2016 Fall 3(b)

Solution

Given IP: 192.168.1.0/24

Network ID bit = 24

Host bit = 32 - 24

= 8

total address = 2^8

A, B, C be 3 organization which requires 20, 24 and 30 addresses respectively.

Assigning address starting with largest and ending with smallest one.

1 Organization C

Required Address size = 30

Allocated Address size = 32 or 2^5

Subnet mask = 32 - 5

= 27

First Address : 192.168.1.0/27 (Networ

Last Address : 192.168.1.31/27 (Broad

Usable Address: 192.168.1.1/27 to

192.168.1.30/27

② Organization B

Required Address size = 24
Allocated Address size = 32 or 2^5
Subnet Mask = 32 - 5
= 27

Network Address = 192.168.1.32/27
Broadcast Address = 192.168.1.63/27

Usable Address = 192.168.1.33/27 to
192.168.1.62/27

Organization A

Required Address size = 20
Allocated Address size = 32 or 2^5
Subnet Mask = 32 - 5
= 27

Network Address = 192.168.1.64/27
Broadcast Address = 192.168.1.95/27

Usable Addrey : 192.168.1.65/27 to
192.168.1.94/27

2019 Spring 9(b)

IP: 192.168.10.0/29

Netmask: 11111111.11111111.11111111.10000000
255.255.255.128 (/25)

Is IP class A or B or C?
⇒ Class C (192 - 223)

Since class C has default subnet mask
255.255.255.0

So additional 1s are subnet bits
no. of subnet bits (n) = 1

$$\text{Subnets} = 2^n = 2^1 = 2$$

$$\text{hosts} = 2^7$$
$$= 128$$

2012 Fall 5(a)

Solution

IP : 160.11.x.x

no. of subnets = 6

no. of bits to be borrowed = 3 as $2^3 = 8$

Changing given IP into suitable binary form

160.11.00000000.00000000

Since given IP is class B

network ID bit = 16

host ID bit = 16

Required subnets,

network

160.11.00000000.00000000

160.11.00100000.00000000

160.11.01000000.00000000

160.11.01100000.00000000

160.11.10000000.00000000

160.11.10100000.00000000

Corresponding decimal coded

160.11.0.0

160.11.32.0

160.11.64.0

160.11.96.0

160.11.128.0

160.11.160.0

2014 Fall 4(a)

Solution
IP: 192.16.0.0
Given IP belongs to class C
So, host bit = 8
Available address = 2^8
= 256

But we have to assign 4000+2000+4000+8000 = 18000 addresses which is not sufficient.

Making correction:

IP: 190.16.0.0
Given IP belongs to class B
host bit = 16
Available = 2^{16}

Assigning address starting with largest and ending with smallest one.

(1) Organization D
Required Address size = 8000
Allocated Address size = 8192 or 2^{13}
Subnet Mask = 32-13
= 19

Network Address = 192.16.0.0/13
Broadcast Address = 192.16.31.255/13

2 Organization C
Required Address size = 4000
Allocated Address size = 4096 or 2^{12}

Subnet Mask = 32 - 12
= 20

Network Address = 192.16.32.0/20
~~Alloc~~ 47
Broadcast Address = 192.16.~~32~~.255/20

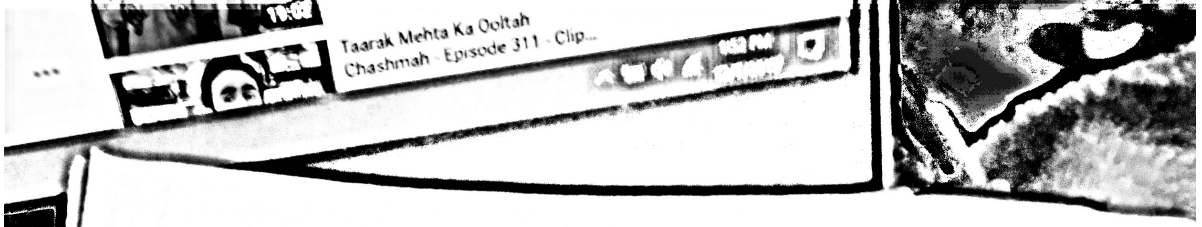
Organization A
Required Address size = 4000
Allocated Address size = 4096 or 2^{12}

Subnet Mask = 32 - 12
= 20
Network Address = 192.16.48.0/20
Broadcast Address = 192.16.63.255/20

9. Organization B

Required Address size = 2000
Allocated Address size = 2048 or 2^{11}
Subnet mask = 32 - 11
= 21

Network Address = 192.16.64.0/21
Broadcast Address = 192.16.71.255/21



2016 Spring 5(a)

IP: 192.168.10.0/25

Netmask : 11111111.11111111.11111111.10000000
255.255.255.128 (/25)

Is IP class A or B or C ?
⇒ Class C (192-223)

Since class C has default subnet mask
255.255.255.0

So additional 1s are subnet bits.
n = no. of subnet bits = 1

Subnets = $2^1 = 2$

hosts = 2^7
= 128

2017 Fall 4(b)

Solution

IP Address : 172.31.255.0/22

Network ID bit = 26

Host bit = 32-26

= 6

Available address = 2^6

Since given IP need to be divided into 5 as there are 5 schools:

Number of subnet = 5

Bits required to represent 5 subnet = 3 as $2^3 = 8$

Changing given IP to suitable binary form

172.31.111111]11.0[0000000

Setting borrowed bit to 0

172.31.111111]00.0[0000000

Required Subnet

172.31.111111 00.0 0000000

00.1 0000000

01.0 0000000

01.1 0000000

10.0 0000000

Corresponding decimal coded addresses

172.31.252.0 /25
172.31.252.128 /25
172.31.253.0 /25
172.31.253.128 /25
172.31.254.0 /25

As per the question, 2 school are divided into 4 department

① 1st School and 4 department

IP: 172.31.252.0/25
N = 4
Required bit = 2 as $2^2 = 4$

Changing to binary,

172.31.252.0] 00 [00000

Required subnet

172.31.252.0 00 00000
01 00000
10 00000
11 00000

Corresponding decimal coded address

172 · 31 · 252 · 0/27
172 · 31 · 252 · 32/27
172 · 31 · 252 · 64/27
172 · 31 · 252 · 96/27

② 2nd School and its 4 department

IP : 172 · 31 · 252 · 128/25
N = 4
Required bit = 2

172 · 31 · 252 · 1] 00 [00000

Required subnet

172 · 31 · 252 · 1] 0 0 0 0 0 0 0
172 · 31 · 252 · 1 0 1 0 0 0 0 0
172 · 31 · 252 · 1 1 0 0 0 0 0 0
172 · 31 · 252 · 1 1 1 0 0 0 0 0

orresponding

172 · 31 · 252 · 128 | 27
172 · 31 · 252 · 160 | 27
172 · 31 · 252 · 192 | 27
172 · 31 · 252 · 224 | 27

2017 Spring 4(a)

If the given IP-address of a network 192.168.10.0/27 then calculate the number of subnets and number of hosts per subnet

Solution

IP : 192.168.10.0/27

Netmask 11111111.11111111.11111111.11100000

255.255.255.224 (/27)

Is IP class A or B or C

⇒ Class C (192-223)

Since class C has default subnet mask

255.255.255.0

So additional 1s are subnet bits

$$\text{Subnets} = 2^{\#\text{subnet bits}} = 2^3 = 8$$

$$\text{Number of hosts} = 2^{\#\text{host bit}} - 2$$

$$= 2^5 - 2$$

$$= 32 - 2$$

$$= 30$$

2018 Fall 4(a)

Solution:
IP Address : 103.16.32.0/22
Network ID bit = 22
Host bit = 32 - 22
= 10
Available address = 2^{10}

Since given IP need to be divided into 7 as there are 7 school.
No. of subnet = 7
Bits required to represent 7 subnet = 3 as $2^3 = 8$

Changing given IP into suitable binary form

103.16.00010000.00000000
Network ID bit

Required subnet:

103.16.00010000.00000000
103.16.00010000.10000000
103.16.00010001.00000000
103.16.00010001.10000000
103.16.00010010.00000000
103.16.00010010.10000000
103.16.00010011.00000000
103.16.00010011.10000000

Corresponding decimal coded addresses are

103.16.32.0/25
103.16.32.128/25
103.16.33.0/25
103.16.33.128/25
103.16.34.0/25
103.16.34.128/25
103.16.35.0/25

As per the question, 3 schools are divided into two departments.

① 1st School and 2 department

103.16.32.0/25

103.16.32.0/26

ork : 103.16.32.0/26
cast: 103.16.32.63/26
e : 103.16.32.1 to
103.16.32.62/26

103.16.32.64/26

103.16.32.64/26
103.16.32.127/26
103.16.32.65/26 to
103.16.32.126/26

② 2nd School 2nd 2 department

IP = 103.16.32.128/25

Network: 103.16.32.128/26
Broadcast: 103.16.32.192/26
Usable : 103.16.32.129/26 to
103.16.32.191/26

103.16.32.~~255~~ 193/26
103.16.32.255/26
103.16.32.194/26 to
103.16.32.254/26

③ 3rd School 2nd 2 department

103.16.33.0/25

Network: 103.16.33.0/26
Broadcast: 103.16.33.63/26
Usable : 103.16.33.1/26 to
103.16.33.62/26

103.16.33.64/26
103.16.32.127/26
103.16.33.65/26
103.16.32.126/2

2017 Spring 4(a)

If the given IP-address of a network 192.168.10.0/27 then calculate the number of subnets and number of hosts per subnet

Solution

IP : 192.168.10.0/27

Netmask 11111111.11111111.11111111.11100000

255.255.255.224 (/27)

Is IP class A or B or C

⇒ Class C (192-223)

Since class C has default subnet mask

255.255.255.0

So additional 1s are subnet bits

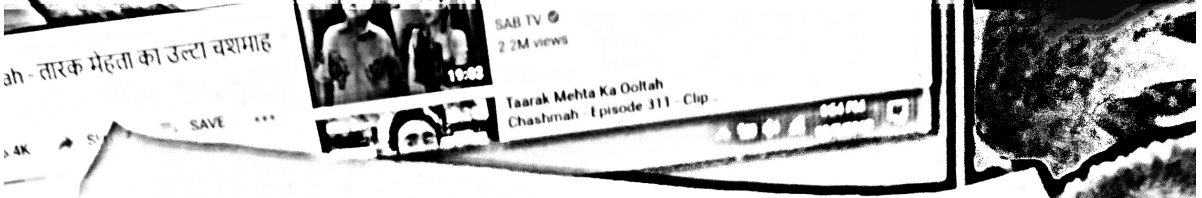
$$\text{Subnets} = 2^{\#\text{subnet bits}} = 2^3 = 8$$

$$\text{Number of hosts} = 2^{\#\text{host bit}} - 2$$

$$= 2^5 - 2$$

$$= 32 - 2$$

$$= 30$$



2019 Fall : 4(b)

Pokhara University has 3 sub-division located at Pokhara, Kathmandu and Biratnagar with 125, 60 and 29 hosts respectively. Now you as a Network Admin design the network with below details

i. All LANs must be implemented using router as default gateway.
ii. Calculate Broadcast, Network, usable address along with subnet and wild card mask
iii. ISP provided IP address was 10.0.17.0/24

Solution

Given IP : 10.0.17.0/24
Network ID bit = 24
Host bit = 32-24 = 8
total address in this block = 2^8
= 256

Assigning address starting with largest and ending with the smallest one.

1. Pokhara Sub-division
Required Address size = 125
Allocated Address size = 128 or 2^7
Subnet mask = 32-7 ($n = 32 - \log_2 N$)
= 25

First Address = 10.0.17.0/25 (Network Address)
Last Address = 10.0.17.127/25 (Broadcast Address)

Usable Addresses 10.0.17.1/25 to 10.0.17.126/25

② Kathmandu Sub-division

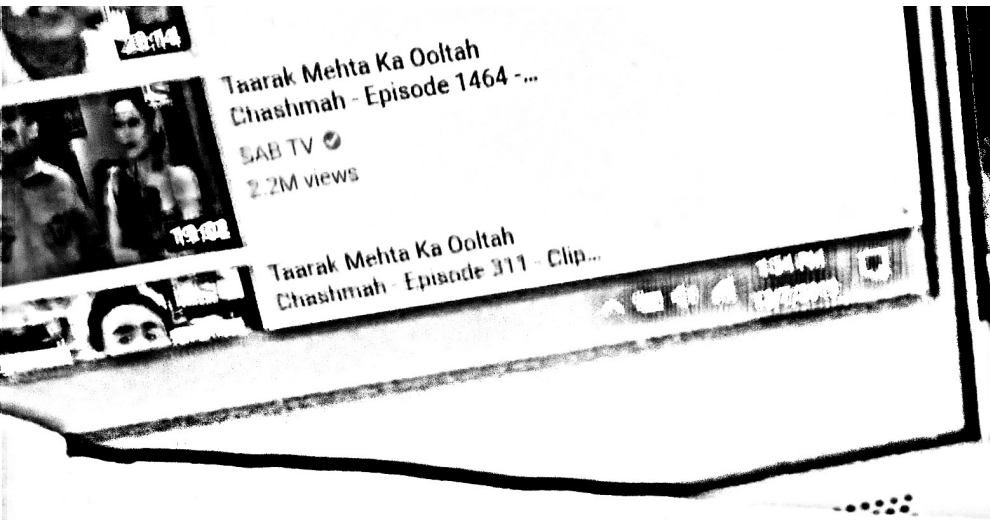
Required Address size = 60
Allocated Address size = 64 or 2^6

Subnet Mask = 32 - 6
= 26

Network Address = 10.0.17.128/26
Broadcast Address = 10.0.17.191/26

Usable Addresses = 10.0.17-129/26 to 10.0.17.190/26

③ Biratnagar Sub-division
Required Address size = 29
Allocated Address size = 32 or 2^5
Subnet mask = 32-5
= 27



Network Address = 10.0.17.192/27
Broadcast Address = 10.0.17.223/27

Usable Addresses = 10.0.17.193/27 to 10.0.17.222/27

Episode 13

2018 Spring 3b

A multi-national company is granted a site IP 172.16.0.15. Design an IP table with its subnet

Solution
In this question, we have to find subnets of IP 172.16.0.15

let's suppose this multi-national company requires 3 subnet
bits to be borrowed = 3 as $2^3 = 8$

Changing given IP into suitable binary form
Since it is class B, network bit = 16, host bit = 16

10101100.00010000 | 00000000.00001111

Required subnets

	Corresponding IP Address
172.16.000 00000 . 00001111	⇒ 172.16.0.15
172.16.001 00000 . 00001111	⇒ 172.16.32.15
172.16.010 00000 . 00001111	⇒ 172.16.64.15
172.16.011 00000 . 00001111	⇒ 172.16.96.15
172.16.100 00000 . 00001111	⇒ 172.16.128.15
172.16.101 00000 . 00001111	⇒ 172.16.160.15
172.16.110 00000 . 00001111	⇒ 172.16.192.15
172.16.111 00000 . 00001111	⇒ 172.16.224.15