CNOS (PROJECT) - Amazon Data Center in Iasi

Step I - Analysis of the organization's requirements

- How many physical subnets are needed today?
  - 6 subnets
- How many physical subnets are expected to be needed in the near future?
  - 8 subnets
- How many hosts must have the largest subnet today?
  - The total number of employees in the company is 200 who have 5 subnets divided among them which gives 40 hosts per subnet and 1 extra subnet for wireless devices.
- How many hosts must have the largest subnet in the near future?
  - 64 hosts
- To which address classes does the IP address belong?
  - Class C

Step II - Partition of bits in the host ID

Class C network: **192 . 168 . 0 . 0**

As we have predicted, 8 subnets with 64 hosts/subnet

Number of subnet bits: $2^S >= 8 \longrightarrow S = 3$ bits

The number of host bits: $2^H - 2 >= 32 \longrightarrow$ Because with 3 subnet bits, only 30 host addresses can be achieved so we proposed to choose 5 host bits in this case. Therefore, H = 5 ($2^5 - 2 = 30$) which leads to 8 subnets with 30 hosts/subnet.

Step III - Determining the custom subnet mask

Class C network: **192.168.0.0**

3 bits for the subnet ID

Subnet mask (in binary): 11111111 . 11111111 . 11111111 . 11100000

Subnet mask (in decimal): **255 . 255 . 255 . 224**

In CIDR notation: **/27**

Step IV - Determining the subnet identifier and IP address of the subnets

Class C network: **192.168.0.0**

3 bits for the subnet ID

CIDR: **/27**

8 subnets: **#0 - #7**

The IP address (in binary): **11000000 . 10101000 . 00000000 . 00000000**

Subnet	*Subnet ID (binary)*	*IP address of the subnet*
#0	*000*	**11000000 . 10101000 . 00000000 . 00000000** **192 . 168 . 0 . 0**
#1	*001*	**11000000 . 10101000 . 00000000 . 00100000** **192 . 168 . 0 . 32**
#2	*010*	**11000000 . 10101000 . 00000000 . 01000000** **192 . 168 . 0 . 64**
#3	*011*	**11000000 . 10101000 . 00000000 . 01100000** **192 . 168 . 0 . 96**
#4	*100*	**11000000 . 10101000 . 00000000 . 10000000** **192 . 168 . 0 . 128**
#5	*101*	**11000000 . 10101000 . 00000000 . 10100000** **192 . 168 . 0 . 160**
#6	*110*	**11000000 . 10101000 . 00000000 . 11000000** **192 . 168 . 0 . 192**
#7	*111*	**11000000 . 10101000 . 00000000 . 11100000** **192 . 168 . 0 . 224**

Step V - Allocating the host addresses for each subnet

The IP address: **192.168.0.0 /27**

5 bits for host ID (32 -27 = 5)

2^5 – 2 = 30 hosts/subnet

The IP address (in binary): **11000000 . 10101000 . 00000000 . 00000000**

Subnet	*IP address of the subnet*	*Host Address Range*	*Broadcast address*
#0	**192 . 168 . 0 . 0**	**192 . 168 . 0 . 1 – 192 . 168 . 0 . 30**	**192.168.0.31**
#1	**192 . 168 . 0 . 32**	**192 . 168 . 0 . 33 – 192 . 168 . 0 . 62**	**192.168.0.63**
#2	**192 . 168 . 0 . 64**	**192 . 168 . 0 . 65 – 192 . 168 . 0 . 94**	**192.168.0.95**
#3	**192 . 168 . 0 . 96**	**192 . 168 . 0 . 97 – 192 . 168 . 0 . 126**	**192.168.0.127**
#4	**192 . 168 . 0 . 128**	**192 . 168 . 0 . 129 – 192 . 168 . 0 . 158**	**192.168.0.159**
#5	**192 . 168 . 0 . 160**	**192 . 168 . 0 . 161 – 192 . 168 . 0 . 190**	**192.168.0.191**
#6	**192 . 168 . 0 . 192**	**192 . 168 . 0 . 193 – 192 . 168 . 0 . 222**	**192.168.0.223**
#7	**192 . 168 . 0 . 224**	**192 . 168 . 0 . 225 – 192 . 168 . 0 . 254**	**192.168.0.255**

Step VI - Assigning of host addresses in each subnet – creation structure of the subnet network

Class C network: **192.168.0.0**

3 bits for the subnet ID

CIDR: **/27**

8 subnets: **#0 - #7**

Subnet	*IP address of the subnet*	*Host Address Range*
#0	**192 . 168 . 0 . 0**	**192 . 168 . 0 . 1 – 192 . 168 . 0 . 30**
#1	**192 . 168 . 0 . 32**	**192 . 168 . 0 . 33 – 192 . 168 . 0 . 62**
#2	**192 . 168 . 0 . 64**	**192 . 168 . 0 . 65 – 192 . 168 . 0 . 94**
#3	**192 . 168 . 0 . 96**	**192 . 168 . 0 . 97 – 192 . 168 . 0 . 126**
#4	**192 . 168 . 0 . 128**	**192 . 168 . 0 . 129 – 192 . 168 . 0 . 158**
#5	**192 . 168 . 0 . 160**	**192 . 168 . 0 . 161 – 192 . 168 . 0 . 190**
#6	**192 . 168 . 0 . 192**	**192 . 168 . 0 . 193 – 192 . 168 . 0 . 222**
#7	**192 . 168 . 0 . 224**	**192 . 168 . 0 . 225 – 192 . 168 . 0 . 254**