Data Communication & Computer Networks - 22414)

Unit V : Reference Models

(Weightage - 20 marks)

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IP Address and IP classes

IP Address: IP address stands for "Internet Protocol address".
An IP address is an uniaue number provided to each an every device. It is the form of integeric number which is seperated by (.) dot.

Example:- 192.168.10.26

Adressing

- IP (logical)
- MAC (~~physical~~) (physical)

There are two version IP address used today IPv4 & IPv6.

IP Address classes: There are Five classes of available IP ranges. Class A, B, C, D & E, while A, B, C are commonly used. Each class allowes for of valid IP address shown in table.

Class	Address Range
class A	1.0.0.0 to 127.255.255.255
class B	128.0.0.0 to 191.255.255.255
class C	192.0.0.0 to 223.255.254.255
class D	224.0.0.0 to 239.255.255.255
class E	240.0.0.0 to 254.255.255.255

IPv4 (4billion)	IPv6 (340 trillion)
IPv4 has 32-bit address length.	IPv6 has 128-bit address length.
Address format is Decimal.	Address format is Hexadecimal.
IP header includes a checksum	IP header does not include checksum.
Header Complexity is Simpler and Smaller.	Header Complexity is complex and larger.
Widely used	Not necessary.
IPV4 has classful addressing scheme class A, B, C, D, E	Classless address scheme.
No. of header fields 12	No. of header fields 8
IPv4 support VLSM	IPV6 does not support VLSM.
IPv4 can be converted to IPV6.	But most of IPV6 can be not converted to IPv4
IPV4 has header 20-60 bytes.	IPV6 has header of 40 byte fixed
Supports DHCP configuration manual	Supports auto / Renumbring address configuration
IPV4 is numeric address seprated by (.)	IPv6 address seperated by colon.
Example 66.69, 29.13	Example 2001:0000:3238:DFE1:0063:0000:0000:FEFB
0-255 (Limited service)	0 to FFFF (new feature service)

Process of DHCP configuration

DHCP (Dynamic Host Configuration Protocol) is a client-server protocol that uses DHCP ~~clients~~ servers and DHCP clients.

A DHCP server is a machine that runs a service that can lease out IP addresses and other TCP/IP information to any client that request them.

The DHCP server typically has pool of IP address that it is allowed to distribute clients, and these client lease an IP address from pool for specific period of time, usually several days.

Once the lease is ready to expire, the client contacts the server to arrange for renewal.

DHCP clients are client machines that run special DHCP client software enabling them to contact with DHCP server.

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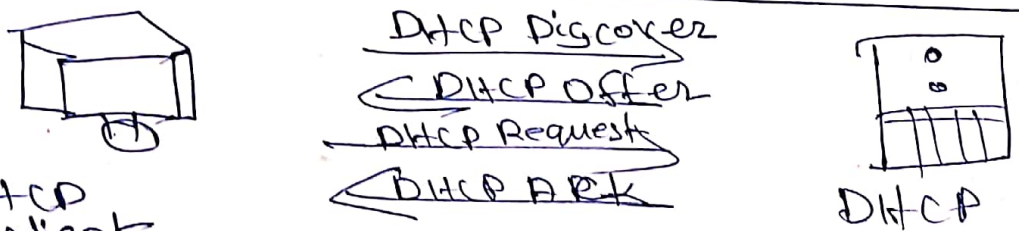


DHCP clients obtain a DHCP lease for an IP address. subnet mask, and various DHCP options from DHCP servers in 4 step process.

DHCP DISCOVER: The clients broadcasts a request for DHCP server.

DHCP Offer: DHCP servers on network offer an address to client.

DHCP Request: DHCP servers on network offer an address to client from one of offering DHCP servers.

DHCP ACK: the DHCP server that client responds to acknowledgements the client, assigned if any configured DHCP options, and updated DHCP database & TCP/IP and being network communication.

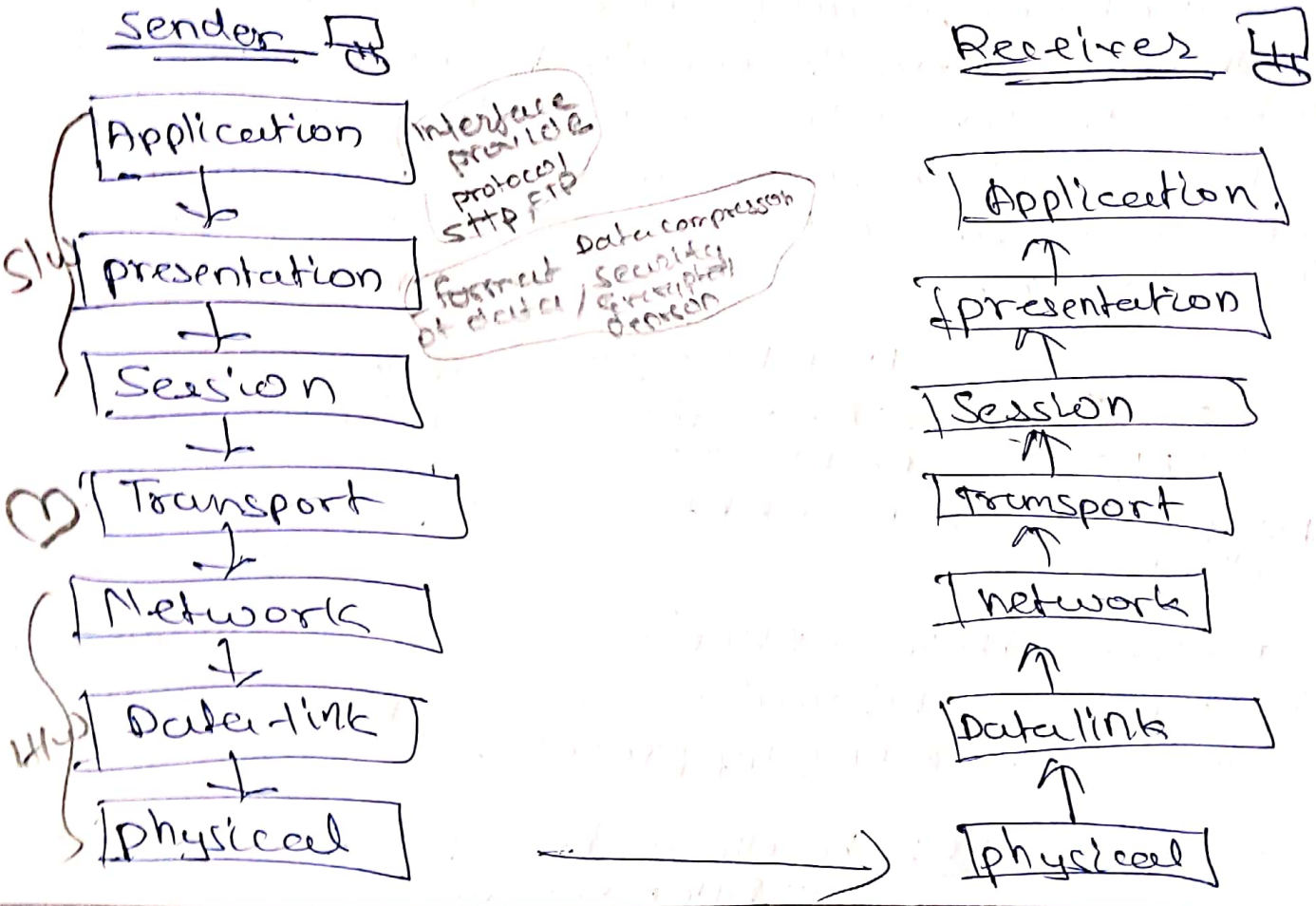
OSI model

V.Imp

OSI stands for "Open System Interconnection" to connect all computers model".
It has been developed by Standard Organization ISO (International Organization for Organization)

Note: It is a 7 layer Architecture where each layer has its own functionality.

All these 7-layer work collaboratively to transmit data from one network to another network across Globe.



Application layer

The Application Layer enables the user, whether human or software, to access to network.

It provides user interfaces and support for services such as email, remote file access.

protocols used are: HTTP, FTP.

Presentation Layer

The Presentation Layer is concered with syntax (format of data) and semantics of information exchanged between two system.

Also responsible for providing security, Encryption / Decryption & also it does work of Data compression.

Protocols used are, MPEG, SSL, SSH.

Session Layer

It establishes connection between sender and receiver.

If you are sending data and half data is already shared and half had to be sent so session layer does not stent from stenting. it sents 50% of data remaing ones.

Protools used are Sokets, APIs.

Transport layer

It divides data into Segment & transport to network layer.

Protools UTP, TCP.

manages error and flow of data. The entire message arrives intact and in correct order.

Heart layer of OSI model.

Network layer

It convert ~~packets~~ Segment into packets. It stores IP address of Sender and Receiver.

& It decides from which path data should be send.

Like Router the work of Network layer

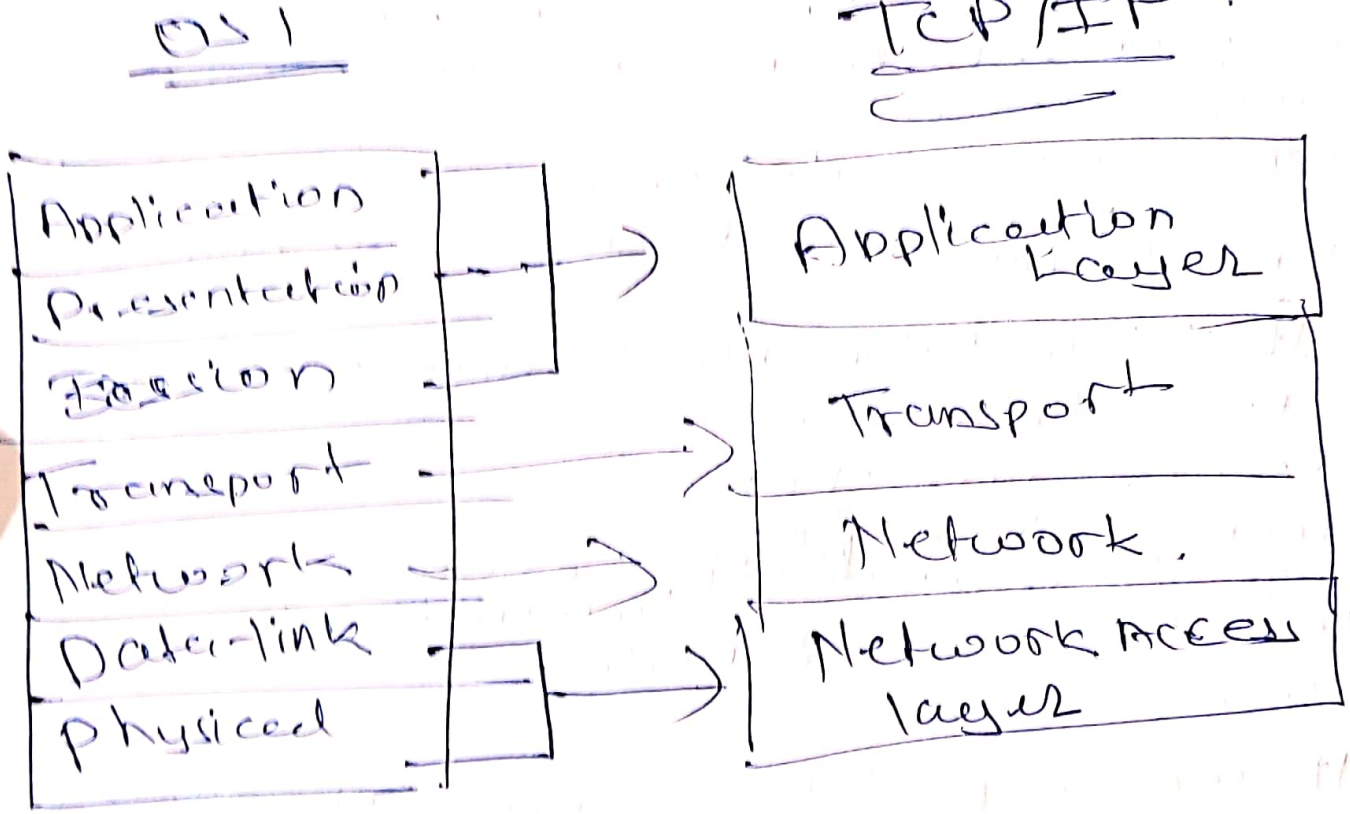
Also ~~it makes data error free~~

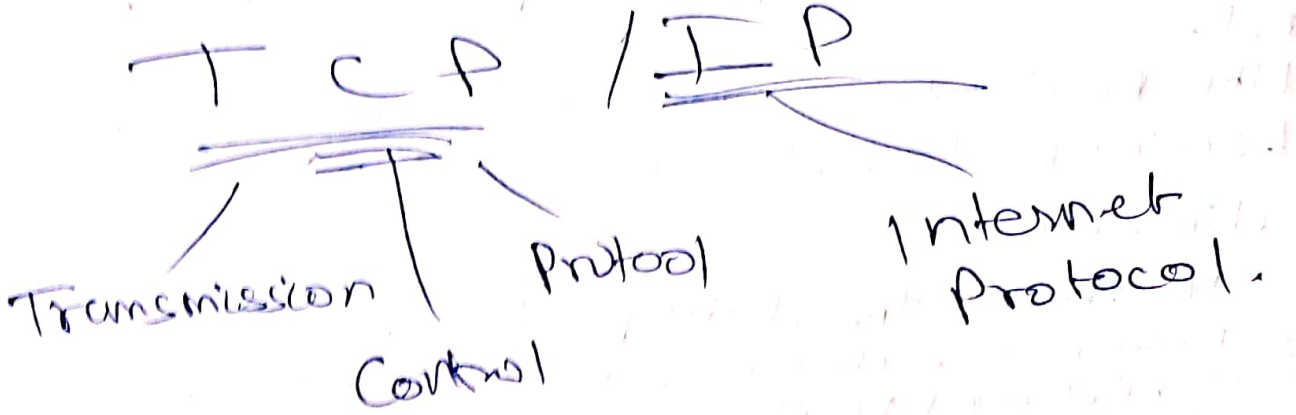
Data Link Layer

- It frames the data packets.
- Mac Ensures data is error free.
- Sender and receiver data flow maintaing.
- manages traffic
- maintains speed.
- physical addressing.

Physical layer

It converts data of frames into Bits.
i.e (0's & 1's). Binary form.
There are many network devices that transmit data. (Switch, hub etc).
It decide data should be sent wired or wireless.





OSI model

Open System Interconnection Model

It has 7 layers

low in usuage

Verticcally approach

It is less relicable than TCP/IP model.

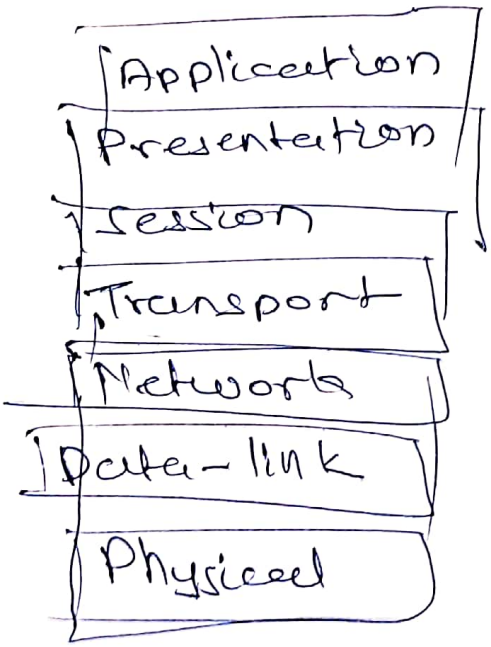
Replacing of tools cond changes can be easily done in model.

Developed in 1984

protocol Independent.

Developed by ISO

Error handling and recovery at multiple layers.



TCP/IP

Transmission control Protocol & Internet Protocol.

It has 4 layers

It mostly used horizontal approach.

It is more reliable than OSI model.

But, as compared to OSI, changes and replacing of tools can't done that easily.

Developed in 1982

protocol dependent

Develop by DARPA

Primarily at transport layer.