



# Computer Networks 04 | Introduction to Subnetting | CS & IT | GATE Crash Course

Generated on October 19, 2024

## Summary

AI Notes

AI Slides

Text Notes

Screenshots

✦ 0

✦ 5

☐ 0

📷 20

I: Organization X need =  $2^{22}$  IP addresses

IP addresses wasted =  $2^{24} - 2^{22}$

$= 2^2 * 2^{22} - 2^{22}$

$= 4 * 2^{22} - 2^{22}$

$= 3 * 2^{22}$

$= 3 * 2^2 * 2^{20}$

$= 12 * 2^{20}$

$= 12M$

$= \underline{12,582,912}$

class A  $2^{24}$  IP

class B  $2^{16}$  IP

class C  $2^8$  IP

CE

X  $\rightarrow 2^{22} \checkmark$

A  $\rightarrow 2^{22} \checkmark$

B  $\rightarrow 2^{22} \checkmark$

C  $\rightarrow 2^{22} \checkmark$

$4 * 2^{22} = 2^2 * 2^{22} = 2^{24}$

Diagram showing two people connected by a cloud, representing a network.

▶ 24:29

II: Organization Y need =  $2^{14}$  IP addresses | IP addresses wasted =  $2^{16} - 2^{14}$

$$\begin{aligned}
 &= 2^2 * 2^{14} - 2^{14} \\
 &= 4 * 2^{14} - 2^{14} \\
 &= 3 * 2^{14} \\
 &= 3 * 2^4 * 2^{10} \\
 &= 48 * 2^{10} \\
 &= 48K \\
 &= 49,152
 \end{aligned}$$

▶ 25:05

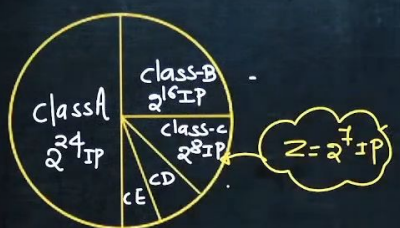
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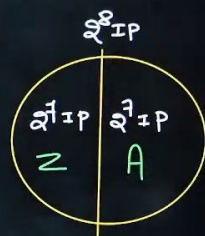
$\frac{2^{16}}{4} = \frac{2^{16}}{2^2} = 2^{14}$

▶ 28:14

III: Organization Z need =  $2^7$  IP addresses | IP addresses wasted =  $2^8 - 2^7$   
= 128



$$\begin{aligned} Z &= 2^7 \\ A &= 2^7 \\ \hline 2 \times 2^7 &= 2^8 \end{aligned}$$



▶ 34:04

## Subnetting

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

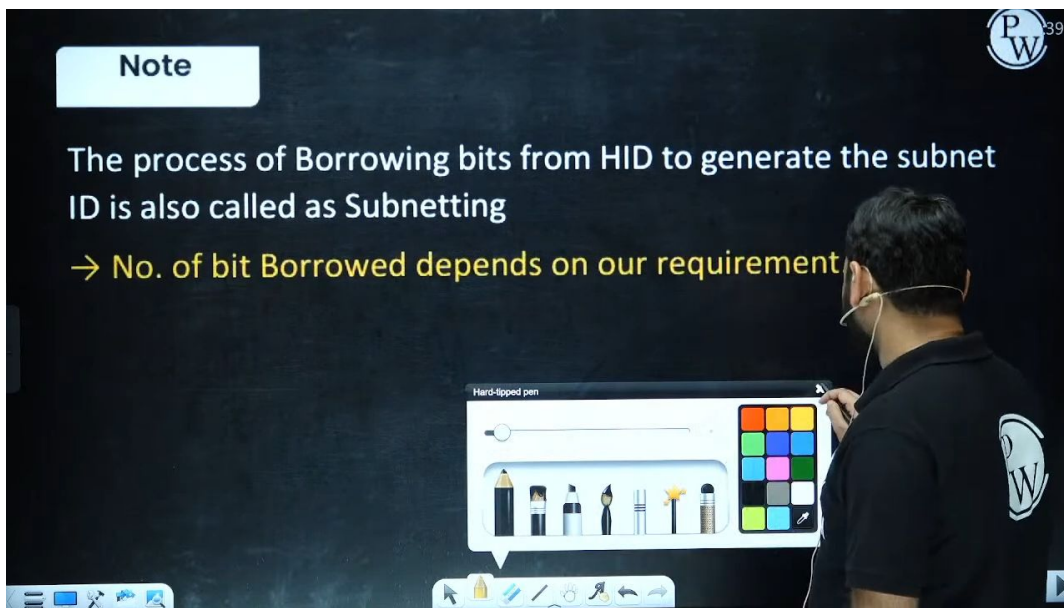


▶ 34:31

Note

The process of Borrowing bits from HID to generate the subnet ID is also called as Subnetting

→ No. of bit Borrowed depends on our requirement

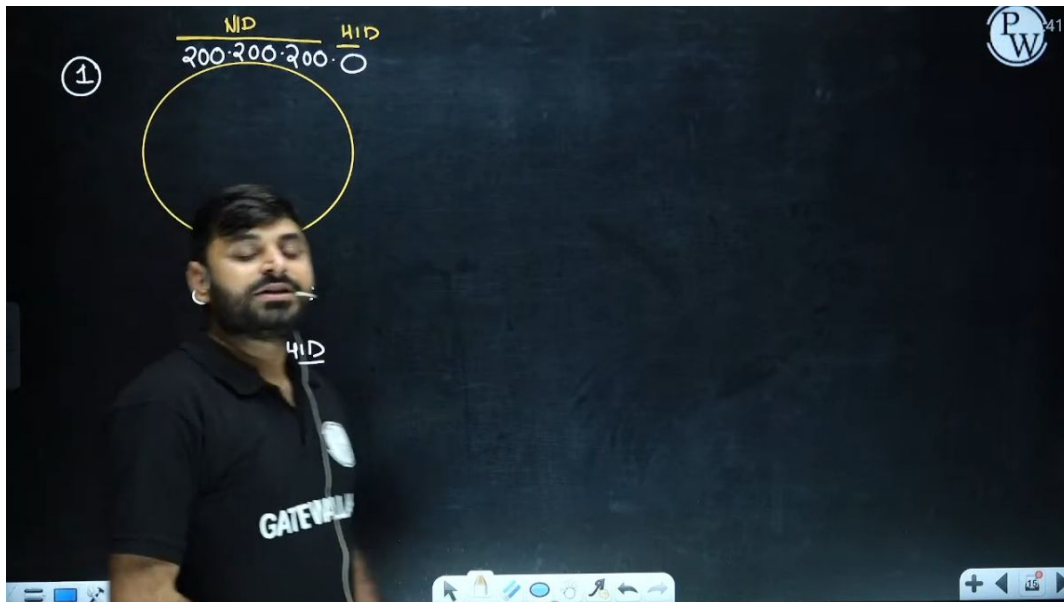


▶ 34:58

①

NID  
200.200.200.0

HID  
0



▶ 36:55



①

NID	HID
200.200.200	0

class-c

NID	HID
24	8

4 subnet

$\frac{2}{SID} \frac{6}{HID} \rightarrow 2^6 - 2 \text{ Host/subnet}$

No. of subnets =  $2^2 = 4$

00 → 1<sup>st</sup> subnet  
 01 → 2<sup>nd</sup> subnet  
 10 → 3<sup>rd</sup> subnet  
 11 → 4<sup>th</sup> subnet

▶ 44:20

1<sup>st</sup> subnet

NID	SID	HID
200.200.200	00	---

200.200.200.00

▶ 47:42

1<sup>st</sup> subnet

$\frac{200.200.200.00}{NID} \quad \frac{00}{SID} \quad \frac{-----}{HID}$

$\frac{200.200.200.00}{NID} \quad \frac{00}{SID} \quad 000000 \rightarrow 200.200.200.0 ] SID$   
 $200.200.200.00 \quad 000000 \quad 1 \rightarrow 200.200.200.1 ] \text{First Host}$   
 $200.200.200.00 \quad 000010 \rightarrow 200.200.200.2$   
 $\vdots$   
 $200.200.200.00 \quad 111110 \rightarrow 200.200.200.62 ] \text{Last Host}$   
 $200.200.200.00 \quad 111111 \rightarrow 200.200.200.63 ] DBA$

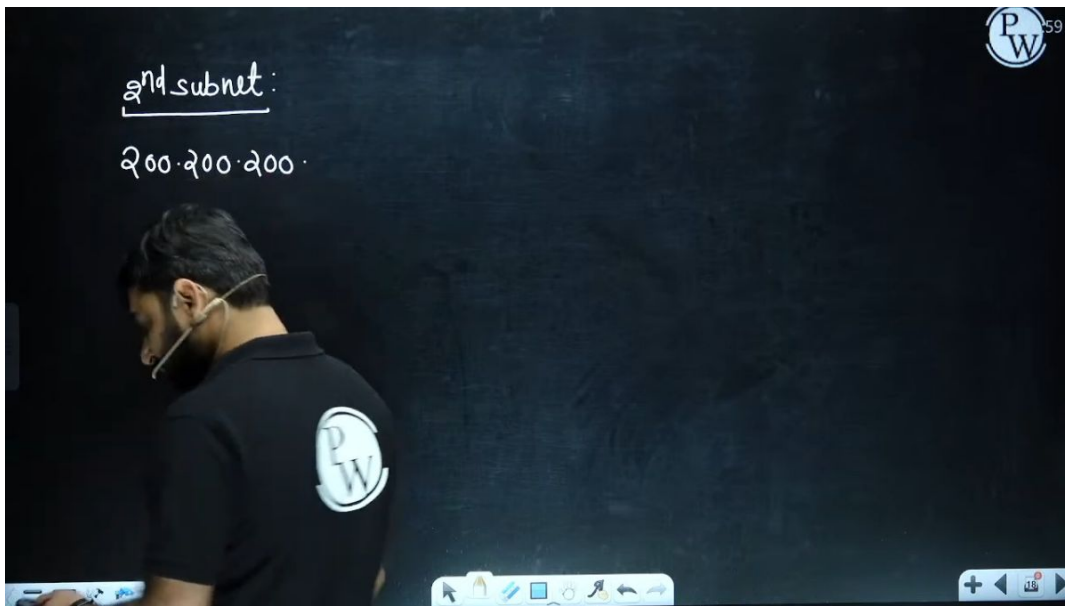
62 Hosts

▶ 54:35

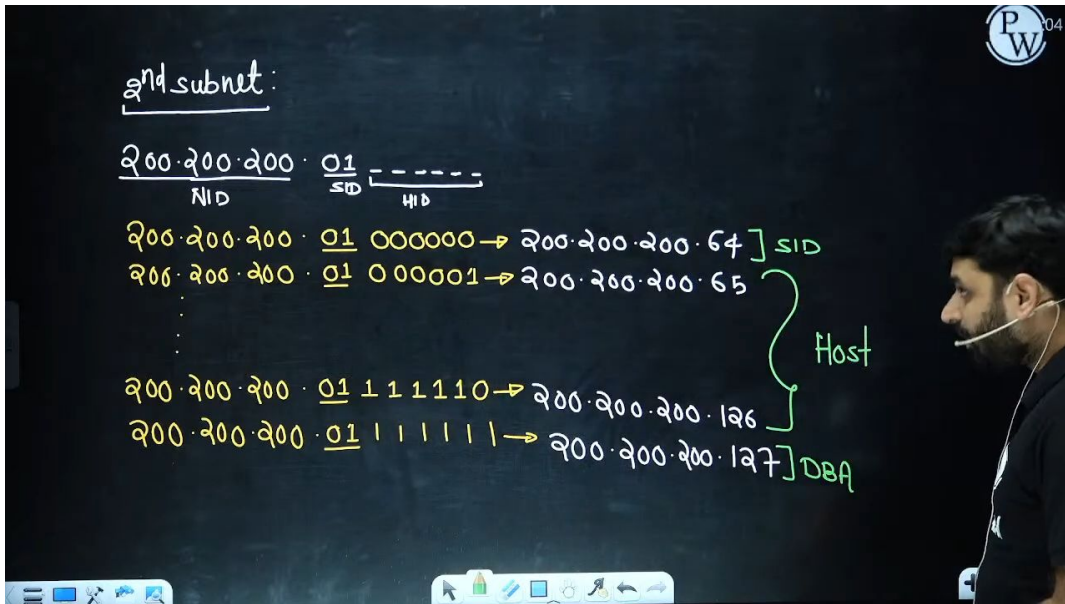
2<sup>nd</sup> subnet:

200.200.200.2

▶ 54:54



▶ 54:55



▶ 59:38

3rd subnet

200.200.200	10	-----
NID	SID	HID

200.200.200.10 0000000 → 200.200.200.128 ] SID

200.200.200.10 1111111 → 200.200.200.191 ] DBA

128 64 32 16 8 4 2 1

255  
64  
191

GATE WALLAH

▶ 1:03:02

4th subnet

200.200.200	11	-----
NID	SID	HID

200.200.200.11 0000000 → 200.200.200.192 ] SID

200.200.200.11 1111111 → 200.200.200.255 ] DBA

GATE WALLAH

▶ 1:05:14



PW<sup>19</sup>

## shortcut

128 64  
00 6 bit  
HID

128 64  
01 6 bit  
HID

128 64  
10 6 bit  
HID

128 64  
11 6 bit  
HID

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: 200.200.200.192 to 200.200.200.255

▶ 1:14:34

3  
ISRO

200.200.200.0

class-C

NID	HID
24	8

4 subnet

PW<sup>27</sup>

$\frac{24}{NID}$	$\frac{6}{HID}$	$\frac{2}{SID}$
------------------	-----------------	-----------------

✓  $\hookrightarrow$  No. of subnet =  $2^2 = 4$

No. of Host/subnet =  $2^6 - 2 = 62$

$\frac{2}{SID}$

00  $\rightarrow$  1st subnet  
 01  $\rightarrow$  2nd "  
 10  $\rightarrow$  3rd "  
 11  $\rightarrow$  4th "

▶ 1:22:49

### 1st subnet

200.200.200.00000000 →  
 NID                      HID                      SID

200.200.200.00000000 → 200.200.200.0 SID

200.200.200.00000001 → 200.200.200.1

200.200.200.00000010 → 200.200.200.2

⋮

200.200.200.11111000 → 200.200.200.248

200.200.200.11111000 → 200.200.200.252 DBA

▶ 1:29:09

6bit 21  
 HID SID

6bit 21  
 HID SID

6bit 21  
 HID SID

6bit 21  
 HID SID

1st subnet  
 SID : 200.200.200.0  
 DBA : 200.200.200.252

2nd subnet  
 SID : 200.200.200.1  
 DBA : 200.200.200.253

3rd subnet  
 SID : 200.200.200.2  
 DBA : 200.200.200.254

4th subnet  
 SID : 200.200.200.3  
 DBA : 200.200.200.255

▶ 1:34:10

# Subnet Mask



It is a 32 bit number used to indicate no. of bits borrowed from host-id and there positions based on the following rules

Rule1: No of 1's in the subnet mask indicate NID+SID

Rule2: No of 0's in the subnet mask indicate HID part

▶ 1:36:01

Q.1

If NID = 200.200.200.0 and the subnet Mask = 255.255.255.192 then identify



No. of bit borrowed from Host-id → 2

No. of <sup>4</sup> subnet possible and their subnet id's

No. of Host/subnet (62)

So/7: 255.255.255.192  
||||| . ||||| . ||||| . ||000000  
NID SID HID

No. of 1's = 26

NID+SID = 26

24+SID = 26

SID = 2 bit

No. of subnet =  $2^2 = 4$

No. of 0's = 6

HID = 6 bit

No. of Host/subnet  
=  $2^6 - 2 = 62$

▶ 1:50:52



**Q.2** If NID = 200.200.200.0 and the subnet Mask = 255.255.255.224 then identify

i. No. of bit borrowed from Host-id  $\rightarrow 3$

ii. No. of subnet possible and their subnet id's

iii. No. of Host/subnet 30

Summary:

NID: 11111111.11111111.11111111.00000000  
 No. of 1's = 27  
 NID + SID = 27  
 24 + SID = 27  
 SID = 3 bit

SID: 000000  
 No. of 0's = 5  
 HID = 5 bit  
 No. of Host/subnet =  $2^5 - 2 = 30$

SID: Address

SID	Address
000	0
001	32
010	64
011	96
100	128
101	160
110	192
111	224

▶ 1:57:49

**Q.3** If NID = 200.200.200.0 and the subnet Mask = 255.255.255.44 then identify

i. No. of bit borrowed from Host-id (3)

ii. No. of subnet possible and their subnet id's

iii. No. of Host/subnet (30)

Summary:

NID: 11111111.11111111.11111111.00101100  
 No. of 1's = 27  
 No. of 0's = 5

SID: Address

SID	Address
000	0
001	4
010	8
011	12
100	16
101	20
110	24
111	28

▶ 2:03:06



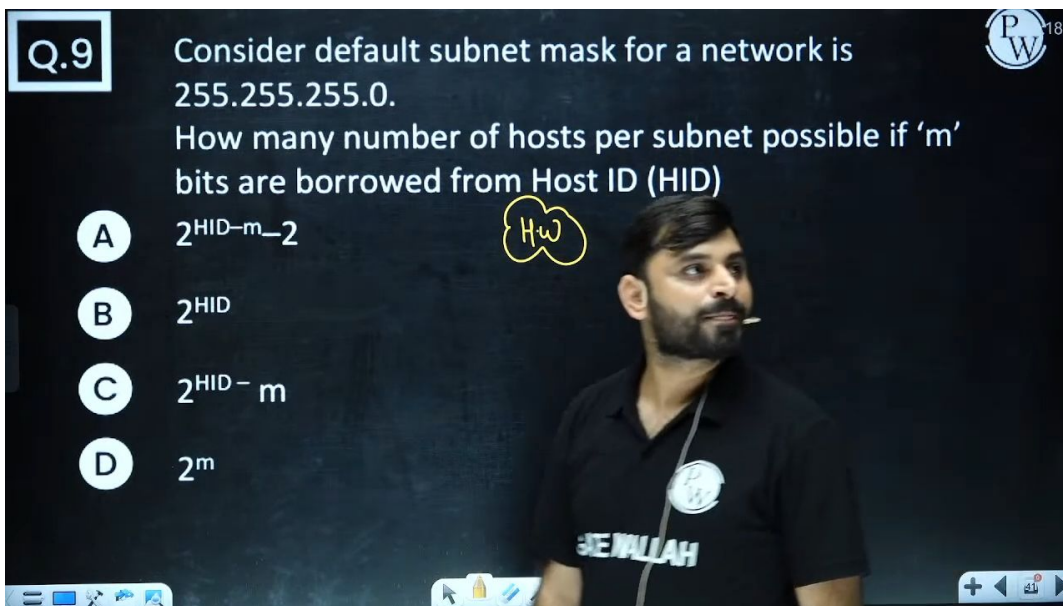
**Q.9** Consider default subnet mask for a network is 255.255.255.0.  
How many number of hosts per subnet possible if 'm' bits are borrowed from Host ID (HID)

A  $2^{\text{HID}-m}-2$  H-w

B  $2^{\text{HID}}$

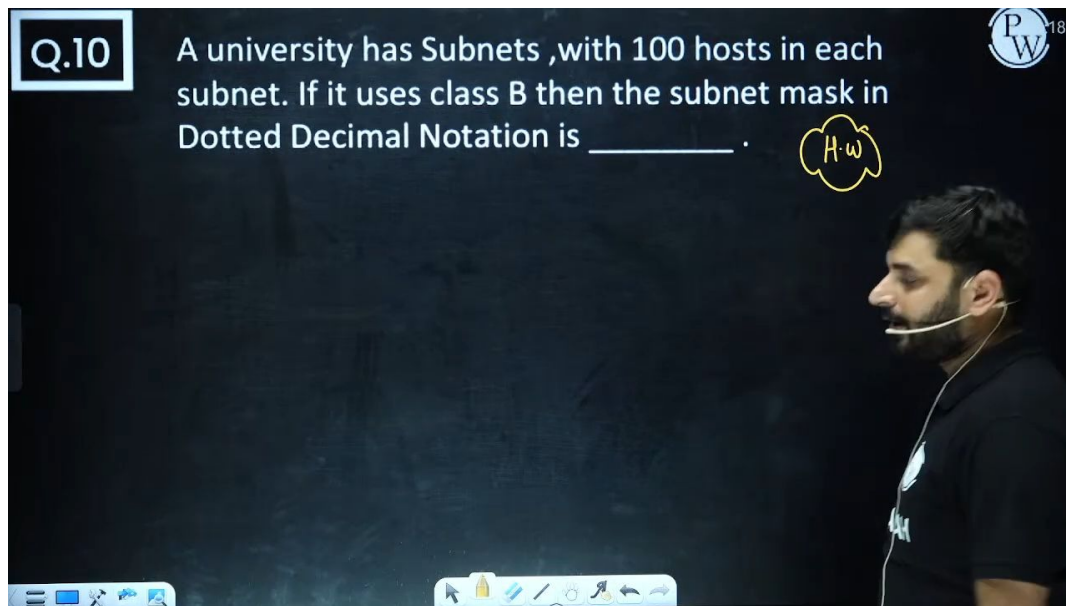
C  $2^{\text{HID}-m}$

D  $2^m$



▶ 2:13:23

**Q.10** A university has Subnets ,with 100 hosts in each subnet. If it uses class B then the subnet mask in Dotted Decimal Notation is \_\_\_\_\_. H-w



▶ 2:13:36

▶ 2:14:43

