-> It is a software assigned address that uniquely identifies a device a network.

-> In networking, this address is called the IP Address (Internet Protocol).

-> It's a dynamic address that changes every time we are connected to a certain network.
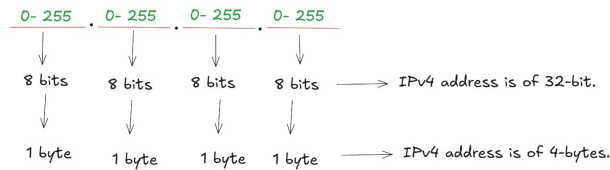
Types of Logical Addresses:

1. IPv4   2. IPv6
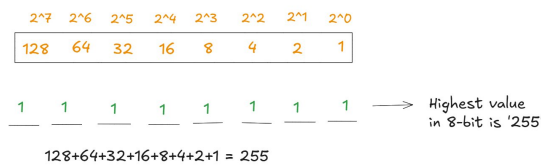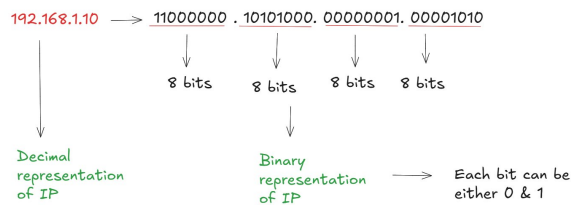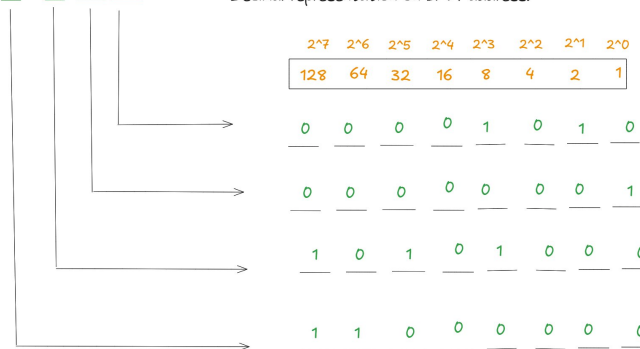
IPv4 (Internet Protocol Version4)

-> It is a 32-bit protocol.

-> The address is divided into 4 sections & each sections are divided by periods(.), eg:

192.168.1.10 $\longrightarrow$ IPv4 Address

-> Each of the section can have numbers from only '0-255'.

0- 255	0- 255	0- 255	0- 255
↓	↓	↓	↓
8 bits	8 bits	8 bits	8 bits	$\longrightarrow$ IPv4 address is of 32-bit.
↓	↓	↓	↓
1 byte	1 byte	1 byte	1 byte	$\longrightarrow$ IPv4 address is of 4-bytes.

192 . 168 . 1 . 10 $\longrightarrow$ Decimal representation on IPv4 address.

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	64	32	16	8	4	2	1

| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

| 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |

| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

192.168.1.10 $\longrightarrow$ 11000000 . 10101000 . 00000001 . 00001010

↓ 8 bits   8 bits   8 bits   8 bits

↓

Decimal representation of IP

Binary representation of IP $\longrightarrow$ Each bit can be either 0 & 1

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	64	32	16	8	4	2	1

| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | $\longrightarrow$ Highest value in 8-bit is '255'

128+64+32+16+8+4+2+1 = 255

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\longrightarrow$ Lowest value in 8-bit is '0'
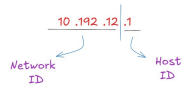
192. 249. 254. 10 ✓

255.255.255.255 ✓

192.315.24.10 ✗

Total number of values = 2^n (where n = total number of bits = 8+8+8+8 =32)

= 2^{32}

= 4294967296 = 4.3 billion = Total no. of IPv4 address we can have.

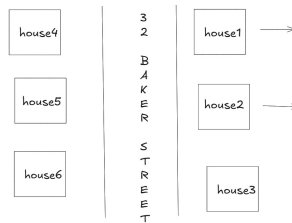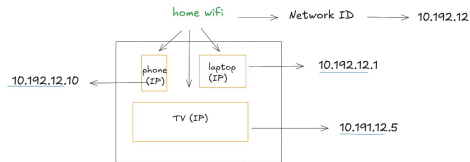10.192.12.1 $\longrightarrow$ 00001010 . 11000000 . 00001100 . 00000001

10 .192 .12 .1

Network
ID

Host
ID

Network ID:

Host ID:

→ Identifies the specific devices inside that network.

→ Host ID should be unique.

home wifi → Network ID → 10.192.12

phone (IP)   laptop (IP)   → 10.192.12.1

10.192.12.10 ←

TV (IP)   → 10.191.12.5

house4   3 2   house1 →
          B
house5   A   house2 →
          K
          E
          R
house6   S   house3
          T
          R
          E
          E
          T

Subnet

Subnet -> Sub - networking

→ A subnet is a smaller part of a large network. It is basically dividing one big network into smaller section.

sub-net1   company wifi

Financial   Devs   TE
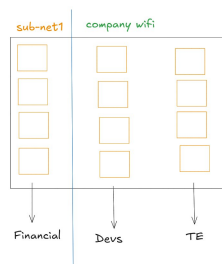
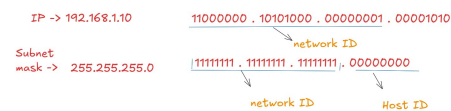→ The process of breaking down a large network into smaller parts, is called as 'Subnetting'.

→ This is achieved by a concept called as 'Subnet Mask'.

Subnet Mask:

→ It is 32-bit number that divides an IP address into 2 parts:

i. Network ID
ii. Host ID

→ It tells us the computer, which portion if IP address belongs to network & which portions refers to the host address/device.

IP -> 192.168.1.10   11000000 . 10101000 . 00000001 . 00001010

network ID

Subnet
mask -> 255.255.255.0   11111111 . 11111111 . 11111111 . 00000000

network ID   Host ID

→ All the sections having all the 1's shows the network ID/bits & 0's shows the host ID/bits.

Network bits -> 24 bits
Host bits -> 8 bits

IP -> 172.16.1.10

Subnet
mask -> 255.255.0.0

network ID