CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

Lecture No-22

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- Classless Addressing

Q.6 Block contains 16 IP address which of the following can be the first address of the block?

MSQ

A. 199.16.16.0 : 199.16.16.00000000 | 2^4 (Rem)

B. 199.16.16.160 : 199.16.16.10100000 | 2^4 (Rem)

C. 199.16.16.161 : 199.16.16.10100001 | 2^4 (Rem X)

D. None

(A, B)

No of IP Addresses Avaliable in the Block = 16 = 2^4

Block size = 2^4

1st IP Address of the Block must be divisible by size of the Block

Q.7 Block contains 2048 IP address which of the following can be the first address of the block

H.W

A. 16.15.19.0

B. 16.15.16.0

C. 16.16.16.8

D. None

Q.8 Which of the following would support best point to point link?

A. /30

B. /24

C. /26

D. /27

(a) /30

NID = 30 bit, HID = 2 bit

No. of IP Addresses = $2^2 = 4$

- NID
- Host-1
- Host-2
- DBA

(b) /24

NID = 24 bit, HID = 8 bit

No. of IP Addresses = $2^8 = 256$

MSQ

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

127.X.X.X → will Always be used as a Destination IP

C. 255.255.255.255 is a valid destination address

LBA will Always be used as a Destination IP

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

S.M = 11111111.11111111.11100000.00000000

255.255.224.0

(A, C)

192.54.10.64/26

NID = 26 bit, HID = 6 bit

192.54.10.01 ------

8 + 8 + 8 + 2 (NID) | (HID)

192.54.10.01000000 → 192.54.10.64

192.54.10.01000001 → 192.54.10.65

⋮

192.54.10.01111110 → 192.54.10.126

192.54.10.01111111 → 192.54.10.127

Q.10 What is the Network ID, Broadcast address, First Usable IP, or Last Usable IP on the subnetwork that the host 172.30.118.230/23 is a part of?

A. Network ID: 172.30.118.0

B. Broadcast address: 172.30.255.255

C. First usable IP : 172.30.118.1

D. Last Usable IP : 172.30.119.254

(A, C, D)

172.30.118.230/23

NID = 23 bit, HID = 32 - 23 = 9 bit

172.30.01110110 . . . . . (HID)

8 + 8 + 7 (NID)

172.30.01110110.00000000 → 172.30.118.0] BID/SID/NID

172.30.01110110.00000001 → 172.30.118.1] 1st Host

⋮

172.30.01110111.11111110 → 172.30.119.254] Last Host

172.30.01110111.11111111 → 172.30.119.255] DBA

Q.11 In the network 143.128.67.235/20, if x represent the decimal value of 3rd octet and y represent the decimal value of 4th octet of last address assigned to any host, then value of x + y is 333

143.128.67.235|20 , NID=20bit, HID=32-20=12 bit

143.128.0100 ----------
8 +8 +4

HID=12 bit

143.128.0100 1111.11111110 → 143.128.79.254

NID HID

X Y

X+Y= 79+254 = 333

Q.12

An organization is granted a block of address with beginning address 14.24.74.0/24. The organization need to have 3 sub blocks of addresses to use in its three subnets: one sub block of 10 addresses , one sub block of 60 addresses and one sub blocks of 120 addresses. Find the first and last address of each sub blocks

[MCQ]

A. 14.24.74.0/25 and 14.24.74.127/25
14.24.74.128/26 and 14.24.74.191/26
14.24.74.192/26 and 14.24.74.255/26

B. 14.24.74.0/25 and 14.24.74.127/25
14.24.74.128/26 and 14.24.74.191/26
14.24.74.192/28 and 14.24.74.207/28

C. 14.24.74.1/25 and 14.24.74.126/25
14.24.74.129/26 and 14.24.74.190/26
14.24.74.193/28 and 14.24.74.206/28

D. 14.24.74.0/25 and 14.24.74.127/25
14.24.74.128/27 and 14.24.74.191/27
14.24.74.192/28 and 14.24.74.207/28

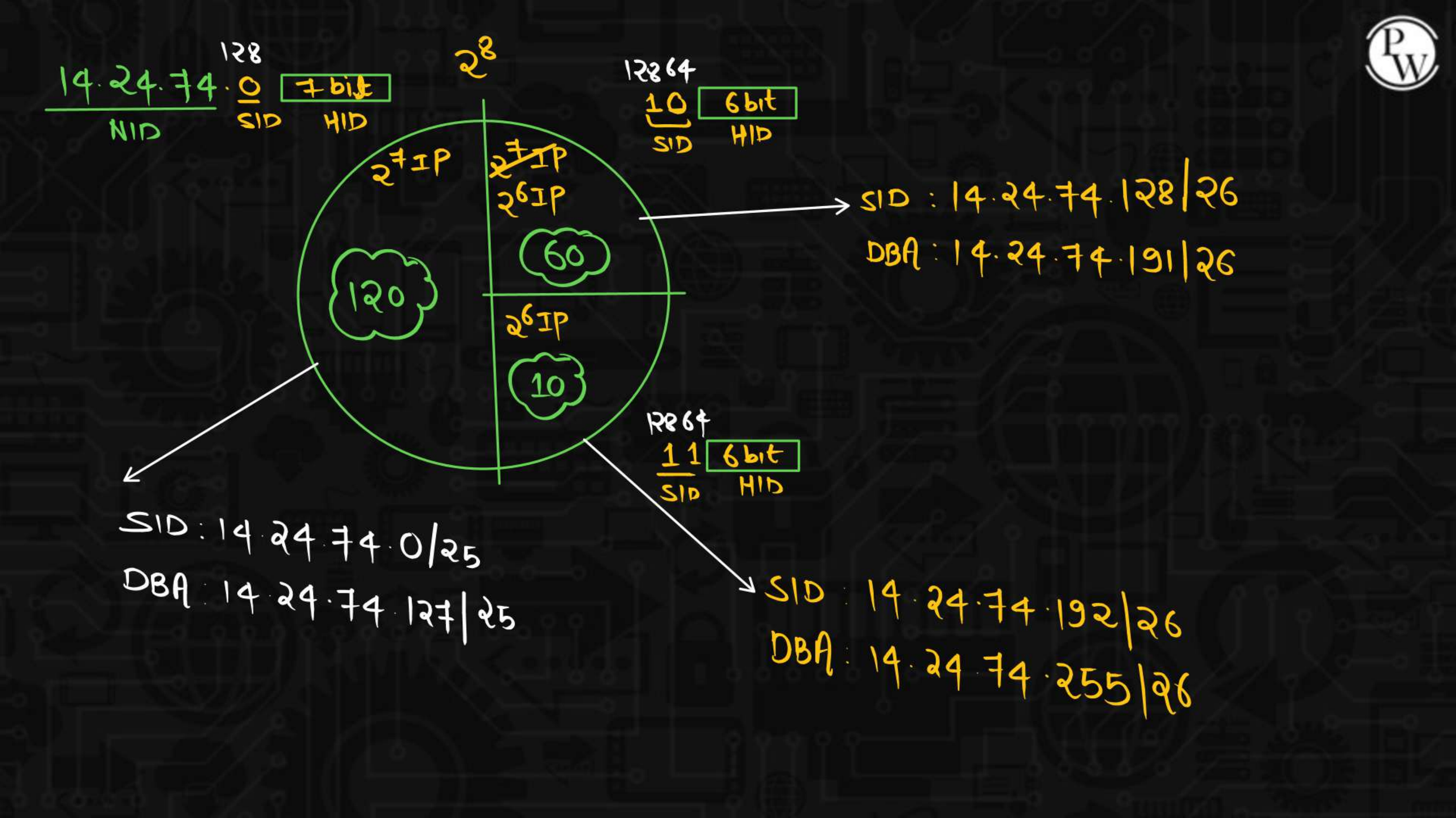
14.24.74.0/24

NID = 24, HID = 32-24 = 8 bit

No of IP Addresses Available in this Block = 2^8

120
60
10

$190 \leq 2^8$ (yes)


14.24.74.0
NID
SID
HID
7 bit
128
2^8
2^7 IP
2^7 IP
2^6 IP
120
60
2^6 IP
10
128 64
10
6 bit
SID
HID
SID : 14.24.74.128/26
DBA : 14.24.74.191/26
SID : 14.24.74.0/25
DBA : 14.24.74.127/25
128 64
11
6 bit
SID
HID
SID : 14.24.74.192/26
DBA : 14.24.74.255/26

OR

SID = 14.24.74.0|25

DBA = 14.24.74.127|25

SID = 14.24.74.128|26

DBA = 14.25.74.191|26

SID = 14.24.74.192|28

DBA = 14.24.74.207|28

Q.13 An internet service provider (ISP) is granted a block of addresses starting with 162.72.0.0/16. The ISP needs to distribute these addresses to three groups of customers as follows:

1. The first group has 128 customers; each needs 256 addresses.
2. The second group has 128 customers; each needs 64 addresses.
3. The third group has 64 customers; each needs 128 addresses.

4. Find the last address of 6^{th} customer of the 2^{nd} group and how many addresses are still available with ISP after these allocations.

162.72.0.0/16

NID 16 | HID 16

No. of IP Addresses Available in this Block $= 2^{16}$

1st Group: 128 customer, each need 256 Addresses

$128 * 256 = 2^7 * 2^8 = 2^{15}$ Addresses

2nd Group: 128 customer, each need 64 Addresses

$128 * 64 = 2^7 * 2^6 = 2^{13}$ Addresses

3rd Group: 64 customer, each need 128 Addresses

$64 * 128 = 2^6 * 2^7 = 2^{13}$ Addresses

Addresses still Available $= 2^{16} - (2^{15} + 2^{13} + 2^{13})$

$= 2^{16} - [2^{15} + 2^{14}]$

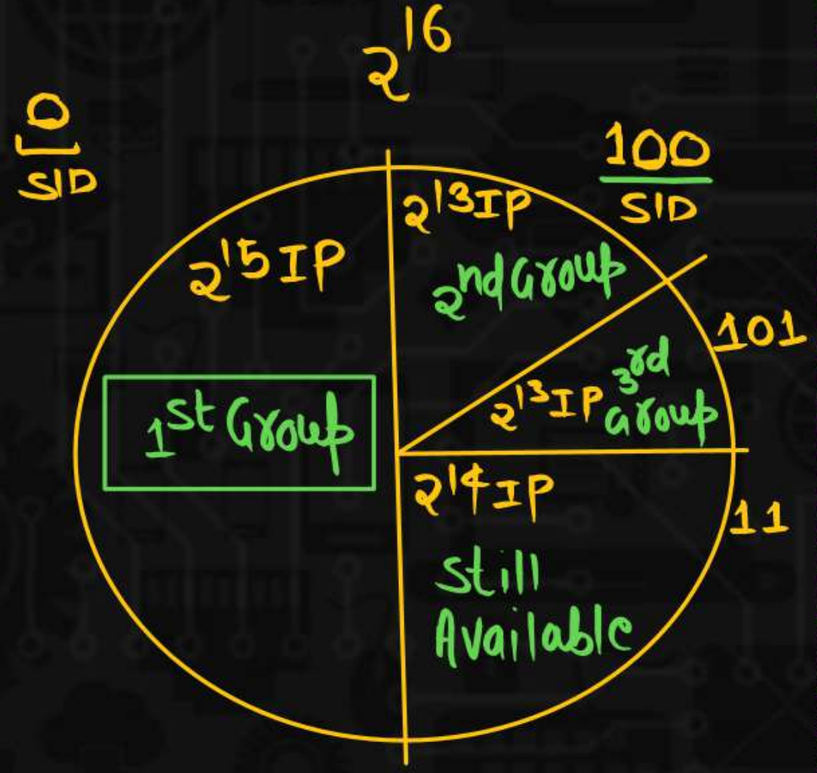
$= 2^{16} - 2^{14}(2^1 + 1)$

$= 2^{16} - 3 * 2^{14}$

$= 2^2 * 2^{14} - 3 * 2^{14}$

$= 4 * 2^{14} - 3 * 2^{14}$

$= 2^{14}$



$162.72.0.0/16$

NID	HID
16	16

I st Group:

16	1	15
NID	SID	HID

1 st Group:

$162.72.\underset{SID}{0}$ ---------- (HID = 15 bit)

NID

$162.72.00000000.00000000 \rightarrow 162.72.0.0/17$

$162.72.0\ 1111111.11111111 \rightarrow 162.72.127.255/17$

$162.72.0.0/17$

NID	HID
17	15

128 customer or subnet

17 = 7 (NID + SID) & (HID)

162.172.0 -------.--------
NID SID HID

1st Group : 1st customer

162.172.0 0000000.00000000 → 162.172.0.0/24
NID SID HID

162.172.0 0000000.11111111 → 162.172.0.255/24

1st Group : 2nd customer

162.172.0 0000001.00000000 → 162.172.1.0/24
NID SID HID

162.172.0 0000001.11111111 → 162.172.1.255/24
SID

1st Group: 128th customer

162.72.0 11111111.00000000 → 162.72.127.0/24

NID SID HID

162.72.0 11111111.11111111 → 162.72.127.255/24

2nd Group

162.72.100.-------.--------

NID | SID | HID

162.72.100.00000.00000000 → 162.72.128.0/19

⋮

162.72.100.11111.11111111 → 162.72.159.255/19

162.72.128.0/19

NID	HID
19	13

128 customer or 128 subnet

NID	SID	HID
19	7	6

2nd Group: 1st customer

162.72.100 ------.--- ------

NID SID HID

162.72.100 00000.00 000000 → 162.72.128.0/26

NID SID HID

162.72.100 00000.00 111111 – 162.72.128.63/26

NID NID

Ankitdoylasirpw


THANK YOU
GW
SOLDIERS !