East West University

Spring 2023

Course Title: Computer Networks

Course code: CSE 405

Section: 2

Mini Project

Submitted To:

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Introduction

University of Scholars, is an enterprise like East West University, owns many computers, with a complex network infrastructure. The motive is this project is to build a whole network connection for the university. Along with wired internet access to all the classrooms, labs, employee PCs, library and other administrative and academic wings, the university also provides wireless internet access for every campus. To build this complete structure Cisco Packet Tracer will be used and different subnetting for the campus will be considered. The motto of this project is to get the understanding of a complete network with various classes and subnetting.

Tasks

To build this network infrastructure, this task needed to be fulfilled-

- Web page of the university will reflect the University of Professionals' web page.
- • A single DNS server needs to be installed to locate the webserver - meaning people will browse University's web site with the following address: http://www.scholars.edu.bd
- • Configure the whole network in such a way that IP for the hosts of different campuses will be automatically assigned by a single DHCP server. If a single DHCP is not doable by you, then use multiple DHCP servers; however, that will be discredited.
- • Among the hosts in a network make sure some wireless hosts are added in addition to wired hosts.
- • University's full network has covered its seven campuses with seven routers like this topology.

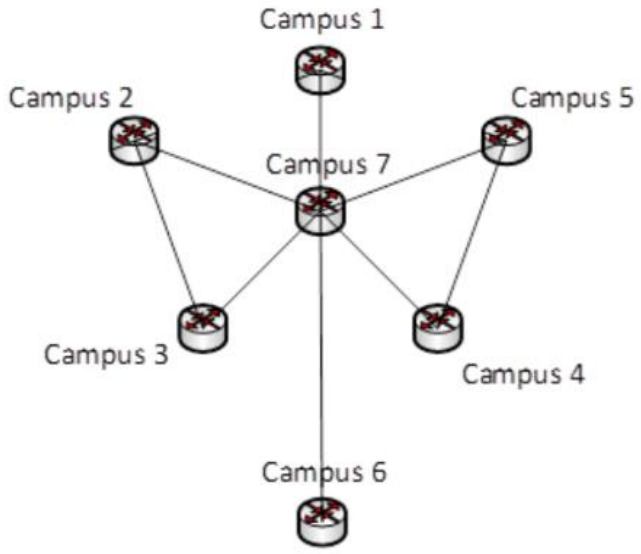


Figure 1: Campus Connection Topology

- Connectivity between all the hosts needs to be established.

Requirements

In this simulation in the ‘Cisco Packet Tracer’ these softwares have been used

- 18 routers and 2 wireless routers
- 35 switches
- 80 end devices
- 3 servers (DHCP, DNS, WEB)

Implementation

Network Design Diagram

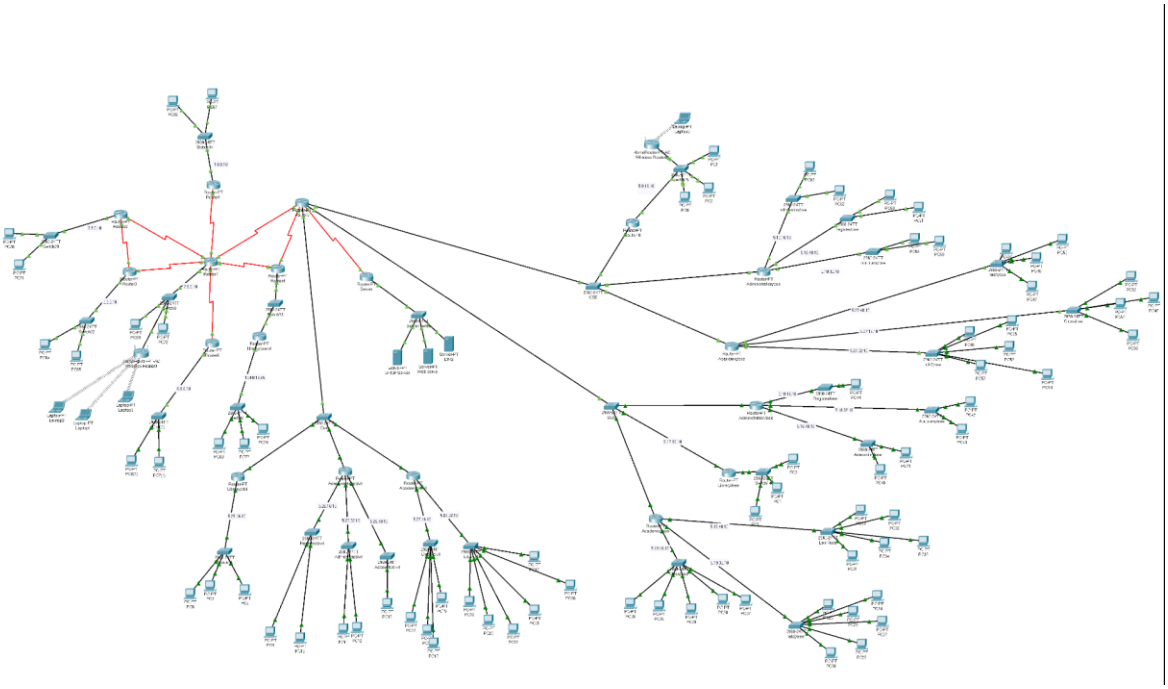


Figure 2: Network diagram

Campus Connection

There are 7 campuses, for the connections of the campus **Class C** IP addresses has been taken, and it has designed in a way that all the campuses are coming to campus 7 along with their other connections using the given topology.

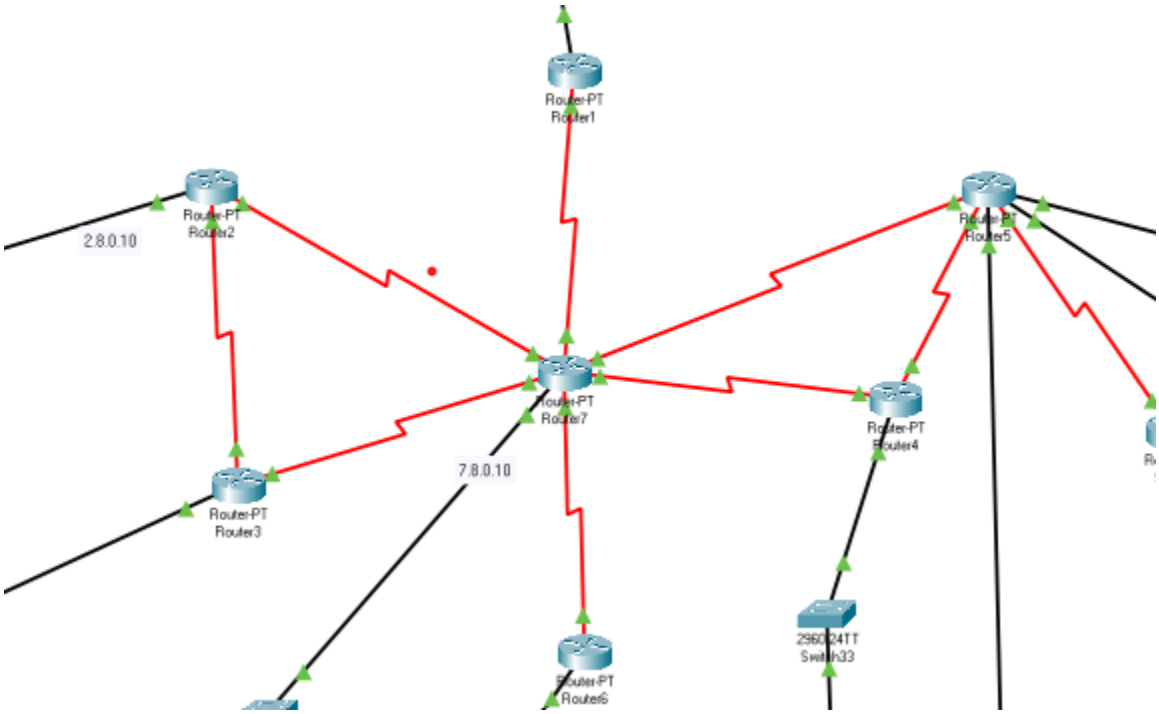


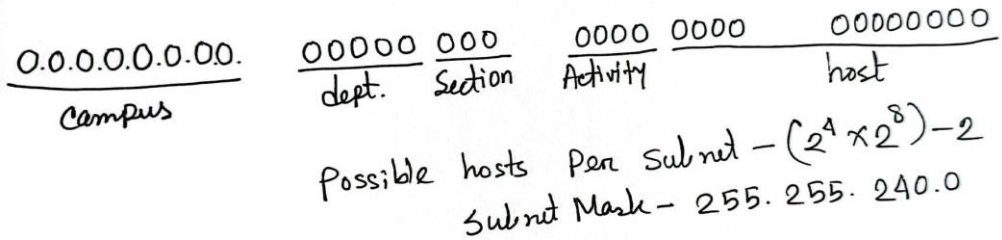
Figure 3: Campus Connections

For the IP **200. <starting router>. <ending router>.0**

For example, the connection is going from router 1 to 7, hence the IP is 200.1.7.0, this follows.

Subnet Configuration

To develop the campus structure **Class A** has been considered. In the class A sub netting follows.



Here for each campus there is subnetting for the department then, in each department there are sections like administration work or Academic or library, afteand r that in each section there can be activity. For example, in Academics there can be classes or labs in the department or in administration works there will be register, accounts or admission offices. In the design campus 5 has been considered as the main campus and it has been expanded in this manner. The other campuses have also been developed with this subnetting. They all can connect like that.

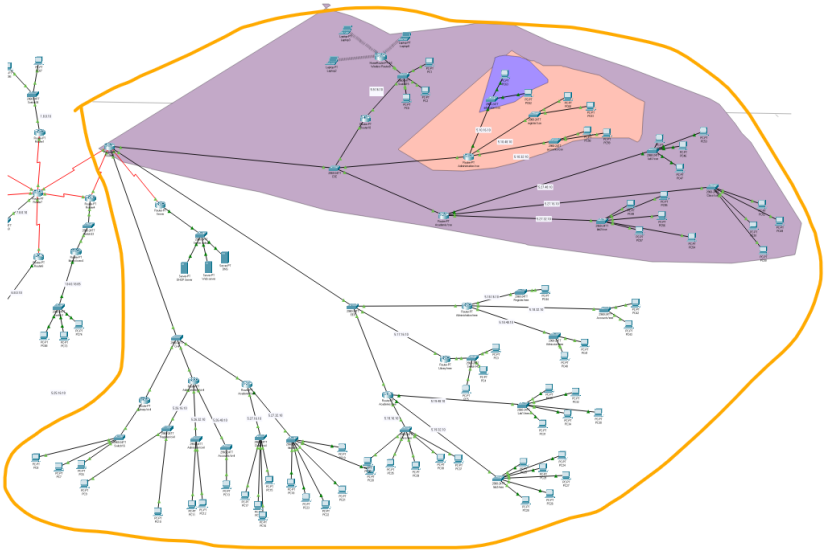
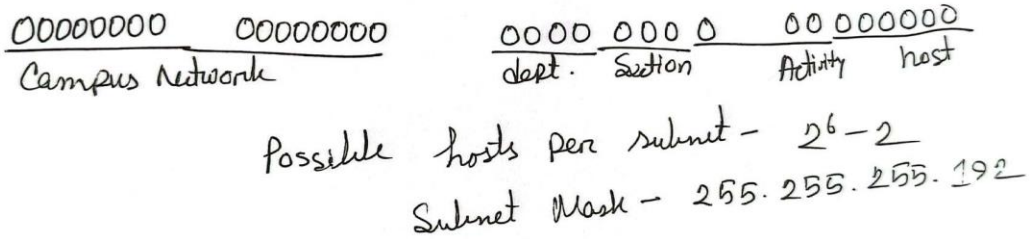


Figure 4: Subnet within Campus

However, it has been assumed that Campus-6 is a small campus in compared to the others. Hence, this has been built with **Class B**. The subnetting-



Server Room Setup

DHCP

The DHCP server has been configured with different Serverpools across the network.

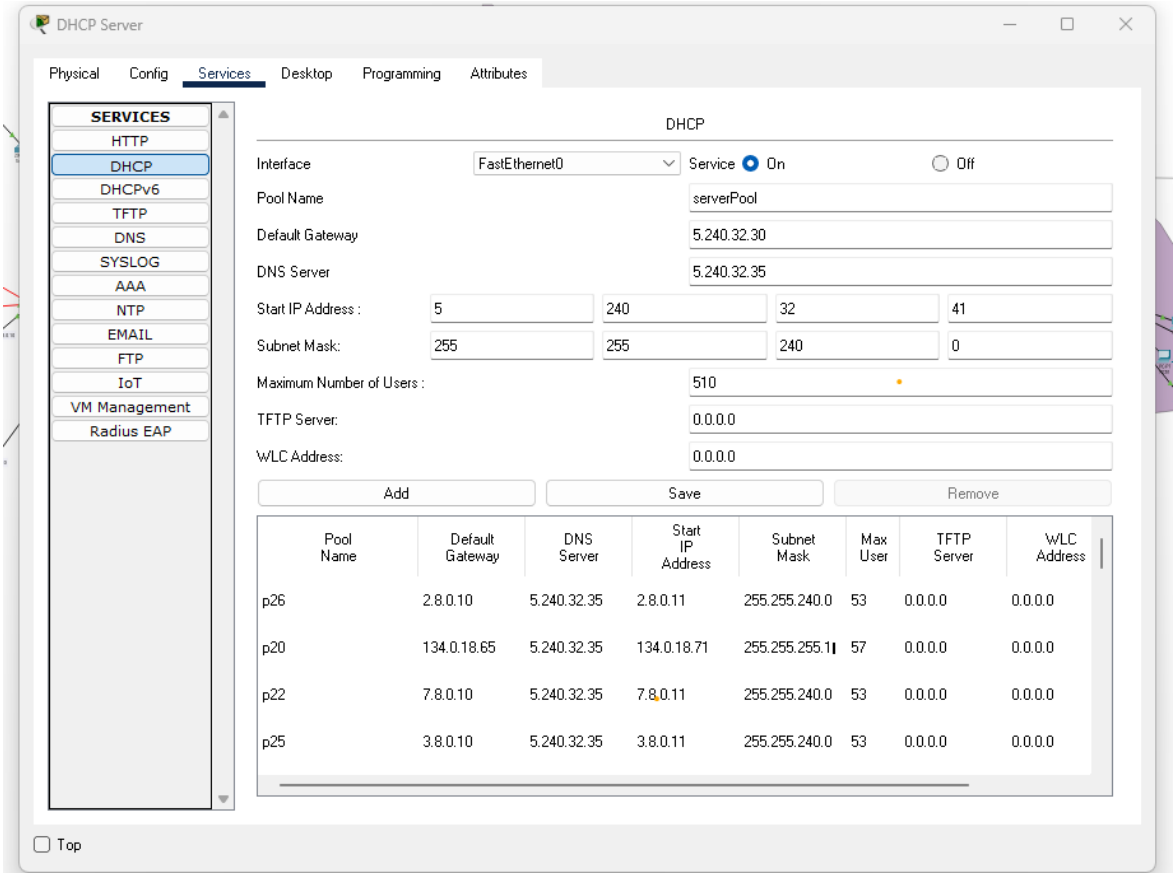


Figure 5: DHCP server config

DHCP IP

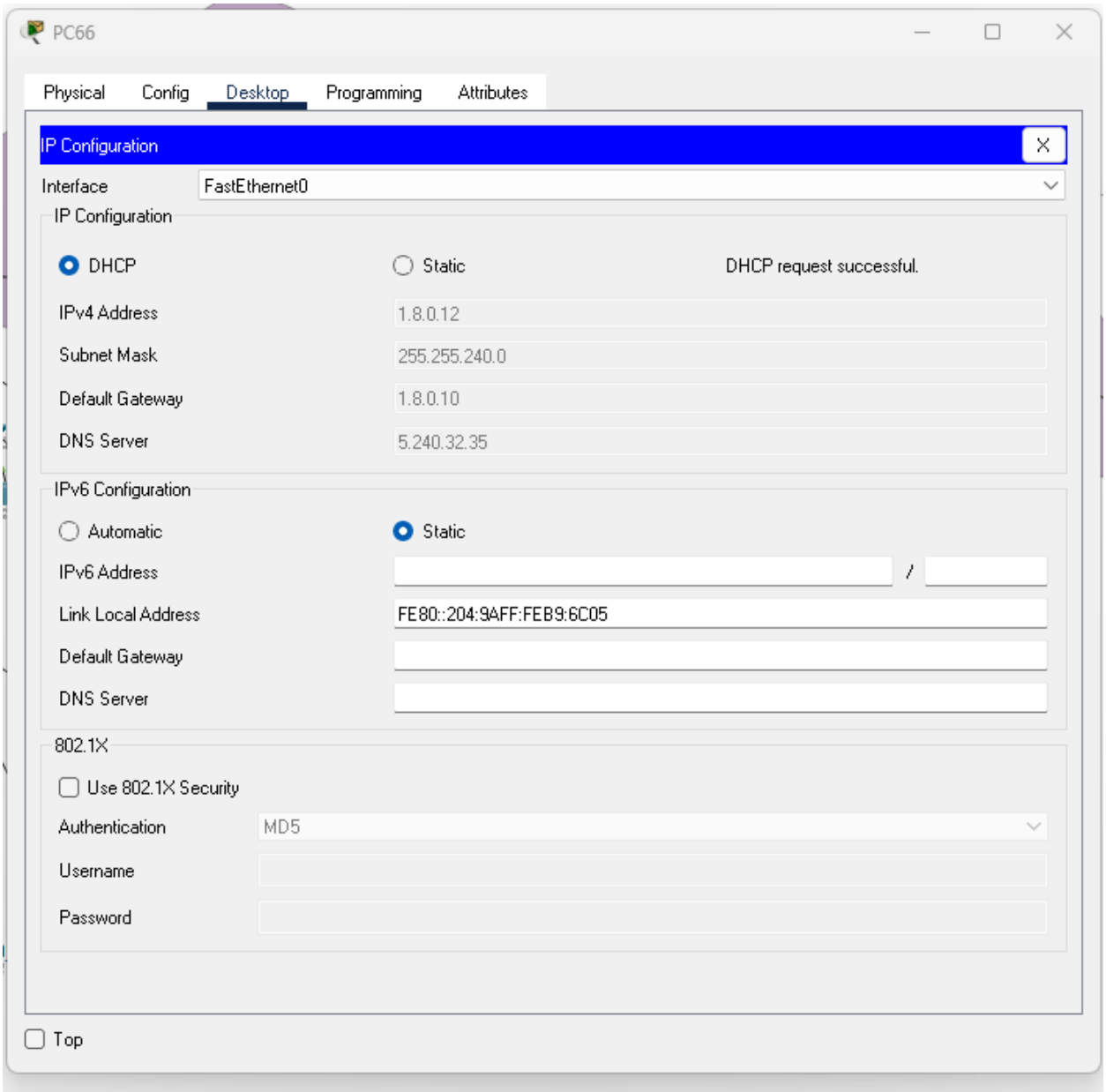


Figure 6: IP Config using DHCP

DNS

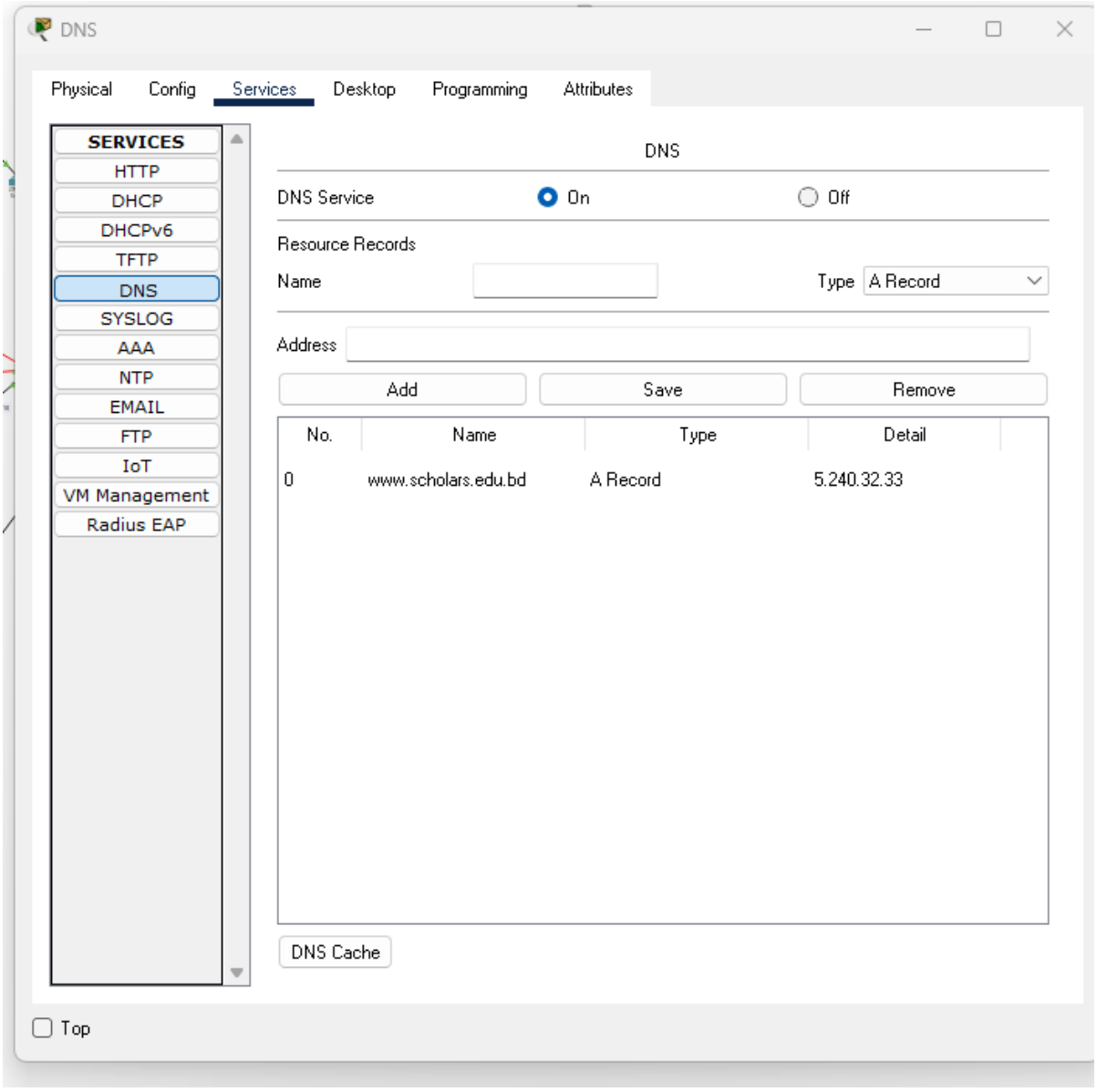


Figure 7: DNS Server Config

WEB

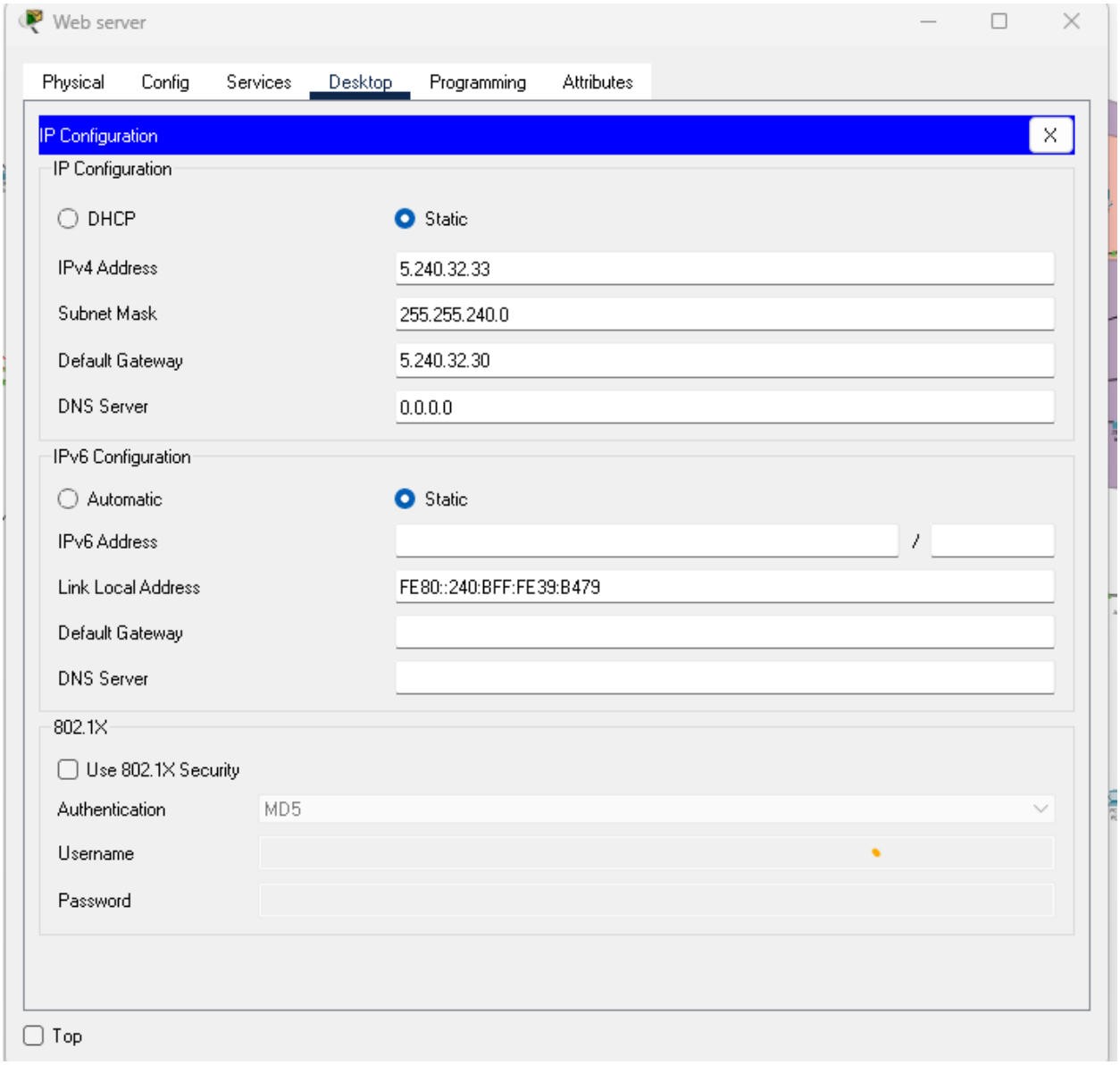


Figure 8: WEB server config

Access of WEB server:

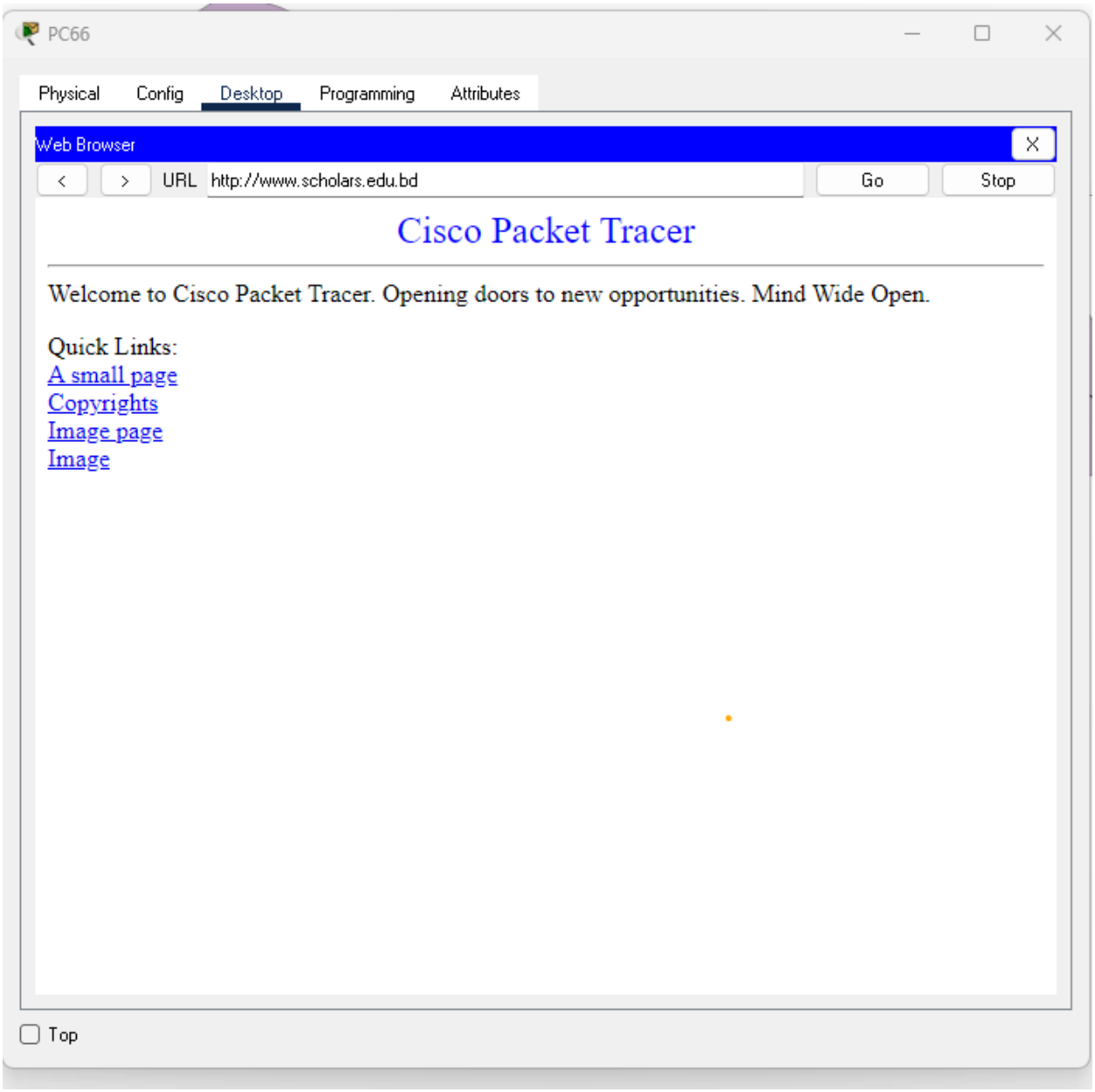


Figure 9: WEB server access using DNS

Router Config Codes

Campus 7
interface se2/0
ip address 200.1.7.11 255.255.255.0
no shut
do wr
exit

interface se3/0
ip address 200.2.7.11 255.255.255.0
no shut
do wr
exit

interface se6/0
ip address 200.5.7.11 255.255.255.0
no shut
do wr
exit

interface se7/0
ip address 200.3.7.11 255.255.255.0
no shut
do wr
exit

interface se8/0
ip address 200.4.7.11 255.255.255.0
no shut
do wr
exit

```
interface se9/0
ip address 200.6.7.11 255.255.255.0
no shut
do wr
exit

interface fa0/0
ip address 7.8.0.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit
```

Campus 5

```
interface se2/0
ip address 200.5.7.10 255.255.255.0
clock rate 64000
no shut
do wr
exit

interface se3/0
ip address 200.5.4.10 255.255.255.0
clock rate 64000
no shut
do wr
exit
```

```
interface se8/0
ip address 5.240.3.10 255.255.240.0
clock rate 64000
no shut
do wr
exit

interface fa0/0
ip address 5.8.0.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa1/0
ip address 5.16.0.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa6/0
ip address 5.24.0.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit
```

Server router

interface se2/0
ip address 5.240.3.20 255.255.240.0
no shut
do wr
exit

interface fa0/0
ip address 5.240.32.30 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

CSE Library
interface fa0/0
ip address 5.8.0.11 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa1/0
ip address 5.9.16.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

CSE administration
interface fa0/0
ip address 5.8.0.12 255.255.240.0

ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa1/0
ip address 5.10.16.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa6/0
ip address 5.10.32.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa8/0
ip address 5.10.48.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

CSE Academic
interface fa0/0
ip address 5.8.0.13 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr

exit

interface fa1/0
ip address 5.27.16.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa6/0
ip address 5.27.32.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa7/0
ip address 5.27.48.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

Civil Library
interface fa0/0
ip address 5.24.0.11 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa1/0

ip address 5.25.16.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

Civil administration
interface fa0/0
ip address 5.24.0.12 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa1/0
ip address 5.26.16.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa6/0
ip address 5.26.32.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa8/0
ip address 5.26.48.10 255.255.240.0
ip helper-address 5.254.254.250
no shut

do wr
exit

Civil Academic
interface fa0/0
ip address 5.24.0.13 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa1/0
ip address 5.27.16.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa6/0
ip address 5.27.32.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

EEE Library
interface fa0/0
ip address 5.16.0.11 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr

exit

interface fa1/0
ip address 5.17.16.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

EEE administration
interface fa0/0
ip address 5.16.0.12 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa1/0
ip address 5.18.16.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa7/0
ip address 5.18.32.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa6/0

ip address 5.18.48.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

EEE Academic
interface fa0/0
ip address 5.16.0.13 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa1/0
ip address 5.19.16.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa6/0
ip address 5.19.32.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa7/0
ip address 5.19.48.10 255.255.240.0
ip helper-address 5.254.254.250
no shut

```
do wr
exit

Router-1

interface se2/0
ip address 200.1.7.10 255.255.255.0
clock rate 64000
no shut
do wr
exit

interface fa0/0
ip address 1.8.0.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

Router-4
interface se2/0
ip address 200.4.7.10 255.255.255.0
clock rate 64000
no shut
do wr
exit

interface se3/0
ip address 200.5.4.11 255.255.255.0
no shut
do wr
exit
```

interface fa0/0
ip address 134.0.16.10 255.255.255.192
ip helper-address 5.254.254.250
no shut
do wr
exit

CSE Library Campus-4
interface fa0/0
ip address 134.0.16.21 255.255.255.192
ip helper-address 5.254.254.250
no shut
do wr
exit

interface fa1/0
ip address 134.0.18.65 255.255.255.192
ip helper-address 5.254.254.250
no shut
do wr
exit

Router-2
interface se2/0
ip address 200.2.7.10 255.255.255.0
clock rate 64000
no shut
do wr

exit

interface se3/0
ip address 200.2.3.10 255.255.255.0
clock rate 64000
no shut
do wr
exit

interface fa0/0
ip address 2.8.0.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

Router -3
interface se2/0
ip address 200.3.7.10 255.255.255.0
clock rate 64000
no shut
do wr
exit

interface se3/0
ip address 200.2.3.11 255.255.255.0
no shut
do wr
exit

interface fa0/0
ip address 3.8.0.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

Router-6
interface se2/0
ip address 200.6.7.10 255.255.255.0
clock rate 64000
no shut
do wr
exit

interface fa0/0
ip address 6.8.0.10 255.255.240.0
ip helper-address 5.254.254.250
no shut
do wr
exit

Router OSPF

Campus-1
router ospf 1
network 1.0.0.0 0.0.15.255 area 1
network 200.1.7.0 0.0.0.155 area 1
exit

Campus-2
router ospf 2
network 2.0.0.0 0.0.15.255 area 1
network 200.2.7.0 0.0.0.155 area 1
network 200.2.3.0 0.0.0.155 area 1
exit

Campus-3
router ospf 3
network 3.0.0.0 0.0.15.255 area 1
network 200.3.7.0 0.0.0.155 area 1
network 200.2.3.0 0.0.0.155 area 1
exit

Campus-4
router ospf 4
network 200.4.7.0 0.0.0.155 area 1
network 200.5.4.0 0.0.0.155 area 1
network 134.0.0.0 0.0.0.63 area 1
exit

Campus-5
router ospf 5
network 5.0.0.0 0.0.15.255 area 1
network 200.5.7.0 0.0.0.155 area 1
network 200.5.4.0 0.0.0.155 area 1
exit

Campus-6
router ospf 6
network 6.0.0.0 0.0.15.255 area 1

network 200.6.7.0 0.0.0.155 area 1
exit

Campus-7
router ospf 7
network 7.0.0.0 0.0.15.255 area 1
network 200.1.7.0 0.0.0.155 area 1
network 200.2.7.0 0.0.0.155 area 1
network 200.3.7.0 0.0.0.155 area 1
network 200.4.7.0 0.0.0.155 area 1
network 200.5.7.0 0.0.0.155 area 1
network 200.6.7.0 0.0.0.155 area 1
exit

router ospf 8 /server
network 5.0.0.0 0.0.15.255 area 1
exit

router ospf 9
network 5.0.0.0 0.0.15.255 area 1
exit

router ospf 10
network 5.0.0.0 0.0.15.255 area 1
exit

router ospf 11
network 5.0.0.0 0.0.15.255 area 1
exit

router ospf 12

```
network 5.0.0.0 0.0.15.255 area 1
exit

router ospf 13
network 5.0.0.0 0.0.15.255 area 1
exit

router ospf 14
network 5.0.0.0 0.0.15.255 area 1
exit

router ospf 15
network 5.0.0.0 0.0.15.255 area 1
exit

router ospf 16
network 5.0.0.0 0.0.15.255 area 1
exit

router ospf 17
network 5.0.0.0 0.0.15.255 area 1
exit
```

Limitations

1. While we can determine the origin of a device within a lab, office, or classroom on a specific floor or department, we cannot specify the exact room.
2. Sometimes routers struggle to navigate, but this could be attributed to the Cisco packet tracer software rather than the routing algorithm
3. Cisco Packet Tracer crashes multiple times due to large files.

Conclusion

To conclude, it can be said that this project provides a detailed idea of the Networks as well as the subnetting in different classes. However, there are more scopes in this project to develop more fruitful system networks.