of transmission impairment. (4)

Ans- Signals travel through transmission media, which are not perfect. The imperfection causes signal impairment. This means that the signal at the begining of the medium. What is sent is not what is recieved. Three causes of impairment are attenuation, distortion and noise.

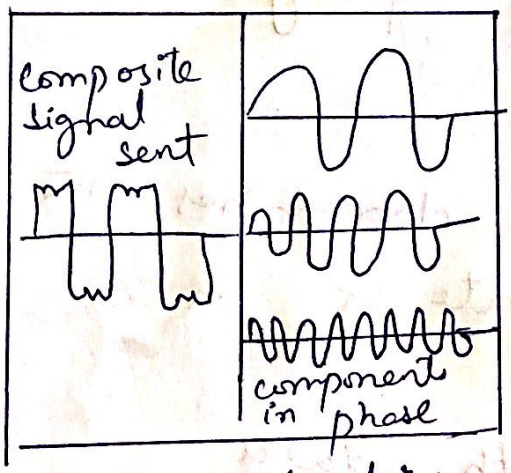
- **Attenuation** :-

It means loss of energy. The strength of signal decreases with increasing distance which causes loss of energy in overcoming resistance of medium. This is also known as attenuated signal. Amplifiers are used to amplify the attenuated signal which gives the original signal back.

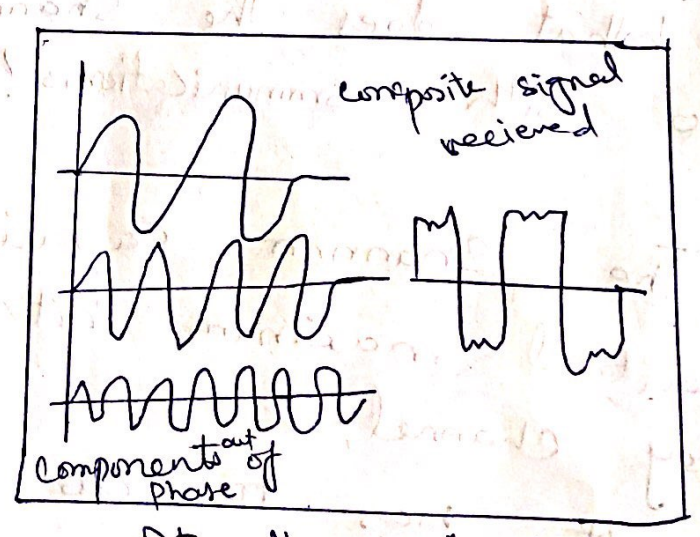


• Distortion :-

It means change in the shape of signal. This is generally seen in composite with different frequencies. Each frequency component has its own propagation speed travelling through a medium. Every component arrive at different time which leads to delay distortion. Therefore, they have different phase at reciever end from what they had at senders end.



At the sender.



At the reciever.

• Noise :-

The random and unwanted signal that mixes up with the original signal is called noise. There are several type of noises such as induced noise, crosstalk noise, thermal noise and impulse noise which may corrupt the signal.

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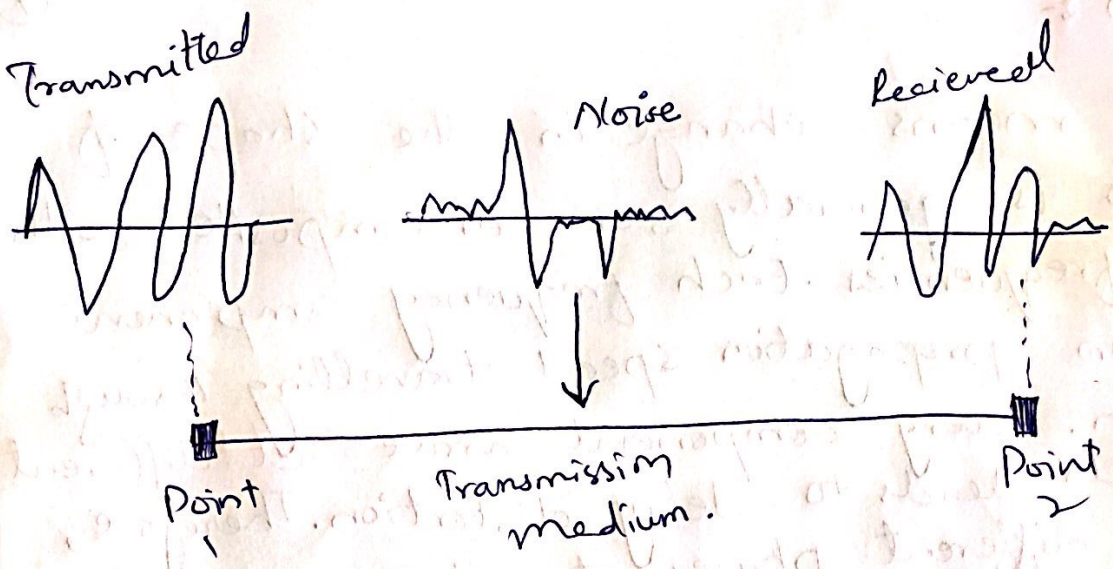


(c) What does the Shannon capacity have to do with communications?

Ans. The Shannon capacity determines the theoritical maximum bit rate of a noisy channel.

It has to do with data communication. It is called the Shannon Channel capacity theory where double the band width equals double the highest data rate. This is of course theoritically and does not take into account white noise (thermal noise), impulse noise, attenuation distortion or delay distortion.

(d) Compare and contrast flow control and error control. (3)

Ans. The main difference between the flow control and error control is that the flow control observes the proper flow of the data from sender to reciever, on the other hand, the error control observes that the data delievered to the reciever is error free and reliable.

Basis for Comparison	Flow Control	Error Control.
Basic	flow control is meant for the proper transmission of the data from sender to the reciever.	Error control is meant for delivering the error-free data to the reciever.
Approach	Feedback based flow control and rate based flow control are the approaches to achieve the proper flow control.	Parity checking, cyclic redundancy code (CRC) and checksum are the approaches to detect the error Hamming code, Binary convolution codes, Reed codes are the approches to correct the error in data.
mpact	avoid overcoming a reciever buffer and prevents the data loss.	Detects and correct the error occured in the data.

~~and contrast flow control and~~

~~) compare control.~~

Q Explain piggybacking and its usefulness: In which layer of OSI is it used and why?

ANS: Piggybacking data is a bit different from sliding protocol used in the OSI model. In the data itself, we incorporate one additional field for acknowledgment (called ACK). Whenever party A wants to send data to party B, it will carry additional ACK information in the PUSH as well.

FOR EXAMPE:

If A has recieved 5 bytes from B, which sequence number starts from 12340 (through 12344), A will place 'ACK 1234' as well in the current PUSH packet to inform B it has recieved the bytes up to sequence number 12344 and expects to see 1234 next time (ACK number is the next sequence e number of the data to be PUSHed by the other party).

Three rules govern the piggybacking data transfer:

1. If station A wants to send both data and an acknowlegment, it keeps both fields there.
2. If station A wants to send the acknowlegment after a short period of time to see whether data frame needs to be sent, then decides whether send an ACK frame alone or attach a data frame with it.
3. If station A wants to send just the data, then the previous acknowlegement field is sent along with the data. Station B simply ignores the duplicate ACK frame upon recieving.

Usefulness:

Improve the efficiency, better use of available channel bandwidth.

Q Brief HDLC w.r.t station types, transfer modes, frame types supported and flag purpose?

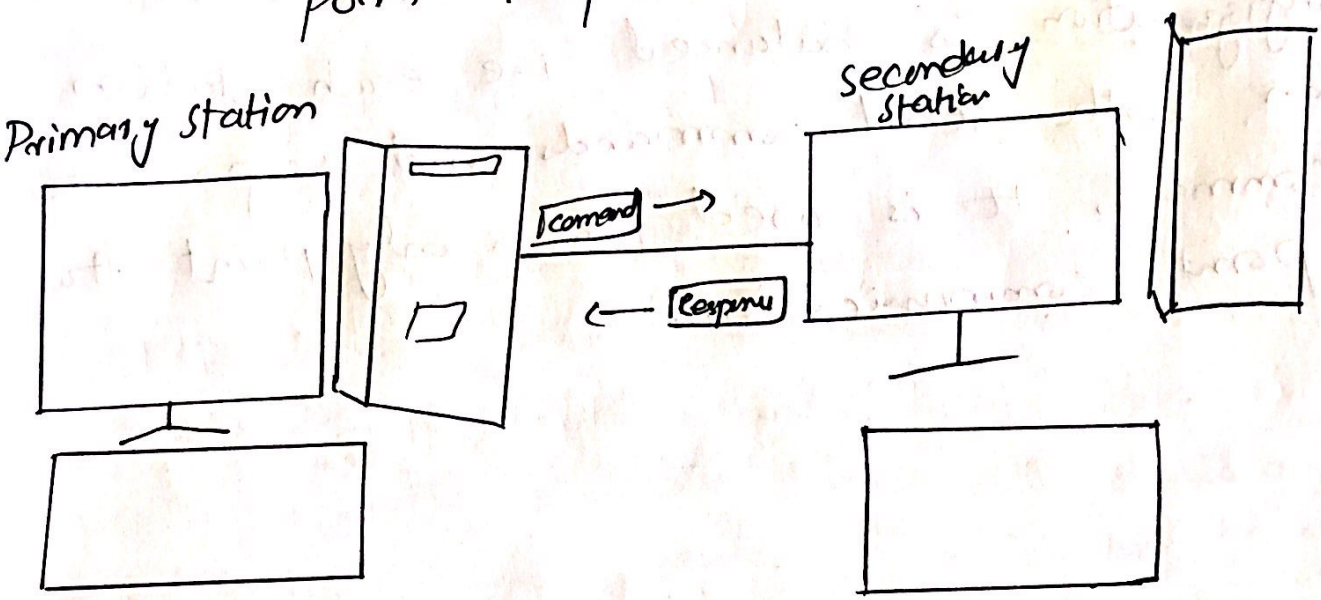
Ans High-level Data ~~link~~ Link control (HDLC) is a group of communications protocols of the data link layer for transmitting data between network points or nodes. Since it is a data link protocol, data is organized into frames. It is a bit orientated protocol that is applicable for both point-to-point and multipoint communications.

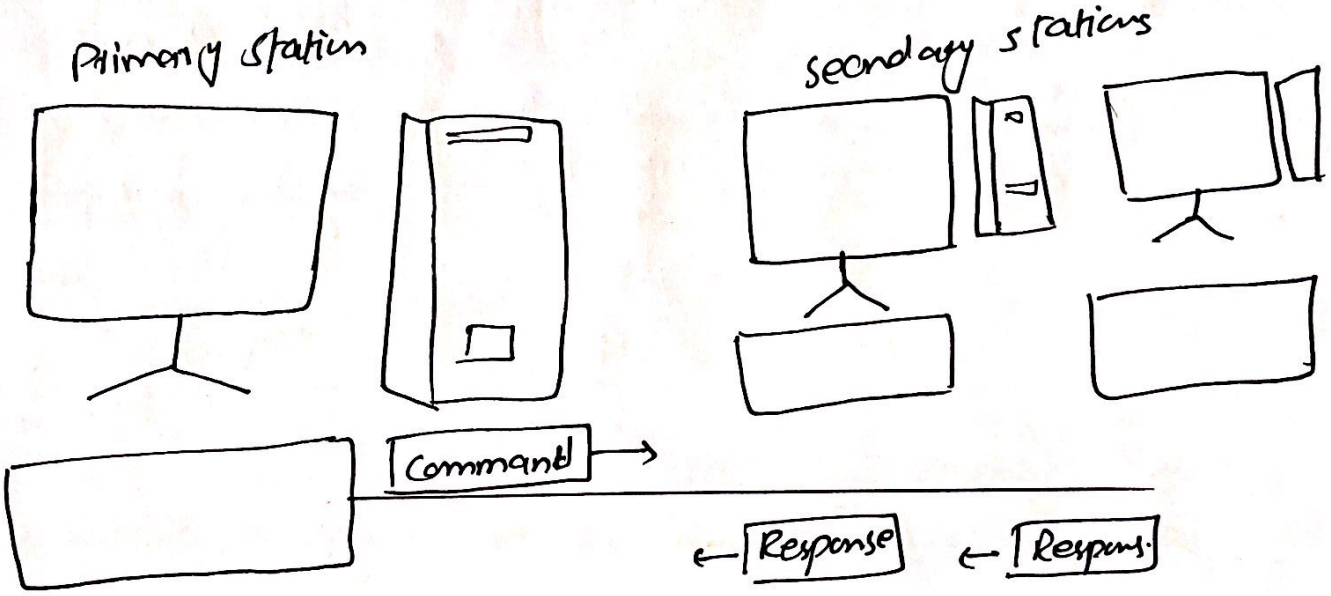
Transfer Modes :-

HDLC supports two types of transfer modes normal response mode and asynchronous balanced mode.

- Normal response mode :- Here two types of stations are there a primary station that send commands and secondary station that can respond to recieved commands. It is used for both point-to-point and multipoint communications.

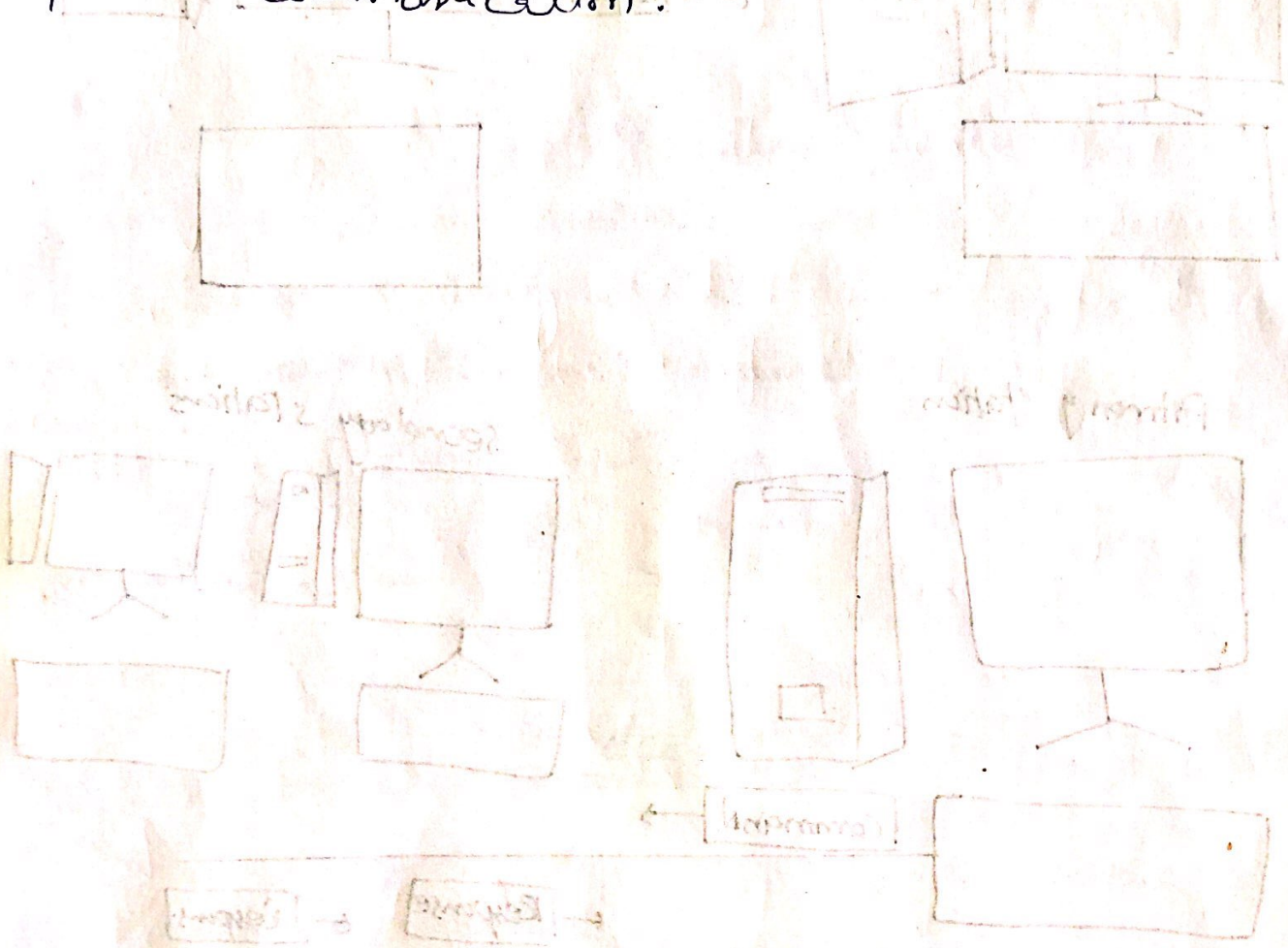
Point-to-point communication





Multipoint communication.

- Asynchronous Balanced Mode :- Here the configuration is balanced i-e each station can both send commands and respond to commands. It is used for a only point-to-point communication.

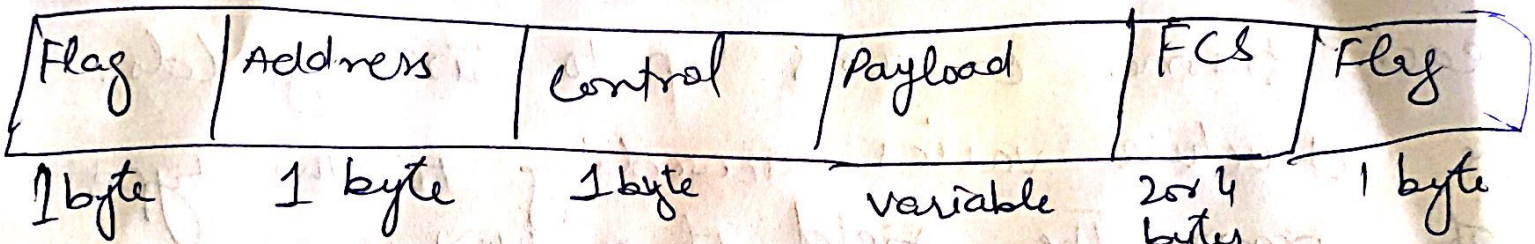


HDLC Frame:-

HDLC is a bit-oriented protocol where each frame contains up to six fields. The structure varies according to the type of frame. The field of a HDLC frame are.

- **Flag**: It is an 8-bit sequence that marks the begining and the end of the frame. The bit pattern of the flag is 01111110.
- **Control**: It is 1 or 2 bytes containing flow and error control information.
- **Payload**: This carries the dat from the data layer. Its length may vary from onet to another.

HDLC Frame.



Types of HDLC Frames :-

There are three types of HDLC frames:

- I - Frame.
- S - frame.
- U - Frame.

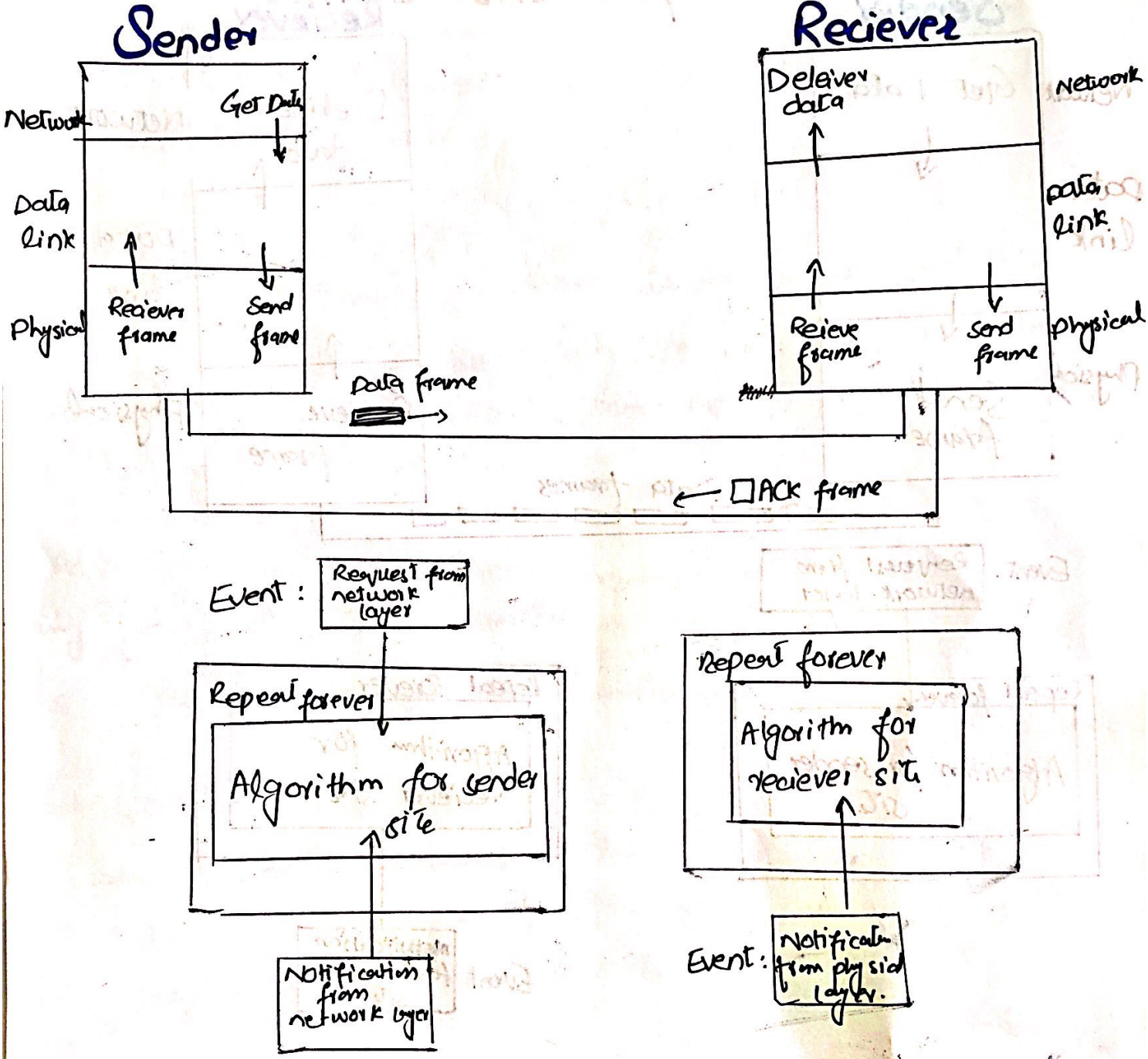
- Noiseless Channel :- Q- Brief the protocols for noiseless channel? (4)

An ideal channel in which no frame are lost, duplicated or corrupted is regarded as noiseless channel.

- Simplest Channel :-
- In simplest protocol, there is no flow control and error control mechanism. It is a uni direction protocol in which data frames travel in only one direction (from sender to receiver).

- Also the reciever can immediately handle any recieved frame with a processing time that is small enough to handle.
- The protocol consists of two distinct procedures a sender and reciever. The senders runs in the data link layer of the destination machine. No sequence number or acknowledgments are used here.

Design Of Stop-And-Wait Protocol

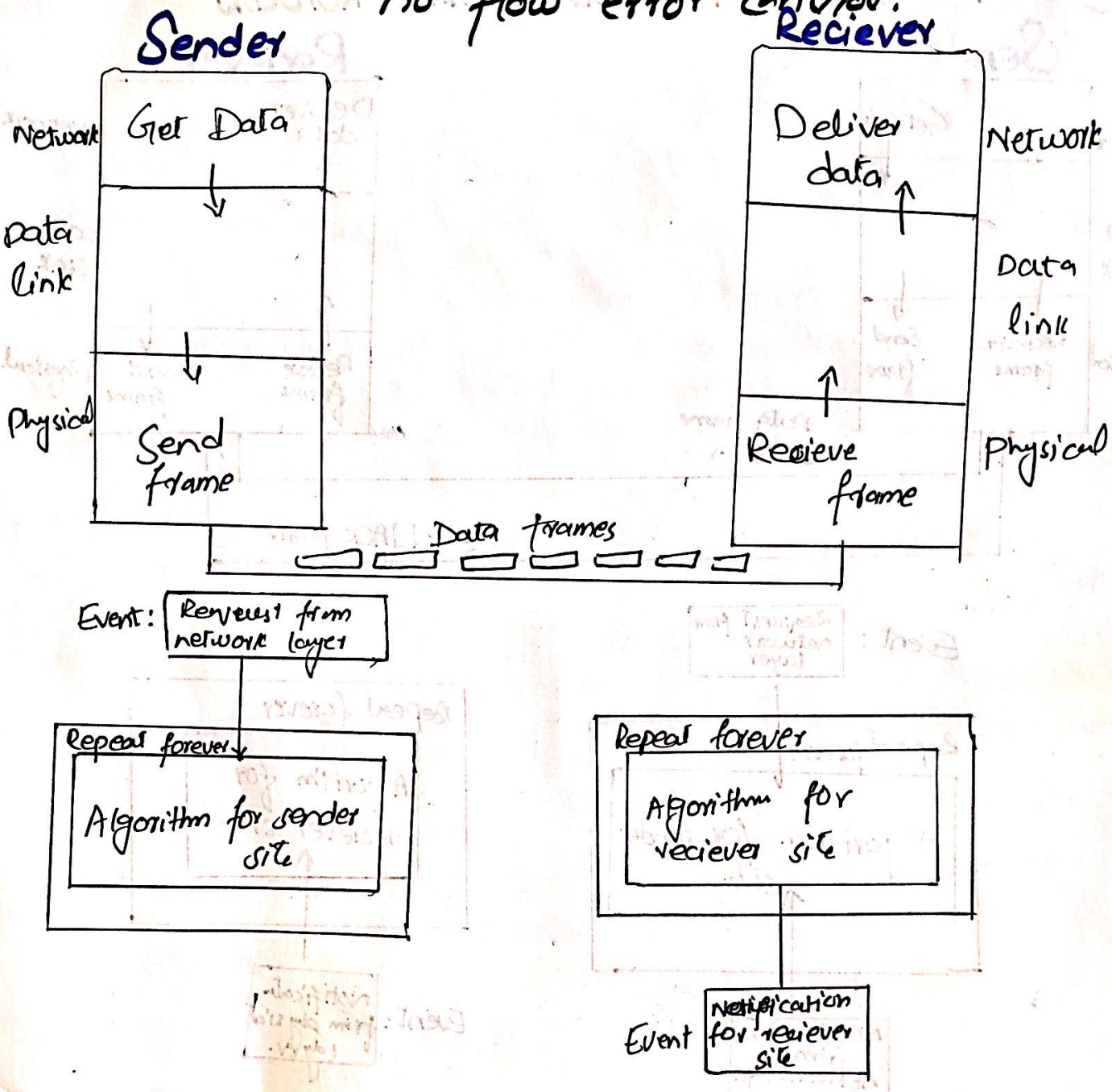


Stop and Wait Protocol :-

- The simplest retransmission protocol is stop and wait.
- Transmitter sends a frame over the communication line and then waits for a positive and negative acknowledgment from the reciever.
- If no error occurs in the transmission, station B sends a positive acknowledgment (ACK) to station A.
- There is also possibility that the information frames or ACKs may get lost.
- Then the sender is equipped with a timer. If no recognizable is recieved when the time expires at the end of time out interval, the same frame is sent again.
- The sender which sends one frame and then waits for an acknowledgment before porcess is known as stop and wait.

Q- Brief the protocols for...

The Design Of The Simplest Protocol With no flow error control:



(h) What is differential encoding? Also explain the difference between NRZ-L and NRZI. Also name the coding schemes of multilevel binary and bi-phase. (14)

Ans Differencial encoding is a digital-encoding technique where by a binary value is denoted by a signal change rather than a particular signal change state. Using differential encoding binary data in any user-defined I/Q or FSK modulation can be encoded during the modulation process via symbol table.

Fundamental difference exists between NRZ-L and NRZI with NRZ-L, the reciever has to check the voltagelevefor each bit to determine whether there is change at the begining of the bit to determine if it is a 0 or a 1

multilevel line codes 5.1.

Multilevel balanced codes.

5.2 Multi level balanced code 5.3.

The 4L7-4 code.

Question No. 2

Part (i)

If the corpted destination address does not match any station address in the network the packet is lost if the courapted destination matches one of the stations, the frame is delievered to the wrong station in this case however the error detection mechanism avaliable in most delaying protocals will find the frame in both case discard the frame in both case source will some how informed using one of the detating contral mechanism

Question. 2.

Part (i)

a. Bit duration = 100 bits ÷ 1000 bps = 0.1 sec

b. Bit duration = 8 bits ÷ 1000 bps = 0.008 sec

c. Bit duration = 1 X 8 bits ÷ 1000 bps = 0.008 sec

Question 2

PART : K

Given

B = 4Khz , N = 100 Kbps

$100 \times 10^3 = 4 \times 10^3 \times SNR_{dB} / 3$

$\Rightarrow 100 \times 3/4 = SNR_{dB} \Rightarrow 75 = SNR_{dB}$

$SNR_{dB} = 16 \times \log_{10} SNR. \Rightarrow 75 = 10 \times \log_{10} SNR$

$\Rightarrow SNR = 10$