



East West University

PROJECT REPORT

Course Name: Computer Networks

Course Code: CSE405

Section: 03

Semester: Spring21

Title: Design a full-fledged network for an organization with multiple subnets

Course Instructor: Dr. Anisur Rahman

Associate Prof, Department of Computer Science and
Engineering

Submitted by: Maleha Israt Chowhdury

Submission date: 25th May,2021.

Title:

Designing a Full-fledged Network for an Organization with Multiple Subnets.

Project Statement:

This is mini project on INTERNATIONAL Apollo University is an enterprise that owns a large number of computers, with a complex network infrastructure. Apart from 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 everyone. On top of that the university runs a number of complex networked systems to support several of its business process like admissions, advising, results, eTender, library management, accounts and so on. This complex network infrastructure is submitted and switching/routing mechanisms are in practice.

Introduction:

A mesh topology is a network configuration in which each computer and network device is linked to the others. Transmissions can be distributed using this topology even if one of the connections fails. The task is to create a complete model of a complex network by detecting the interconnection of the systems and subnetworks, which will reflect the structure and facilities of the INTERNATIONAL Apollo University within the network.

Used Components:

1. DHCP Server
2. DNS Server
3. WEB Server
4. Switches [2960]
5. PT Routers
6. Access point PT
7. PC
8. Smart Phone
9. Tablet
10. Connectors

Requirements:

1. All the 6 campus have to interconnected
2. All PC, Tablet, Mobile Should be able to connect with www.apollointernational.edu
3. All host should get unique IP address through DHCP server.

Design specifications:

Here we design this network for Six campus All the network is connected with each other with MESH tropology. Different subnets are used for each network.

Server Room:

All different types of servers are placed here. Such as DHCP, DNS, WEB server etc.

Classrooms:

The main campus has classroom. Each classroom has a LAN connection for PC.

Employee room:

Employee rooms have a LAN connection for Desktop PC and wireless connection.

Administrative room:

The main campus has administrative room. Each classroom has a LAN connection for PC.

Library:

Students can access the University Library Server by PC connected with LAN.

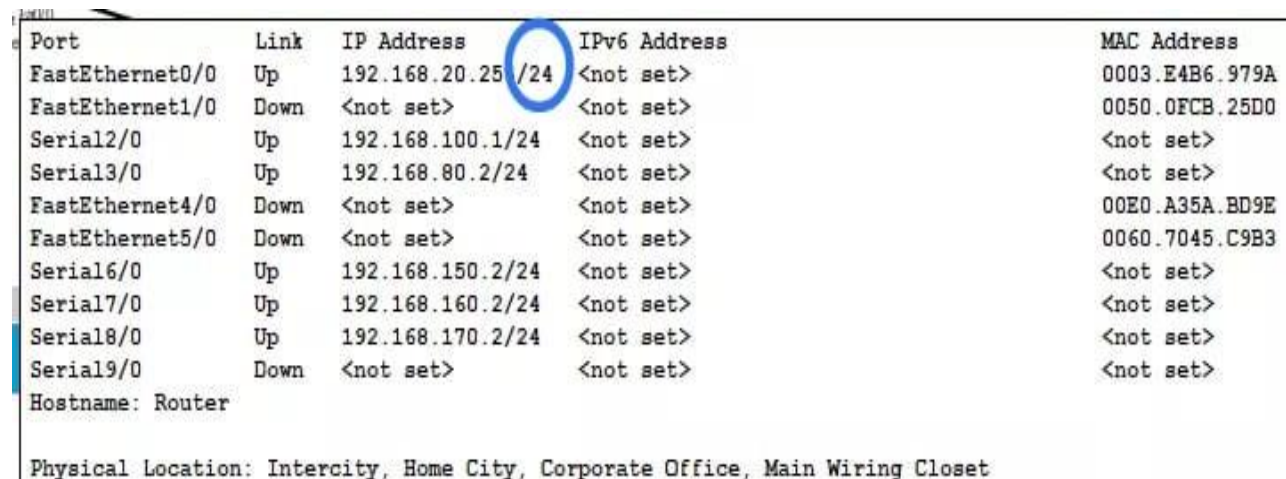
Wi-Fi Access:

The main campus has Wi-Fi router for all the students. Here a student can connect their wireless device for access the internet.

By using Mesh Tropology all the networks are connected with each other. By this if a connection goes down other network won't be hampered.

Preface:

Preface or Netmask of all host and router is 24.



Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0/0	Up	192.168.20.25 /24	<not set>	0003.E4B6.979A
FastEthernet1/0	Down	<not set>	<not set>	0050.0FCB.25D0
Serial2/0	Up	192.168.100.1/24	<not set>	<not set>
Serial3/0	Up	192.168.80.2/24	<not set>	<not set>
FastEthernet4/0	Down	<not set>	<not set>	00E0.A35A.BD9E
FastEthernet5/0	Down	<not set>	<not set>	0060.7045.C9B3
Serial6/0	Up	192.168.150.2/24	<not set>	<not set>
Serial7/0	Up	192.168.160.2/24	<not set>	<not set>
Serial8/0	Up	192.168.170.2/24	<not set>	<not set>
Serial9/0	Down	<not set>	<not set>	<not set>
Hostname: Router				
Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet				

Figure: Netmask or Preface

Physical Diagram:

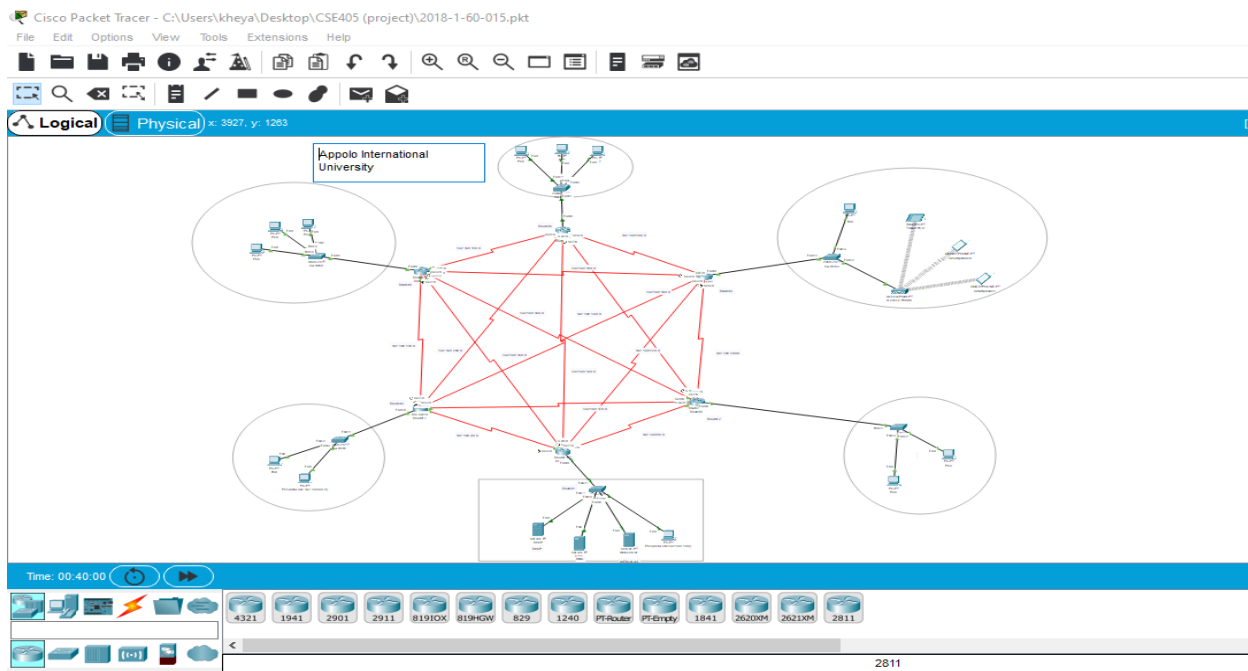


Figure 1: Network Model created in Cisco Packet Tracer

The image shows the DHCP configuration window in Cisco Packet Tracer. The window has tabs for Physical, Config, Services, Desktop, Programming, and Attributes. The IP Configuration section is active, showing options for DHCP and Static. The Static option is selected, and the following fields are filled: IP Address (192.168.10.100), Subnet Mask (255.255.255.0), Default Gateway (192.168.10.254), and DNS Server (192.168.10.250). The IPv6 Configuration section is also visible, with options for DHCP, Auto Config, and Static. The Static option is selected, and the following fields are filled: IPv6 Address (FE80::2D0:97FF:FEAA:C728), Link Local Address (FE80::2D0:97FF:FEAA:C728), IPv6 Gateway, and IPv6 DNS Server. The 802.1X section is also visible, with options for Use 802.1X Security, Authentication (MD5), Username, and Password.

Figure 2: IP configuration of DHCP server

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP**
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

DHCP

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: serverPool1

Default Gateway: 192.168.10.254

DNS Server: 192.168.10.250

Start IP Address: 192.168.10.1

Subnet Mask: 255.255.255.0

Maximum Number of Users: 252

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool1	192.168.10.254	192.168.10.250	192.168.10.1	255.255.255.0	252	0.0.0.0	0.0.0.0
serverPool2	192.168.20.254	192.168.10.250	192.168.20.1	255.255.255.0	252	0.0.0.0	0.0.0.0
serverPool3	192.168.30.254	192.168.10.250	192.168.30.1	255.255.255.0	252	0.0.0.0	0.0.0.0
serverPool4	192.168.40.254	192.168.10.250	192.168.40.1	255.255.255.0	252	0.0.0.0	0.0.0.0
serverPool5	192.168.50.254	192.168.10.250	192.168.50.1	255.255.255.0	252	0.0.0.0	0.0.0.0
serverPool6	192.168.60.254	192.168.10.250	192.168.60.1	255.255.255.0	252	0.0.0.0	0.0.0.0
serverPool	0.0.0.0	0.0.0.0	192.168.10.0	255.255.255.0	255	0.0.0.0	0.0.0.0

☐ Top

Figure 3: Creating Server Pool

Physical Config Services **Desktop** Programming Attributes

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IP Address: 192.168.10.250

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.10.254

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::200:CFF:FE4D:4BE2

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

Figure 4: IP configuration of DNS server

Webserver

Physical Config Services **Desktop** Programming Attributes

IP Configuration [X]

IP Configuration

☐ DHCP ☒ Static

IP Address: 192.168.10.200

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.10.254

DNS Server: 192.168.10.250

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::20D:80FF:FEDB:8495

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MDS

Username:

Password:

☐ Top

Figure 5: IP configuration of WEB server

PC1(network: 192.168.60.0)

Physical Config **Desktop** Programming Attributes

IP Configuration [X]

Interface: FastEthernet0

IP Configuration

☒ DHCP ☐ Static

IP Address: 192.168.60.1

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.60.254

DNS Server: 192.168.10.250

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::201:64FF:FE3B:7587

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MDS

Username:

Password:

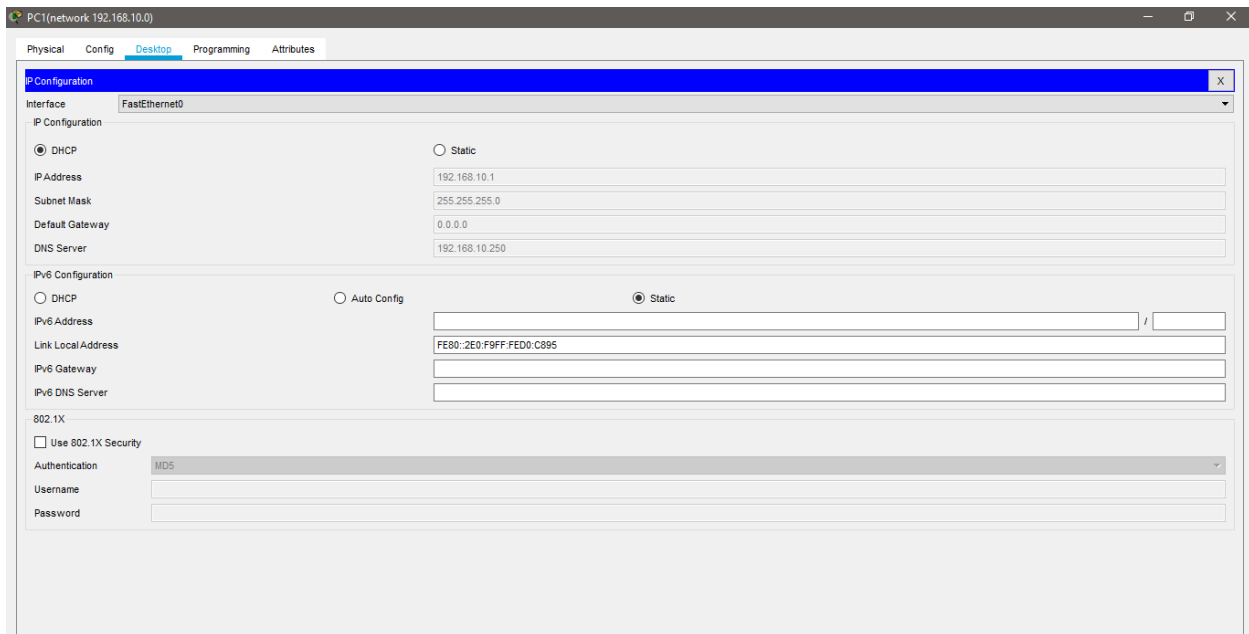
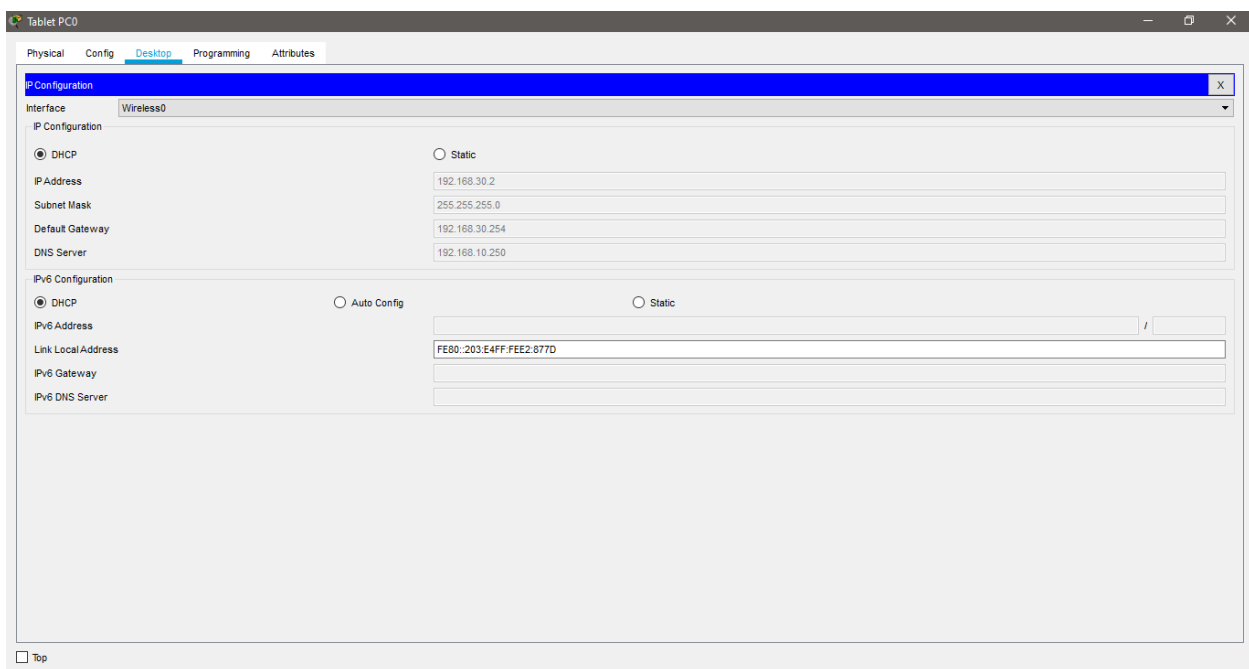


Figure 8: DHCP auto IP configuration of PC



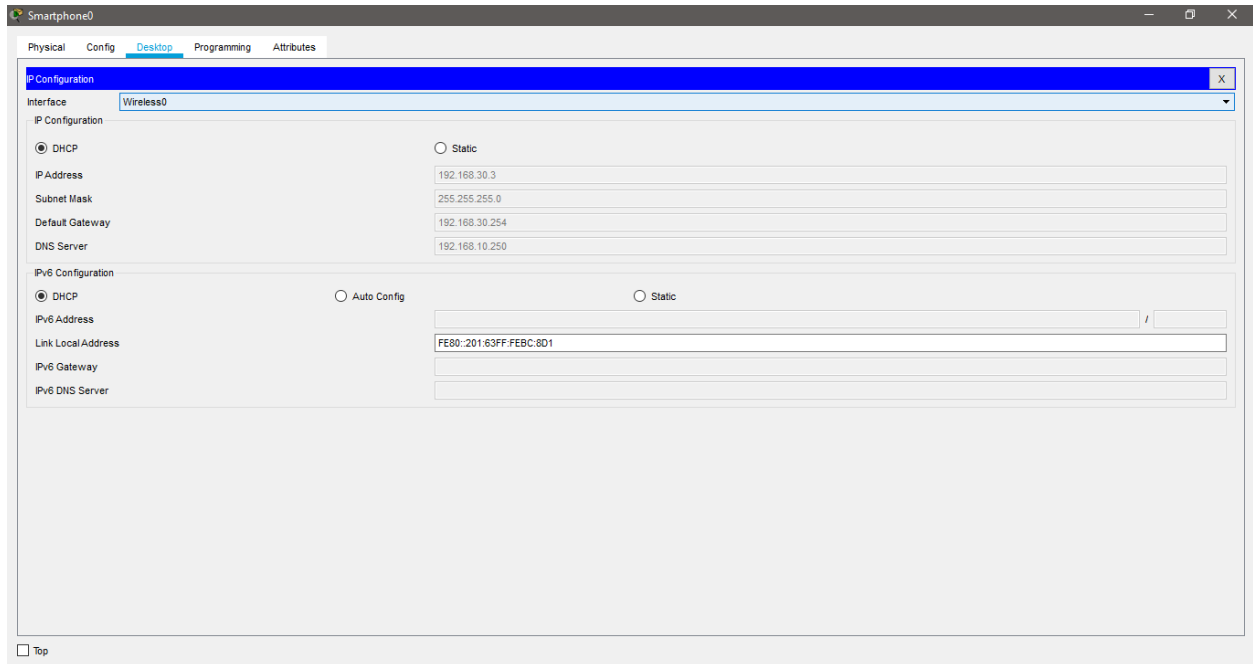


Figure 9: IP configuration of wireless device

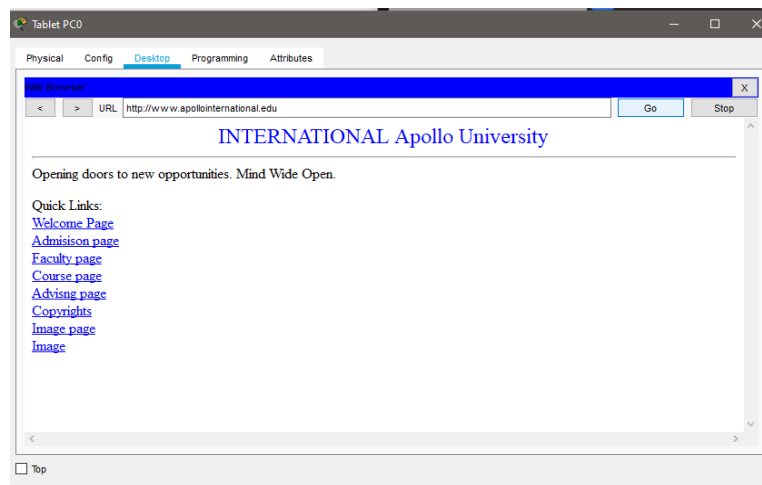


Figure 10: WEB browser page of International Apollo University

Commands:

These commands are used in CLI platform for the configuration of routers in config mood:

Router 1:

interface fa0/0

ip address 192.168.10.254 255.255.255.0


```
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
interface se3/0
ip address 192.168.90.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
interface se6/0
ip address 192.168.120.2 255.255.255.0
no shut
do wr
exit
interface se7/0
ip address 192.168.130.2 255.255.255.0
no shut
do wr
exit
interface se8/0
ip address 192.168.140.2 255.255.255.0
no shut
do wr
exit
```

all other routers were configured in a same way

Routing table for the routers:

Router 1

```
router ospf 1
network 192.168.10.0 0.0.0.255 area 1
network 192.168.80.0 0.0.0.255 area 1
network 192.168.90.0 0.0.0.255 area 1
network 192.168.120.0 0.0.0.255 area 1
network 192.168.130.0 0.0.0.255 area 1
network 192.168.140.0 0.0.0.255 area 1
exit
```

Router 2

```
router ospf 1
network 192.168.20.0 0.0.0.255 area 1
network 192.168.80.0 0.0.0.255 area 1
network 192.168.100.0 0.0.0.255 area 1
network 192.168.150.0 0.0.0.255 area 1
network 192.168.160.0 0.0.0.255 area 1
network 192.168.170.0 0.0.0.255 area 1
exit
```

Router 3

```
router ospf 1
```

```
network 192.168.30.0 0.0.0.255 area 1
network 192.168.100.0 0.0.0.255 area 1
network 192.168.105.0 0.0.0.255 area 1
network 192.168.120.0 0.0.0.255 area 1
network 192.168.180.0 0.0.0.255 area 1
network 192.168.190.0 0.0.0.255 area 1
exit
```

Router 4

```
-----
router ospf 1
network 192.168.40.0 0.0.0.255 area 1
network 192.168.105.0 0.0.0.255 area 1
network 192.168.150.0 0.0.0.255 area 1
network 192.168.130.0 0.0.0.255 area 1
network 192.168.200.0 0.0.0.255 area 1
network 192.168.110.0 0.0.0.255 area 1
exit
```

Router 5

```
-----
router ospf 1
network 192.168.50.0 0.0.0.255 area 1
network 192.168.110.0 0.0.0.255 area 1
network 192.168.180.0 0.0.0.255 area 1
network 192.168.160.0 0.0.0.255 area 1
network 192.168.140.0 0.0.0.255 area 1
```

```
network 192.168.115.0 0.0.0.255 area 1
```

```
exit
```

Router 6

```
router ospf 1
```

```
network 192.168.60.0 0.0.0.255 area 1
```

```
network 192.168.90.0 0.0.0.255 area 1
```

```
network 192.168.115.0 0.0.0.255 area 1
```

```
network 192.168.200.0 0.0.0.255 area 1
```

```
network 192.168.190.0 0.0.0.255 area 1
```

```
network 192.168.170.0 0.0.0.255 area 1
```

```
exit
```

Design issue:

- **Number of Network:**

We have total 21 network in this project.

Router

Network IP	Range
192.168.80.0	192.168.70.1 - 192.168.70.20
192.168.90.0	192.168.80.1 - 192.168.80.20
192.168.100.0	192.168.90.1 - 192.168.90.20
192.168.105.0	192.168.110.1 - 192.168.110.20
192.168.110.0	192.168.120.1 - 192.168.120.20
192.168.115.0	192.168.115.1 - 192.168.115.20
192.168.120.1	192.168.120.1 - 192.168.120.20
192.168.130.1	192.168.130.1 - 192.168.130.20
192.168.140.0	192.168.140.1 - 192.168.140.20
192.168.150.0	192.168.150.1 - 192.168.150.20

192.168.160.0	192.168.160.1 - 192.168.160.20
192.168.170.0	192.168.170.1 - 192.168.170.20
192.168.180.0	192.168.180.1 - 192.168.180.20
192.168.190.0	192.168.190.1 - 192.168.190.20
192.168.200.0	192.168.200.1 - 192.168.200.20

Hosts

Network IP	Range
192.168.10.0	192.168.10.1 - 192.168.10.252
192.168.20.0	192.168.20.1 - 192.168.20.252
192.168.30.0	192.168.30.1 - 192.168.30.252
192.168.40.0	192.168.40.1 - 192.168.40.252
192.168.50.0	192.168.50.1 - 192.168.50.252
192.168.60.0	192.168.60.1 - 192.168.60.252

- **Host:** Each host network can have 252 number of hosts.
- **Limitations:** In this design, the network classes are not from all 3 classes. I only used class C. There is no use of subnetting.

Conclusion:

A full model of a complicated network with system and subnetwork interconnections is built here. Mesh connectivity is provided so that each campus of INTERNATIONAL Apollo University may quickly link with one another, and the design can easily maintain the complicated network architecture. Following the architecture allows for further networking evolution.