CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

Lecture No-23

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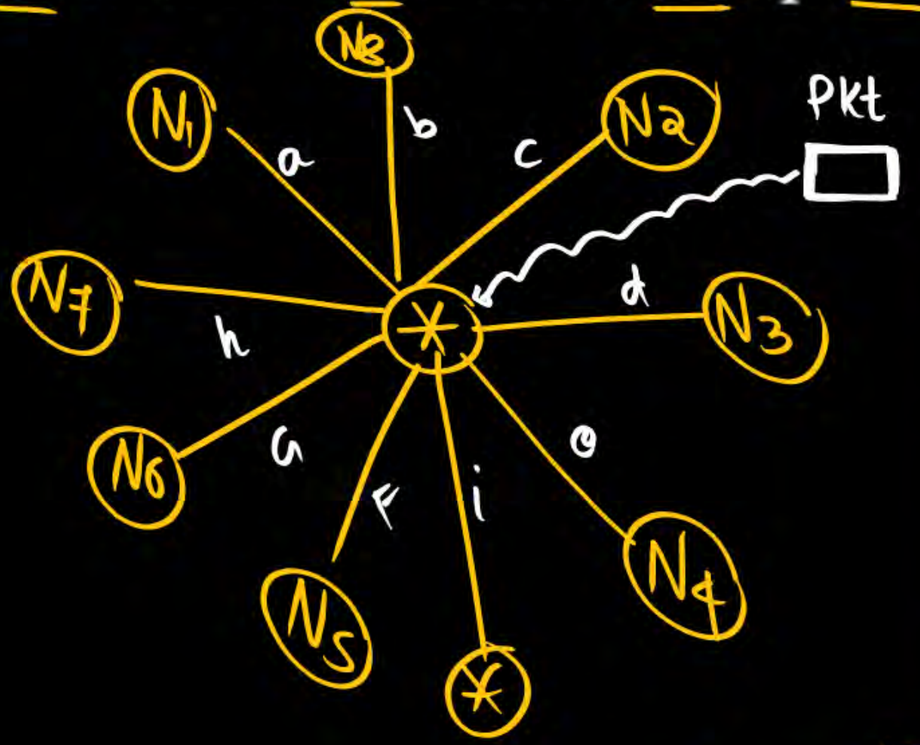
Topics to be covered..

Supernetting
in
Classless addressing

Supernetting or Aggregation

The process of combining two or more network to get a single network is called as supernetting.



Routing table

NID	S.M.	Interface
—	—	a
—	—	b
—	—	c
—	—	d
—	—	e
—	—	F
—	—	g
—	—	h
0.0.0.0	0.0.0.0	i

Default entry

Advantage of Supernetting

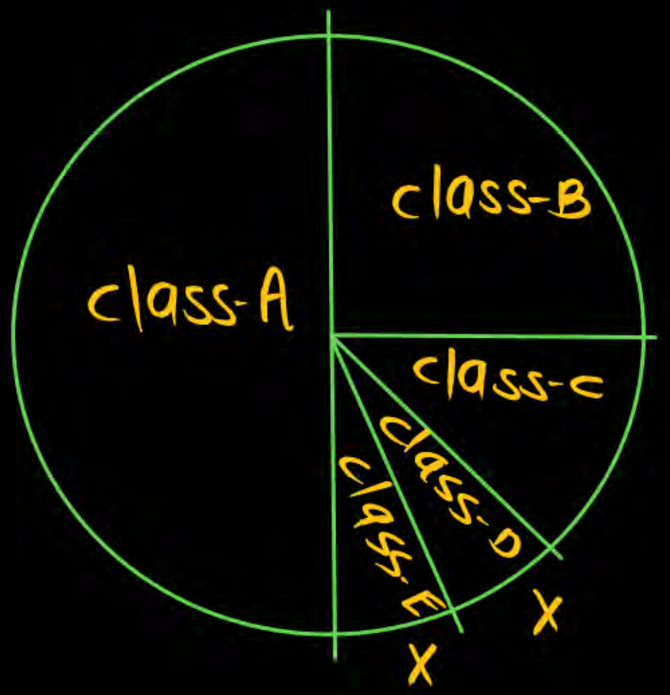
a. Super netting Reduce Routing table entry.

b. Router will take less time for processing the packet.

c. It improve flexibility of IP Address Allotment i.e. If some one required 500 Address then we have no need to purchase class B network we can combine two class C network.

classFul Addressing

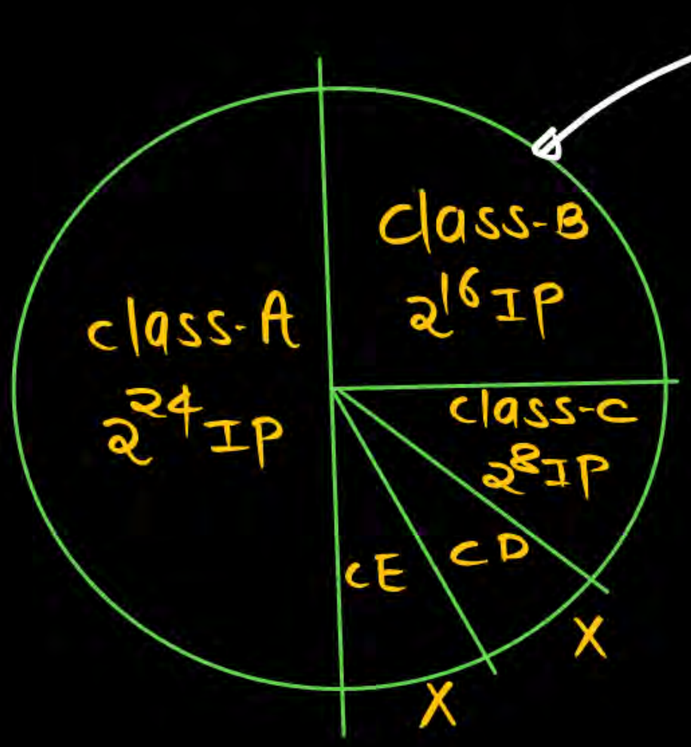
2^{32}



classA → No. of IP Addresses in one N/W = 2^{24}

class-B → " " " " " " " = 2^{16}

class-C → " " " " " " " = 2^{8}



X = 500 IP Addresses

IP Addresses wasted = $2^{16} - 500$

$= 65,536 - 500$

$= 65,036$

$2^9 = 512$ IP Addresses

✓ Possible

Not possible

Rules of Supernetting

a. Network ID must be contiguous
b. Size of the Network must be same & No. of Network must be in a power of 2
c. First Network ID must be div. by tota size of the supernet.

or

First IP Address must be div by total size OF supernet

Ex – 1

HID

N_1: 128.56.24.$\bar{0}$/24, NID = 24 bit, HID = 8 bit, No. OF IP Addresses = 2^8

N_2: 128.56.25.$\bar{0}$/24, NID = 24 bit, HID = 8 bit, " " " " = 2^8

N_3: 128.56.26.$\bar{0}$/24, NID = 24 bit, HID = 8 bit, " " " " = 2^8

N_4: 128.56.27.0/24, NID = 24 bit, HID = 8 bit, " " " " = 2^8

(1) Network-id must be Contiguous (True)

N_1 : 128.56.24.0/24, NID = 24 bit, HID = 8 bit

128.56.24 . --------

NID HID

128.56.24.00000000 → 128.56.24.0

128.56.24.00000001 → 128.56.24.1

128.56.24.00000010 → 128.56.24.2

⋮

128.56.24.11111111 → 128.56.24.255

+ 1

128.56.25.0

N_2: 128.56.25.--------

NID | HID

128.56.25.00000000 → 128.56.25.0

⋮

128.56.25.11111111 → 128.56.25.255

+ 1

128.56.26.0

N_3: 128.56.26.--------

NID HID

128.56.26.00000000 → 128.56.26.0

⋮

128.56.26.11111111 → 128.56.26.255

+ 1

128.56.27.0

N4: 128.56.27.--------

NID HID

128.56.27.00000000 → 128.56.27.0

⋮

128.56.27.11111111 → 128.56.27.255

② size of n/w must be same and No. of n/w's must be in a Power of 2

same size = 2^8 & No. of Networks = $4 = 2^2$

③ First Network-id must be div by total size of supernet

Total size of supernet = $2^8 + 2^8 + 2^8 + 2^8 = 4 * 2^8 = 2^2 * 2^8 = 2^{10}$

128.56.24.0

Rem or HID

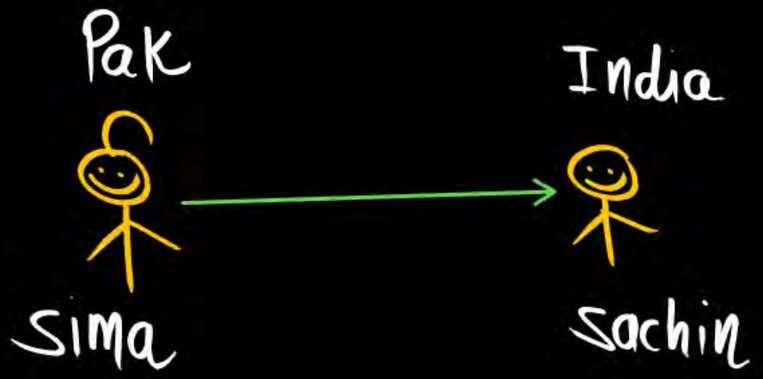
128.56.00011000.00000000 | 2^{10}

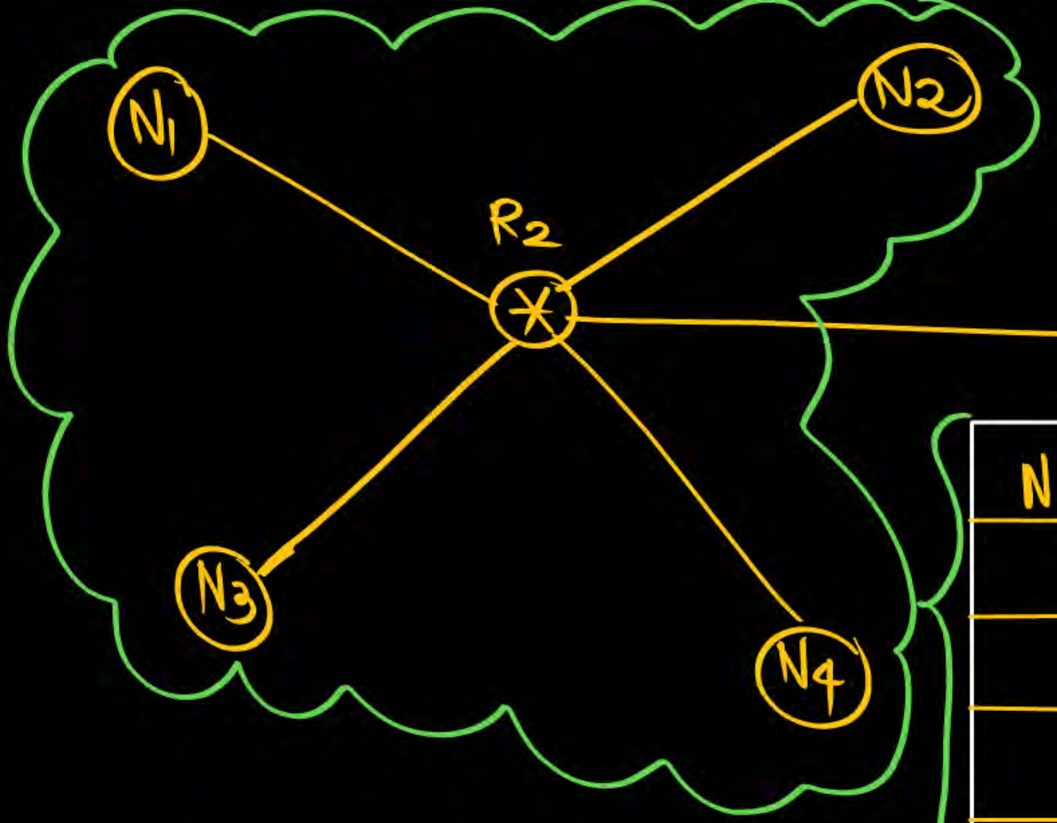
N_1 : 128.56.24.0/24

N_2 : 128.56.25.0/24

N_3 : 128.56.26.0/24

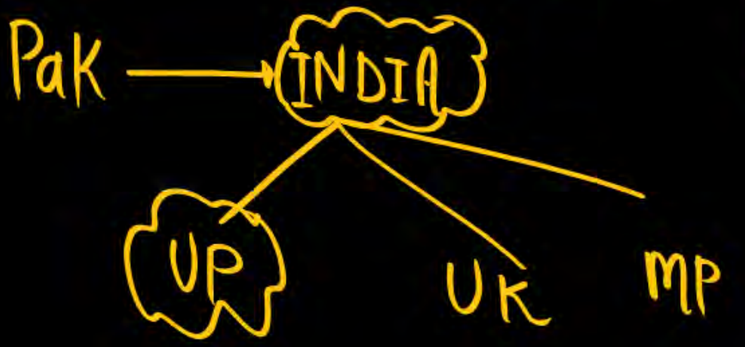
N_4 : 128.56.27.0/24





Routing table

NID	S.M	I/F



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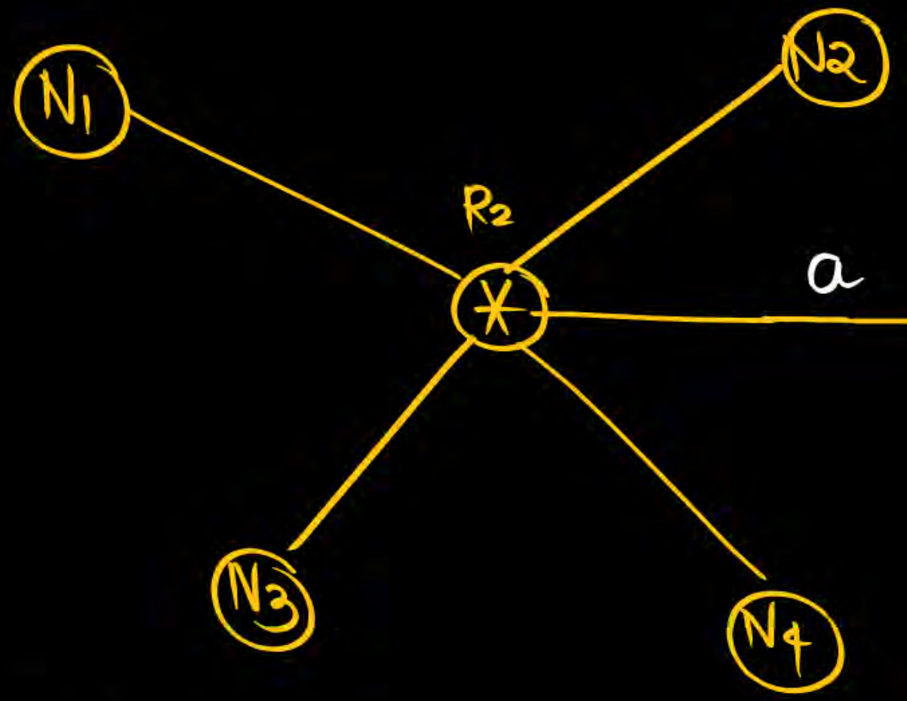


DIP = 128.56.24.130

DIP = 128.56.24.130
AND AND
S.M = 255.255.255.0
NID = 128.56.24.0

Routing table at R_1 without supernetting

NID	S.M.	Interface
128.56.24.0	255.255.255.0	a
128.56.25.0	255.255.255.0	a
128.56.26.0	255.255.255.0	a
128.56.27.0	255.255.255.0	a

DIP = 128.56.27.192

DIP = 128.56.27.192
AND AND
SM = 255.255.255.0
NID = 128.56.27.0

Supernet mask

It is a 32 bit number used to generate a single IP address for the group of network based on the following two rules

Rule1: No of 1's in the supernet mask indicate fixed part

Rule2: No of 0's in the supernet mask indicate variable part

N_1 : 128.56.24.0/24
N_2 : 128.56.25.0/24
N_3 : 128.56.26.0/24
N_4 : 128.56.27.0/24

⇒ 128.56.24.0/22 ⇒ Final Ans

N_1: 10000000.00111000.00011000.00000000
N_2: 10000000.00111000.00011001.00000000
N_3: 10000000.00111000.00011010.00000000
N_4: 10000000.00111000.00011011.00000000

← Fixed Part → ← Variable →

11111111.11111111.11111100.00000000

Subnet Mask = 255.255.252.0

IP Add
AND
S.M

SID

IP Add
AND
subnet Mask
---
subnet-id = 128.56.24.0
AND
255.255.252.0

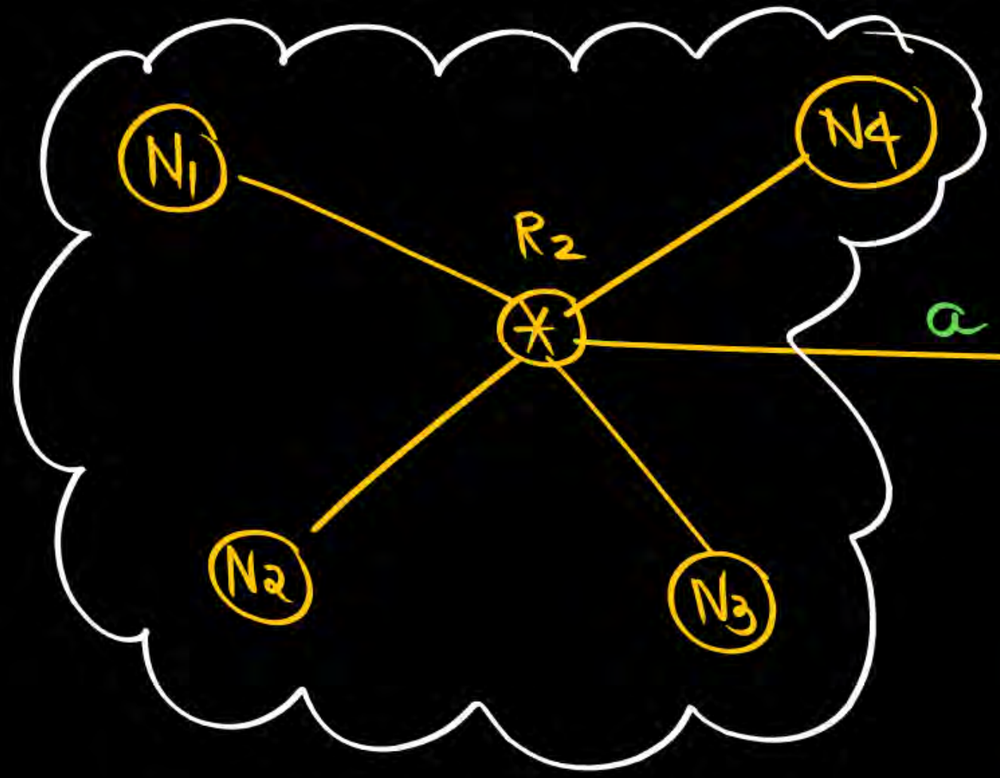
128.56.24.0

24 : 00011001
AND AND
252 11111100
---
(24) 00011000

25 00011001
AND AND
252 11111100
---
(24) 00011000

26 00011010
AND AND
252 11111100
---
24 = 00011000

27
AND
252
---
(24)



DIP = 128.56.27.192

DIP = 128.56.27.192
AND
Subnet Mask = 255.255.252.0
Subnet id = 128.56.24.0

with subnetting Routing table at R_1

Subnet-id	Subnet Mask	I/F
128.56.24.0	255.255.252.0	

AD Rule (For subernet-id)

Subernet-id = First IP Address Always

Subernet-id = 128.56.24.0

AD Rule (For subernet mask)

Total size of subernet = $2^8+2^8+2^8+2^8 = 2^{10}$

HID = 10 bit, NID = 32-10 = 22 bit

SubernetMask = 11111111.11111111.111111 00.00000000

255.255.252.0

(9PM-11PM)

THANK YOU!