September
01/09/2025
Monday

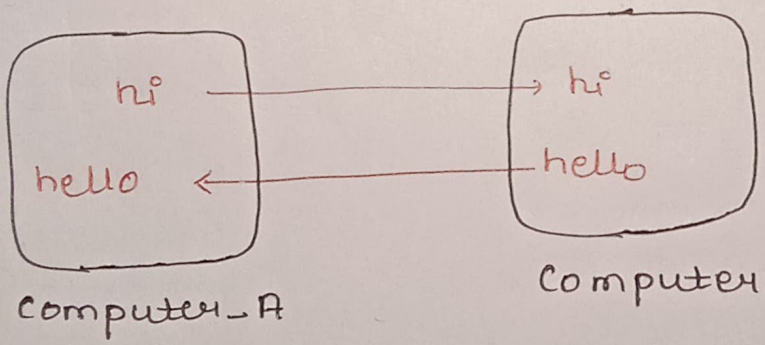
Lecture - 1 (Day - 1)

Introduction To Web Development/ Internet Working

What is Internet and How it work?

- We use internet
  - To watch reels on Instagram
  - Sending messages through whatsapp
  - Watching tutorial on Youtube

So in basic terms we use internet for communic-ation purpose and data transfer.



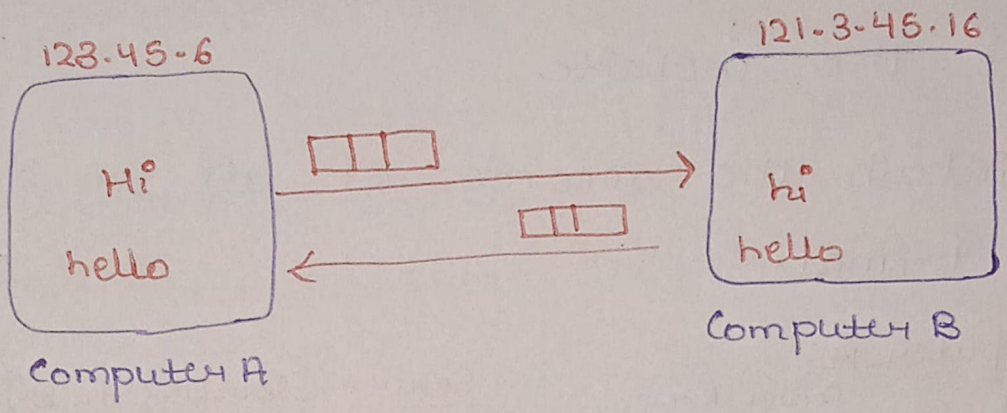
How this msg go from one device to another?

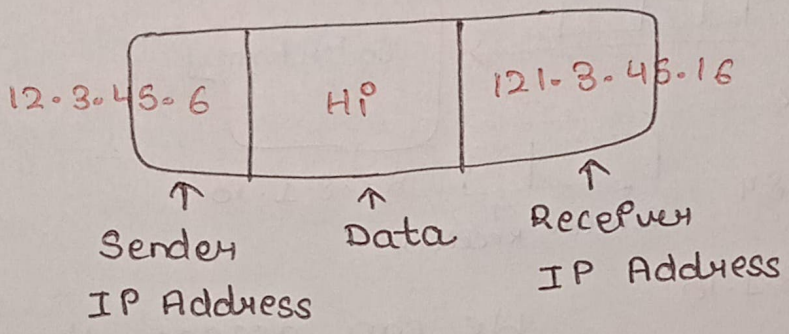
- So, In real-life networking work same as post-office.
- If we want to send letter to a friend we require address. In the same way for sending message online we require address and that is known as IP Address (Internet Protocol).

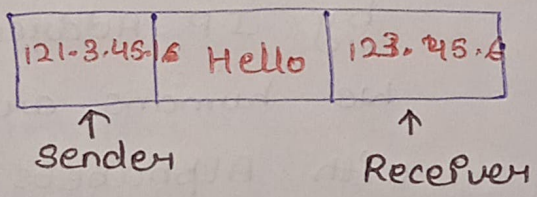
Look like - 123.45.6
12.3.45.16

For sending message we require -

- Sender Address
- Receiver Address
- Data or message







For sending message online we require IP Address

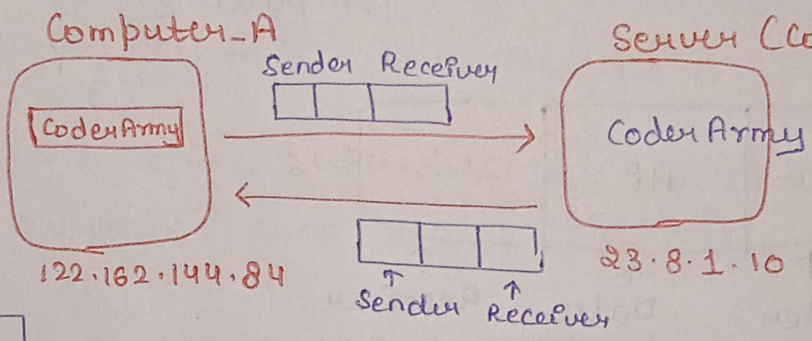
Note : When we connect to internet. We have IP Address given by someone ~~Server~~. This is not a permanent Address so when we disconnect IP Address will be taken away.

When we go to browser and type Coder Army then we get the website but how we get it without IP Address ?

- IP Address is provided by ISP (Internet Service Provider)

- When we type on browser DNS convert the domain name to IP Address and then we access the website.

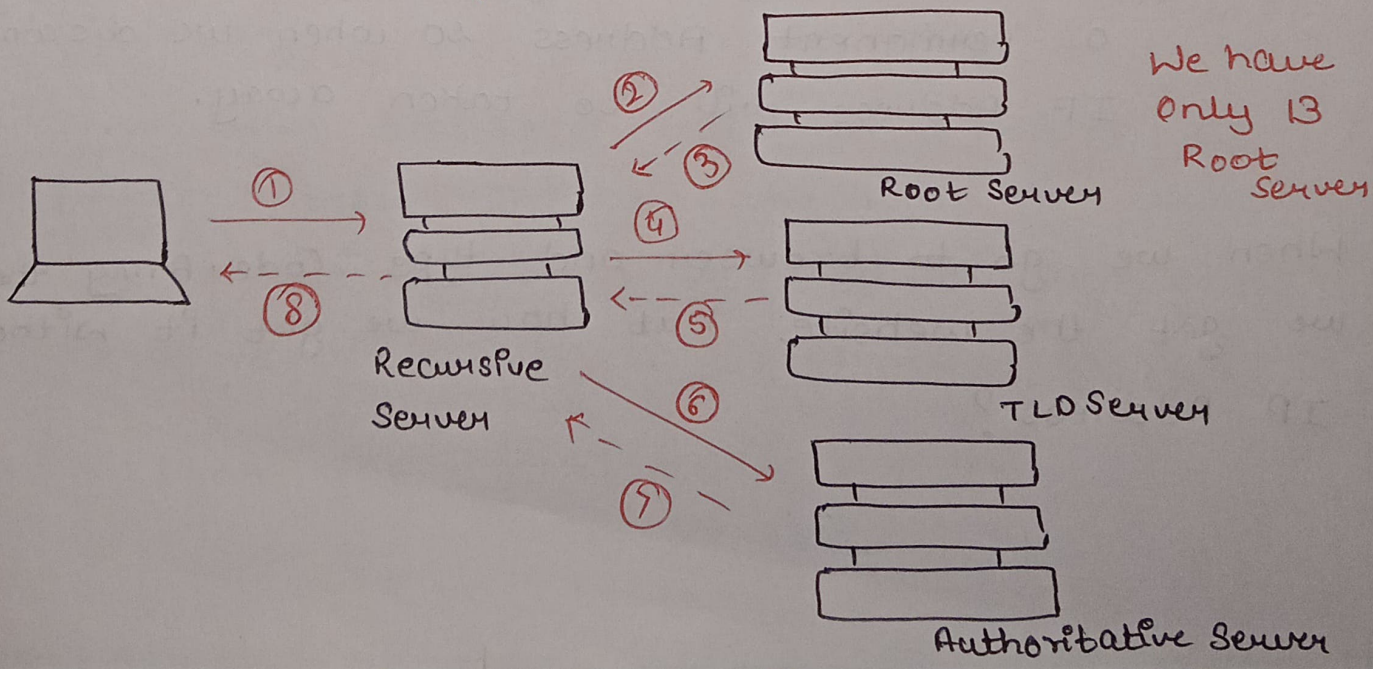
- DNS maintain the records of all the domains in table format.



CoderArmy.in → 23.8.1.10
google.com → 8.8.8.8.
DNS

We can access the website by IP Address also but we humans are more familiar with Alphabets and it is easy to remember

How DNS Works?

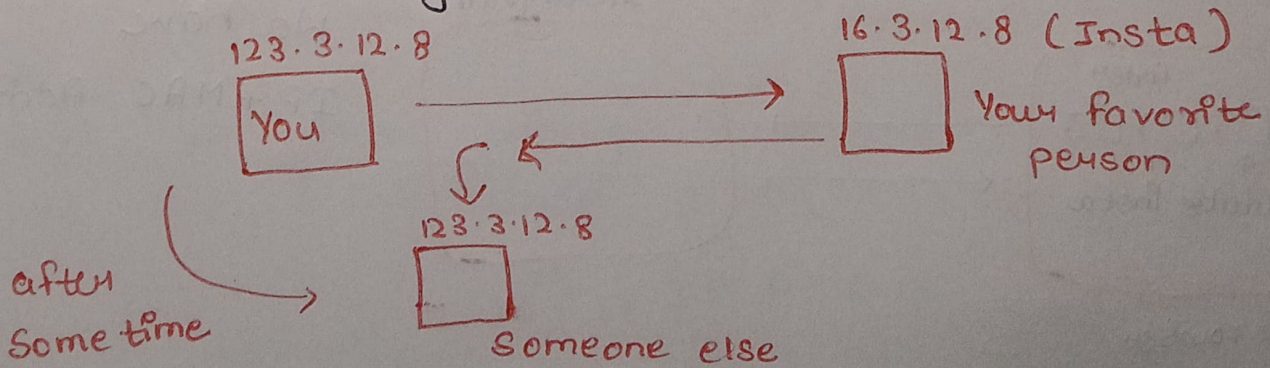


We have only 13 Root Server

We want to access the google.com

- First when we enter on browser it check inside the browser whether the google IP Address is present (laptop device) or not
- If it not present in your device then it go to recursive server (DNS Resolver). If Recursive Server have Address then it return from there.
- Else it will go to root server (only 13 root Server). Root server don't have google IP Address. It has .com, .edu, .in address etc. So it send it to TLD Server (Top level Domain) through recursive server.
- Next it will go to that TLD which have only .com Addresses but it don't have IP Address So it will send the request to authoritative Server.
- Authoritative Server return with response to recursive and then to your device

Suppose you want a personal chat of your favorite person on instagram.

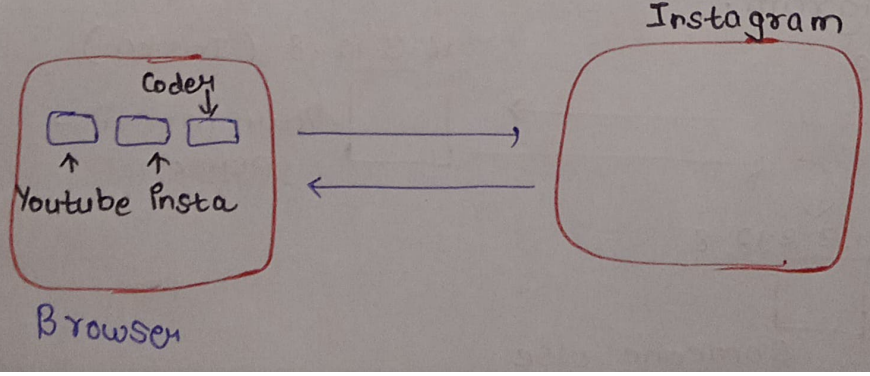


- But Instagram server reply late (take 5min) and in-between your internet cut-off.
- So ISP provide your IP Address to someone else and then after 5 mint. Insta reply and chat go to third person instead of you.
- And Noone want that their personal info. go to someone else so for that we have MAC Address (Medium Access Control)
- MAC Address is a permanent address and every device have their own
- When we send request MAC Address is also go with sender and receiver address.

Sender IP	MAC Add.	Data	Receiver IP	Receiver MAC

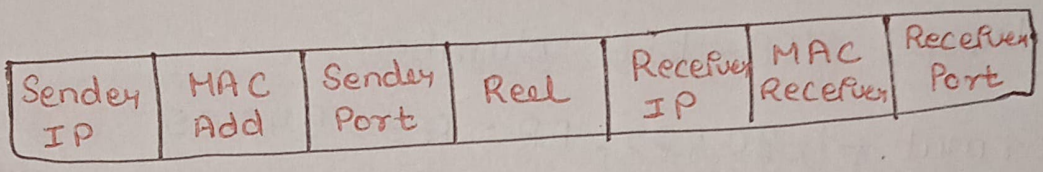
- So if IP Address is same but respone can't go to someone else if MAC Address is different.

Port Number -



We have IP + MAC Address

- There are multiple tabs open in our browser and we watch reels in one tab.
- When the response come from Insta Server with IP + MAC but how it will know on which tab it should go so for that we have Port Number.
- On the basis of Port Number it will decide on which tab it should go



http - 80 } Port Number
https - 443 }
Secure (Message is hidden)

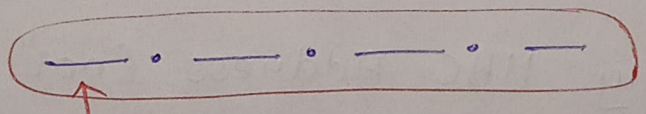
Hyper Text Transfer Protocol

How IP Address looks like?

- 32 bit Number (IPV4)

12.34.9.8 → 0.0.0.0 – 255.255.255.255

Range



→ Format

8bit

00000000 → lowest

11111111 → highest

2^{32} = 4.3 Billion ← We can allocate to 4.3 billion devices

But we have more than 4.3 billion devices so they introduce IPV6 – 128 bit Number

2^{128} → IP Address

Why they don't take 2^{64}?

- They think of future that 2^{64} may be become less for the devices in future so they take 2^{128}.

format - 2401 : 4900 : 1c75 : d88c : 6981 : 6f4e : 13e7 : b473

(Hexadecimal)

MAC Address: 48-bit Number

format - i) 3C : 22 : FB : A3 : B4 : C5 (Colon Separated)

ii) hypen-separated (Common on Windows)

3C-22-FB-A3-B4-C5

iii) Period-separated (used by cisco and network gear)

3c22.fba3.b4c5

iv) No separators (less common, seen in software)

3C22FBA3B4C5

Note- We have many MAC Address (not only one)

To see the MAC Address on Windows. Write the command in terminal or Command prompt.

```
ipconfig /all
```

Why we have many MAC Addresses for a single device?

- Because we can send the data in many ways -
  - either through bluetooth
  - USB cable
  - Airdrop (for IOS user)
  - Through port number

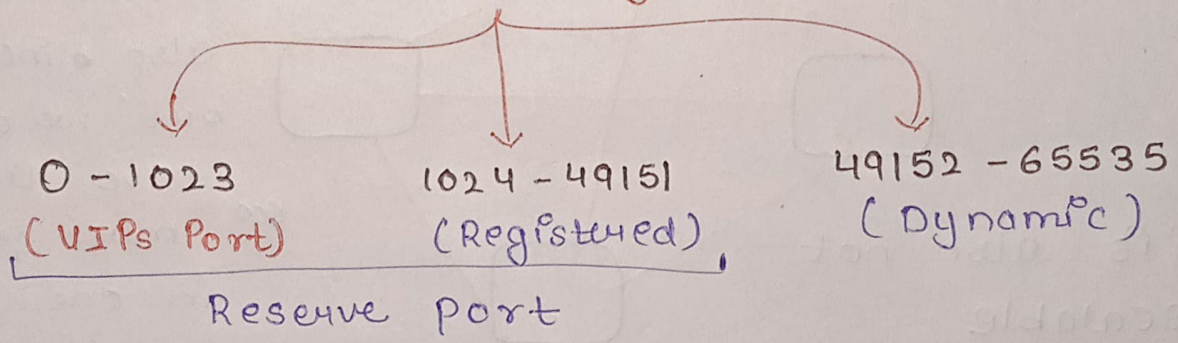
If we have 14 MAC Address then we can send data in 14 ways.

Port Number: 16 bit unsigned (can't be negative)

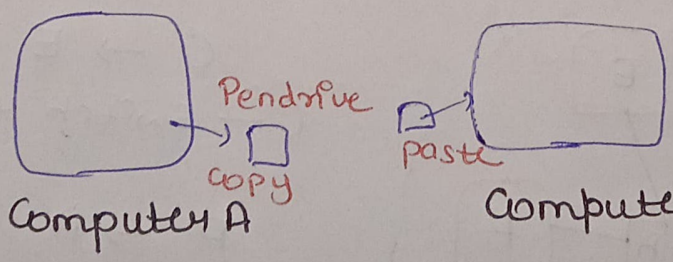
$2^{16} = 65,536$ ← Generate port number

0 – 65,535 ← Range

Three categories



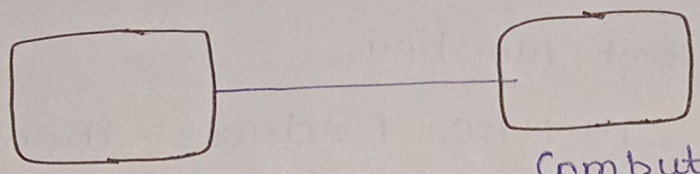
Let's move to history. How all these things come into picture?



- To transfer the data we use pendrive first copy the data from computer A to pendrive and then paste to computer-B

- This is not scalable we have to do things manual.

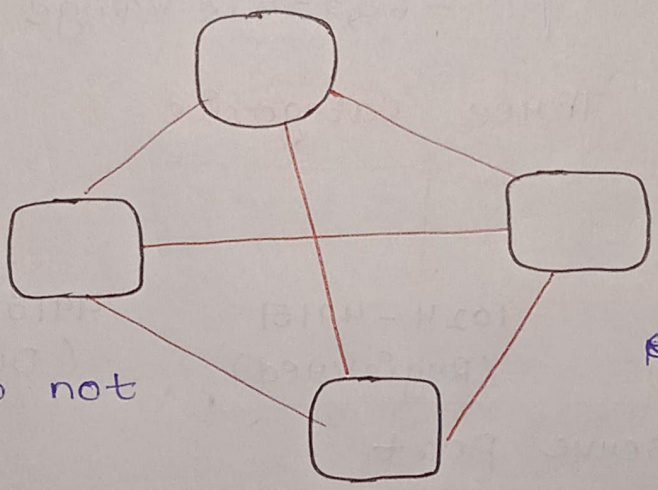
Second - solution - We put wire in between the computer



Computer-A Computer-B

Now they can communicate through wire

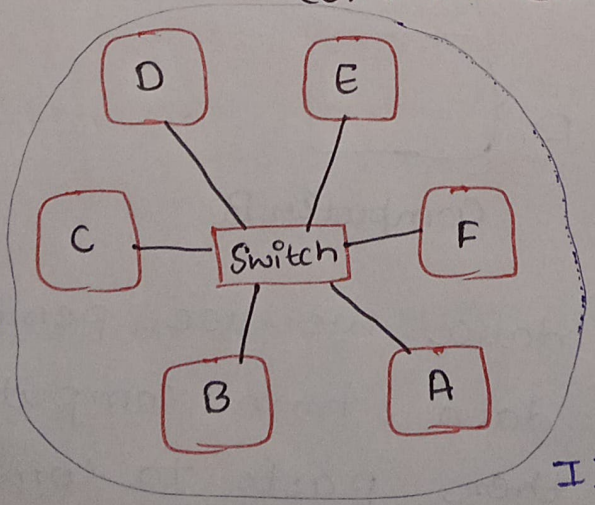
Now Computer increases



PC increases so cables also increases but we don't have that much port in one PC

This is also not a scalable

Third - Solution - We place the switch between the computer so they can communicate through it



Local Network

C → E

C — Switch — E

F → A

F — Switch — A

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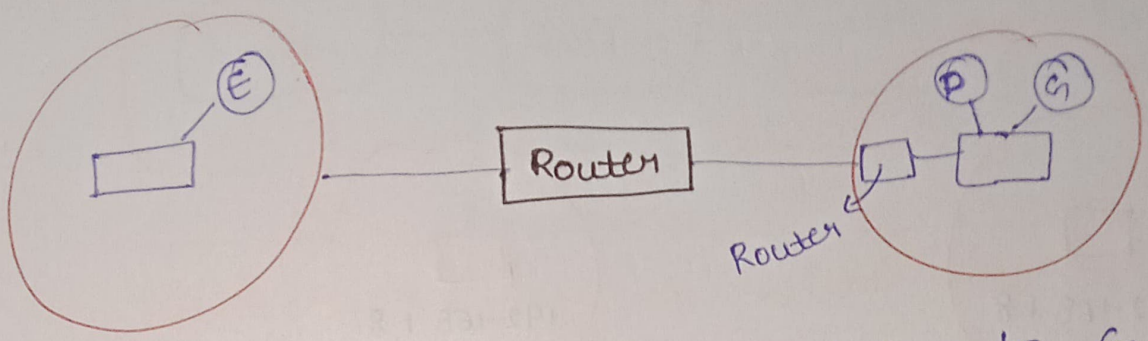


Now E wants to send data to G but both networks are not connected so here we introduce ROUTER to send data

↓

Different different local network ko connect karna

E → G

E — Switch → Router — Router — Switch — G

Internet - Small - Small local network talk with each other, known as internet via router

When we check IP Address through What is my IP Address website then the address that shown on it, is the actual IP Address ?

- The answer is No, because we have two kinds of IP Address

Public

Private

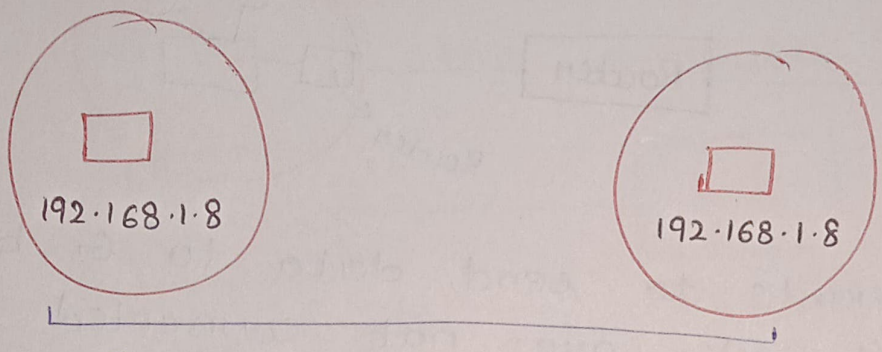
Reserve →

10.0.0.0 – 10.255.255.255
Larged Corporations

172.16.0.0 – 172.31.255.255
medium - sized

192.168.00. – 192.168.255.255
Home Networks

- The IP Address which is shown on website is Router Address (Public Address)



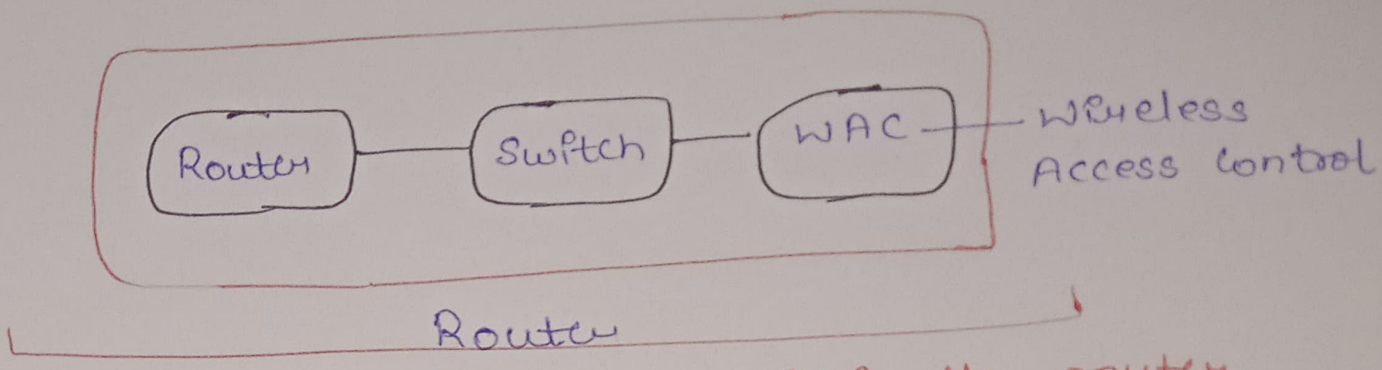
Private Address will be unique in its area (local) but can be same in different local network

- Public IP Address will be unique in Global
- When the message go from from one local to another local then the IP Address change from private to public IP Address.

Why we introduce private IP Address?

- Because in that time there are only 4.3 billion (IPv4) devices can connect so they found a solution that they will give the private IP Address to within the local network. And unique address to (Public IP) router of that network.

But we never see the switch in home or outside the home we only see router why?

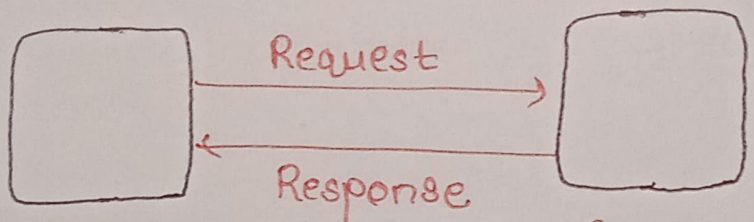


Switch is present within the router

- Within the local network we can transfer the data with the help of MAC Address

What is Web Development?

- Creating website or web application



Client (which ask for data)

Server (which serve data)

When we ask for coderarmy website then it will return three files (HTML, CSS, JS)

- Content (which can be read)
- Styling (looks beautiful)
- Logic (Brain Introduce)