

# IP Addressing

[09-08-2025]

# Host → (Client, Router, Server)

# ২টা computer connect করার পথ, উভয় logical.n

Connection এর জন্য IP Address লাগু।

IP Address / Logical Address =

Network Address + Host Address

# একটি Network এর বেতে multiple Host

Example:

[1000 pc] VAP এর বেতে 1000 pc এর

প্রতিটি Host Address [VAP এর Server] এর জন্যে ইন্ডেক্স

Network Address.

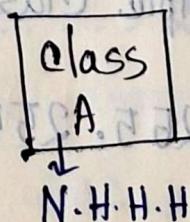
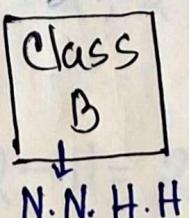
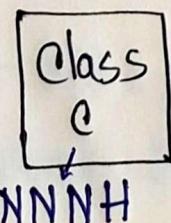
→ Host Address

IP Address :

# has 32 bit.

(~~total allocation~~)  $\frac{32 \text{ bit}}{8 \text{ bit}} = 4$  .  $\frac{8 \text{ bit}}{8 \text{ bit}} = 1$  .  $\frac{8 \text{ bit}}{8 \text{ bit}} = 1$  .  $\frac{8 \text{ bit}}{8 \text{ bit}} = 1$

Classful IP Addressing:



Class 'B': (can connect 256 host)  $\text{IP} \rightarrow \text{NNNNH}$

N.N.N.0  $\rightarrow$  Network Address  
 N.N.N.255  $\rightarrow$  Broadcast Address

$\rightarrow$  First IP Address or 1st Address

# Have 256 IP's from which we can connect,

$$2^8 - 2 = 254 \text{ (connectable host)}$$

192.168.10.1  
 192.168.10.3

Network Address

Subnet Mask

larger network cast तरीके में Logical Segment वर्गीकरण (Logical segment of a logical segment)

Network Address = 1 and Host Address = 0

Subnet of Class-C: Network address 24 bit

11111111.	11111111.	11111111.	00000000.
255	255	255	0

Subnet mask = 255.255.255.0

Class "B": IP  $\rightarrow$  N.N.H.H

$$\text{No of host} = 2^{24} - 2 = 2^{8 \times 2} - 2 = 65534 \text{ (connectable Host)}$$

↪ Class A, Multiple class use करने से IP अलग होता है

Subnet mask = 255.255.0.0

H.H.H.H

220/0  
H.H.H.H

220/0  
H.H.H.H

Class - "A":  $[IP \rightarrow N.H.H.H]$   $\rightarrow$  Broadcast =  $1^{\text{st}} \text{ bit} - 1^{\text{st}} \text{ bit}$   $\rightarrow$  255

No of host =  $2^H - 2 = 2^{3 \times 8} - 2 = 16 \text{ million.}$   
0000 0000 . 0001 1111 . 1111 1111 . 1111 1111 = decreasing bandwidth

Subnet Mask: 255.0.0.0

0.8.0.0 (07-08-25)

# एक device connect करते हैं एक Network में

अन्य उसी message से अक्षित,  $2^8 = 256 - 2 = 254$  =  $1^{\text{st}} \text{ bit} - 1^{\text{st}} \text{ bit}$

There are three type of message transfer mechanism.

# Unicast: One to One

feast 0000 = EEE.E

# Multicast: One to group / many

# Broadcast: One to all

0.8.0.0.0.0.0 = feeb02

### Example:

1. OSE = 2000 Host [Always Broadcast way]

Here if we want to connect in class-C, it will take 7-8 net. so, we have to use class-B, so will create 65536 message and sent it to all. in this case,  $(65536 - 2000) = 63536$  will not utilize so, it will increase traffic.

To solve this we use VLSM (variable length subnet Mask)

manually,  $2^0 = 1, 2^1 = 2, 2^2 = 4, \dots, 2^{10} = 1024, 2^{11} = 2048$

Host bit = 11

Network bit =  $32 - 11 = 21$  bit

IP  $\oplus$  32 bit - Host bit = Network bit

Subnet mask =  $\frac{1111111}{255} \cdot \frac{1111111}{255} \cdot \frac{1111000}{248} \cdot \frac{0000000}{0}$

$(255 - 248) = 7$  bits = 7 host bits

$(255 - 248) = 7$  bits = 7 host bits

$(255 - 248) = 7$  bits = 7 host bits

2. CEO 1500 host

Host bit = 11 bit

Network bit =  $32 - 11 = 21$  bit

Subnet =  $\frac{1111111}{255} \cdot \frac{1111111}{255} \cdot \frac{1111000}{248} \cdot \frac{0000000}{0} = 255 \cdot 255 \cdot 248 \cdot 0$

3. EEE = 1200 host

Host bit = 11 bit ; Network bit =  $32 - 11 = 21$  bit

Subnet =  $255 \cdot 255 \cdot 248 \cdot 0$

4. Pharmacy of 1000 host  $2^{10} = 1024$

Host bit = 10 bit ; Network bit =  $32 - 10 = 22$

Subnet mask =  $\frac{1111111}{255} \cdot \frac{1111111}{255} \cdot \frac{1111000}{248} \cdot \frac{0000000}{0} = 255 \cdot 255 \cdot 248 \cdot 0$

5. English of 100 host  $2^7 = 128$

Host bit = 7 bit ; Network bit =  $32 - 7 = 25$  bit

Subnet mask =  $255 \cdot 255 \cdot 255 \cdot 10000000 = 255 \cdot 255 \cdot 255 \cdot 128$

6. BBA of 64 host

Host bit = 6 bit ; Network bit =  $32 - 6 = 26$  bit

Subnet Mask =  $255 \cdot 255 \cdot 255 \cdot 128$

# we design classless internetwork routing (CIDR) using with VLSM.

### CIDR:

Base / Network Address :  $10.10.0.0/16$   $\rightarrow$  Network bit

Package  $\Rightarrow$  (Network Address), IP Address (First and Last host),

↓  
have to find.  $\downarrow$  Only provided Subnet mask, Broadcast Address.

### Example 1:

Class-C  $\Rightarrow$   $192.168.5.0/24$   $\rightarrow$  Network Address

First host  $\Rightarrow$   $(IP + 1) \Rightarrow 192.168.5.1$

Subnet mask  $\Rightarrow$   $255.255.255.0$

Broadcast Address  $\Rightarrow$   $192.168.5.255$

Last host  $\Rightarrow$   $(Broadcast - 1) \Rightarrow 192.168.5.254$

Example 2 Base =  $10.10.0.0/21$  Example

First host =  $10.10.0.1$

Subnet mask =  $255.255.252.0$

Broadcast =  $10.10.10.255$  Base in binary  
Binary  
 $10.10.10.00000000.00000000$   
 $7 \rightarrow 11111111 \rightarrow 255$   
 $11 \text{ bits} + (\text{host bit})$

SD =  $10.10.7.255$

Last host =  $10.10.7.254$

JAB-5 → 320

10/08/25

The Types of IP address

# Public IP Address : This can be accessed from anywhere in the world.

# Private IP Address : This is assigned for local network.

Class	Private IP	Public IP
Class A	10.0.0.0 to 10.255.255.255	1.0.0.0 to 9.255.255.255 10.0.0.0 to 126.255.255.255
Class B	172.16.0.0 to 172.31.255.255	128.0.0.0 to 172.15.255.255 172.32.0.0 to 191.255.255.255
Class C	192.168.0.0 to 192.168.255.255	192.0.0.0 to 192.167.255.255 192.169.0.0 to 223.255.255.255

# [10. - . - . - /19] → base address full 16 bits

Base Address

IP address consider 30 bits, 7 bits

Base Address 7 bits 256

Example 9

Find the following requirement of [192.168.0.0/24]

# CSE = 100

# BOA = 125

# Pharma = 70

# EEE = 80

# CE = 15

# Eng = 62

Base Address

BOA = 125

CSE = 100

EEE = 80

Pharma = 70

Eng = 62

CE = 15

[DC-Subnet] CSE & EEE

NAME	Host Requirement	Network Address	Subnet Mask	First Host	Last Host	Broadcast Address
BBA	125 (7)	192.168.0.0/25	255.255.255.128	192.168.0.1	192.168.0.128	192.168.0.127
CSE	100(7)	BA(CSE)+1 → 192.168.0.128/25	255.255.255.128	192.168.0.129	192.168.0.254	192.168.0.255
EEE	80(7)	BA(EEE)+1 → 192.168.1.0/25	255.255.255.128	192.168.1.1	192.168.1.126	192.168.1.127
Pharma	70(7)	192.168.1.128/25	255.255.255.128	192.168.1.129	192.168.1.254	192.168.1.255
ENG	62(6)	192.168.2.0	255.255.255.192	192.168.2.1	192.168.2.62	192.168.2.63
CE	15(5)	192.168.2.64/27	255.255.255.224	192.168.2.65	192.168.2.94	192.168.2.95

$b_{\text{host}} = 8 = 2^3 - 1$

BBA → 125 →  $2^7 = 128$  ∵ Host bit = 7

$\frac{1111111}{255}, \frac{1111111}{255}, \frac{1111111}{255}, \underline{10000000} \leftarrow \text{Subnet mask}$

Broadcast Address → 192.168.0.01111111

CSE →

BA → 192.168.0.10000000  
 $\frac{1111111}{255}$

ENG → Host Bit = 6

255.255.255.11000000  
 $\underline{192}$   
 192.168.2.00000000  
 $\underline{111111}$   
 63

CE →

255.255.255.11100000  
 192.168.2.01000000  
 $\underline{95}$

## CSE 319 [Lecture - 11]

## Example 8

IP: 19.12.15.17 /19 → Network bits

# IP in binary, then Subnet mask in binary,  
then AND AND then the result is Network Address.

IPg 288 14.12.15.17  
SEL L-321 SEL L-321.200 TEC  
PAN P-21

I.P.  $\rightarrow$  00001110 . 00001100 . 00001111 . 00010001

$\text{SubNet} \rightarrow 1111111 \cdot 1111111 \cdot 11100000 \cdot 00000000$

**Mark** **१०** **१०** **१०** **१०** **१०** **१०** **(व) दा**

AND Operation → 00001110 . 00001100 . 00000000 . 00000000

Network / Base Address  $\Rightarrow$  19.12.0.0 [  $32 - 19 = 13 \Rightarrow$  Host Bit ]

111111110000.631.501 ← 255 keyboard  
⇒ 14.12.631.255 ← 329

$\Rightarrow$  14.12.631.255

G E E

00000 111.222.333.444  
100 00000 111.222.333.444  
11111  
00000 0010.2.333.444  
11111

$$\begin{array}{r} 000000001.0.821.821 \leftarrow AB \\ \underline{11111111} \\ \text{संकेत} \end{array}$$