Notes 09/02/2021 Date

Computer Networks

Independent
~~Atom~~
Autonomous
Systems.

Communication.

→ Protocol : set of rules + conventions.

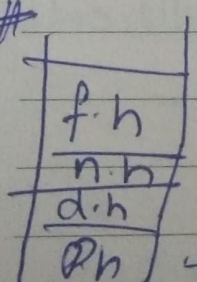
executable program : Algorithms + Data Structures.

→ A special program where world-wide accepted Data structure & algorithms are used & should not be changed.

→ RFC :→ Reference for comments

↳ to ~~make~~ give your suggestions / advice. Then these will be considered & implemented after testing.

#



layer by layer libraries.

Protocol Stack

P.h has 3 functions.

```
#include
fun1
{ P1()
  P2();
```

} d.h.

```
#include <d.h>
fun1()
```

} n.h.

→ If we want to develop software for Computer it will be built layer by layer.

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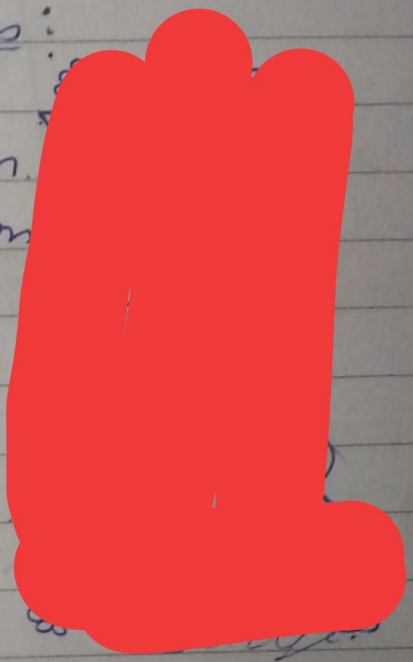
ISO [International's Standards Organization]

ISO's OSI Reference Model:

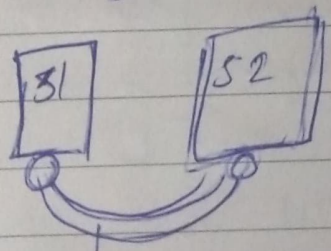
OSI → Open Systems Interactions

In (N), there are 7 layers:

→ Away	Application
→ Pizzas	Presentation
→ Sausa	Session
→ Throw	Transport
→ Not	Network
→ Do	Data link
→ Please	Physical



Physical layer



Bits

Data type transfers in Physical layer.

① Transport medium to connect two systems.

② Modems for modulation/demod.

③ What should flow in between computers ie. type of Signals... Voltage, Optics

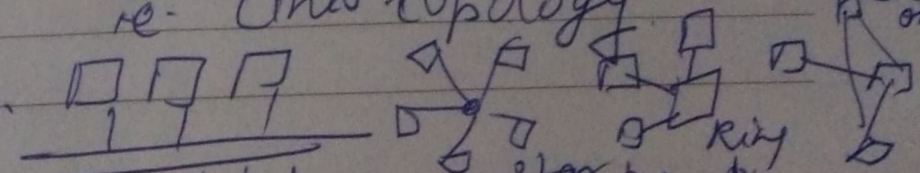
④ Encoding & Decoding

eg: in previous day −0.5V = 0
+0.5V = 1

⑤ ~~Hot~~ Which way — Full Duplex
— Half duplex.

⑥ What way you connect system ie. Und topology

eg.



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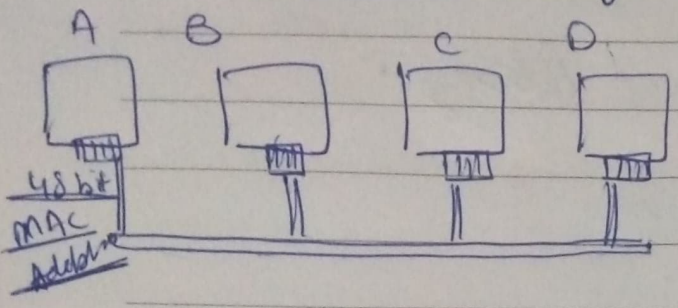
Data link Layer :-



Frames → Data type used by this layer.

made up of 0 & 1's

① Physical Addressing [Face]
Network Interface Card or Ethernet Card through with systems is connected to network. have unique id
- 48 bit long address / id.
- IEEE / MAC / LAN / Mission address

② Framing.

③ Access control - diff. protocol to decide ↓
[Medium Access can given to one station at a time]

④ Synchronization
[If free then only can talk]

⑤ Flow control [so that sending speed = receiving speed to avoid data loss].

⑥ Error Control.
[resend if not received properly]

⑦ Node to Node Data transfer.

* 48 bit Physical Address is expressed as 12 Hexa-words & → consists of 4 bits.

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Network Layer

0.0.0.0 = Nobody
1.1.1.1 => Everyone

Data type = Packets

① Logical Address / IP address / Network Address / Subnet Add.
[32 bits long]
eg. 202.141.49.75
[8 bits | max. value can be 255]
Asia [continents] | India [Country] | 0-63 → south regions ⇓ 49 ⇒ NITW
800ms [254 people can get diff. connection]
0 [You] | 1 [Everyone]

② Routing

③ ~~Congestion~~ Transition Contrd. [Too many Packets, wait]

Physical Address is used for communication in LAN.

④ Address Translation.
[from logical address to Physical address]

⑤ multiplexing

⑥ Internet working.

⑦ Source to Destination Data Transfer

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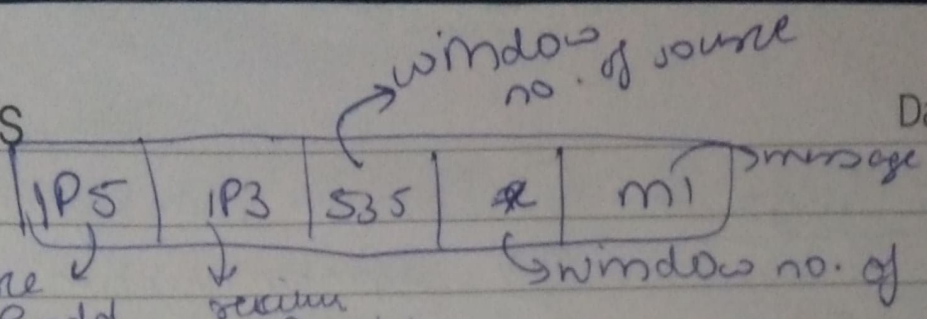
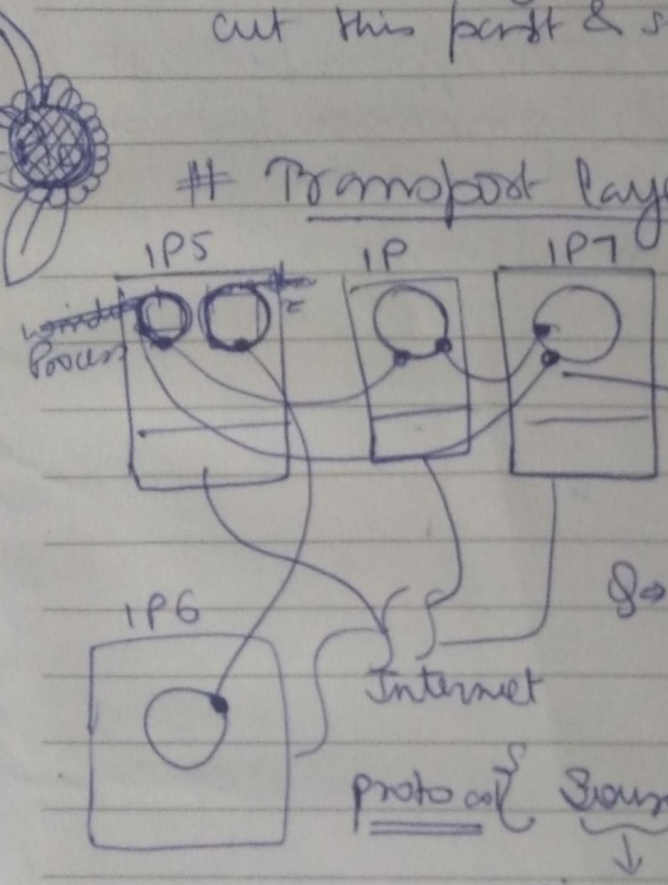


Network layer
cut this part & send remaining to Transport layer.

Transport layer → ① Port Addressing [16 bit]



→ ② Connection oriented service / Connection less service

There are the Ports.

So how these connections can be uniquely identified

Protocol { Source IP, Source IP, foreign IP, foreign Port }

Since we are sending
so ⇒ local IP, local Port.

↳ ③ synchronizing
↳ ④ flow control
↳ ⑤ error control
↳ ⑥ multiplexing
↳ ⑦ end to end data Transfer.

Data send via internet uses IP add & Port add No Physical Add used

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Session layer :-
1. Session management
2. Synchronization
3. Dialogue management
4. Graceful close

Presentation layer —
1. Encryption / Decryp
2. Compression / Decompr
3. Translation
4. Security

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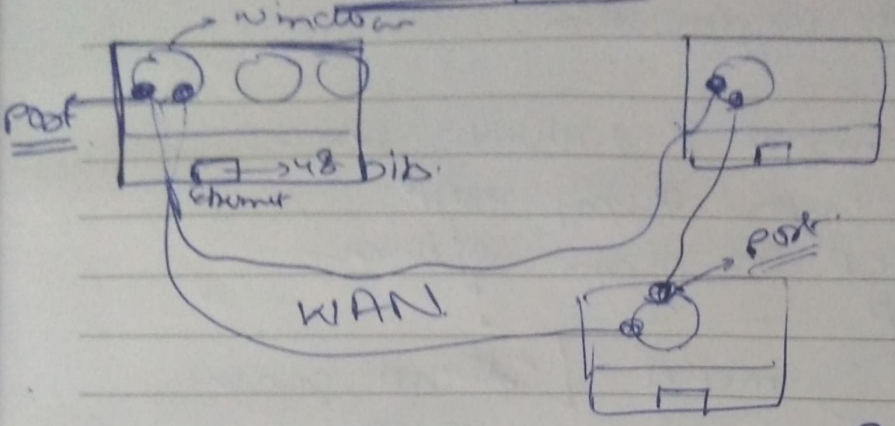


Socket Connection

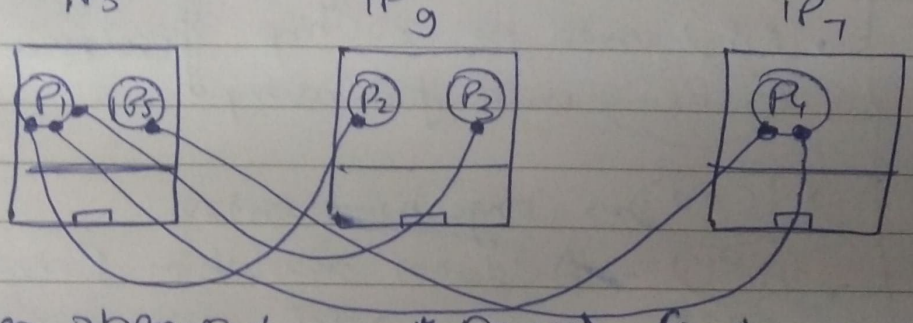
All connections in this world are unique.

Local IP | Foreign IP
Local Port | Foreign Port

Port No. → 16 bits.

So, a device can have 2^{16} ports.

Eg.



* P1 has opened 5 ports.

* Packet first reached to a system, then Transport layer handles port no.

$2^{16} = 65,536$

so, port no. are b/w $0 - 2^{16}-1$ | $0 - 65,535$] Not for each Process but in total for a system.

Application layer
- E-mail
- File Transfer
- DNS ← Domain Name service
- NFS
- so many more
- Remote Login

Upper media layer

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ISO – Internet Std Organisation.

OSI model

Among all layers Transport & Network layer are the most imp layers during WAN.

Trans layer has TCP as main software

Netw " " IP " "

so TCP/IP model [Internet, general name]

Network layer → IP main func is formation of Packets [logical address]

Protocols

- RIP used for routing
- OSPF used for routing
- ICMP → congestion control
- ARP → Address resolution Protocol
- RARP → Reverse addr resolution Pro.
- DHCP → when we boot sometim we get new IP.
- BGP

Transport Layer :- TCP → Transmission Control. Connection oriented

Protocols. UDP → Connectionless Protocol

Application layer :

Protocols

- SMTP → Electronic mails. Simple Mail Transfer Protocol
- MIME extended version of SMTP for more media. Multipurpose Internet mail Extension
- FTP → File Transfer Protocol.

Notes Trivial File transfer Protocol Date

TFTP for small file transfer.

NFS - it is invented using RPC.
Network File System.

TELNET - Remote Login.

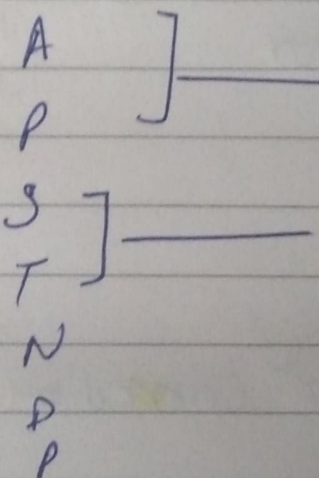
HTTP

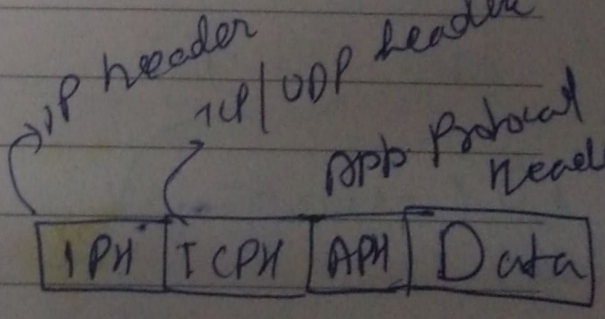
SNMP Simple Network Management Protocol

DNS

hebbramittal095@gmail.com to IP address.
[32 bit].

ISO / OSI. TCP / IP.





SMTP uses TCP.
HTTP uses TCP
DNS uses either of the two.
FTP uses TCP
TFTP uses UDP.
NFS use UDP
Telnet uses TCP.

TCP/UDP uses IP in Network layer.

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Any connection across internet contains 5 elements

{ protocol, local IP, local port, foreign IP, foreign port }

Errors

- Single Bit (only one Bit is changed)
- Multi Bit Error
- Burst Error

eg. Data 10110111101

⇓

1011000101

burst error

Error control

- Error Detection
  - LRC → Parity Longitudinal Redundancy Check
  - VRC Vertical Redundancy Check (2D LRC)
  - CRC Cyclic Redundancy Check

Both will be suitable for checking errors only if odd no of Bits are changed

- Error Correction