CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

Lecture No-21

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- Classless Addressing

Subnetting in CIDR

VLSM IN CIDR

① 100.100.100.14/25

NID = 25 bit

HID = 32 - 25 = 7 bit

No. of IP Addresses Available in this Block = 2^7

No. of Host Available in this block = $2^7 - 2$

100.100.100.0 | 0001110

8+8+8+1 | 7

NID | HID

100.100.100.0 | -------

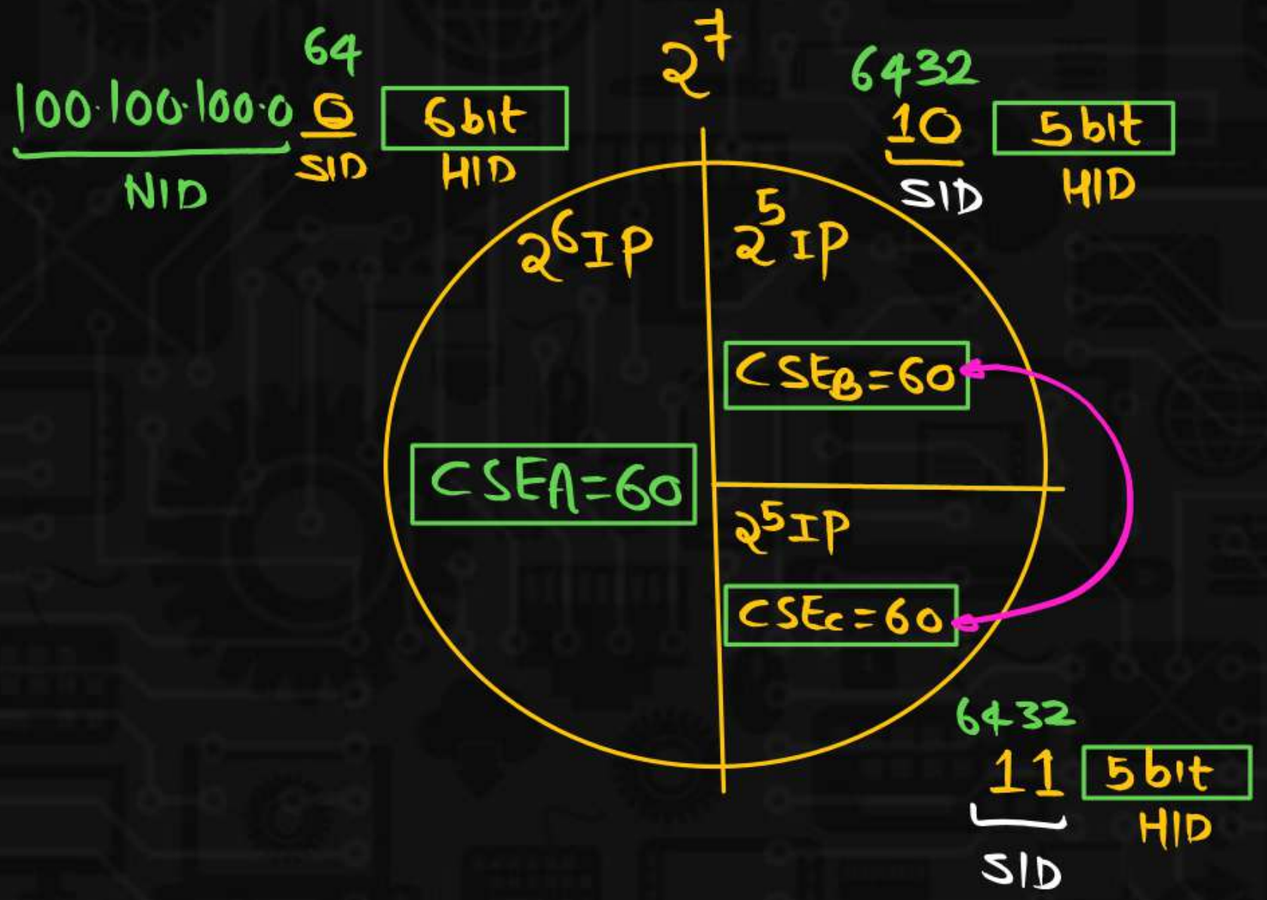
NID | HID

CSE$_A$ = 60

CSE$_B$ = 30

CSE$_C$ = 30

120 ≤ $2^7 - 2$ (yes)



1st way

CSE_A
- SID: 100·100·100·0 | 26
- DBA: 100·100·100·63 | 26

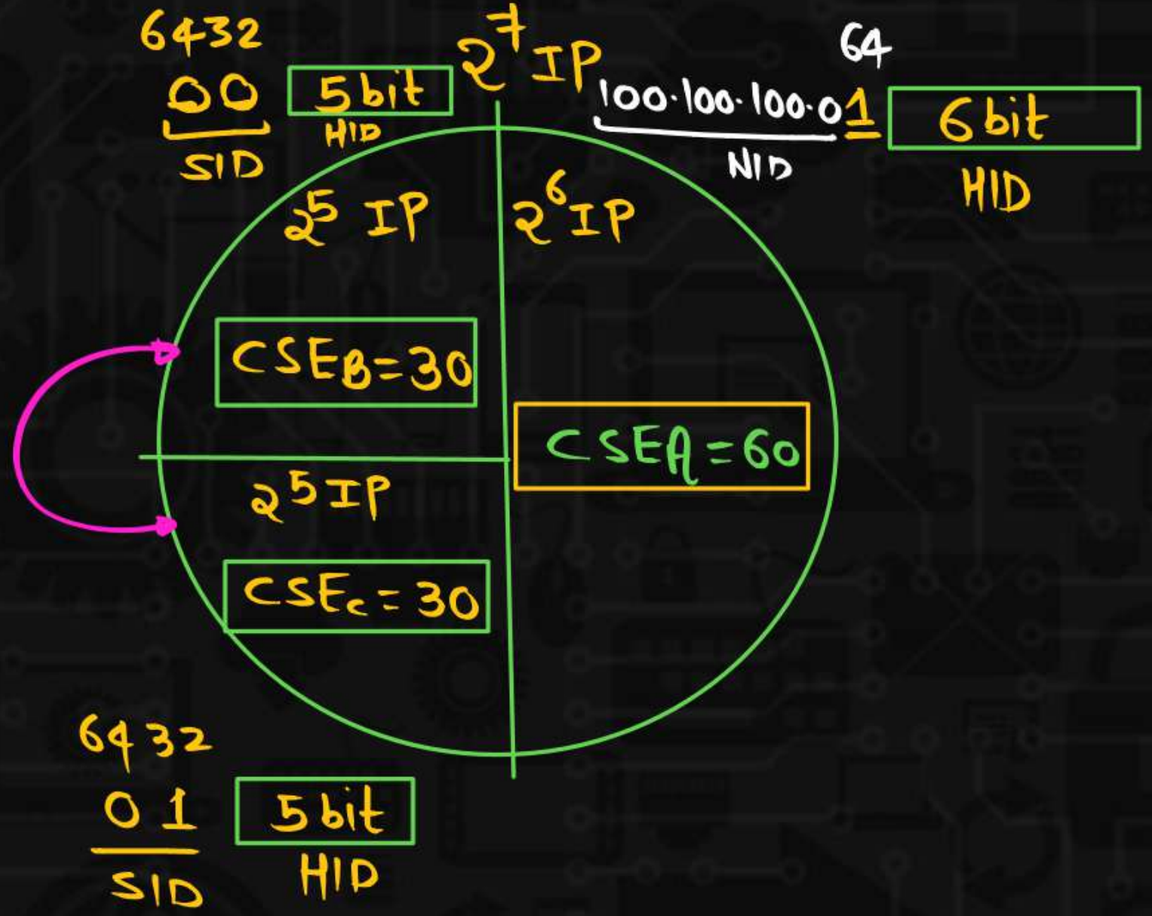
CSE_B
- SID: 100·100·100·64 | 27
- DBA: 100·100·100·95 | 27

CSE_C
- SID: 100·100·100·96 | 27
- DBA: 100·100·100·127 | 27

IInd way

CSE_A
CSE_B
CSE_C

OR



IIIrd way

CSE$_A$ — SID: 100·100·100·64|26; DBA: 100·100·100·127|26

CSE$_B$ — SID: 100·100·100·0|27; DBA: 100·100·100·31|27

CSE$_C$ — SID: 100·100·100·32|27; DBA: 100·100·100·63|27

IVth way

CSE$_A$

CSE$_B$ ↺

CSE$_C$ ↺

(2) 100.100.14.14/20

NID = 20 bit

HID = 32 − 20 = 12 bit

No. of IP Addresses Available in this Block = 2^{12} = 4096

No. of Host Available in this Block = $2^{12} - 2 = 4094$

100.100.0000 | 1110.00001110

8 + 8 + 4 | HID

NID

100.100.0000 ----------

8 + 8 + 4 | HID

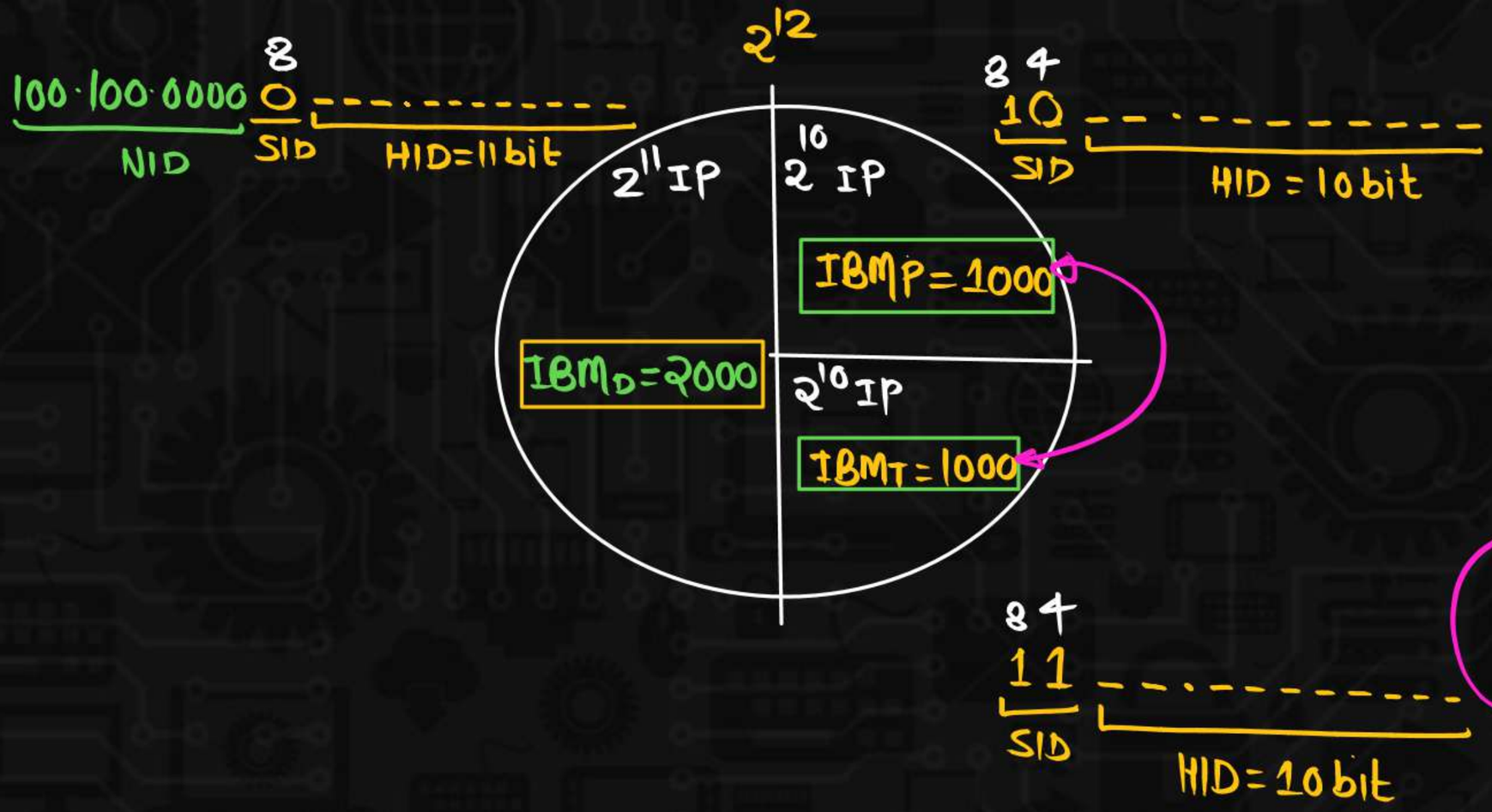
NID

$IBM_D = 2000$

$IBM_P = 1000$

$IBM_T = 1000$

$4000 \leq 4094$ (Yes)



ADRule (1st way)

IBM_D
- SID: 100·100·0·0|21
- DBA: 100·100·7·255|21

IBM_P
- SID: 100·100·8·0|22
- DBA: 100·100·11·255|22

IPM_T
- SID: 100·100·12·0|22
- DBA: 100·100·15·255|22

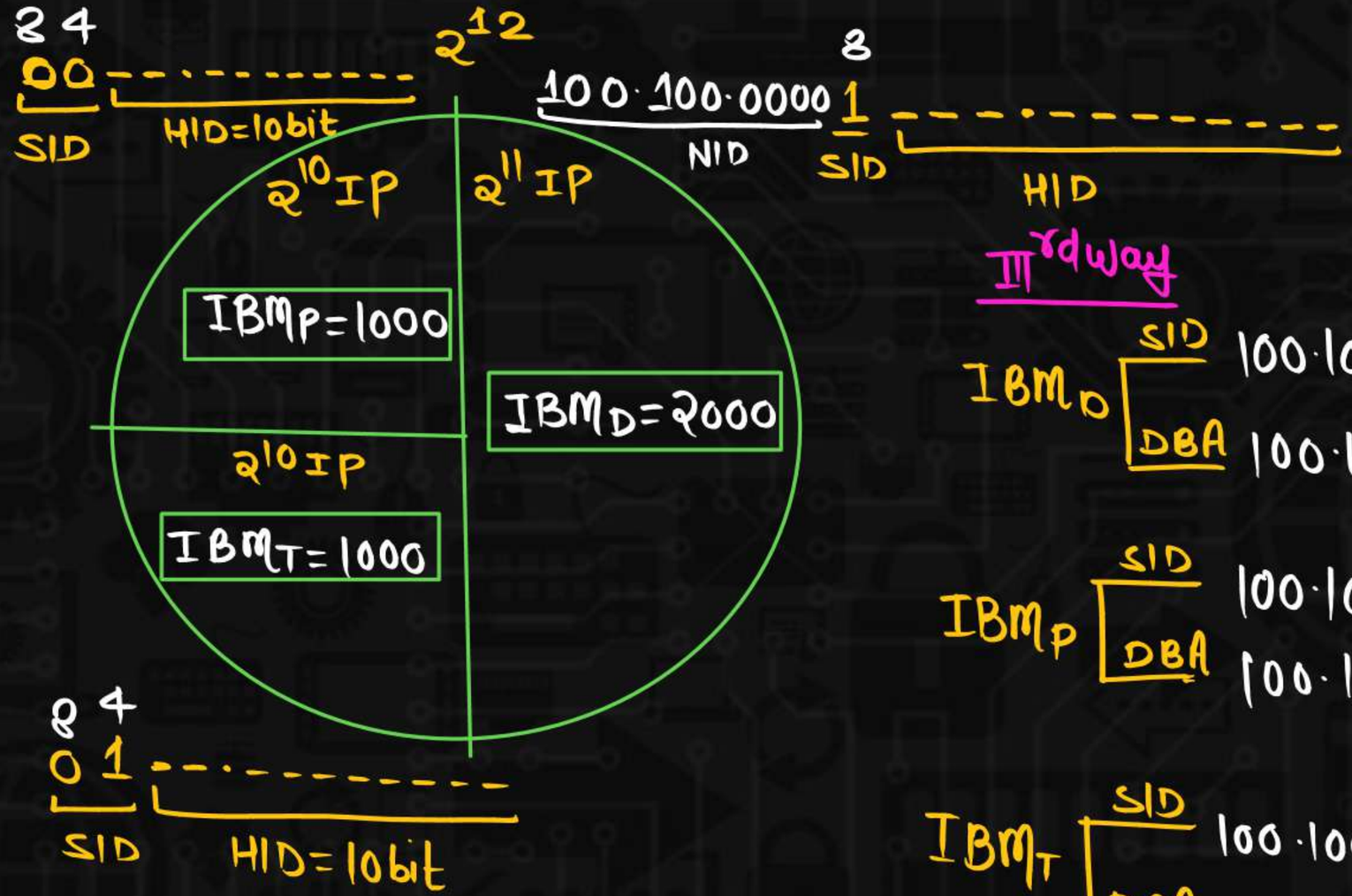
IInd way

IBM_D

IBM_P

IBM_T

OR



III rd way

IBM_D SID 100.100.8.0 | 21
DBA 100.100.15.255 | 21

IBM_P SID 100.100.0.0 | 22
DBA 100.100.3.255 | 22

IBM_T SID 100.100.4.0 | 22
DBA 100.100.7.255 | 22

IVth way

IBM_D

IBM_P

IBM_T

IBM D

100.100.0000 0 ----------

NID | SID | HID

100.100.0000 0 000.00000000 ⟶ 100.100.0.0/21

⋮

100.100.0000 0 111.11111111 → 100.100.7.255/21

NID | SID

PROBLEM SOLVING ON CLASSLESS ADDRESSING

Q.1 In the network 200.10.11.144/27 , the fourth octet (in decimal) of last IP address of the network which can be assigned to a host -- ~~(158)~~ --

GATE-2M

200 · 10 · 11 · 144 | 27

NID = 27 bit , HID = 5 bit

200 · 10 · 11 · 100 | 10000
8 + 8 + 8 + 3 | HID
NID

200 · 10 · 11 · 100 -----
NID HID

200 · 10 · 11 · 100 11110 → 200 · 10 · 11 · 158
NID HID

Last Host

HID must be : 11110
HID

200.10.11.100 ------

NID HID

200.10.11.100 00000 → 200.10.11.128] BID | SID | NID

200.10.11.100 00001 → 200.10.11.129] 1st Host

⋮

200.10.11.100 11110 → 200.10.11.158] Last Host

200.10.11.100 11111 → 200.10.11.159] DBA

Q.2 A n Internet Service Provider (ISP) has the following chunk of CIDR-based IP addresses available with it: 245.248.128.0/20. The ISP wants to give half of this chunk of addresses to Organization A, and a quarter to Organization B, while retaining the remaining with itself. Which of the following is a valid allocation of addresses to A and B?

GATE-२०१२

A. 245.248.136.0/21 and 245.248.128.0/22

B. 245.248.128.0/21 and 245.248.128.0/22

C. 245.248.132.0/22 and 245.248.132.0/21

D. 245.248.136.0/24 and 245.248.132.0/21

245.248.128.0/20

NID = 20 bit , HID = 32 - 20 = 12 bit

No. of IP Addresses Available = 2^{12}

No. of Host Available = $2^{12} - 2$

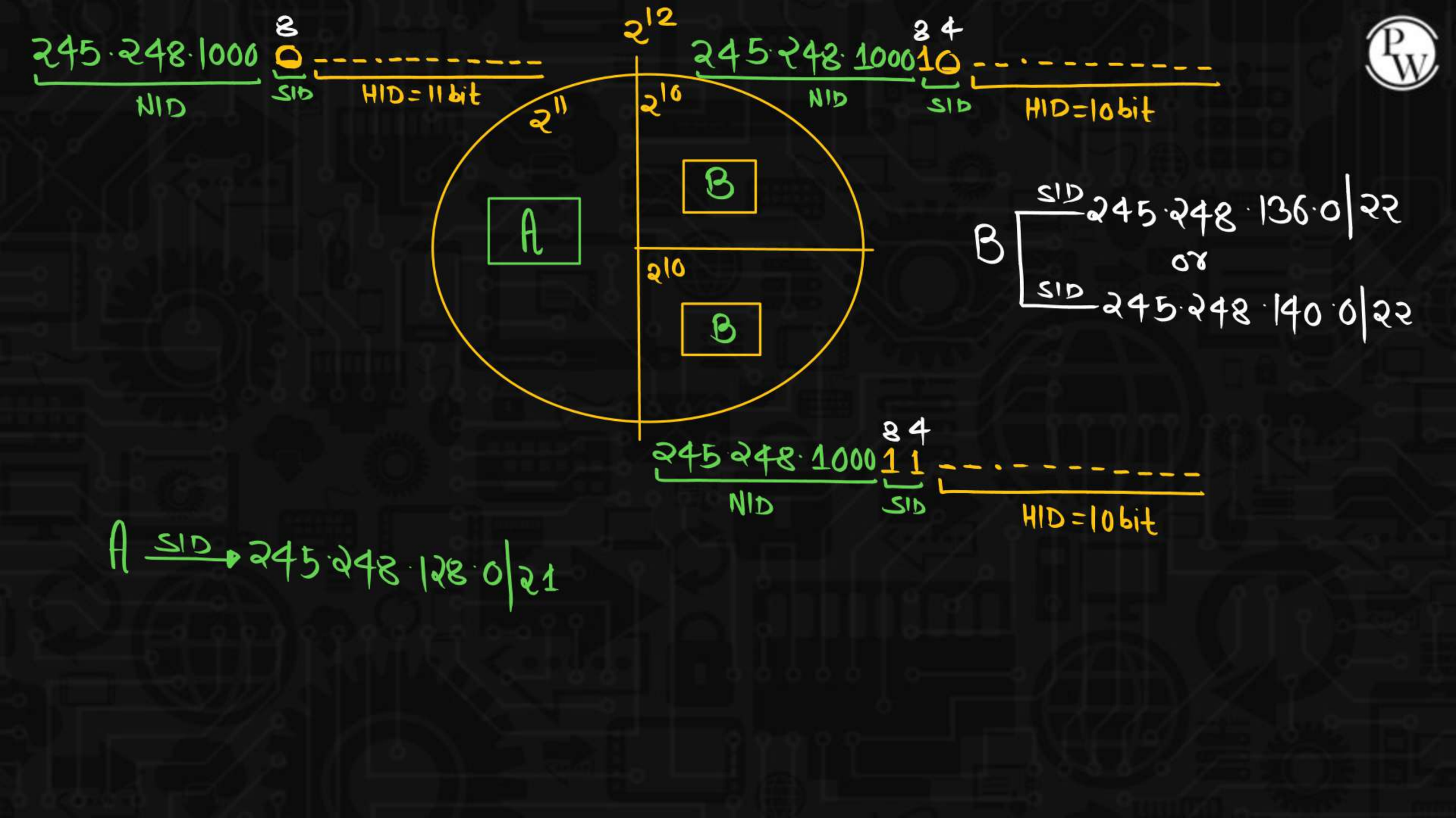
245.248.1000 0000.00000000

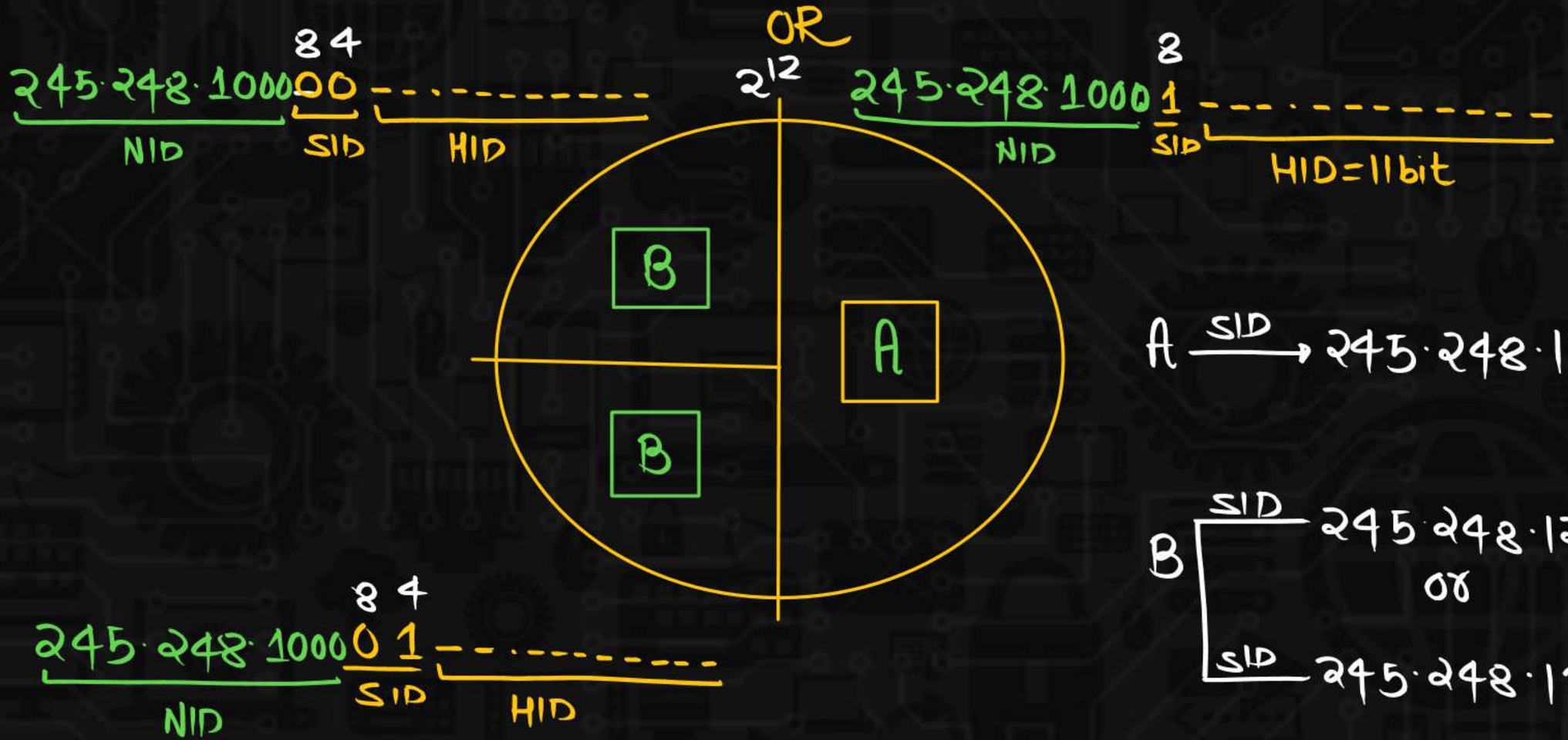
8 + 8 + 4

NID | HID

245.248.1000 ----.----------

NID | HID = 12 bit


245.248.1000 0 ----------
NID
SID
HID=11bit
8
2^{12}
245.248.1000 10 ---------
NID
SID
HID=10bit
8 4
2^{11}
2^{10}
A
B
2^{10}
B
245.248.1000 11 ---------
NID
SID
HID=10bit
8 4
B
SID
245.248.136.0/22
or
SID
245.248.140.0/22
A SID → 245.248.128.0/21



A $\xrightarrow{SID}$ 245·248·136·0|21

B
- SID → 245·248·128·0|22
- or
- SID → 245·248·132·0|22

Q.3 In IPv4 match the corresponding host IP address with their network ID.

List-1 (Network ID)		List-II (Host IP)	
P.	203.207.208.0	1.	203.207.175.45/20
Q.	203.207.160.0	2.	203.207.190.37/20
R.	203.207.176.0	3.	203.207.210.42/20

Codes:

	P	Q	R
A.	3	1	2
B.	2	3	1
C.	3	2	1
D.	2	1	3

1. 203.207.175.45/20, NID = 20bit, HID = 12bit

203.207.1010 ---- . --------

8 + 8 + 4 | HID

NID

203.207.1010 0000.00000000

203.207.160.0 (NID)

Q.4 An organization is granted the block 150.36.0.0/16. The Administrator want to create 512 subnets. What is the subnet mask.

A. 255.255.255.192/26

B. 255.255.255.224/27

C. 255.255.255.128/25 ✓

D. 255.255.255.240/28

150.36.0.0/16

NID 16 | HID 16

512 subnet

16 NID | 9 SID | 7 HID

No. of 1's in the S.M = NID + SID = 16 + 9 = 25

No. of 0's " " " = HID = 7

11111111.11111111.11111111.10000000

255.255.255.128/25

Q.5 Block contains 64 IP address which of the following can be first address of the block

A. 200.50.60.32 : 200.50.60.00 | 100000 | 2^6 (Rem or HID)

B. 200.50.60.192 : 200.50.60.11 | 000000 | 2^6 (Rem or HID)

C. 200.50.60.191 : 200.50.60.10 | 111111 | 2^6 (Rem / HID)

D. None

No. of IP Addresses Available in the Block = 64 = 2^6

Block size = 2^6

First IP Address of the Block must be divisible by size of the Block

Q.9 Which of the following is/are true:

A. 192.54.10.96 is a valid IP address in the 192.54.10.64/26 subnet

B. 127.0.0.1 is a valid source address

C. 255.255.255.255 is a valid destination address

D. The subnet 193.10.32.0/19 has a subnet mask of 255.255.32.0

9PM - 11PM