~~Subnet ID~~ (1 bit) ~~Host ID~~ (9 bit)

Q. For class B find ~~subnet~~ Total subnets, total devices and a subnet mask for subnet ID 2,3, 6, 10.

Class B default mask is,

255.255.0.0

Net ID (16 bit) Host ID (16 bit)

2^{16} dev (65536)

(1) For subnet ID = 2 bits

255.255.0.0

Net ID (16 bit)

00 000000 00000000

Subnet ID (2 bits) Host ID (14 bits)

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② For subnet ID = 3 bits
255.255.0.0
Total subnets = 2^2 = 4 subnets
Total devices = 2^{14} = 16384 dev/subnet
For subnet mask, set subnet ID = 1
11000000 00000000
255.255.192.0 subnet Mask.

② For subnet ID = 3 bits
255.255.0.0
Net ID (16 bits) Host ID (16 bits)
000 00000 00000000
Subnet ID = 3 bits Host ID = 13 bits
Total subnets = 2^3 = 8 subnets
Total devices = 2^{13} = 8192 dev/subnet
For subnet mask set subnet ID = 1
11100000 00000000
255.255.224.0 Subnet Mask.

③ For subnet ID = 6 bits
255.255.0.0
Net ID Host ID
000000 00 00000000
Subnet ID = 6 bits Host ID = 10 bits
Total subnets = 2^6 = 64 subnets
Total devices = 2^{10} = 1024 dev/subnet
For subnet mask set subnet ID = 1
11111100 00000000
255.255.252.0 Subnet Mask

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④ For subnet ID = 10 bits

255. 255. 0. 0

Net ID.

00000000 00000000

Subnet ID - 10 bits Host ID = 6 bits

Total Subnets = 2^{10} = 1024 subnets

Total devices = 2^6 = 64 dev/subnet

for subnet mask set subnet ID = 1

11111111 11000000

255.255.255.192 Subnet Mask.

What is the maximum no of IP addresses that can be assigned to HOST on a local subnet that uses the subnet mask 255.255.255.224.

255.255.255.224

00000000 11100000

$2^5 - 2$ = 30 devices.

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Q.] A company has a network out of which one of the IP address is 165.121.0.1. Administrator is reponsible for creating a subnet and each subnet should provide atleast 900 hosts. What subnet mask meets the requirement for minimum no. of hosts and provides greatest no. of subnets.

Soln:-

IP 165.121.0.1 belongs to class B

∴ Using default mask of class B

255.255.0.0

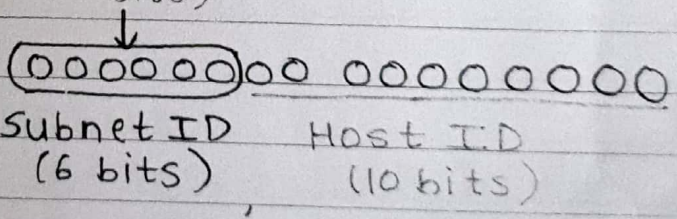
Net ID (16 bits) Host ID (16 bits)

For 900 devices, 10 bits host ID is required

∵ $2^{10} = 1024$

∴ 255.255.0.0

Net ID (16 bits) Host ID (16 bits)



∴ Total subnets = 2^6 = 64 subnets

∴ Total devices = 2^{10} = 1024 devices/subnet

Out of 1024, 900 devices would be used in this network.

To find subnet mask, set subnet ID = 1

11111100 00000000

↓

255.255.252.0

Subnet mask = 255.255.252.0

Q] A network 200.1.2.0 needs to be used for creating 4 subnets and each subnet has 64 ~~devices~~ IPs. Find the range of IP addresses for all 4 subnets.

Soln:-

IP is of class C

Using default mask,

255.255.255.0

Net ID (24 bits) Host ID (8 bits)

↓

00000000

Subnet ID (2bit) Host ID (6 bits)

1st Range 00000000
00111111

2nd Range 01000000
01111111

3rd Range 10000000
10111111

4th Range 11000000
11111111

IP:- 200.1.2.0

1st subnet 200.1.2.0
200.1.2.63

2nd subnet 200.1.2.64
200.1.2.127

3rd subnet 200.1.2.128
200.1.2.191

4th subnet 200.1.2.192
200.1.2.255

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Classless Inter Domain Routing / Classless IP / (CIDR) / Slash Notation

- With classfull addressing the problem is limitation of using IP addresses because class D and E remains unutilized, and even for clas A, B and C net ID is fixed (8, 16, 24).
- With so much demand, network is getting increased and IPs are getting depleted and hence somewhere there was need to handle this problem.

Solution:- CIDR

> Syntax:- a.b.c.d/x
> x: no. of bits in Net ID

Here there is independence of designing network as per the requirement.

eg. 1.2.3.4/8
130.30.30.2/16
200.3.4.5/24
192.168.64.3/20

Q] Find 1st IP and last IP for 200.14.170.92/20

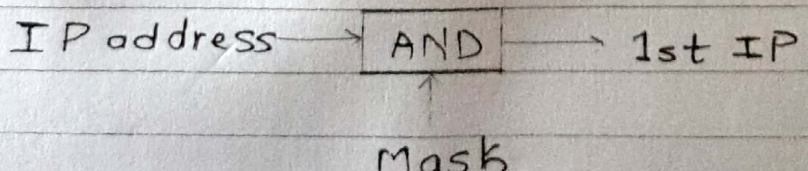
Soln:-

I] Finding mask

Set 1st 20 bits (Net ID) = 1
Set remaining 12 bits (Host ID) = 0

∴ 11111111 11111111 11110000 00000000
∴ Mask 255.255.240.0/20

II] 1st IP



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IP:- 11001000 00001110 10101010 01011100

AND

Mask:- 11111111 11111111 11110000 00000000

11001000 00001110 10100000 00000000

∴ 1st IP:- 200.14.160.0/20

III] Last IP

IP address → OR → Last IP

1st complement of mask

IP:- 11001000 00001110 10101010 01011100

OR

1s complement of mask :- 00000000 00000000 00001111 11111111

11001000 00001110 10101111 11111111

∴ Last IP:- 200.14.175.255/20

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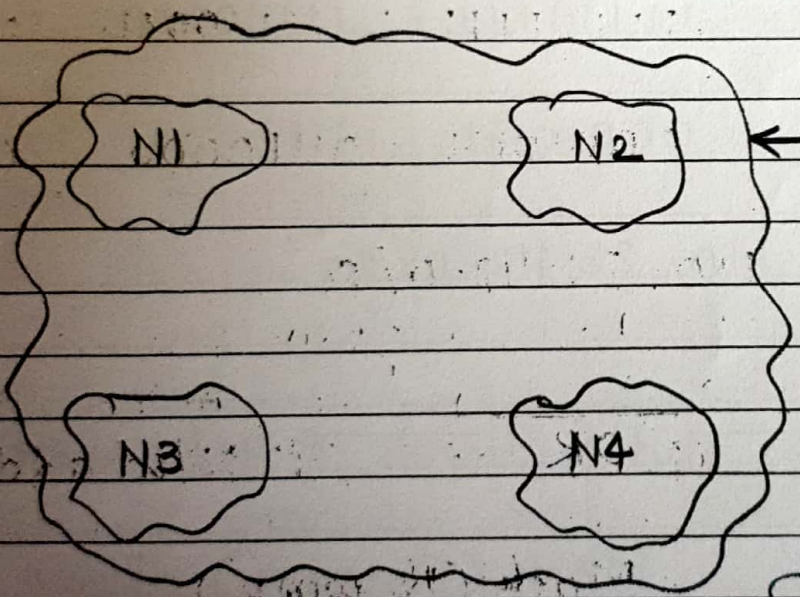
Superneting :-

- An organisatn wants to set up a n/w with 1024 devices.
- It approaches an ISP and request for the same
- An organisatn cannot use class A IP, because it supports 1,67,77,216 devices.
- An organisatn even can't use class B IP because it supports 65536 devices.
- So the only option left is class C address but it only connects 256 devices.
- So, the organisatn set up 4 class C n/w.
- Since this n/w's to the outside world will be viewed as 4 different n/w's, an organisatn takes decision to combine this 4 n/w and form a big supernet. This is called superneting



N1 : 192.168.64.0/24
N2 : 192.168.65.0/24
N3 : 192.168.66.0/24
N4 : 192.168.67.0/24

Jitne n/w to be combined utne supernet ke values

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Now IP address is divided into parts :-
(1) NET ID
(2) Supernet ID
(3) Host ID.

Here supernet ID is derived from NET ID.

Mask 255.255.255.0/24

Net ID (24 bits) Host ID (8 bits)

2 bits supernet ID

Net ID (22 bits)

To find supernet Mask set supernet ID = 0.

11111111 11111100

255.255.252.0/22

1st IP of supernet : 192.168.64.0 /22

last IP of supernet : 192.168.67.0 /22