

G.Nithish

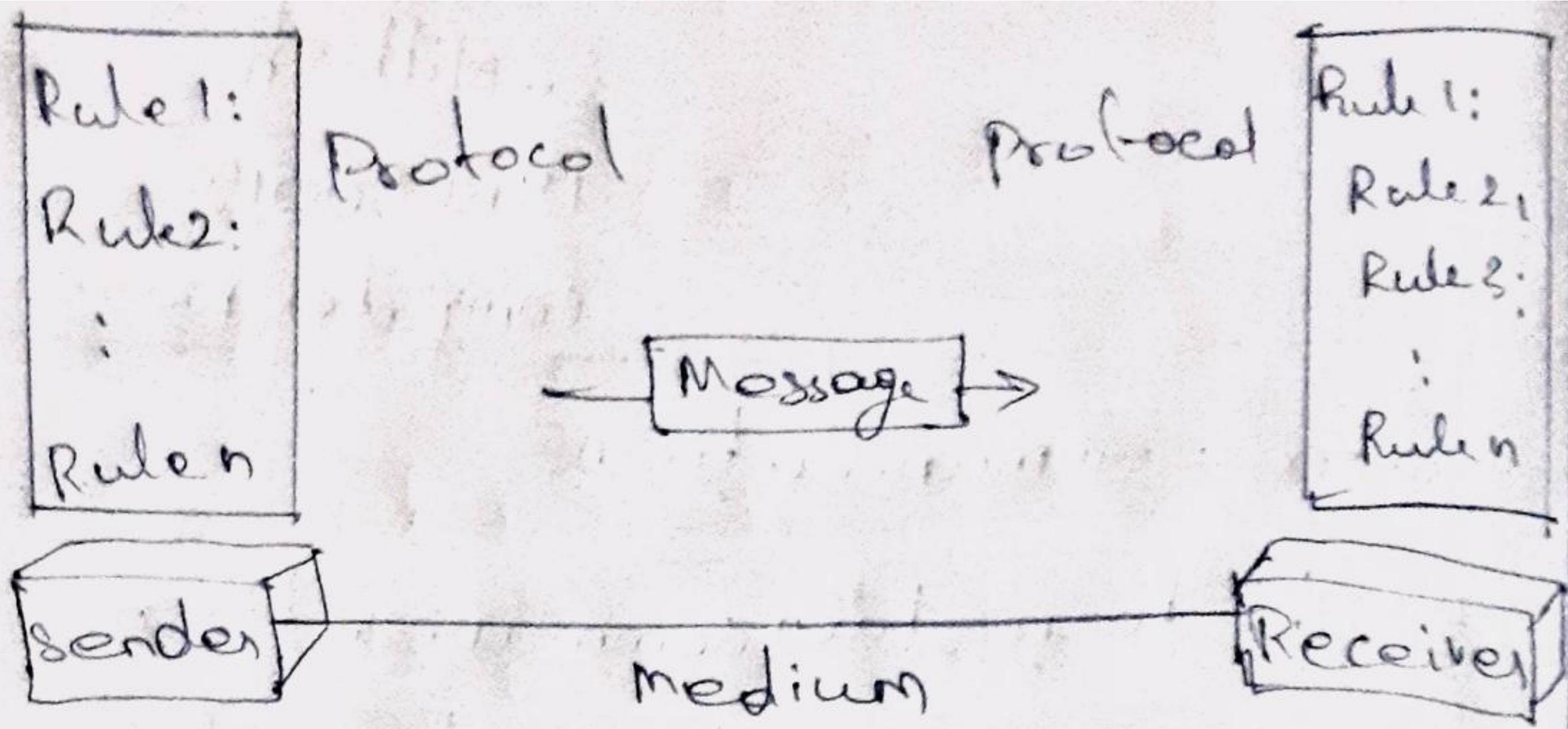
19BCS0012

Computer Networks

1.7

Data communication:

- ↳ The term telecommunication means communication at a distance.
- ↳ The word data refers to information presented in whatever form is agreed upon by the parties creating and using the data.
- ↳ Data communications are the exchange of data between two devices via some form of transmission medium such as wire cable.



~~Eg:~~

1) Post man sending file; ~~Collecting~~  
Collecting & sending based on  
the address.

2) Email:

Sending mail by appropriate  
email id:

Received mail is known by  
the address or id of sender email.

① Message:

→ The message is the information (data) is to be communicated. Popular forms of information include text, numbers, Pictures, audio and video.

2) Sender:

→ The sending is the device that sends the data message. It can be a computer, workstation, telephone, handset, Video, camera and so on.

3) Receiver:-

→ The receiver is the device that receives the message. It can be a computer, workstation, telephone handset.

4.)

### Transmission medium:-

- ↳ The transmission medium is the physical path by which a message travels from sender to receiver.
- Some examples of transmission media. Coaxial cable, fibre, optical cable.

5.)

### Protocol

- ↳ Protocol is a set of rules that govern data communication.
- ↳ It is represented as agreement between the communicating devices.
- Without protocol two devices connected But can't communicate.

Example:

Email

Message: text, Picture, video,  
document.. etc..

Sender : Who need's to send  
this message to  
someone : by Receiver  
Email Id address

Receiver:

↳ The Receiver who  
receives the message from  
the sender by knowing Email  
Id

Transmission medium: Online  
wireless

Protocol: Rules are message should  
reach it's destination by the  
correct Email Id.

2.

## OSI reference model

\* OSI model established in 1984,  
the International Standards Organization  
(ISO) is a multinational body dedicated  
to world wide organization, agreement  
on international standards. An ISO  
Standard that covers all aspects of  
network communications is OSI model.

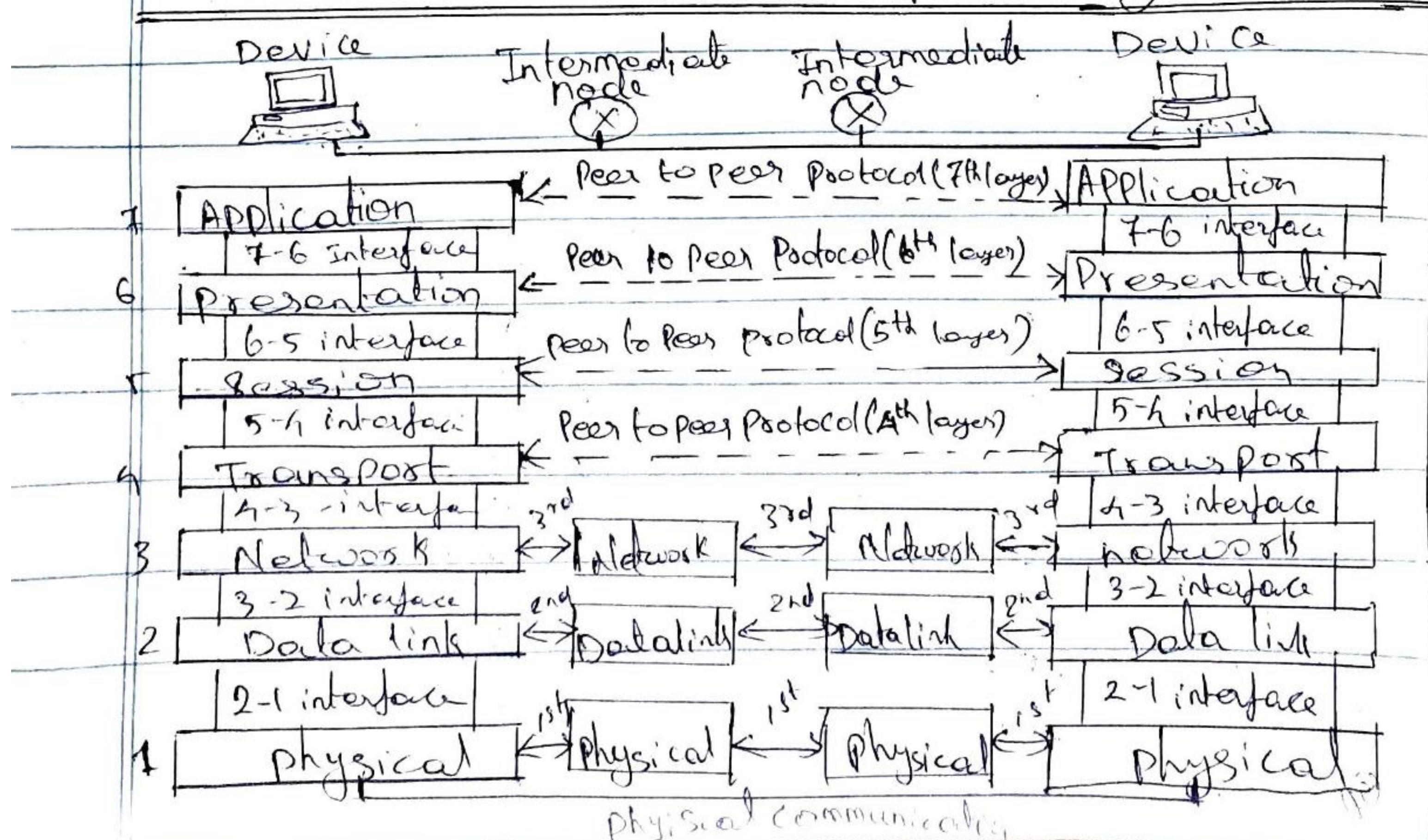
OSI reference model specifies standards  
for describing "Open System Interconnection"  
with the term 'open' chosen to emphasise  
the fact that by using these international  
standards.

### Seven layers of OSI

|              |   |
|--------------|---|
| Application  | 7 |
| Presentation | 6 |
| Session      | 5 |
| Transport    | 4 |
| Network      | 3 |
| Data link    | 2 |
| Physical     | 1 |

The seven layers can be thought of as belonging to three subgroups.

- ↳ Layer 1, 2, 3 → Physical, data link & network are the network support layers; they deal with the physical aspects of moving data from one device to another
- ↳ Layer 5, 6, 7 → Session, Presentation & application can be thought of as the user support layers;
- ↳ Layer 4 → the transport layer links the two subgroups and ensures that what the lower layers have transmitted in a form that the upper layer can use.

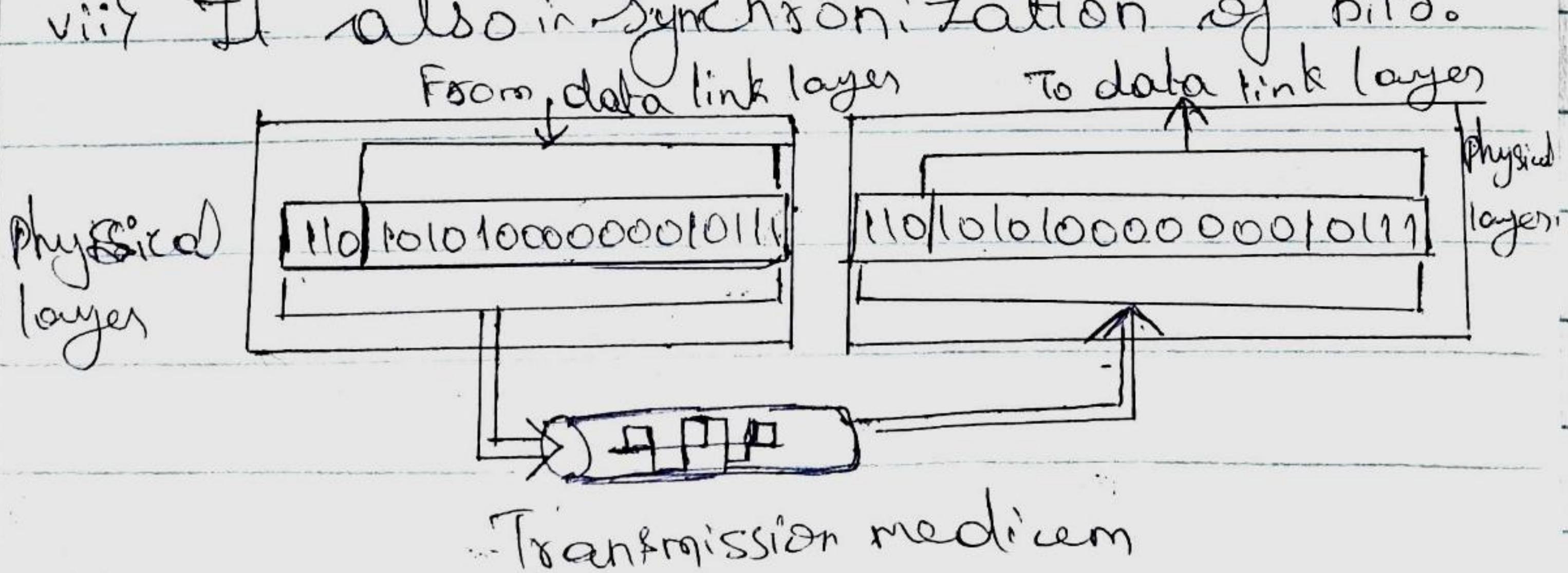


## 1st Physical Layer :-

Responsible for movements of individual bits from one hop/node to another next.

### Functions :-

- i) To active, maintain and deactivate the physical connection.
- ii) To define voltages and data rates needed for transmission.
- iii) To convert digital bits into electrical signal.
- iv) To decide whether the transmission is Simplex, half duplex or full duplex.
- v) A physical layer is concerned with the connections of devices to the media.
- vi) It also defines the physical topology.
- vii) It also in synchronization of bits.



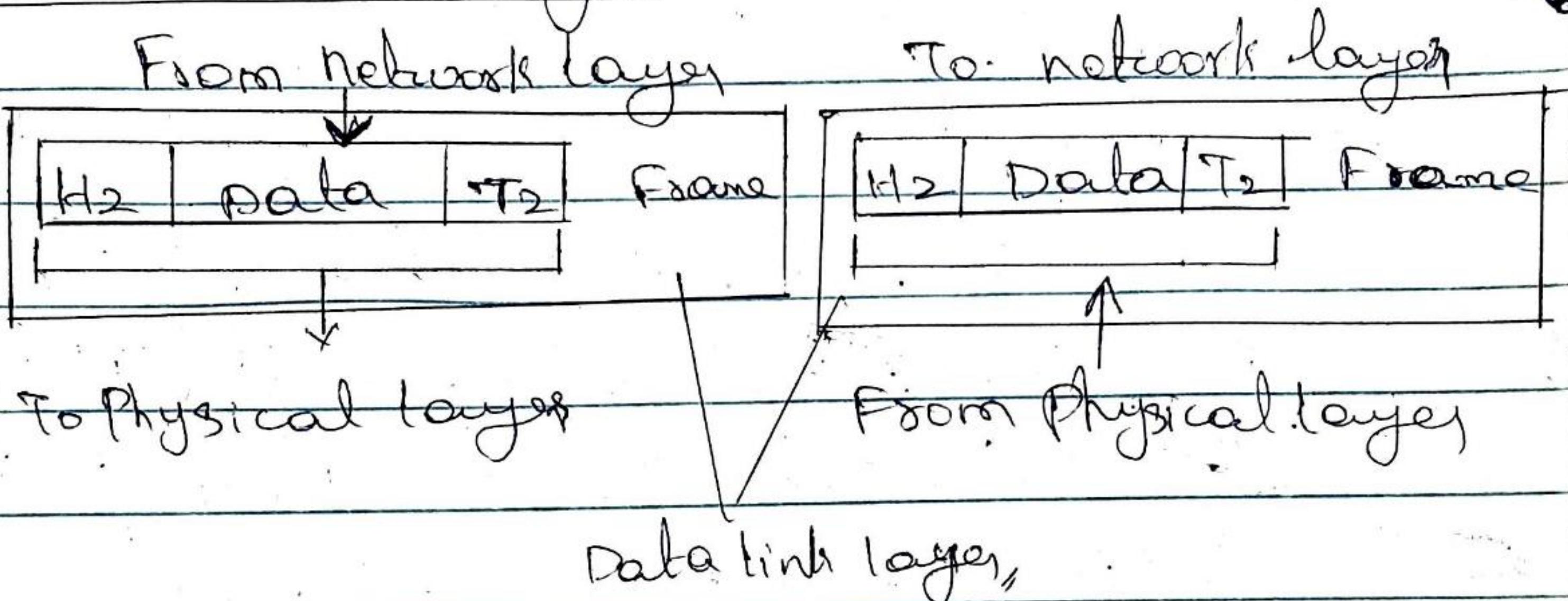
## Services

\* Physical Characteristics of medium

    i) Data Rate   ii) Line configuration

\* Physical topology   ii) Representation of bits

## Data link layer:-



## Functions:

\* It transforms the Physical layer's raw transmission facility to a reliable link.

\* It is responsible for moving frames from one hop(node) to the next.  
(i.e.) Hop-to-Hop delivery.

## Services:

i) Framing: The layer divides the stream of bits received from the network layer into manageable data units called frames.

14, 5, b

## Physical addressing:-

→ It adds a header to the frame to define the Physical address of the sender and/or receiver of the frame:

## Flow control:

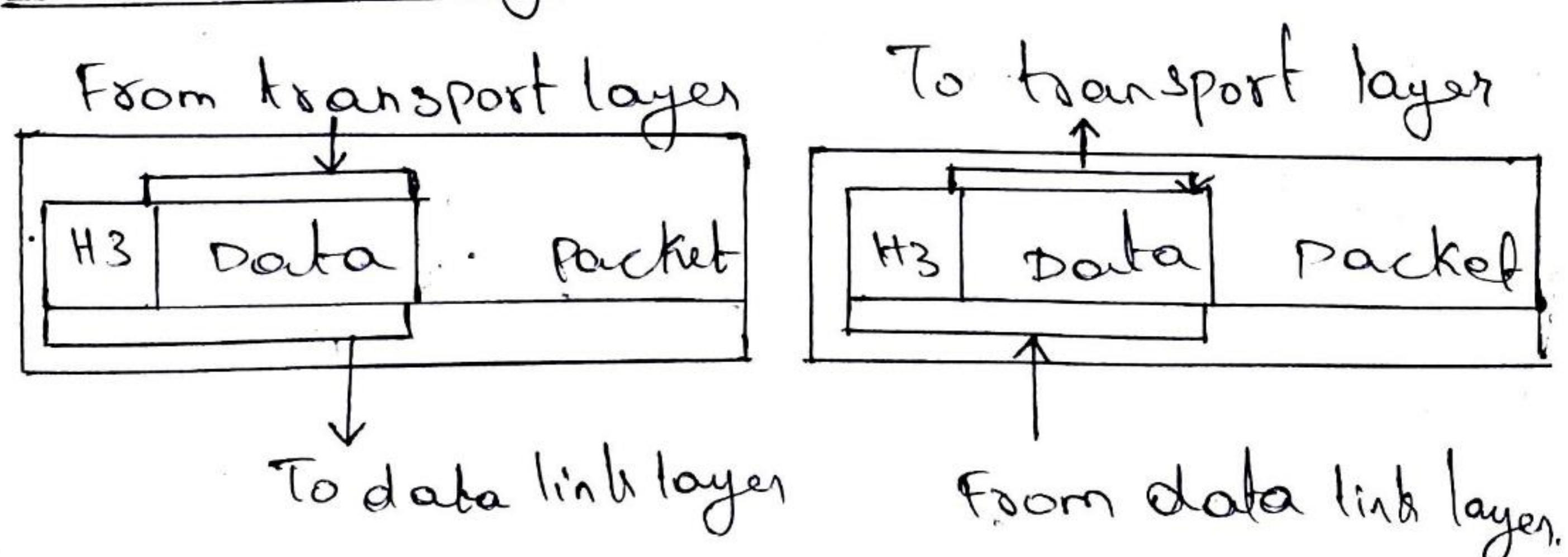
It provides a flow control mechanism to avoid a fast transmitter from overrunning a slow receiver by buffering extra bits:

## \* Error control

## \* Physical Addressing

## \* Access control

## Network layer:- → ③



## Function:

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

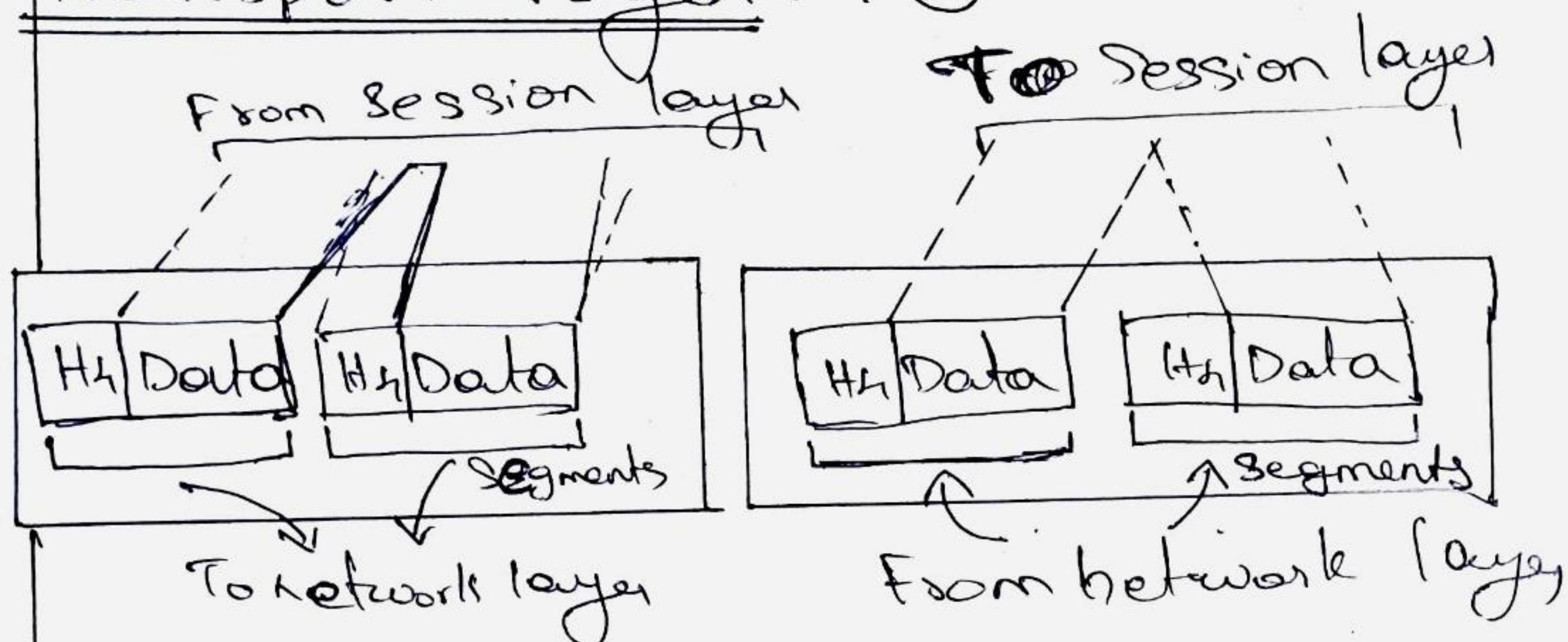
## Services Provided

### \* Logical Addressing:-

It translates logical network address into physical machine address.

### \* Routing:

### Transport Layer → ④



### Function:

It is responsible for process to process delivery of the entire message i.e. Source to destination delivery of the entire message.

It ensures that the whole message arrives intact and in order, ensuring both error control and flow control at source destination level.

Services Provided by the Transport layer.

- \* Port addressing
- \* Segmentation & Reassembly
- \* Connection control.
- \* End to End flow control
- \* Error control.

Session layer: → ⑤

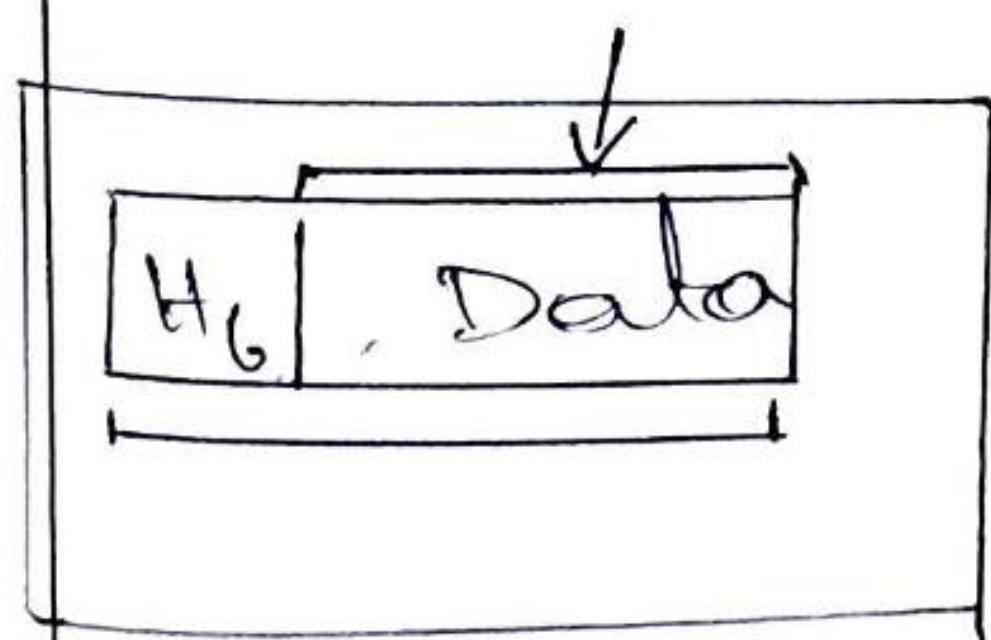
It is responsible for dialog control and synchronization i.e. it is network dialog controller. It establishes maintains and synchronizes the interaction among communicating system.

Services:-

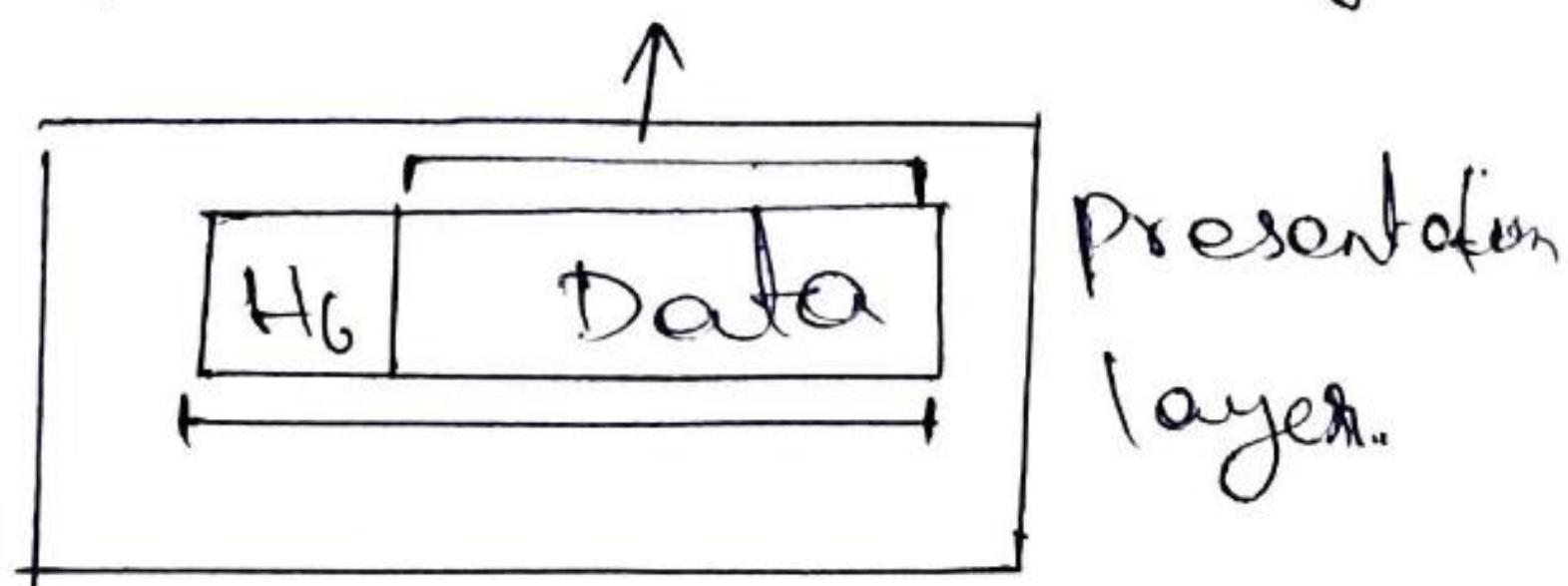
- \* Synchronization
- \* Dialog Control.

Presentation layer: → ⑥

From Application layer To Application layer.



To session  
layer



From session  
layer

Presentation  
layer.

## functions

It is responsible for translation, compression and encryption. It is concerned with the syntax and semantics of the information exchanged between two systems.

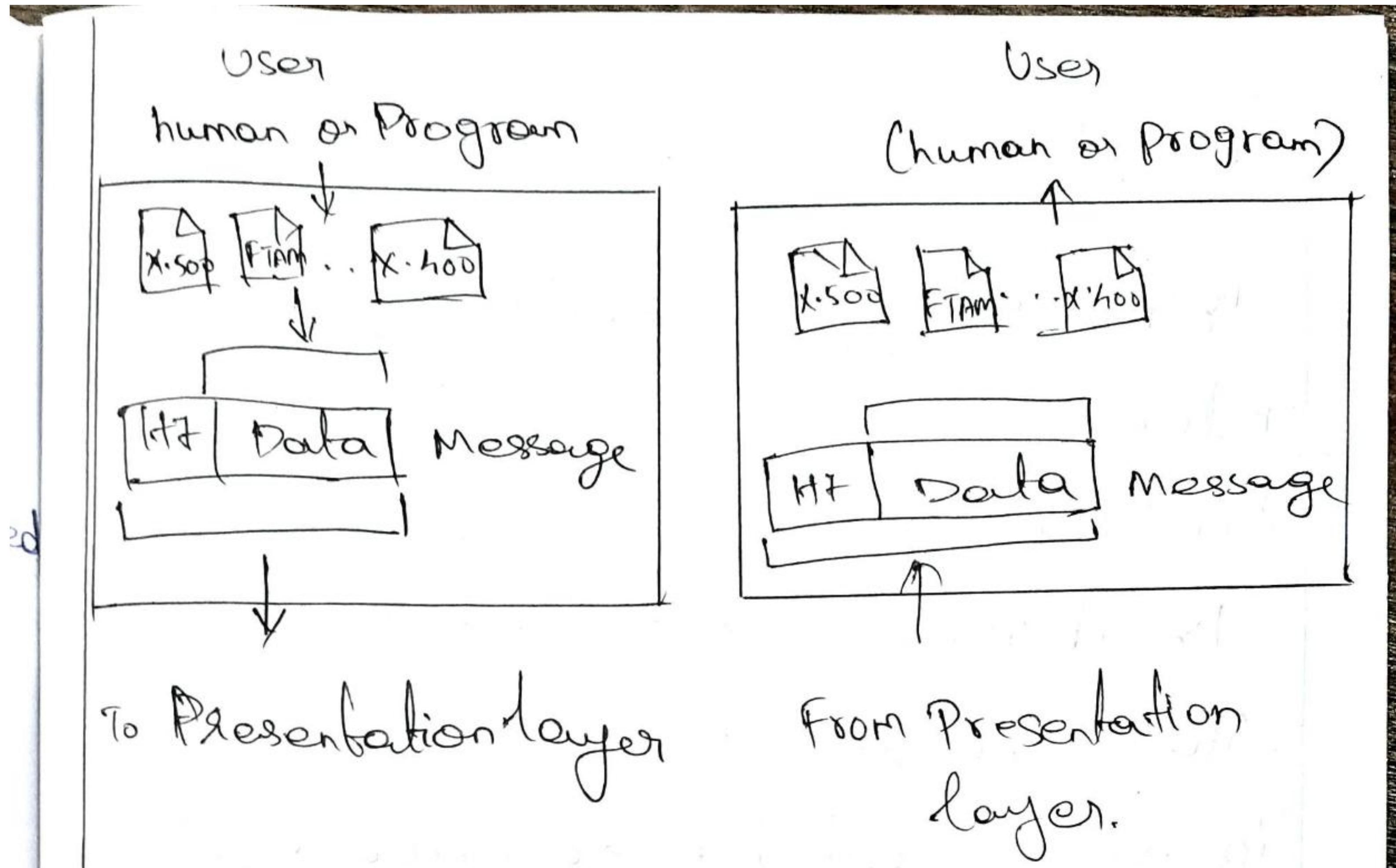
## 7.4 Application layer:

It is responsible for providing services to the user. It provides services that directly support user applications such as database access, e-mail, file transfer.

### Services

\* File Transfer and Access Management (FTAM)

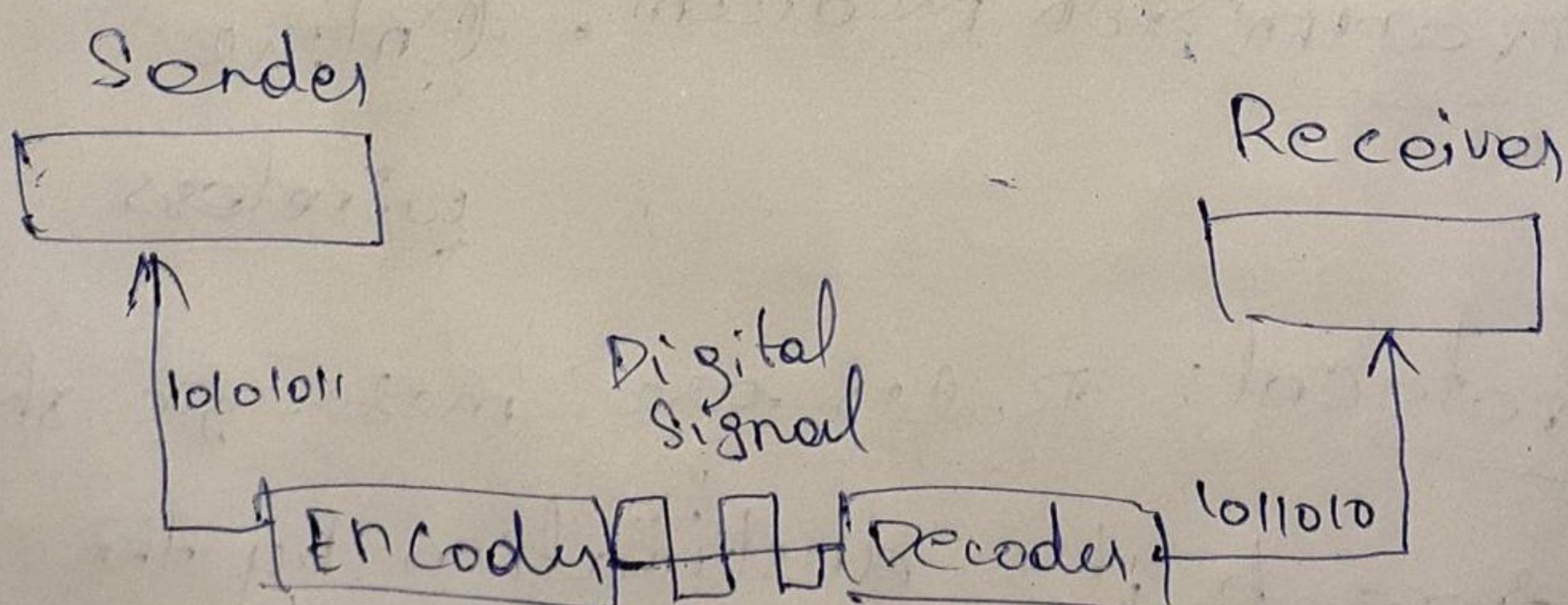
- (\*) Mail Services
- (\*) Directory Services.



X — X — X

### ③ Line Coding

Line coding refers to the process of connecting digital data into digital signal. Whenever we transmit data, it is in the form of digital signals, so with the help of line coding, we can convert a sequence of bits into a digital signal which then again converted into bits by the receiver.



## Line Coding Scheme

Line Coding

[Unipolar]  $\rightarrow$  NRZ (Non-polar to zero)

[Polar]  $\rightarrow$  NRZ, RZ and bipolar

[Bipolar]  $\rightarrow$  Pseudoternary

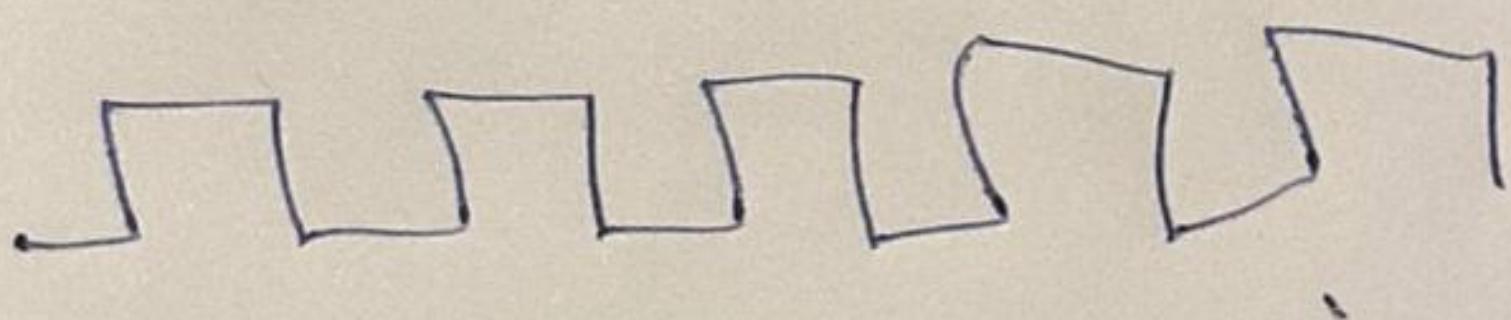
So Ami means alternate inversion

$\rightarrow$  A natural zero voltage represent binary 0,

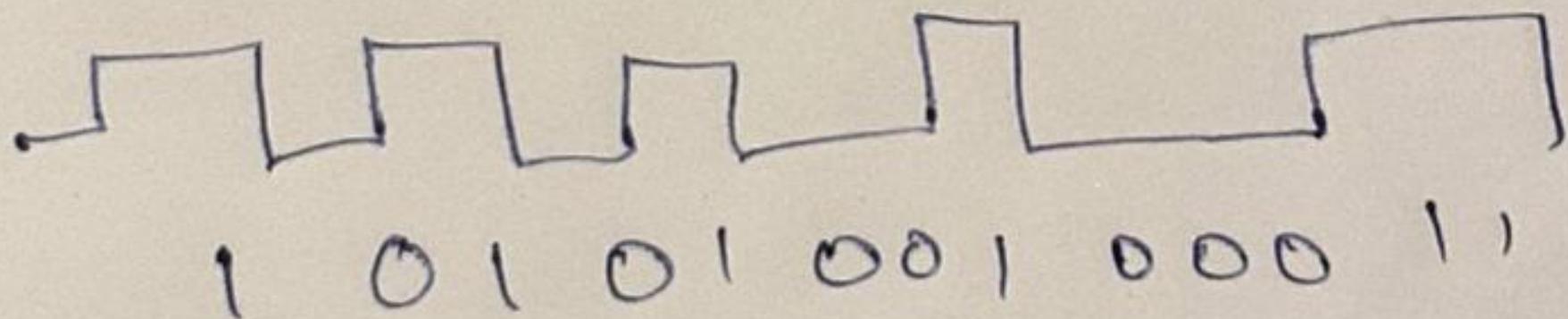
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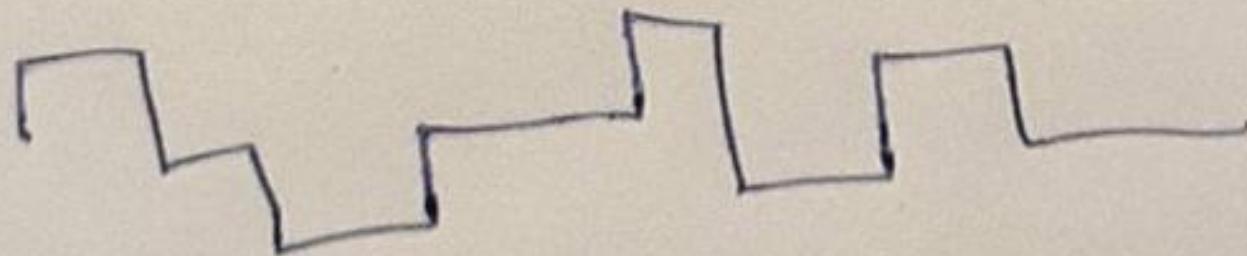
Clock



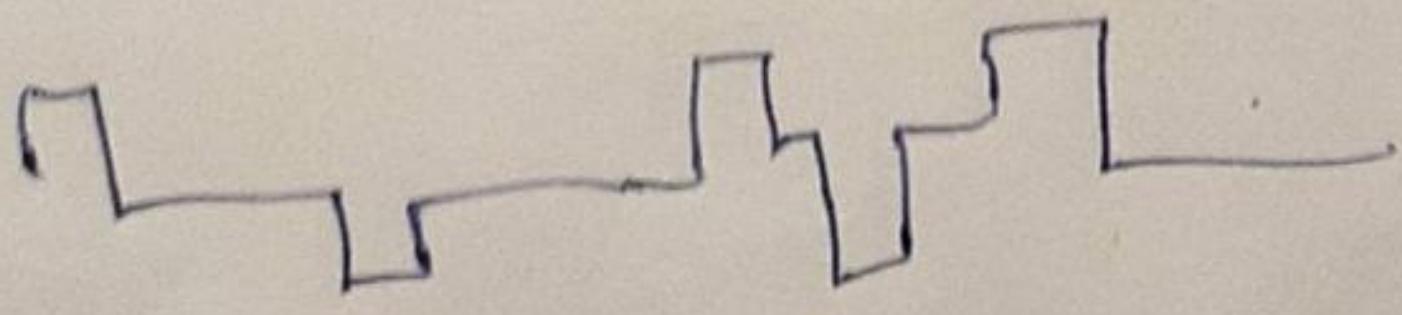
Data



Dipole

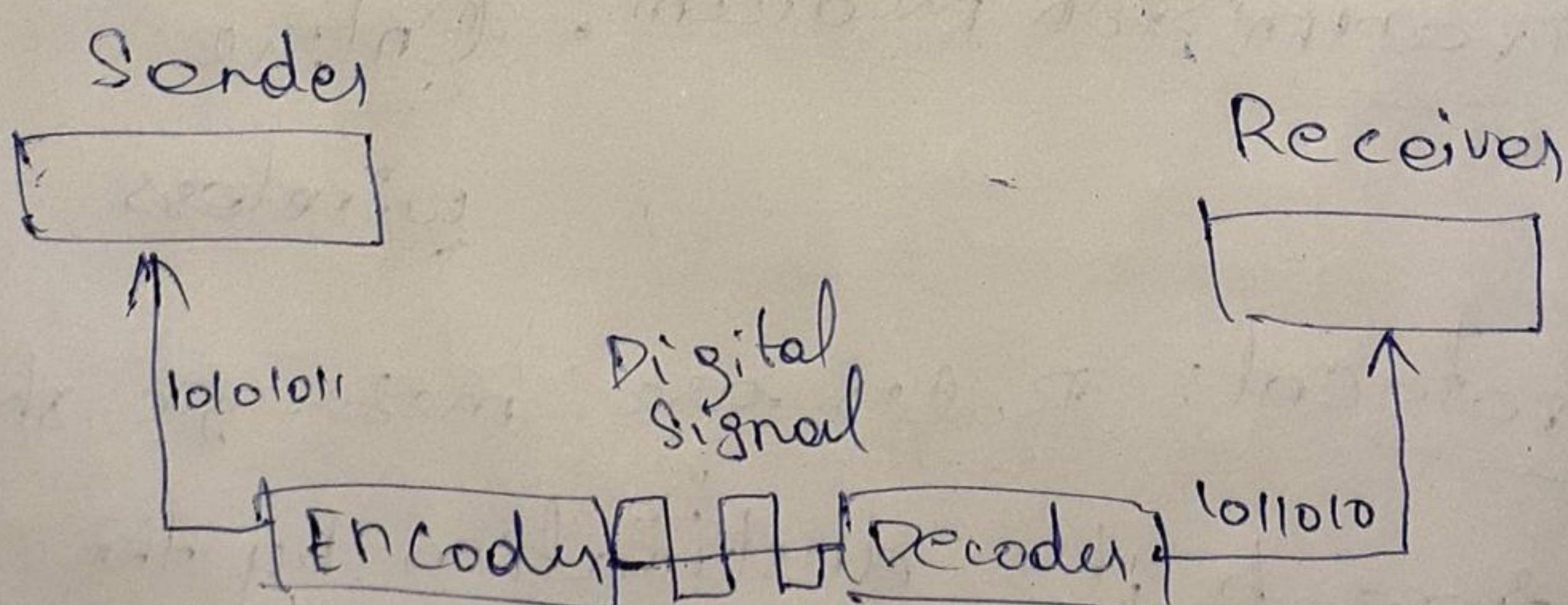


Dipolar



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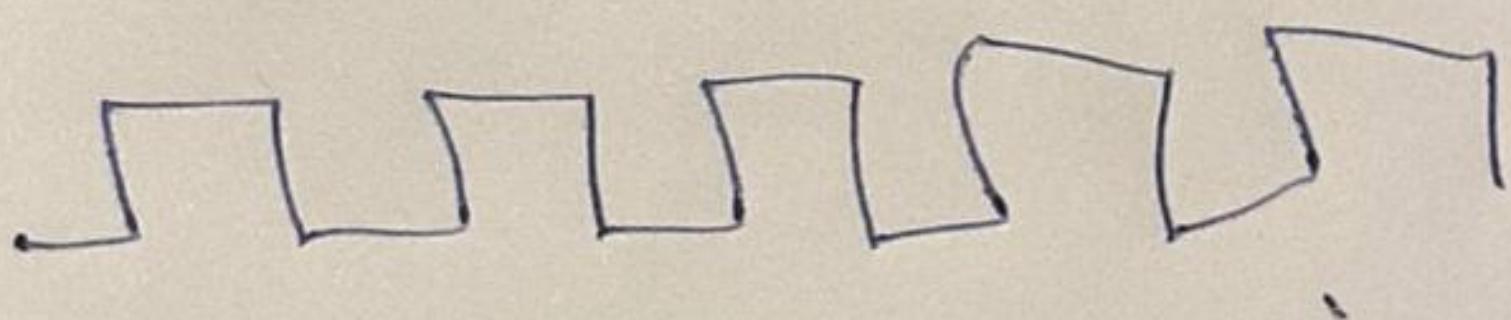
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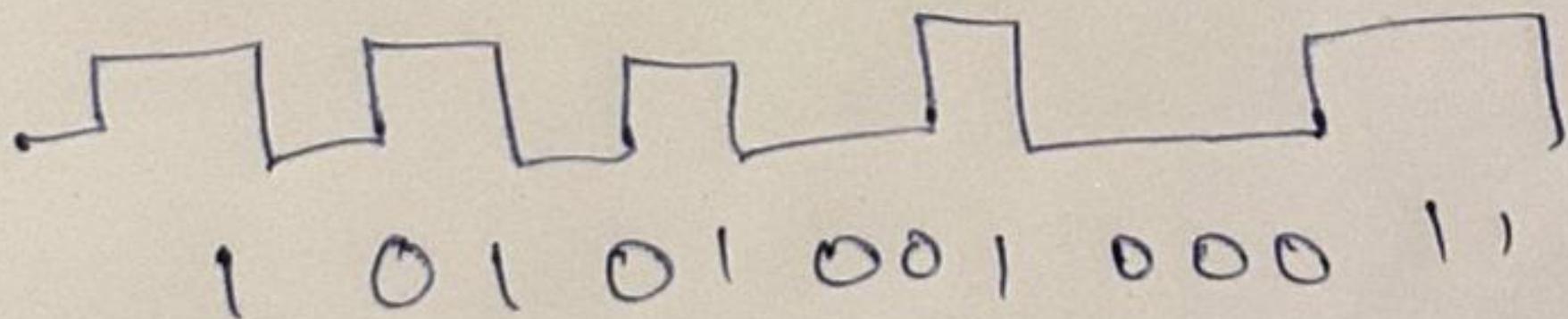
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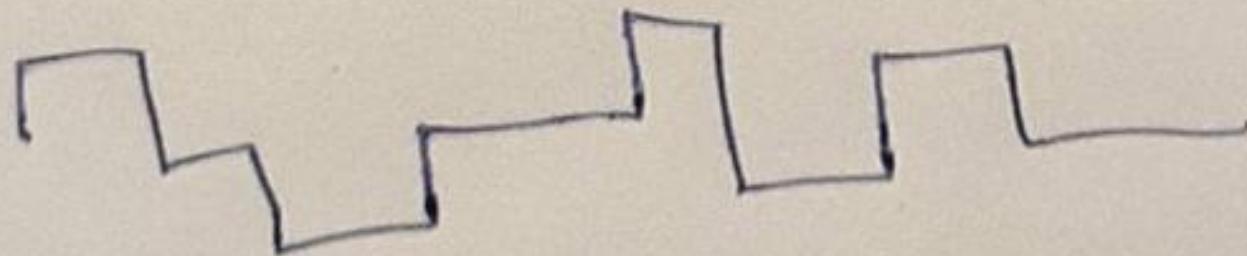
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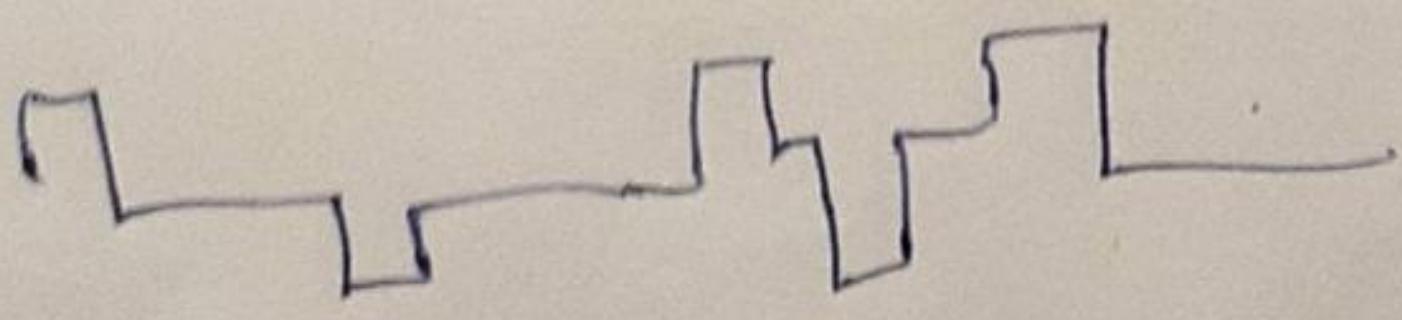
Data



Dipole



Dipolar



## Polar

→ The Polar line code has voltage are on the both sides,

→ It is a simple technique

→ It does no certain low frequency components.

→ A scope of error correction is absent in Polar line coding.

→ Occupies a lot of bandwidth.

## Bipolar

→ Bipolar has 3 voltage levels positive, negt, and zero.

→ It is the simplest kind of link coding.

→ It might result in loss of synchron.

→ Unlike Polar line coding errors detection is possible here.

→ Occupies very low bandwidth.