



East West University

(Department of Computer Science and Engineering)

Project Report

Course Name: COMPUTER NETWORKS

Course Code: CSE 405

Semester: FALL-2020

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

Submitted To: DR. ANISUR RAHMAN

SUBMITTED BY: MD. ASHRAFUR RAHMAN

ID: 2017-1-60-125

SEC: 1

DATE: 08 JANUARY 2021

Introduction

Background:

International Apollo University, is an enterprise 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 subnetted and switching/routing mechanisms are in practice.

As there perform lots of services, so huge number data is transmitting continuously. As there has a lots of service fast data transmission (Bandwidth), Reliability, Jitter everything needs to handle properly. Another thing is there working a lot of people and students, so data security is going to be concern.

Method (Network Topology)

As this is a Campus Area Network (CAN) & Concerning all these things, it may be best to use Mesh Topology. With different types of Lan network using a different type of IP address provides. All router follows **OSPF model** to find the shortest path to reach.

There has not only use wired connection but also **Wireless Access Point** to connect Mobile Phone and other wireless IoT devices.

Here all types of IP addresses are used- **A Class type, B Class type IP** and **C Class type IP** also.

Limitations of this Topology

As this Campus Area Network (CAN), So there has a few numbers of LAN. That's why MESH is applicable. But if there is a very large number LAN, then Mesh doesn't a proper network, Mesh will be an inappropriate connection. This is a predesign using Cisco Packet Tracer. To simulate the network.

Design Details

Tools & Equipment

1. Cisco Packet Tracer
2. Switch 2960-24TT



3. Cisco PT Router
4. Server
5. Packet Tracer Access Point
6. Straight Through Twisted Pair Cable and others



Description

To Connect multiple end devices, a switch has been used and connected by fast Ethernet Ports, all switches are connected Cisco PT Router and Added extra 6 PT-ROUTER-NM-1S serial Port. Because all routers are communicating via Serial Ports. Every LAN there has DHCP servers to Assign the IP Dynamically. The OSPF routing table is given in the last page.

Here, the first LAN is an administrative Network, Where all **Webserver (5.1.1.50) and DNS (5.1.1.200)** servers are incorporated. This Lan has a **A-class IP: 5.0.0.0**.

All devices are connected with a Switch and the switch is connected with a router. Router follow OSPF model incorporated with two Different A class IP network that are 10.0.0.0 & 20.0.0.0.

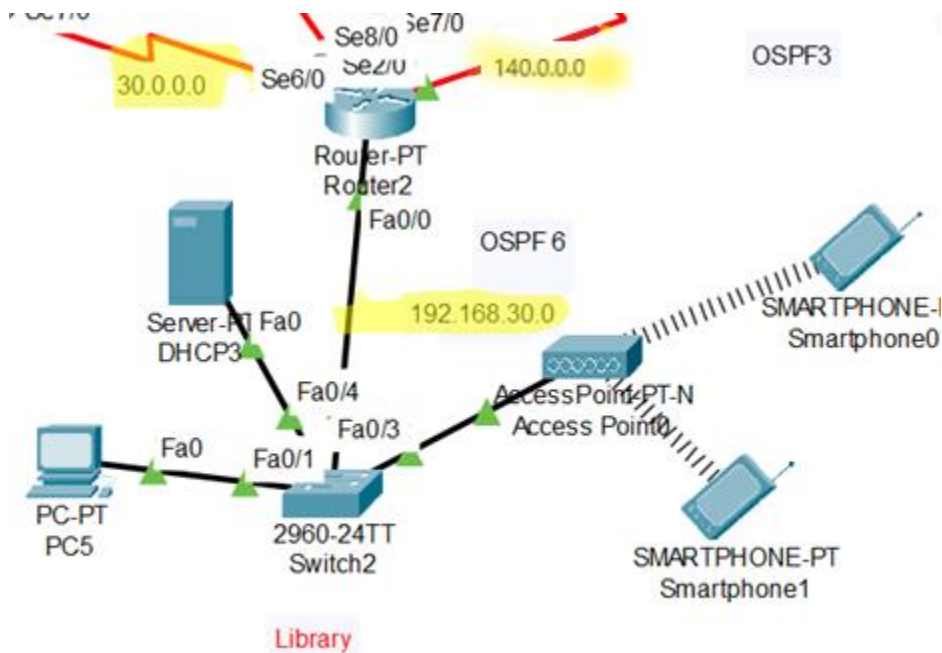
2nd LAN is a classroom and used a **Class ‘C’ type IP: 192.168.20.0** to connect a few PC.

3rd LAN is a Library where Wireless Access Point is also available to the user who needs wireless network. This LAN connected with a router which is connected with **‘A’ class IP 30.0.0.0 and a ‘B’ class IP 140.0.0.0**

4th LAN is Lab1 is only some wired devices LAN- 192.168.40.0

5th LAN is LAB-2 192.168.50.0. there is some wired devices and Some **Wireless devices** to Connect Student personal Laptop wirelessly

6th Lan is office and Accounts Lan, where a **dedicated Printer is shared**. This printer can be used from the whole campus that is any of the CAN network is use this printer.



Findings after Simulation:

All the Networks are connected and can be ping easily. Website- www.apollointernational.edu can be accessed from all networks. As all routers are connected using the OSPF routing table. So, data are transferred in the shortest possible path. This is because OSPF follows the Dijkstra Algorithm to find the shortest path. For the very time ping to another network is failed but browsing web server from any network is successful in first time. After web browsing all ping test is successful. Here we added some screenshot for better understandings.

Vis.	Time(sec)	Last Device	At Device	Type
0.656	--	Router6	Router0	OSPF
0.657	Router6	Router0	OSPF	
0.805	--	Router3	Router5	OSPF
0.806	Router3	Router5	OSPF	
1.004	--	Router5	Router6	OSPF
1.005	Router5	Router6	OSPF	
1.064	--	Router6	PC7	ICMP
1.064	--	PC7	Router6	ICMP
1.065	Router6	Switch1	OSPF	
1.065	PC7	Access Poi...	ICMP	
1.066	--	Router0	Switch4	OSPF
1.066	Access Point1	Switch4	ICMP	
1.066	Switch1	PC0	OSPF	
1.066	Switch1	PC3	OSPF	
1.066	Switch1	DHCP2	OSPF	
1.066	--	Router4	Router0	OSPF
1.067	Router0	Switch0	OSPF	
1.067	Router4	Router0	OSPF	
1.067	Switch4	Router4	ICMP	
1.067	--	Router2	Router5	OSPF

Reset Simulation ☒ Constant Delay Captured to: 11.199 s

Play Controls

Vis.	Time(sec)	Last Device	At Device	Type
1.229	Switch0	DHCP1 - 5...	STP	
1.229	Switch0	Web Serve...	STP	
1.229	Switch0	DNS 5.1.1...	STP	
1.229	Switch3	Laptop1	ICMP	
1.229	--	Switch0	ARP	
1.230	Switch0	Router0	ARP	
1.237	--	Router4	OSPF	
1.238	Router4	Router5	OSPF	
1.248	--	Switch5	STP	
1.249	Switch5	PC8	STP	
1.249	Switch5	Router5	STP	
1.249	Switch5	DHCP6	STP	
1.249	Switch5	Printer0	STP	
3.150	--	Switch1	STP	
3.151	Switch1	PC0	STP	
3.151	Switch1	Router6	STP	
3.151	Switch1	PC3	STP	
3.151	Switch1	DHCP2	STP	
3.202	--	Switch2	STP	
3.203	Switch2	PC5	STP	

Reset Simulation ☒ Constant Delay Captured to: 11.199 s

Vis.	Time(sec)	Last Device	At Device	Type
41.073	--	Switch5	DTP	
41.073	--	Router4	OSPF	
41.073	Switch1	PC0	OSPF	
41.073	Switch1	PC3	OSPF	
41.073	Switch1	DHCP2	OSPF	
41.073	--	Router4	OSPF	
41.074	Switch5	Router5	DTP	
41.074	Router4	Switch4	OSPF	
41.074	Router4	Router0	OSPF	
41.074	--	Router0	OSPF	
41.075	--	Router5	OSPF	
41.075	Router0	Switch0	OSPF	
41.075	Switch4	Laptop0	OSPF	
41.075	Switch4	Access Poi...	OSPF	
41.075	Switch4	DHCP5	OSPF	
41.075	--	Router6	OSPF	
41.076	Access Point1	Laptop2	OSPF	
41.076	Access Point1	PC7	OSPF	
41.076	Router5	Router2	OSPF	
41.076	Router6	Router5	OSPF	

Reset Simulation ☒ Constant Delay Captured to: 41.077 s

PDU List Window										
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC7	DNS 5.1.1.200	ICMP		1.064	N	0	(edit)	
	Successful	Laptop2	Printer0	ICMP		1.068	N	1	(edit)	
	Successful	Smartphone1	Web Server - 5....	ICMP		1.074	N	2	(edit)	
	Successful	Smartphone0	DNS 5.1.1.200	ICMP		1.082	N	3	(edit)	
	Successful	Laptop3	Printer0	ICMP		1.086	N	4	(edit)	
	Successful	PC1	Printer0	ICMP		1.090	N	5	(edit)	
	Successful	Laptop2	DNS 5.1.1.200	ICMP		1.097	N	6	(edit)	
	Successful	PC0	PC1	ICMP		1.205	N	7	(edit)	
	Successful	Laptop0	DHCP5	ICMP		1.209	N	8	(edit)	
	Successful	Laptop0	PC8	ICMP		1.212	N	9	(edit)	
	Successful	Laptop1	DNS 5.1.1.200	ICMP		1.218	N	10	(edit)	
	Failed	DHCP4	DHCP1 - 5.1.1.1...	ICMP		1.222	N	11	(edit)	
	Successful	Laptop0	Printer0	ICMP		9.330	N	12	(edit)	
	Successful	Laptop2	PC8	ICMP		9.333	N	13	(edit)	
	Successful	Laptop2	Smartphone1	ICMP		9.339	N	14	(edit)	
	Successful	Smartphone1	Smartphone0	ICMP		9.342	N	15	(edit)	
	Successful	Laptop3	PC7	ICMP		9.348	N	16	(edit)	
	Successful	PC0	DNS 5.1.1.200	ICMP		9.356	N	17	(edit)	
	Successful	Printer0	Web Server - 5....	ICMP		9.361	N	18	(edit)	

Screenshots of PDU LIST window and Events Log after simulation

Conclusion:

As a predesign purpose this is perfectly working. And No error is found when testing. Now its time to physically implement it to the campus. The CLI command of OSPF is given the following page.

CLI Command of OSPF

router ospf 1

network 5.0.0.0 0.255.255.255 area 1

network 10.0.0.0 0.255.255.255 area 1

network 20.0.0.0 0.255.255.255 area 1

network 160.0.0.0 0.0.255.255 area 1

network 210.0.0.0 0.0.0.255 area 1

network 212.0.0.0 0.0.0.255 area 1

router ospf 2

network 192.168.20.0 0.0.0.255 area 1

network 40.0.0.0 0.255.255.255 area 1

network 20.0.0.0 0.255.255.255 area 1

network 30.0.0.0 0.255.255.255 area 1

network 218.0.0.0 0.0.0.255 area 1

network 220.0.0.0 0.0.0.255 area 1

router ospf 3

network 140.0.0.0 0.0.255.255 area 1

network 150.0.0.0 0.0.255.255 area 1

network 160.0.0.0 0.0.255.255 area 1

network 192.168.40.0 0.0.0.255 area 1

network 216.0.0.0 0.0.0.255 area 1

network 216.0.0.0 0.0.0.255 area 1

network 2.0.0.0 0.0.0.255 area 1

router ospf 4

network 150.0.0.0 0.0.255.255 area 1

network 200.0.0.0 0.0.0.255 area 1

network 210.0.0.0 0.0.0.255 area 1

network 221.0.0.0 0.0.0.255 area 1

network 218.0.0.0 0.0.0.255 area 1

network 192.168.50.0 0.0.0.255 area 1

router ospf 5

network 192.168.60.0 0.0.0.255 area 1

network 40.0.0.0 0.255.255.255 area 1

network 10.0.0.0 0.255.255.255 area 1

network 200.0.0.0 0.0.0.255 area 1

network 214.0.0.0 0.0.0.255 area 1

network 216.0.0.0 0.0.0.255 area 1

router ospf 6

network 140.0.0.0 0.0.255.255 area 1

network 192.168.30.0 0.0.0.255 area 1

network 30.0.0.0 0.255.255.255 area 1

network 212.0.0.0 0.0.0.255 area 1

network 214.0.0.0 0.0.0.255 area 1

network 221.0.0.0 0.0.0.255 area 1