**CNOS (Project) – Installation of an intranet network at the 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 are present in each subnet at this moment?
* The total number of employees in the company is 200 who have 5 subnets divided among them with 15 hosts per subnet and 1 extra subnet for wireless devices.
* How many hosts will be there in each subnet in the near future?
* 25 hosts
* To which class 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 25 hosts/subnet

Number of subnet bits: 2S >= 8 S = 3 bits

The number of host bits: 2H – 2 >= 25 Therefore, H = 5 (25 – 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)

**25 – 2 = 30 hosts/subnet**

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Subnet*** | ***Subnet ID (binary)*** | ***IP address of the subnet*** | ***Subnet Mask*** | ***Host Address Range*** | ***Broadcast address*** |
| **#0** | ***000*** | **192 . 168 . 0 . 0** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 1 – 192 . 168 . 0 . 30** | **192.168.0.31** |
| **#1** | ***001*** | **192 . 168 . 0 . 32** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 33 – 192 . 168 . 0 . 62** | **192.168.0.63** |
| **#2** | ***010*** | **192 . 168 . 0 . 64** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 65 – 192 . 168 . 0 . 94** | **192.168.0.95** |
| **#3** | ***011*** | **192 . 168 . 0 . 96** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 97 – 192 . 168 . 0 . 126** | **192.168.0.127** |
| **#4** | ***100*** | **192 . 168 . 0 . 128** | **255 . 255 . 255 . 224** | **192.168 . 0 . 129 – 192 . 168 . 0 . 158** | **192.168.0.159** |
| **#5** | ***101*** | **192 . 168 . 0 . 160** | **255 . 255 . 255 . 224** | **192.168 . 0 . 161 – 192 . 168 . 0 . 190** | **192.168.0.191** |
| **#6** | ***110*** | **192 . 168 . 0 . 192** | **255 . 255 . 255 . 224** | **192.168 . 0 . 193 – 192 . 168 . 0 . 222** | **192.168.0.223** |
| **#7** | ***111*** | **192 . 168 . 0 . 224** | **255 . 255 . 255 . 224** | **192.168 . 0 . 225 – 192 . 168 . 0 . 254** | **192.168.0.255** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Subnet*** | ***Subnet ID (binary)*** | ***IPv6 address of the subnet*** | ***IPv4-to-IPv6 mixt mapping address range*** | ***Broadcast address*** |
| **#0** | ***000*** | **2002:c0a8:0000:0:0:0:0:0** | **2002:c0a8:0001:0:0:0:0:0**  **–**  **2002:c0a8:001e:0:0:0:0:0** | **2002:c0a8:001f:0:0:0:0:0** |
| **#1** | ***001*** | **2002:c0a8:0020:0:0:0:0:0** | **2002:c0a8:0021:0:0:0:0:0**  **–**  **2002:c0a8:003e:0:0:0:0:0** | **2002:c0a8:003f:0:0:0:0:0** |
| **#2** | ***010*** | **2002:c0a8:0040:0:0:0:0:0** | **2002:c0a8:0041:0:0:0:0:0**  **–**  **2002:c0a8:005e:0:0:0:0:0** | **2002:c0a8:005f:0:0:0:0:0** |
| **#3** | ***011*** | **2002:c0a8:0060:0:0:0:0:0** | **2002:c0a8:0061:0:0:0:0:0**  **–**  **2002:c0a8:007e:0:0:0:0:0** | **2002:c0a8:007f:0:0:0:0:0** |
| **#4** | ***100*** | **2002:c0a8:0080:0:0:0:0:0** | **2002:c0a8:0081:0:0:0:0:0**  **–**  **2002:c0a8:009e:0:0:0:0:0** | **2002:c0a8:009f:0:0:0:0:0** |
| **#5** | ***101*** | **2002:c0a8:00a0:0:0:0:0:0** | **2002:c0a8:00a1:0:0:0:0:0**  **–**  **2002:c0a8:00be:0:0:0:0:0** | **2002:c0a8:00bf:0:0:0:0:0** |
| **#6** | ***110*** | **2002:c0a8:00c0:0:0:0:0:0** | **2002:c0a8:00c1:0:0:0:0:0**  **–**  **2002:c0a8:00de:0:0:0:0:0** | **2002:c0a8:00df:0:0:0:0:0** |
| **#7** | ***111*** | **2002:c0a8:00e0:0:0:0:0:0** | **2002:c0a8:00e1:0:0:0:0:0**  **–**  **2002:c0a8:00fe:0:0:0:0:0** | **2002:c0a8:00ff:0:0:0:0:0** |

**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*** | ***Subnet Mask*** | ***IP address of the subnet*** | ***Host Address Range*** |
| **#0** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 0** | **192 . 168 . 0 . 1 – 192 . 168 . 0 . 30** |
| **#1** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 32** | **192 . 168 . 0 . 33 – 192 . 168 . 0 . 62** |
| **#2** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 64** | **192 . 168 . 0 . 65 – 192 . 168 . 0 . 94** |
| **#3** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 96** | **192 . 168 . 0 . 97 – 192 . 168 . 0 . 126** |
| **#4** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 128** | **192 . 168 . 0 . 129 – 192 . 168 . 0 . 158** |
| **#5** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 160** | **192 . 168 . 0 . 161 – 192 . 168 . 0 . 190** |
| **#6** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 192** | **192 . 168 . 0 . 193 – 192 . 168 . 0 . 222** |
| **#7** | **255 . 255 . 255 . 224** | **192 . 168 . 0 . 224** | **192 . 168 . 0 . 225 – 192 . 168 . 0 . 254** |