Computer Science & IT

COMPUTER NETWORKS (CN)

IP address Subnetting Supernetting

Lecture No. 1

By- Ravindra Sir

Recap of Previous Lecture

- Topic
- Topic
- Topic

Subnetting (F L S M)

Fixed Length Subnet. masking

Topics to be Covered

- Topic
- Topic
- Topic

IP address

Extra Ordinary Individuals: Stories to Ignite Student Motivation

Florence Nightingale (1820–1910) is known as the founder of modern nursing. During the Crimean War, she organized sanitary care for wounded soldiers, drastically reducing mortality rates through hygiene reforms. She later established England's first secular nursing school at St Thomas' Hospital, training generations of nurses in evidence-based practices. Nightingale's data-driven approach, using statistical charts to advocate healthcare reform, laid the foundation for professional nursing and hospital management. ***Lesson:*** Compassion paired with systematic care and data analysis can revolutionize healthcare practices.

Extra Ordinary Individuals: Stories to Ignite Student Motivation

Helen Keller (1880–1968) was deafblind from infancy yet learned to communicate through her teacher Anne Sullivan's innovative methods. She graduated from Radcliffe College, becoming the first deafblind person to earn a college degree. Keller became an author, activist for disability rights, and advocate for women's suffrage and labor rights.

Lesson: Breakthrough learning and advocacy can transform personal limitations into platforms for widespread change.

Extra Ordinary Individuals: Stories to Ignite Student Motivation

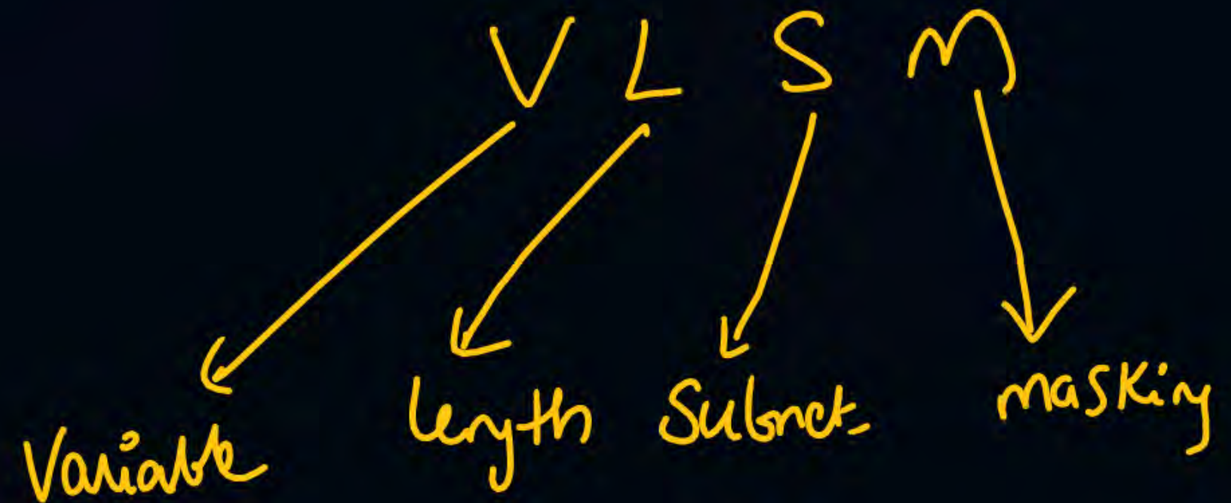
Barack Obama (b. 1961) became the first African American U.S. President in 2009, rising from community organizer to Senator. He led reforms in healthcare, economic recovery, and climate action, inspiring a sense of hope and civic engagement. His memoirs and speeches emphasize unity, resilience, and the power of grassroots activism.

Lesson: Inclusive leadership and eloquent vision can mobilize diverse communities toward common goals.

Extra Ordinary Individuals: Stories to Ignite Student Motivation

Michelle Obama (b. 1964) worked as a lawyer and hospital executive before becoming First Lady of the U.S. She launched initiatives promoting healthy living, education for girls, and veteran support. Her autobiography, Becoming, details her journey and has inspired millions with themes of self-discovery, service, and empowerment.

Lesson: Authenticity and commitment to service can elevate public platforms to catalysts for positive change.


V L S M
Variable
length
Subnet
masking

200.1.2.0

NID=24
SID=2
HID=6 0's

$2^6 = 64$ → No of IP addr per subnet

SM :- NID+SID → all 1's
Host id → all zeros

SM :-
11111111.11111111.11111111.11000000
11001000.00000001.00000010.00001010
11001000.00000001.00000010.00000000
200 . 1 . 2 . 0

S1	S2	S3	S4
0-63 NID DBA	64-127 NID DBA	128-191 NID DBA	192-255 NID DBA

DIP

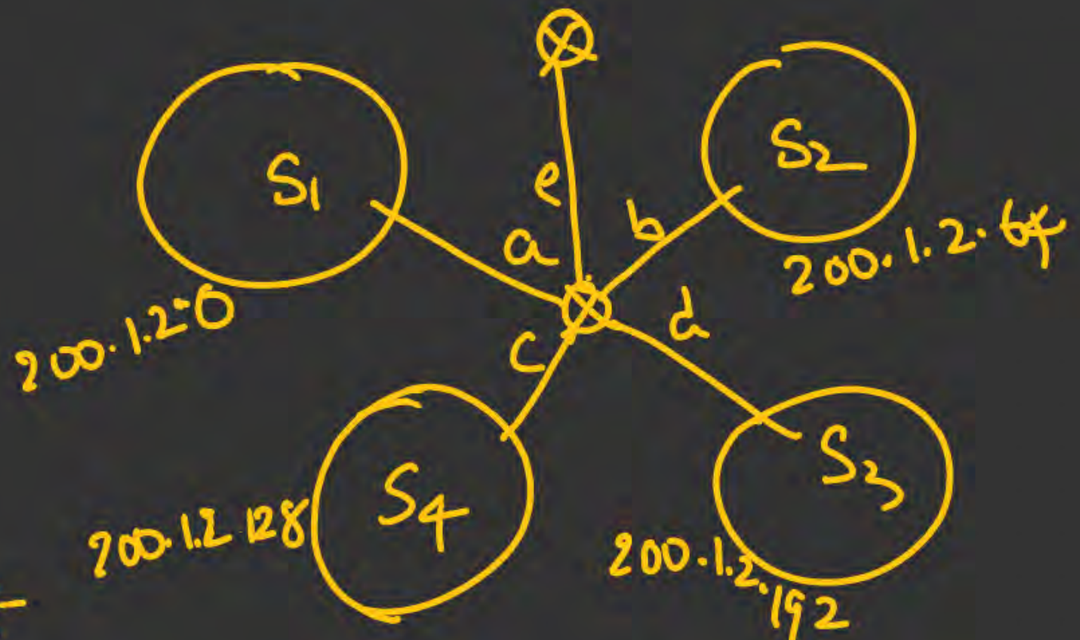
M	SIP	200.1.2.10

M → 200 − 192 + 8

1 1 0 0

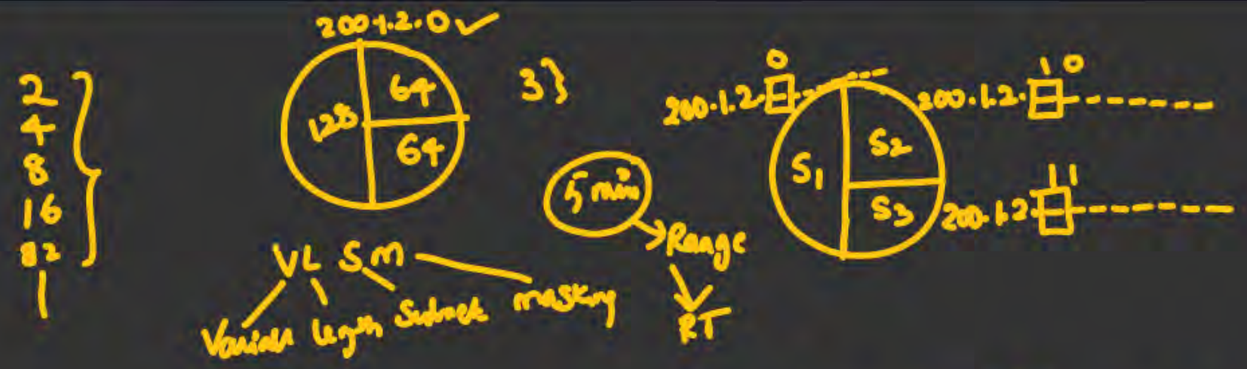
10000000 − 128
11000000 − 192
11100000 − 224
11110000 − 240
11111000 − 248
11111100 − 252
11111110 − 254
11111111 − 255

192
132
224

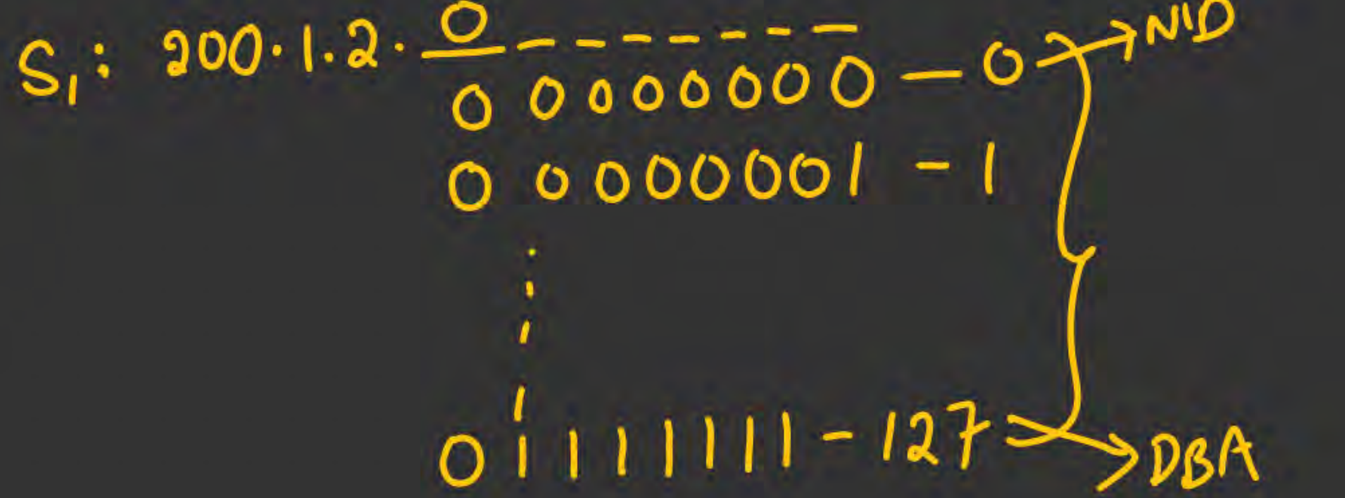


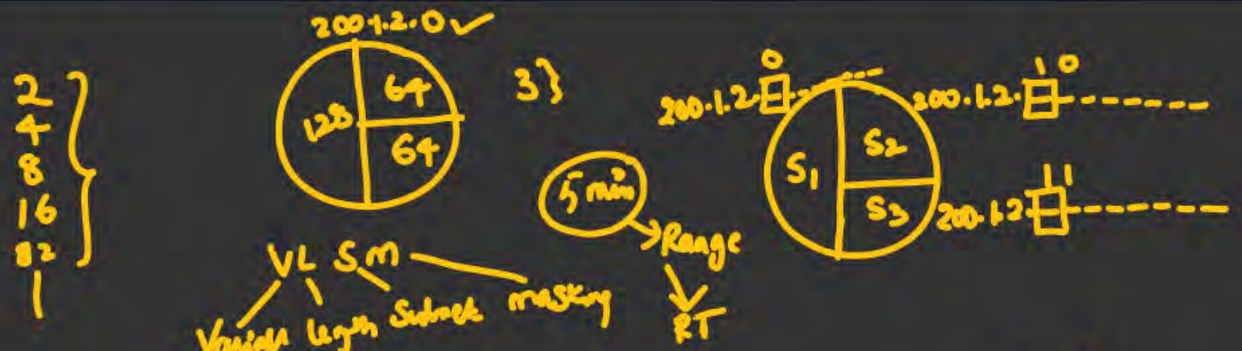
Routing table at R_1 :-

NID	SM	Interface
200.1.2.0	255.255.255.192	a
200.1.2.64	255.255.255.192	b
200.1.2.128	255.255.255.192	c
200.1.2.192	255.255.255.192	d
0.0.0.0	0.0.0.0	e


200.1.2.0
128
64
64
3}
2
4
8
16
32
1
5 min
Range
RT
VL SM
Variable Length Subnet masking
200.1.2.0
200.1.2.0
200.1.2.1
S1
S2
S3


0
1 0
1 1


S1 : 200.1.2.0
0 - 127
0 0000000 - 0
NID
0 0000001 - 1
0 1111111 - 127
DBA



S_2: 200.1.2. 1 0 ------ → NID of S_2

1 0 0000000 - 128

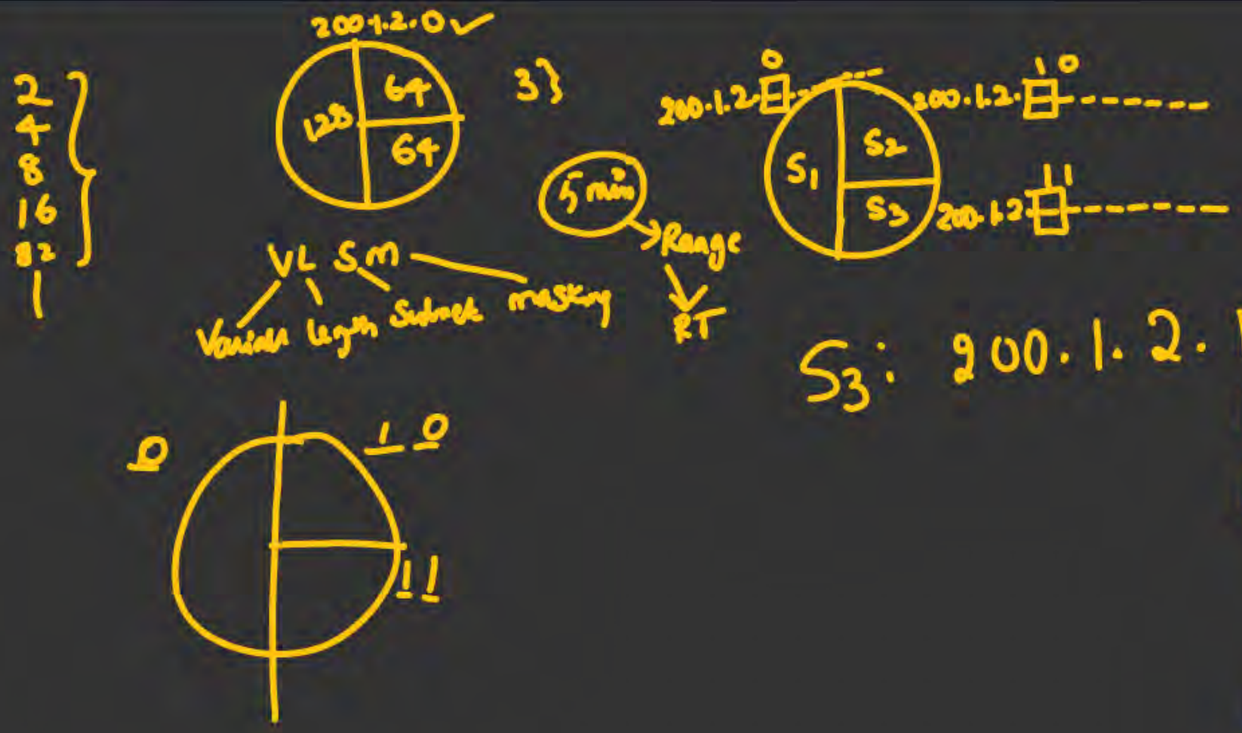
1 0 0000001 - 129

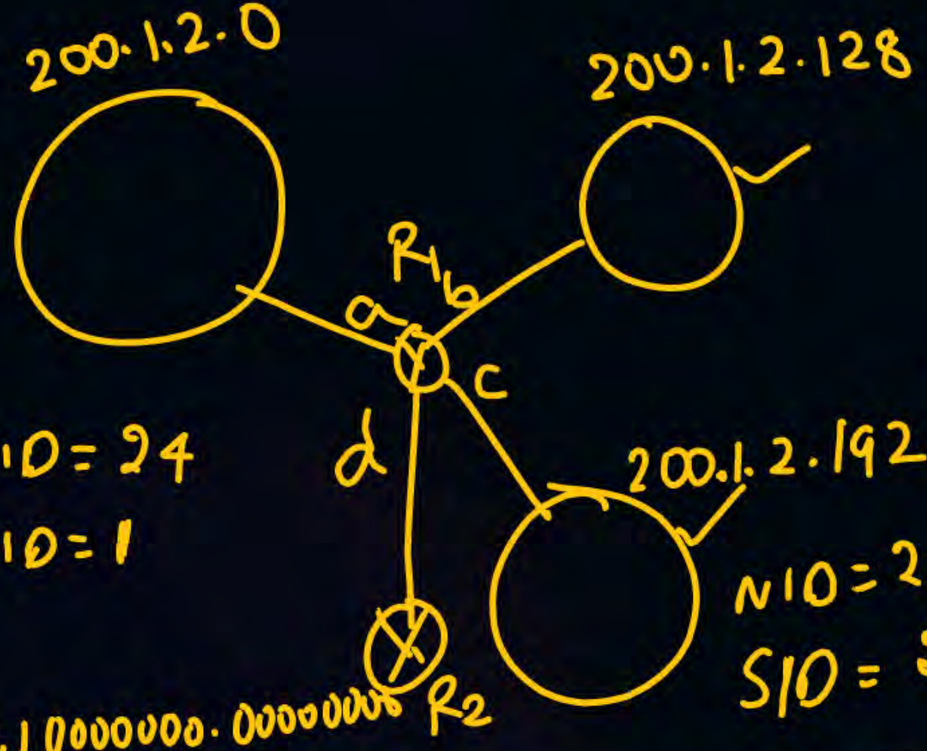
1 0 0000010 - 130

⋮

1 0 111111 - 191 → DBA

128
63
191


200.1.2.0
128
64
64
3}
2
4
8
16
32
VLSM
Variable Length Subnet masking
5 min
Range
RT
200.1.2.0
200.1.2.0
200.1.2.1
S1
S2
S3
S3: 200.1.2.11------
11000000 - 192
11000001 - 193
i
11 111 111 - 255
0
1 0
1 1



RT at R_1

NID	NM	Interface
200.1.2.0	255.255.255.128	a
200.1.2.128	255.255.255.192	b
200.1.2.192	255.255.255.192	c
0.0.0.0	0.0.0.0	d

RT

NID = 24

SID = 1

NID = 24

SID = 2

11111111.11111111.10000000.00000000

255.255.128.0

NID + SID = 25

24 1

7 bits $_{IP/NW} = 2^7 = 128$

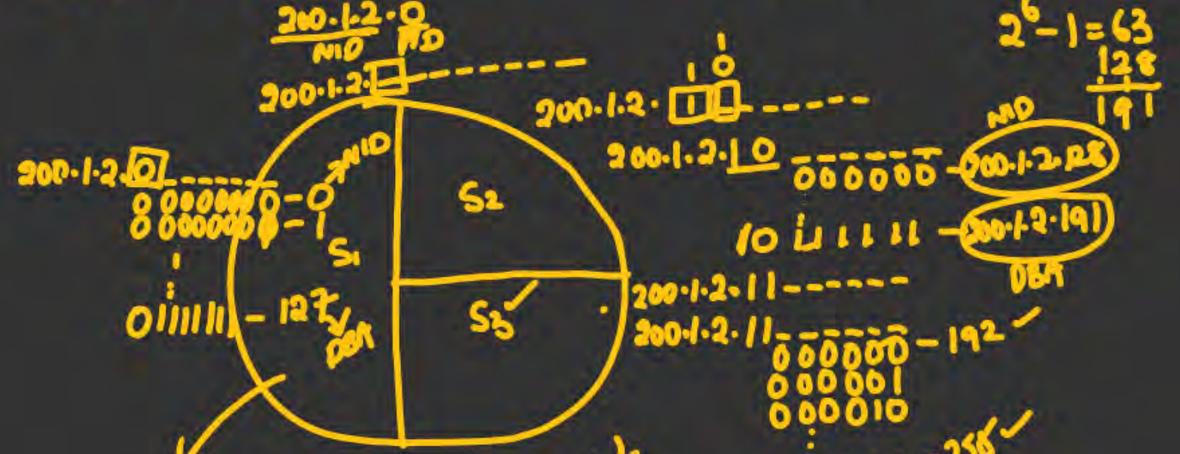
11111111.11111111.11111111.11000000

24 + 2 bits = NID + SID

HID = 6

$IP/NW = 2^6 = 64$

An ISP, has a class C network 200.1.2.0, he wants to break it into 3 parts such that one part has 128 IP addr and remaining two parts has 64 and 64 IP



$2^6 - 1 = 63$

128

191

Sm = NID + SID - 1's

= HID → 0's

Sm = NID + SID → 1's

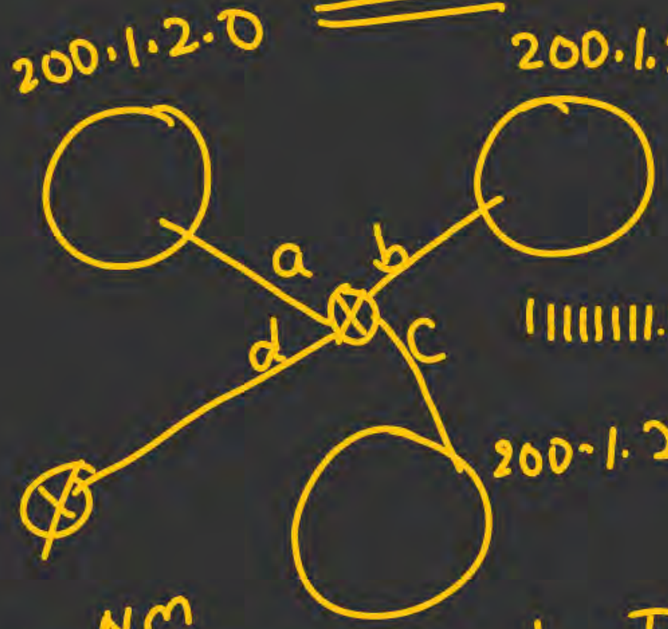
24 + 1

11111111.11111111.11111111.10000000

255.255.255.128

↳ 25 ✓

VLSM



NID + SID = 1's

24 + 2

11111111.11111111.11111111.11000000

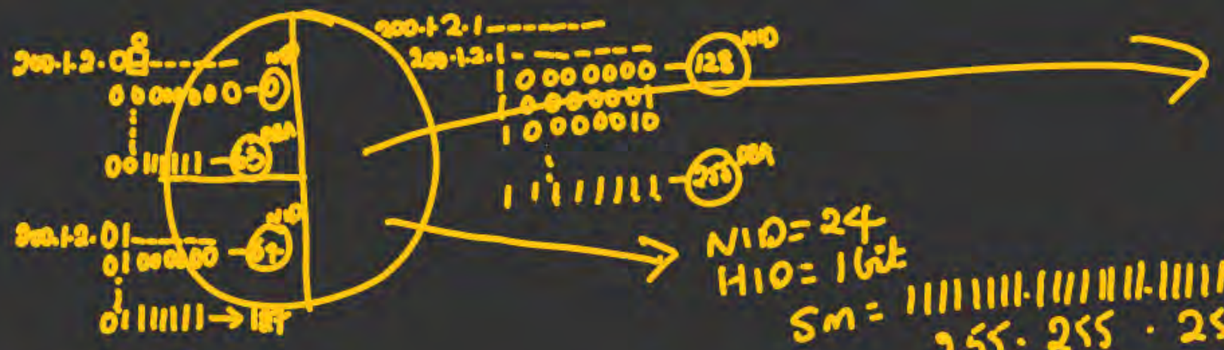
↳ 26

200.1.2.192

NID	NM	Interface
200.1.2.0	255.255.255.128	a
200.1.2.128	255.255.255.192	b
200.1.2.192	255.255.255.192	c
0.0.0.0	0.0.0.0	d

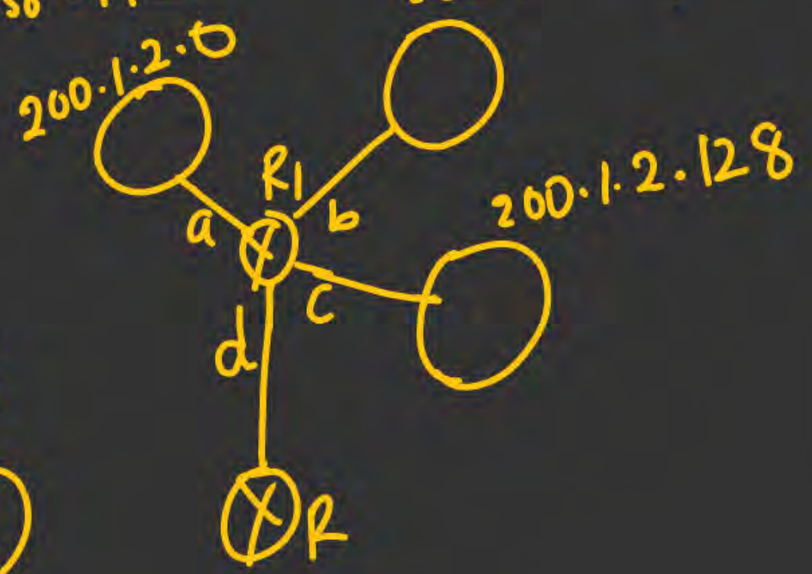

0
1 0
1 1
0 0
1
0 1

200.1.2.0 / NID 0 / HID = 200.1.2.□-----



NID+SID
24 + 1 = 25 ✓

NID=24
HID=2
Sm. 11111111.11111111.11111111.11000000
255.255.255.192



Sm-1's
↓
NID + SID
24 2
26

Routing table at R1

NID	Sm/Nm	intufac
200.1.2.0	255.255.255.192	a
200.1.2.64	255 255 255.192	b
200.1.2.128	255 255 256.128	c
0.0.0.0	0.0.0.0	d

When no of 1's in SM/NM are more, then the Size of HID is small and so Size of the N/W is small

When no of 1's in SM/NM are less, than HID part is more, then the Size of N/W is more

255.255.255.128 → 1's - 25 → Size of N/W is more

255.255.255.240 → 1's - 28 → Size of N/W is less

255.255.25

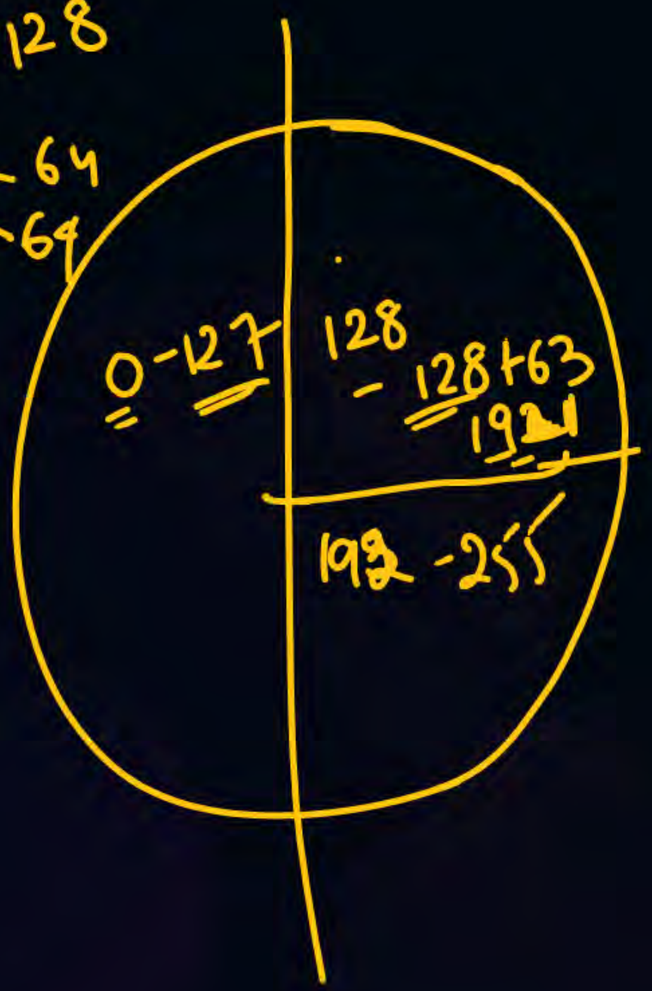
10
01
11

00
1
01

Short cut → RBR method

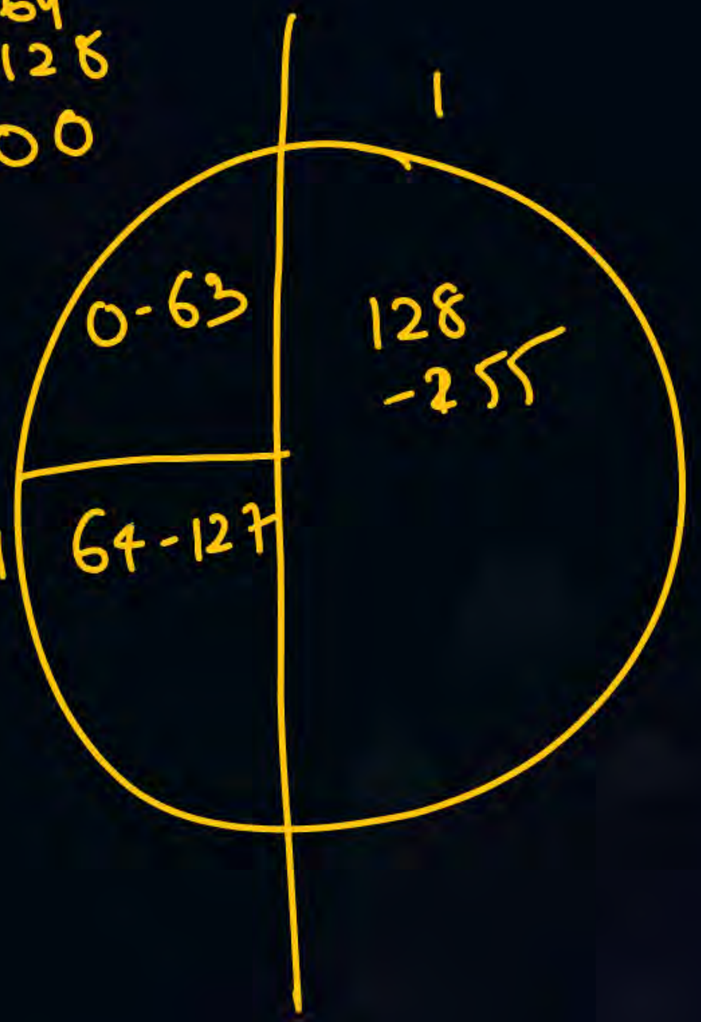
256 → 128, 64, 64

0 - 255



128
63
+
191

256 → 64, 64, 128, 00



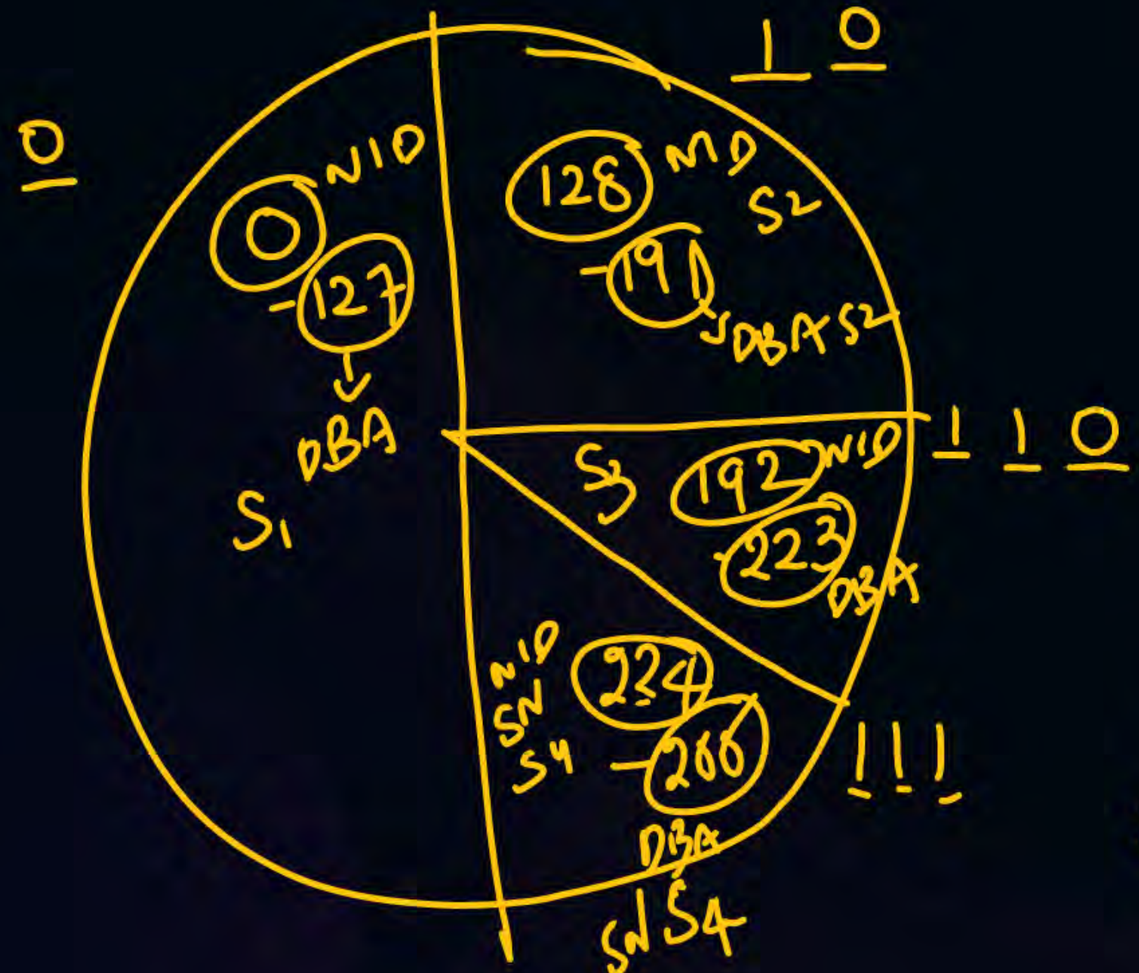
$$256 < 128 < 64 < 32$$

$$11100000$$

$$2^7\ 2^6\ 2^5$$

$$128 + 64 + 32 = 224$$

200.1.2.0



111 000000

$2^8 - 2^6 - 2^5$

128
64
32
96
224

THANK - YOU