Project Report

# Title: A full-fledged network for International Apollo University with multiple subnets

Prepared by:

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**Introduction:** International Apollo University is one of the prominent universities in Bangladesh. Here, we construct a complex network system for the university. This university has 6 campuses with different departments. We basically design a network for this. The varsity's website address is- http://www.apollointernational.edu

To construct this network, we choose 2 classes for network's IP addresses. One is 'B' class and another is 'C' class. We use 14 networks to construct the system. We use cisco packet tracer 7.2.1 software as a network design tool.

14 networks are-

| | |
|---|---|
| 145.60.0.0 | 193.240.60.0 |
| 145.20.0.0 | 193.240.10.0 |
| 145.30.0.0 | 193.240.20.0 |
| 145.40.0.0 | 193.240.30.0 |
| 145.41.0.0 | 193.240.40.0 |
| 145.50.0.0 | 193.240.50.0 |
| 145.51.0.0 | 193.193.10.0 |

**Campus wise Department's Name:**

Campus-1: Administrative Building

Network IP Address: 193.193.10.0

Subnet Mask: 255.255.255.0

Class Type: C

Campus-2: Department of Economy, Bachelor of Business Administration (BBA)

Network IP Address: 145.30.0.0

Subnet Mask: 255.255.0.0

Class Type: B

Campus-3: Department of Pharmacy, Department of Mathematics & Physical Sciences (MPS)

Network IP Address: 145.20.0.0

Subnet Mask: 255.255.0.0

Class Type: B

Campus-4: Department of Computer Science & Engineering (CSE), Department of EEE

Network-1 IP Address: 145.40.0.0

Network-2 IP Address: 145.42.0.0

Subnet Mask: 255.255.0.0

Class Type: B

Campus-5: Department of Civil Engineering (CE), Bachelor of Textile Engineering, Library, Research center.

Network-1 IP Address: 145.50.0.0

Network-2 IP Address: 145.51.0.0

Subnet Mask: 255.255.0.0

Class Type: B

Campus-6: Department of English, Department of Law

Network IP Address: 145.60.0.0

Subnet Mask: 255.255.0.0

Class Type: B

**Routing Device Network:**

Campus-1 to Campus-2:

Network IP Address: 193.240.20.0

Subnet Mask: 255.255.255.0

Class Type: C

Campus-1 to Campus-3:

Network IP Address: 193.240.10.0

Subnet Mask: 255.255.255.0

Class Type: C

Campus-1 to Campus-4:

Network IP Address: 193.240.40.0

Subnet Mask: 255.255.255.0

Class Type: C

Campus-2 to Campus-5:

Network IP Address: 193.240.50.0

Subnet Mask: 255.255.255.0

Class Type: C

Campus-2 to Campus-3:

Network IP Address: 193.240.30.0

Subnet Mask: 255.255.255.0

Class Type: C

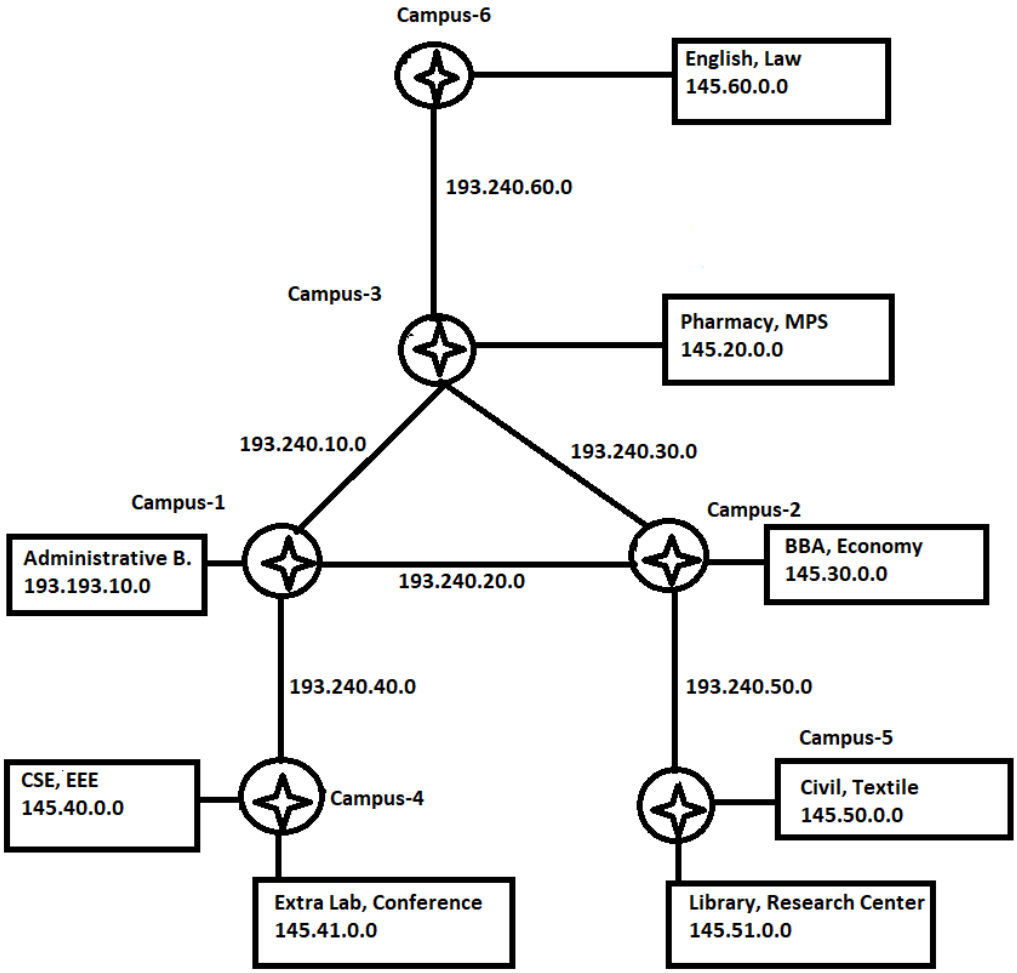
Campus-3 to Campus-6:

Network IP Address: 193.240.60.0

Subnet Mask: 255.255.255.0

Class Type: C

**Network System Block Diagram:**



## Network Design:

### Campus-1: Administrative Building

Network IP address:193.193.10.0/24 (No subnetting)

DHCP server IP address: 193.193.10.200

WEB server IP address: 193.193.10.250

DNS server IP address: 193.193.10.50

Total usable Host: 254

Campus-1 connected Device:

Total server: 3(DHCP, WEB, DNS)

Total switch: 4

Total wireless access point: 3

Total printer: 6 (2 wired and 4 wireless)

Total Computer: 62

Campus-1 routing device connected network IP address:

Default gateway: 193.193.10.254

Campus-1 to Campus-2 IP address: 193.240.20.1

Campus-1 to Campus-3 IP address: 193.240.10.1

Campus-1 to Campus-4 IP address: 193.240.40.1

Description: This campus is varsity's main administrative building. So, a limited number of hosts we need. So, we choose Class C type. In future hosts number can be increased according to requirements. The router and also the network's system have option to increase hosts or create another individual network.

This campus has included varsity's main web server. This campus has a WEB server, DNS server and a DHCP server.

**Campus-2: BBA, Economy**

Network IP address:145.30.240.0/20 (4-bit subnetting)

DHCP server IP address: 145.30.240.200

DNS server IP address: 193.193.10.50

Total usable Host: 57316

Campus-2 connected Devices:

Total server: 1(DHCP)

Total switch: 6

Total wireless access point: 2

Total printer: 5 (3 wired and 2 wireless)

Total Computer: 81

Campus-2 routing device connected network's IP address:

Default gateway: 145.30.240.254

Campus-2 to Campus-1 IP address: 193.240.20.2

Campus-2 to Campus-3 IP address: 193.240.30.1

Campus-2 to Campus-5 IP address: 193.240.50.1

Description: This campus has two department Economy and BBA. In future the department number will be increased and also the student number. So, we choose Class B type Ip address with 4 bits subnetting. The campus has option to increase the hosts number and also can create another network as per requirements.

**Campus-3: Pharmacy, MPS**

Network IP address:145.20.248.0/21 (5-bit subnetting)

DHCP server IP address: 145.20.248.200

DNS server IP address: 193.193.10.50

Total usable Host: 61380

Campus-3 connected Devices:

Total server: 1(DHCP)

Total switch: 6

Total wireless access point: 2

Total printer: 4 (3 wired and 1 wireless)

Total Computer: 81

Campus-3 routing device connected network's IP address:

Default gateway: 145.20.248.254

Campus-3 to Campus-1 IP address: 193.240.10.2

Campus-3 to Campus-2 IP address: 193.240.30.2

Campus-3 to Campus-6 IP address: 193.240.60.2

Description: This campus has two department Pharmacy and MPS. In future the department number will be increased and also the student number. So, we choose Class B type Ip address with 5 bits subnetting. The campus has option to increase the hosts number and also can create another network as per requirements.

**Campus-4: CSE, EEE**

Network IP address:145.40.248.0/21 (5-bit subnetting)

Net-1 DHCP server IP address: 145.40.248.200

Net-2 DHCP server IP address: 145.41.248.200

DNS server IP address: 193.193.10.50

Total usable Host: 61380

Campus-4 connected Devices:

Total server: 2(DHCP)

Total switch: 10

Total wireless access point: 4

Total printer: 7 (7 wireless)

Total Computer: 183

Campus-4 routing device connected network's IP address:

Net-1 Default gateway: 145.40.248.254

Net-2 Default gateway: 145.41.248.254

Campus-4 to Campus-1 IP address: 193.240.40.2

Description: This campus has two department CSE and EEE. The CSE department needs more device and also the EEE departments. Here we create two different networks. One is for regular basis and another is for extra like lab, especially any contest, conference. The hosts number can be increased any time. In future the department number will be increase and also the student number. So, we choose Class B type Ip address with 5 bits subnetting. The campus has option to increase the hosts number requirements.

**Campus-5: Civil, Textile, library**

Network IP address:145.50.248.0/21 (5-bit subnetting)

Net-1 DHCP server IP address: 145.50.248.200

Net-2 DHCP server IP address: 145.51.248.200

DNS server IP address: 193.193.10.50

Total usable Host: 61380

Campus-4 connected Devices:

Total server: 2(DHCP)

Total switch: 8

Total wireless access point: 5

Total printer: 8 (4 wireless)

Total Computer: 102

Campus-4 routing device connected network's IP address:

Net-1 Default gateway: 145.50.248.254

Net-2 Default gateway: 145.51.248.254

Campus-4 to Campus-2 IP address: 193.240.50.2

Description: This campus has two department Civil and Textile and a library. In future the department numbers will be increase and also the student number. So, we choose Class B type Ip address with 5 bits subnetting. The campus has option to increase the host's number.

**Campus-6: English, Law**

Network IP address:145.60.240.0/20 (4-bit subnetting)

DHCP server IP address: 145.60.240.200

DNS server IP address: 193.193.10.50

Total usable Host: 57316

Campus-2 connected Devices:

Total server: 1(DHCP)

Total switch: 7

Total wireless access point: 3

Total printer: 6 (4 wired and 2 wireless)

Total Computer: 120

Campus-2 routing device connected network's IP address:

Default gateway: 145.60.240.254

Campus-6 to Campus-3 IP address: 193.240.60.1

Description: This campus has two department English and Law. In future the department number will be increase and also the student number. So, we choose Class B type Ip address with 4 bits subnetting. The campus has option to increase the hosts number and also can create another network as per requirements.

## Routing Configuration code:

### Campus-1 Routing device:

```
config t
interface fa0/0
ip address 193.193.10.254 255.255.255.0
no shut
do wr
exit

interface se2/0
ip address 193.240.20.1 255.255.255.0
clock rate 64000
no shut
do wr
exit

interface se3/0
ip address 193.240.10.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
```

interface se6/0

ip address 193.240.40.1 255.255.255.0

clock rate 64000

no shut

do wr

exit

**Campus-2 routing device:**

config t

interface fa0/0

ip address 145.30.240.254 255.255.0.0

no shut

do wr

exit

interface se2/0

ip address 193.240.20.2 255.255.255.0

no shut

do wr

exit

interface se3/0

ip address 193.240.30.1 255.255.255.0

clock rate 64000

no shut

do wr

exit

interface se6/0

ip address 193.240.50.1 255.255.255.0

clock rate 64000

no shut

do wr

exit

**Campus-3 Routing device:**

config t

interface fa0/0

ip address 145.20.248.254 255.255.0.0

no shut

do wr

exit

```
interface se2/0
ip address 193.240.30.2 255.255.255.0
no shut
do wr
exit

interface se3/0
ip address 193.240.10.2 255.255.255.0
no shut
do wr
exit

interface se6/0
ip address 193.240.60.2 255.255.255.0
clock rate 64000
no shut
do wr
exit
```

**Campus-4 Routing device:**

config t

interface fa0/0

ip address 145.40.248.254 255.255.0.0

no shut

do wr

exit

interface fa1/0

ip address 145.41.248.254 255.255.0.0

no shut

do wr

exit

interface se2/0

ip address 193.240.40.2 255.255.255.0

no shut

do wr

exit

**Campus-5 Routing device:**

config t

interface fa0/0

ip address 145.50.248.254 255.255.0.0

no shut

do wr

exit

interface fa1/0

ip address 145.51.248.254 255.255.0.0

no shut

do wr

exit

interface se2/0

ip address 193.240.50.2 255.255.255.0

no shut

do wr

exit

**Campus-6 Routing device:**

config t

interface fa0/0

ip address 145.60.240.254 255.255.0.0

no shut

do wr

exit

interface se2/0

ip address 193.240.60.1 255.255.255.0

no shut

do wr

exit

**Routing Table code:**

**Campus-1 Routing Device:**

router ospf 1

network 193.240.10.0 0.0.0.255 area 1

network 193.240.20.0 0.0.0.255 area 1

network 193.240.40.0 0.0.0.255 area 1

network 193.193.10.0 0.0.0.255 area 1

exit

**Campus-2 Routing Device:**

router ospf 2

network 193.240.30.0 0.0.0.255 area 1

network 193.240.20.0 0.0.0.255 area 1

network 193.240.50.0 0.0.0.255 area 1

network 145.30.0.0 0.0.255.255 area 1

exit

**Campus-3 Routing Device:**

router ospf 3

network 193.240.30.0 0.0.0.255 area 1

network 193.240.10.0 0.0.0.255 area 1

network 193.240.60.0 0.0.0.255 area 1

network 145.20.0.0 0.0.255.255 area 1

exit

**Campus-4 Routing Device:**

router ospf 4

network 193.240.40.0 0.0.0.255 area 1

network 145.40.0.0 0.0.255.255 area 1

network 145.41.0.0 0.0.255.255 area 1

exit

**Campus-5 Routing Device:**

router ospf 5

network 193.240.50.0 0.0.0.255 area 1

network 145.50.0.0 0.0.255.255 area 1

network 145.51.0.0 0.0.255.255 area 1

exit

**Campus-6 Routing Device:**

router ospf 6

network 193.240.60.0 0.0.0.255 area 1

network 145.60.0.0 0.0.255.255 area 1

exit

**Limitation**: Here we design a full-fledged complex network for this university. This network has some limitations. The wireless network is not a common network for a campus. We install different wireless access point. A limited number of wireless devices can connect from an access point. We do not install some devices like Ip phone. But it will install any time as per requirements.