Problems with Classfull Addressing

Issue #1 :- Lack of Internal flexibility

N	H		N/W	Hosts	Total
8	24	A	$2^7 = 128-2 = 126$	$2^{24} = 16777216$	$2^{24} \times 126$
16	16	B	$2^{14} = 16384$	$2^{16} = 65536$	65536×16384
24	8	C	$2^{21} = 2097152$	$2^8 = 256$	

Solution: Subnetting

(1) In class the number network are less but each n/w contain a large number of IP Addres / Hosts.
(2) In classB Moderate number of N/W & IP Addres.
(3) In Class C number of N/w are very large & IP addresare less.

In classful Addreing a complete n/w to any organization

e.g. 100000 → (A) 16777216

Issue #2 :→ Inefficient use of Addres space.

Solution: IPv6

wastage of addres.

Issue #3 :- More routing table entries & this will create an explosion in the routing table.

Solution: NAT Private & Public

SUBNETTING

Subnetting is a process of dividing a single network into smaller subnets.

N/W Id → N/W Id. (Subnets), N/W Id (Subnets)

Process of subnetting

N — 8 — borrowed 2 — H — 24 — 10 — 22 — $2^{22} = 4194304$ — $2^2 - 4$

	N	H	
A	8	24	borrowed
B	16	16	
C	24	8	

10 → (22)

$2^2 = 4$

16777216

* Borrow host bits & convert them bits to N/w bits.

Example :- An organisation need to setup a network of (40) hosts in its office. ISP provide the a class C network having N/w Id 192.168.10.0/24. Organisation wants only the number of address there are sufficient to satisfy its requirement. ISP decided to provide a subnet of N/w to this organisation. You have help the ISP to divide the N/w into a subnet that satisfy the requirement of the organisation & there should be high wastage of IP Address.

Class C 192.168.10.0 256 − 40 = 216 waute.

Step-1 :- Identify the required number of Host bits to support the requirement of 40 (minimum) system in the n/w. DN=24 DH=8

Host(n)	0	1	2	3	4	5	6	7
Hosts (2^n)	1	2	4	8	16	32	64	128

40

Required number of Host bits H = 6

Step-2 :- Find the number of host bits borrowed & converted to the network bits.

N = DH − H = 8 − 6 = 2

Step-3 :- Find the total number of Network bits

TN = DN + N = 24 + 2 = 26

126

$TN = DN + N = 24 + 2 = 26$ [129]

Step-4:- Calculate the Subnet Mask of each subnet.

11111111 . 11111111 . 11111111 - 11000000

128
64
192

∴ 255 . 255 . 255 . 192

Step-5:- Total number of subnets $= 2^N = 2^2 = 4$

Step-6:- Total number of Hosts/subnet $= 2^H = 2^6 = 64$

Step-7:- Range of subnets.

Subnet	N/w Id	Start IP	End IP	B/c Id
1	192.168.10.0	192.168.10.1	192.168.10.62	192.168.10.63
2	192.168.10.64	192.168.10.65	192.168.10.126	192.168.10.127
3	192.168.10.128	192.168.10.129	192.168.10.190	192.168.10.191
4	192.168.10.192	192.168.10.193	192.168.10.254	192.168.10.255

* To calculate the N/w Id of next subnet

DSM 255.255.255.0 ← 256 − 192 = 64

CSM 255.255.255.192

192