East West University

Department of CSE

PROJECT REPORT

Course Code and Name: CSE 350 Data Communication	
Project no: 01	
Project name: Design a network infrastructure using packet tracer for a university. In the design include the following: DHCP server, sub-net, web server, FTP server, DNS server.	
Semester and Year: Summer-2022	**GROUP NO:**
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Date of Report Submitted: 09-16-2022	**TOTAL Marks:**

Project Description

In this project I am going to develop a network infrastructure for a university with multiple campuses. The main aspect of the infrastructure is that this will cover the whole university. The 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 everyone. On top of that the university runs several complex networked systems to support several facilities like Customer service, Building service, Accommodation, Medical service and features such as CSE, EEE, BBA, ENGLISH, ECE etc. This complex network infrastructure is sub netted and switching/routing mechanisms are in practice.

The project will contain DHCP server, sub-net, web- server, FTP server, DNS server.

Description of each is given below.

DHCP server

DHCP stands for Dynamic Host Configuration Protocol. To every computer there is a unique id, which is known as IP address. For every computer the IP address is unique, which give every machine a unique address. Now the IP address is originally given by the network provider. But as there are a lot of computers for a provider to give IP address manually, the internet provider sets up a DHCP server. Now the server must be set manually. The server must be given a network address. The server will then work. Now when a new computer is requesting for IP, the DHCP server looks for the first valid IP address from the network address and if it is empty or not in use, then it will be given to the user. Like that, every new computer will ask for a IP address. The server will always look to the next IP and check if it was given to another user or not. If the IP address is empty, then it will assign the IP to the next user. In this way the manual labor is removed. That is how DHCP server works.

Fig: DHCP server

In cisco packet tracer, a server must be made a DHCP server. For that I have to open the console of the server and enable the DHCP service. Then I have to manually assign a network address for the DHCP server. From now if a new computer requests for a IP address, The DHCP server will

check if the next IP address is empty or not. If empty then it will give that IP address to that computer.

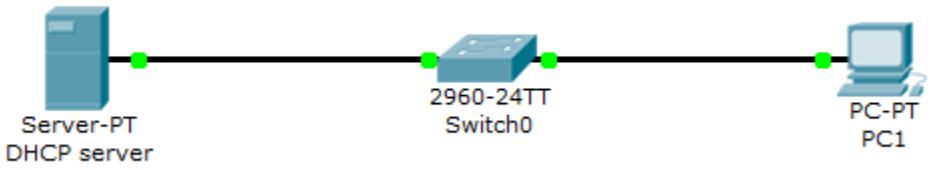


Fig: DHCP configuration

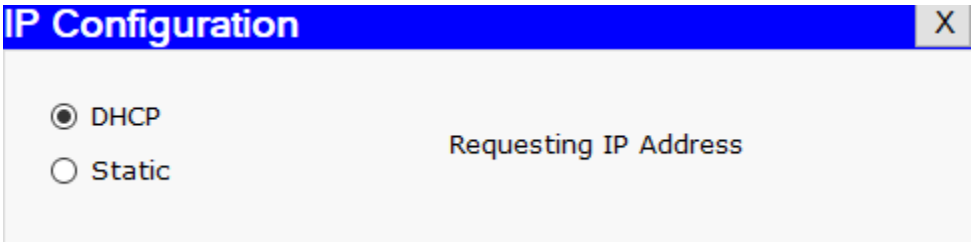


Fig: IP request to DHCP

Sub-net

As we know that the IP address is an 8-bit separated values for total 32 bit. Every 8-bit is separated by a dot in the middle. Now if we think the maximum value for an IP address can be of 255.255.255.255. This may seem a big number but when it comes to the whole world the number is quite lesser than we can imagine. So, to have solve this matter sub-netting technique was introduced. What happens is, we can break the 8 bits to create a new patter. For example: Let's say we have 255.255.255.255(Binary: 11111111.11111111.11111111.11111111). Now we want to create a subnet after the 20^{th} bit. The we will have 255.255.240.0 (Binary: 11111111.11111111.1111/0000.00000000). Now this 255.255.240.0 will be the new network address and the first valid address of the subnet 255.255.240.0 will be 255.255.240.1 (Binary: 11111111.11111111.1111/0000.00000001). Now if we think, we will have total 256+16 = 272 new valid IP address just for the subnet 255.255.240.0. That is how we can create a huge number of IP address. This is the reason subnetting is being used.

Fig: Simple example of Sub-netting

In the project, we can use a certain subnet for a specific cause. Say for example we will assign different subnets for different campuses. That way, traffic can be control in an easy fashion and the process will be much easier as the subnet will be specific for a fixed department.

Web Server

Web servers are used to display website content through storing, processing and delivering webpages to users. For instance, in this project, I have enabled the web service for a server. So, this server will act like the web server. The web page that I have used is for the university "Apollo University". If a user wants to access the web page for the university, simply writing the URL for the university in the browser will be enough.

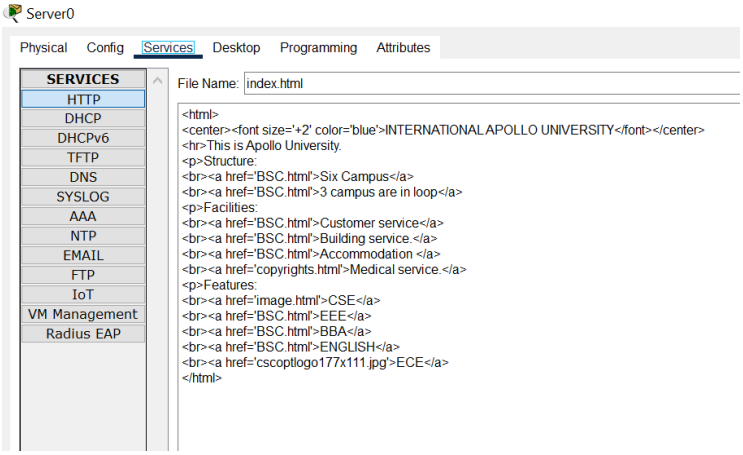


Fig: Added web server in the project

DNS server

As we know, there are a lot of websites in the world and we are using them frequently for our daily activities. Now, remembering all of them by IP address is not possible. So, to resolve this matter, we deploy DNS servers. DNS stands for Domain Name System. For this project, I have used DNS server. To do that, I have enabled the DNS service from the service tab of the server. As mentioned before, I have used a webserver for the University. Against that URL, I have given

the IP “192.168.10.10” for the university. Now we cannot remember the IP all the time. So, we may write the URL. Whenever the URL will be called, webserver will ask the DNS server to identify the website of that URL. Then DNS server will give the IP address for the desired URL and that is how we will get access to the web page of the university.

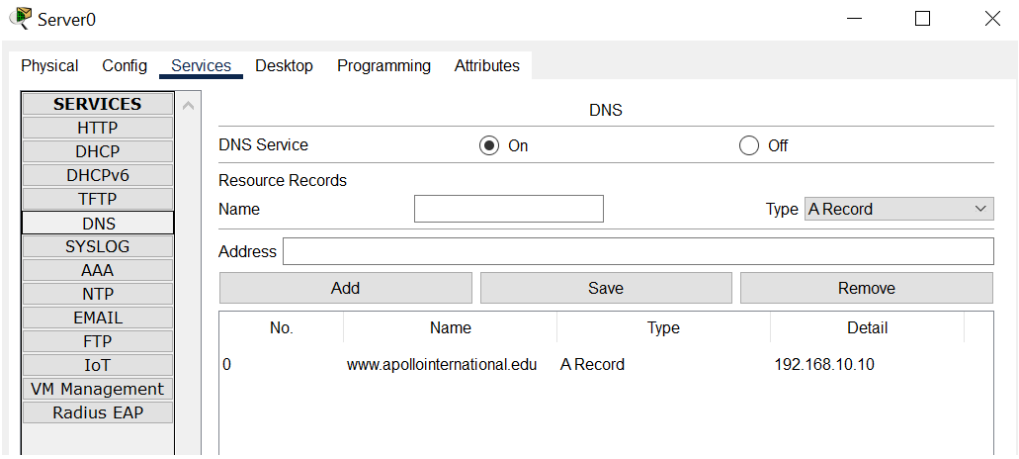


Fig: Added DNS in the project

FTP Server

FTP servers are used to store massive amount of data and then share those data inside the FTP network. For instance, I have enabled the FTP service of the servers in this project. So, all the servers will act like an FTP server. One of those server’s IP address is 192.168.10.10. So, if any PC in the any campus wants to use that server’s FTP service, they can use it.

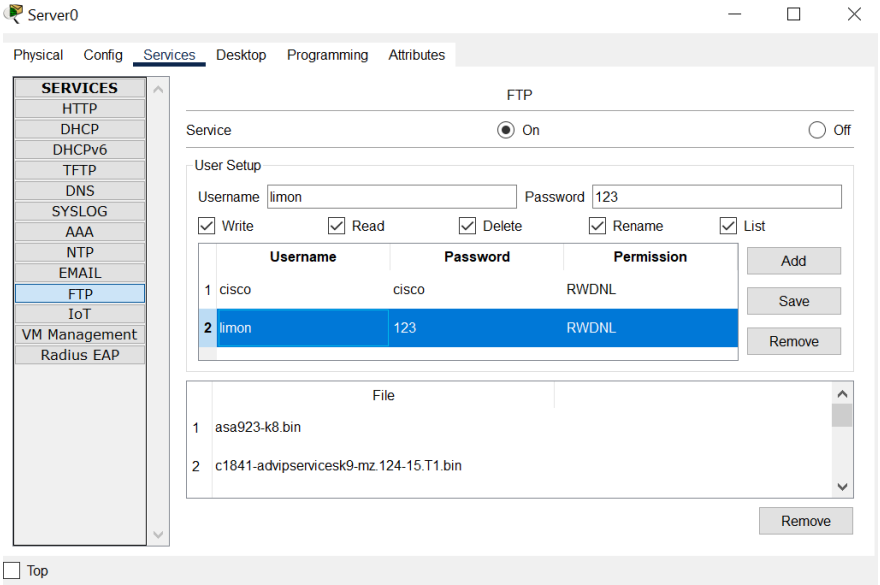


Fig: Added FTP server with username and password.

Solution Description

I approached the project thinking that each of the Apollo University's campuses as an individual network but also all six campuses are connected, where I have to implement DHCP, DNS, web server, FTP server and subnetting individually. In order to do that I have to implement 6 routers for each campus and 6 switch for each campus too. There must be servers in each campus and then every PC that connects with the router has to successfully send a message to any PC in any campus.

Firstly, I integrated 6 routers for 6 campuses and connected every router with each other using straight through cable. Every router is designated to one campus each. Then for every campus I added a switch and connected the switches with its router by straight through cable. After That I connected some PCs, servers and access points to all the switches. I added the access points so that the network can have wireless connection. Then I assigned different network addresses for each router's connection. Later I implemented subnetting in router connections. For instance, I used subnetting in router 3 and router 2. Afterwards I assigned the DHCP servers for the network address. So, whenever I add PCs in the network with those network address, DHCP will automatically assign an IP for all the PC's. Going forwards I added the PCs and as expected DHCP assigned Ips for every PC. With that I also added servers, access points and connected a laptop to every access point for wireless connection. Next, I connected all the PCs, servers and access points to the switch by straight through cables. The simulation for successful connection is given bellow:

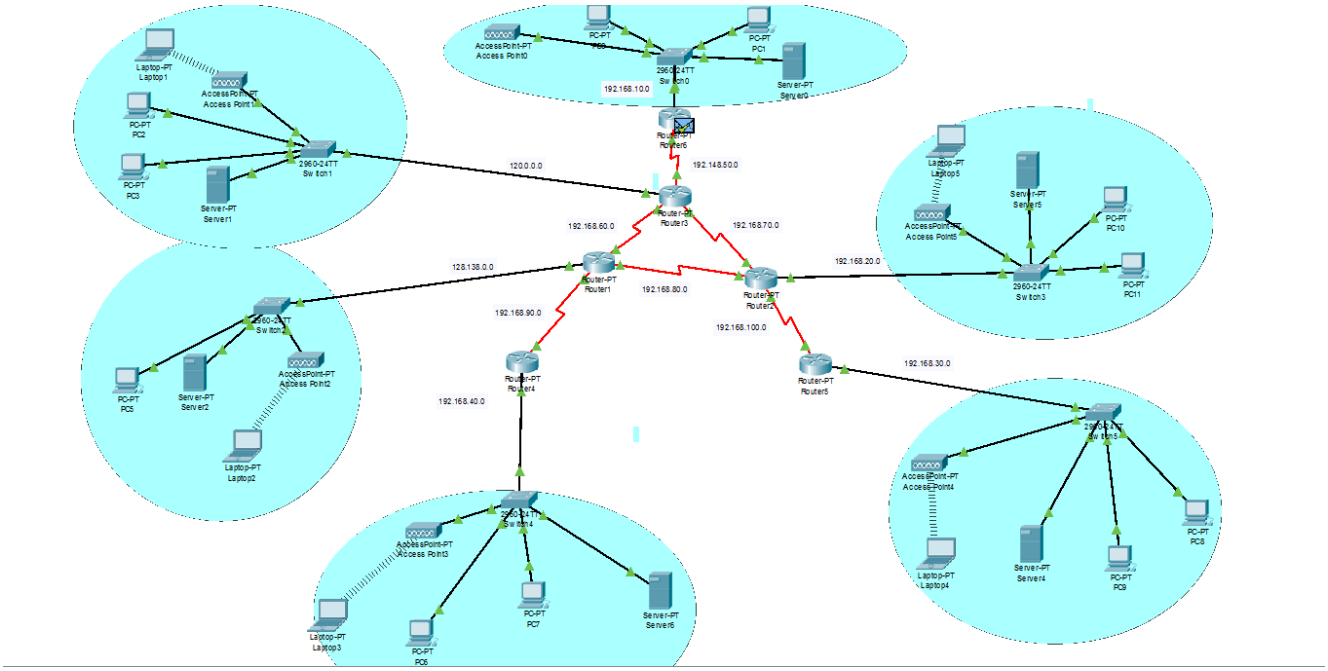


Fig: The network after completing all the connection

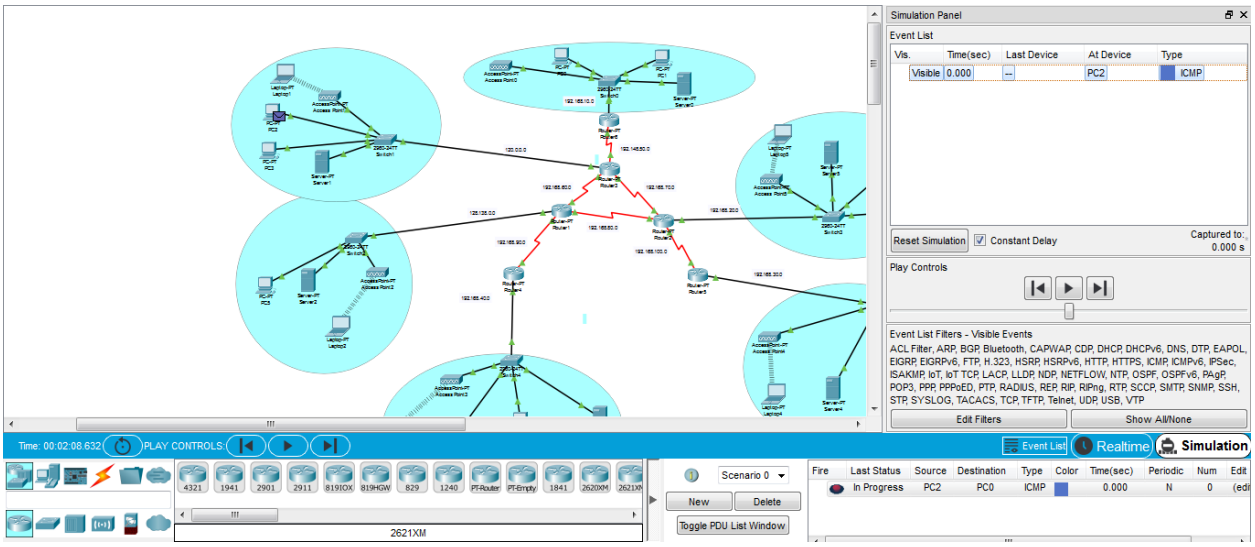
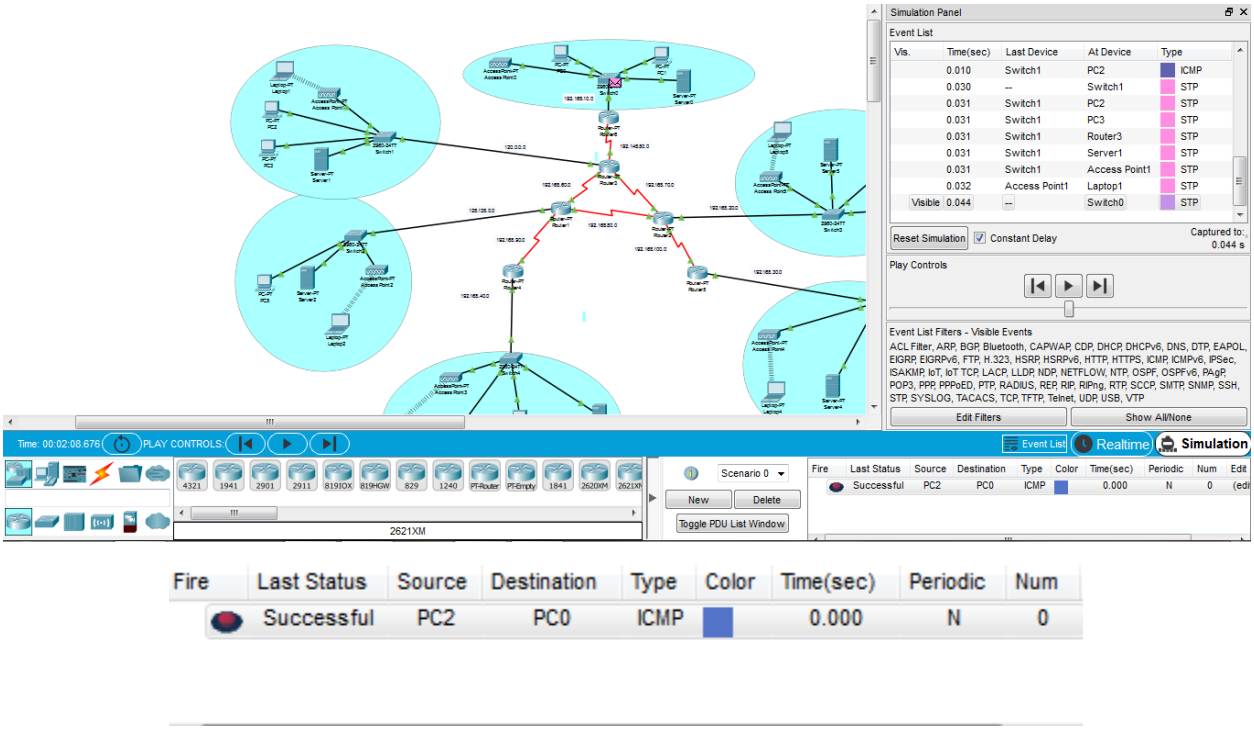


Fig: Simulation in process

Here a simulation is shown where I have sent a message for PC2 of router 1 and PC0 of router 6.



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
	Successful	PC2	PC0	ICMP		0.000	N	0

Fig: Simulated transmission

Here is a successful transmission.

To implement web server, I enabled web server service in each server and created a web page for Apollo University with the URL being www.apollouniversity.edu . Then using HTML I added the necessary services in the web page. After that I implemented DNS with deploying a valid IP address against the web URL. So, when I use the browser of a PC and type in the URL then the web server will collect the website against that URL from server show it in the browser. Likewise, if I type the Ip address in the browser, the DNS will find the website against that IP address and deploy it in the browser.

The results for successful web server and DNS implementation are:

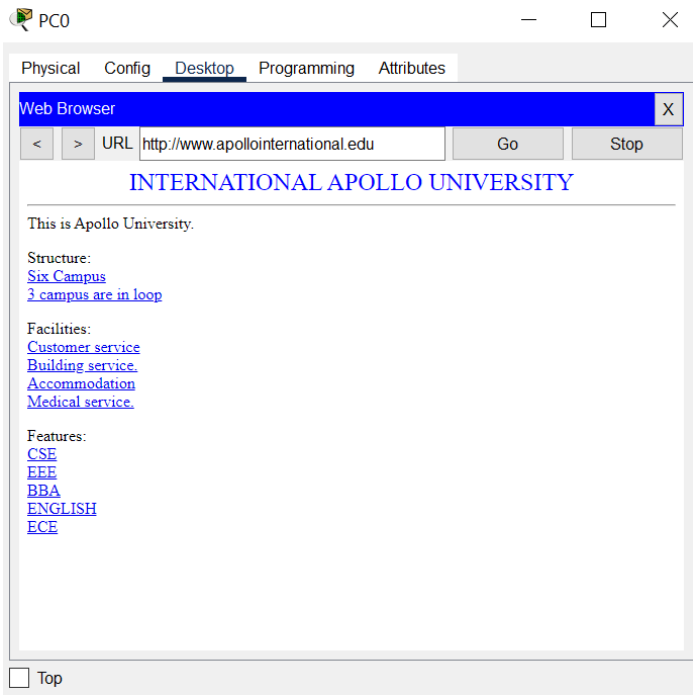


Fig: Access through URL

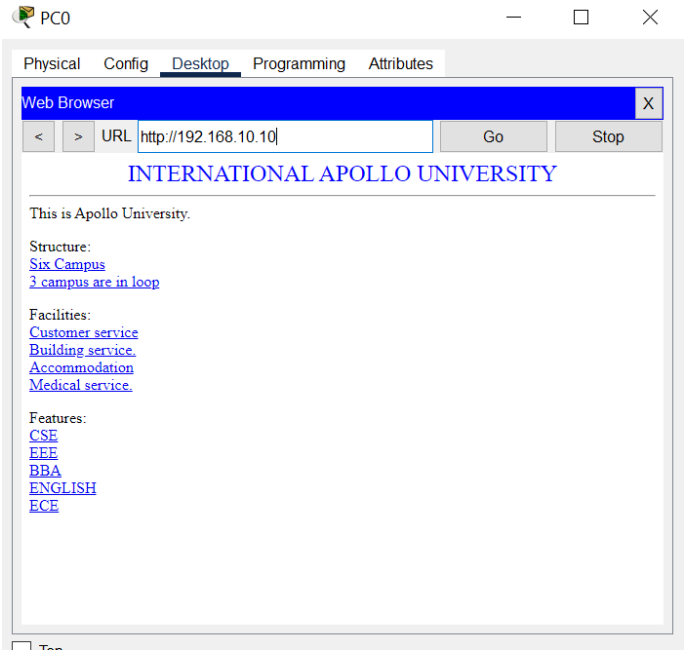


Fig: Access through IP address

To implement FTP server, I turned on the FTP service in each server and created a new user profile giving some permissions to users in the FTP server. In order to use the FTP service, I went to the CMD of a PC and typed in the following command “ftp <space> IP address of any server”. Then I inserted the username and password. After that I had the access of that server’s FTP service. A successful implementation result is given bellow:

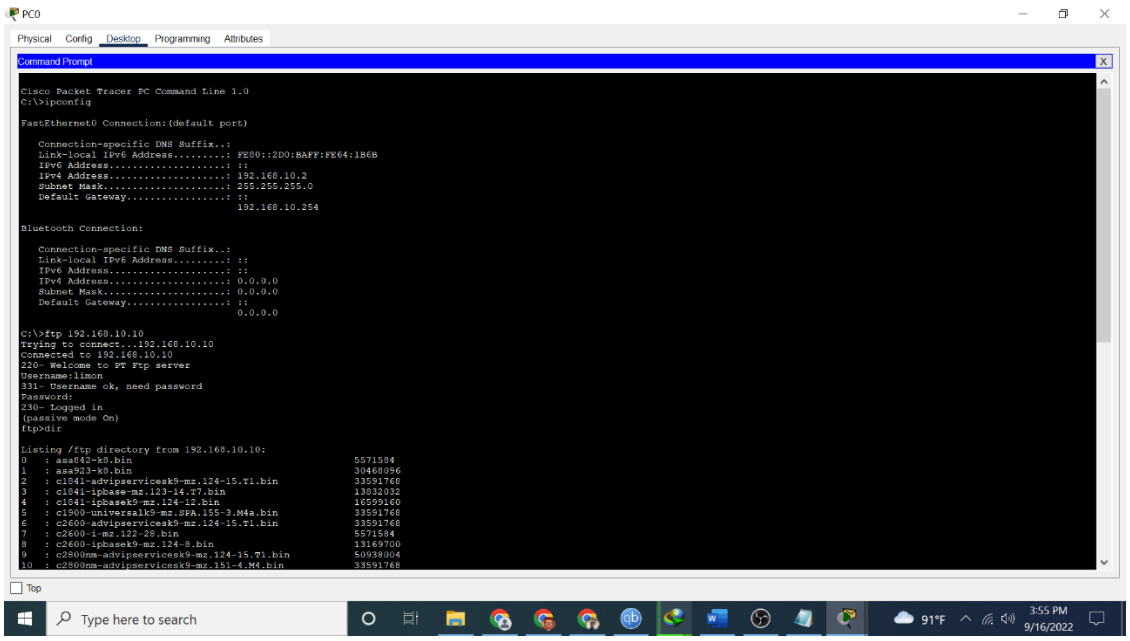


Fig: Accessing the FTP server

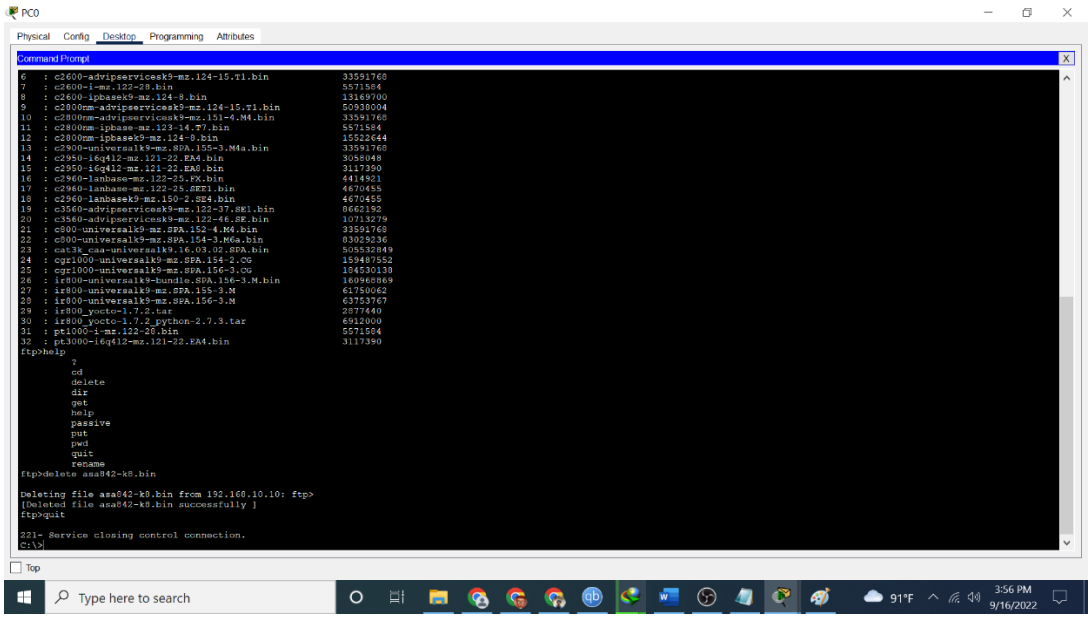


Fig: Using some commands in the FTP server

Conclusion

The simulation was successful in the end where DHCP, DNS, web server, subnet and FTP server was implemented. There were some issues such as, the simulation does not run-on CPT version 8.2.0.0162.