① Company needs 600 addresses. Which of the following class C blocks can be used to form a supernet?

a) 198.47.32.0, 198.47.33.0 and 198.47.50.0

b) 198.47.32.0, 198.47.42.0, 198.47.52.0 and 198.47.62.0

c) 198.47.31.0, 198.47.32.0, 198.47.33.0 and 198.47.52.0

d) 198.47.32.0, 198.47.33.0, 198.47.34.0 and 198.47.35.0

Class C: NID = 24 bits and HID = 8 bits

Check for contiguous: a) x b) x c) x d) ✓

But be sure to check the other rules for d). Here, we don't have a none of the above option, so just marked d)

Answer: d)

② Networks: 199.202.1.0, 199.202.2.0, 199.202.3.0 and 199.202.4.0. Supernet mask could be?

a) 255.255.252.0 b) 255.255.255.252 c) 255.255.252.255 d) none of these

Class C: NID = 24 bits and HID = 8 bits. The networks are contiguous. ✓

Total no. of networks = 4 = 2^2 ✓

Size of supernet = $4 \times 2^8 = 2^{10}$ ⇒ HID = 10 bits and NID = 22 bits

Supernet ID = 192.202.00000000.00000000 → Remainder = 0 ✓

Supernet mask = 255.255.252.0

Answer: a)

③ Class C . Supernet mask : 255.255.224.0 . No. of class C networks combined to form this supernet = ?

Supernet bits

Supernet mask : 255.255.11100000 . 00000000 . No. of supernet bits = S

NID HID

⇒ No. of networks combined to form this supernet = $2^S = 32$

Answer : 32

④ Supernet mask : 255.255.252.0 . One of the IP addresses of the supernet is 201.99.89.113. What will be the range of supernet ? (Class C)

a) 201.99.88.0 to 201.99.91.255

b) 201.99.81.0 to 201.99.92.254

c) 201.99.255.255 to 201.99.0.0

d) None of these

IP address : 201.99.89.13 (Class C : NID = 24 bits and HID = 8 bits)

& Supernet mask : 255.255.252.0

Supernet ID : 201.99.88.0

Supernet bits

Supernet mask : 11111111.11111111.11111100.00000000

Combined Networks :

N_1 : 201.99.0101000.00000000 to 201.99.0101000.00000000

: 201.99.88.0 to 201.99.88.255

N_2 : 201.99.01010 01.00000000 to 201.99.01010 01.00000000

201.99.89.0 to 201.99.89.255

N_2 : 201.99.01010 10.00000000 to 201.99.01010 10.00000000

201.99.90.0 to 201.99.90.255

N_2 : 201.99.01010 11.00000000 to 201.99.01010 11.00000000

201.99.91.0 to 201.99.91.255

Combined Range: 201.99.88.0 to 201.99.91.255

Answer : a)

⑤ Default subnet mask for a network : 255.255.255.0. 'm' bits are borrowed from NID. What is the supernet mask?

Subnet mask : 255.255.255.0 ⇒ Class C

: 11111111.11111111.11111111.00000000 (NID | HID). Borrow m bits from NID. m < 8 else subnet mask changes

Supernet mask : $255.255.(2^8 - 2^m).0$

: $255.255.(2^{8-m} - 1) + 2^m.0$

⑥ Total no. of computers in an org. : 1500. ISP uses CIDR and has an address space : 202.61.0.0/17. Which address space should be assigned to org. that will minimize the no. of routing entries in the ISP's router using route aggregation?

N_1 : 202.61.84.0/21 ; N_2 : 202.61.104.0/21

N_3 : 202.61.64.0/21 ; N_4 : 202.64.144.0/21

Address space : 202.61.0.0/17 ⇒ NID = 17 bits and HID = 15 bits

Total no. of IP addresses = 2^{15}

No. of IP addresses required = 1500 = 2^{11}

Range of ISP's network : 202.61.0 00000000.00000000 to 202.61.0 11111111.11111111

: 202.61.0.0 to 202.61.127.255

Checking divisibility rule (÷ by block size) for the networks :

N_4 falls out of the range of ISP's network. ⇒ N_4 ✗

N_1 : 202.61.01010100.00000000 /21 (NID = 21 bits and HID = 11 bits) ✗

Remainder ≠ 0

N_2 : 202.61.01101000.00000000 /21 (NID = 21 bits and HID = 11 bits) ✓

Remainder = 0

N_3 : 202.61.01000000.00000000 /21 (NID = 21 bits and HID = 11 bits) ✓

Remainder = 0

⑦ An ISP is granted a block of addresses starting with 162.72.0.0/16. The ISP needs to distribute these addresses to 3 groups of customers as follows :

G_1 : 128 customers ; each needs 256 addresses

G_2 : 128 customers ; each needs 64 addresses

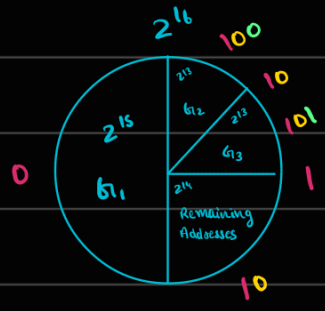
G_3 : 64 customers ; each needs 128 addresses

Find the last address of 6^{th} customer of G_2. Also, how many addresses are still available with the ISP after these allocations ?

Total no. of IP addresses : 2^{16}

G_1 : $128 \times 256 = 2^{15}$; G_2 : $128 \times 64 = 2^{13}$; G_3 : $64 \times 128 = 2^{13}$

Addresses left : $2^{16} - 2^{15} - 2^{13} - 2^{13} = 2^{14}$



G_1 in turn has 128 customers (2^7) $\Rightarrow$ 7 subnets

G_2 in turn has 128 customers (2^7) $\Rightarrow$ 7 subnets

G_3 in turn has 64 customers (2^6) $\Rightarrow$ 6 subnets

G_1 : 162.72.00000000.00000000 /17 to 162.72.01111111.11111111 /17

: 162.72.0.0 /17 to 162.72.127.255 /17

G_2 : 162.72.10000000.00000000 /19 to 162.72.10000000.00000000 /19

: 162.72.128.0 /19 to 162.72.159.255 /19

G_1 subnets : 162.72.00000000.00000000 /24

1st customer : 162.72.00000000.00000000/24 to 162.72.00000000.11111111 /24

: 162.72.0.0 /24 to 162.72.0.255 /24

2nd customer : 162.72.00000001.00000000/24 to 162.72.00000001.11111111 /24

: 162.72.1.0 /24 to 162.72.1.255 /24

3rd customer : 162.72.00000010.00000000/24 to 162.72.00000010.11111111 /24

: 162.72.2.0 /24 to 162.72.2.255 /24

⋮

128th customer : 162.72.01111111.00000000 /24 to 162.72.01111111.11111111 /24

: 162.72.127.0 /24 to 162.72.127.255 /24

G_3 subnets : 162.72.10000000.00000000/24

1st Customer : 162.72.100 00000.0 0000000 /24 to 162.72.100 00000.0 1111111 /24

: 162.72.128.0 /24 to 162.72.128.63 /24

2nd Customer : 162.72.100 00000.1 0000000 /24 to 162.72.100 00000.1 1111111 /24

: 162.72.128.64 /24 to 162.72.128.127 /24

⋮

So, 6th Customer : 162.72.100 00110.0 0000000 /24 to 162.72.100 00110.1 1111111 /24

162.72.134.0 /24 to 162.72.134.63 /24

Answer : 2^14 and 162.72.134.64 /24