EAST WEST UNIVERSITY

Project Report

On

Full-fledged network for University of Scholars with multiple subnets.

Course Code: CSE_405
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Submitted To :

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Preface :

After completing a full course of computer networking, it is quite mandatory to build a project to learn how to apply knowledge to the real world. Thanks Dr. Anisur Rahman sir gave me the opportunity to design a networking system for a university. I tried to implement maximum knowledge on this project which I gathered throughout the semester.

Objective :

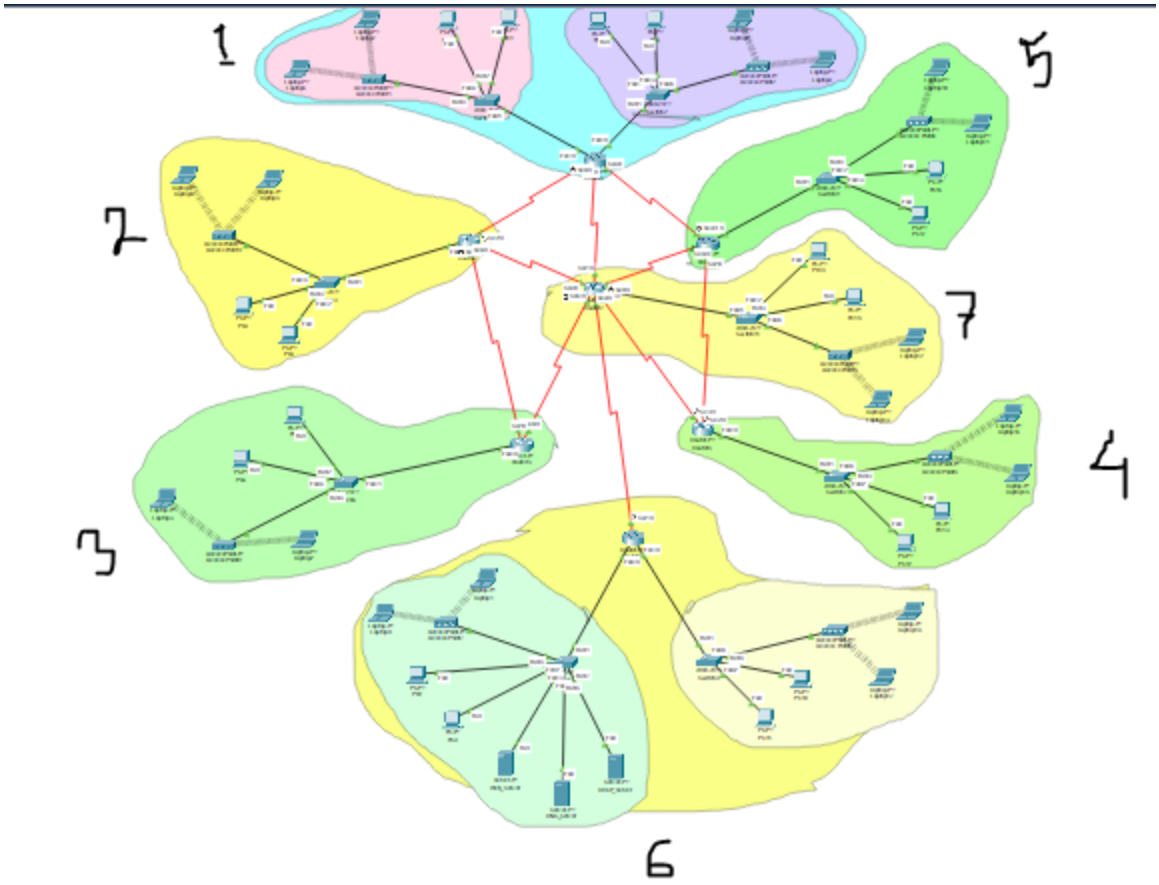
Designing a full full-fledged network for a university with multiple subnets. On top of that, a web page for University of Scholars was to be made and it would be located through the address http://www.scholars.edu.bd. Each Campus was also given a wireless access point to access the network. All the 7 campuses of the university were in the complex network along with subnets inside each campus. Multiple class levels(A, B, C) are used to design the whole networking system. Proper subnetting was made based on respective networks.

Structure:

There were 7 campuses, so we used 7 different routers to build the network. The routers are interconnected with each other by serial connections. Each router has a different network.

- Campus - 1 is under class B(140.15.0.0) and its network is divided into two subnets. Each subnet has its own wireless router.
- Campus - 2 is under class C(192.168.120.0) and has its own wireless service.
- Campus - 3 is developed in class-A(113.160.0.0) network with its wireless.
- Campus - 4 is another class-A(117.0.0.0) network with the same attributes as campus - 3.
- Campus - 5 is a C(192.160.10.0) class network which also have wireless network
- Campus - 6 belongs to class C which is divided into two subnets. One of the subnets acts as a server room with WEB, DNS and DHCP server. The whole campus has a wireless network also.
- Campus - 7 is the only one who is directly connected with all other campuses. It also has some host and wireless networks.

Those wireless networks are for all the classrooms, labs, employee PCs, library and other administrative and academic wings.



The network elements in the network :

- Routers
- Switches
- PC
- Access points
- Laptops
- Connections
- Server
    - DNS
    - DHCP
    - WEB

Network and Subnetting :

We used all three types of classes based on requirements on the network. Each network has enough ability to serve a good amount of hosts in the classrooms, labs, employee PCs, library and other administrative and academic wings and so on.

We made a subnetted network on campus - 1 and the network IP of the campus is 140.15.0.0 and we made 20 bit subnetting on it. All class A are subneted at 16 bit, class B at 20 bit and class C at 24 bit.

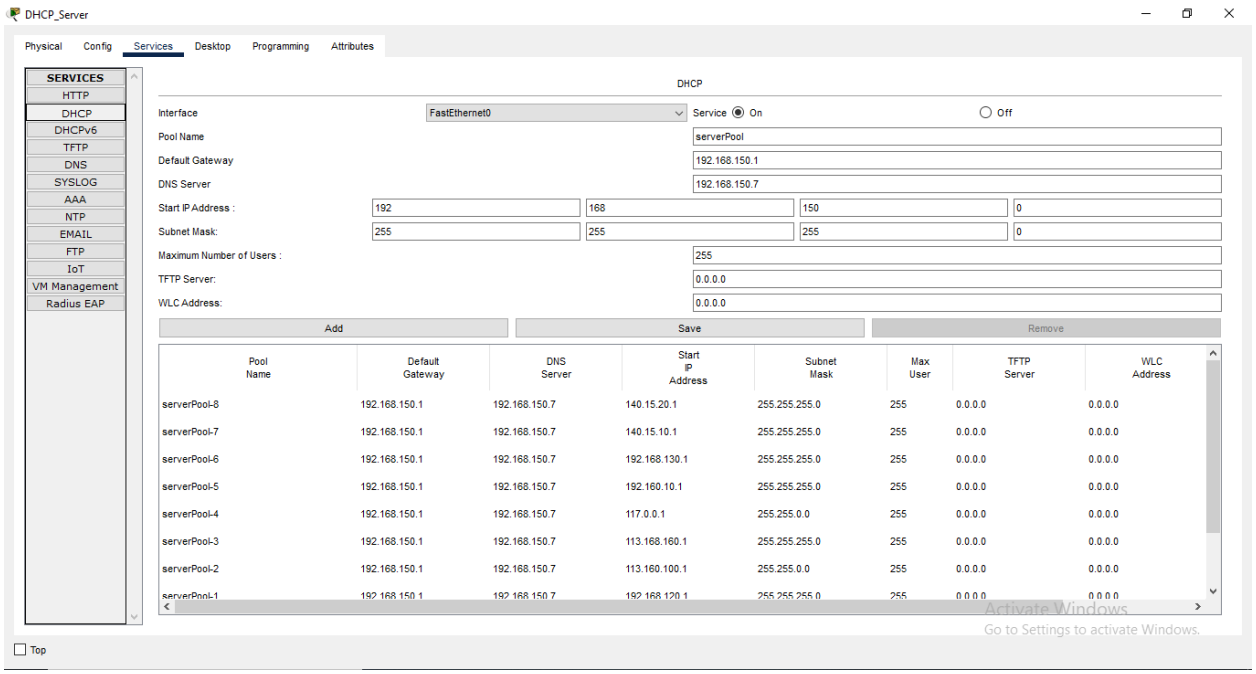
Campus	Network IP	Number of useable Hosts
Campus - 1	140.15.0.0	4094
Campus - 2	192.168.120.0	254
Campus - 3	113.160.10.0	65534
Campus - 4	117.0.0.0	65534
Campus - 5	192.168.130.0	254
Campus - 6	192.168.140.0	254
Campus - 7	192.160.10.0	65534

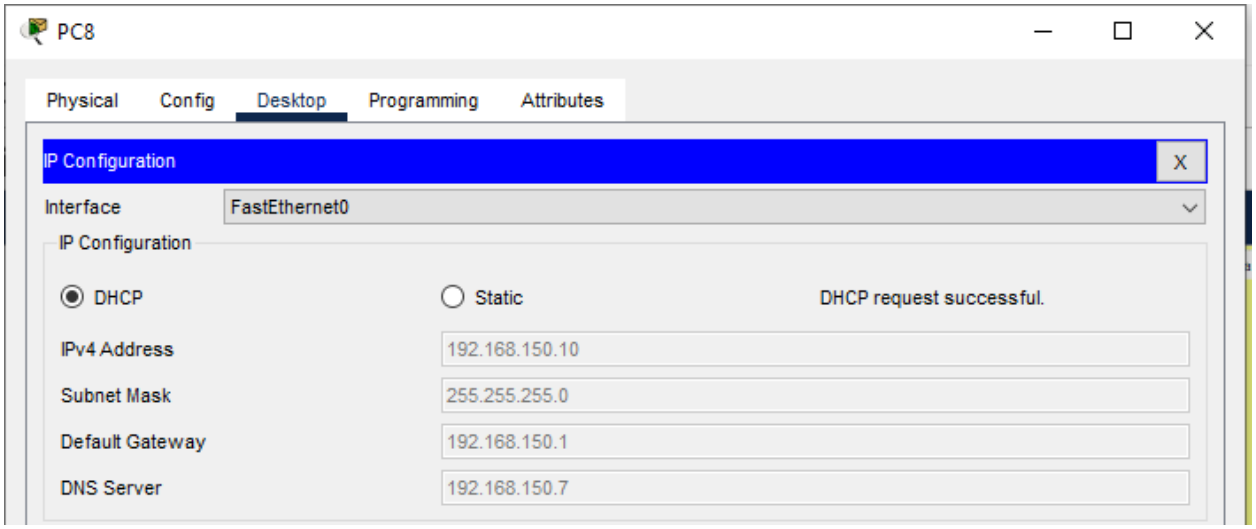
Router configuration :

We have a total of 7 routers with 16 different networks.Router configuration is done following CLI commands. We use a branch of code to configure the routers[1] and also to generate dynamic routing tables[2] from CLI commands.

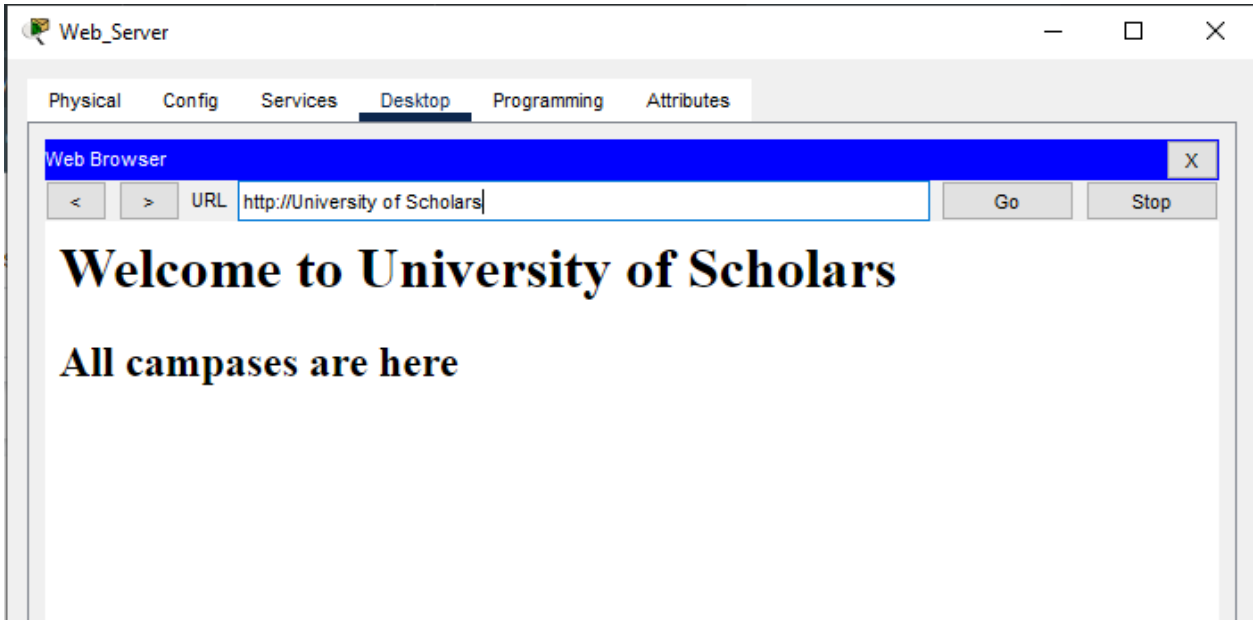
Server configuration :

The DHCP server was used to dynamically provide IP addresses to all the hosts present in the 6 campuses including the different Subnets in each campus.



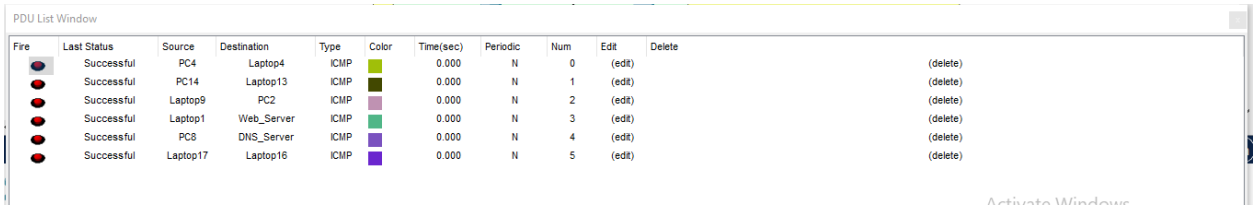


The DNS server was used so that all the hosts can access the webpage in the Web Server through the required web address instead of the IP address of the Web Server. This web server provides us the webpage of Scholars university.



Checking connections :

When all the set up was done, we checked connections pinging packets between different networks.



Limitations :

The network, where we use class C, has only 254 usable hosts, which cannot take more pressure. Again, the network which has a server room will face pressure and data processing speed may degrade.

Appendix :

[1]

```
Router 1
interface fa0/0
ip address 140.115.10.254 255.255.255.0
```

```
no shut
do wr

exit
interface fa1/0
ip address 140.115.20.254 255.255.255.0
no shut
do wr

exit
interface se2/0
ip address 192.168.10.1 255.255.255.0
no shut
do wr

exit
interface se6/0
ip address 192.168.70.1 255.255.255.0
clock rate 64000
no shut
do wr

exit
interface se3/0
ip address 192.168.60.1 255.255.255.0
no shut
do wr

exit

Router 2
interface fa0/0
ip address 192.168.120.254 255.255.255.0
no shut
do wr
```

```
exit

interface se2/0
ip address 192.168.10.2 255.255.255.0
clock rate 64000
no shut
do wr

exit
interface se3/0
ip address 192.168.20.1 255.255.255.0
clock rate 64000
no shut
do wr

exit
interface se6/0
ip address 192.168.100.1 255.255.255.0
no shut
do wr

exit


Router 3
interface fa0/0
ip address 113.0.0.254 255.255.0.0
no shut
do wr

exit
interface se6/0
ip address 192.168.100.2 255.255.255.0
clock rate 64000
```

```
no shut
do wr

exit
interface se2/0
ip address 192.168.30.1 255.255.255.0
no shut
do wr

exit


Router 4
interface fa0/0
ip address 117.0.0.254 255.255.0.0
no shut
do wr

exit
interface se3/0
ip address 192.168.40.2 255.255.255.0
clock rate 64000
no shut
do wr

exit
interface se2/0
ip address 192.168.90.1 255.255.255.0
clock rate 64000
no shut
do wr

exit
```

```
Router 5
interface fa0/0
ip address 192.168.130.254 255.255.255.0
no shut
do wr

exit

interface se2/0
ip address 192.168.90.2 255.255.255.0
no shut
do wr

exit
interface se3/0
ip address 192.168.60.2 255.255.255.0
clock rate 64000
no shut
do wr

exit
interface se6/0
ip address 192.168.50.1 255.255.255.0
no shut
do wr

exit




Router 6
interface fa0/0
ip address 140.115.150.254 255.255.255.0
```

```
no shut
do wr

exit
interface fa1/0
ip address 140.115.160.254 255.255.255.0
no shut
do wr

exit
interface se2/0
ip address 192.168.80.1 255.255.255.0
clock rate 64000
no shut
do wr
exit

Router 7
interface fa0/0
ip address 192.160.10.254 255.255.255.0
no shut
do wr

exit
interface se2/0
ip address 192.168.70.2 255.255.255.0
no shut
do wr

exit
interface se3/0
ip address 192.168.20.2 255.255.255.0
no shut
do wr
```

```
exit
interface se6/0
ip address 192.168.30.2 255.255.255.0
clock rate 64000
no shut
do wr

exit
interface se9/0
ip address 192.168.80.2 255.255.255.0
no shut
do wr

exit
interface se7/0
ip address 192.168.40.2 255.255.255.0
no shut
do wr

exit
interface se8/0
ip address 192.168.50.2 255.255.255.0
no shut
do wr

exit
```

---

[2]

```
Router 1:

router OSPF 1
network 140.15.10.0 0.0.15.255 area 1
```

```
network 140.15.20.0 0.0.15.255 area 1
network 192.168.70.0 0.0.0.255 area 1
network 192.168.60.0 0.0.0.255 area 1
network 192.168.10.0 0.0.0.255 area 1
exit
```

Router 2:

```
router OSPF 2
network 192.168.120.0 0.0.0.255 area 1
network 192.168.10.0 0.0.0.255 area 1
network 192.168.20.0 0.0.0.255 area 1
network 192.168.100.0 0.0.0.255 area 1
exit
```

Router 3:

```
router OSPF 3
network 113.60.10.0 0.0.255.255 area 1
network 192.168.100.0 0.0.0.255 area 1
network 192.168.30.0 0.0.0.255 area 1
exit
```

Router 4:

```
router OSPF 4
network 117.0.0.0 0.0.255.255 area 1
network 192.168.90.0 0.0.0.255 area 1
network 192.168.40.0 0.0.0.255 area 1
exit
```

Router 5:

```
router OSPF 5
network 192.168.130.0 0.0.0.255 area 1
```

```
network 192.168.50.0 0.0.0.255 area 1
network 192.168.60.0 0.0.0.255 area 1
network 192.168.90.0 0.0.0.255 area 1
exit
```

Router 6:

```
router OSPF 6
network 192.168.150.0 0.0.0.255 area 1
network 192.168.160.0 0.0.0.255 area 1
network 192.168.80.0 0.0.0.255 area 1
exit
```

Router 7:

```
router OSPF 7
network 192.160.10.0 0.0.0.255 area 1
network 192.168.20.0 0.0.0.255 area 1
network 192.168.30.0 0.0.0.255 area 1
network 192.168.40.0 0.0.0.255 area 1
network 192.168.50.0 0.0.0.255 area 1
network 192.168.70.0 0.0.0.255 area 1
network 192.168.80.0 0.0.0.255 area 1
exit
```