CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

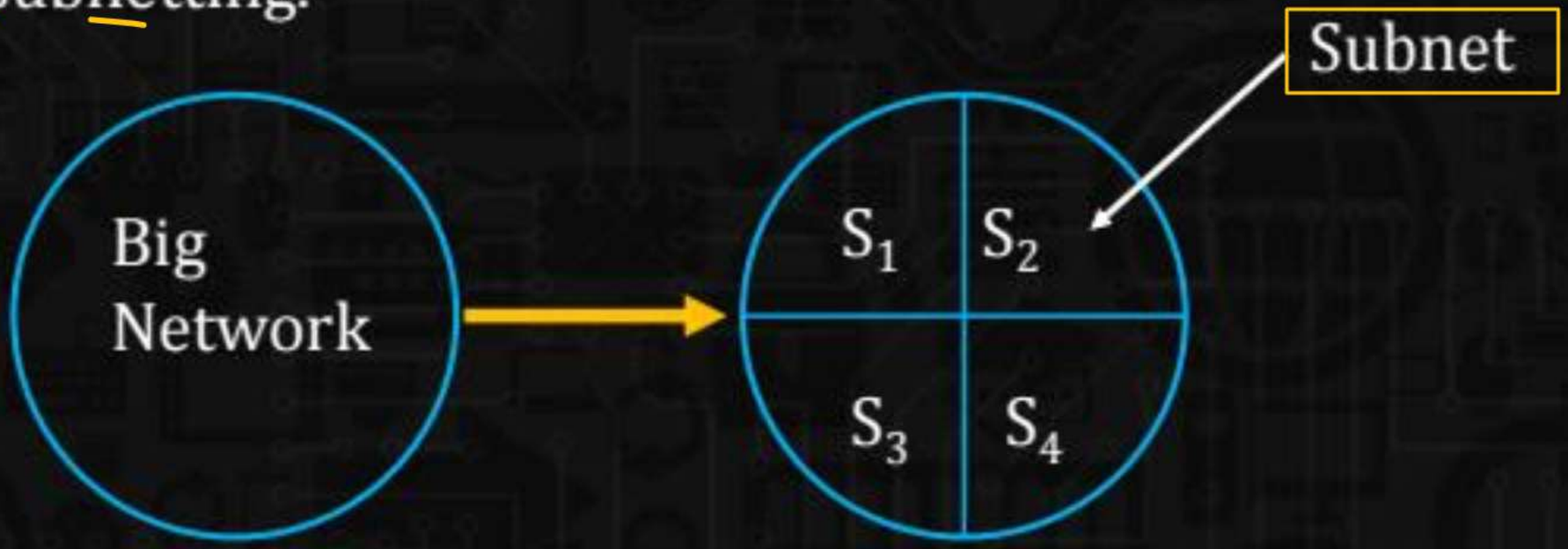
Lecture No-09

By- Ankit Doyla Sir

Subnetting Part-1

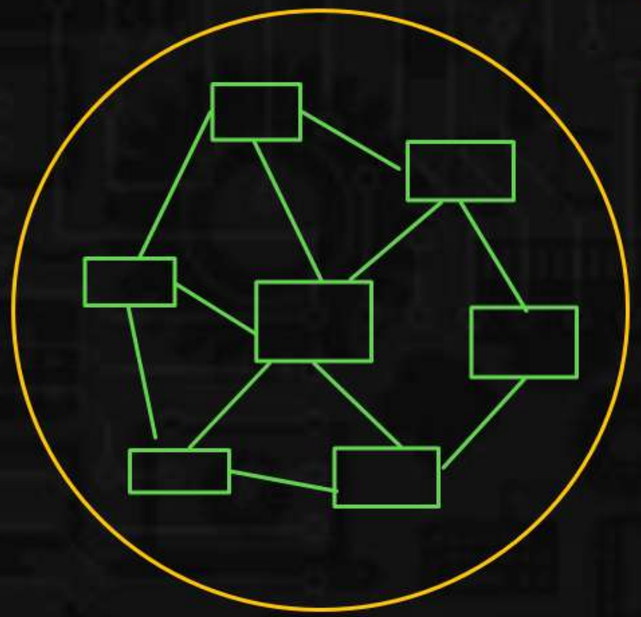
Subnetting

The process of dividing a big network into many smaller subnet is called as subnetting.

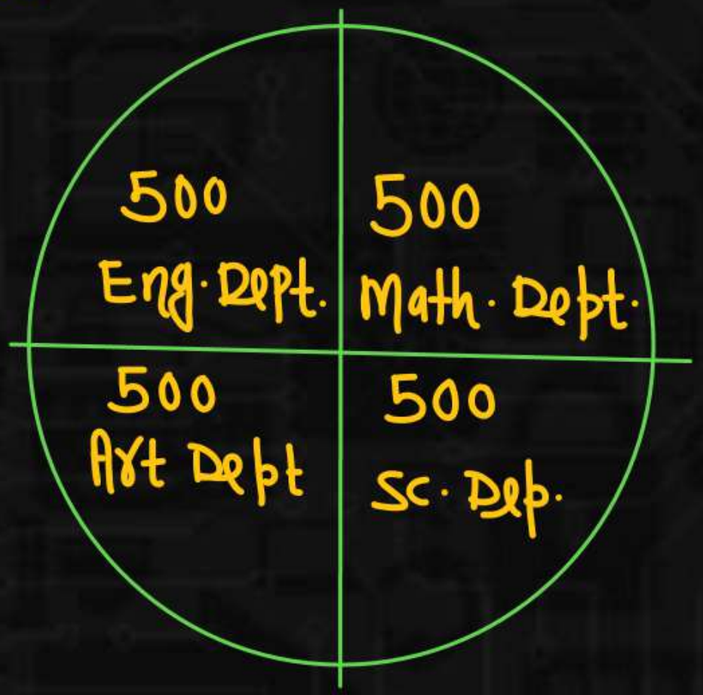


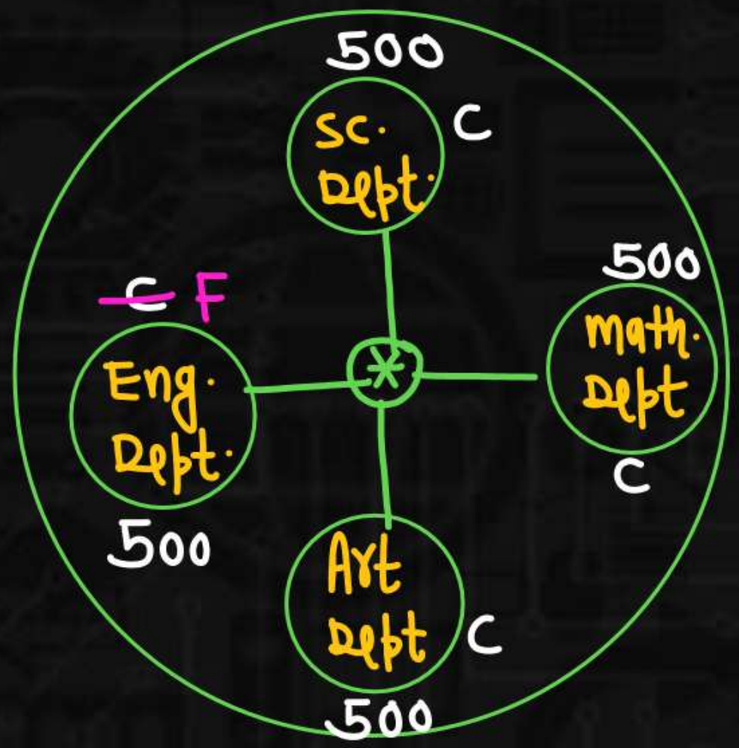
Subnetting

JNU Delhi → 2000

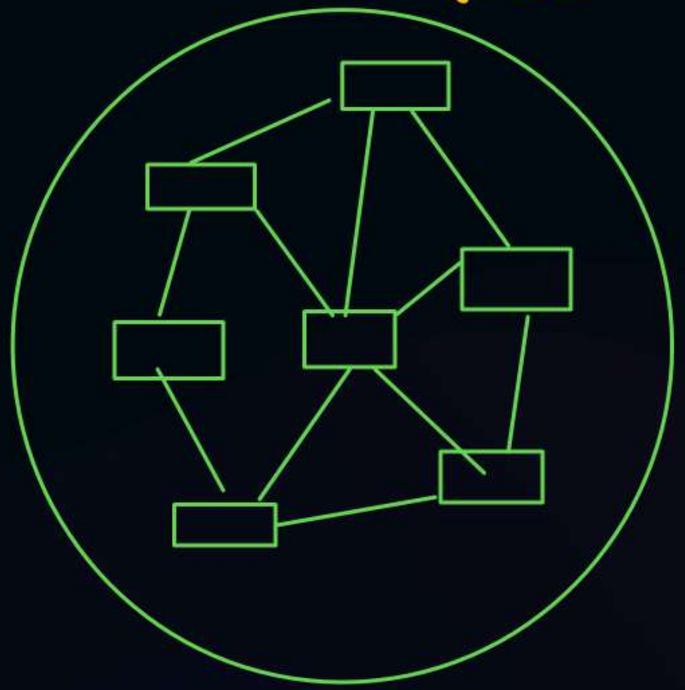


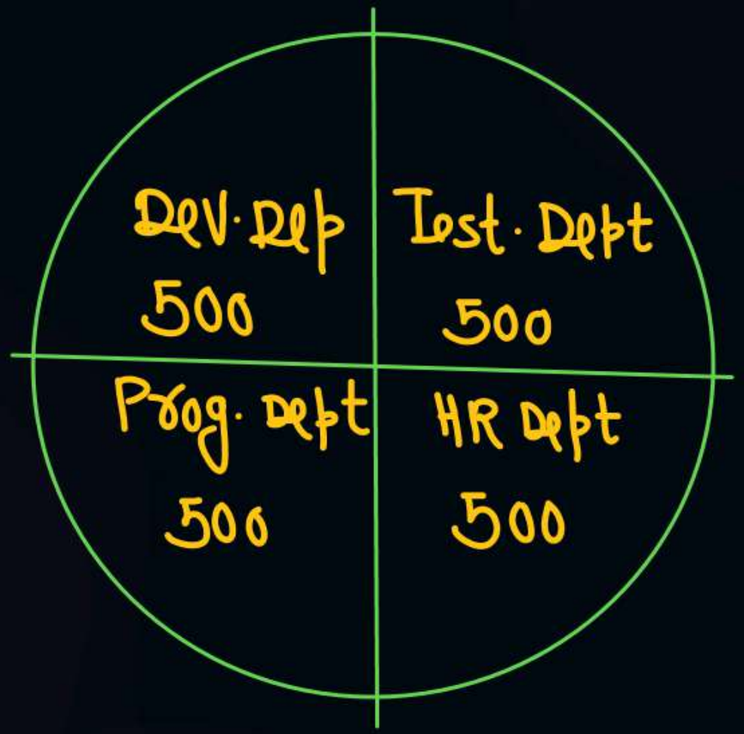
Cover





2. IBM → 2000




Dev. Dept
500
Test. Dept
500
Prog. Dept
500
HR Dept
500


500
Dev. Dept
500
Prog. Dept
Test. Dept
500
HR Dept
500

Advantage of Subnetting

1. Maintenance and Administration is simple and easy.
2. It provides security to one Network from another Network.

   Example: Code of developer department must not be accessed by another department.

Disadvantage of subnetting

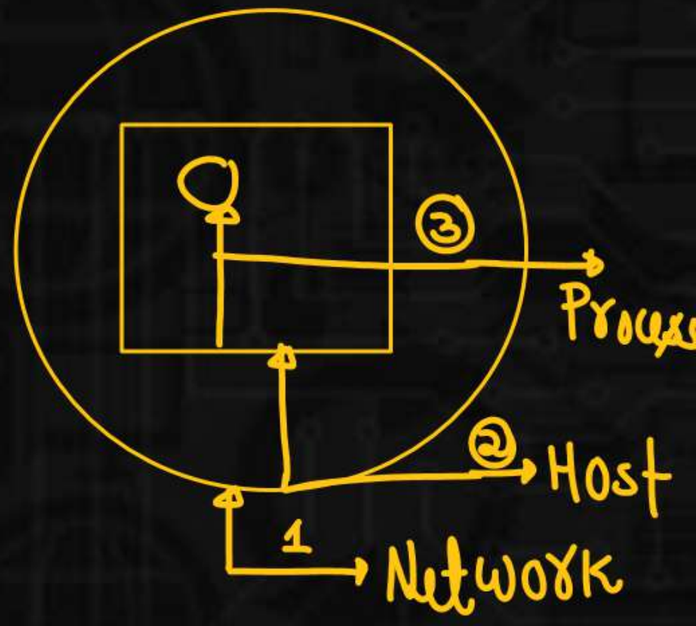
1. Subnetting complicates the communication process. Instead of 3 step procedure now it becomes 4 step procedure

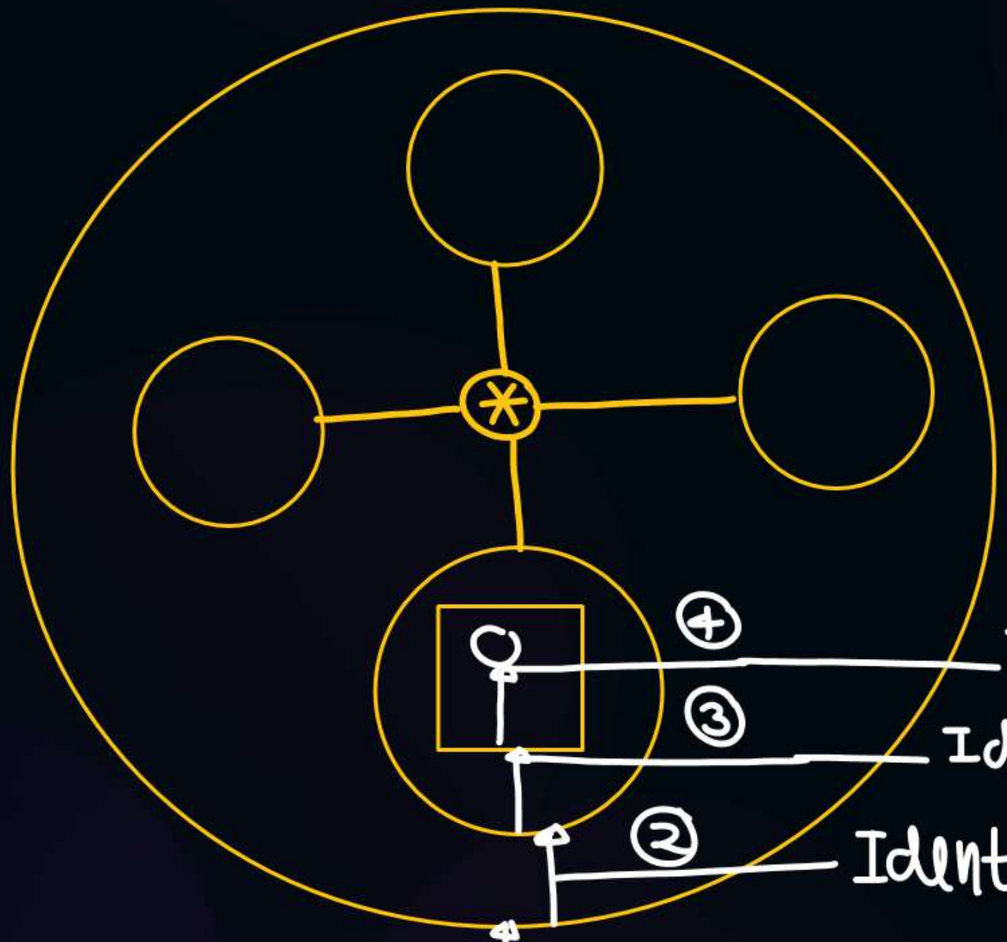
Step 1: Identify the Network

Step 2: Identify the Subnet with in the network

Step 3: Identify the host with in the Subnet.

Step 4: Identify the process with in the Host.





Identify the Process with in the Host

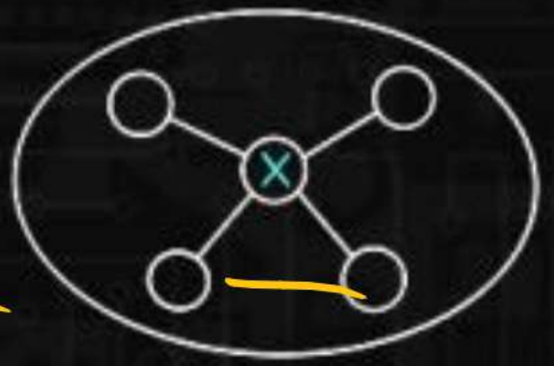
Identify the Host within the subnet

Identify the subnet within the Network

Identify the Network

Disadvantage of subnetting

2. In case of single Network only two IP addresses are wasted to represent Network id and direct Broadcast Address but in case of Subnetting two IP Addresses are wasted for each subnet.
3. Cost of overall Network also increase. Subnetting requires Internal routers, Switches, Hub, Bridges etc. which are very costly.



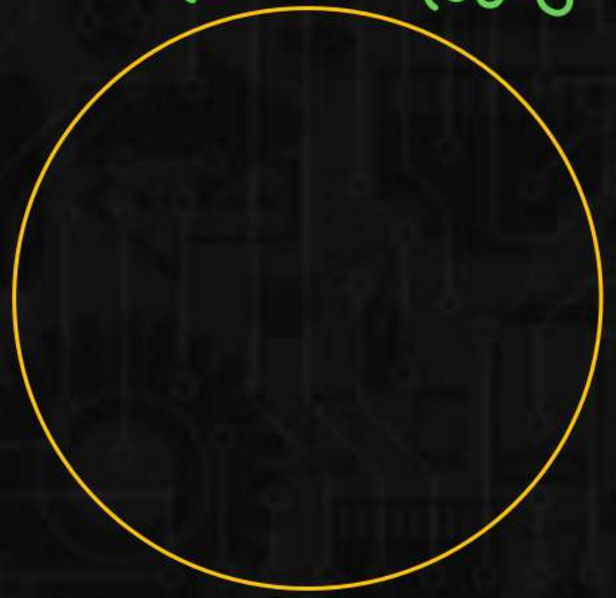
Note:

1. The process of Borrowing bits from HID to generate the subnet ID is also called as Subnetting
2. Number of bit Borrowed depends on our requirement.

1.

NID HID

200.200.200.0



Class-C

24 8

NID HID

4 subnet

2 6

SID HID

2^2 = 4 subnet

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

$S_1 \rightarrow 00$

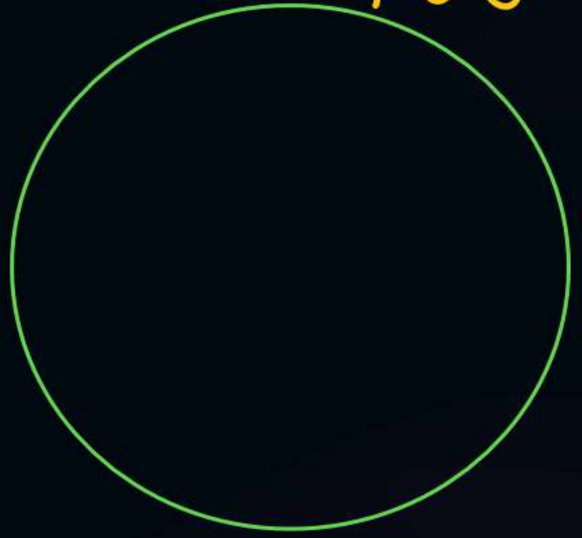
$S_2 \rightarrow 01$

$S_3 \rightarrow 11$

$S_4 \rightarrow 11$

2. NID / HID

157.157.0.0



Class-B

NID | HID

16 | 16

512 subnet

9 | 7

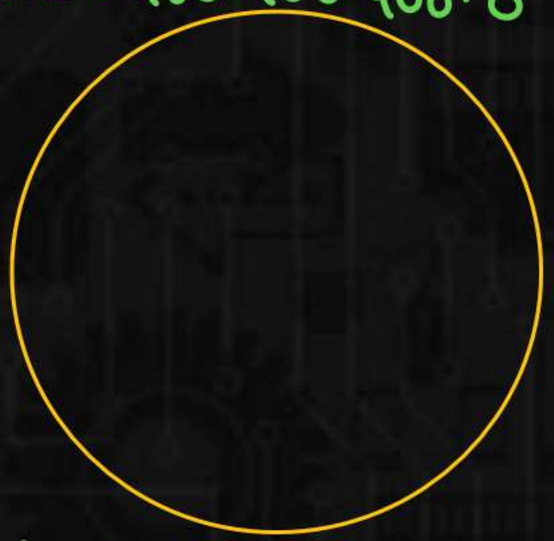
SID | HID

$2^9 = 512$ subnet

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

Subnetting Category-1

1. NID = 200.200.200.0 (NID | HID)



DBA = 200.200.200.255

Class-C

24 (NID) | 8 (HID)

4 subnet

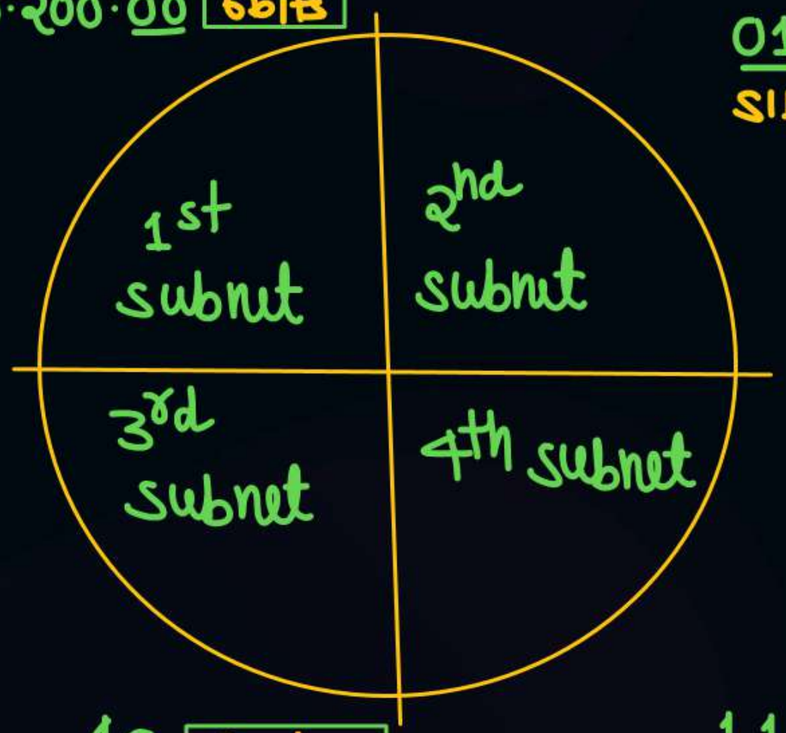
24 (NID) | 2 (SID) | 6 (HID)

$2^2 = 4$ subnet $2^6 - 2 = 62$ Host/subnet

00 → 1st subnet
01 → 2nd subnet
10 → 3rd subnet
11 → 4th subnet

NID | SID | HID

200.200.200.00 | 6bits



01 | 6bit
SID | HID

10 | 6bits
SID | HID

11 | 6bit
SID | HID

1st subnet

२००.२००.२००.00 ------
NID SID HID

२००.२००.२००.00 000000 → २००.२००.२००.0] SID
२००.२००.२००.00 000001 → २००.२००.२००.1 → First Host
२००.२००.२००.00 000010 → २००.२००.२००.२ → २nd Host
:
:
२००.२००.२००.00 111110 → २००.२००.२००.६२ → Last Host
२००.२००.२००.00 111111 → २००.२००.२००.६३] DBA

Valid Host

2nd subnet

200.200.200.01 [6bits]
NID SID HID

200.200.200.01 ------
SIP HID

200.200.200.01 000000 → 200.200.200.64] SID

200.200.200.01 111111 → 200.200.200.127] DBA

3rd subnet

200.200.200.10 ------
SID | HID

200.200.200.10 000000 → 200.200.200.128] SID

200.200.200.10 111111 → 200.200.200.191] DBA

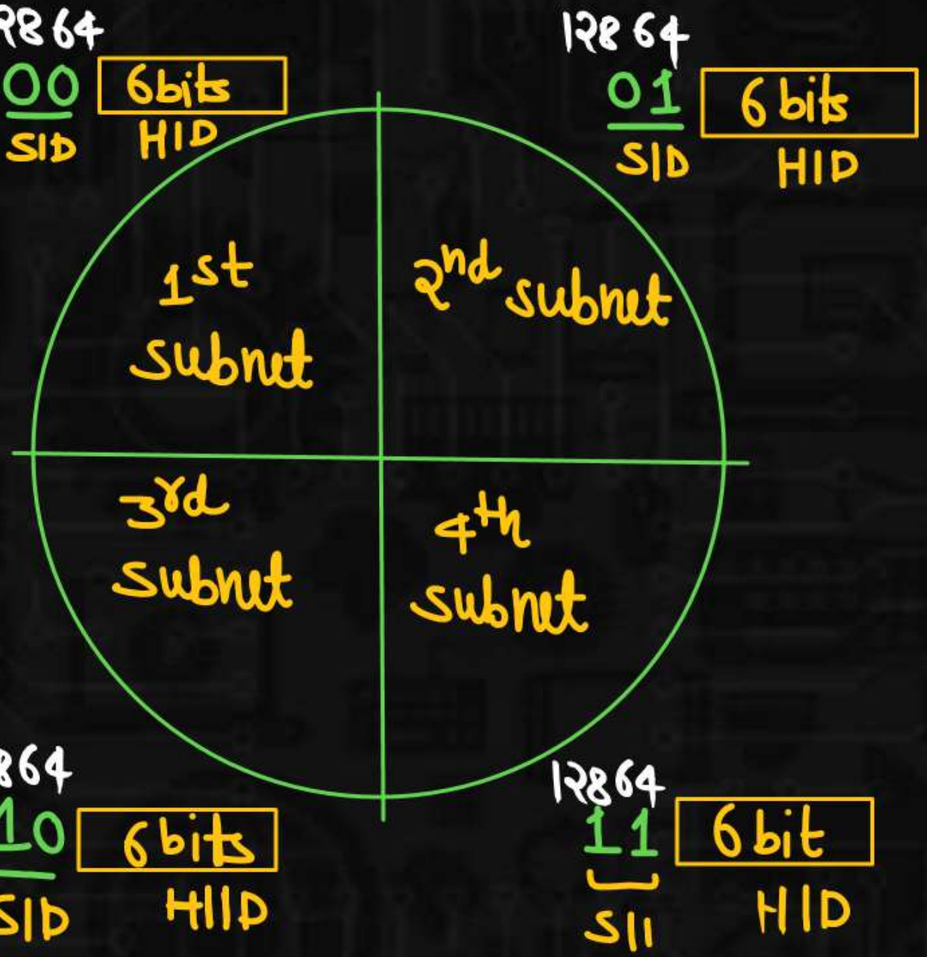
4th subnet

200.200.200.11 ------
SID | HID

200.200.200.11 000000 → 200.200.200.192] SID

200.200.200.11 111111 → 200.200.200.255] DBA

Shortcut

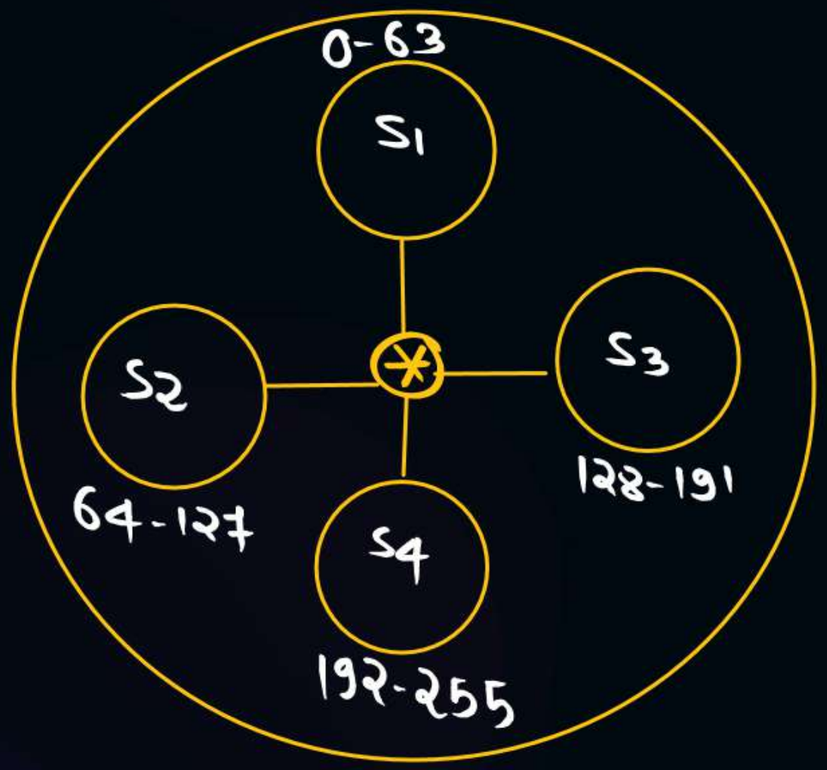


1st subnet
- SID : 200.200.200.0
- DBA : 200.200.200.63

2nd subnet
- SID 200.200.200.64
- DBA 200.200.200.127

3rd subnet
- SID 200.200.200.128
- DBA 200.200.200.191

4th subnet
- SID 200.200.200.192
- DBA 200.200.200.255



	S.I.P	D.I.P
Data	—	200.200.200.255

2. NID HID

200.200.200.0

Class-C

NID (24) HID (8)

8 subnet

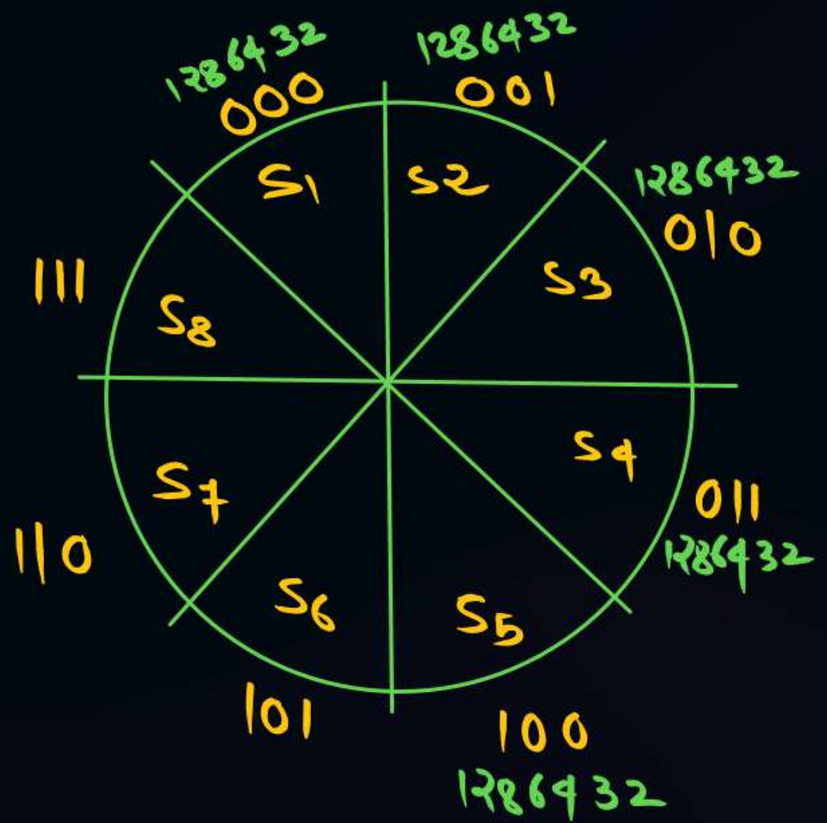
24 (NID) 3 (SID) 5 (HID)

SID → $2^3 = 8$ subnets

HID → $2^5 - 2 = 30$ Host/subnet

or

$2^5 = 32$ IP Add/subnet



SID = 3 bit

0 ← dVal 000 → 1st subnet
1 ← 001 → 2nd "
2 ← 010 → 3rd "
3 ← 011 → 4th
4 ← 100 → 5th "
5 ← 101 → 6th "
6 ← 110 → 7th "
7 ← 111 → 8th "

1st subnet
- SID : 200.200.200.0
- DBA 200.200.200.31

2nd subnet
- SID : 200.200.200.32
- DBA : 200.200.200.63

3rd subnet
- SID : 200.200.200.64
- DBA : 200.200.200.95

4th subnet
- SID : 200.200.200.96
- DBA : 200.200.200.127

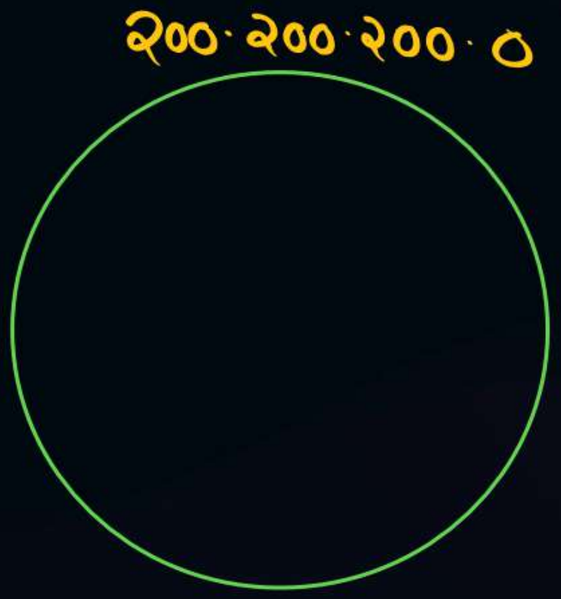
5th subnet
- SID 200.200.200.128
- DBA 200.200.200.159

6th subnet
- SID 200.200.200.160
- DBA 200.200.200.191

7th subnet
- SID 200.200.200.192
- DBA 200.200.200.223

8th subnet
- SID 200.200.200.224
- DBA 200.200.200.255

AD Rule



Q.1] 4th subnet Subnet id, DBA

Q.2] 6th subnet subnet id, DBA

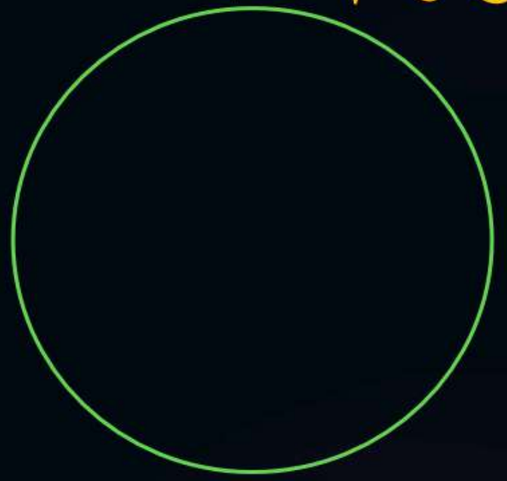
Soln: 200.200.200 — NID

128 64 32 — SID — HID

4th subnet
- SID : 200.200.200.011 00000 → 200.200.200.96
- DBA : 200.200.200.011 11111 → 200.200.200.127

6th subnet
- SID : 200.200.200.101 00000 → 200.200.200.160
- DBA : 200.200.200.101 11111 → 200.200.200.191

3. 157.157.0.0



Class B

16	16
NID	HID

64 subnet

6	10
SID	HID

Q.1 8th subnet → Subnet id, DBA

Q.2 17th Subnet → " "

Q.3 28th subnet → " "

Q.4 61th Subnet → " "


THANK YOU
GW
SOLDIERS !