

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

* IBM * Xerox

* 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

Data Link Layer
Physical layer

Application Layer

Transport Layer

Internet Layer

Link Layer



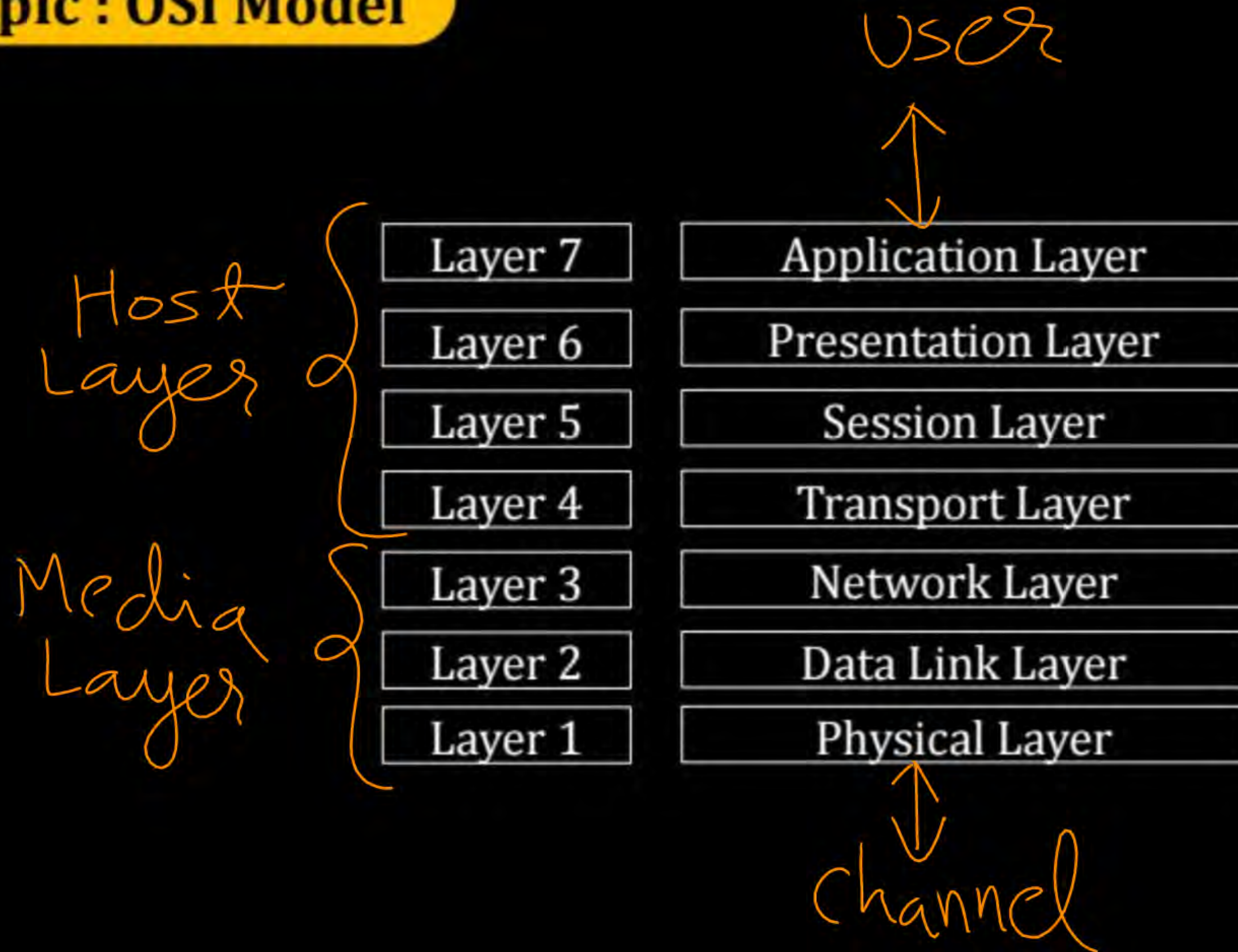
Topic : ISO - OSI Model



- 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



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



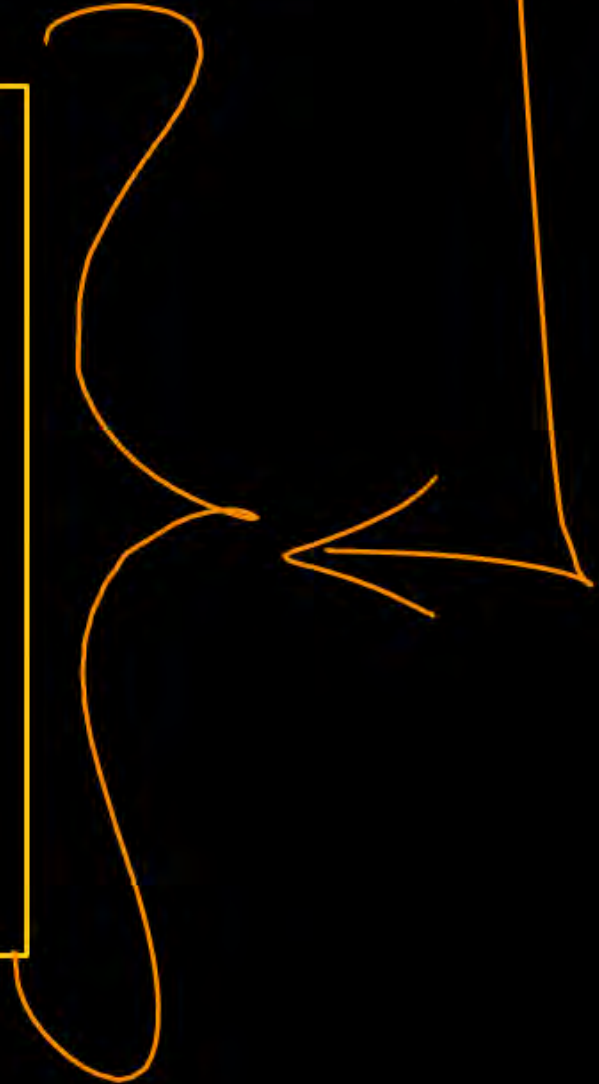
Topic : Application Layer



* 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 :

→ Source Port No. (16-Bit)

→ Source IPv4 Address (32-Bit)

→ Destination IPv4 Address (32-Bit)

→ Destination Port No. (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]

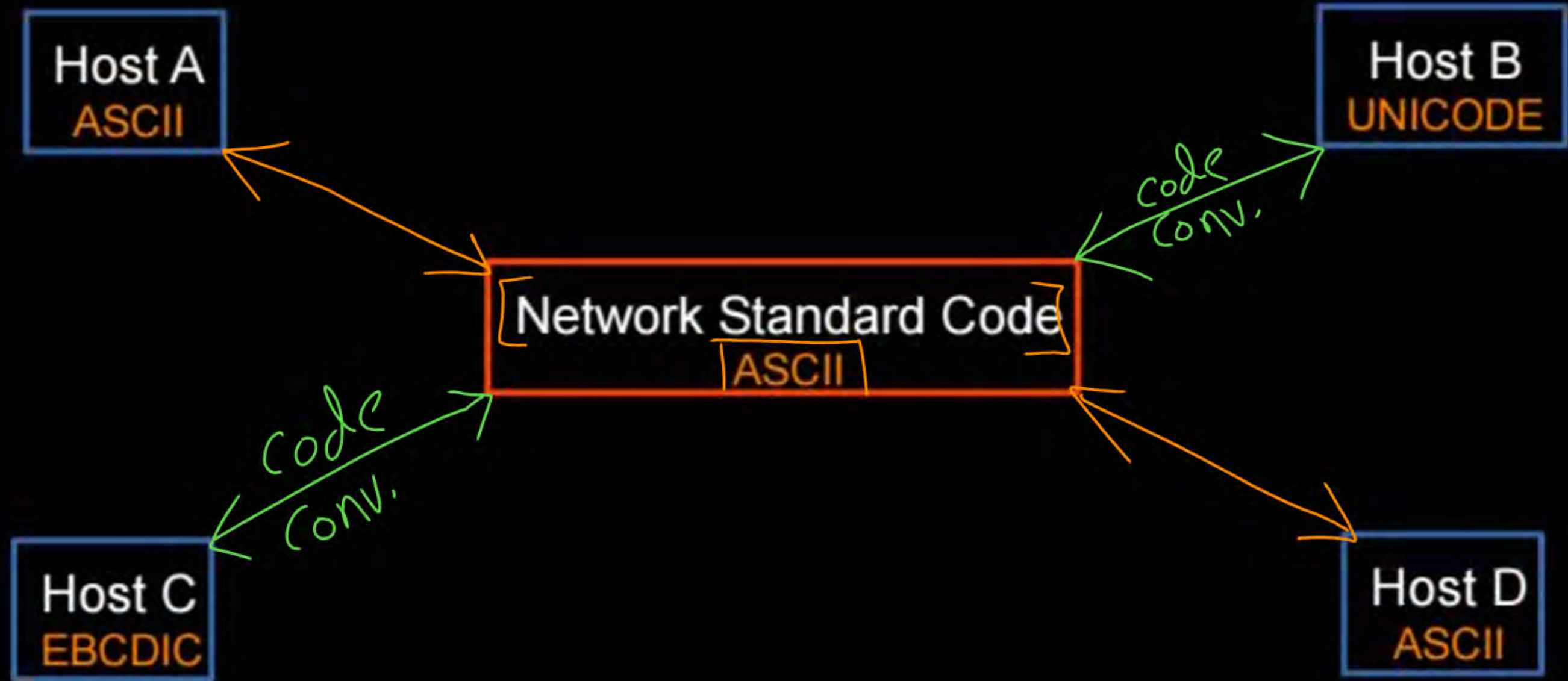
ASCII : American Standard Code for Information Interchange

EBCDIC : Extended Binary Coded Decimal Interchange Code

UNICODE : Universal Coded Character Set



Topic : Code Conversion





Topic : Session Layer

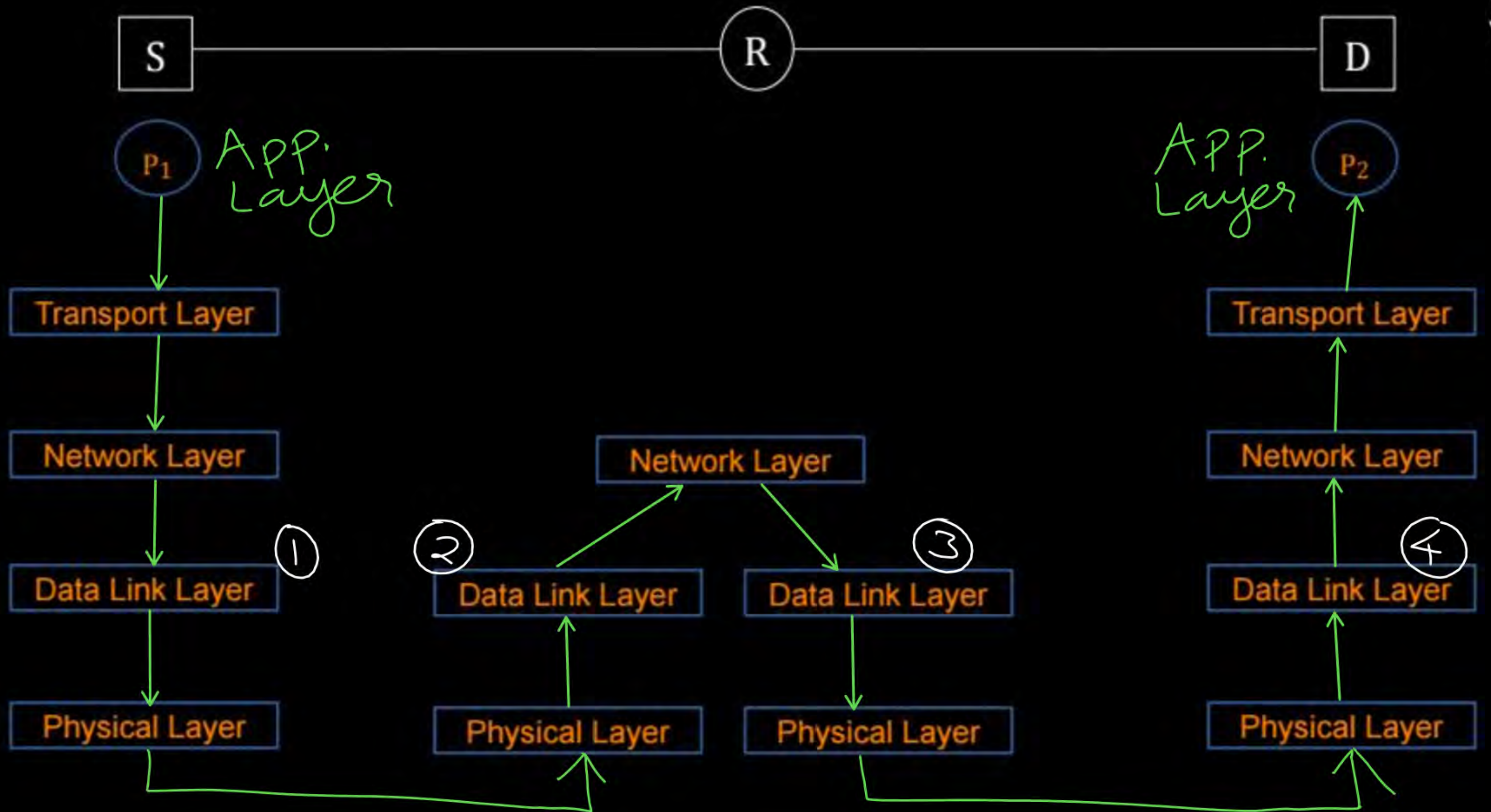


Session layer functions :-

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?

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

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OSI & TCP/IP Model

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Application Layer

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~~Transport Layer~~



THANK - YOU

