Computer Science & IT

COMPUTER NETWORKS (CN)

IP address Subnetting Supernetting

Lecture No. 11

By- Ravindra Sir

Recap of Previous Lecture

- Topic
- Topic
- Topic

IP

Topics to be Covered

- Topic
- Topic
- Topic

IP

Extra Ordinary Individuals: Stories to Ignite Student Motivation

Pustam Raut

1. Background: PhD student at IISc, coming from a disciplined academic background but focused entirely on research impact rather than fame.

2. Education: PhD, Aerospace Engineering, IISc Bangalore.

3. Career Achievements: Discovered a high-severity Android security vulnerability and was featured on Google's Android Security Rewards Hall of Fame in 2021 (with a $5,000 award).

4. Impact: Strengthened Android ecosystem security; contributed critical bug fixes affecting millions of users globally.

Extra Ordinary Individuals: Stories to Ignite Student Motivation

Simo Häyhä – The White Death of Finland

1. Background: A humble Finnish farmer drafted during the 1939 Winter War.

2. Struggles: Operated in freezing forests, with no scope and near-zero visibility. Took a Soviet bullet that shattered his jaw.

3. Achievements: 705 confirmed kills — all without modern tech. Survived the war and lived to 96.

4. Impact: He turned stillness into strength. If he could find precision in blizzards, you can find it in Computer Networks and TOC.

Extra Ordinary Individuals: Stories to Ignite Student Motivation

Harish Hande – Solar Social Entrepreneur

1. Background: Grew up in a modest household in Orissa. His family relocated to Rourkela; they lived simply and faced financial struggle while he pursued education.

2. Education: BTech in Energy Engineering from IIT Kharagpur (1990), followed by MS & PhD in Energy Engineering at University of Massachusetts Lowell (USA).

3. Career Achievements: Co-founded SELCO India in 1995, a social enterprise delivering solar power solutions tailored for the rural poor.

4. Impact: Pioneered rural solar electrification in India, making clean energy accessible to

Extra Ordinary Individuals: Stories to Ignite Student Motivation

INDIAN INSTITUTE OF SCIENCE

भारतीय विज्ञान संस्थान

Jagriti Singh

1. Background: Graduate student in Materials Science from humble academic roots, without prior fame.

2. Education: PhD, Centre for Nano Science & Engineering (CeNSE), IISc Bangalore.

3. Career Achievements: Won DST-AWSAR science communication award for popularizing her material design research titled “Electromagnetic Kawach.”

4. Impact: Bridged research and public science communication to make advanced EMI-shielding materials accessible to general audiences.

Routing
SM

classful add

FLSM VLSM

CIDR

FLSM & VLSM

IP and SM → Routing

NID → of the N/w to which the IP belongs to

IPconfig or Ifconfig

IPv4 ← ISP

SM ← ISP

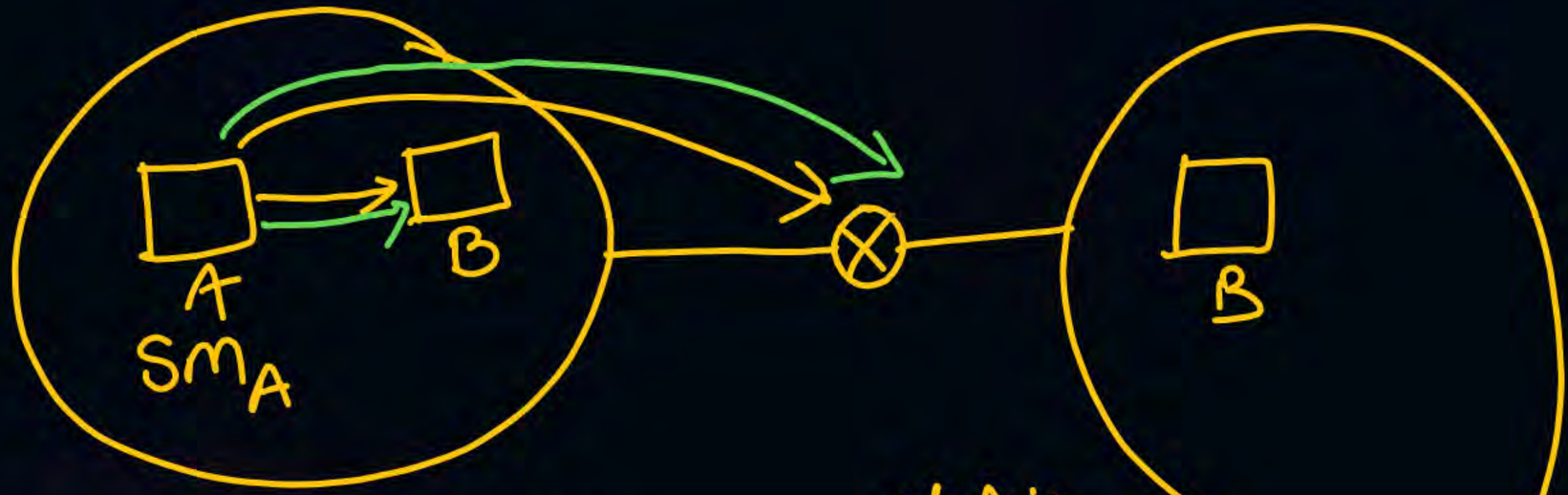
DNS ← ISP

Default GW ← ISP

Host ✓

↓

SM ? ✓



$A \rightarrow B$

At A :-

- IP_A
- SM_A
- $IP_B \rightarrow ONS$

At A :

IP_A

SM_A

NIO_{AA}

At A :-

IP_B

SM_A

NIO_{BA}

$=$

$\neq$

Every host will have a IPV4 add, DNS, Default GW, SM

Why should a host have SM?

Host needs SM to find out whether destination host is in the same n/w or different N/w.

If $NID_{AA} = NID_{BA}$ → both are in same n/w

If $NID_{AA} \neq NID_{BA}$ → both are in diff n/w

I_A : 200.1.2.10

S_A : 255.255.255.128

I_B : 200.1.2.130

130 : 10000010
128 : 10000000
10000000

At A :

IP_A	200.1.2.	00001010
SM_A	255.255.255.	10000000
NID_{AA}	200.1.2.0	

If we AND 255 with any number, we will get the same number

At A :

IP_B	200.1.2.130	
SM_A	255.255.255.	128
NID_{BA}	200.1.2.	128

According to A, both are in diff networks

A: I_A: 200.1.2.10

S_A: 255.255.255.128

I_B: 200.1.2.126

I_A . 200 . 1 . 2 . 10

S_A . 255 . 255 . 255 . 128

NIO_{AA} 200 . 1 . 2 . 0

I_B : 200 . 1 . 2 . 126 ✓

S_A : 255 . 255 . 255 . 128 ✓

NID_{BA} = 200 . 1 . 2 . 0

10000000

00001010

$NIO_{AA} = NID_{BA}$, So according to A both are in same N/w

IP_A : 200 . 1 . 2 . 10

SM_A : 255 . 255 . 255 . 128

According to A, both are on same N/w

AtA :-

IP_A : 200 . 1 . 2 . 10

SM_A : 255 . 255 . 255 . 128

NID_{AA} : 200 . 1 . 2 . 0

IP_B : 200 . 1 . 2 . 69

SM_A : 255 . 255 . 255 . 128

NID_{BA} : 200 . 1 . 2 . 0

IP_B : 200.1.2.69

SN_B : 255.255.255.192

AtB :-

IP_B : 200 . 1 . 2 . 69

SN_B : 255 . 255 . 255 . 192

NID_{BB} : 200 . 1 . 2 . 64

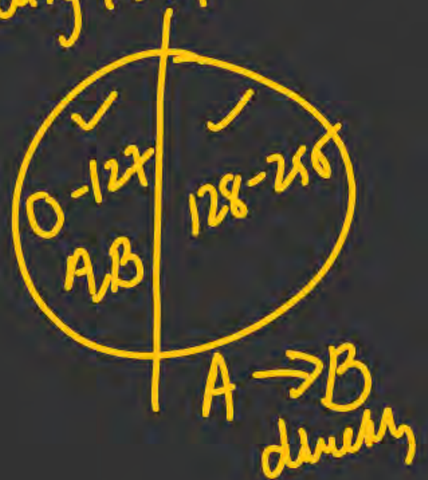
IP_A : 200 . 1 . 2 . 10

SM_B : 255 255 . 255 . 192

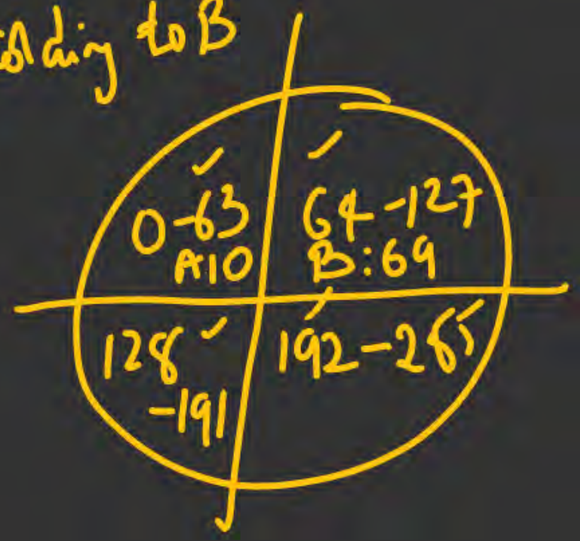
NID_{AB} : 200 . 1 . 2 . 0

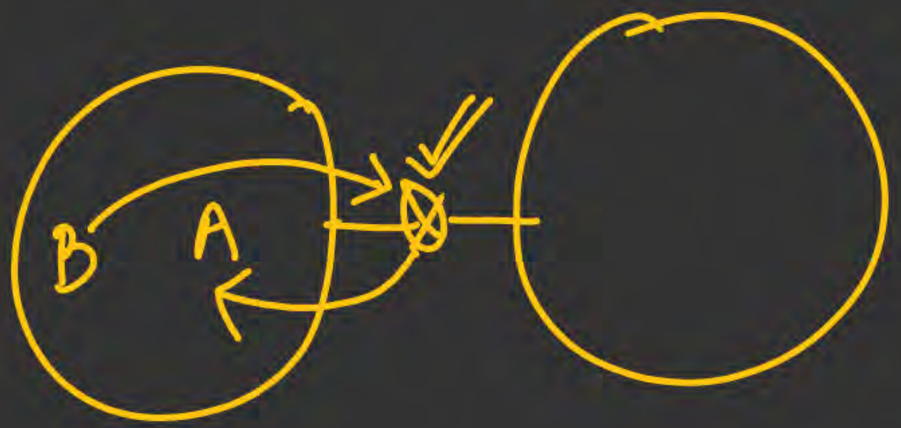
According to B both are in diff N/w

According to A



According to B





A SM given to a host, is just an illusion and it might be not the actual SM

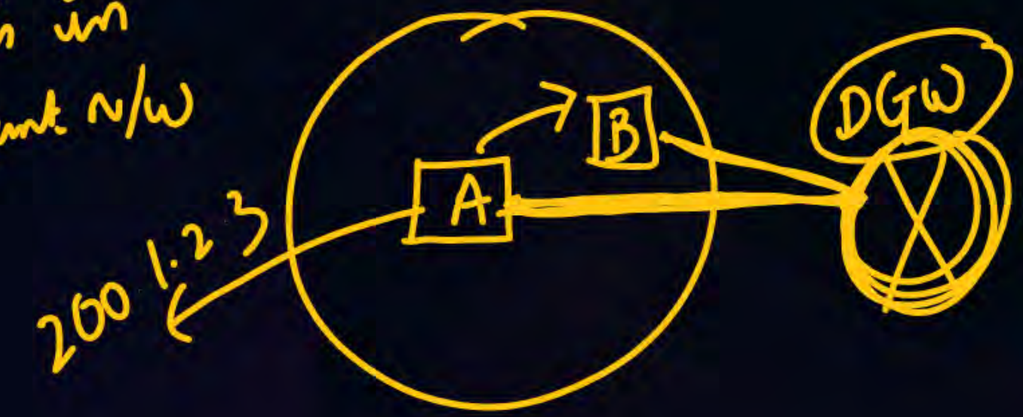
Sm : 255.255.255.255 → maximum case

Sm – 1's → NID + SID

Sm – 0's → Host

2^0 – IP add

According to A, every other i/p add in in a diffunt n/w



Sm_A 255.255.255.255

IP_A 200.1.2.3

NID_{AA} 200.1.2.3

Sm_A 255.255.255.255

IP_B 10.1.2.3

NID_{BA} 10.1.2.3

Sm : 255.255.255.255

IP_A

IP_A

Sm

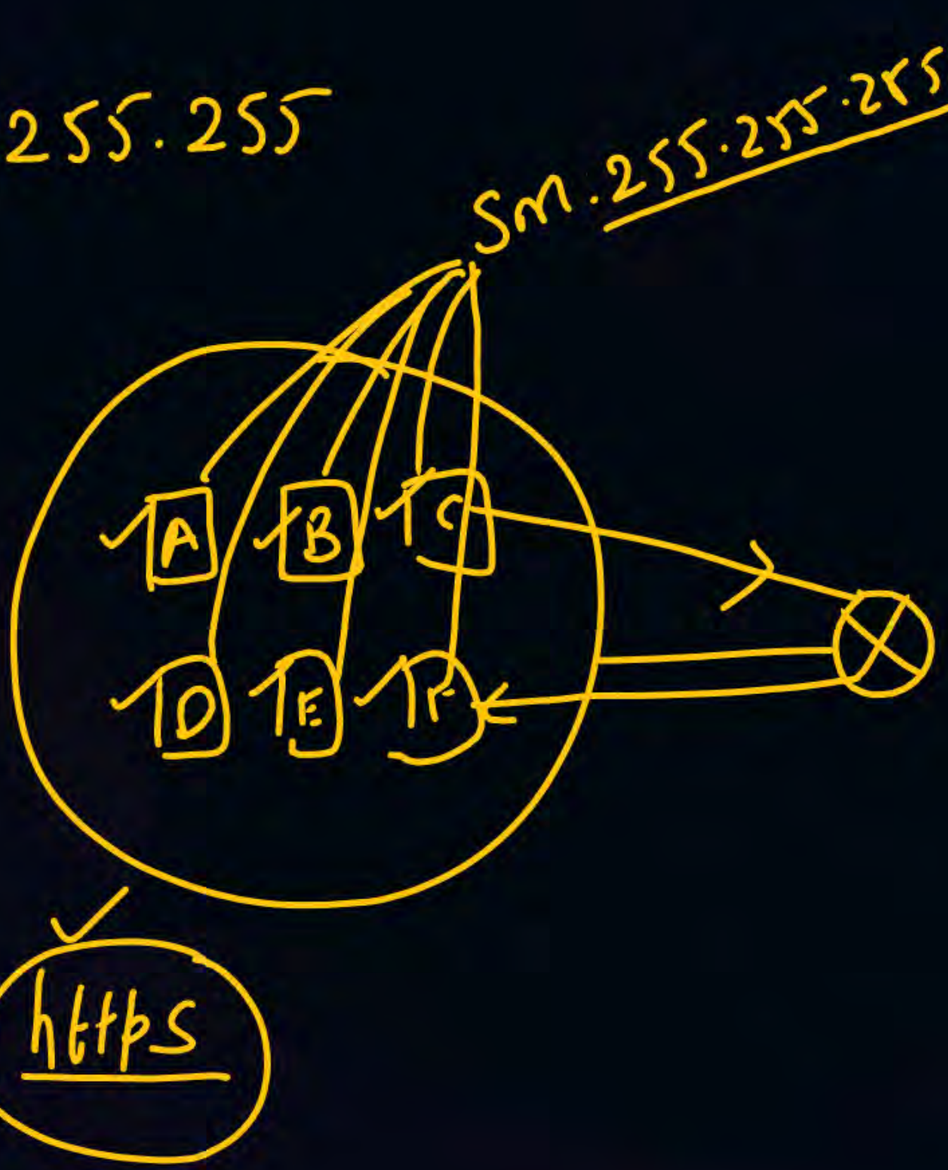
IP_B

IP_B

Sm

IP_C

IP_C



Given a DBA Can we find N/w id?

BID

SID

CIDR ✓

DBA · 200.1.15.255 ✓

CCX

11001000.00000001.0000 1111.11111111

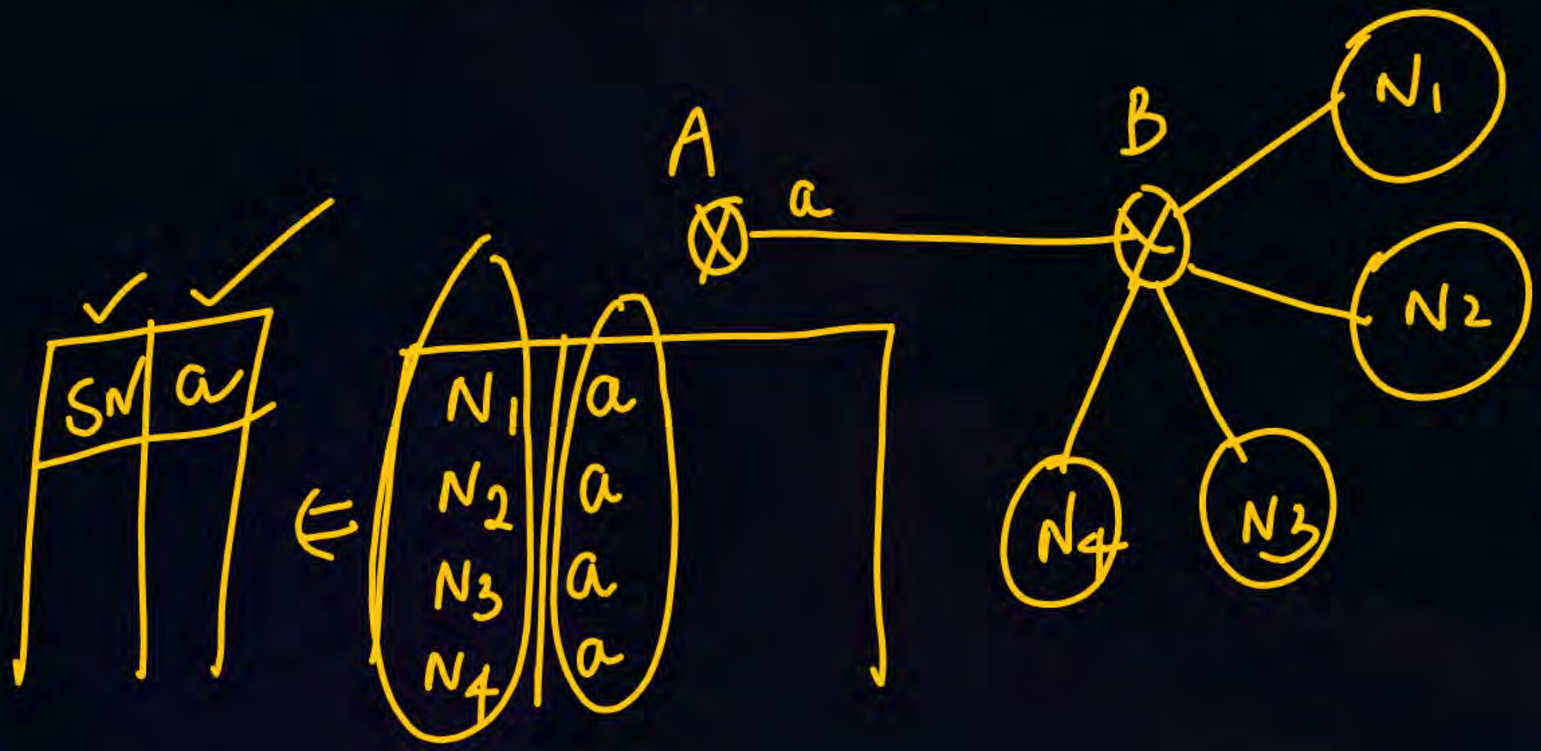
HID

DBA → HID → ALIS

a) b) c) d) ALL

Supernetting of aggregation :-

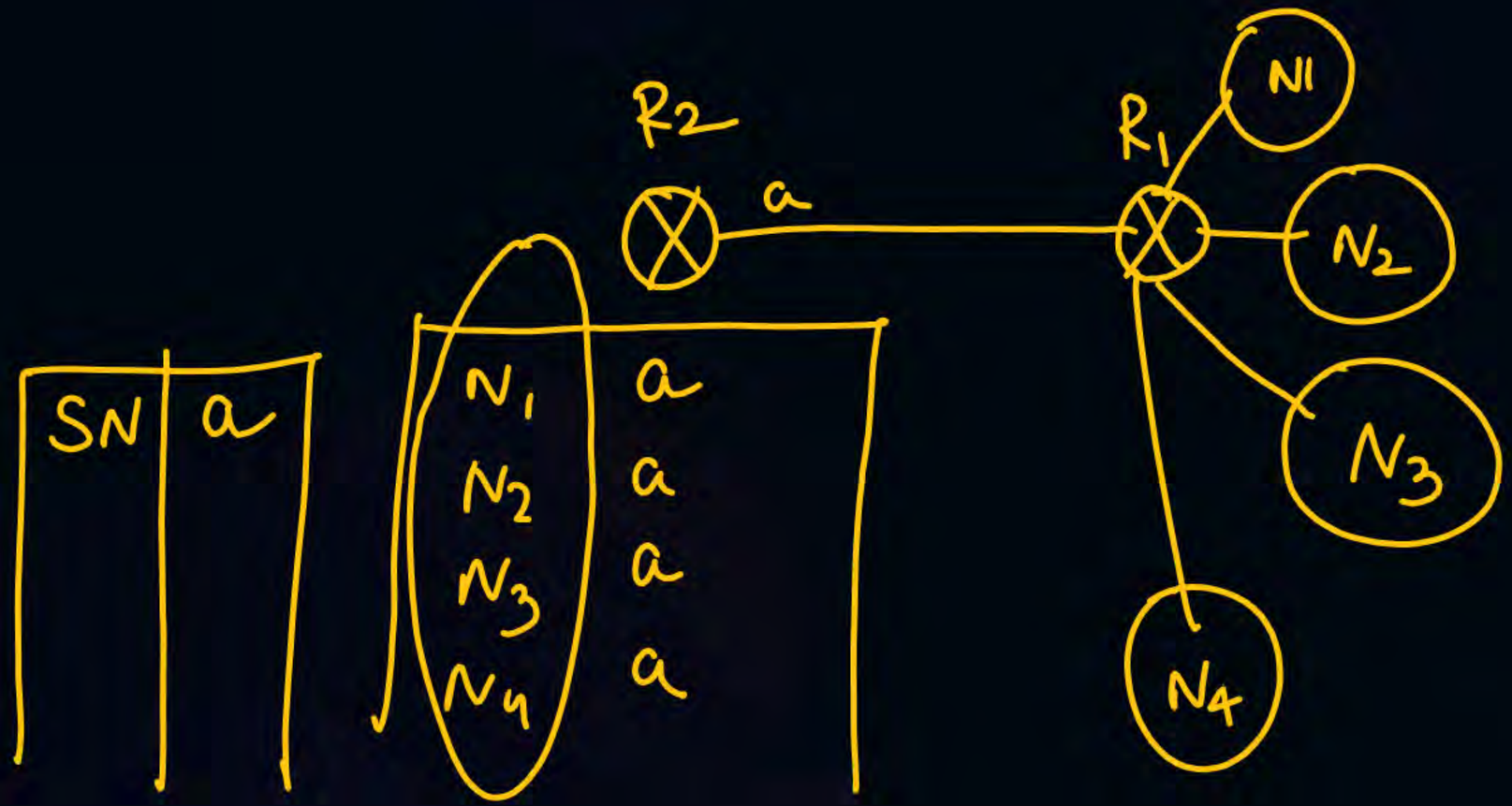
Combing many small n/w's into a big network is called Supernetting of aggregation



Why we need Supernetting?

To reduce the Size of Routing table.

HNO	RN	SN	D/S	Str
India a				


R2
a
R1
N1
N2
N3
N4
SN
a
N1
a
N2
a
N3
a
N4
a

RBR Rules for Supernetting

1) All the N/w should be Contiguous
2) Size of all the N/w should be Same
3) No of N/w Should be power of 2
4) First IP add should be divisible by Size of the Supernet

N1: 200.1.0.0/24 — 2^8
N2: 200.1.1.0/24 — 2^8
N3: 200.1.2.0/24 — 2^8
N4 200.1.3.0/24 — 2^8

$4 \times 2^8 = 2^2 \times 2^8 = 2^{10}$

200.1.0.0 → % 2^{10}

200.1.00000000.00000000 / 2^{10}
(10 bits)

1) Contiguous
2) Same size
3) N/w power of 2 → $4 = 2^2$
4) I IP → divisible by size of SN

THANK - YOU