# CS & IT ENGINEERING

## Computer Networks

### OSI and TCP/IP protocol stack

(One Shot)

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# Recap of Previous Lecture

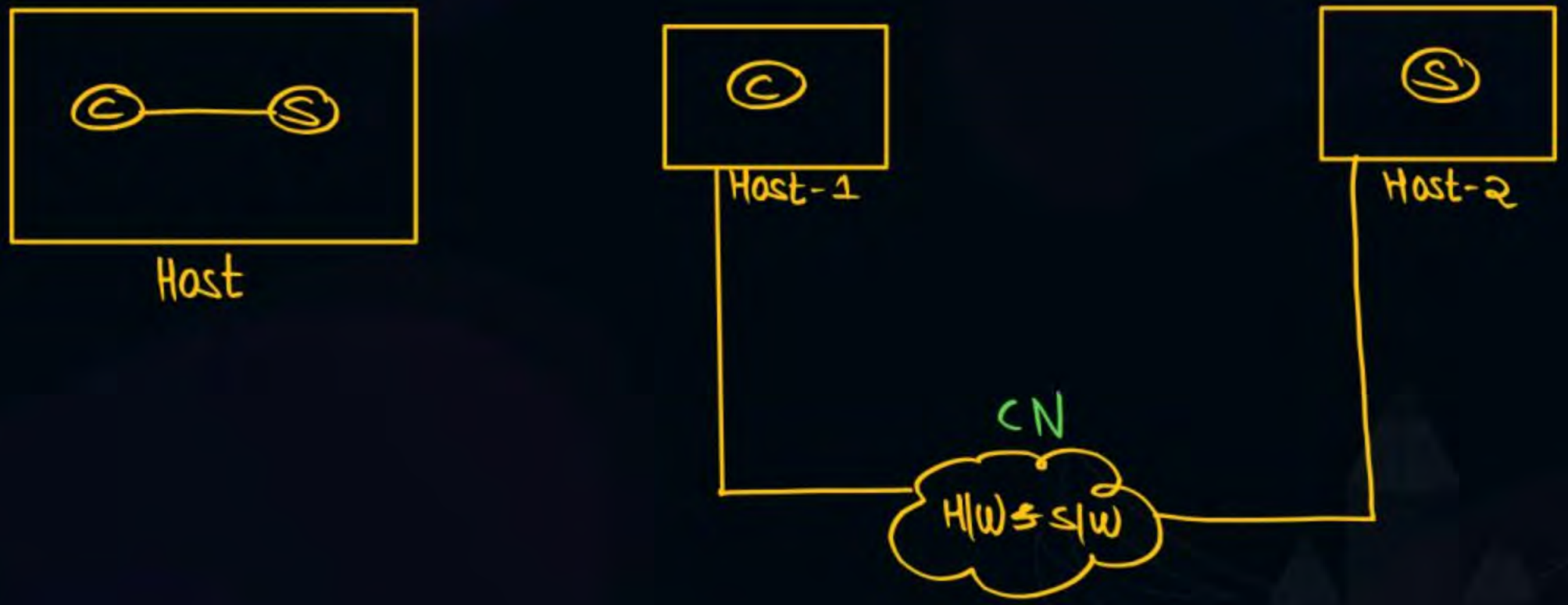
Topic

Topic

# Topics to be Covered

| Topic | OSI Model |
| --- | --- |

# Introduction To OSI Model


C
S
Host
C
Host-1
S
Host-2
CN
H/W & S/W

# Topic : OSI Model

(7 of function)

Functions

- Mandatory
  - Error control
  - Flow control
  - Access control
  - Multiplexing and Demultiplexing
- Optional
  - Encryption & Decryption
  - Check pointing
  - Routing

# Reference models in computer Networks

- ✓ ISO-OSI
- ✓ TCP/IP

Not in the Gate syllabus:
- ATM
- X.25
- IEEE

# Topic : OSI/ISO

OSI: Open systems Interconnection model.

ISO : International Standards Organization. It is a multinational body dedicated to worldwide agreement on international standard.

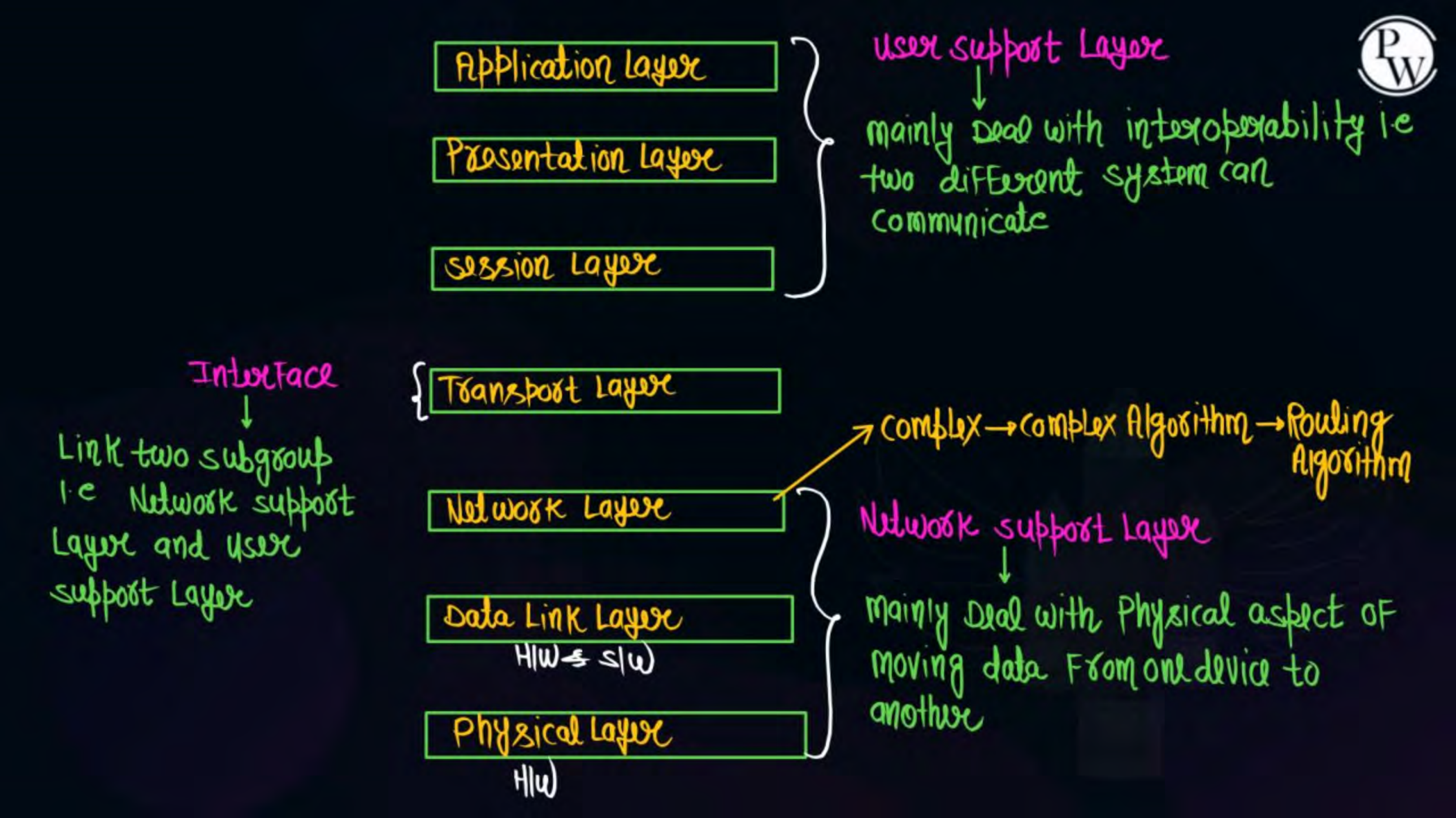
# Topic : OSI Model

- This model has been proposed by ISO.
- An open system is a set of protocols that allows any two different systems to communicate regardless of their underlying architecture. (H/W & S/W)
- The purpose is to show how to facilitate communication between different systems without requiring changes to the logic of the underlying hardware & software.
- This model has got 7 separate but related layers.

# Topic : Layers in the OSI Model

7 Layers

Application layer
Presentation Layer
session Layer
TL
NL
DLL
PL


Application Layer
Presentation Layer
Session Layer
User support Layer
mainly Deal with interoperability i.e two different system can communicate
Interface
Link two subgroup i.e Network support Layer and user support Layer
Transport Layer
Network Layer
Data Link Layer
H|W & S|W
Physical Layer
H|W
Complex → Complex Algorithm → Routing Algorithm
Network support Layer
mainly Deal with Physical aspect of moving data From one device to another

# Functions OF Physical Layer

# Topic : Functions of Physical Layer

**Physical Layer:** Physical Layer is responsible for movement of individuals bits from one Hop to next Hop.

## Functions of physical Layer

1. It is used to define electrical, mechanical, functional and procedural characteristic of physical link.

   Physical Link

   Copper → Electrical signal

   Fiber → Light signal

   Wireless communication → Electromagnetic signal.

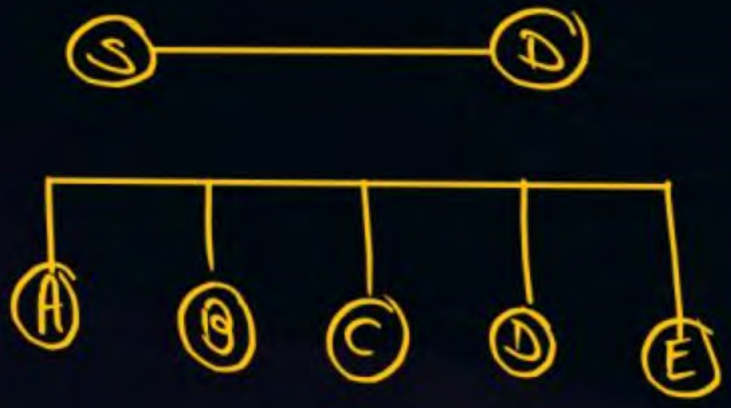
2. It defines transmission mode
   a. Simplex
   b. Half duplex
   c. Full duplex

# Topic : Functions of Physical Layer

3. It defines topology configuration
   - Bus topology
   - Star topology
   - Mesh Topology
   - Tree Topology

4. It is totally Hardware layer

5. It defines link configuration
   i) Point to Point Link
   ii) Broadcast Link



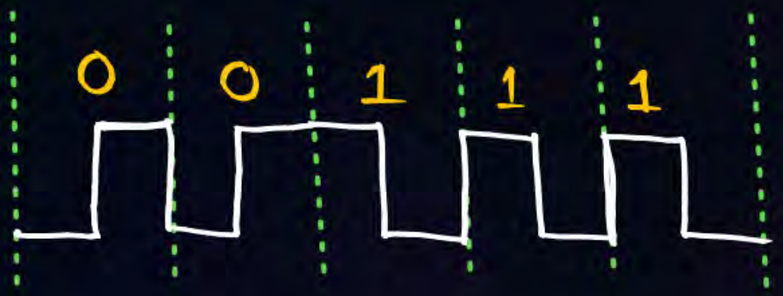

6. It defines Encoding.

- ✓ ii) Manchester Encoding
- ✓ iii) Differential Manchester Encoding

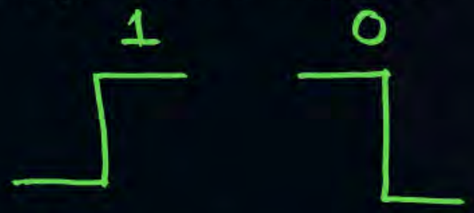
# Manchester Encoding: Two opposing conventions of representing data

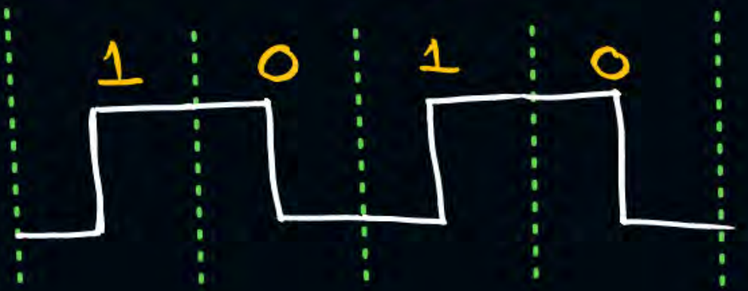
(i) Dr. G.E Thomas

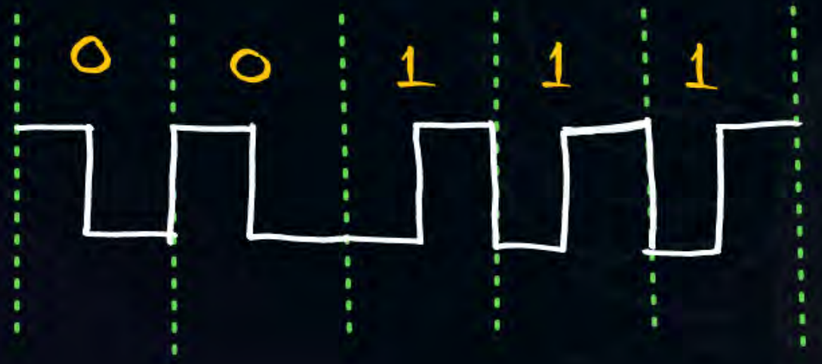




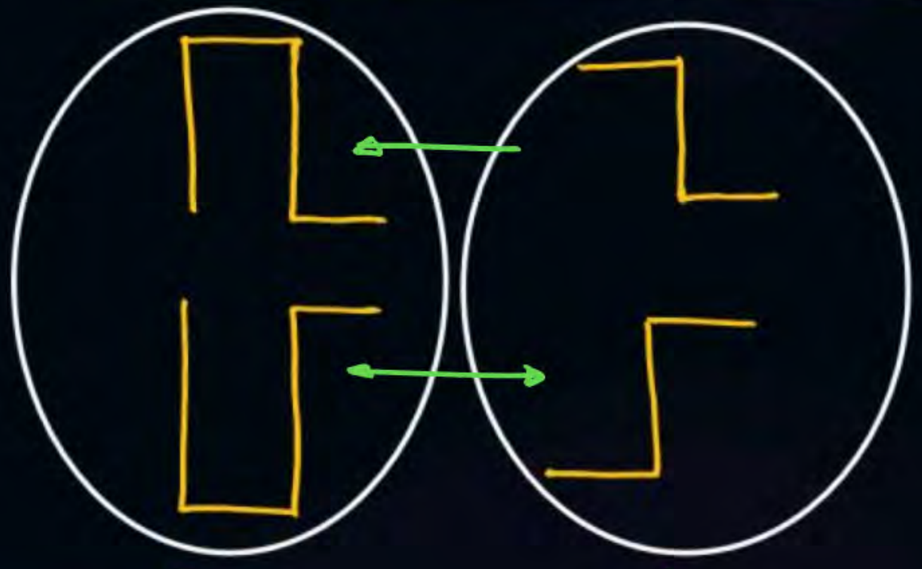

(ii) IEEE 802.3



# Differential manchester Encoding






Both Encoding

Baud rate = 2* Bit rate

# Topic : Functions of Physical Layer

7. **Bit synchronization:**

8. **Bit rate control**: The physical layer also define the transmission rate i.e no of bits send per second.

# Functions
# OF
# Data Link Layer

# Topic : Functions of Data link Layer

**Data Link Layer:** Data link layer is responsible for moving frames From One Hop (Node) to Next Hop (Node)

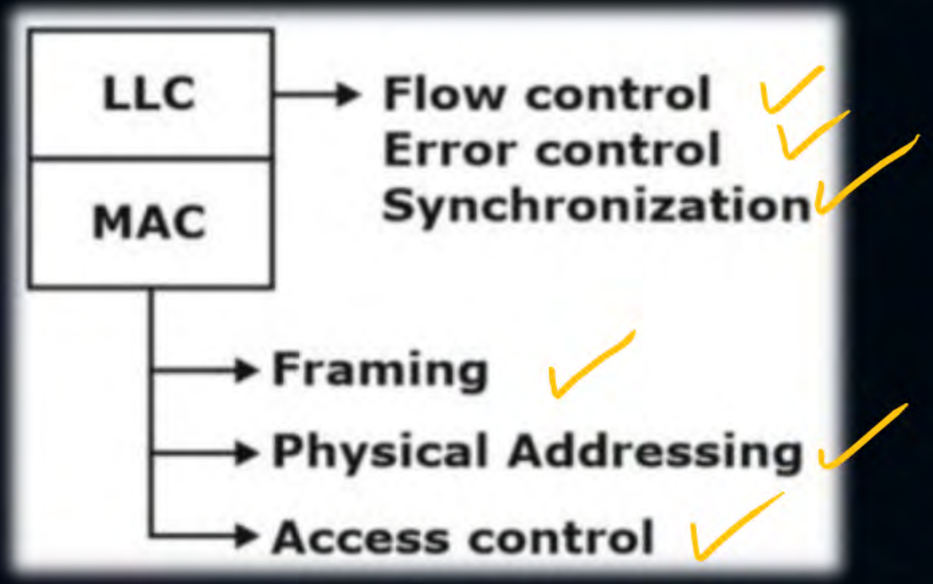
**Function of data link layer**

1. **Flow control** (stops wait, GB-N, SR)
2. **Error control** (simple Parity, 2D Parity, CRC, Checksum)
3. **Access Control** (Aloha, CSMA, CSMA/CA, CSMA/CD)
4. **Framing**: DLL add header and trailer of datagram received from n/w layer and resulting packet is called Frame.
5. **Physical Addressing:** Header of frame contains physical address(MAC address) of both sender and receiver.


AL
msg
TL
H1
segment
NL
H2
dodagram
DLL
T1
H3
Frame

# Topic : Functions of Data link Layer

Data Link Layer is divided into two parts




Processes
Processes
Host-1
Host-2
DLL
DLL
DLL
DLL
NL
TL

# Functions OF Network Layer

# Topic : Functions of Network Layer

**Network Layer:** The network layer is responsible for the delivery of individual packet from source to destination(Host to host)

**Function of Network Layer**

1. **Host to Host connectively:**
2. **Logical Addressing:** Header of network layer contains logical address(IP Address) of sender and receiver
3. **Switching:**
4. **Routing:**
5. **Fragmentation:**
6. **Congestion control:** If no. of packets present in the network is greater than the no. of packet it can handle. Then we can say congestion has occurred.

# Functions OF Transport Layer

# Topic : Functions of Transport Layer

**Transport Layer:** Transport Layer is responsible for process to process delivery.
A process is an application program running on a host.

# Topic : Functions of Transport Layer

**Function of Transport Layer-**

1. **End to end connectivity:**

2. **Service point Addressing:** Computers run several program at the same time. For this reason end to end delivery means, delivery not only from one computer to next computer but also from specific process(running program) on one computer to a specific process(running program) on the other computer. So the transport layer header must include a type of address called service point address( or port number)

3. **Flow control:**

4. **Error control:**

# Topic : Functions of Transport Layer

**5. Segmentation and Reassembly:** Transport layer receives the message from session layer , breaks this message into small packets called segment. Each segment has segment number which help the transport layer at receiver side to reassemble them.

**6. Congestion control:**

**7. Connection control:** Transport layer can be connection oriented or connection less

**8. Multiplexing and Demultiplexing:**

# Functions OF Session Layer

# Topic : Functions of Session Layer

**Session Layer:** Session Layer is also known as **network dialog controller**. It establish , maintain, synchronize and terminates the interaction b/w sender and receiver.

# Topic : Functions of Session Layer

**Function of Session Layer-**

1. **Authentication & Authorization:**

2. **Check point or synchronization:** session Layer adds checkpoints or synchronization points when transmitting the data in a sequence. For example-If system is sending a file of 2000 pages. It is advisable to insert checkpoint after every 100 pages to ensure that each 100 unit is received and acknowledge independently. In this case if crash happen during the transmission of page 523. the only page that need to be resent after system recovery are pages 501 to 523. page previous to 501 need not be resent.

3. **Dialog control:** The session Layer allow two system to start communication with each other either in Half duplex or Full duplex.

# Functions OF Presentation & Application Layer

# Topic : Functions of Presentation & Application Layer

**Presentation Layer:** This layer take cares of syntax and semantics of the information exchanged between two communicating system.

**Function of Presentation Layer-**

1. **Character translation:** If architecture of sender and receiver is different then still they can communicate. For example , ASCII to EBCDIC.

2. **Encryption & Decryption:** Encryption & Decryption is needed to maintain privacy. Transforming information from plain text to cipher text is called as Encryption. Transforming information from cipher text to plain text is called as decryption.

3. **Compression:** Reduce the number of bits that need to be transmitted on the network.

# Topic : Functions of Presentation & Application Layer

## Application Layer:

Application Layer is responsible for providing services to users. Such as

1. Mail services
2. File sharing
3. File transfer and many more

## 2 mins Summary

Topic

# Introduction To OSI Model

# THANK - YOU