Course:

Computer Networks

Project:

Design a Full-Fledged Network for an Organization with Multiple Subnets

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

Documentation: Apex University, is an enterprise like East West University, owns many 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 every campus. On top of that the university runs complex networked systems to support several of its business process like admissions, advising, results, eTender, library management, accounts and so on.
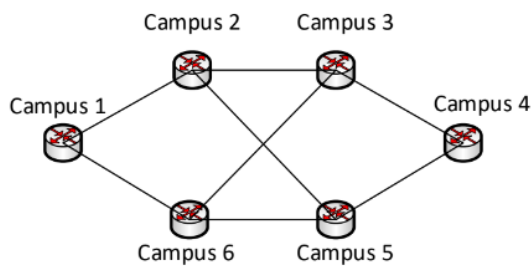
Tools:

Components:

1. Router-PT

2. Straight Through Cable

3. 6 Routers

4. Serial DCE cables

5. 2960 Switches 7

6. PC (6 pcs per router = 36 pcs)

7. DNS Server

8. Web Server

9. DHCP server

Software:

Cisco Packet Tracer

DNS Server: DNS servers translate requests for names into IP addresses, controlling which server an end user will reach when they type a domain name into their web browser. These requests are called queries.

DHCP Server: A DHCP server manages a record of all the IP addresses it allocates to network nodes. If a node is relocated in the network, the server identifies it using its media access control (MAC) address, which prevents the accidental configuration of multiple devices with the same IP address.

WEB Server: A Web server uses HTTP (Hypertext Transfer Protocol) and other protocols to respond to client requests made over the World Wide Web. The main job of a web server is to display website content through storing, processing and delivering webpages to users.
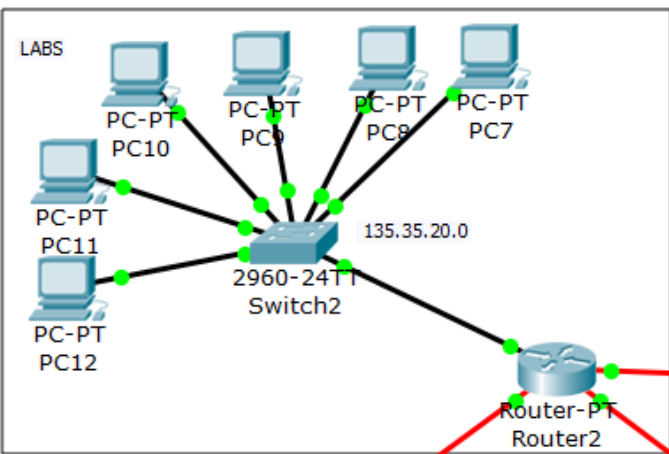
## Network Design in Cisco Packet Tracer:
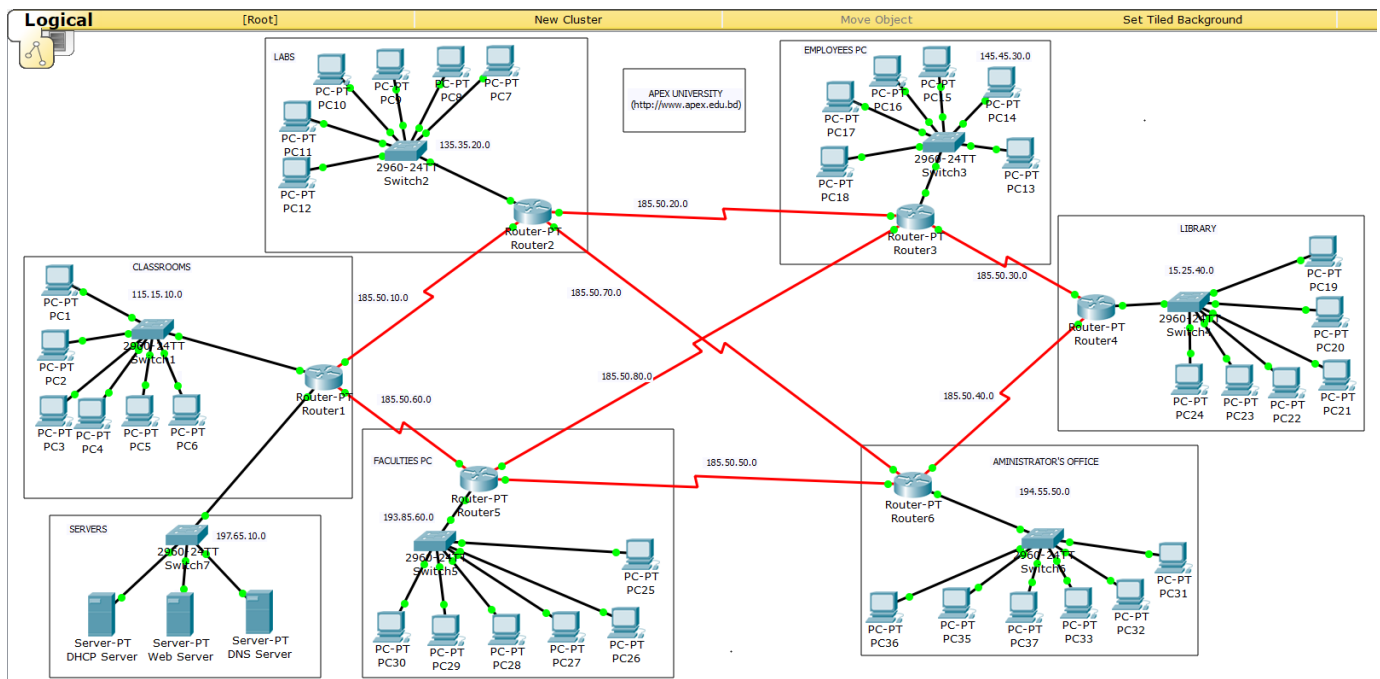
Router 1 (Clasrooms):
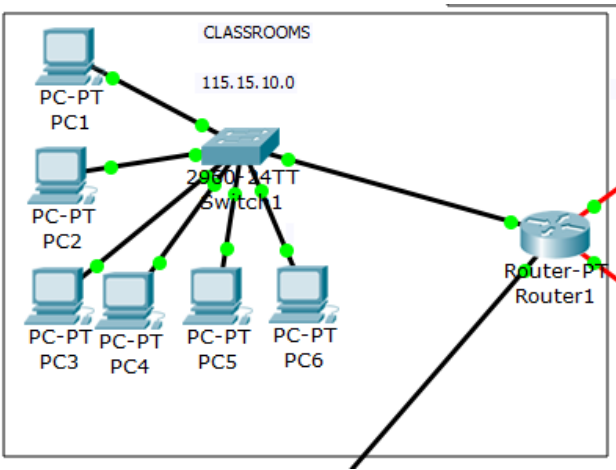
Router 1 is defined as 'Clasrooms'. Router 1 is connected to a 2960 switch and the switch is connected with 6 pcs. Every pc of this router has IP address from 115.15.10.1 to 115.15.10.6 serially.
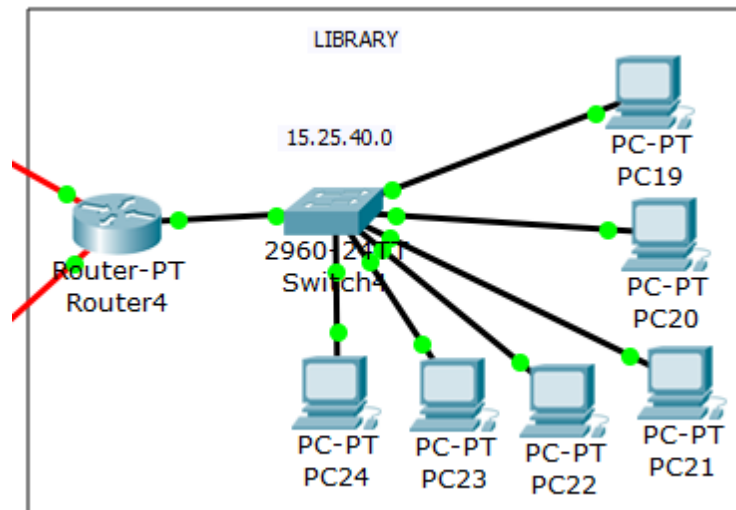
Router 2 (Labs):

Router 2 is defined as 'Labs'. Router 2 is connected to a 2960 switch and the switch is connected with 6 pcs. Every pc of this router has IP address from 135.35.20.1 to 135.35.20.6 serially.
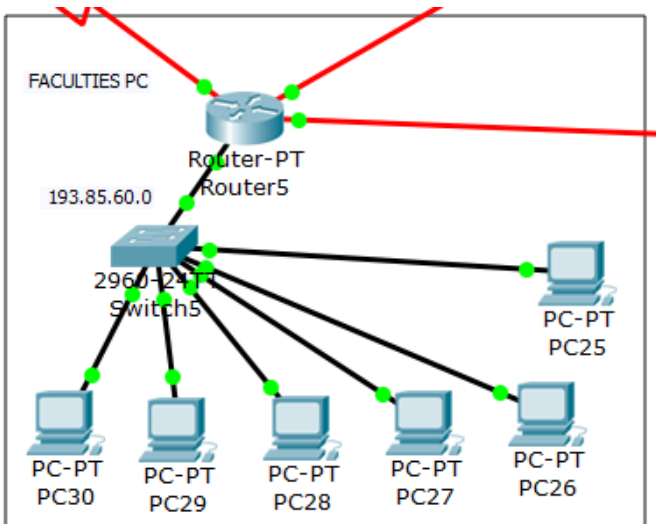
Router 3 (Employees PC):
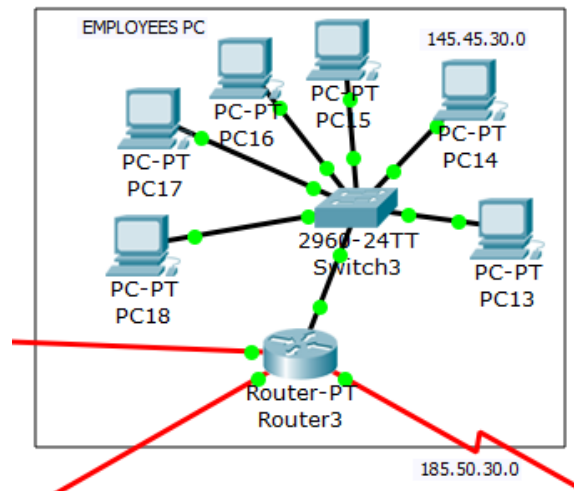
Router 3 is defined as 'Employees PC'. Router 3 is connected to a 2960 switch and the switch is connected with 6 pcs. Every pc of this router has IP address from 145.45.30.1 to 145.45.30.6 serially.
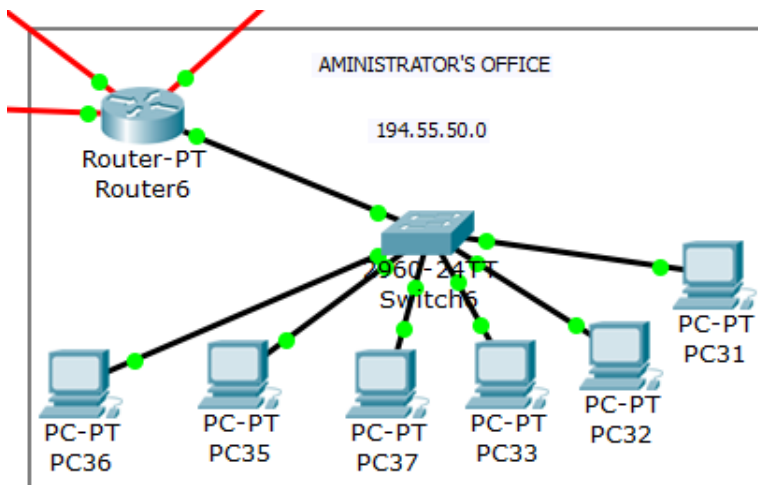
Router 4 (Library):

Router 4 is defined as 'Library'. Router 4 is connected to a 2960 switch and the switch is connected with 6 pcs. Every pc of this router has IP address from 15.25.40.1 to 15.25.40.6 serially.

Router 5 (Faculties PC):

Router 5 is defined as 'Faculties PC'. Router 5 is connected to a 2960 switch and the switch is connected with 6 pcs. Every pc of this router has IP address from 193.85.60.1 to 193.85.60.6 serially.

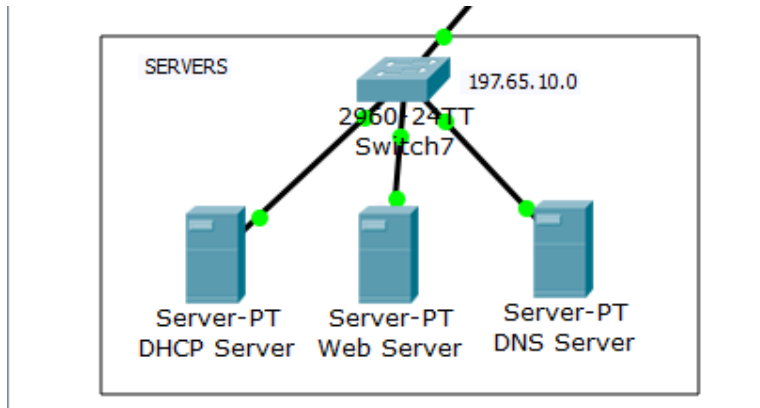## Router 6 (Administrator's Office):

Router 6 is defined as 'Administrator's Office'. Router 6 is connected to a 2960 switch and the switch is connected with 6 pcs. Every pc of this router has IP address from 194.55.50.1 to 194.55.50.6 serially.

Servers:

I have taken 3 servers which are- DNS server, DHCP server, Web server. Router 1 is connected to a 2960 switch and that switch is connected with these three routers.

Web Server HTTP Configuration:

OSPF Routing Table in CLI Command Box:

```
Router1                                          —    □    ×

Physical   Config   CLI

           IOS Command Line Interface

Router(config-if)#exit
Router(config)#
01:12:57: %OSPF-5-ADJCHG: Process 1, Nbr 175.50.80.2 on Serial3/0 from
FULL to DOWN, Neighbor Down: Interface down or detached

01:12:57: %OSPF-5-ADJCHG: Process 1, Nbr 175.50.70.1 on Serial2/0 from
FULL to DOWN, Neighbor Down: Interface down or detached

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 115.15.10.0 0.255.255.255 area 1
Router(config-router)#network 197.65.10.0 0.0.0.255 area 1
Router(config-router)#network 185.50.10.0 0.0.255.255 area 1
Router(config-router)#network 185.50.60.0 0.0.255.255 area 1
Router(config-router)#exit
01:23:04: %OSPF-5-ADJCHG: Process 1, Nbr 175.50.70.1 on Serial2/0 from
LOADING to FULL, Loading Done

01:26:25: %OSPF-5-ADJCHG: Process 1, Nbr 175.50.80.2 on Serial3/0 from

                                          Copy          Paste
```

Website:

```
PC1                                              —    □    ×

Physical   Config   Desktop   Custom Interface

Web Browser                                                    X

 <    >   URL  http://www.apex.edu.bd            Go          Stop

              Apex University

Welcome to Apex University. This University is a well reknowned university in Bangladesh.

Links:
Admissions
Advising
Results
eTender
Library Management
Accounts
```
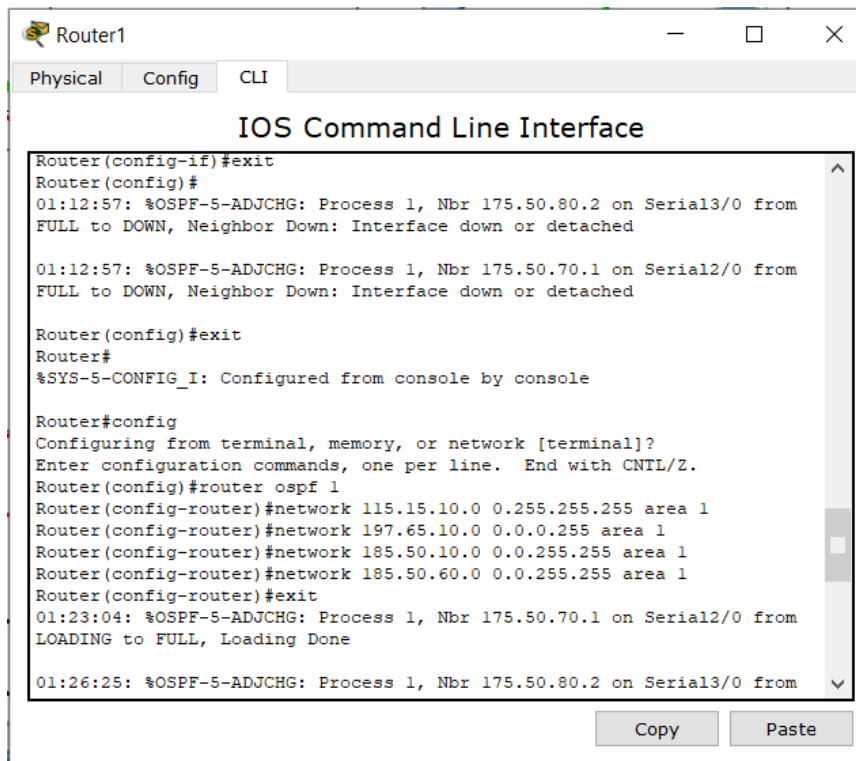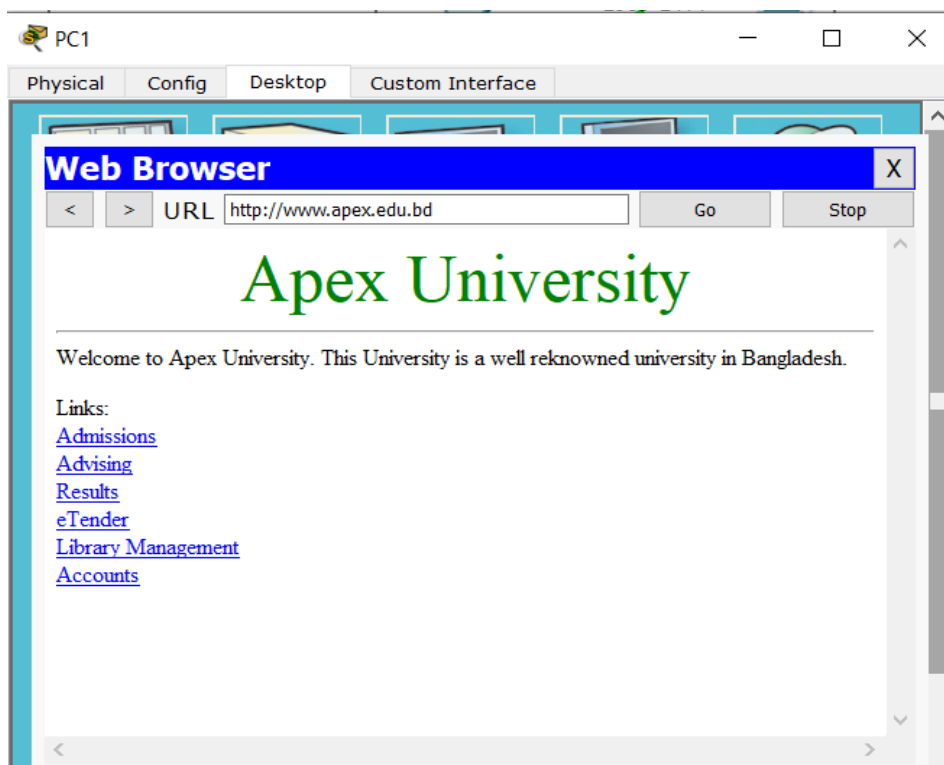
CLI Router Config:

Router-1:

interface fa0/0

ip address 115.15.10.254 255.0.0.0

no shut

do wr

exit

interface fa1/0

ip address 197.65.10.254 255.255.255.0

no shut

do wr

exit

interface se3/0

ip address 185.50.60.1 255.255.255.0

no shut

do wr

exit

interface se2/0

ip address 185.50.10.1 255.255.255.0

clock rate 64000

no shut

do wr

exit

Router-2:

interface fa0/0

ip address 135.35.20.254 255.0.0.0

no shut

do wr

exit

interface se2/0

ip address 185.50.10.2 255.255.255.0

no shut

do wr

exit

interface se3/0

ip address 185.50.20.1 255.255.255.0

clock rate 64000

no shut

do wr

exit

interface se6/0

ip address 185.50.70.1 255.255.255.0

clock rate 64000

no shut

do wr

exit

Router-3:

interface fa0/0

ip address 143.45.30.254 255.0.0.0

no shut

do wr

exit

interface se2/0

ip address 185.50.20.2 255.255.255.0

no shut

do wr

exit

interface se6/0

ip address 185.50.80.1 255.255.255.0

clock rate 64000

no shut

do wr

exit

interface se3/0

ip address 185.50.30.1 255.255.255.0

clock rate 64000

no shut

do wr

exit

Router-4:

interface fa0/0

ip address 15.25.40.254 255.0.0.0

no shut

do wr

exit

interface se2/0

ip address 185.50.30.2 255.255.255.0

no shut

do wr

exit

interface se3/0

ip address 185.50.40.1 255.255.255.0

clock rate 64000

no shut

do wr

exit

Router-6:

interface fa0/0

ip address 194.55.50.254 255.0.0.0

no shut

do wr

exit

interface se2/0

ip address 185.50.40.2 255.255.255.0

no shut

do wr

exit

interface se6/0

ip address 185.50.70.2 255.255.255.0

no shut

do wr

exit

interface se3/0

ip address 185.50.50.1 255.255.255.0

clock rate 64000

no shut

do wr

exit

Router-5:

interface fa0/0

ip address 193.85.60.254 255.0.0.0

no shut

do wr

exit

interface se2/0

ip address 185.50.50.2 255.255.255.0

no shut

do wr

exit

interface se6/0

ip address 185.50.80.2 255.255.255.0

no shut

do wr

exit

interface se3/0

ip address 185.50.60.2 255.255.255.0

clock rate 64000

no shut

do wr

exit

OSPF Routing Table:

Router -1:

router ospf 1

network 115.15.10.0 0.255.255.255 area 1

network 197.65.10.0 0.0.0.255 area 1

network 185.50.10.0 0.0.255.255 area 1

network 185.50.60.0 0.0.255.255 area 1

exit

Router -2:

router ospf 2

network 135.35.20.0 0.255.255.255 area 1

network 185.50.10.0 0.0.255.255 area 1

network 185.50.20.0 0.0.255.255 area 1

network 185.50.70.0 0.0.255.255 area 1

exit

Router -3:

router ospf 3

network 143.45.30.0 0.255.255.255 area 1

network 185.50.20.0 0.0.255.255 area 1

network 185.50.80.0 0.0.255.255 area 1

network 185.50.30.0 0.0.255.255 area 1

exit

Router -4:

router ospf 4

network 15.25.40.0 0.255.255.255 area 1

network 185.50.30.0 0.0.255.255 area 1

network 185.50.40.0 0.0.255.255 area 1

exit

Router -6:

router ospf 6

network 194.55.50.0 0.255.255.255 area 1

network 185.50.40.0 0.0.255.255 area 1

network 185.50.70.0 0.0.255.255 area 1

network 185.50.50.0 0.0.255.255 area 1

exit

Router -5:

router ospf 5

network 193.85.60.0 0.255.255.255 area 1

network 185.50.50.0 0.0.255.255 area 1

network 185.50.80.0 0.0.255.255 area 1

network 185.50.60.0 0.0.255.255 area 1

exit

Conclusion: In this mini project, I have used six routers as 6 different places of Apex University, where all routers each have one 2960 switch and sic PC or devices. Router 1 have two switches because another switch is being used for holding three servers. I have implemented DHCP, DNS and Web servers so that I can get the web page of the Apex University from pc's web browser. I have correctly added the wire connections. I have implemented OSPF routing system. Using OSPF routing network helped me to configure the routers path. I have used three different classes IP addresses to add more diversity in it. I have successfully routed all the routers according to question's manual. I have learnt lot more unknown things by doing this project and these learnings will ease my future path of network designing in cisco packet tracer. It will be useful for any future projects.