ODTÜ METU

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CNG 436 Wireless Communication and Networks
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Assignment 1

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Question 1

We are given a range of IP addresses as:

(192+STD NO%30) . (STD NO%200) . (STD NO%8). 0

to

(192+STD NO%30) . (STD NO%200) . (STD NO%20 + 40). 0

My student number is 2585461. Therefore, when I substitute STD_NO with my student number and do the operations I find the following range of address available:

193.61.5.0 to 193.61.41.0

Question 2

Table 1.1: Department information

Department	No. of work groups	No.of hosts per work group
Administration	2	8+(STD_NO % 4)
Classrooms	2	130+(STD_NO % 70)
Labs	2	18+(STD_NO % 10)
Student accommodation	2	150+(STD_NO % 50)
Staff	2	40+(STD_NO % 20)

We need to configure the network given. First, I need to find the number of hosts per work group. Again, I substitute STD_NO with my student number and do the operations. I got the results as following:

Table 1.2: Resulting table of department information

Department	No. of work groups	No.of hosts per work group
Administration	2	9
Classrooms	2	141
Labs	2	19
Student accommodation	2	161
Staff	2	41

Now I know the number of hosts in every workgroup. I can discuss how many C class addresses I will need.

Administration → $\frac{9}{254}$ → $\frac{1}{16}$ class C * 2 workgroups = $\frac{2}{16} = \frac{1}{8}$ class C

Classrooms → $\frac{141}{254}$ → 1 class C * 2 workgroups = 2 class C

Labs → $\frac{19}{254}$ → $\frac{1}{8}$ class C * 2 workgroups = $\frac{2}{8} = \frac{1}{4}$ class C

Student accommodation → $\frac{161}{254}$ → 1 class C * 2 workgroups = 2 class C

Staff → $\frac{41}{254}$ → $\frac{1}{4}$ class C * 2 workgroups = $\frac{2}{4} = \frac{1}{2}$ class C

In total I will need :

$= \frac{1}{8} + 2 + \frac{1}{4} + 2 + \frac{1}{2}$

$= 4 + \frac{7}{8}$

≈ 5 Class C

Since we need to reserve n bits to do supernetting, we need to reserve 2^n Class C's. The smallest number of n I can choose is 3 which gives me 8 Class C's.

I have the range 193.61.5.0 to 193.61.41.0.

The block of class C addresses I reserved are:

1. 193.61.00000101.00000000 = 193.61.5.0/21
2. 193.61.00000110.00000000 = 193.61.6.0/21
3. 193.61.00000111.00000000 = 193.61.7.0/21
4. 193.61.00001000.00000000 = 193.61.8.0/21
5. 193.61.00001001.00000000 = 193.61.9.0/21
6. 193.61.00001010.00000000 = 193.61.10.0/21
7. 193.61.00001011.00000000 = 193.61.11.0/21
8. 193.61.00001100.00000000 = 193.61.12.0/21

We need to select the subnet with the highest number of hosts (Student accommodation) first because we are implementing VLSM. This ensures that larger subnets receive allocations before smaller ones. Properly ordering the subnets will help avoid potential conflicts when aggregating networks for supernetting.

Student accommodation 1:

2^h - 2 ≥ 161

h = 8

Network Address: 193.61.5.0/24

First Available Address: 193.61.5.1/24

Last Available Address: 193.61.5.254/24

Broadcast Address: 193.61.5.255/24

Student accommodation 2:

2^h - 2 ≥ 161

h = 8

Network Address: 193.61.6.0/24

First Available Address: 193.61.6.1/24

Last Available Address: 193.61.6.254/24

Broadcast Address: 193.61.6.255/24

Classroom 1:

2^h - 2 ≥ 141

h = 8

Network Address: 193.61.7.0/24

First Available Address: 193.61.7.1/24

Last Available Address: 193.61.7.254/24

Broadcast Address: 193.61.7.255/24

Classroom 2:

2^h - 2 ≥ 141

h = 8

Network Address: 193.61.8.0/24

First Available Address: 193.61.8.1/24

Last Available Address: 193.61.8.254/24

Broadcast Address: 193.61.8.255/24

Staff 1:

2^h - 2 ≥ 41

h = 6

Network Address: 193.61.9.0/26

First Available Address: 193.61.9.1/26

Last Available Address: 193.61.9.62/26

Broadcast Address: 193.61.9.63/26

Staff 2:

2^h - 2 ≥ 41

h = 6

Network Address: 193.61.9.64/26

First Available Address: 193.61.9.65/26

Last Available Address: 193.61.9.126/26

Broadcast Address: 193.61.9.127/26

Lab 1:

2^h - 2 ≥ 19

h = 5

Network Address: 193.61.9.128/27

First Available Address: 193.61.9.129/27

Last Available Address: 193.61.9.158/27

Broadcast Address: 193.61.9.159/27

Lab 2:

2^h - 2 ≥ 19

h = 5

Network Address: 193.61.9.160/27

First Available Address: 193.61.9.161/27

Last Available Address: 193.61.9.190/27

Broadcast Address: 193.61.9.191/27

Administration 1:

2^h - 2 ≥ 9

h = 4

Network Address: 193.61.9.192/28

First Available Address: 193.61.9.193/28

Last Available Address: 193.61.9.206/28

Broadcast Address: 193.61.9.207/28

Administration 2:

2^h - 2 ≥ 9

h = 4

Network Address: 193.61.9.208/28

First Available Address: 193.61.9.209/28

Last Available Address: 193.61.9.222/28

Broadcast Address: 193.61.9.223/28

Serial 1:

Network Address: 193.61.9.224/30

First Available Address: 193.61.9.225/30

Last Available Address: 193.61.9.226/30

Broadcast Address: 193.61.9.227/30

Serial 2:

Network Address: 193.61.9.228/30

First Available Address: 193.61.9.229/30

Last Available Address: 193.61.9.230/30

Broadcast Address: 193.61.9.231/30

Serial 3:

Network Address: 193.61.9.232/30

First Available Address: 193.61.9.233/30

Last Available Address: 193.61.9.234/30

Broadcast Address: 193.61.9.235/30

Serial 4:

Network Address: 193.61.9.236/30

First Available Address: 193.61.9.237/30

Last Available Address: 193.61.9.238/30

Broadcast Address: 193.61.9.239/30

Serial 5:

Network Address: 193.61.9.240/30

First Available Address: 193.61.9.241/30

Last Available Address: 193.61.9.242/30

Broadcast Address: 193.61.9.243/30

Question 3

You can see my network topology diagram created in Cisco Packet Tracer below where different workgroups and users are assigned separate VLSM subnets.

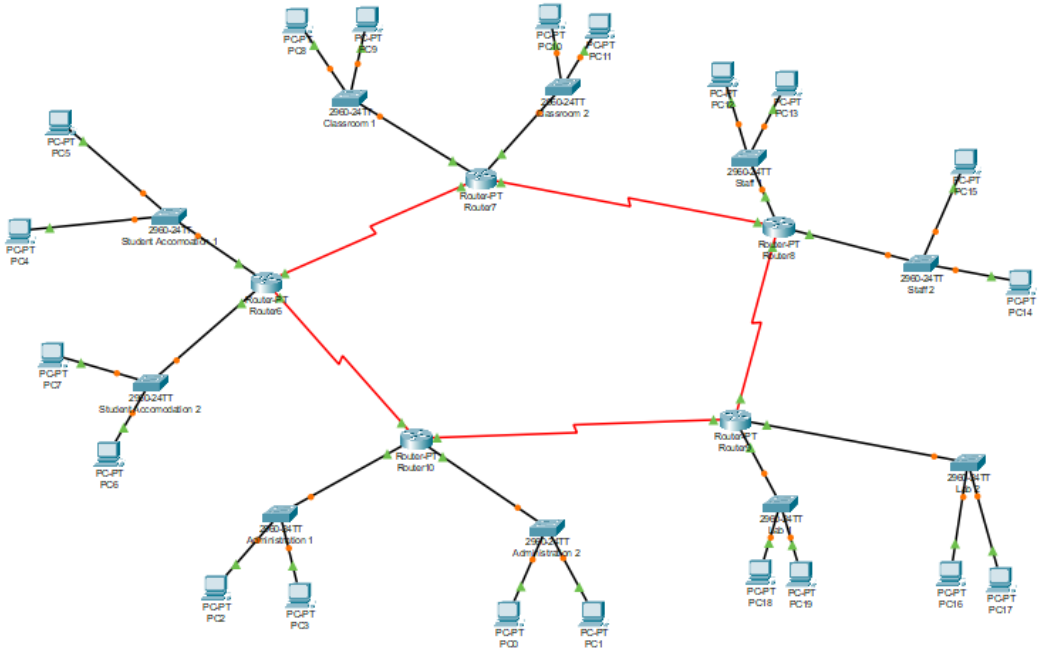

Figure 1: Network Topology Diagram