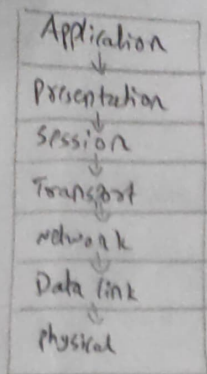


## → OSI model



Application : software inherent of user.

Presentation : content the msg (translation) ⇒ encoding - encryption - compress

Session : helps in connection, authentication + authorization

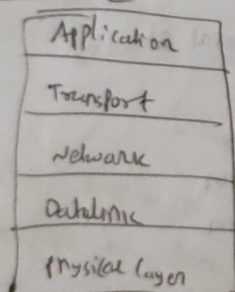
Transport : protocols came here (how data be transferred) + segment of data + flow control  
TCP + UDP

Network : router + used to comm to other n/w + logical addressing

Data Link : ~~Physical addressing~~ Physical address (MAC address) + Packet

Physical : hardware section + bits + electrical signals + cables

## → TCP/IP model



Protocols

HTTP

TCP - UDP

IP

Data type

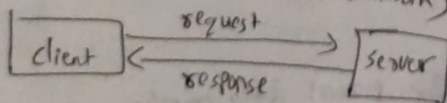
→ segments

→ packets

→ frames

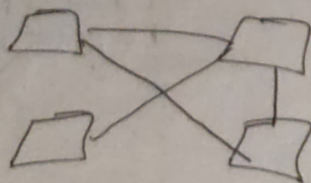
\* Application : users interact (eg: whatsapp, Bluetooth)

①



\$ Ping google.com

② Peer to peer



Terms

• Repeater, Hub, Bridge, switch, Router, gateway, Brouter

## • Protocols

web protocols

→ TCP/IP;

→ HTTP

→ DHCP

→ FTP

→ SMTP

→ IMAC

→ SSH

→ VNC

• telnet: Port 23

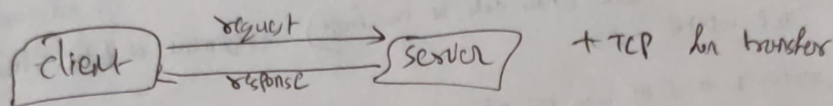
• UDP → connection less

## ~~• socket~~

• Program → process → thread

• socket ÷ Interface b/w process & Internet

• HTTP ÷ <sup>stateless</sup>



↳ HTTP methods ÷

1) get

2) post

3) put

4) delete

↳ status codes / error codes ÷

1-100 → Informational category

200 - success

300 - redirecting

400 - client error

500 - server error

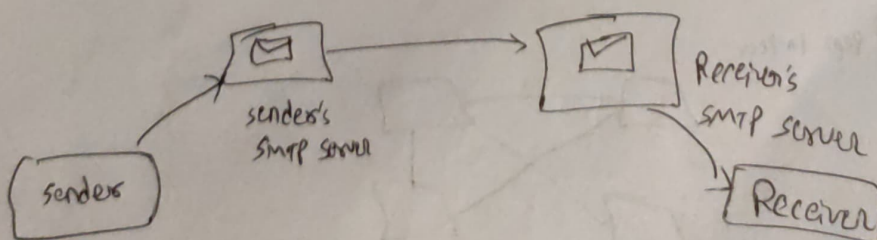
↳ cookies ÷ unique string, stored in client browser.

, third party cookies ÷ cookies set on webs that are not you viewed

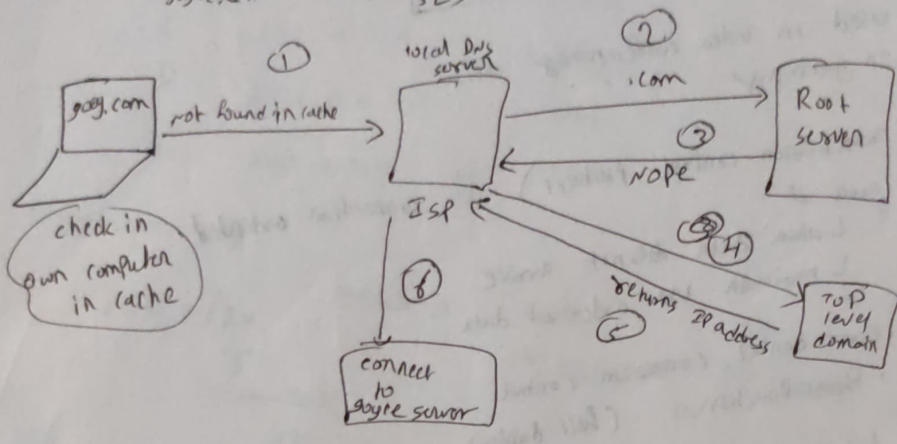
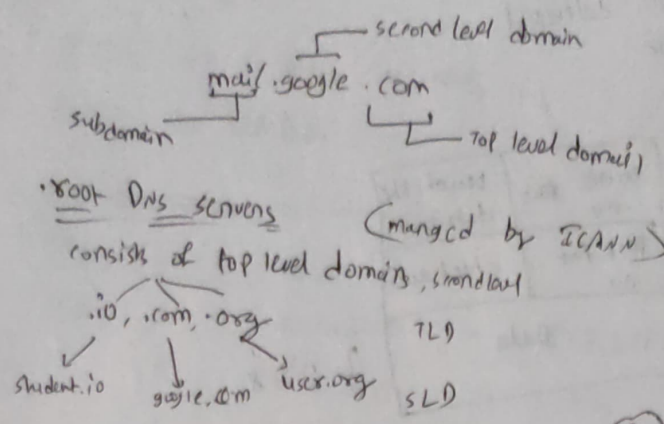
• How email works ÷

SMTP - simple mail transfer protocol } → to transfer

POP3 } → to receive email

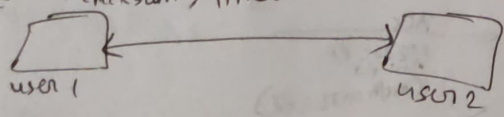


\* DNS :- Domain name system

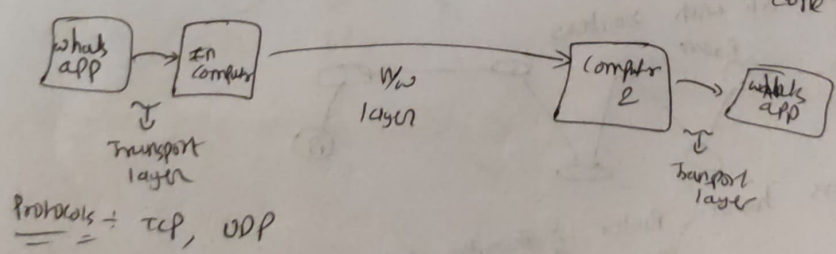


\$ dig google.com

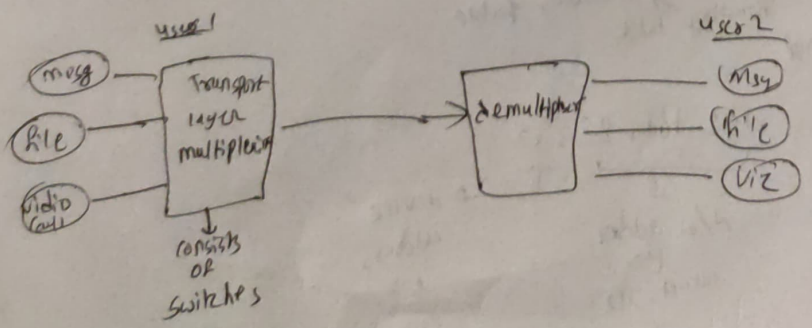
→ Transport layer :- \*takes care of congestion control / traffic  
\*checksum, timer



Actual transfer of one computer to another is done by network layer but transport of data from network to the applications is done by Transport layer.



protocols :- TCP, UDP



Switches has port numbers to determine to which application



\* UDP (User Datagram Protocol) : connectionless

- Data may or maynot delivered.
- Data not in order
- UDP uses checksums

↳ UDP Packet

total size =  $2^{16}$

source port no	length of data gram
dest. port no.	checksum
Data	

}  $2^{16}-8$

- It is faster
- used in video conferencing apps
- in gaming

\* TCP (Transmission control Protocol) : connection oriented

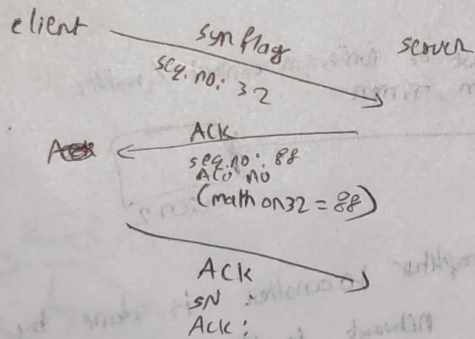
• Takes care of

- ↳ When data doesnot arrive
- ↳ maintain the order of data

• Features :

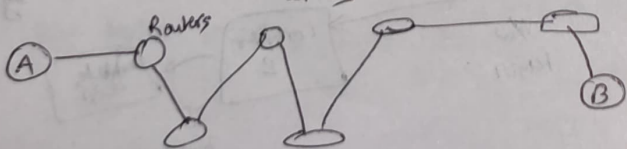
- error control, congestion control
- ~~Bi~~ Bidirectional (full duplex)

• 3 way handshake



→ Network layer :

• Here we work with routers



\* Routers have

Router forwarding table  
Routing table

\* hop-by-hop

\*

192.168.2.30

n/w address  
(or)  
subnet ID

device address  
(or)  
host ID

# Internet Protocol (IP)

IPv4  $\rightarrow$  32 bit, 4 words

IPv6  $\rightarrow$  128 bit

~~class A~~ ~~class B~~ ~~class C~~  
\* class of IP address

class A	0.0.0.0	-	027.255.255.255
B	128.0.0.0	-	191.
C	192.0.0.0	-	223.
D	224.0.0.0	-	239.
E	240.0.0.0	✓	255.

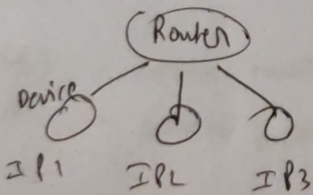
\* subnet masking

192.0.1.0 /24  $\xrightarrow{\text{means}}$  start 192.0.1.0 end 192.0.1.255  
 $\downarrow$   
 22 bit - 8 bit  
 8 bit = 1 in  $\rightarrow$  (normally that 256)

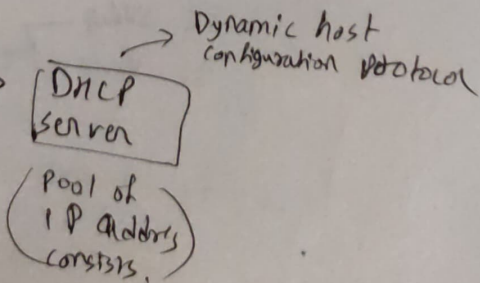
\* Reserved add

127.0.0.0 /8  
 local host  $\div$  127.0.0.1

$\rightarrow$  Data Link layer



If new device wants  $\rightarrow$



# → Networking

• Computer n/w is a communication b/w two (or) more n/w interfaces

• components of computer n/w :

• OSI model.

• LAN, MAN, WAN → classification of n/w by geography.

LAN, PAN

• switches → connects multiple computers together

• Routers → connects multiple n/w's together

• Home n/w.

• IP address (IPv4, IPv6) { Public IP  
Private IP

<sup>IPv4</sup>  
~~Public~~ Private IP → Class A Class B Class C Class D <sup>2 R&D</sup> Class E

Class A → 10.0.0.0 - 10.255.255.255

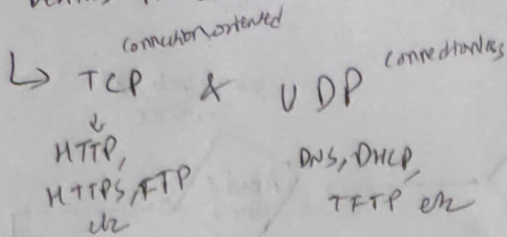
Class B → 172.16.0.0 - 172.31.255.255

Class C → 192.168.0.0 - 192.168.255.255



## • Protocols :

Defines procedure that followed when transmitting or receiving data.



## • Protocols & Port numbers :

<u>Label on column</u>	<u>Service name</u>	<u>UDP &amp; TCP Port numbers included</u>
DNS	Domain name service - UDP	UDP 53
DNS TCP	" " " - TCP	TCP 53
HTTP	web	TCP 80
HTTPS	secure web (SSL)	TCP 443
SMTP	Simple mail transport	TCP 25
POP	Post office protocol	TCP 109, 110
SNMP	Simple r/w management	TCP 161, 162; UDP 161, 162
TELNET	Telnet Terminal	TCP 23
FTP	File transfer Protocol	TCP 20, 21
SSH	secure shell (terminal)	TCP 22
AFP IP	Apple file protocol/IP	TCP 497, 548.

## • TCP IP Protocol :

### • Networking commands.

↳ ifconfig ⇒ show active interfaces (on) ip address show

↳ ping 192.168... ⇒ If packets are sending continuously means so that we can understand it is receiving & transmitting.

↳ traceroute www.google.in ⇒ used to know how packets going to server from host.

↳ netstat -antp ⇒ show all TCP open ports.

↳ nmap

↳ dig

↳ nslookup

↳ route -n

↳ arp

↳ mtr

↳ telnet