Project Report

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

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CSE 405

SEC: 3

Submitted to
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Problem specification:

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 processes like admissions, advising, results, eTender, library management, accounts and so on. This complex network infrastructure is subnetted and switching/routing mechanisms are in practice.

Statements & Features:

Computer networks encompass multiple computer systems and various computing hardware devices that are interconnected to share data. To facilitate these connections, routers, switches, and hubs are commonly used. In this project, I have established a comprehensive network for an organization like East West University, known as the Apex University. This network comprises 6 routers, each representing a distinct campus within the university. Additionally, I have integrated 2960 switches to link the computers, and for wireless connectivity, I've opted for the Router 2911. To manage the allocation of all IP addresses efficiently, a single DHCP server has been installed, connected to the switch under Campus 1. This server is responsible for configuring all Class A, B, and C IP addresses for the computers. Furthermore, it is equipped with a DNS server and a web server. I've configured the DNS server with the university's URL, "http://www.apex.edu.bd," enabling users to access the university's website.

Components:

1. Cisco Packet Tracer

Packet Tracer:

1.Generic End Devices (PC-PT, Laptop-PT, Smartphone-PT, TabletPC-PT)
2. Routers (2811)
3. Server (DHCP, DNS, HTTP)
4. Switch (switch-Pt)
5. Wireless Device(Access Point-PT)
6. Connections (Copper Straight Through, Serial DCE with clock)

Implementation:

To create this network, I have taken DHCP server DNS server, and WEB server which is basically named Server PT-Server all these servers relate to the switches, and we set up the IP address for each of the servers and PC.I have given the router network as Class-A, the Science & Engineering Department as Class-B and the rest as Class-C network. I set up the DHCP IP 195.168.1.2 and DNS server IP address 195.168.1.3 address and gave default GATEWAY 195.168.1.1, the DNS Server gives the link address and Web server mainly shows a web page. The IP of WEB server is 195.168.1.5 and all the routers connect through serial DCE AND DTE. By connecting all the routers, I have assigned the IP automatically by this 1 DHCP server to all the devices. Here, I also used access points to connect devices via wireless connections. After that each router ports have been given ip address according to their networks, set their clock rates, then

configured them using **OSPF** and gave ip address to all the end-devices using **DHCP** . At last, checked the DNS server using http://www.apex.edu.bd and found that the web server is working without any difficulties.

2 major flaws of Cisco Packet Tracer in my eyes,

1. Once I close the project using "X" and opened the file after a day the PC's configuration changed back into "static" instead of "DHCP". So, please check if the same thing happened again and configure it back into "DHCP" by choosing "DHCP" option in the "Desktop".

2. After giving the url in the DNS server with the IP address, several attempts to run the url http://www.apex.edu.bd failed from the PC's browser because of some unknown reasons. Then, I had to turn off the DNS service and again turned on and it worked out nicely.

   To make sure everything is fine I tried with several example urls like "apex.edu.bd", "apex.edu", "apex" and all the tests ran without any faults.

1 minor flaw that resides in the system is, at first time pinging the result comes as "failed". So, I had to make another attempt to make sure which is also troublesome.
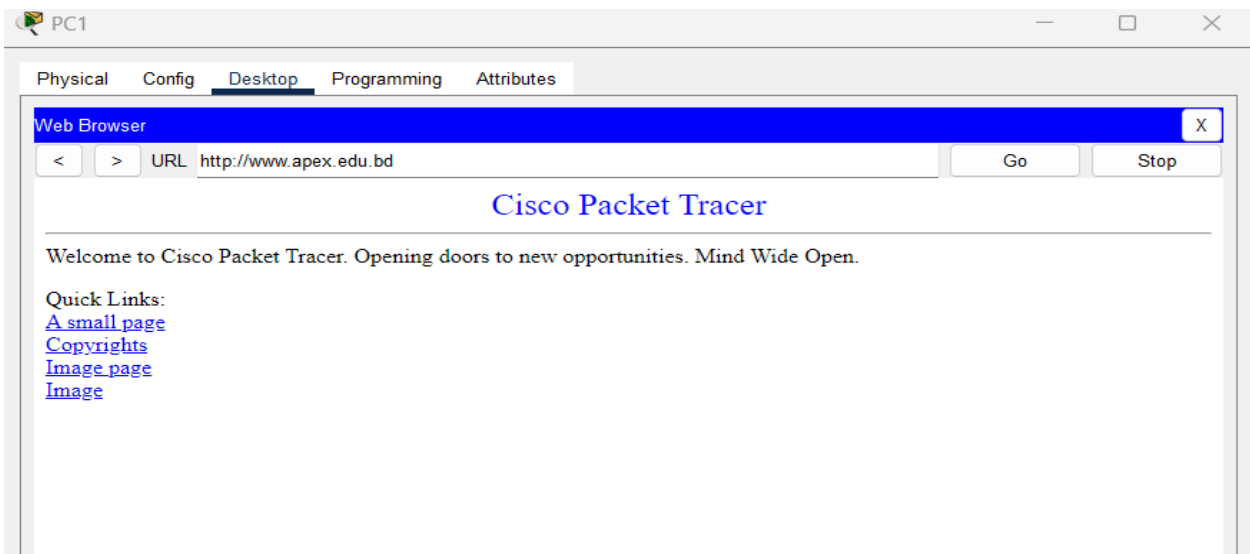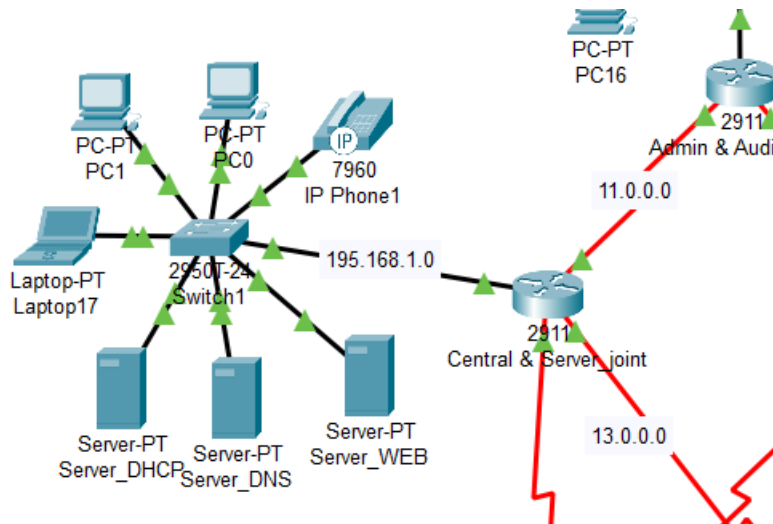
Here are some pictures of the projects that I worked on,
Full Network :
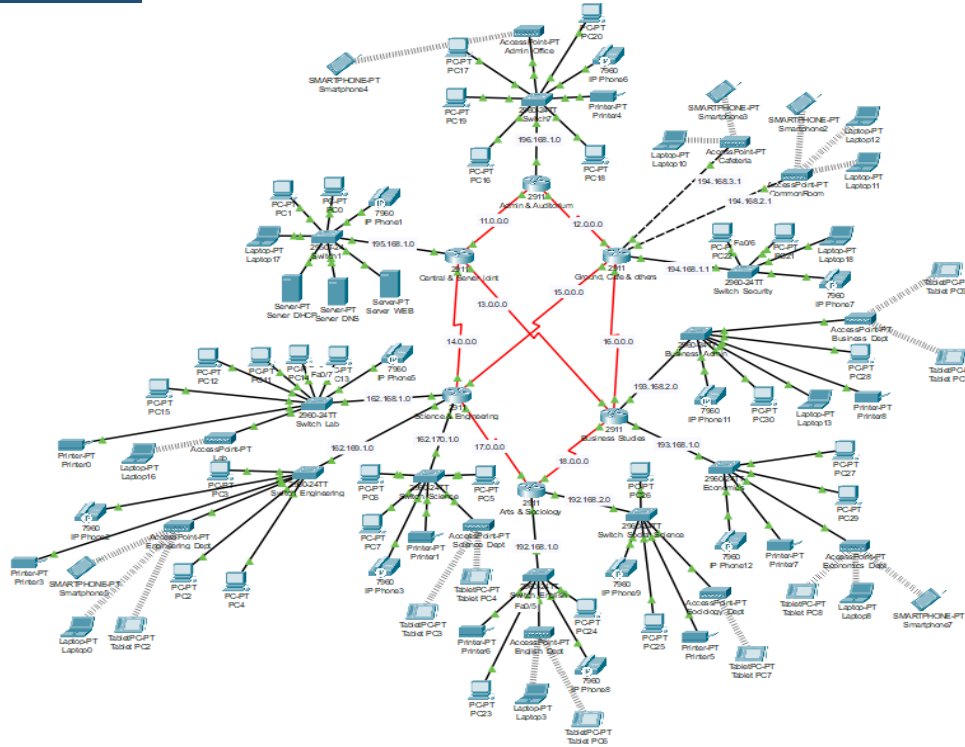
DNS Service :
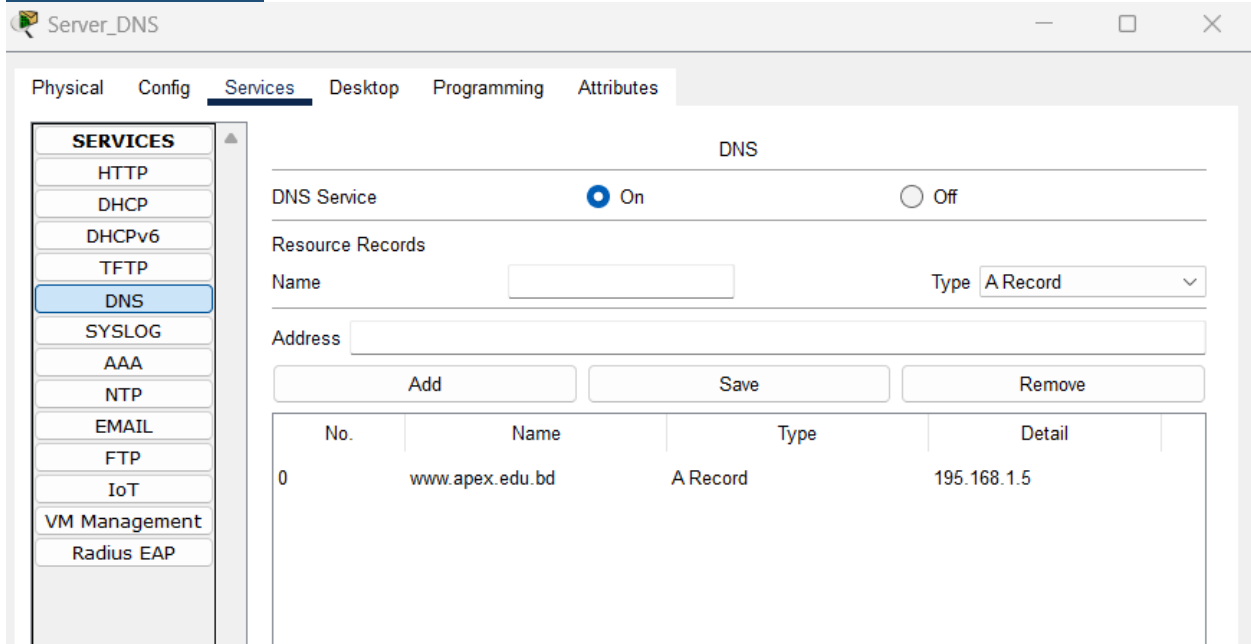
DHCP ServerPools :

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool11	194.168.3.1	195.168.1.3	194.168.3.5	255.255.255.0	100	0.0.0.0	0.0.0.0
serverPool10	194.168.2.1	195.168.1.3	194.168.2.5	255.255.255.0	100	0.0.0.0	0.0.0.0
serverPool9	194.168.1.1	195.168.1.3	194.168.1.5	255.255.255.0	100	0.0.0.0	0.0.0.0
serverPool8	193.168.2.1	195.168.1.3	193.168.2.5	255.255.255.0	100	0.0.0.0	0.0.0.0
serverPool7	193.168.1.1	195.168.1.3	193.168.1.5	255.255.255.0	100	0.0.0.0	0.0.0.0
serverPool5	192.168.1.1	195.168.1.3	192.168.1.5	255.255.255.0	100	0.0.0.0	0.0.0.0
serverPool6	192.168.2.1	195.168.1.3	192.168.2.5	255.255.255.0	100	0.0.0.0	0.0.0.0
serverPool4	162.170.1.1	195.168.1.3	162.170.1.5	255.255.0.0	400	0.0.0.0	0.0.0.0
serverPool2	162.168.1.1	195.168.1.3	162.168.1.5	255.255.0.0	400	0.0.0.0	0.0.0.0
serverPool3	162.169.1.1	195.168.1.3	162.169.1.5	255.255.0.0	400	0.0.0.0	0.0.0.0
serverPool1	196.168.1.1	195.168.1.3	196.168.1.5	255.255.255.0	100	0.0.0.0	0.0.0.0
serverPool	195.168.1.1	195.168.1.3	195.168.1.5	255.255.255.0	100	0.0.0.0	0.0.0.0

Checking Web Server from the same network :

PC1

Physical Config Desktop Programming Attributes

Web Browser   X

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

Cisco Packet Tracer

Welcome to Cisco Packet Tracer. Opening doors to new opportunities. Mind Wide Open.

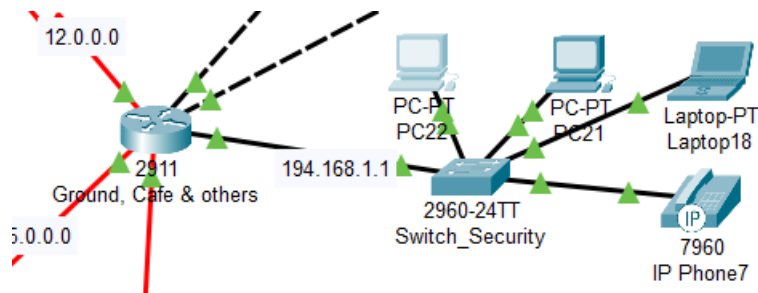Quick Links:
A small page
Copyrights
Image page
Image

PC-1's position :

Checking Web Server from a different network :
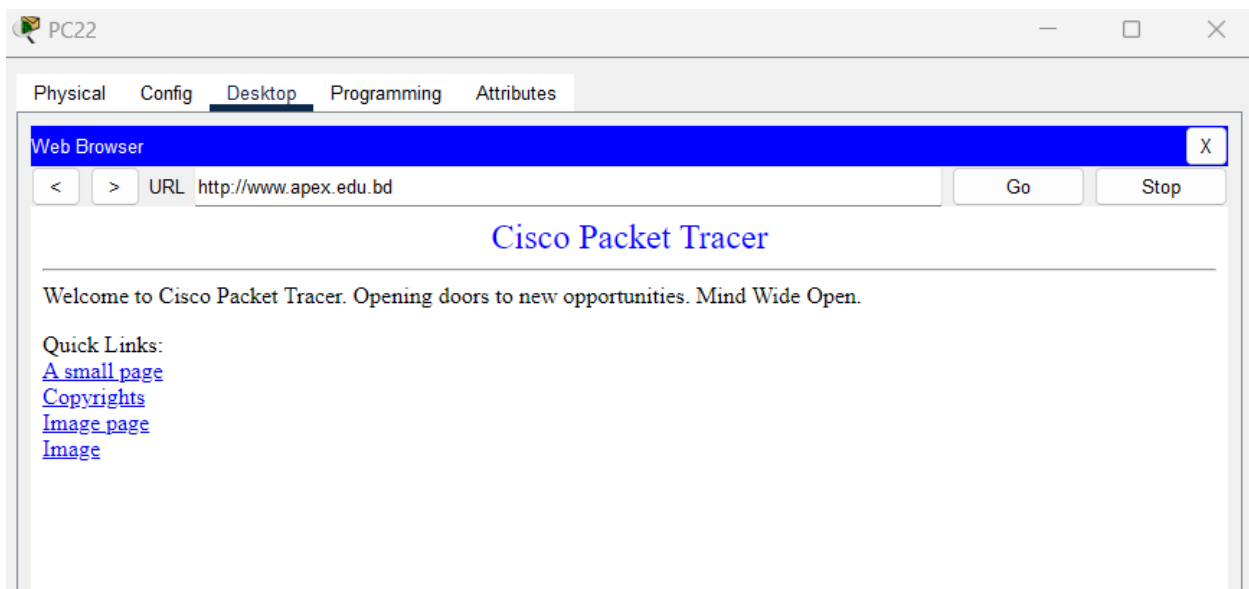
PC-22's position :

Configuring the router to router network :

Admin router

int se0/1/0
ip address 11.0.0.2 255.0.0.0
clock rate 64000
no shut
exit

int se0/1/1
ip address 12.0.0.1 255.0.0.0
clock rate 64000
no shut
exit

Central router

int se0/2/0
ip address 13.0.0.1 255.0.0.0
clock rate 64000

no shut
exit

int se0/1/1
ip address 14.0.0.1 255.0.0.0
clock rate 64000
no shut
exit

int se0/0/0
ip address 11.0.0.1 255.0.0.0
no shut
exit

Science & Engineering router

int se0/2/0
ip address 15.0.0.1 255.0.0.0
no shut
clock rate 64000
exit

int se0/1/1
ip address 17.0.0.1 255.0.0.0
clock rate 64000
no shut
exit

int se0/1/0
ip address 14.0.0.2 255.0.0.0
no shut

exit

<u>Business Studies router,</u>

int se0/2/1
ip address 16.0.0.1 255.0.0.0
clock rate 64000
no shut
exit

int se0/2/0
ip address 18.0.0.1 255.0.0.0
clock rate 64000
no shut
exit

int se0/1/0
ip address 13.0.0.2 255.0.0.0
no shut
exit

<u>Arts and Sociology,</u>

int se0/2/0
ip address 17.0.0.2 255.0.0.0
no shut
exit

int se0/2/1
ip address 18.0.0.2 255.0.0.0
no shut

exit

<u>Ground & Café</u>,

int se0/2/0
ip address 15.0.0.2 255.0.0.0
no shut
exit

int se0/1/1
ip address 16.0.0.2 255.0.0.0
no shut
exit

int se0/1/0
ip address 12.0.0.2 255.0.0.0
no shut
exit

<u>Giving default gateways and DHCP helper to different networks</u> :

(By giving the DHCP helper address the networks gets connected with the DHCP server. Given that the server pool is already created the server will automatically assign an ip address to each end device.)
<u>Admin</u> :

int Gig0/0
ip address 196.168.1.1 255.255.255.0

no shut
ip helper-address 195.168.1.1
exit

Central :

int Gig0/0
ip address 195.168.1.1 255.255.255.0
no shut
ip helper-address 195.168.1.1
exit

Science & Engineering :

int Gig0/0
ip address 162.168.1.1 255.255.0.0
no shut
ip helper-address 195.168.1.1
exit

int Gig0/1
ip address 162.169.1.1 255.255.0.0
no shut
ip helper-address 195.168.1.1
exit

int Gig0/2
ip address 163.170.1.1 255.255.0.0
no shut
ip helper-address 195.168.1.1
exit

<u>Arts & Sociology</u> :

int Gig0/0
ip address 192.168.1.1 255.255.255.0
no shut
ip helper-address 195.168.1.1
exit

int Gig0/1
ip address 196.168.2.1 255.255.255.0
no shut
ip helper-address 195.168.1.1
exit

<u>Business Studies</u> :

int Gig0/0
ip address 193.168.1.1 255.255.255.0
no shut
ip helper-address 195.168.1.1
exit

int Gig0/1
ip address 193.168.2.1 255.255.255.0
no shut
ip helper-address 195.168.1.1
exit

<u>Ground & Café</u> :

int Gig0/0
ip address 194.168.1.1 255.255.255.0
no shut
ip helper-address 195.168.1.1
exit

int Gig0/1
ip address 194.168.2.1 255.255.255.0
no shut
ip helper-address 195.168.1.1
exit

int Gig0/2
ip address 194.168.3.1 255.255.255.0
no shut
ip helper-address 195.168.1.1
exit

Configuring OSPF routing in each router :

Admin :

en
config t
router ospf 1
network 11.0.0.0 0.255.255.255 area 1
network 12.0.0.0 0.255.255.255 area 1
network 196.168.1.0 0.0.0.255 area 1
exit

Central :

```
en
config t
router ospf 2
network 11.0.0.0 0.255.255.255 area 1
network 13.0.0.0 0.255.255.255 area 1
network 14.0.0.0 0.255.255.255 area 1
network 195.168.1.0 0.0.0.255 area 1
exit
```

Ground & Cafe :

```
en
config t
router ospf 3
network 12.0.0.0 0.255.255.255 area 1
network 15.0.0.0 0.255.255.255 area 1
network 16.0.0.0 0.255.255.255 area 1
network 194.168.1.0 0.0.0.255 area 1
network 194.168.2.0 0.0.0.255 area 1
network 194.168.3.0 0.0.0.255 area 1
exit
```

Sciences & Engineering :

```
en
config t
router ospf 4
network 14.0.0.0 0.255.255.255 area 1
network 15.0.0.0 0.255.255.255 area 1
network 17.0.0.0 0.255.255.255 area 1
```

network 162.168.1.0 0.0.0.255 area 1
network 162.169.2.0 0.0.0.255 area 1
network 162.170.3.0 0.0.0.255 area 1
exit

Arts & Sociology :

en
config t
router ospf 5
network 17.0.0.0 0.255.255.255 area 1
network 18.0.0.0 0.255.255.255 area 1
network 192.168.1.0 0.0.0.255 area 1
network 192.168.2.0 0.0.0.255 area 1
exit

Business Studies :

en
config t
router ospf 6
network 13.0.0.0 0.255.255.255 area 1
network 16.0.0.0 0.255.255.255 area 1
network 18.0.0.0 0.255.255.255 area 1
network 193.168.1.0 0.0.0.255 area 1
network 193.168.2.0 0.0.0.255 area 1
exit