

# COMPUTER NETWORKS

①

→ ~~Python~~

~~Agenda~~

① What is Internet

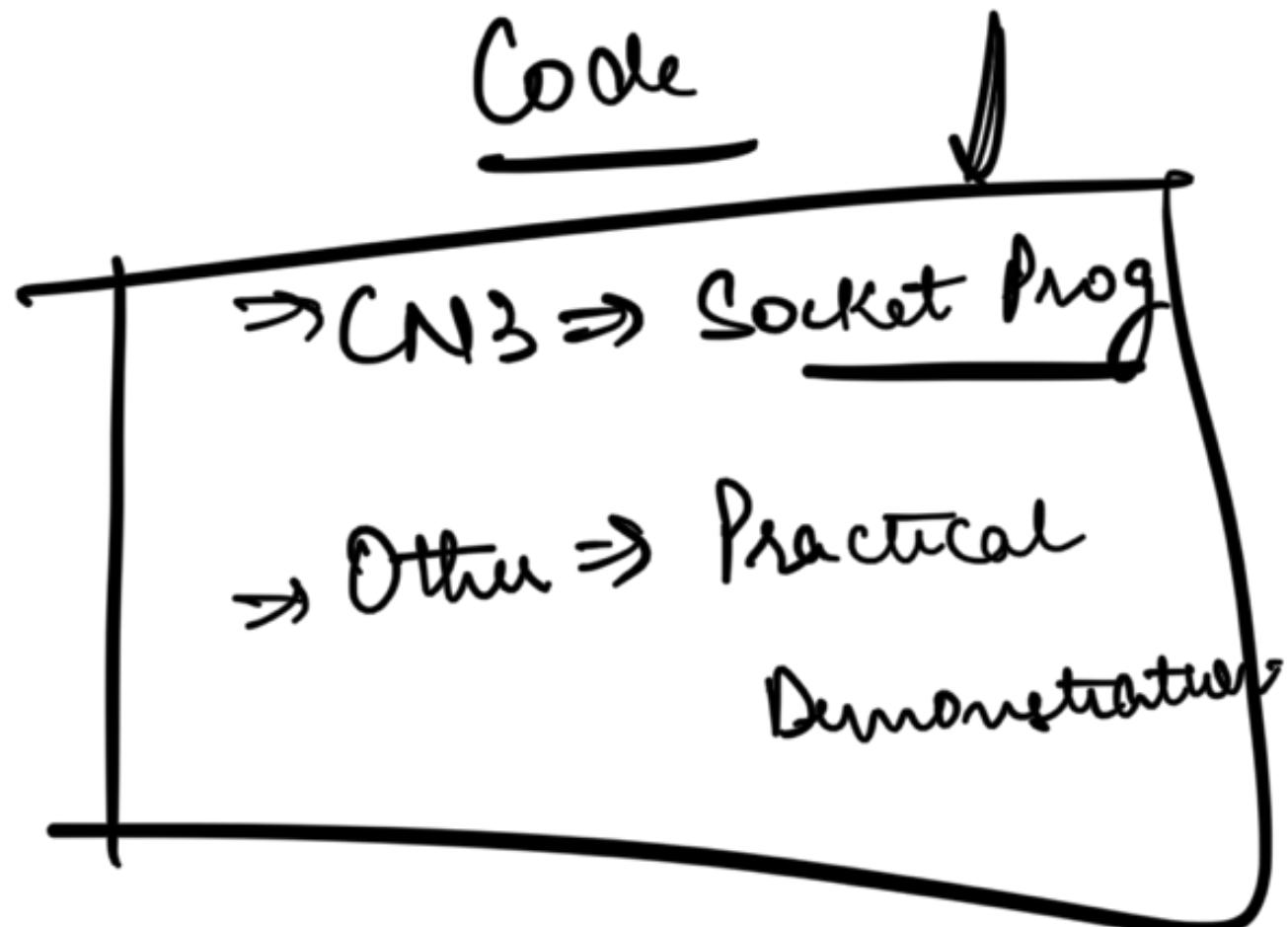
② Protocol

③ Layered Architecture

→ OSI Model

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(2.5 hrs)

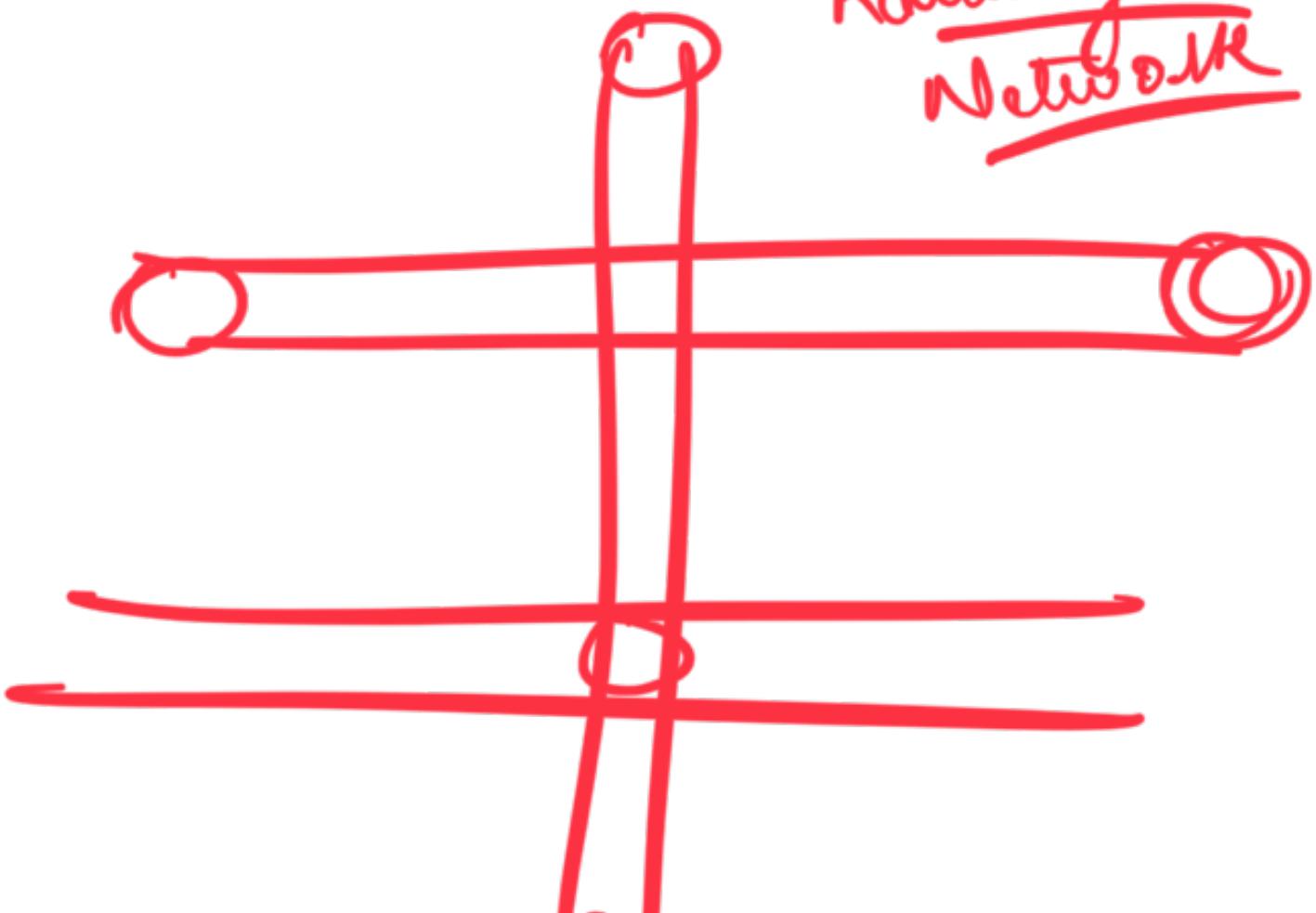
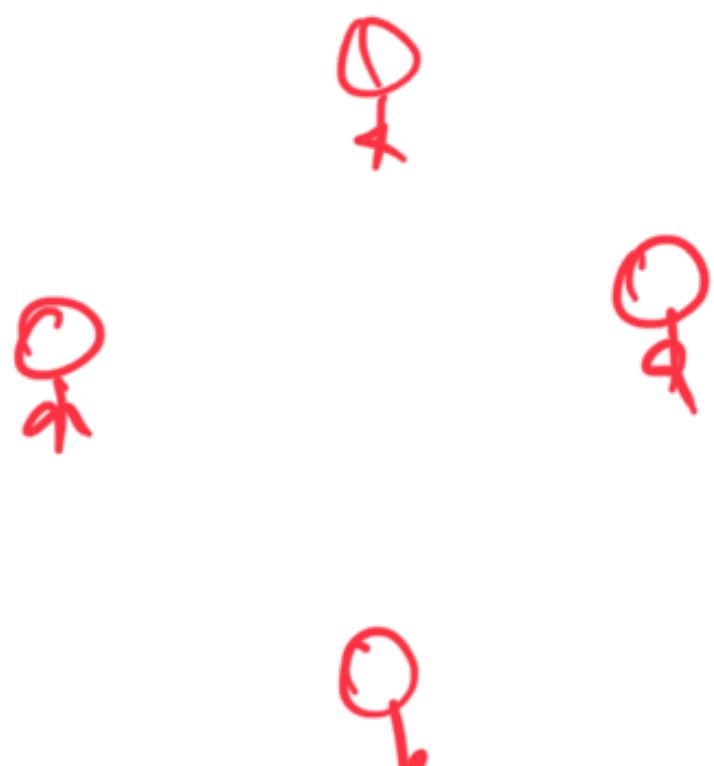
→ TCP/IP Model





→ group of interconnected things

Railway  
Network



E

Facebook  $\Rightarrow$  Social N/w  $\Rightarrow$  N/w of people

## Internet

$\rightarrow$  Network of computers

$\rightarrow$  Why?

①

Communicate

| ② Sharing resources info

→ Invented by US Army

→ DARPA

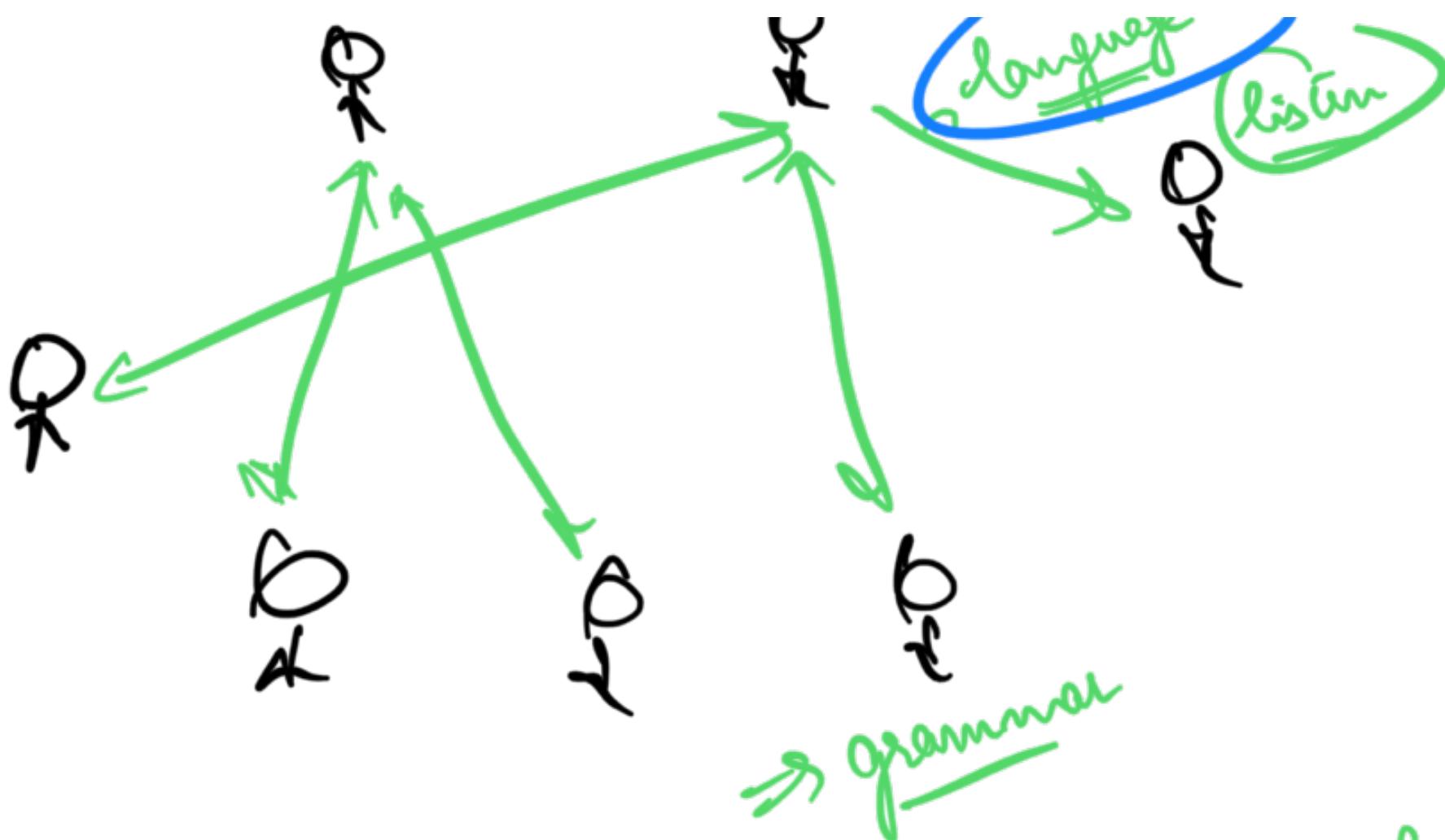
→ ARPANet

→ Internet

↓  
ARPANet

Just try to understand how humans work





Protocol  
 ⇒ Set of rules that govern how data  
 is shared b/w 2 progs  
 → Analogies to language in humans

Protocols

D-Hypertext

FTP → file transfer protocol

HTTP://

WWW

+

-

IP → Internet protocol

CN2

RFCs

⇒ Request for Comment.

⇒ IETF (Internet Engineering Task Force)

(A)

IP

(B)



A can only talk with B only when  
A knows the address of B



Other  
Protocol

## Network Addressing

### IP Addressing



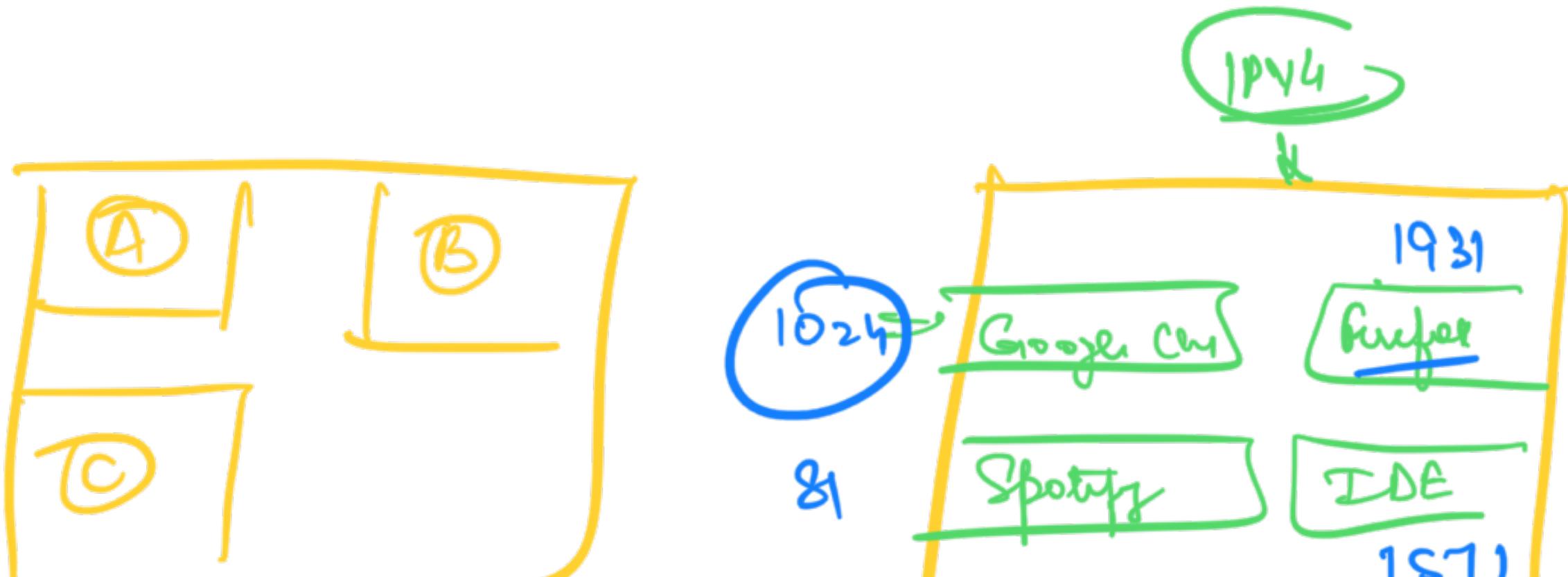
IP allows new devices  
were introduced

## IPv6) Addressing

128 Bit Address

$2^{128} > \text{No of atoms on the planet}$

$$2^{80} =$$



## Port

→ Every process that wants to talk via internet, gets assigned a port

→ 16 Bit int

→ 65535

0 - 1023

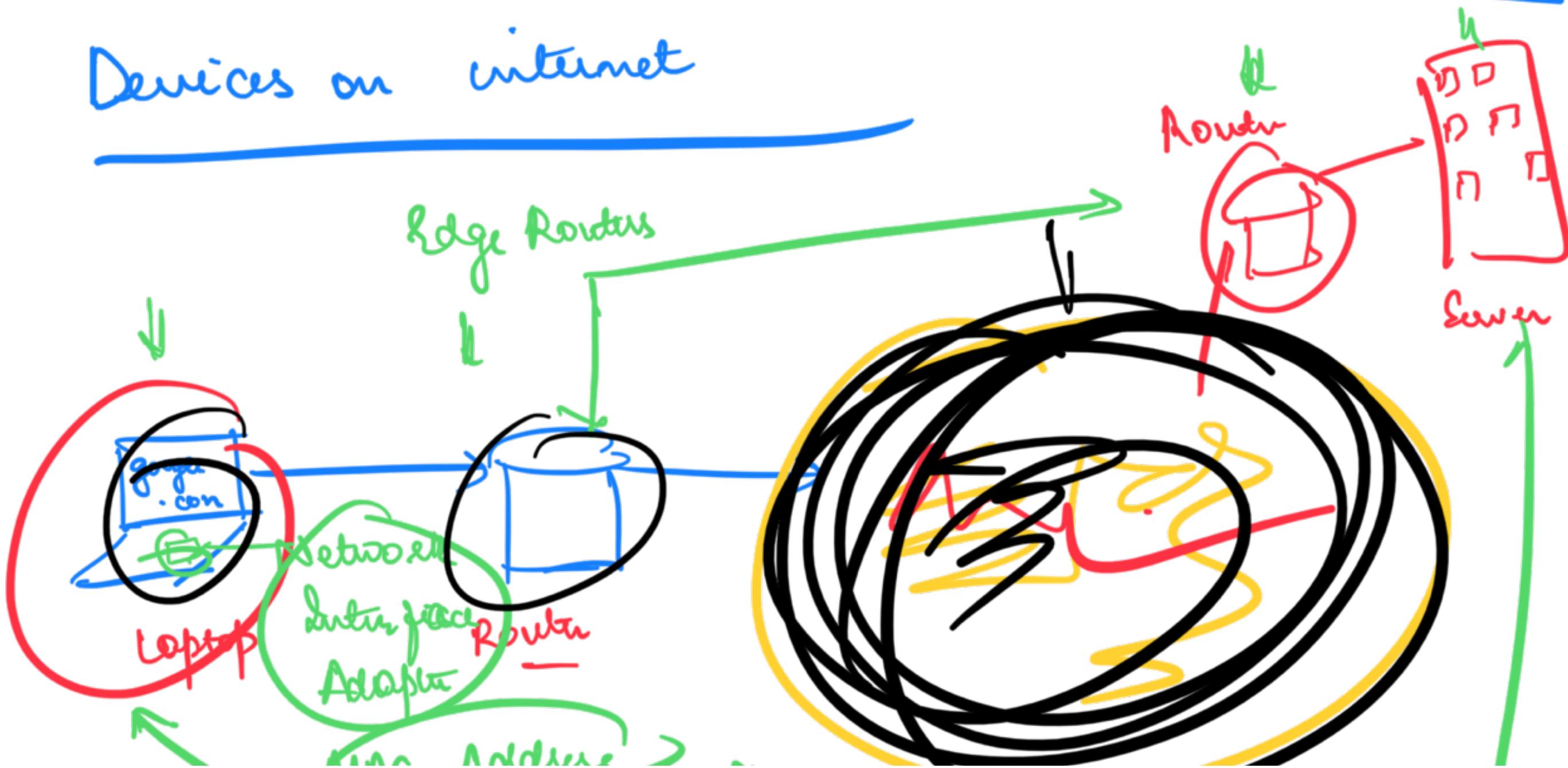
Reserved for well known app

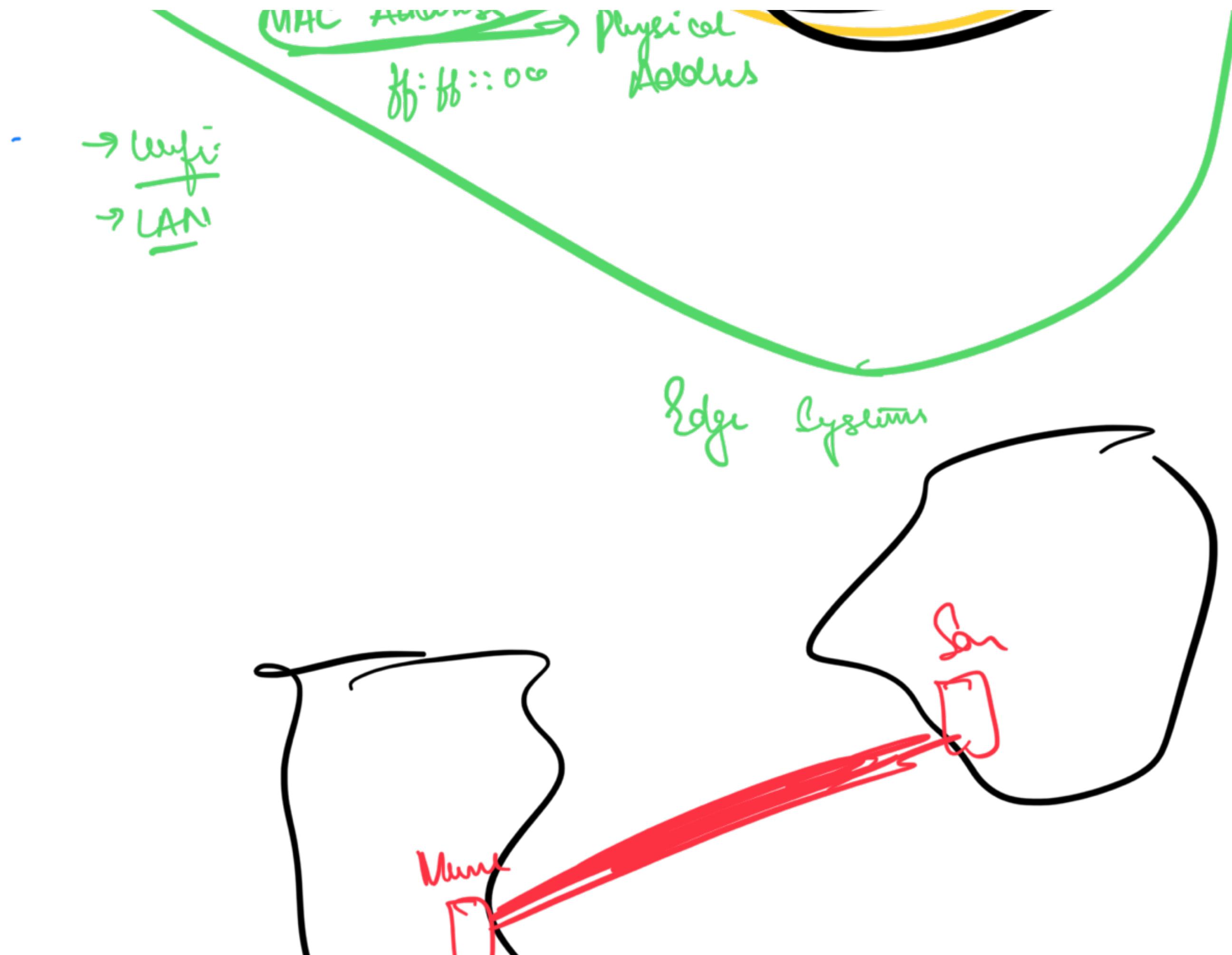
HTTP: 80

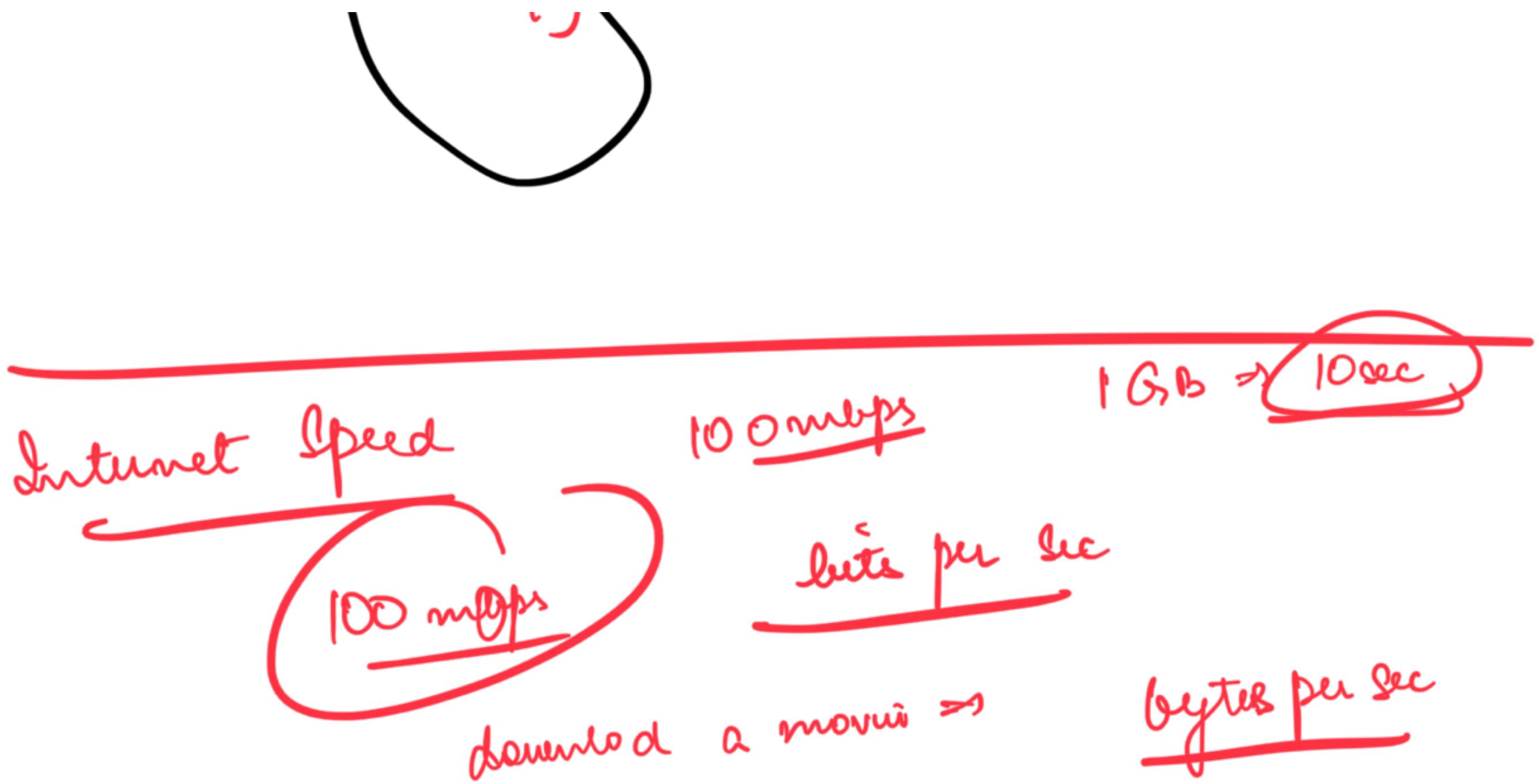
HTTP: 80

FTP: 21/23

Devices on internet







$\Rightarrow$  Data is bytes

n.r. / Sec

~~units~~

$\times 10^{24}$

1 kilobit =  $\times$  bits

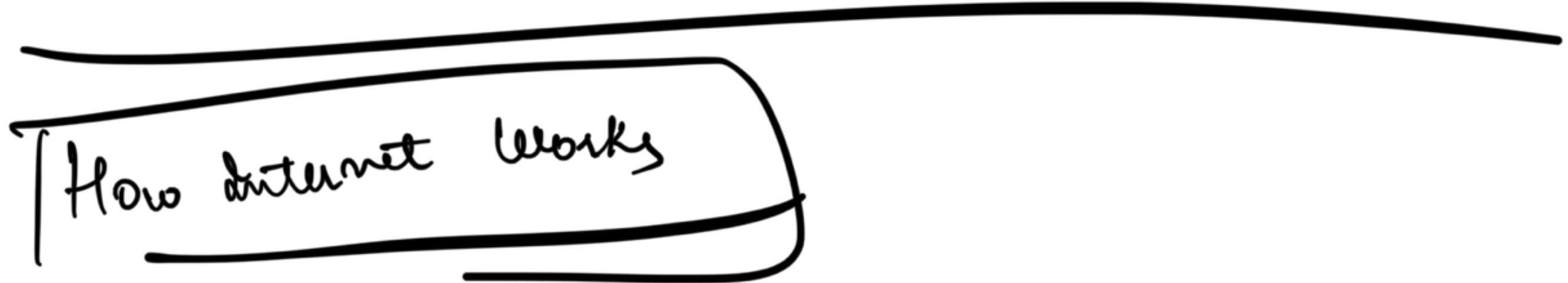
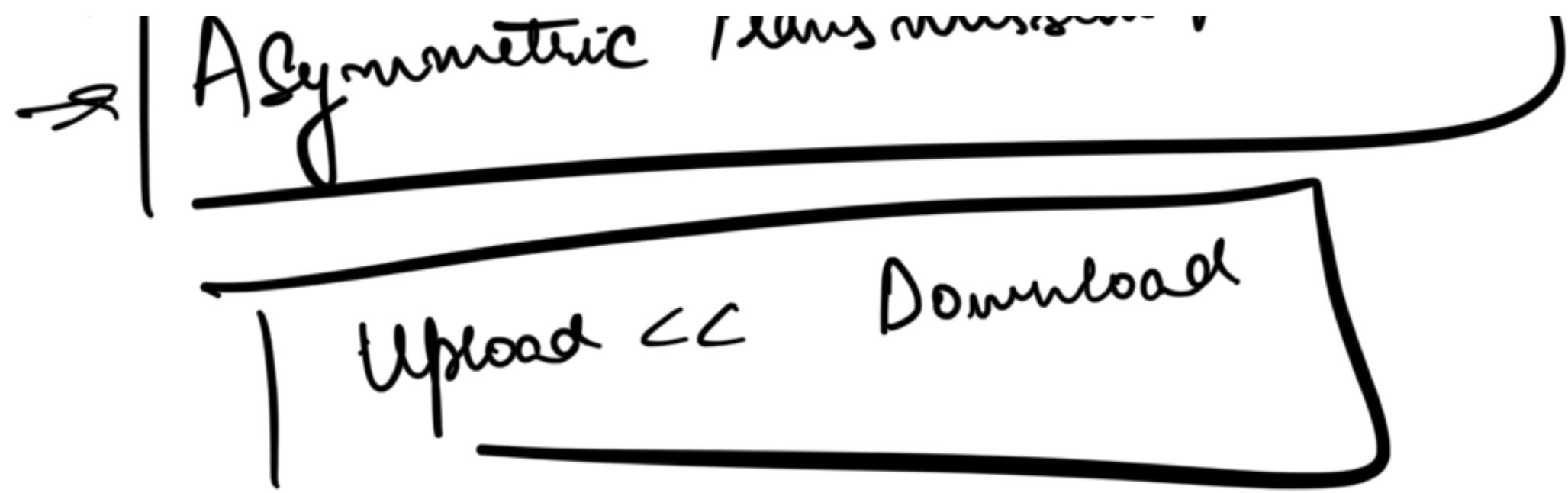
1 kilobit =  $\frac{1000}{1000 \text{ bits}}$

1 megabit = 1000 kilobit

1 gigabit = 1000 megabit

}

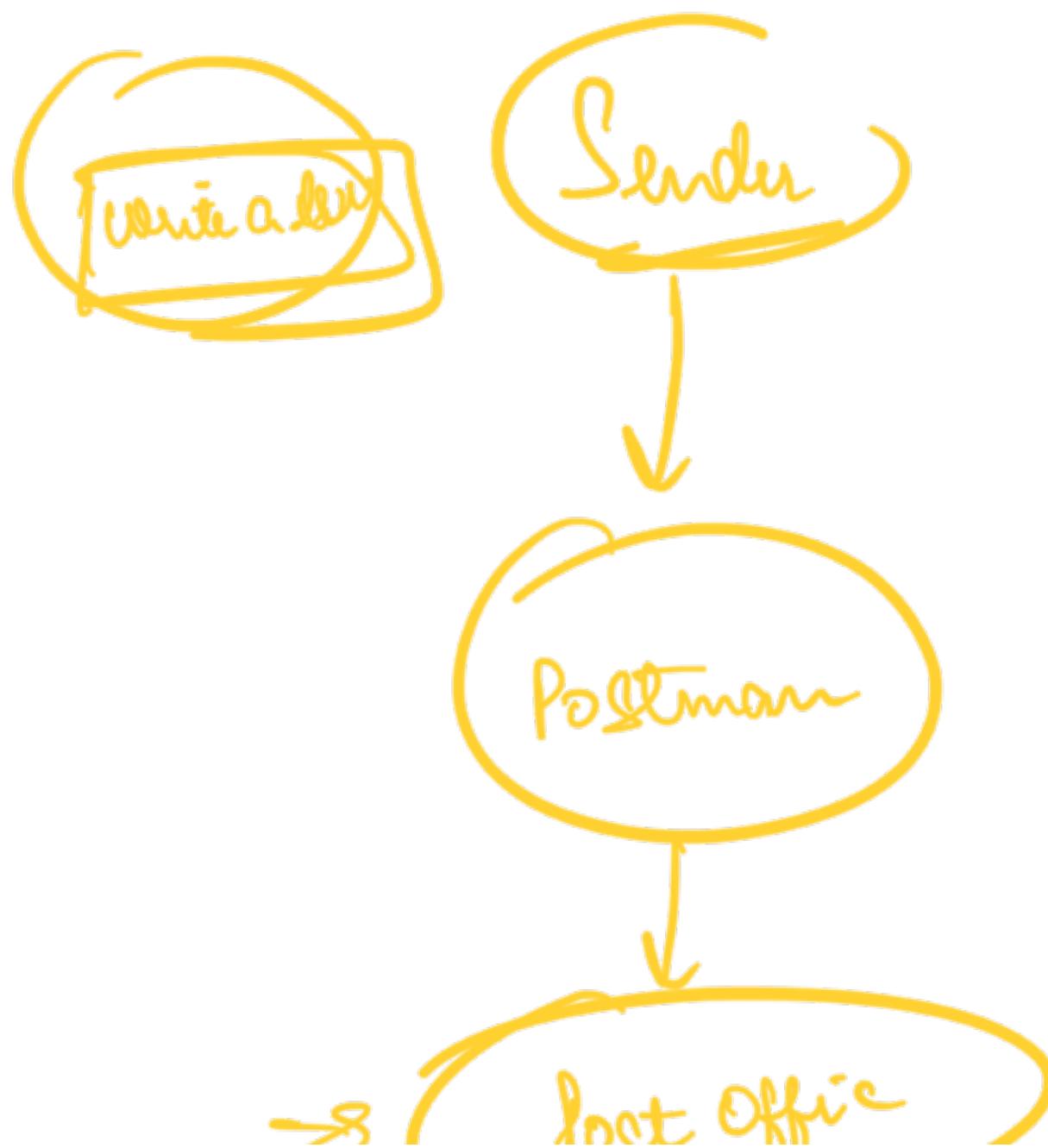
To maximum Rate



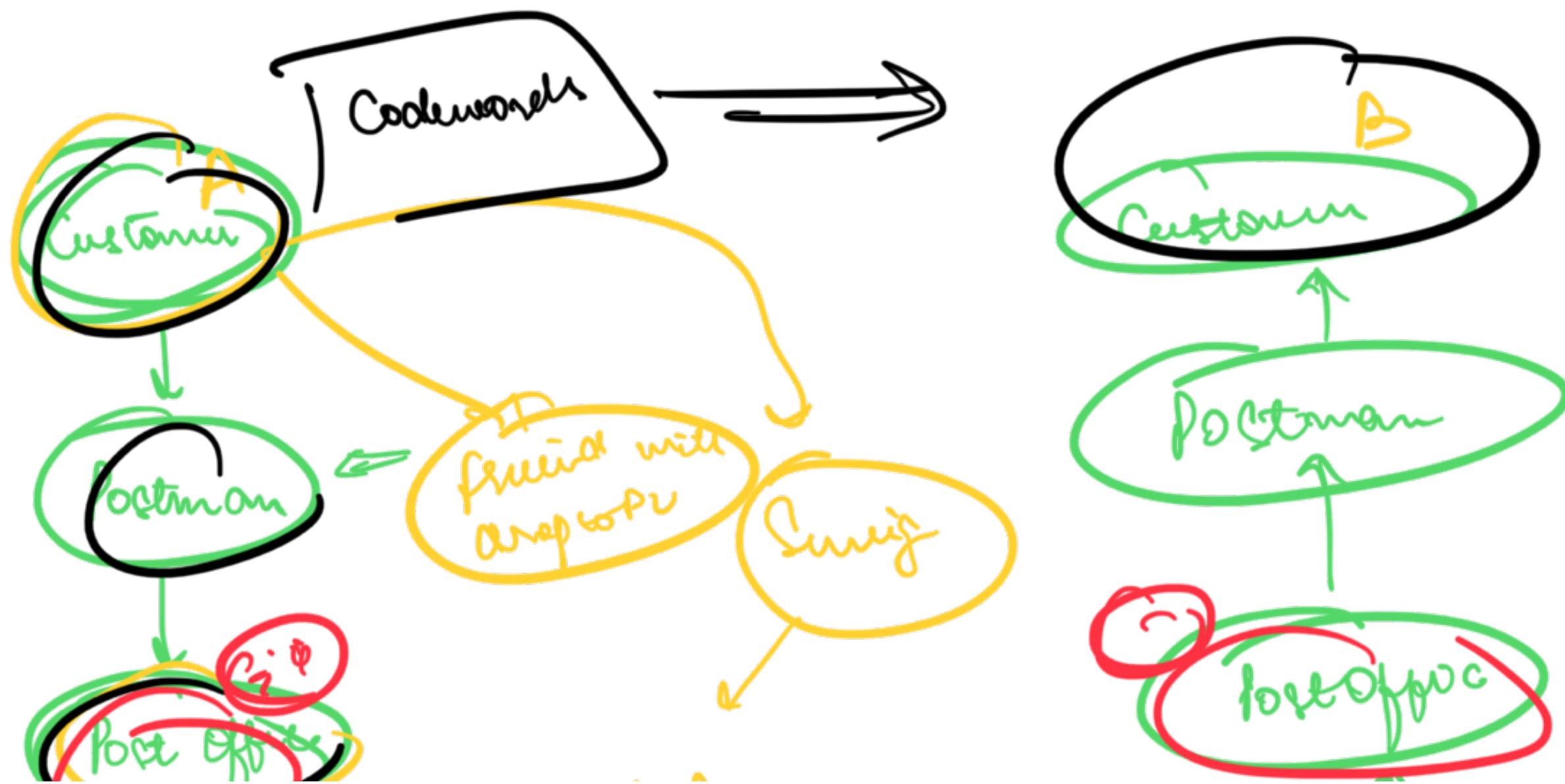
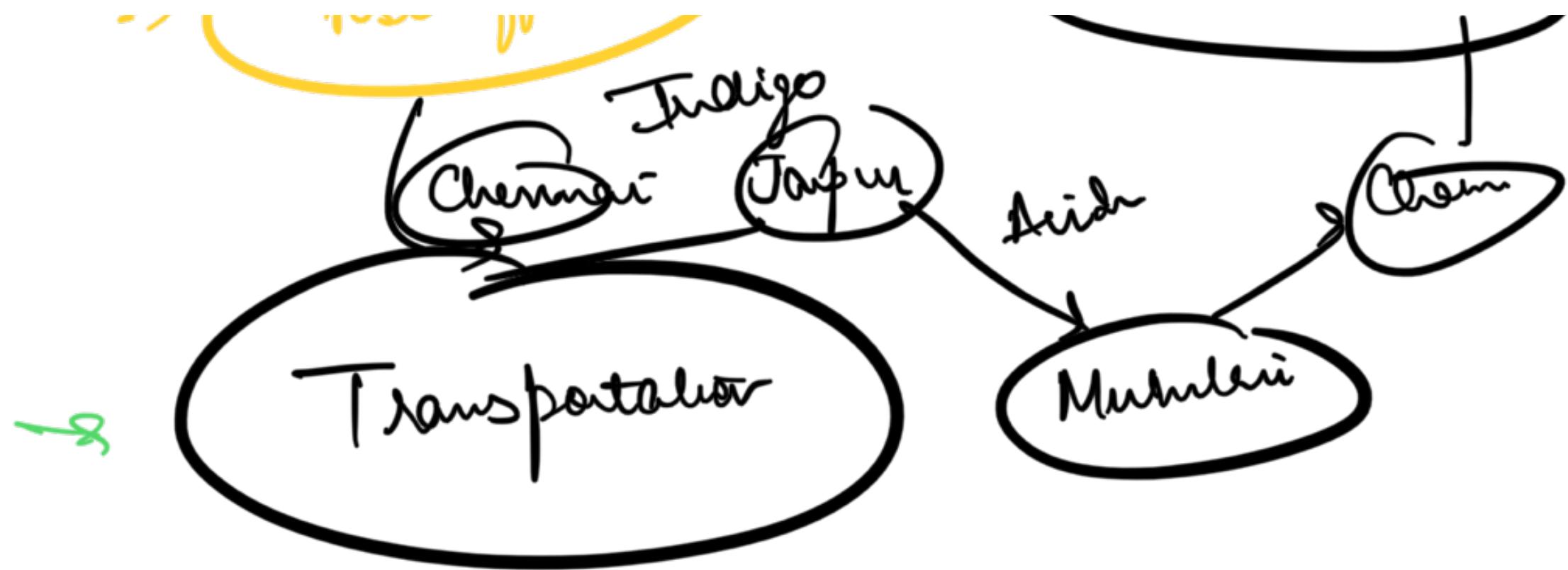
POST

A  
Delhi

B  
Chennai



Recipient  
Postman  
Postman  
Chennai PO

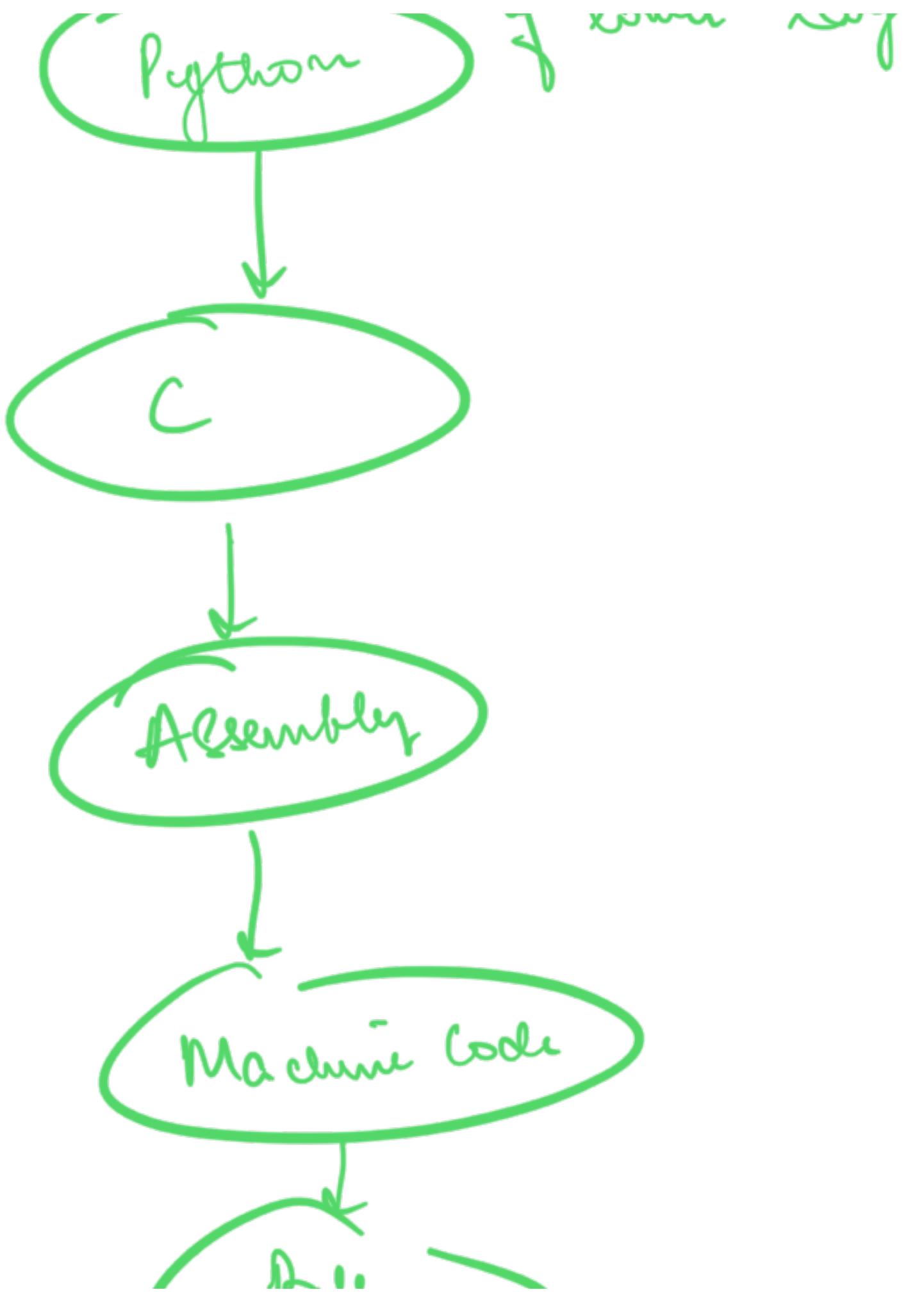




## Layering Architecture

### ① Vertical Communication

- Layers below you provide services to layers above them
- Upper layers are free to choose any variant of lower layers





## Vertical

- ① lower layers provide service to upper ones
- ② upper layers choose service based on features and don't care about how those services work

## Horizontal

- ① Corresponding layer on other side knows how to interpret the data of the other side

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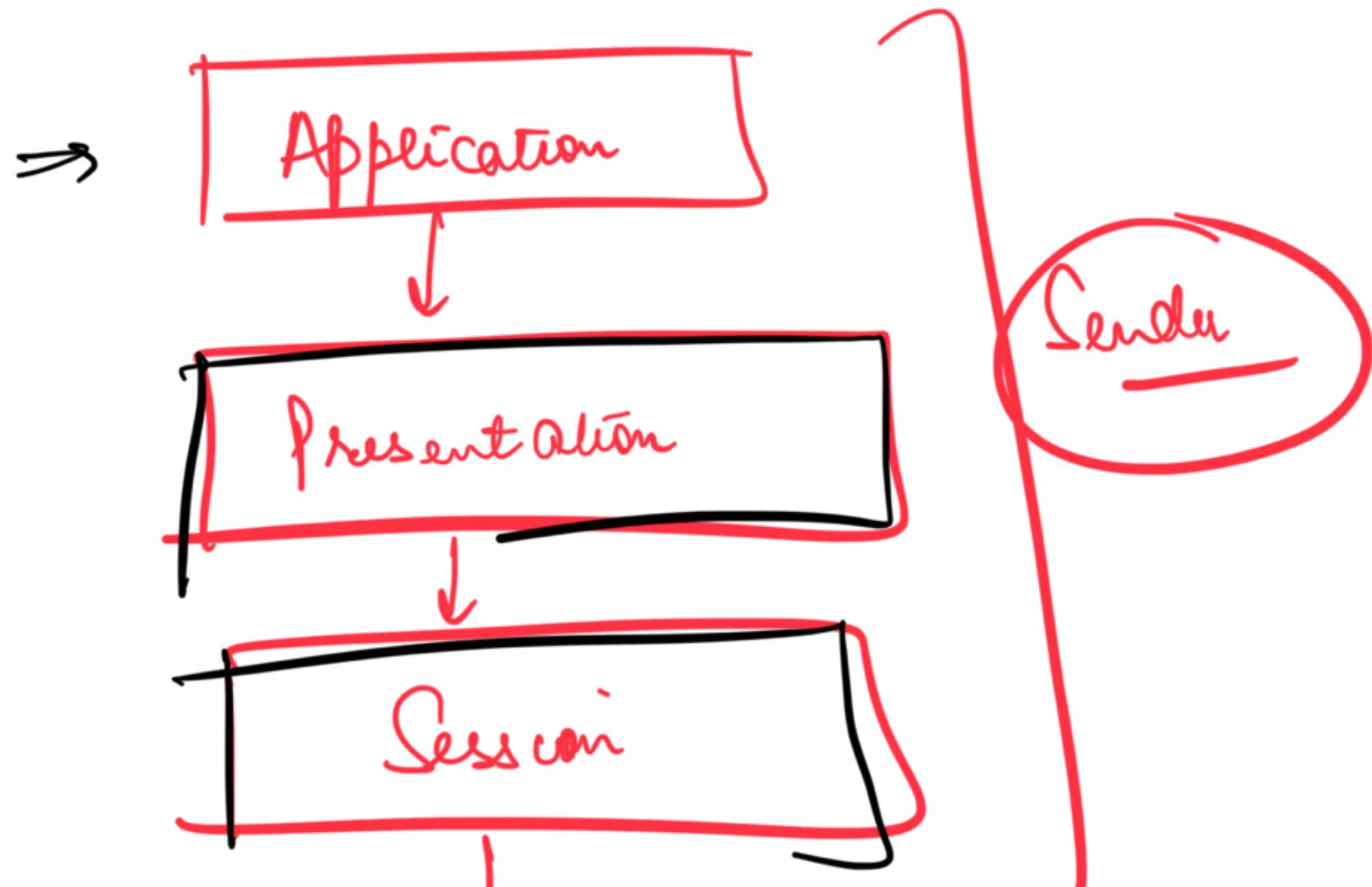
Internet has a layered architecture

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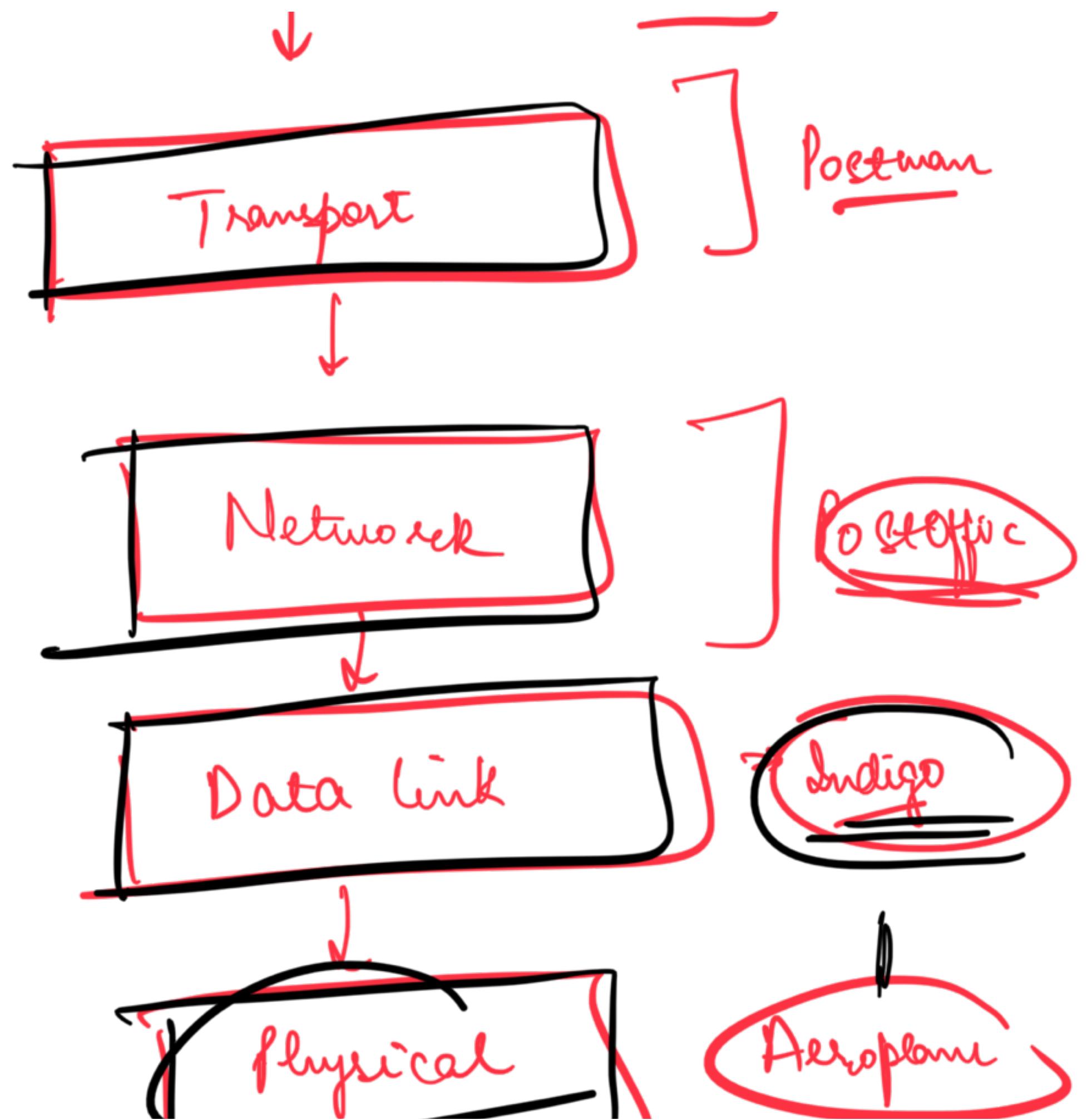
## OSI Model

Open Systems Interconnect

- ~~TP~~ T  
1970s  
7 layers



7 layers



## ① App<sup>n</sup> layer

- Software layers
- Used by End Users to interact
- Eg: Chrome, Firefox, Email Client
- Create/ receive the data front) for user.

②

## Presentation layer

- Encoding | Encryption | Compression

- ③ Session
- Manage user session b/w 2 end system, Auth
  - b/c data will be sent multiple times.

- ④ Transport
- divides the data into chunks

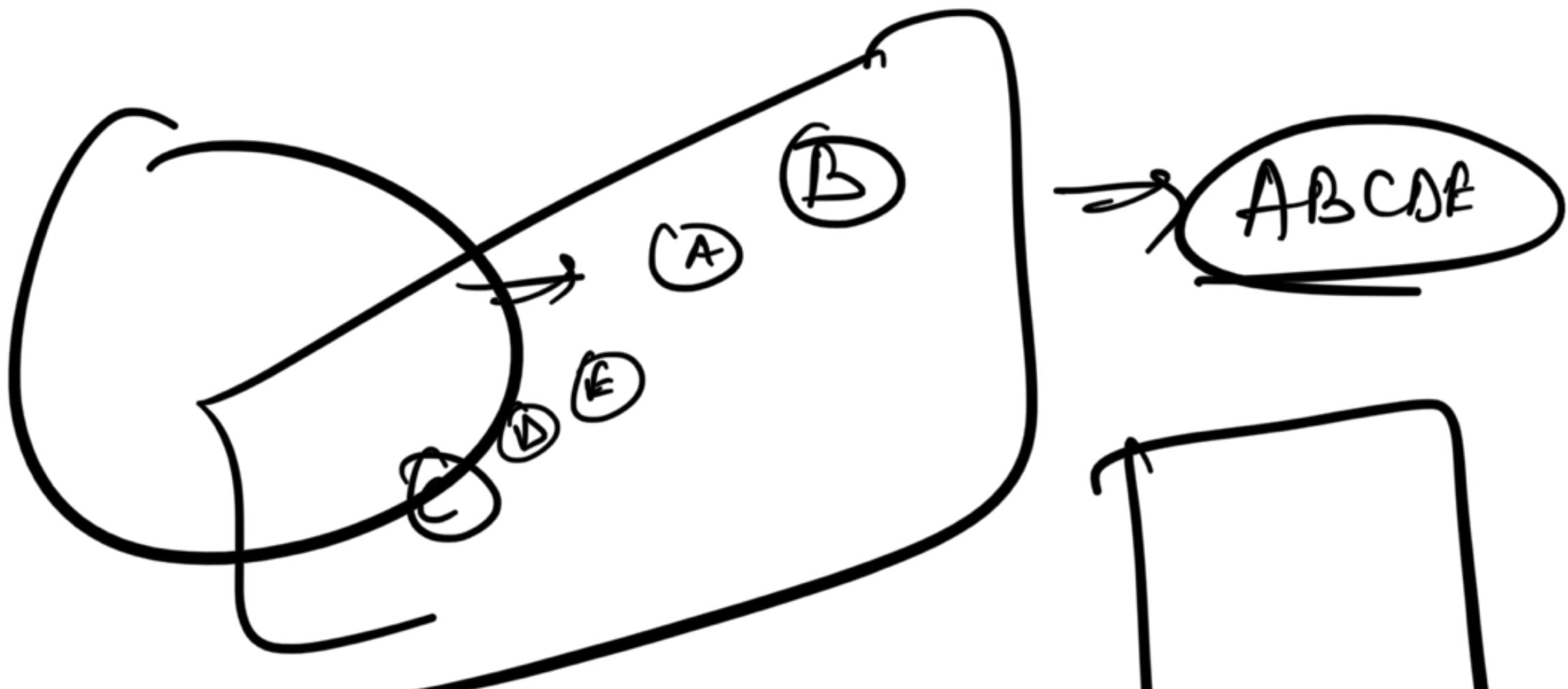


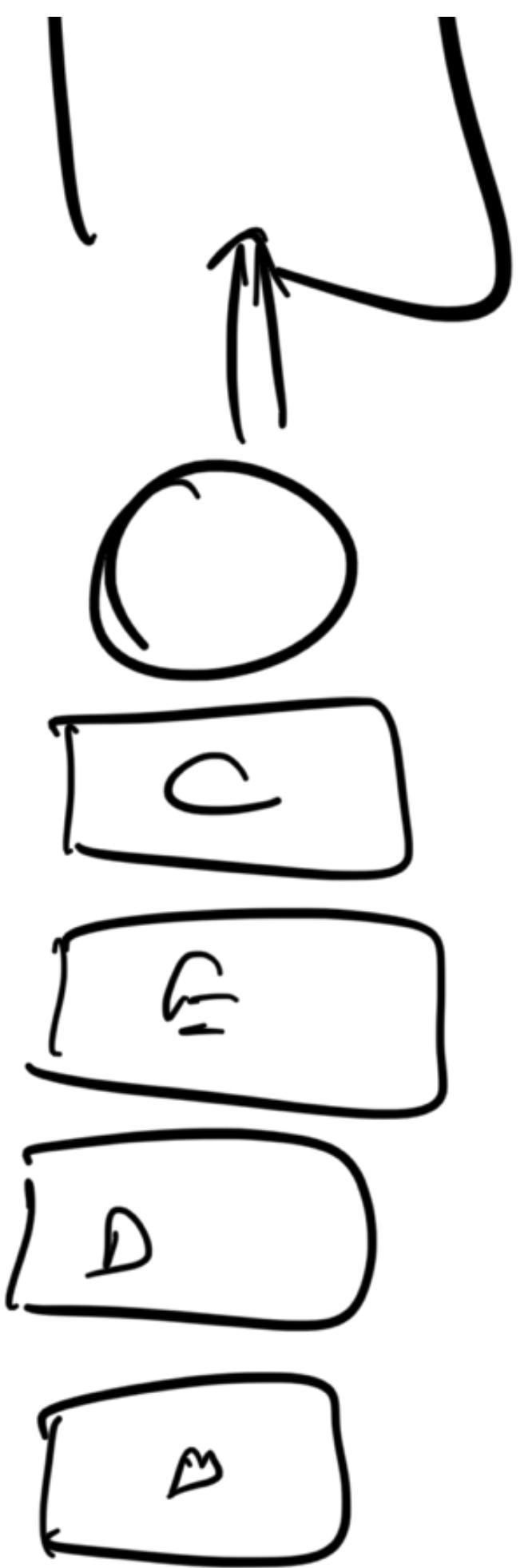
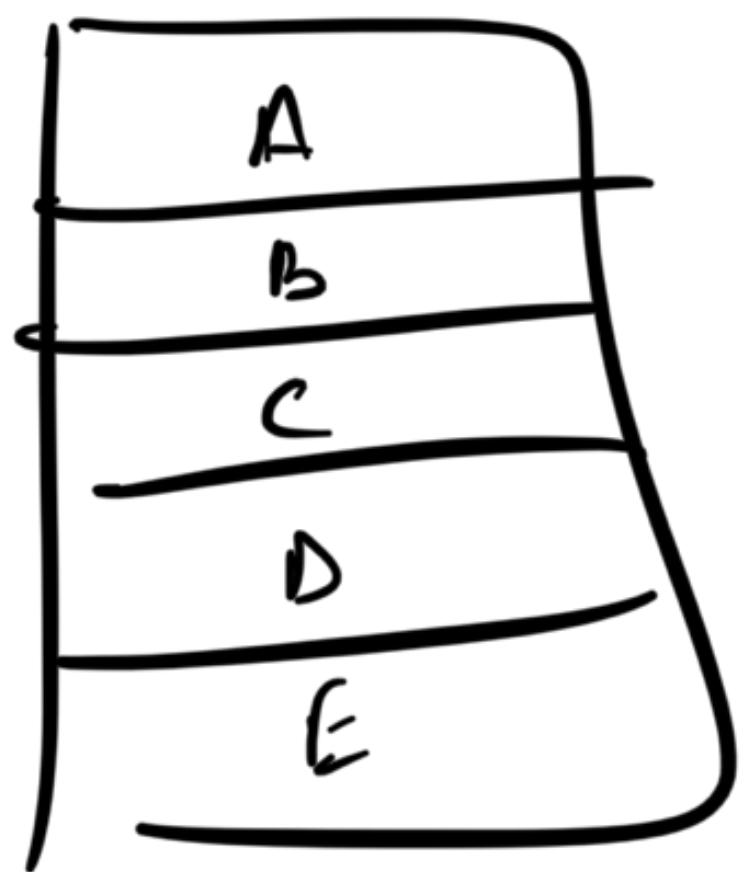
- Datagram
- UDP

→ Segments (TCP)

→ Checksums to check correctness of data

→ Maintains order of delivery to app (TCP)







## Network Layer

→ Routing

→ Routing protocols run on this layer

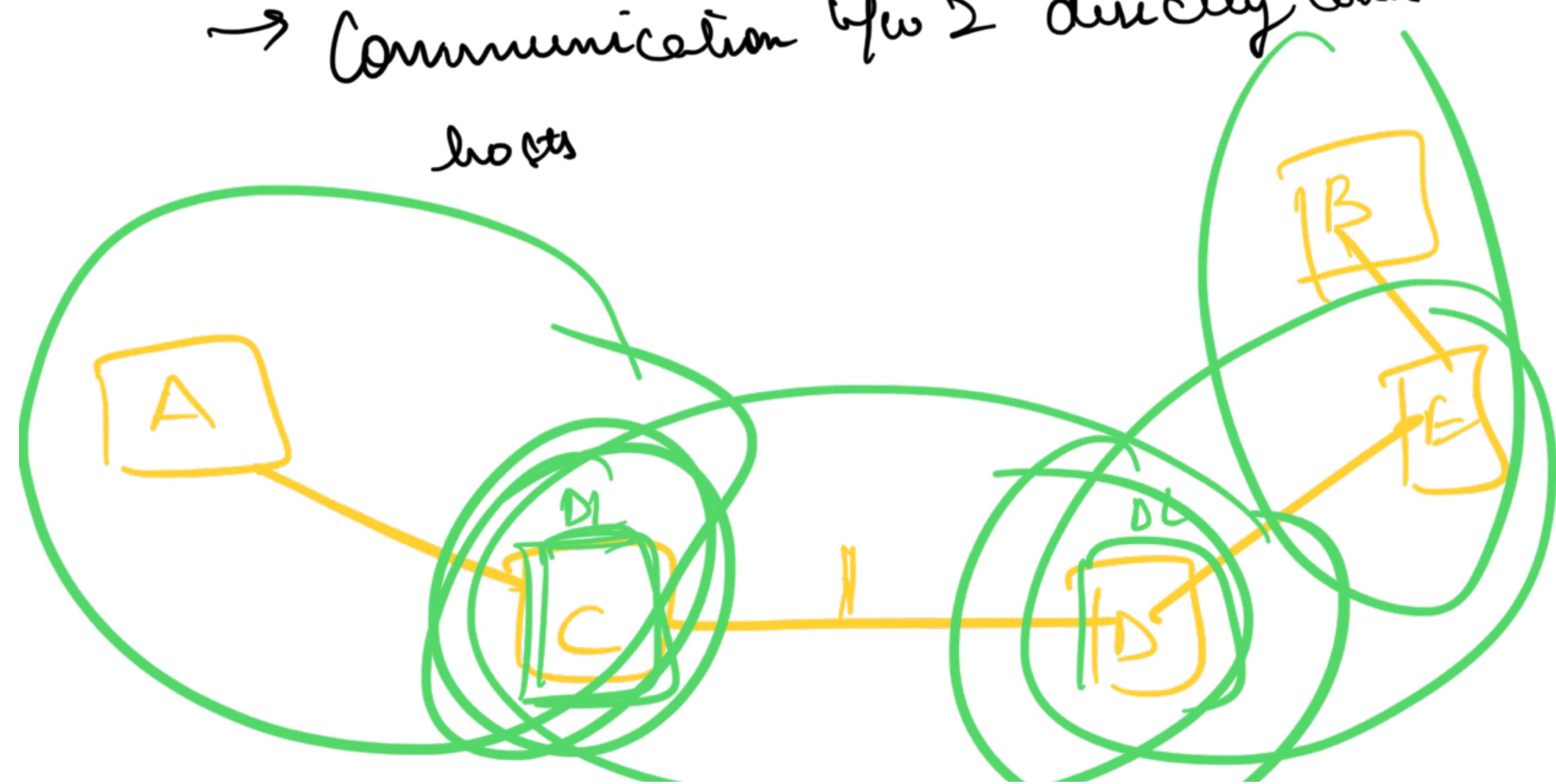
⇒ Internet exists here



→ Messages are called packets

## Data link layer

→ Communication b/w 2 directly conn hosts



~~features:~~

- Directly interacts with HW
- Flow Control

→ Transmission Complex =  
Error Detection | Correction  
Physical





S

Channe



Physical

→ Hardware / Medium via which  
com happens

→ Complete EHW Layer

11:07 PM

Domini



## TCP/IP Model

→ How internet is really structured

→ 1984

- ⇒ Came out of practice
- ⇒ Came out how internet was really being used
- Developed as each layer matured



Layers

Internet

Network

Data Link

Physical layer

$$\begin{aligned} & [7 - 3 + 1] \\ & = 5 \text{ TCP/IP} \end{aligned}$$

These layers communicate both horizontally & vertically

*via header*

