

# CS & IT ENGINEERING



## Computer Network - 1

### Introduction

Lecture No. - 01

By - Abhishek Sir





# Topics to be Covered



Topic

Concepts of Layering

Topic

OSI & TCP/IP Model

Topic

Application Layer

Topic

Transport Layer





## ABOUT ME

Hello, I'm **Abhishek**

- GATE CS AIR - 96
- M.Tech (CS) - IIT Kharagpur
- 12 years of GATE CS teaching experience

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## Topic : Reference



→ Request for Comments (RFC)

by Internet Engineering Task Force (IETF)





## Topic : Books

- Computer Networking : A Top-down Approach by James F. Kurose
- Computer Networks by Andrew S. Tanenbaum
- Data Communications And Networking by Behrouz A. Forouzan





## Topic : Syllabus



**Concept of layering :** OSI and TCP/IP Protocol Stacks;

TCP/IP → [DARPA]

\* [ \*Packet switch Network ] ←  
⇒ Internet

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\* IBM      \* Xerox

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\* ISO : OSI



# Topic : Computer Networks

- Define communication of hosts
- Hosts can be connected either directly or indirectly through some networking devices

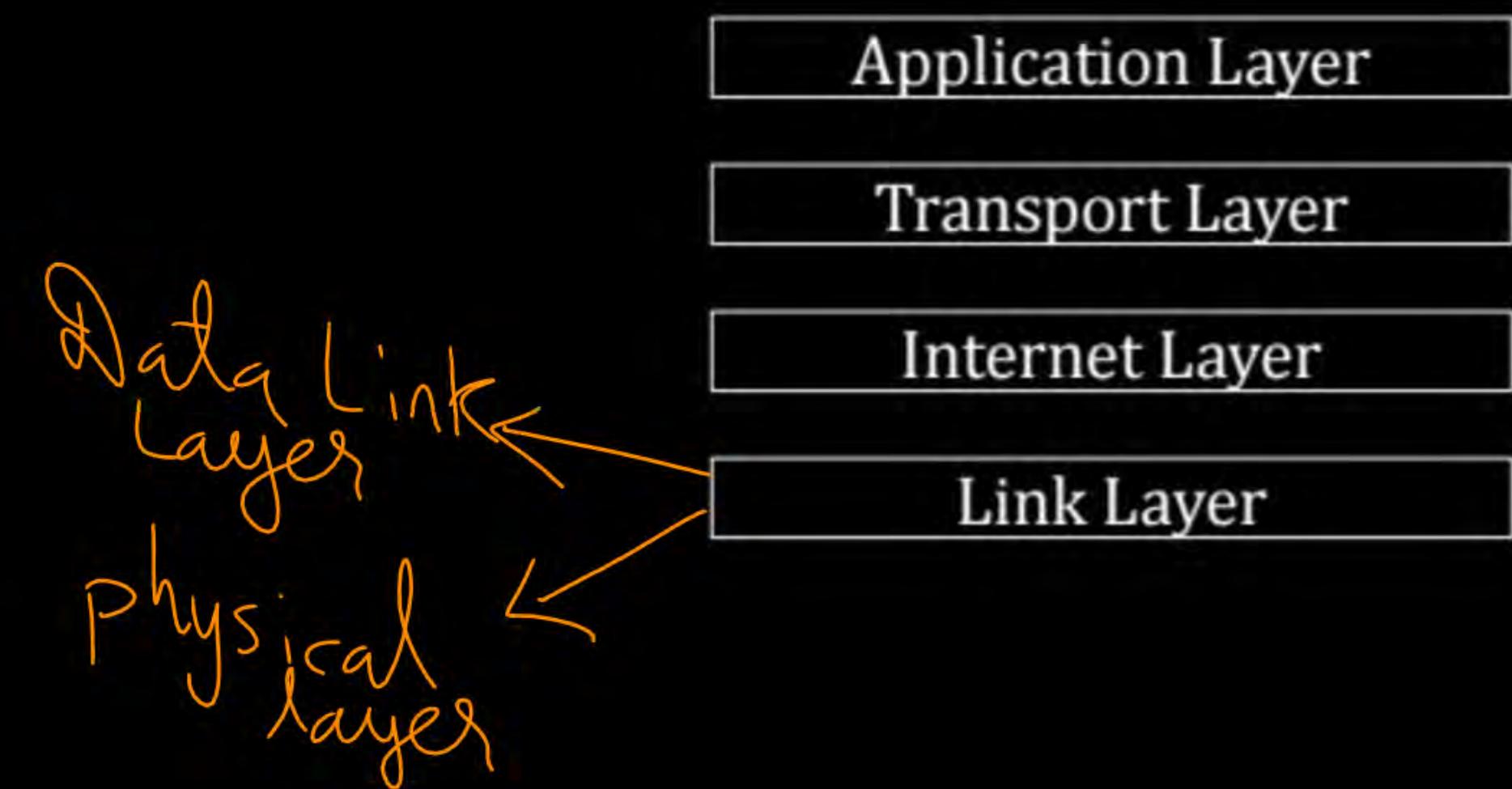
Hosts : PC, Mobile



# Topic : TCP/IP Model



- Internet protocol stack
  - Conceptual Model
  - Layered Architecture ←
  - 4 - Layer Model
- 5 - Layer Model



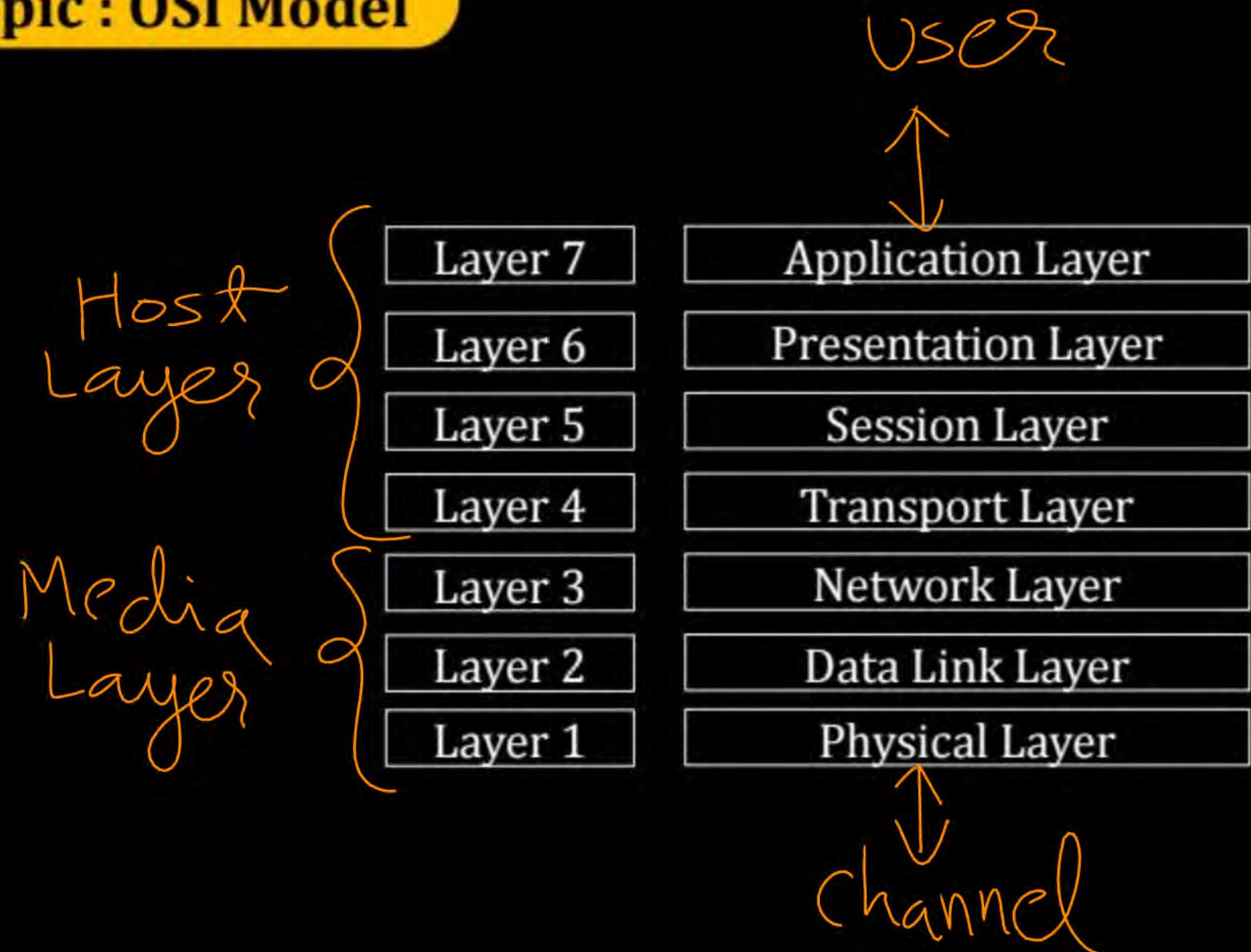


# Topic : ISO - OSI Model

- Open System Interconnection
- Conceptual Model
- Seven layer architecture \*



# Topic : OSI Model





## Topic : Layered Architecture



→ Each lower-layer provides service to its higher layers



## Topic : Application Layer

- Network application program (network process)  
[e.g. Browser]
- Process : Program in execution



# Topic : Port Number

-> Port Number (16-bit) : Identifier

-> Used to identify a network process in a machine  
[Process involved in Network Communication]



## Topic : Port Number

-> Port Number assigned/managed by OS  
[different with process id (pid)]

-> Port Number should be unique within a machine  
[two network process running in same host, can not have same port no. at a time]



# Topic : Two Process Communication

Two network processes belongs to :

1. **Same Host**

→ Communicate using **IPC** (Inter-process communication) of **OS**

2. **Different Hosts**

→ Communicate over **network**



## Topic : Protocol

P  
W

- > Set of Rules
- > Define, how data is exchanged between network processes



# Topic : Application Layer

\* Client -  
Server Model

## Application Layer Protocols :

- > DNS : Domain Name System
- > HTTP : Hyper Text Transfer Protocol
- > FTP : File Transfer Protocol
- > SMTP : Simple Mail Transfer Protocol





## Topic : PDU



=> Protocol Data Unit (PDU)

→ Basic unit of exchange

→ Between same protocols of different machine

→ Between 'Layer-n protocol' of one machine  
and 'Layer-n same protocol' of other machine



# Topic : Application Layer



Application Layer PDU : **"Message"**

#Q. The protocol data unit (PDU) for the application layer in the Internet stack is:

[GATE-2012, 1-Mark]

- (A) Segment
- (B) Datagram
- (C) Message
- (D) Frame

Ans: C



## Topic : Two Process Communication

→ Two network processes, belongs to different hosts

Communicate over network, by exchanging "messages"



# Topic : Two Process Communication

## Communication Credentials :

→ <u>Source Port No.</u>	(16-Bit)
→ <u>Source IPv4 Address</u>	(32-Bit)

→ <u>Destination IPv4 Address</u>	(32-Bit)
→ <u>Destination Port No.</u>	(16-Bit)



# Topic : Presentation Layer

Presentation layer functions :-

1. Code Conversion
2. Encryption and Decryption
3. Compression and Decompression

optional





## Topic : Code Conversion

-> Convert data into **network standard code**, before transmission  
[Network presentable form]

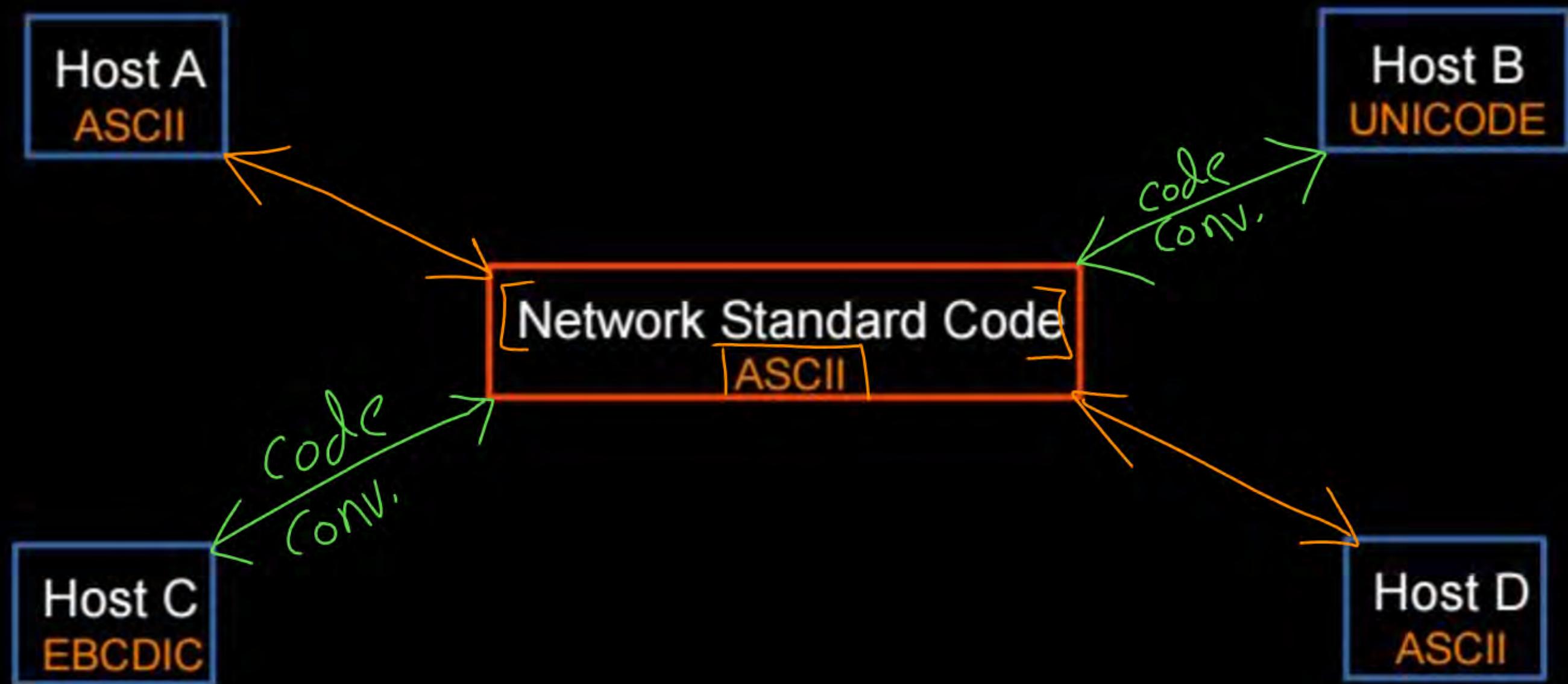
**ASCII** : American Standard Code for Information Interchange

**EBCDIC** : Extended Binary Coded Decimal Interchange Code

**UNICODE** : Universal Coded Character Set



# Topic : Code Conversion





# Topic : Session Layer

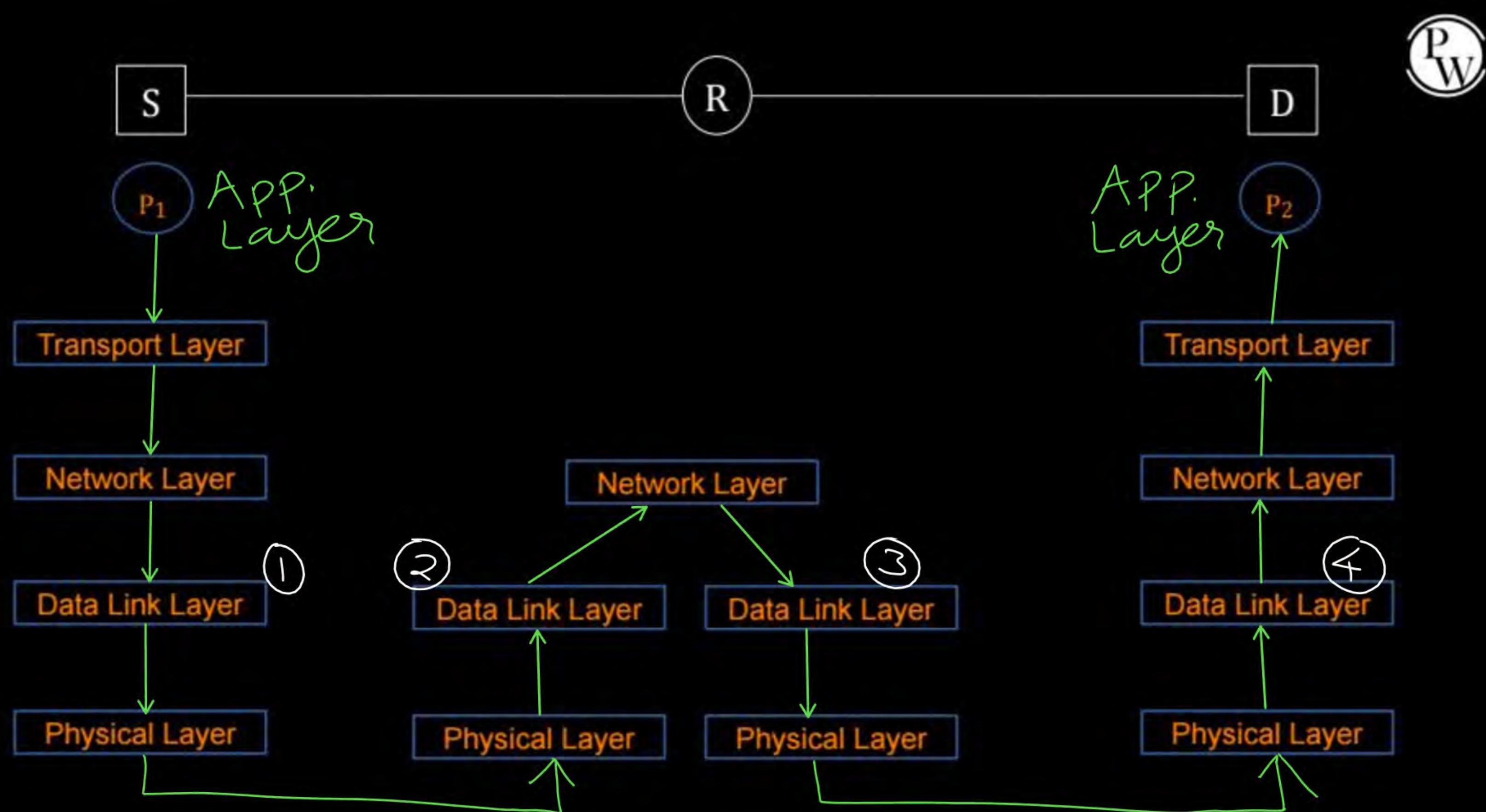


Session layer functions :-

1. Session Establishment
2. Dialog Management
3. Authentication
4. Authorization

#Q. Assume that source and destination hosts are connected through one intermediate router. Determine how many times each packet has to visit the data link layer during a transmission from source to destination hosts?

$$\boxed{\text{Ans} = 4}$$



#Q. Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D ?

[GATE-2013, 1-Mark]



IIT-B  
(H.W)

- (A) Network layer - 4 times and Data link layer - 4 times
- (B) Network layer - 4 times and Data link layer - 3 times
- (C) Network layer - 4 times and Data link layer - 6 times
- (D) Network layer - 2 times and Data link layer - 6 times



## 2 mins Summary



Topic

**Concepts of Layering**

Topic

**OSI & TCP/IP Model**

Topic

**Application Layer**

Topic

**~~Transport Layer~~**



# THANK - YOU

