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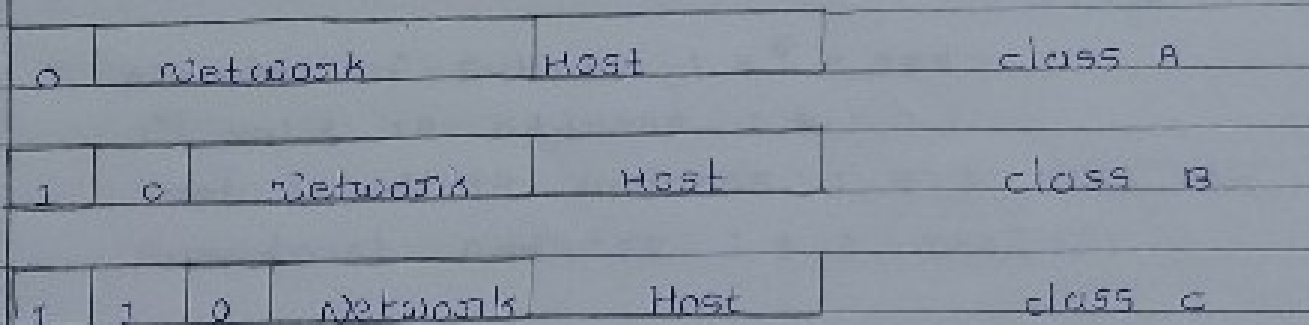
IPV4 Address

classful | classless

class	first octect value
A	0 - 127
B	128 - 191
C	192 - 223
D	224 - 239
E	240 - 255

→ 32 - bit IP Address :-



→ classless Address : represent as a.b.c.d/n
→ Network / host bits are vary (change) according to the users need.
→ First address :- Network Address,
last address : Broadcast Address
→ num of addresses → 2^{hostbits}
→ we can't use first add... & last add... for assign to the end devices.

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(1) Find default subnet masks, network bits, hosts bits, hosts per subnet, no of subnets, subnet number, 1st valid IP address, last valid IP address, and broadcast address.

(i) 8.1.4.5 / 16

class : A [N : 8, H : 24]

Default subnet mask : 255.0.0.0

Network bits : 16

Host bits : 16

Bits borrowed / subnet number : 8

Host per subnet : $2^{hosthit} - 2 = 2^{16} - 2$

$= 65536 - 2 = 65534$

Number of subnet : $2^8 = 256$

1st valid IP Address : 8.1.0.1

Last valid IP Address : 8.1.255.254

Broadcast Address : 8.1.255.255

(ii) 130.4.102.1 / 24

class : B [N : 16, H : 16]

Default subnet mask : 255.255.0.0

Network bits : 24

Host bits : 8

Bits borrowed / subnet number : 8

Host per subnet : $2^{hostbit} - 2 = 2^8 - 2$

$= 256 - 2 = 254$

number of subnet : $2^8 = 256$

1st valid IP address : 130.4.102.1

Last valid IP address : 130.4.102.254

Broadcast Address : 130.4.102.255

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(iii) 130.4.102.1 /22

class : B [N:16 , H:16

Default subnet mask : 255.255.0.0

Network bits : 22

Host bits : 10

Bits Borrowed / Subnet number : 6

Host per Subnet : $2^{hostbit} - 2 = 2^{10} - 2$

$= 1024 - 2 = 1022$

number of subnet : $2^6 = 64$

1st Valid IP address : 130.4.100.1

Last Valid IP address : 130.4.103.254

Broadcast Address : 130.4.103.255

(iv) 199.2.1.100 / 27

class : c [N:24 , H:8]

Default Subnet mask : 255.255.255.0

Network bits : 27

Host bits : 5

Bits Borrowed / subnet number : 3

Host per subnet : $2^{hostbit} - 2 = 2^5 - 2$

$= 32 - 2 = 30$

number of Subnet : $2^3 = 8$

1st Valid IP address : 199.1.1.97

last valid IP address : 199.1.1.126

Broadcast address : 199.1.1.127

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(2) A host in a class C network has been assigned an IP address 192.168.17.9. Find the number of address in the block, the first address in the block, the first address, and the last address.

Given IP Address : 192.168.17.9
class : C [N:24, H:8]
Number of Addresses : $2^{\text{hostbit}} = 2^8 = 256$
First address in the block : 192.168.17.0
Last address in the block : 192.168.17.255
First usable address : 192.168.17.1
Last usable address : 192.168.17.254

(3) An address in a block is given as 185.28.17.9. Find the number of address in the block, the first address, and the last address.

Given IP address : 185.28.17.9
class : B [N:16, H:16]
Number of Address : $2^{16} = 65536$
first address : 185.28.0.0
Last address : 185.28.255.255

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(4) A block of addresses is granted to a small organization we know that one of the address is 205.16.37.39 /28, what is the first address, last address, number of addresses in a block?

Given IP Address : 205.16.37.39 /28
class : C [N:24, H:8]
Number of Addresses : 2^4 = 16
Network bits : 28
host bit : 4
First Address : 205.16.37.032 (00100111 → 00100000)
Last Address : 205.16.37.255/47 (00100111 → 00101111)

(5) Subnet the IP Address 216.21.5.0 into 30 hosts in each subnet. Find class, Default mask, Subnet mask, Bit Borrowed, New subnet mask, No. of hosts & subnet, Network ranges

Host Per Subnet = 30
IP Address : 216.21.5.0
class : C [N:24, H:8]
Default Subnet mask : 255.255.255.0
No. of host per subnet : $30 = 2^{hostbit} - 2$

$32 = 2^{hostbit}$

hostbit : 5

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Subnet mask : 255.255.255.224
Network bits : 27
bit borrowed / subnet Number : 3
Total no. of subnet : $2^3 = 8$
Block size : 256 - 224 = 32

First 2 subnet Ranges :
216.21.5.0 → 216.21.5.31
216.21.5.32 → 216.21.5.63

(6) Subnet the IP address 192.10.20.0 into 52 hosts in each subnet. Find class, Default mask, Bit - Borrowed, new subnet mask, No. of Hosts & subnet, Network Ranges

Hosts per subnet = 52
IP address : 192.10.20.0
class : C [N:24, H:8]
Default subnet mask : 255.255.255.0
No. of host per subnet : $52 = 2^{hostbit} - 2$
$54 = 2^{hostbit}$

Here, $2^h - 2 \geq 52$

if $h = 6$: $2^5 - 2 = 32 - 2 = 30$ (too Small)
if $h = 6$: $2^6 - 2 = 64 - 2 = 62$ (Sufficient)

So, host bits = 6
Network bits = 26

new
Subnet mask : 255.255.255.192
Bit borrowed / subnet number : 2
Total no. of subnet : $2^2 = 4$
Block size : 256 - 192 = 64

Subnet Renges :
192.10.20.0 → 192.10.20.63
192.10.20.64 → 192.10.20.127
192.10.20.128 → 192.10.20.191
192.10.20.192 → 192.10.20.255

(7) Determining the subnet mask for Device A and B :
(a) Device A : 172.16.17.30 /20
(b) Device B : 172.16.25.15 /20

(a) Device A : 172.16.17.30 /20

class : B [N : 16, H : 16]
Default subnet mask : 255.255.0.0
subnet mask → 255.255.240.0
Network bit : 20
Host bit : 12
Bits borrowed : 4

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(b) Device B : 172.16.28.15 /20

class : B (N : 16 , H : 16)
Default subnet mask : 255.255.0.0
subnet mask : 255.255.240.0
Bit borrowed : 4