Computer Science & IT

COMPUTER NETWORKS (CN)

IP address Subnetting Supernetting

Lecture No. 09

Recap of Previous Lecture

- Topic
- Topic
- Topic

IP add

Topics to be Covered

- Topic
- Topic
- Topic

IP add

Extra Ordinary Individuals: Stories to Ignite Student Motivation

1.Dr. Vijay Kumar Saraswat: Background: Came from a humble background with a dream to safeguard India's skies; joined DRDO with a passion for defense technology.

2. Education: Earned a Ph.D. in Propulsion Engineering from IISc Bangalore, one of India's top institutions.

3. Career Achievements: Played a pivotal role in India's missile program—especially the Prithvi series—despite early skepticism and failed trials; helped shape India's missile defense capabilities.

4. Impact: Known for his persistence and innovation, he turned technical setbacks into breakthroughs, becoming a key architect of India's modern defense strategy.

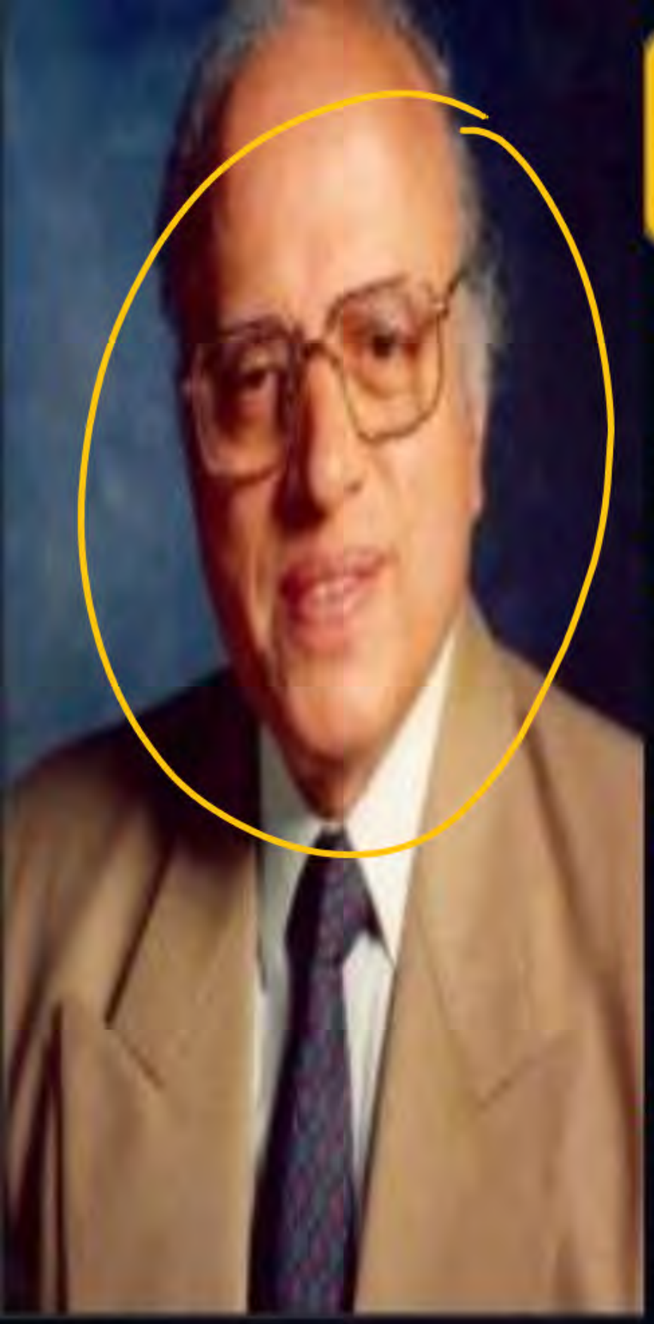
Extra Ordinary Individuals: Stories to Ignite Student Motivation

1.Dr. G. Satheesh Reddy: Background: Rose through India's defense ecosystem during a time of rising cyber threats; known for hands-on leadership and tireless work ethic.

2. Education: Completed his Ph.D. in Engineering from JNTU Hyderabad and received advanced training at IISc Bangalore and other premier institutes.

3. Career Achievements: As DRDO chief, led the development of indigenous electronic warfare systems and advanced defense tech despite limited resources.

4. Impact: Built strong industry-academic partnerships, encouraged rapid innovation, and kept India's defense tech competitive on a global scale.



Extra Ordinary Individuals: Stories to Ignite Student Motivation

1.Dr. M. S. Swaminathan: Background: Grew up in British India and was deeply moved by food shortages; chose agricultural science over civil services to help end hunger.

2. Education: Earned his Ph.D. in Genetics from Cambridge University, after studying at IARI Delhi and gaining field experience at premier Indian research institutes.

3. Career Achievements: Spearheaded India's Green Revolution by developing high-yield, disease-resistant wheat and rice varieties, despite early resistance.

4. Impact: Transformed India from a famine-prone country to a food-secure nation, lifting millions out of starvation through science applied with empathy.

Extra Ordinary Individuals: Stories to Ignite Student Motivation

1.Dr. Gagandeep Kang: Background: Moved by the suffering of children from preventable diseases, she committed herself to improving child health in India's underserved areas.

2. Education: Earned her MBBS and MD from Christian Medical College (CMC), Vellore, followed by a Ph.D. in Enteric Infections—conducting research with global and Indian institutions.

3. Career Achievements: Led groundbreaking research on rotavirus vaccines, conducted large-scale rural trials, and collaborated with clinics to overcome infrastructure barriers.

4. Impact: Her work significantly reduced child hospitalizations from diarrhea in India, setting a global benchmark for vaccine research rooted in public health compassion.

IP = 32 bits

Classful addressing

2^{24} = 16m

2^{16} = 64K

2^{8} = 256

300 IP

300

256
256
512

There is no flexibility in classful addressing

It was used in 1990

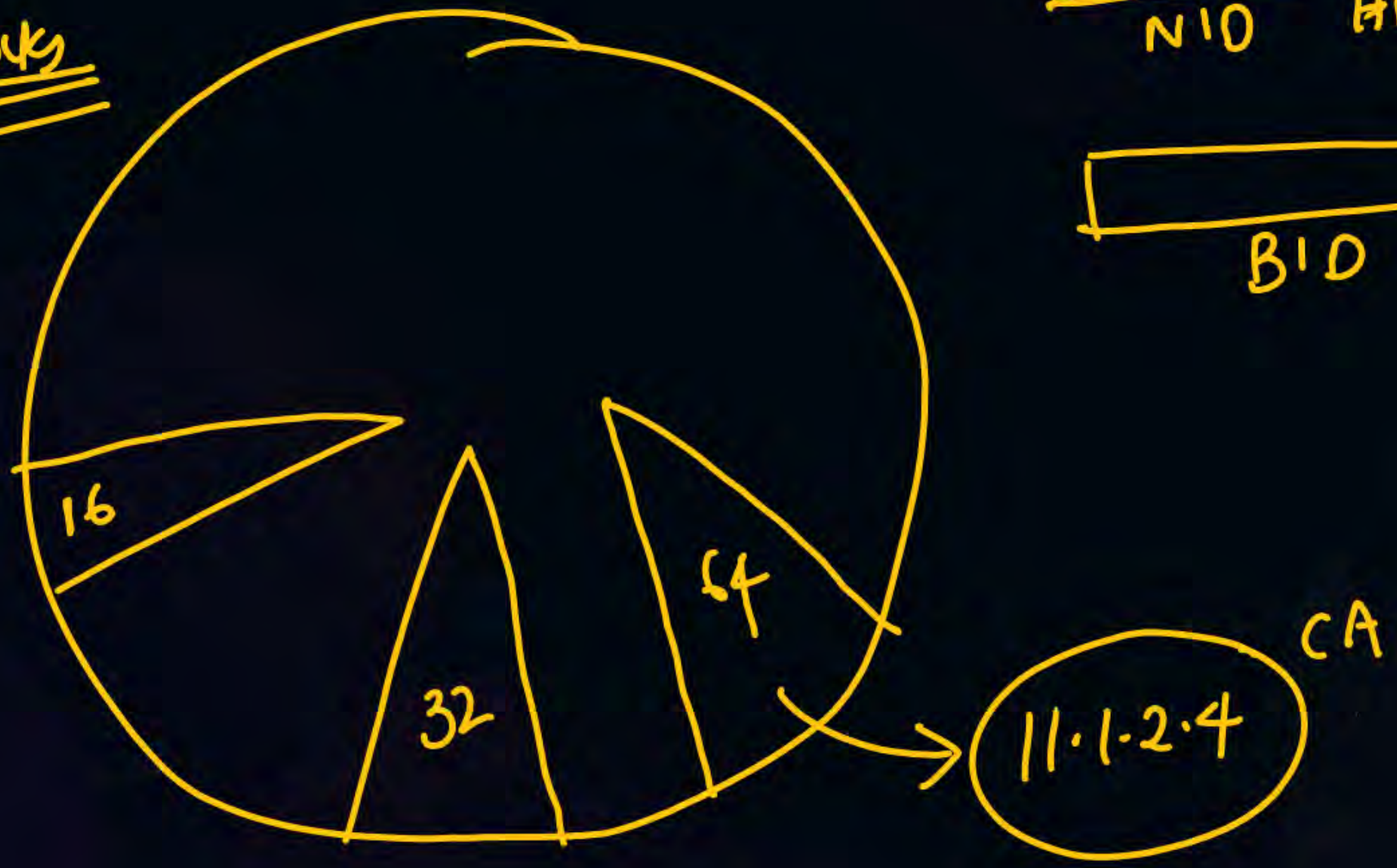
CIDR (Classless Interdomain routing)

(Blocks)

CIDR Blocks

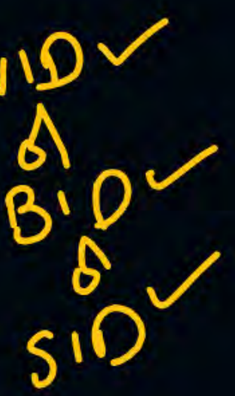
200.1.2.3 → class ?C

NID HID



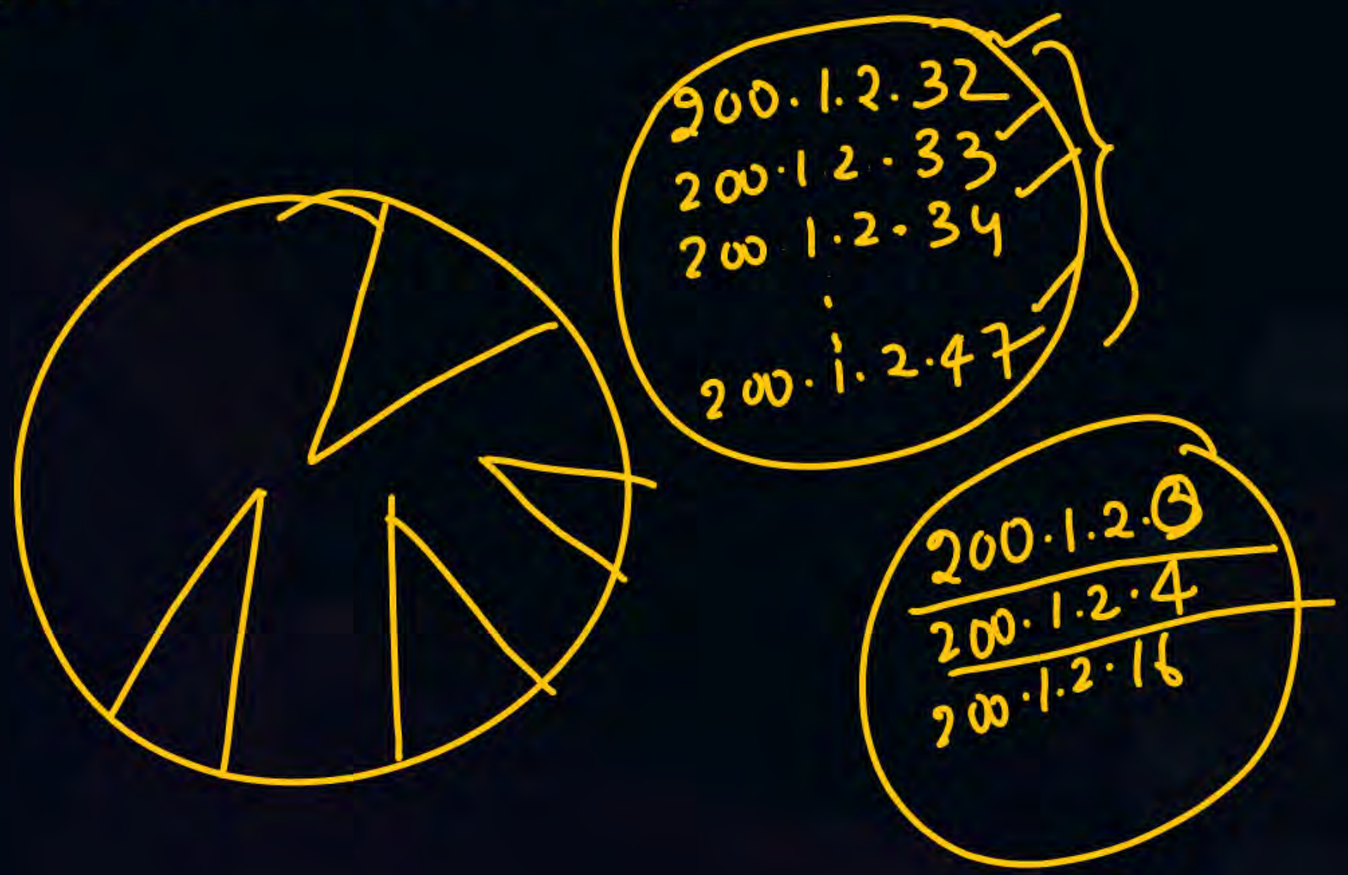
CIDR Notation :-

a.b.c.d/n



RBR Rules to identify CIDR Blocks :-

1) All the IP addres should be Contiguous



RBR Rule

2) Block size should always be a power of 2

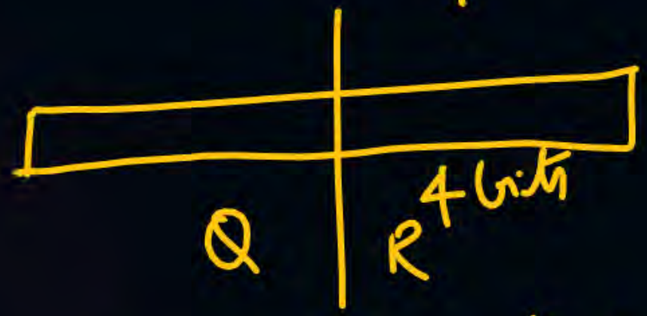
2^2 (5)

2^4

2^8 (7)

2^{10} (9)

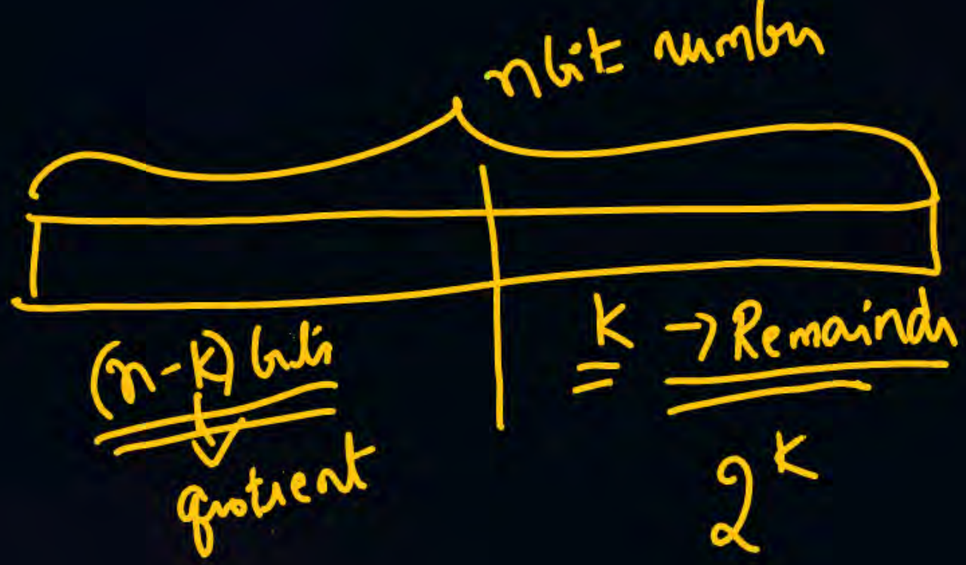
2^2



2^4

Binary 2^k number → 2^k divide →

2^2



Binary → %2^K →

RBR Rule-3:-

First IP add in a block should be evenly divisible by the Size of the block

32 → Size of block

$32 = 2^5$

2^K {
00000 - I
00001 - II
00010 - III
:
11111 - Last

00010
00011
00100
:
11111
} 2^K

100.1.2.32 ✓
100.1.2.33
100.1.2.34
⋮
100.1.2.47

CIDR block

100.1.2.00100000

↓

0

100.1.2.32 / 16

100.1.2.0

000 ✓

RBR Rule-I :- Contiguous ✓

RBR Rule II :- 47-32+1 ✓

16

RBR Rule III : ✓

32 ⋮ 47 } 47 − 32 = 15 ✗

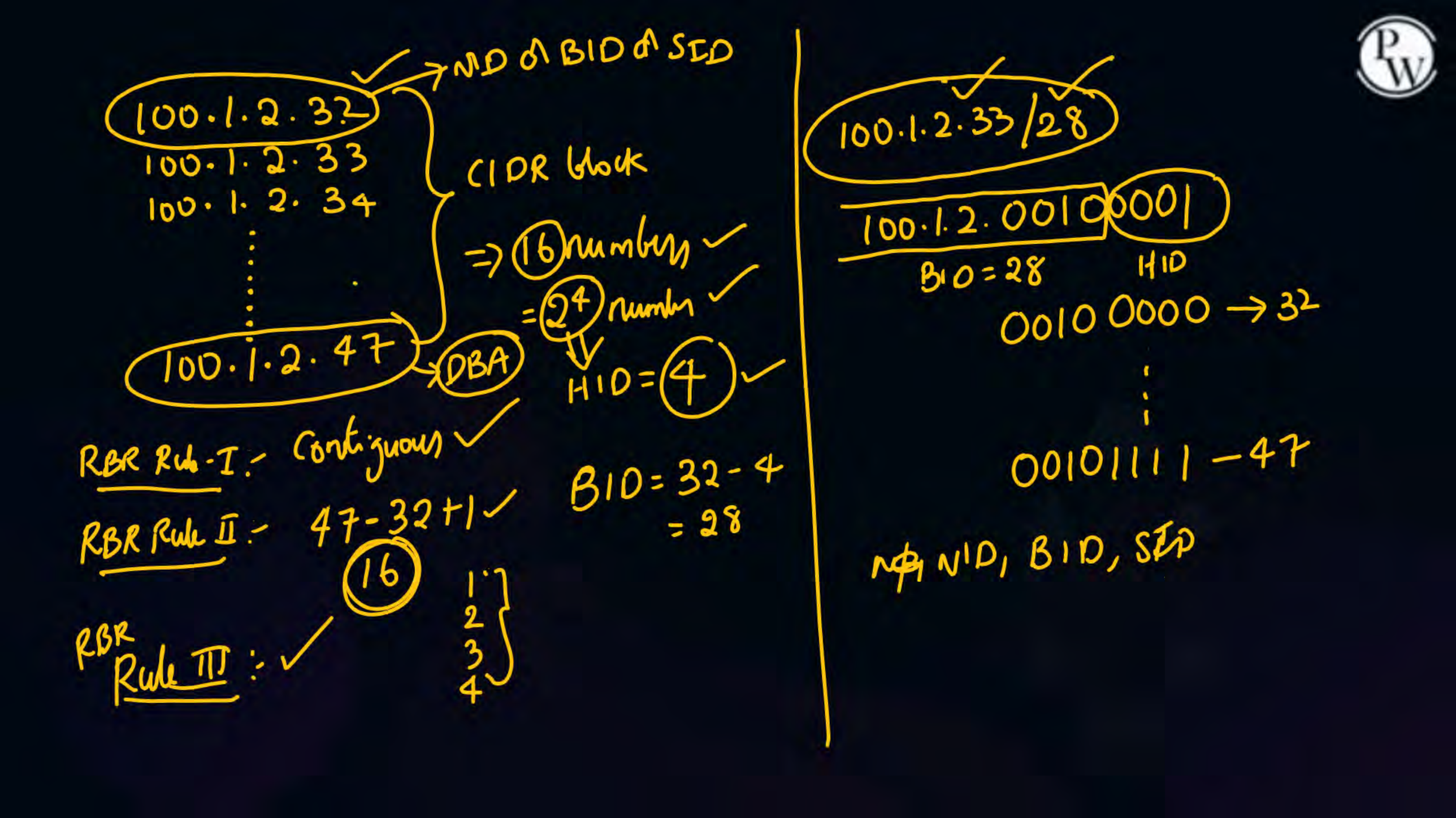
15 + 1 = 16

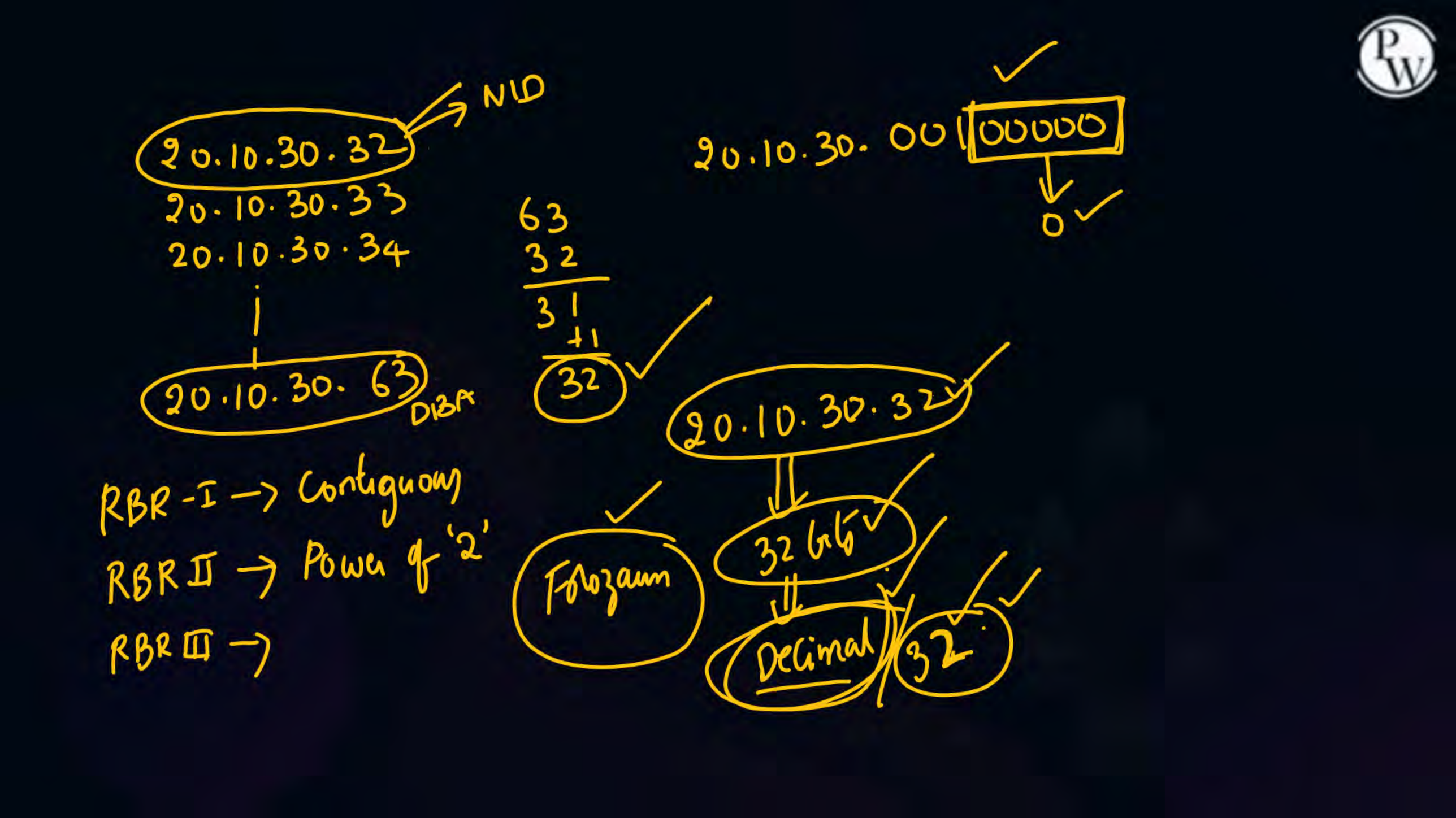
1 2 3 4 } 4 − 1 + 1

2^4 → Rem 4 bits

2^5 → Rem 5 bits

2^6 → Rem 6 bits


NID of BID of SID
100.1.2.32
100.1.2.33
100.1.2.34
100.1.2.47
CIDR block
DBA
=> 16 numbers
= 24 number
HID = 4
RBR Rule-I :- Contiguous
RBR Rule II :- 47-32+1
16
RBR Rule III :
1
2
3
4
BID = 32 - 4
= 28
100.1.2.33/28
100.1.2.0010 0001
BID = 28
HID
0010 0000 → 32
00101111 - 47
NOW NID, BID, SID


20.10.30.32
NID
20.10.30.33
20.10.30.34
20.10.30.63
DIBA
63
32
31
+1
32
20.10.30.001 00000
0
20.10.30.32
32 bits
Decimal
32
Flozaam
RBR-I → Contiguous
RBR II → Power of '2'
RBR III →

20.10.30.001 00000

BID 001 00000 → 32

001 11 111 → 63

20.10.30.32

20.10.30.33

20.10.30.34

⋮

20.10.30.63

63

32

31

+1

32 ✓

Size → IP add - $\underline{32} = \underline{2^5}$ ⇒ HID = 5 bits

BID = 32 - 5 = 27 bits

20.10.30.32/27

RBR-I → Contiguous

RBR II → Power of '2'

RBR III →

150.10.20.64
150.10.20.65
150.10.20.66
⋮
150.10.20.127

127
64
63
1
64

2^6 - IP ⇒ HID = 6 bits

150.10.20.01 000000
BID HID

01000000 - 64
01000001
01000010
⋮
01111111 - 127

BID = 32 - 6 = 26

150.10.20.65/26

RBR I: Con

RBR II: 64 = 2^6

RBR III:- IP add should be divisible by Size of the block

3 min

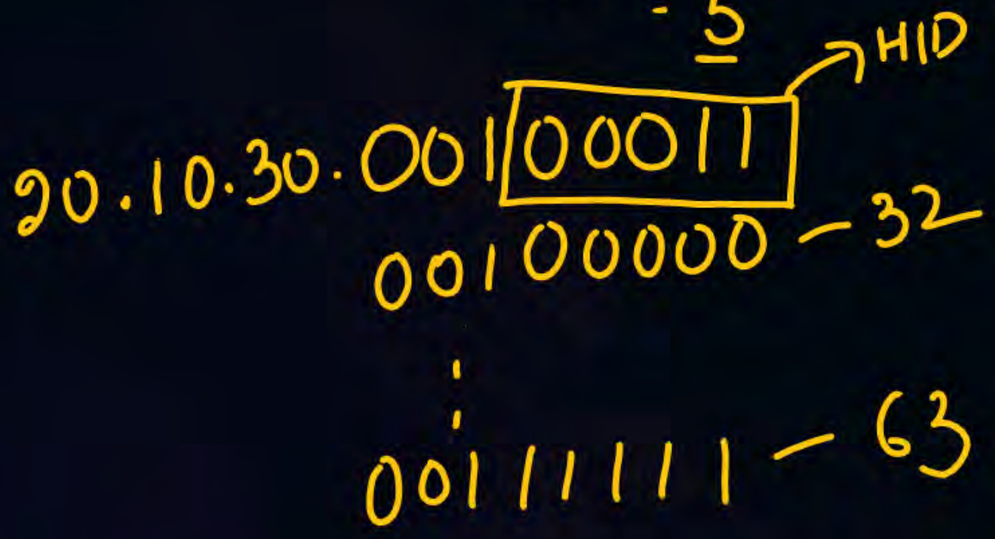
CIDR

20.10.30.35/27

SID of NID of BID = 27

HID = 32 - 27

= 5



100.1.2.35/28 ✓

NID & BID = 28

HID = 32 - 28 = 4

100.1.2.00100011 → HID

00100000 — 32

:

00101111 — 47

32-47

100.1.2.35/20

NID = 20

HID = 12

100.1.0000 | 0010.00100011

NID

HID

0010.00100011

0000.00000000 → 100.1.0.0 ✓

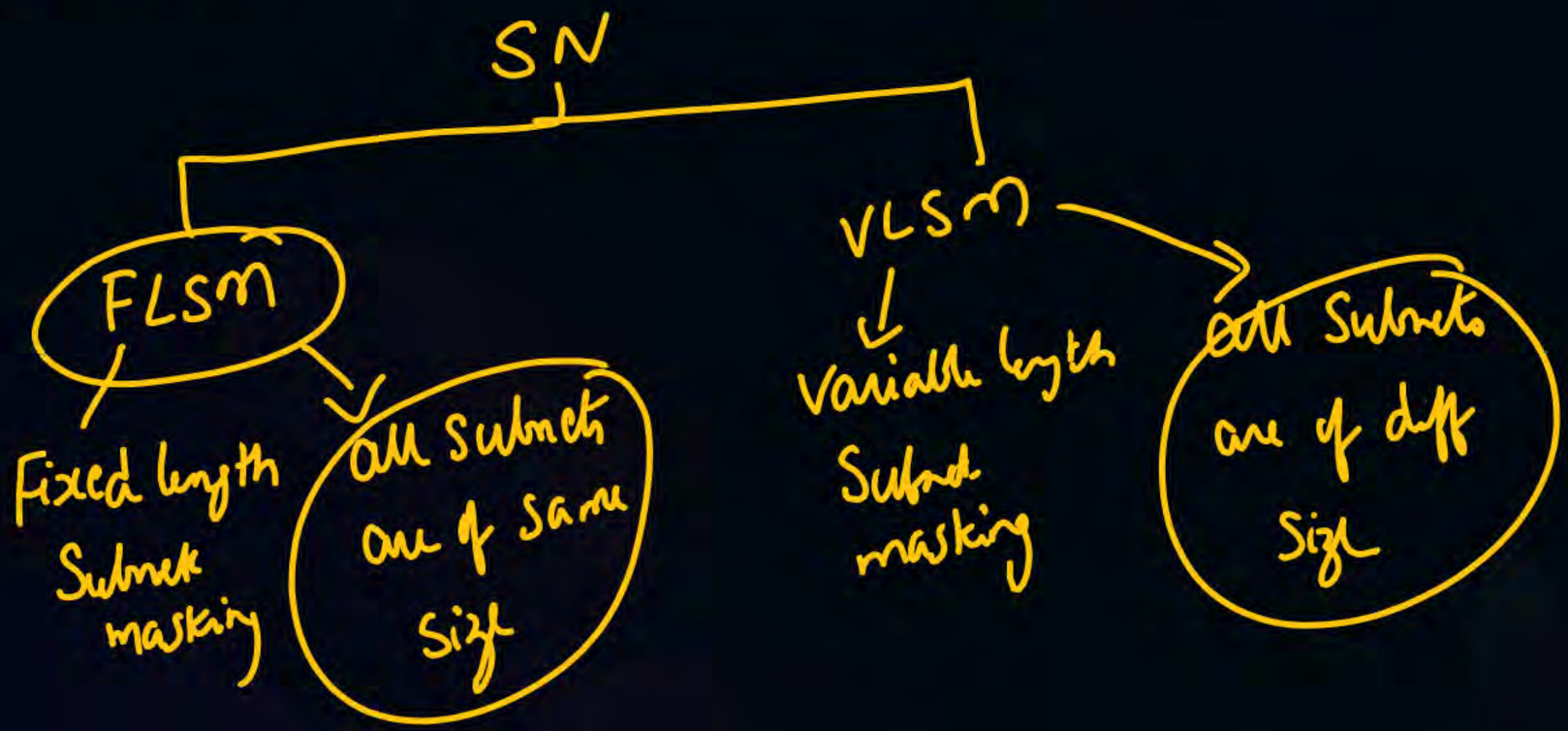
0000.00000001

⋮

1111.11111111 → 100.1.15.255 ✓

Subnetting in CIDR

FLSM in CIDR



FLSM in CIDR :-

20.30.40.10/25 ⇒ NID 20.30.40.0 | 0001010

0 0000000

0 1

20.30.40.0 | 00000000

SID

20.30.40.0 00 00000000

20.30.40.0 00 000000

20.30.40.63 00 111111

(0-63)

NID DBA

20.30.40.0

1 0000000

1 0000000

1 0000001

1 0000010

1 1111111

FLSM in CIDR :-

20.30.40.10/25 ⇒ NID 20.30.40.0 | 00001010

00000000

16+4

00000000.00000000.00000000.00001010

NID & BID

HID 00001010

01111111

16 → 4 0

8 → 1.

4 → 32

2 → +8

THANK - YOU