31 October 2021 05:38

A router receives a packet with the destination address 131.24.67.32.

1. Show how the router finds the network address of the packet. Subnet Mask or Default

2. How router is going to do direct broad casting?

3. How many numbers of hosts are possible?

Step-1 Class → B
Default Mask → 255.255.0.0

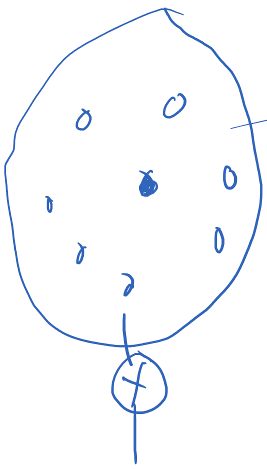
Step-2 finding N/w address
→ Bitwise AND operation IP & SM

IP → 10000011 . 00011000 . 01000011 . 00100000
SM → 11111111 . 11111111 . 00000000 . 00000000

10000011 . 00011000 . 00000000 . 00000000
131.24.0.0 — N/w address

(II) Broadcasting Address

Limited B/C Address
→ 255.255.255.255



Direct B/C Address

Bit wise OR operation between IP & SM

IP 10000011 . 00011000 . 01000011 . 00100000
SM = 00000000 . 00000000 . 11111111 . 11111111

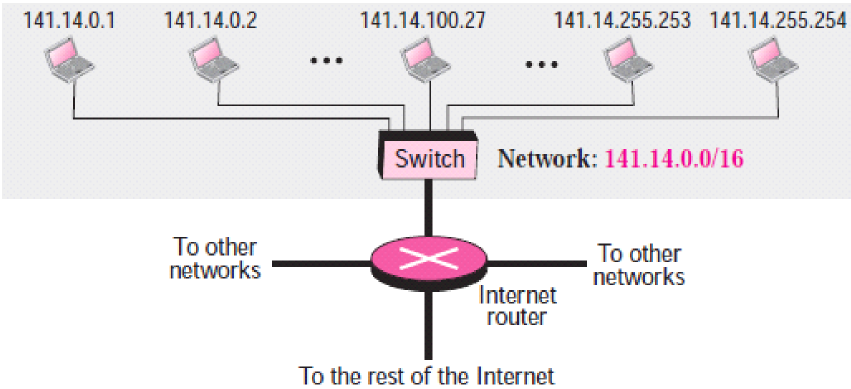
10000011 . 00011000 . 11111111 . 11111111

10001011 . 00001110 . 1111 ....

$\boxed{131 \cdot 24 \cdot 255 \cdot 255}$

Direct B/C Address

Question 3: Given an Network address 141.14.0.0 /16 as in figure below:



CIDR → Classless Inter Domain Routing

196.14.0.0 /16 → first 16 bits are reserved for N/w ID

141.14.0.0 /18 →

Class A → /8 Class B – 16 Class C – 24

CIDR → / notation

B_0 00
B_1 01
B_2 10
B_3 11

The network can belong to a university campus with four different schools (buildings). How will you divide the network into four subnetworks? Such that after Subnetting, each school has its own subnetworks, but still the whole campus is one network.

$\frac{2^n}{2}$
4
8
16

/16 →

16 Bits ISP	00 Host

01
10
11

2^{16}

0000000000000000 to 1111111111111111

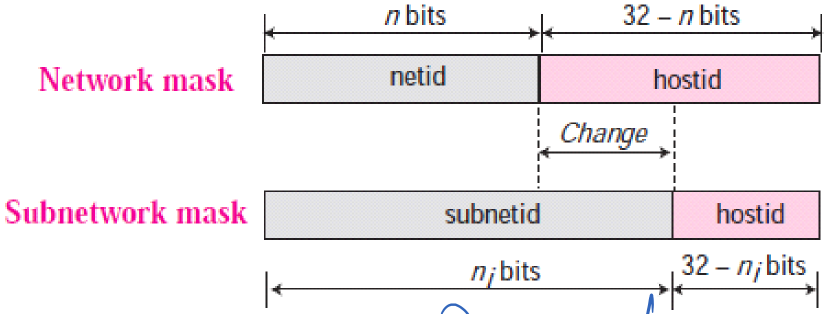
00 01 10 11

$2 = 1$

$3-4 = 2$

$5-8$

$9 = 16$



Given Data

$2^n = 4$

00
01
10
11

GNB → 16

GHB → 32 − 16 = 16

No. Subnets: 4

000
001
101

$2^n = 4$

n = 2

Required

RNB = 16 + 2 = 18

RHB = 16 − 2 = 14

No. of host in each network = 2^{14}

Default Mask /16

11111111 . 11111111 . 00000000 . 00000000

Required Mask /18

11111111 . 11111111 . 11000000 . 00000000

255 . 255 . 192 . 0

RM → 255 . 255 . 192 . 0

GM → 255 . 255 . 0 . 0

Subtract it from 256 − 192 = 64

Size of 3rd octet

Change

Blk 0	Blk-1	Blk 2	Blk 3
141 . 14 . 0 . 0	141 . 14 . 64 . 0	141 . 14 . 128 . 0	141 . 14 . 192 . 0

	Bin 0			141.14.192.0
N|W	141.14.0.0 +64	141.14.64.0 +64	141.14.128.0 +64	
$2^{14}-2$	141.14.0.1 141.14.0.2 141.14.0.3 ⋮ 141.14.63.254	Useable Range ?		?
B|C →	141.14.63.255	141.14.127.255	141.14.191.255	141.14.255.255

Question A router receives a packet with the destination address 131.24.67.32/20 Show how the router finds the network address of the packet.

① Given IP address = 131.24.67.32 /20

CIDR → slash notation

IP = 131 . 24 . 67 . 32

Default Mask = 255 . 255 . 240 . 0

11111111 . 11111111 . 11110000 . 00000000

N/W 128+64+32+16+0+0+0+0 Host

IP → 10000011 . 00011000 . 01000011 . 00100000

DM → 11111111 . 11111111 . 11110000 . 00000000

10000011 . 00011000 . 01000000 . 00000000

N/w address = 131 . 24 . 64 . 0

Limited Broadcast address.

✓ 255 . 255 . 255 . 255

Direct Broadcast

$\overline{IP}$ & DM → Bit wise OR operation

10000011 . 00011000 . 01000011 . 00100000

$\overline{DM}$ → 00000000 . 00000000 . 00001111 . 11111111

10000011 . 00011000 . 01001111 . 11111111

131 . 24 . 79 . 255

Question: An ISP is granted a block of addresses starting with 190.100.0.0/18. The ISP needs to distribute these addresses to three groups of customers, Design the subblocks and find out how many addresses are still available after these allocations

Given IP → 190.100.0.0/18

GNB → 18 GHB → 32 − 18 = 14

Blocks = 3

$2^n \geq 3$, $\boxed{n = 2}$

CNB = GNB + n = 18 + 2 = 20 bits

CHB = GHB − n = 14 − 2 = 12 bits

Total Host per groups = $2^{12} - 2 = 4096 - 2 = 4094$

DM → 11111111.11111111.11000000.00000000

255.255.192.0

RM → 11111111.11111111.11110000.00000000

255.255.240.0

DM → 255.255.192.0

RM → 255.255.240.0

256 − 240 = 16 − Range

	Blk 0	Blk 1	Blk 2
N/W ID →	190.100.0.0 +16	190.100.16.0	190.100.32.0 16
Usable Range $2^{14}-2$	190.100.0.1 190.100.0.2 ⋮ 190.100.15.253 190.100.15.254	190.100.16.1 16.2 ⋮ 31.253 190.100.31.254	190.100.32.1 32.2 ⋮ 47.253 190.100.47.254
Broadcast	190.100.15.255	190.100.31.255	190.100.47.255

$\boxed{2^n \geq 3}$ n = 2 $2^n = 4$

DM → /18

RM /20

− 2^{12} − 4096 addresses are not used

RM 120

$2^{12} = 4096$ addresses are not used

$2^3 = 8$

$2^2 = ~~3~~\ 4$

$2^1 = 2$

FLSM → Fixed Length Subnet Mask

VLSM → Variable Length Subnet Mask

Question: An ISP is granted a block of addresses starting with 190.100.0.0/16 (65,536 addresses). The ISP needs to distribute these addresses to three groups of customers as follows:

a. The first group has 64 customers; each needs 256 addresses.
b. The second group has 128 customers; each needs 128 addresses.
c. The third group has 128 customers; each needs 64 addresses.

Design the subblocks and find out how many addresses are still available after these allocations.

Variable Length Subnet Mask
VLSM

Given an ISP assigns an IP address
192.168.10.0/24
Subnetworks of size 60, ~~30~~ 30, 120

Step 1 → GNB = 24

Step 1 → GNB = 24

GHB = 32 - 24 = 8

Maximum Hosts can be $2^8 = 256$

Required Users = 60 + 30 + 120 = 210

210 < 256 so subnetting is possible

Step II :⇒ Arrange the subnetworks in descending order of no. of users.

Block 0 = 120 users

Block 1 = 60 users

Block 2 = 30 users

Step III

	Blk-0 120	Blk-1 60	Block-2 30
Required Host Bits	$2^n \geq 120$ n = 7	$2^n \geq 60$ n = 6	$2^n \geq 30$ n = 5
Required N/W Bits (CNB)	32 - 7 = 25	32 - 6 = 26	32 - 5 = 27
CSM	11111111.11111111. 11111111.10000000 255.255.255.128 255.255.255.0	11111111.11111111. 11111111.11000000 255.255.255.192 255.255.255.0	11111111.11111111. 11111111.11100000 255.255.255.224 255.255.255.0
Compare DSM with CSM	256 - 128 = 128	256 - 192 = 64	256 - 224 = 32
Network add	192.168.10.0/25 0 + 128	192.168.10.128/26 128 + 64	192.168.10.192/27

Direct Broadcast	192.168.10.127/25	192.168.10.191/26	192.168.10.223/27