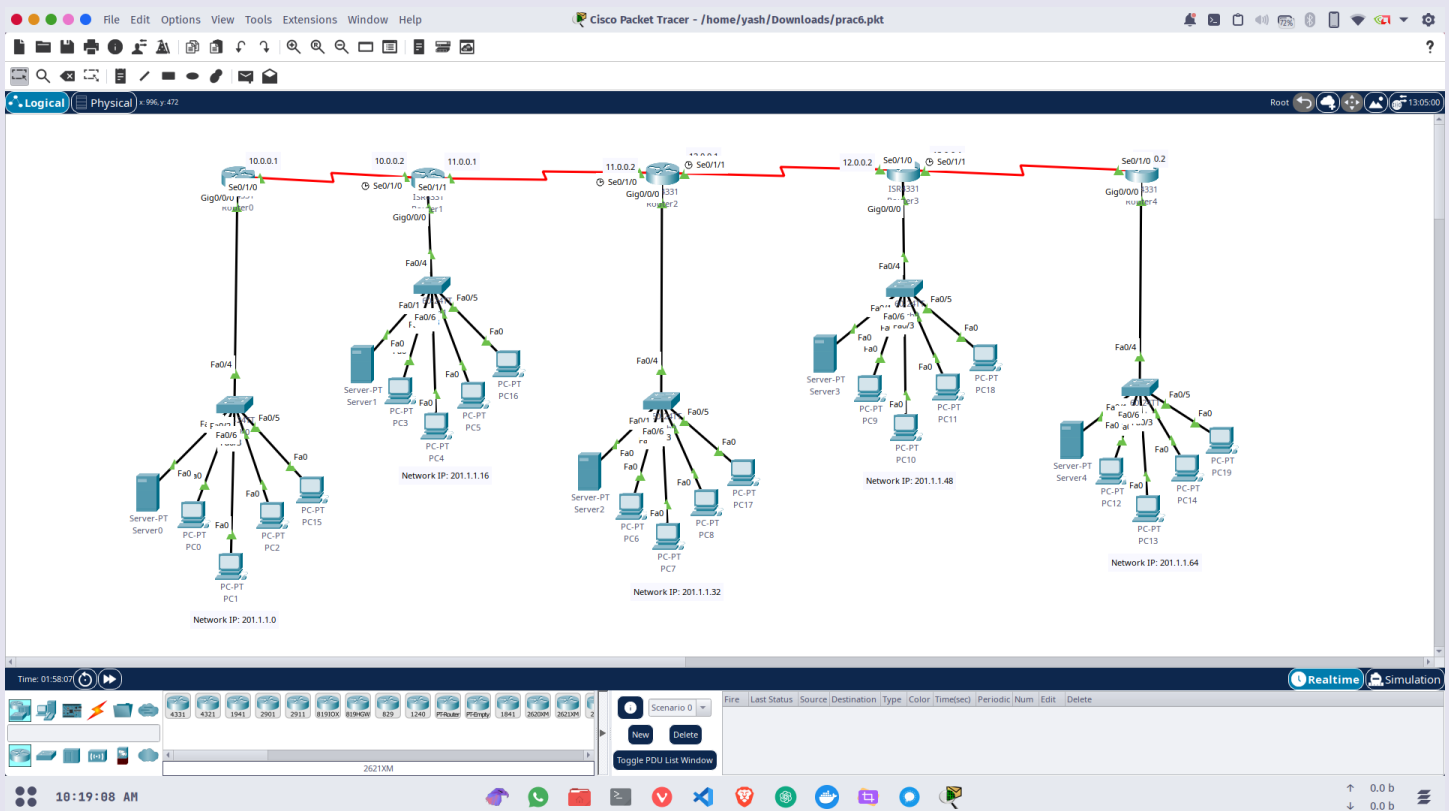# Practical 6

Aim : Design a Network of an organization using fundamentals of subnetting

Scenario : Organization named Zenith enterprise has setup a branch office at Noida and hired you as a Network Engineer. The branch office will be having 5 different Departments and each department has its own network. Each department has actually 14 devices. The IP address range given to you is 201.1.1.0/24. Design the network such that wastage of IP address is less. So, for designing purpose you can take 4 devices in each department. Also assign IP address dynamically to the device for ease of the implementation.

Procedure :

1. Design a network with 5 departments as seen in the figure.

2. Assign classless IP to one router's interfaces.

3. Similarly, configure all the routers and add static routing.
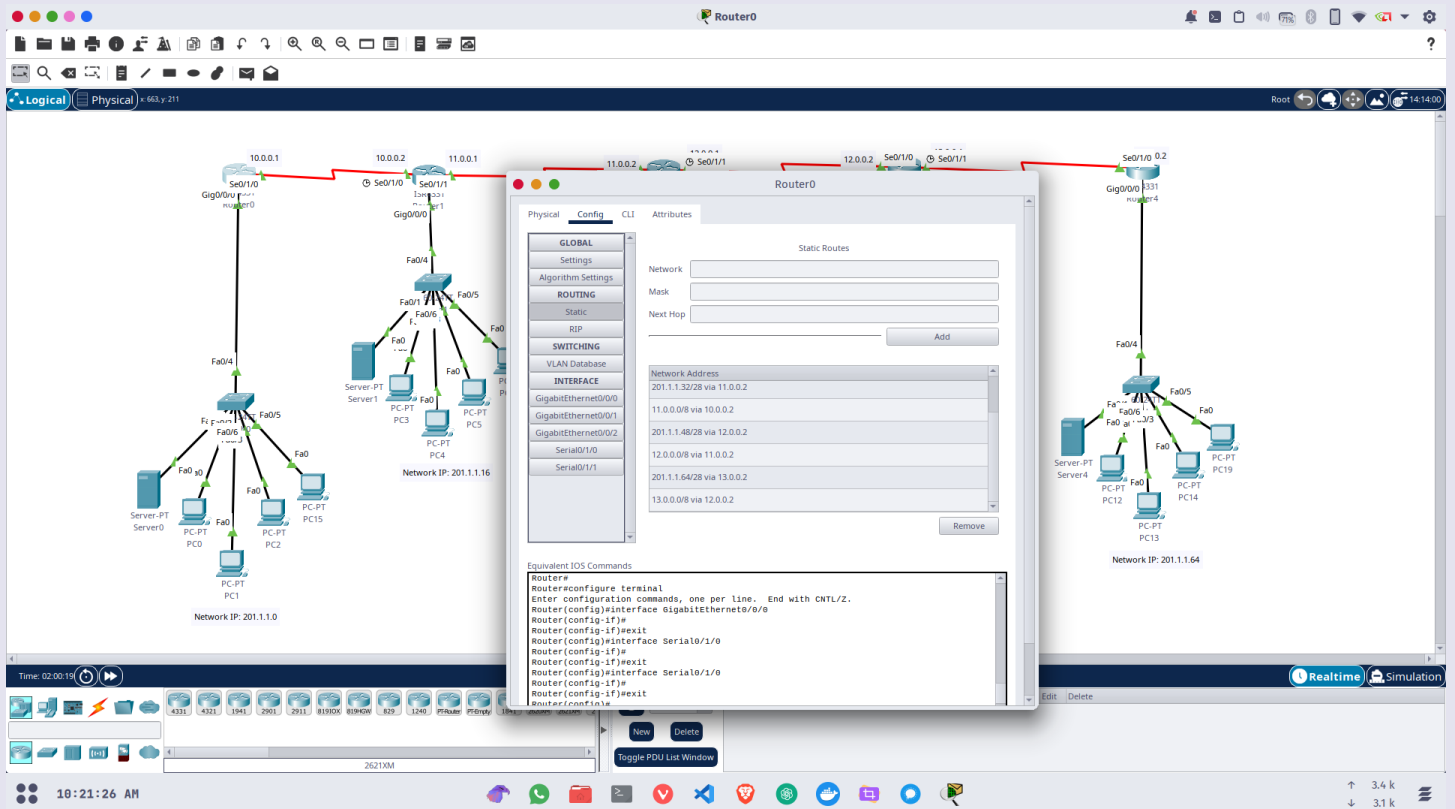
4. Enable and configure DHCP services in all servers of the departments.

5. Transfer a packet to check the network connectivity.
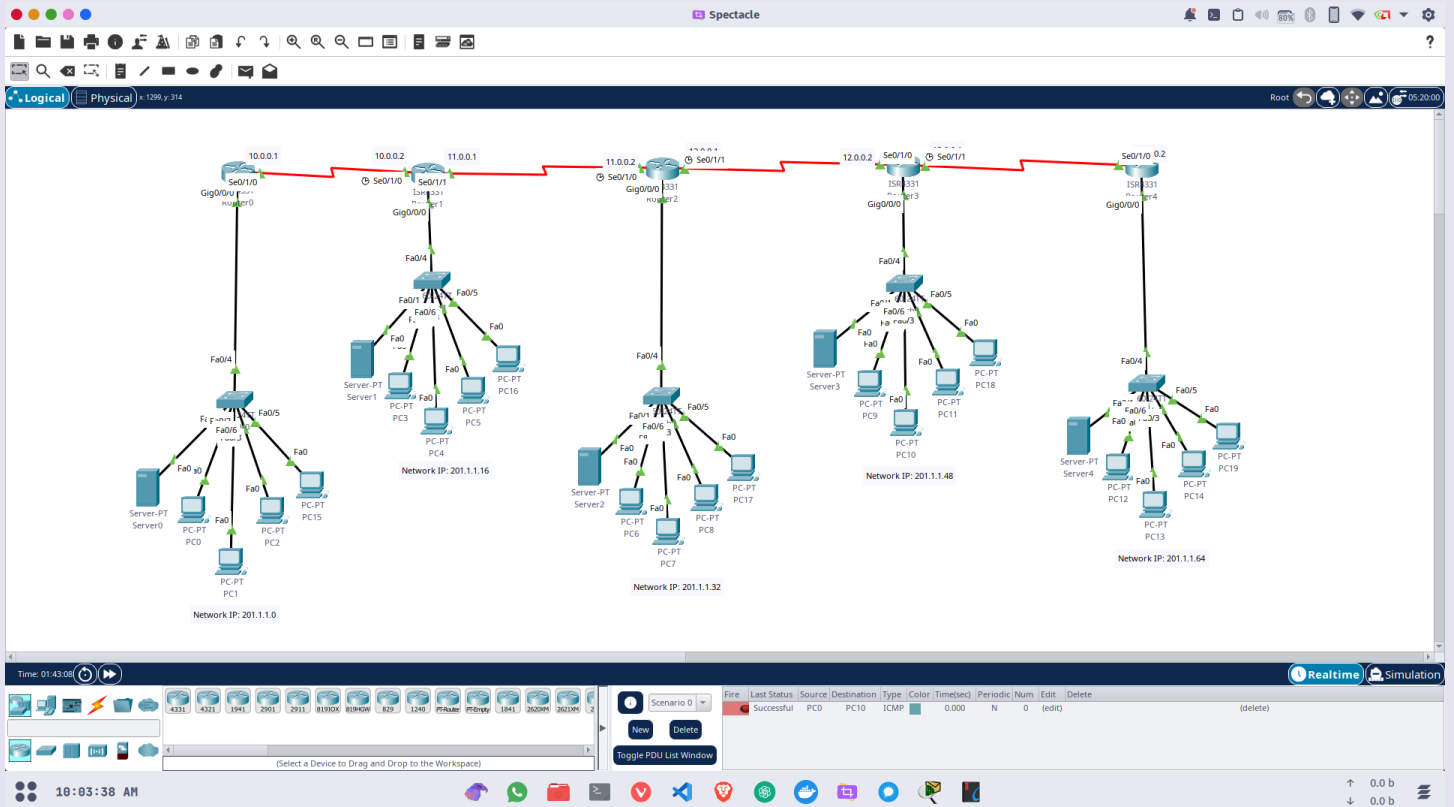
Calculations :

No. of departments = 5

Each dept. has 14 devices

IP address range = 201.1.1.0/24

Step-1: requirement $\leq 2^n - 2$

$14 \leq 2^n - 2$

Let $n = 4$; $14 \leq 2^4 - 2$

$14 \leq 16 - 2$

$14 \leq 14$

Hence, condition is fulfilled. So, $\boxed{n = 4}$

Step-2: 201.1.1.0/24 (class C)

old subnet : 255.255.255.0

Now, as $n = 4$

New subnet : $\underbrace{11111111 . 11111111 . 11111111 . 1111}_{\text{network}} \overbrace{0000}^{\text{hosts}}$

255.255.255.240/28 $(32 - 4 = 28)$

Step-3:

Dept-1: Network IP : 201.1.1.0/28

First valid Host IP : 201.1.1.1/28

Last valid Host IP : 201.1.1.14/28

Broadcast IP : 201.1.1.15/28

Dept – 2 : Network IP : 201.1.1.16/28
First valid host IP : 201.1.1.17/28
Last valid host IP : 201.1.1.30/28
Broadcast IP : 201.1.1. 31/28

Dept. – 3 : Network IP : 201.1.1.32/28
First valid host IP : 201.1.1.33/28
Last valid host IP : 201.1.1.46/28
Broadcast IP : 201.1.1.47/28

Dept. – 4 : Network IP : 201.1.1.48/28
First valid host IP : 201.1.1.49/28
Last valid host IP : 201.1.1.62/28
Broadcast IP : 201.1.1.63/28

Dept – 5 : Network IP : 201.1.1.64/28
First valid host IP : 201.1.1.65/28
Last valid host IP : 201.1.1.78/28
Broadcast IP : 201.1.1.79/28

Conclusion : This experiment ensures the understanding of using classless IP addresses for different networks, using same main network and thus decreasing the wastage of IP addresses.