

# IP Addressing

①

Physical Addressing

↓  
MAC Address.  
↓  
48 bits

Logical Addressing

Eg 10, Vasthapur, Albad,  
Gujarat, India.

IPv4

IPv6.

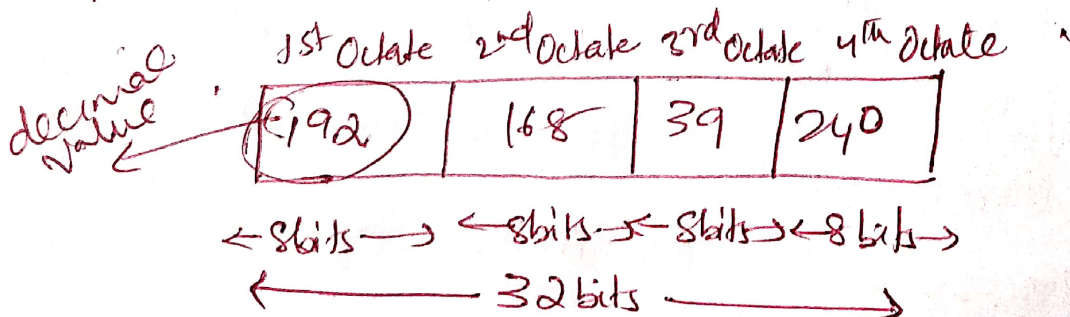
Public  
IP

Private  
IP.

IPv4

- 32 bit Logical address.
- 4 Octet
- 0-255 in each octate.

IP address → Network ID + Host ID



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## Classes

Class A  $\rightarrow$  1.0.0.0 to 126.0.0.0

Class B  $\rightarrow$  128.0.0.0 to 191.255.0.0

Class C  $\rightarrow$  192.0.0.0 to 223.255.255.

Class D  $\rightarrow$  224.0.0.0 to 239.255.255.255

Class E  $\rightarrow$  240.0.0.0 to 255.255.255.255

Multicasting  $\rightarrow$  class D

Research  $\rightarrow$  class E

Loopback Address  $\rightarrow$  127.0.0.0

$\hookrightarrow$  The IP address range 127.0.0.0 to 127.255.255.255 is reserved for loopback. Loopback IP address is managed entirely by and within the O.S. These addresses enable the server and client processes on a single system to commu

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with each other. When a process creates a packet with destination address as loopback address, the OS ~~looks~~ loops it back to itself without having any interference of NIC.

The address is mostly used for testing purposes

For eg If a host machine can successfully ping 172.0.0.2 or any IP from loopback range, implies that TCP/IP on the machine is successfully loaded and working. ~~For eg~~

For eg

Cmd →

C:\Users\Administrator> 172.0.0.3

Pinging 172.0.0.3 with 32 bytes of data:

Reply from 172.0.0.3 bytes: - - -

Reply from - - -

Reply from - - -



A loopback address has been built into the IP domain system in order to allow for a device to send and receive its own data packets.

USES :-

Loopback address can be useful in various kinds of analysis like testing & debugging

In IPV4, 172.0.0.1 is the most commonly used loopback address. however this range can be extended upto ~~127.0.0.1~~ ~~127.0.0.255~~  
127.255.255.255

Q1. 137.20.20.10 is IP address of which class.

Ans Class B.

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Q1. 192.168.37.200. Convert this IP address into binary

Ans

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

$$128 + 64 = 192$$

For 192.

128	64	32	16	8	4	2	1
-----	----	----	----	---	---	---	---

1	1	0	0	0	0	0	0
---	---	---	---	---	---	---	---

↓ Binary for 192.

Now for 168.

$$128 + 32 + 8 = 168$$

128	64	32	16	8	4	2	1
1	0	1	0	1	0	0	0

↓ Binary for 168.

for 37.

(6)

128	64	32	16	8	4	2	1
0	0	1	0	0	1	0	1

binary  
for 37

for 200

128	64	32	16	8	4	2	1
1	1	0	0	1	0	0	0

Binary  
Value  
for 200.

So complete address in Binary  $\rightarrow$

~~11000000~~

11000000. 10101000. 00100101. 11001000

192. 168. 37. 200.

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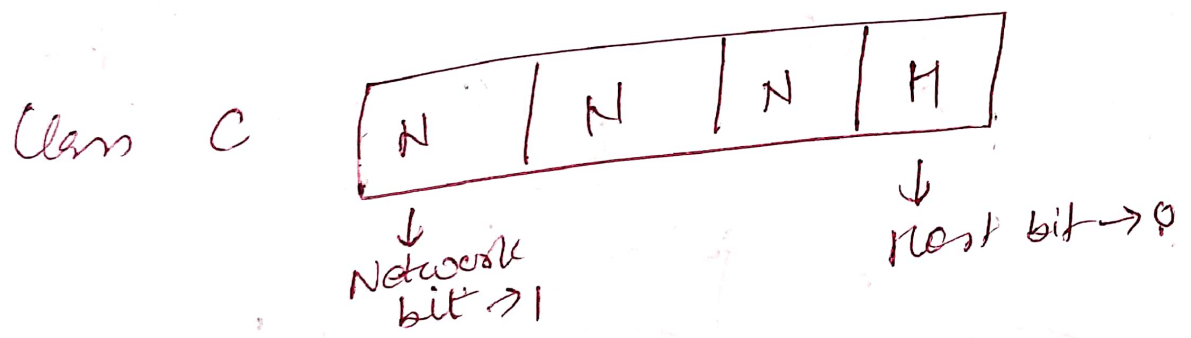
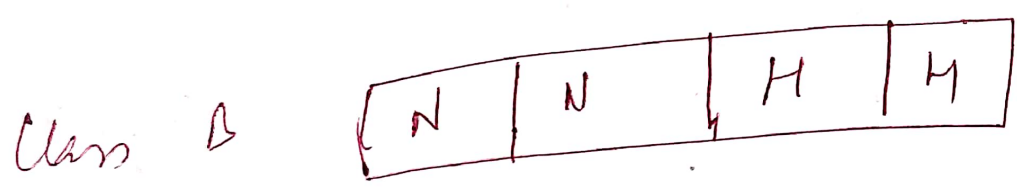
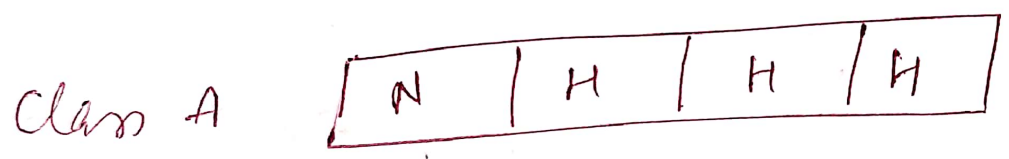
Q2.

201. 100. 10. 0 is the IP address of which class?

Ans

Class C.

How to find Network ID?



Q

115. 10. 0. 15. What is the class & Network ID for this IP.

Ans

class A

Network ID → 115. 0. 0. 0

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Q Find out — Class & Network ID for  
IP address 196.10.10.10.

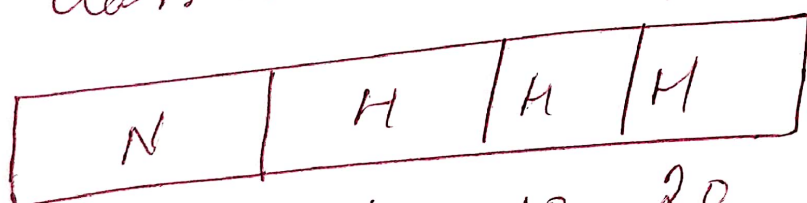
Ans Class C  $\rightarrow$  answer.

Network ID = 196.10.10.0.

Host ID = 10.

Subnetting

Ex 1 115.10.10.20  
class A IP address.



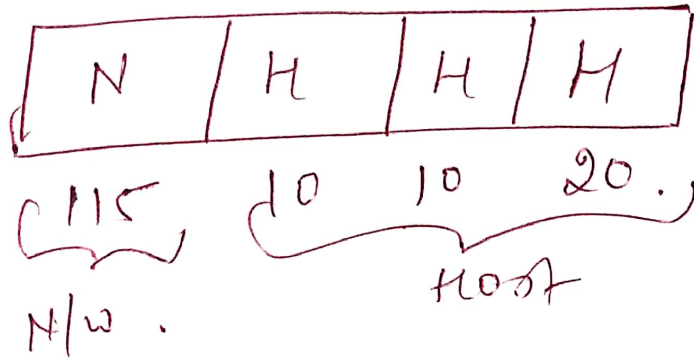
115  
N/w.

10 10 20  
Host—

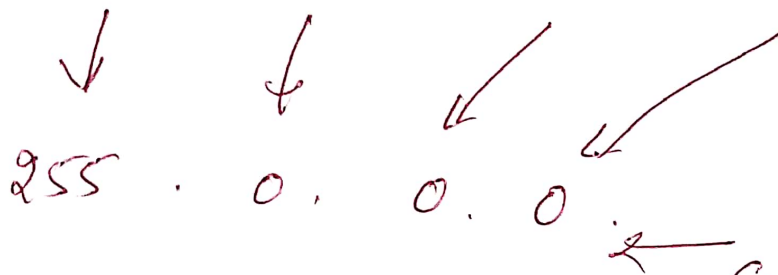
8 bits are  
reserved for  
network in  
class A



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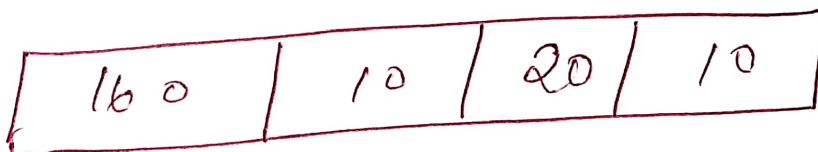
11111111 . 00000000 . 00000000 . 00000000



Subnet Mask  
of Class A

Note: 8 bits for network  
& 24 bits for host

Q2 . 160 . 10 . 20 . 10



11111111 . 11111111 . 00000000 . 00000000

255 . 255 . 0 . 0    ← Subnet Mask  
for class B

16 bits for Network & 16 for Host

Some IPs are common in Colleges & Institutions or in offices like starting with

192.168.0.0

10.0.0.0

172.16. . . .

All these 3 are ranges of private IP.

Class A  $\rightarrow$  10.0.0.0  $\rightarrow$  Private IP.

Reserved for LAN, cannot be taken on internet.

Class B  $\rightarrow$  172.16.X.X to 172.31.X.X

Class C  $\rightarrow$  192.168.0.0 to 192.168.255.255

Private IP ranges of class A, B & C.

## Diff b/w Public & Private IPs

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We need to buy Public IP while that is not the case with Private IP

Q How many Computers can be connected to one network?

Ans

Network ID of class B.

→  $\underbrace{176.10.0.0}_{\text{N/W ID}} \underbrace{0.0}_{\text{Host part}}$

How many IP address I can allocate or how many computers can be connected

Q 150.10.20.30

What is N/W ID & Broadcast ID & no. of usable hosts?

Ans

150.10.20.30.

→ Class B.

→ 150.10.0.0 → Network ID

→ Broadcast ID → give max value to Host ID <sup>(12)</sup>  
 $150.10.255.255$   
↓  
Host part

→ How many usable hosts can be allocated?

we have 16 bits for hosts as it is class B network.

\* No of hosts =  $2^{16} - 2 = 65,534$  IPs  
↓  
can be allocated.

why  $-2$  because 1st IP is N/W ID & last IP is Broadcast ID.

→ Total IPs =  $2^{16}$

\* Network ID represents the whole N/W. Through we can come to know that particular IP belongs to which N/W.

Ex:  $150.10.200.200$  → is the IP of  
 $150.10.0.0$  → Network.



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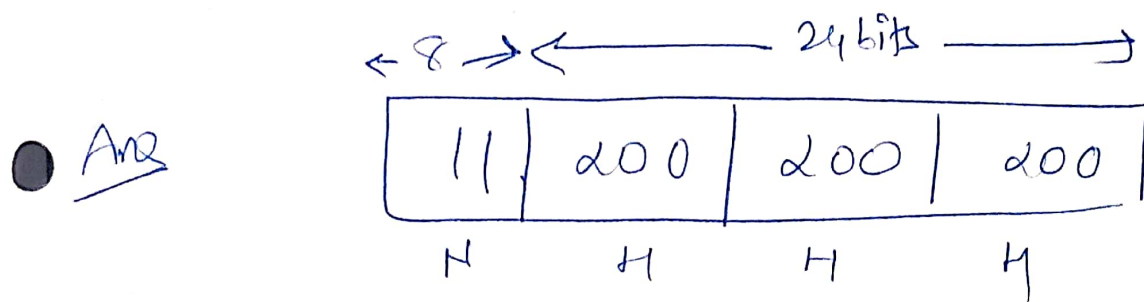
Just like "Arjun" belongs to CSE class.

Q 11.200.200.200.

Find out N/w ID

Broadcast ID

NO of Usable IP addresses?



N/w ID ← 11.0.0.0

Broadcast ID ← 11.255.255.255

No. of Usable IPs. →  $2^{24} - 2 =$

Note:- 0-127 is the part of class A only.  
1.00.0 to 127.0.0.0. theoretically  
but we don't use 127.

Private IP Address and Public IP Address are used to uniquely identify a machine on the internet. Private IP address is used with a local network and public IP address is used outside the network. Public IP address is provided by ISP, Internet Service Provider.

Following are the important differences between Private IP Address and Public IP Address.

Sr. No.	Key	Private IP Address	Public IP Address
1	Scope	Private IP address scope is local to present network.	Public IP address scope is global.
2	Communication	Private IP Address is used to communicate within the network.	Public IP Address is used to communicate outside the network.
3	Format	Private IP Addresses differ in a uniform manner.	Public IP Addresses differ in varying range.
4	Provider	Local Network Operator creates private IP addresses using network operating system.	ISP, Internet Service Provider controls the public IP address.
5	Cost	Private IP Addresses are free of cost.	Public IP Address comes with a cost.
6	Locate	Private IP Address can be located using ipconfig command.	Public IP Address needs to be searched on search engine like google.
7	Range	Private IP Address range:	Except private IP Addresses, rest IP addresses are public.
		10.0.0.0 – 10.255.255.255,	

Sr. No.	Key	Private IP Address	Public IP Address
		172.16.0.0 – 172.31.255.255,  192.168.0.0 – 192.168.255.255	
8	Example	Private IP Address is like 192.168.11.50.	Public IP Address is like 17.5.7.8.