CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

Lecture No-11

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Subnetting Part-4

Subnetting Category 3

Q.1 Consider a Class C network with 7-subnets and 25 hosts per subnet. An appropriate Subnet Mask for this network?

class-C

$7 \times 25 \leq 2^8 - 2$

$175 \leq 254$ (yes)

class-C

24	8
NID	HID

7 subnet

3	5
SID	HID

$2^3 = 8$ subnet

$2^5 - 2$ = 30 Host/subnet

NID	SID	HID
24	3	5

No. of 1's in the S.M = NID + SID = 24 + 3 = 27

No. of 0's in the S.M = HID = 5

11111111.11111111.11111111.111 00000 → 255.255.255.224 (Best)

(NID) (SID) (HID)

11111111.11111111.11111111.00000111 → 255.255.255.7

11111111.11111111.11111111.00101100 → 255.255.255.44

11111111.11111111.11111111.00101001 → 255.255.255.41

⋮

All are Possible

SM	No. of 1's
① $255.255.255.8$ (8+8+8+1)	25 (Invalid)
② $255.255.255.9$ (8+8+8+2) (8+1)	26 (Invalid)
③ $255.255.255.10$ (8+8+8+2) (8+2)	26 (Invalid)
④ $255.255.255.11$ (8+8+8+3) (8+2+1)	27 (Valid)
⑤ $255.255.255.12$ (8+8+8+2) (8+4)	26 (Invalid)
⑥ $255.255.255.13$ (8+8+8+3) (8+4+1)	27 (Valid)
⑦ $255.255.255.14$ (8+4+2)	27 (Valid)
⑧ $255.255.255.15$ (8+8+8+4) (8+4+2+1)	28 (Invalid)

Q.2 Consider a Class B network with 180-subnets and 200 hosts per subnet. An appropriate Subnet Mask for this network ?

Class-B

$180 * 200 \leq 2^{16} - 2$

$36,000 \leq 65,534$ (Yes)

Class-B

NID	HID
16	16

180 subnet

16	8	8
NID	SID	HID

No. of subnet $= 2^8 = 256$

No. of Host/subnet $= 2^8 - 2 = 254$

16 | 8 | 8
NID | SID | HID

No. of 1's in the S.M = NID + SID = 16 + 8 = 24

No. of 0's in the S.M = HID = 8

11111111.11111111.11111111.00000000 → 255.255.255.0 } Best

11111111.11111111.00000000.11111111 → 255.255.0.255

11111111.11111111.11110000.11110000 → 255.255.240.240

11111111.11111111.11111100.11000000 → 255.255.252.192 } All are Possible

⋮

Q.3 Consider a Class C network with 15-subnets and 20 hosts per subnet. An appropriate Subnet Mask for this network ?

class-c

$15 * 20 \leq 2^8 - 2$

$300 \leq 254$ (No)

Not Possible

class-c

NID	HID
24	8

15 subnet

4	4
SID	HID

$2^4 = 16$ subnet

$2^4 - 2 = 14$ Host/subnet

Q.4 Consider a Class C network with 3-subnets and 60 ,60, 120 hosts per subnet. An appropriate Subnet Mask for this network ?

$CSE_A = 120$

$CSE_B = 60$

$CSE_C = 60$

$240 \leq 2^8 - 2$ (Yes)

Case I

class-C

NID	HID
24	8

3 Subnet

2	6
SID	HID

$2^2 = 4$ subnet

$2^6 - 2 = 62$ Host/subnet

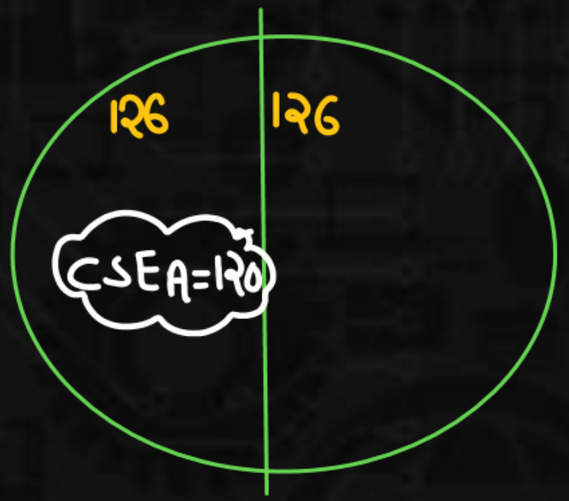
Case II

NID	HID
24	8

1	7
SID	HID

$2^1 = 2$ subnet

$2^7 - 2 = 126$ Host/subnet



Note: Both the case are Possible Here. To solve this Problem we use VLSM technique

VLSM technique

Subnetting Category 4

Q.1 Consider a Class C network with 3-subnets and 60, 60, 120 hosts per subnet. An appropriate Subnet Mask for this network ?

NID = 200.200.200.0 (Given)

$CSE_A = 120$

$CSE_B = 60$

$CSE_C = 60$

$240 \leq 2^8 - 2$ (Yes)

Class C

NID	HID
24	8

1	7
SID	HID

$2^1 = 2$ subnet

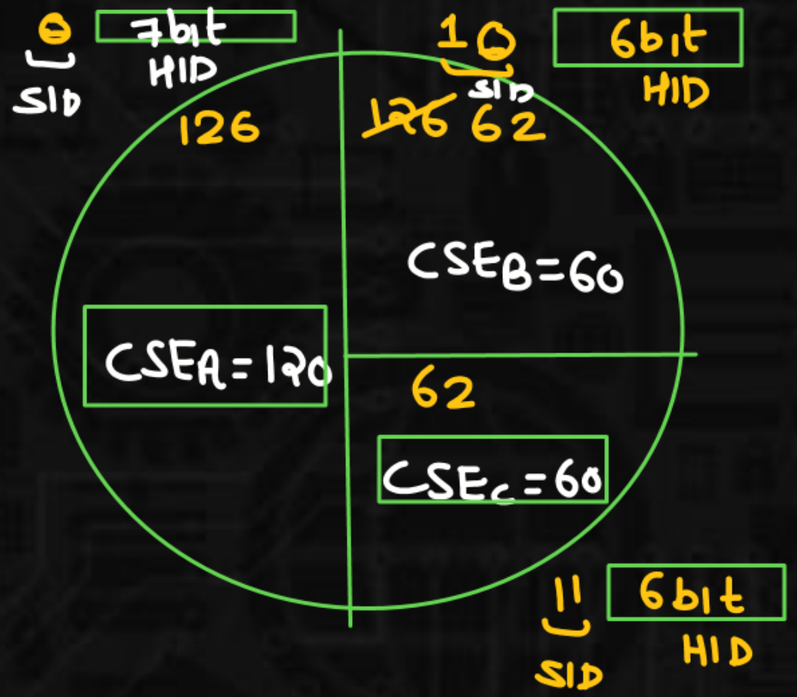
$2^7 - 2 = 126$ Host/Subnet

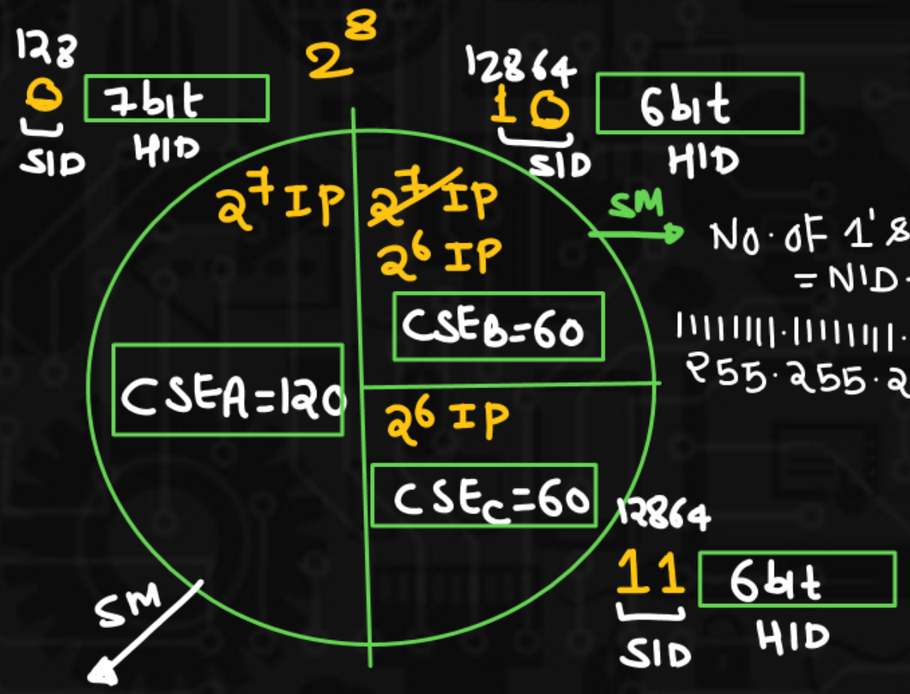
HID
7

1	6
SID	HID

$2^1 = 2$ subnet

$2^6 - 2 = 62$ Host/subnet





No. of 1's in the s.m = NID + SID = 24 + 2 = 26

11111111.11111111.11111111.11000000

255.255.255.192

No. of 1's in the s.m = NID + SID = 24 + 1 = 25

No. of 0's in the s.m = HID = 7

11111111.11111111.11111111.10000000

255.255.255.128

Ist way

CSE$_A$

SID	200.200.200.0
DBA	200.200.200.127
SM	255.255.255.128

CSE$_B$

SID	200.200.200.128
DBA	200.200.200.191
SM	255.255.255.192 (128+64)

CSE$_C$

SID	200.200.200.192
DBA	200.200.200.255
S.M	255.255.255.192 (128+64)

IInd way

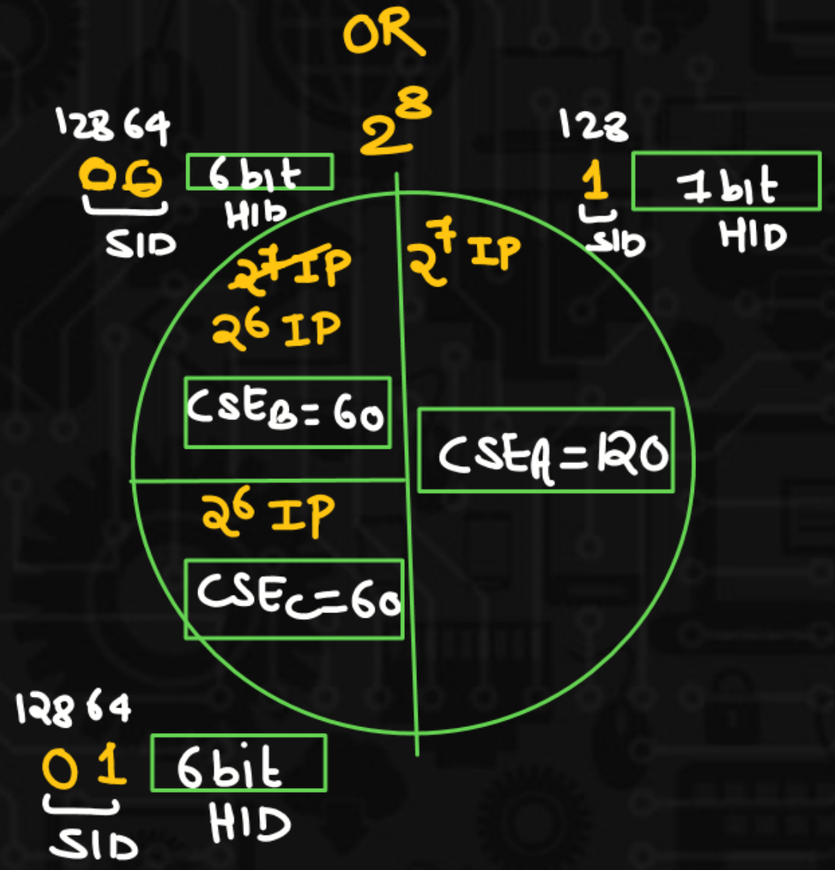
CSE$_A$
- SID : 200.200.200.0
- DBA : 200.200.200.127
- SM : 255.255.255.128

CSE$_B$
- SID : 200.200.200.192
- DBA : 200.200.200.255
- SM : 255.255.255.192

CSE$_A$

CSE$_B$ ⇄ CSE$_C$

CSE$_C$
- SID : 200.200.200.128
- DBA : 200.200.200.191
- SM : 255.255.255.192



III rd way

CSE_A
- SID — 200.200.200.128
- DBA — 200.200.200.255
- sm — 255.255.255.128

CSE_B
- SID — 200.200.200.0
- DBA — 200.200.200.63
- sm — 255.255.255.192 (128+64)

CSE_C
- SID — 200.200.200.64
- DBA — 200.200.200.127
- sm — 255.255.255.192 (128+64)

4th way

CSE_A

CSE_B

CSE_C

Q.2 Consider a Class C network with 4-subnets and 75, 35, 25, 20 hosts per subnet. An appropriate Subnet Mask for this network ?

75
35
25
20
---
155 $\leq 2^8 - 2$ (yes)

class-C

NID	HID
24	8

4 subnet

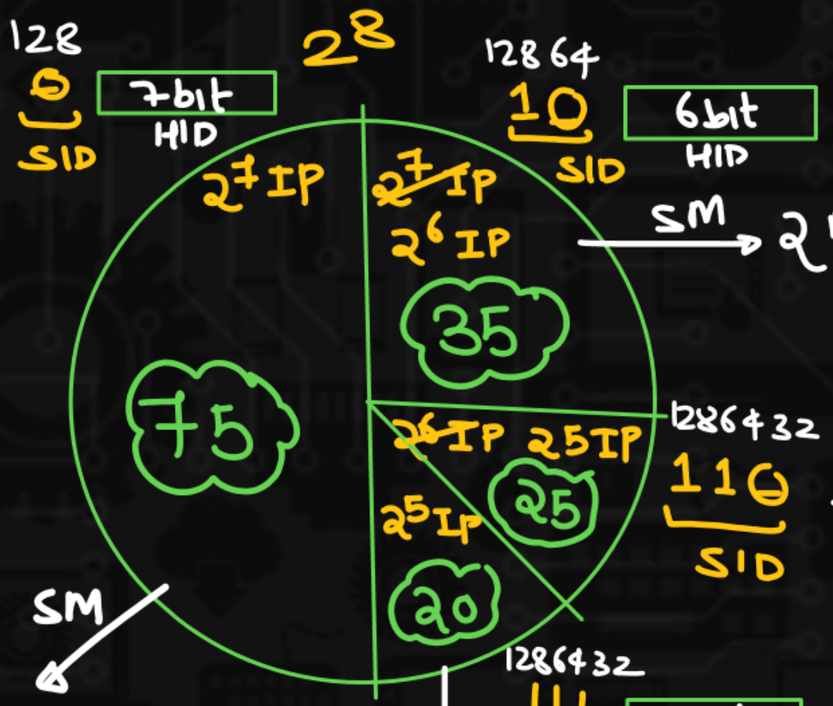
2	6
SID	HID

$2^2 = 4$ subnet

$2^6 - 2 = 62$ Host/subnet

Not possible

VLsm technique



Q.3 Consider a Class C network with 3-subnets and 130, 50, 50 hosts per subnet. An appropriate Subnet Mask for this network ?

$CSE_A = 130$

$CSE_B = 50$

$CSE_C = 50$

$230 \leq 2^8 - 2$ (yes)

class-c

NID	HID
24	8

3 subnet

2	6
SID	HID

$2^2 = 4$ subnet

$2^6 - 2 = 62$ Host/ subnet

Not Possible

VLSM technique

Not Possible

Q.4 Consider a Class C network with 6-subnets and 5, 10, 15, 20, 25, 30 hosts per subnet. An appropriate Subnet Mask for this network ?

5
10
15
20
25
30

$105 \leq 2^8 - 2$ (Yes)

Class-C

NID	HID
24	8

6 subnet

3	5
SID	HID

$2^3 = 8$ subnet

$2^5 - 2 = 30$ Host/subnet

SM : 255.255.255.224 (128+64+32) (Best)

NID	SID	HID
24	3	5

No. of 1's in S.M = NID + SID = 24 + 3 = 27

No. of 0's in S.M = HID = 5

11111111.11111111.11111111.11100000 → 255.255.255.224 (Best)

11111111.11111111.11111111.00000111 → 255.255.255.7

11111111.11111111.11111111.00101100 → 255.255.255.44

All are Possible

Q.5

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

No. of 1's in the sm or NID

7PM - 9PM


THANK YOU
GW
SOLDIERS !