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

Project Report

Course: CSE405
Section: 02
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Submitted to:
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Objectives:

- Design a full-fledged network for an organization with multiple subnets
- To learn how to build a complex network with multiple subnets
  (using 3 different types of IP addresses)
- Real-life implement of computer network knowledge
- Use of network device in virtual mood using CISCO packet tracer

Introductions:

A network consists of a complex or simple network and networking devices that are connected with each other via transmission media in order to share or exchange data. In any network, the devices are known as hosts which must have a unique identity to communicate with self-network or other networks.

Design Description:

We have to build a complete model of a complex network by discovering the interconnectivity of the system and subnetworks that will reflect the INTERNATIONAL APOLLO University's structure and facilities within the network will include the bellow's feature:

- The web page of the university will reflect International Apollo University's web page.
- DNS server is installed to locate webserver - meaning people will browse University's web site with the following address: http://www.apollointernational.edu
- Among the hosts, we make sure that wireless links to the networks are available.
- University's full network has covered its six campuses with six routers, connectivity between routers are mesh (complex).
- Connectivity between all the hosts is established.

While designing, we have kept in mind that for future expansion/growth, we should have enough facilities. As it was compulsory for us to incorporate wireless devices along with wired hosts in the LAN, we followed this instruction. In the physical design, we have a server room where all the servers are positioned in one LAN segment. Making our routing system more efficient, we configured the router with some extra features:

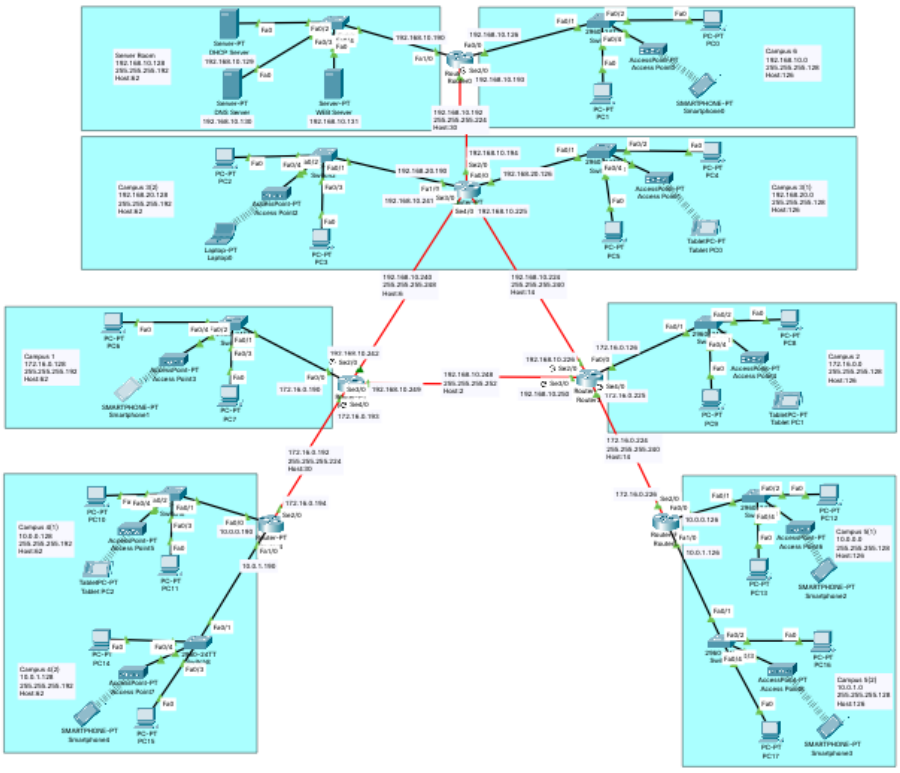
- Configured the whole network in such a way that IP for the hosts of different campuses will be automatically assigned by a single DHCP server.
- Network addresses were used from 3 different classes.
- Subnets are incorporated into our system.

Tools:

Cisco packet tracer 8.0.0

- Router: PT-Router
- Switch: 2960-24TT
- Wireless device: AccessPoint-PT
- End devices: PC-PT, Server-PT, Laptop-PT, TabletPC-PT, SMARTPHONE-PT
- Cable: Copper Straight-through, Serial DCE & Automatically choose connection type (for configuring wireless network system through AccessPoint-PT)

Physical diagram:



Design:

- Services: DHCP, DNS, Web
- DHCP server IP: 192.168.10.129 (static)
- A single DHCP server is used.
- Web server IP: 192.168.10.131 (static)
- DNS server IP: 192.168.10.130 (static)
- Dynamic routing algorithm (using OSPF protocol)
- Incorporated subnetting into 3 different types of class IP Address

Configuration code:

Router 0:

```
enable
config t

interface fa0/0
ip address 192.168.10.126 255.255.255.128
no shut
do wr
exit

interface fa1/0
ip address 192.168.10.190 255.255.255.192
no shut
do wr
exit

interface se2/0
ip address 192.168.10.193 255.255.255.224
clock rate 64000
no shut
do wr
exit
```

```
router ospf 1
network 192.168.10.0 0.0.0.127 area 1
network 192.168.10.128 0.0.0.63 area 1
network 192.168.10.192 0.0.0.31 area 1
exit

config t
interface fa0/0
ip helper-address 192.168.10.129
do wr
exit

config t
interface fa1/0
ip helper-address 192.168.10.129
do wr
exit
```

Router 1:

```
enable
config t

interface fa0/0
ip address 192.168.20.126 255.255.255.128
no shut
do wr
exit

interface fa1/0
ip address 192.168.20.190 255.255.255.192
no shut
do wr
exit
```

```
interface se2/0
ip address 192.168.10.194 255.255.255.224
no shut
do wr
exit

interface se3/0
ip address 192.168.10.241 255.255.255.248
no shut
do wr
exit

interface se4/0
ip address 192.168.10.225 255.255.255.240
no shut
do wr
exit

router ospf 2
network 192.168.20.0 0.0.0.127 area 1
network 192.168.10.192 0.0.0.31 area 1
network 192.168.20.128 0.0.0.63 area 1
network 192.168.10.240 0.0.0.7 area 1
network 192.168.10.224 0.0.0.15 area 1
exit

config t
interface fa0/0
ip helper-address 192.168.10.129
do wr
exit

config t
interface fa1/0
ip helper-address 192.168.10.129
do wr
exit
```

Router 2:

```
enable
config t

interface fa0/0
ip address 172.16.0.190 255.255.255.192
no shut
do wr
exit

interface se2/0
ip address 192.168.10.242 255.255.255.248
clock rate 64000
no shut
do wr
exit

interface se3/0
ip address 192.168.10.249 255.255.255.252
no shut
do wr
exit

interface se4/0
ip address 172.16.0.193 255.255.255.224
clock rate 64000
no shut
do wr
exit

router ospf 3
network 192.168.10.240 0.0.0.7 area 1
network 192.168.10.248 0.0.0.3 area 1
network 172.16.0.128 0.0.0.63 area 1
network 172.16.0.192 0.0.0.31 area 1
exit
```

```
config t
interface fa0/0
ip helper-address 192.168.10.129
do wr
exit
```

Router 3:

```
enable
config t

interface fa0/0
ip address 172.16.0.126 255.255.255.128
no shut
do wr
exit

interface se2/0
ip address 192.168.10.226 255.255.255.240
clock rate 64000
no shut
do wr
exit

interface se3/0
ip address 192.168.10.250 255.255.255.252
clock rate 64000
no shut
do wr
exit

interface se4/0
ip address 172.16.0.225 255.255.255.240
clock rate 64000
no shut
do wr
exit
```

router ospf 4
network 192.168.10.224 0.0.0.15 area 1
network 192.168.10.248 0.0.0.3 area 1
network 172.16.0.0 0.0.0.127 area 1
network 172.16.0.224 0.0.0.15 area 1
exit

config t
interface fa0/0
ip helper-address 192.168.10.129
do wr
exit

Router 4:

enable
config t

interface fa0/0
ip address 10.0.0.190 255.255.255.192
no shut
do wr
exit

interface fa1/0
ip address 10.0.1.190 255.255.255.192
no shut
do wr
exit

interface se2/0
ip address 172.16.0.194 255.255.255.224
no shut
do wr
exit

```
router ospf 5
network 10.0.0.128 0.0.0.63 area 1
network 10.0.1.128 0.0.0.63 area 1
network 172.16.0.192 0.0.0.31 area 1
exit

config t
interface fa0/0
ip helper-address 192.168.10.129
do wr
exit

config t
interface fa1/0
ip helper-address 192.168.10.129
do wr
exit
```

Router 5:

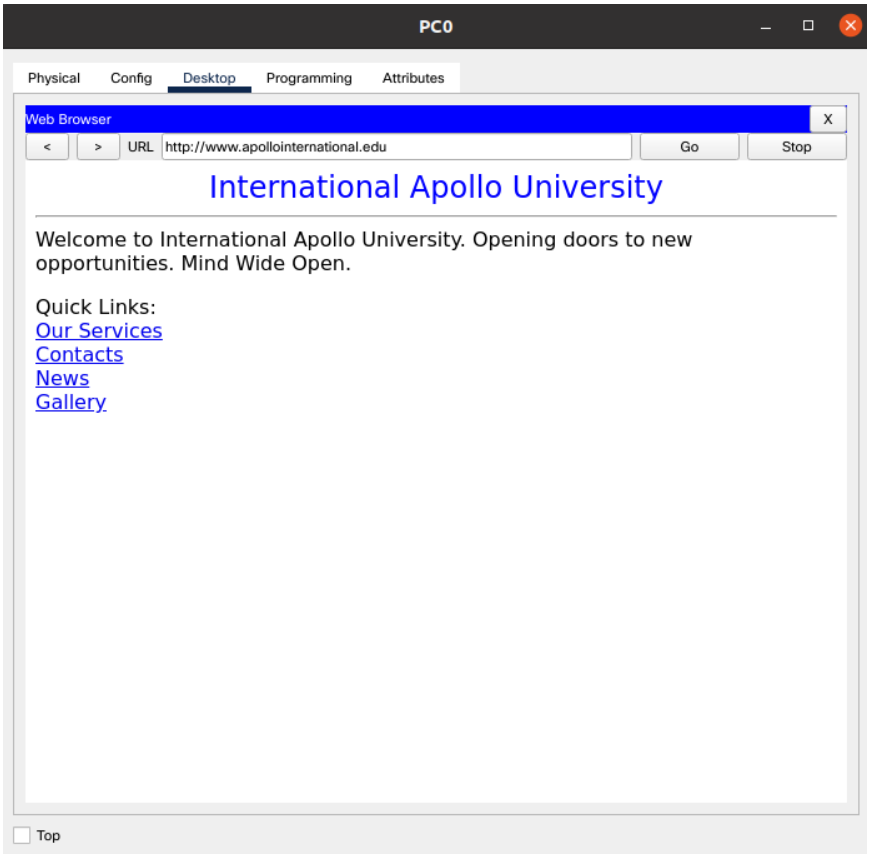
```
enable
config t

interface fa0/0
ip address 10.0.0.126 255.255.255.128
no shut
do wr
exit

interface fa1/0
ip address 10.0.1.126 255.255.255.128
no shut
do wr
exit
```

```
interface se2/0
ip address 172.16.0.226 255.255.255.240
no shut
do wr
exit

router ospf 5
network 10.0.0.0 0.0.0.127 area 1
network 10.0.1.0 0.0.0.127 area 1
network 172.16.0.224 0.0.0.15 area 1
exit

config t
interface fa0/0
ip helper-address 192.168.10.129
do wr
exit

config t
interface fa1/0
ip helper-address 192.168.10.129
do wr
exit
```

Testing:

Successfully ping for most of the case

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	Tablet PC0	IC...		0.000	N	0	(edit)	(delete)
	Successful	PC5	PC1	IC...		0.000	N	1	(edit)	(delete)
	Successful	Smar...	Tablet PC0	IC...		0.000	N	2	(edit)	(delete)
	Successful	PC2	PC5	IC...		0.000	N	3	(edit)	(delete)



Any devices can access the University website by entering http://www.apollointernational.edu

Conclusion:

In this project, developing a computer network system, we almost covered the necessary criteria and requirements of the international Apollo University. The model is well designed. By accomplishing this project, I learnt well how to develop a computer network system in real life.