Computer Network

IP Address : Internet Protocol Address

- IP is a logical address which is used to establish communication

Version

- IPV4 (32 bit)
- IPV6 (128 bit)

8bit octant

8bit	8bit	8bit	8bit

Type of IP

(1) Private IP

- for Communication in the LAN environment.
- Provided by IANA. (Internet Assigned Number Authority)
- Free of Cost.

Private IP Range is

- CLASS A: 10.0.0.0 (10 = NW) to 10.255.255.255
- CLASS B: 172.16.0.0 (16 = NW) to 172.31.255.255
- CLASS C: 192.168.0.0 to 192.168.255.255

172.16 ⋮ 172.31 } 16 Private N/W

# of Private Network in

- CLASS A : 1
- CLASS B : 16
- CLASS C : 256

(2) Public IP.

- for Communication in the Internet environment
- Provided by ISP (Internet service Provider)

NAT (Network Address Translation) : that Convert the Private IP into Public IP when Packet is going Outside the Network.

that Convert Public IP into Private IP when Packet is Coming Inside the Network.

Representation of IP

IPV4: 32bit ⇒ | 8bit | 8bit | 8bit | 8bit |

① Decimal Representation / Dotted Decimal

② Binary Representation

① **Decimal Representation** : In which IP is Represent in a Decimal Number.

| 8bit | 8bit | 8bit | 8bit |

eg (11).5.6.9

② **Binary Representation** :- In which IP is Represent in the form of 0's & 1's.

00001011 . 00000101 . 00000110 . 00001001
11 5 6 9

IP has 2 parts

| 8bit | 8bit | 8bit | 8bit |

Network Part	Host Part
Nid	Host id

① Network Part

② Host Part

① **Network part** :- Nw part means from where we are getting Network

② **Host Part** :- from where we are Connecting the Host

IPV4 ⇒ 32bit ⇒ | 8bit | 8bit | 8bit | 8bit |

↳ $2^8 = 256$ [0-255]

8421
1000 → 8
1100 → 12
1110 → 14
1111 → 15

IPV4

1 — 128
11 — 192
111 — 224

200
128 64 8
11001000

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 0 0 0 0 0 0 0 → 128
1 1 0 0 0 0 0 0 → 192

11 — 192

111 — 224

1111 — 240

11111 — 248

111111 — 252

1111111 — 254

11111111 — 255

11000000

1 0 0 0 0 0 0 0 → 128

1 1 0 0 0 0 0 0 → 192

1 1 1 0 0 0 0 0 → 224

1 1 1 1 0 0 0 0 → 240

1 1 1 1 1 0 0 0 → 248

1 1 1 1 1 1 0 0 → 252

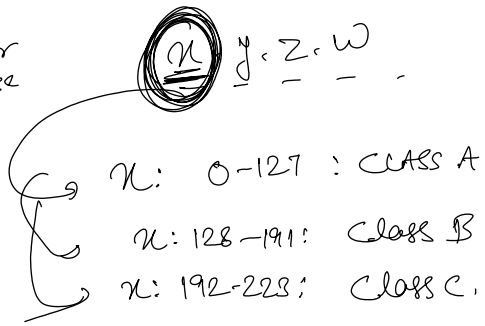
1 1 1 1 1 1 1 0 → 254

1 1 1 1 1 1 1 1 → 255

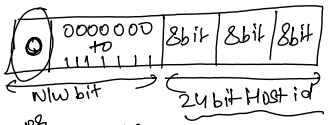
11111111 → 255

Classes of IP

1. CLASS A [0-127] (1-126) [1 Octave Nid, 3 octave Host id] ⇒ 8bit N/w & 24bit Host
2. CLASS B [128-191] [2 Octave Nid, 2 Octave Hid] ⇒ 16bit N/w & 16bit Host
3. CLASS C [192-223] [3 Octave Nid, 1 Octave Hid] ⇒ 24 bit N/w & 8bit Host.
4. ~~CLASS D [224-239]~~ Multicasting
5. ~~CLASS E [240-255~~ Reserved for future purpose



CLASS A [0-127]



128 64 32 16 8 4 2 1

0 0000000 → 0

0 1111111 → 127

$\#$ of Network $= 2^{8-1}$

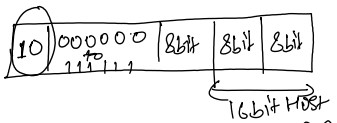
$\Rightarrow 2^7$ N/w Ans

$\#$ Host $= 2^{24} - 2$ (all 0's, all 1's)

Ans

≈ 1.6 Crore Host

CLASS B [128-191]



128 64

10 000000 → 128

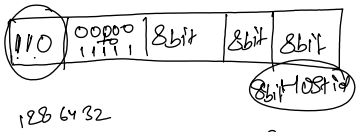
10 111111 → 191

$\#$ N/w $= 2^{16-2} = 2^{14}$ N/w

$\#$ Host $= 2^{16} - 2$ (all 0's, all 1's)

≈ 65534 Host

CLASS C [192-223]



128 64 32

110 00000 → 192

110 11111 → 223

$\#$ N/w $= 2^{24-3}$

$= 2^{21}$ N/w Ans

$\#$ Host $= 2^8 - 2$ (all 0's, all 1's)

254 Host

NOR In Decimal Representation first octant [Left Most] will Decide the type of class.

x.y.z.w

x: 0-127 : CLASS A

128-191 : CLASS B

192-223 : CLASS C.

Note In Binary Representation first few bits (Left most) will Decide the type of class.

if Left most bit

0 → CLASS A

10 → CLASS B

110 → CLASS C

Find the Class, Netid, Host id of the following IP.

Q.1 11.5.9.4

Soln CLASS A

N/w id : 11

Host id : 5.9.4

N/w Address : 11.0.0.0

DBA : 11.255.255.255

0-127 : A
128-191 : B
192-223 : C

Q.2 156.16.9.11

CLASS B

N/w Id : 156.16

Host id : 9.11

N/w Address : 156.16.0.0

DBA : 156.16.255.255

Q.3 221.101.17.11

Host bit

CLASS : C

N/w ID : 221.101.17

Host id : 11

N/w Address : 221.101.17.0

DBA : 221.101.17.255.

NW Addr: 11.0.0.0 → DBA: 11.255.255.255	DBA: 156.16.255.255	DBA: 221.101.17.255

Why -2 in Host ← all 0's → NW Addr
all 1's → DBA

Note: for a Network Address all Host bits are 0's &
for a Direct BroadCast Address [DBA] all Host bit 1's.

11.5.9.4
24bit

00001011 . 00000101 . 00001001 . 00000100

NW Addr: 00001011 . 00000000 . 00000000 . 00000000 : 11.0.0.0

DBA: 00001011 . 1111 1111 . 1111 1111 . 1111 1111 ⇒ 11.255.255.255