LAB 09: DHCP, WEB,DNS, EMAIL, FTP Server Configuration

Objective:
- To Understand the Working Principle of DHCP, WEB, DNS, EMAIL and FTP Servers

Background:

DHCP: Dynamic Host Configuration Protocol is a network management protocol that is used to dynamically assign the IP address and other information to each host on the network so that they can communicate efficiently. DHCP automates and centrally manages the assignment of IP address easing the work of network administrator. The DHCP also assigns the subnet masks, default gateway and domain name server (DNS) address and other configurations to the host and by doing so, it makes the task of network administrator easier. The DHCP client uses port 68 where as the server uses port 67 to connect to the DHCP client.
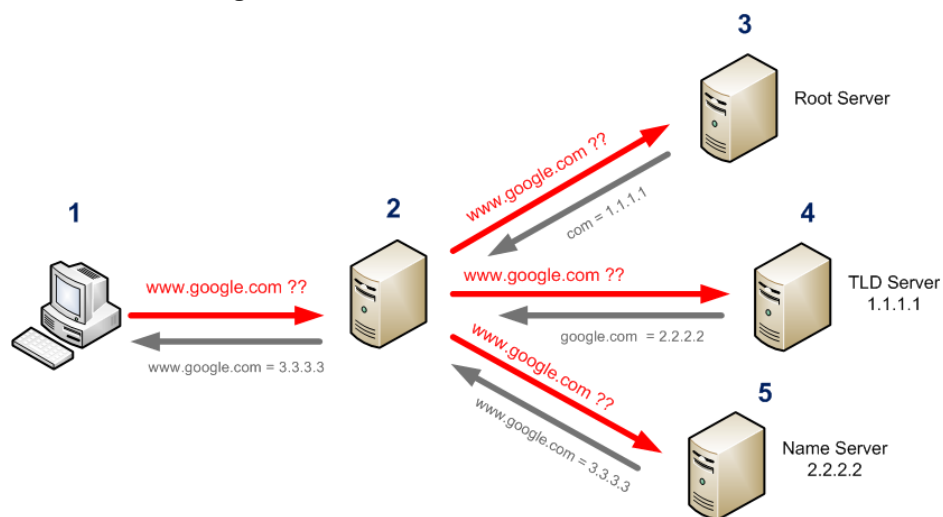

Components of DHCP
1. **DHCP Server:** It is typically a server or a router that holds the network configuration information.
2. **DHCP Client:** It is the endpoint that gets the configuration information from the server like any computer or mobile.
3. **DHCP Relay Agent:** If you have only one DHCP Server for multiple LAN's then the DHCP relay agent present in every network will forward the DHCP request to the servers. This because the DHCP packets cannot travel across the router. Hence, the relay agent is required so that DHCP servers can handle the request from all the networks.
4. **IP address pool:** It contains the list of IP address which are available for assignment to the client.
5. **Subnet Mask:** It tells the host that in which network it is currently present.
6. **Lease Time:** It is the amount of time for which the IP address is available to the client. After this time the client must renew the IP address.
7. **Gateway Address:** The gateway address lets the host know where the gateway is to connect to the internet.

Web Server: Web server generally refers to a website server, which refers to a program that resides on a certain type of computer on the Internet. It can provide documents to Web clients such as browsers, and can also place website files for the world to browse; data files can be placed for all World download. The three most popular Web servers are Apache and Microsoft's Internet Information Services (Internet Information Services, IIS). HTTP uses port 80 for connection where as HTTPS uses port 443.
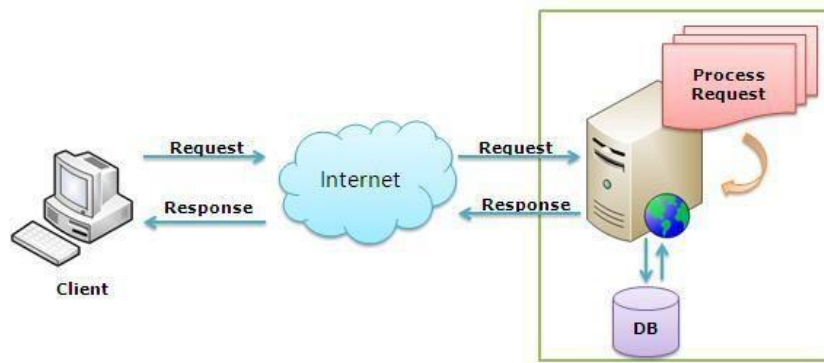
DNS: DNS is an essential part of the Internet which manages to translate all the inquiries into IP addresses and can identify different devices that are connected to the network. Apart from translating hostnames to IP addresses (A and AAAA DNS records), DNS also has many different functions like defining port in use, connecting services to domains, authentication of emails.

Components of DNS
1. **Domain Namespace**: It is a tree-like hierarchy structure that divides hostnames into smaller pieces called domains. They are further divided into more categories: top-level domains, second-level domains, and subdomains.
2. **Authoritative DNS servers**: Such a server has the main information – the zone file. It has all the DNS records, and all the changes to the records happen inside it. It has the most accurate information for a hostname.
3. **Recursive DNS servers:** Those servers will have a temporary memory where they store DNS records. They have a mechanism for synchronizing with the authoritative nameserver and updating the information. The advantage is that they can be many, located in different regions, and provide redundancy and speed.
4. **DNS Query:** Each request comes from a device that demands a DNS record. It is a question that runs from one recursive server to another in search of the answer.
5. **DNS Records:** Domain name system keeps information in so-called DNS records. They are text documents with various purposes like A Record, SPF record, CNAME record, etc.

Mail Server: A mail server (sometimes also referred to an e-mail server) is a server that handles and delivers e-mail over a network, usually over the Internet. A mail server can receive e-mails from client computers and deliver them to other mail servers.

SMTP, POP3 and IMAP4
1. **SMTP (Simple Mail Transfer Protocol)** is a protocol that is used when e-mails are delivered from clients to servers and from servers to other servers. It uses port 25, 2525 and 465.
2. **POP3 (Post Office Protocol version 3)** is used to retrieve email from the servers. It uses port 110 and 995.
3. **IMAP4 (Internet Message Access Protocol Version 4)** is a further development of the POP3 protocol and is used to read e-mail from mail servers. IMAP4 is not used as much as POP3, but many modern mail servers have support for IMAP4. It uses por 143 and 993

FTP: The File Transfer Protocol (FTP) is a standard communication protocol used for the transfer of computer files from a server to a client on a computer network.
FTP Uses:
1. TCP port 20 for data connection
2. TCP port 21 for command connection
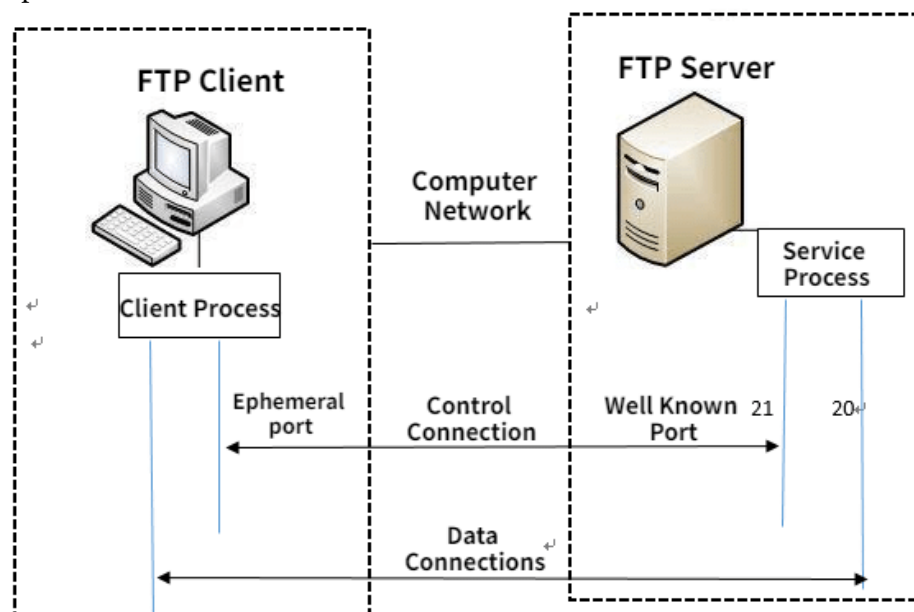
Modes
1. **Active Mode**—The client issues a PORT command to the server signaling that it will "actively" provide an IP and port number to open the Data Connection back to the client.
2. **Passive Mode**—The client issues a PASV command to indicate that it will wait "passively" for the server to supply an IP and port number, after which the client will create a Data Connection to the server.

3
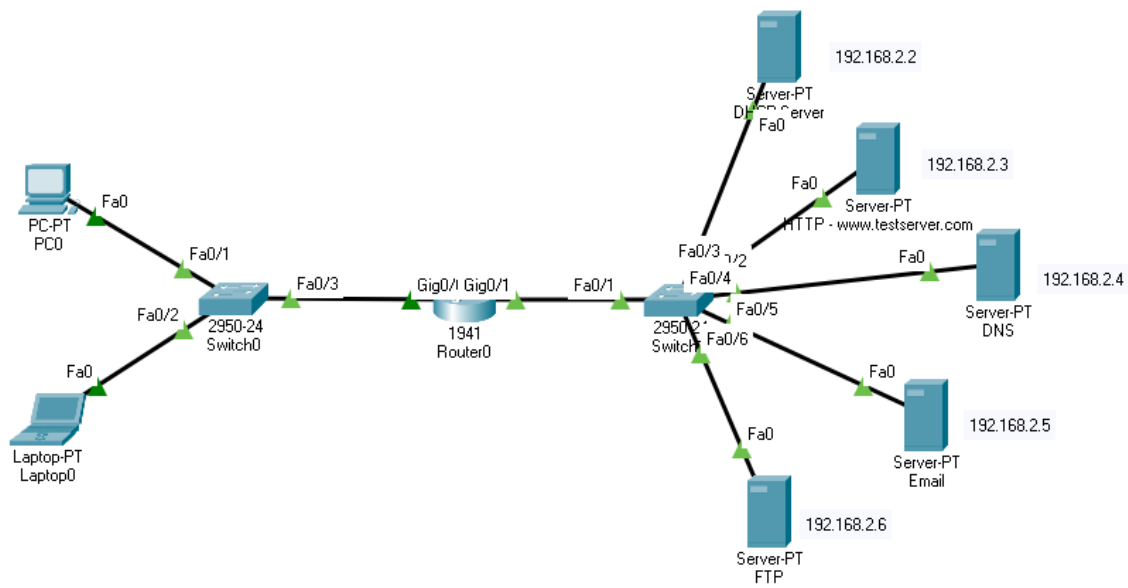
Configurations

Steps to Follow
- Make the LAN
- Connect All Cables
- Make sure to remember all ports you connect cable to

Router Interface Configuration
- Go to router and assign static ip addresses

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int g0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed
state to up
Router(config-if)#int g0/1
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed
state to up
```
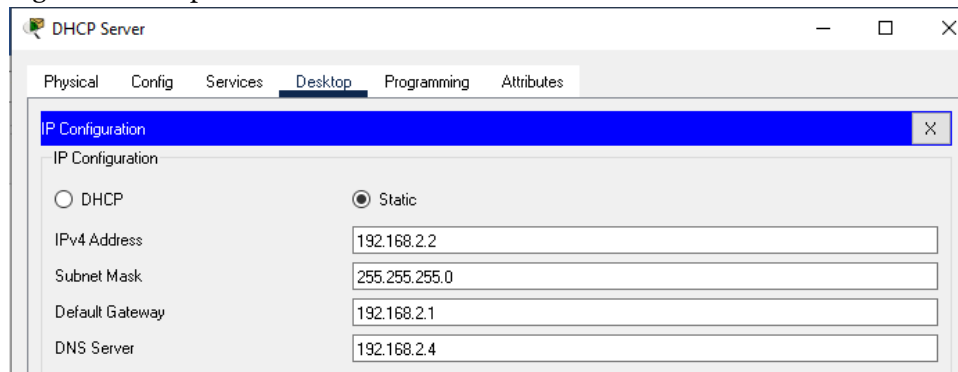
DHCP helper configuration in the Router
- Enable ip helper-address in the router for DHCP
```
Router(config-if)#int g0/0
Router(config-if)#ip helper-address 192.168.2.2
Router(config-if)#
```

DHCP Server Configuration
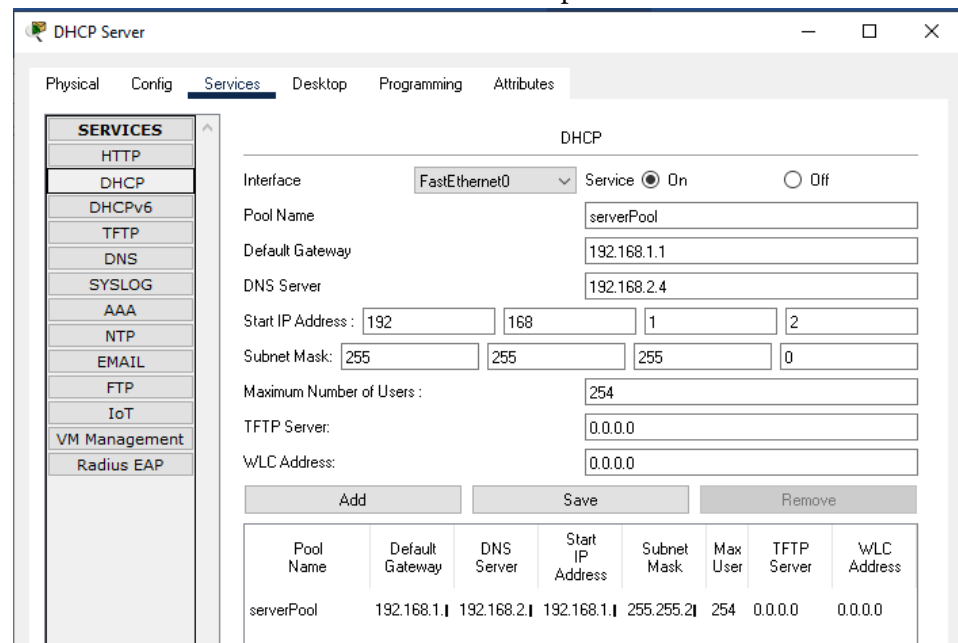
- Assign the static ip address to the server

- Turn ON the DHCP service and create the server pool as follows

Assign Dynamic IP Configuration to PCo and Laptopo

- Go to PCo>Desktop>IP Configuration then select DHCP

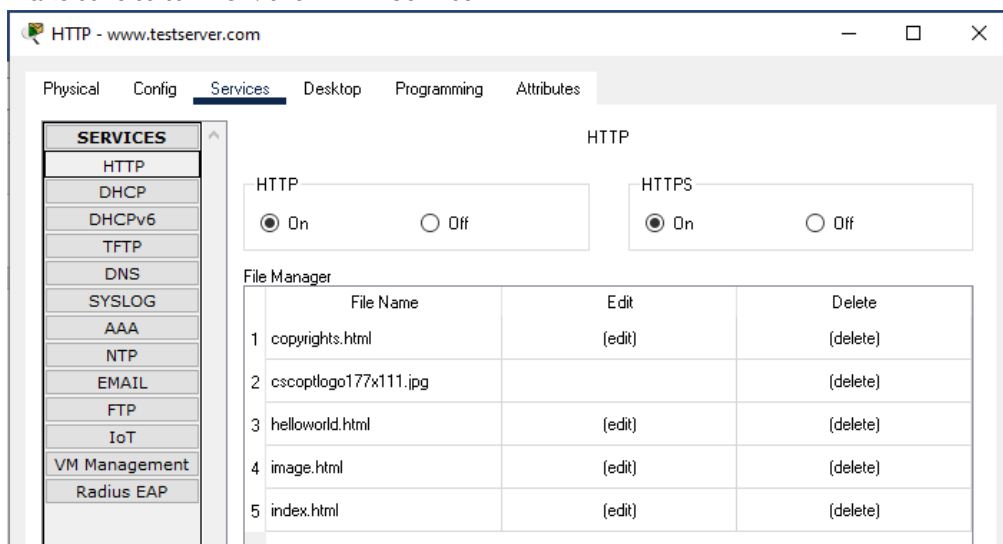- Go to Laptopo>Desktop>IP Configuration then select DHCP
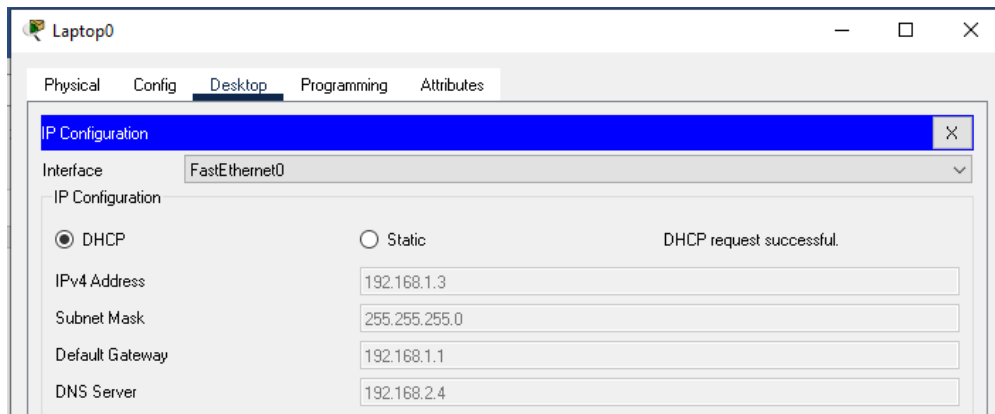
HTTP Server
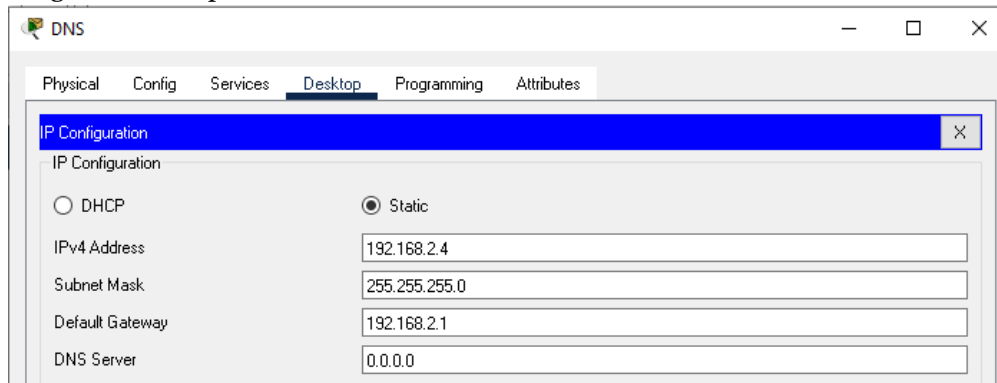- Assign static ip address to the HTTP server
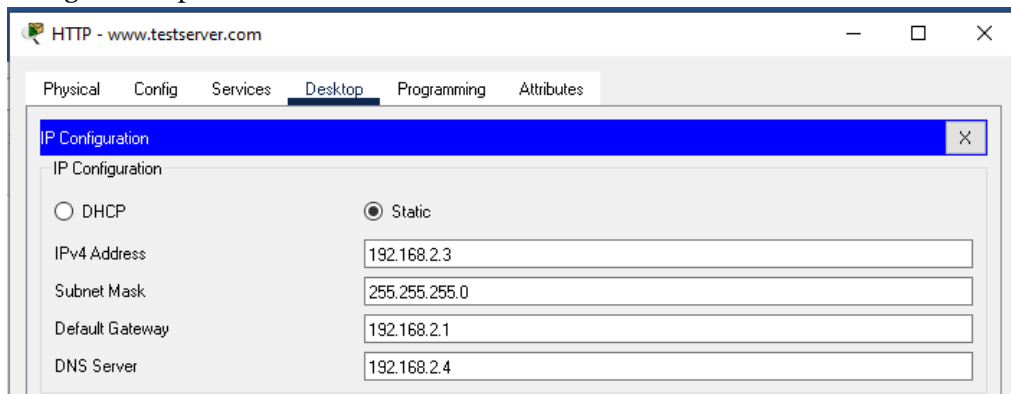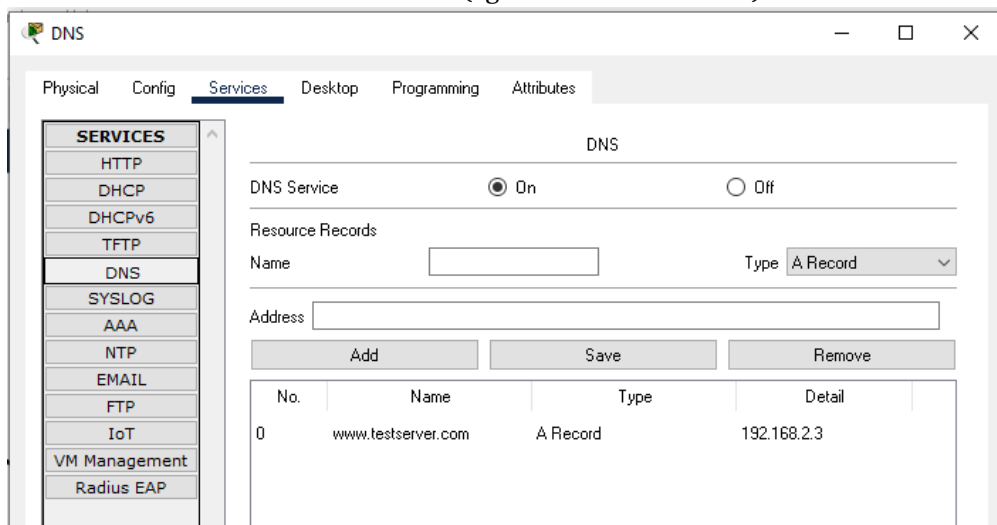

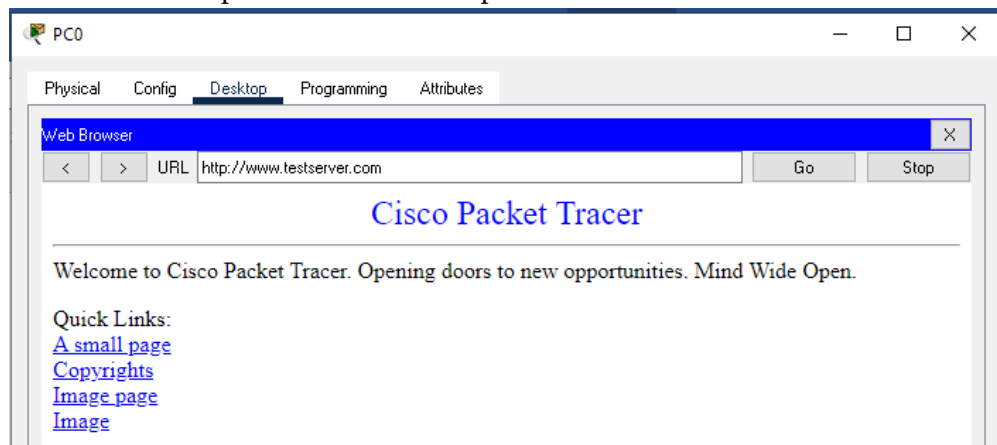- Make sure to turn ON the HTTP Service

DNS Server Configuration

- Assign the static ip address to the DNS server

- Add DNS Records of the domain name (eg. www.testserver.com)

- Go to PCo>Desktop>Web browser and open the url

EMAIL Server Configuration

- Assign the static ip address to the EMAIL server

- Turn ON the SMTP and POP3 services and create two users

- Go to PC0>Email>Configure user as follows

- Go to Laptop0>Email and create user account as follows

- Go to PC0>Desktop>Email and compose the email as follows

- Go to Laptop0>Desktop>Email and check (receive) email as follows
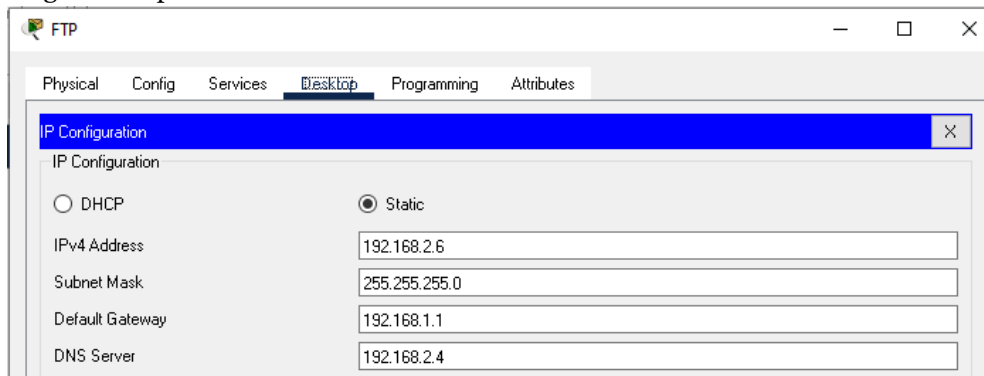
FTP Server Configuration
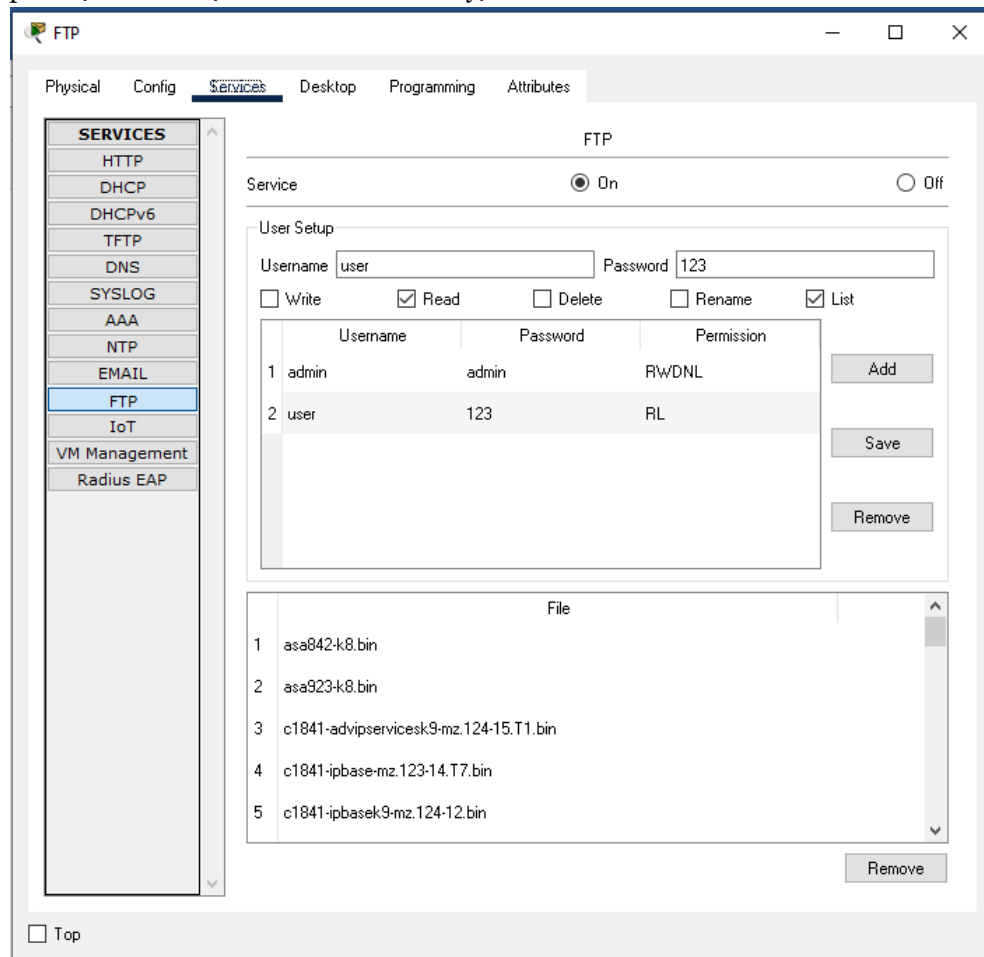
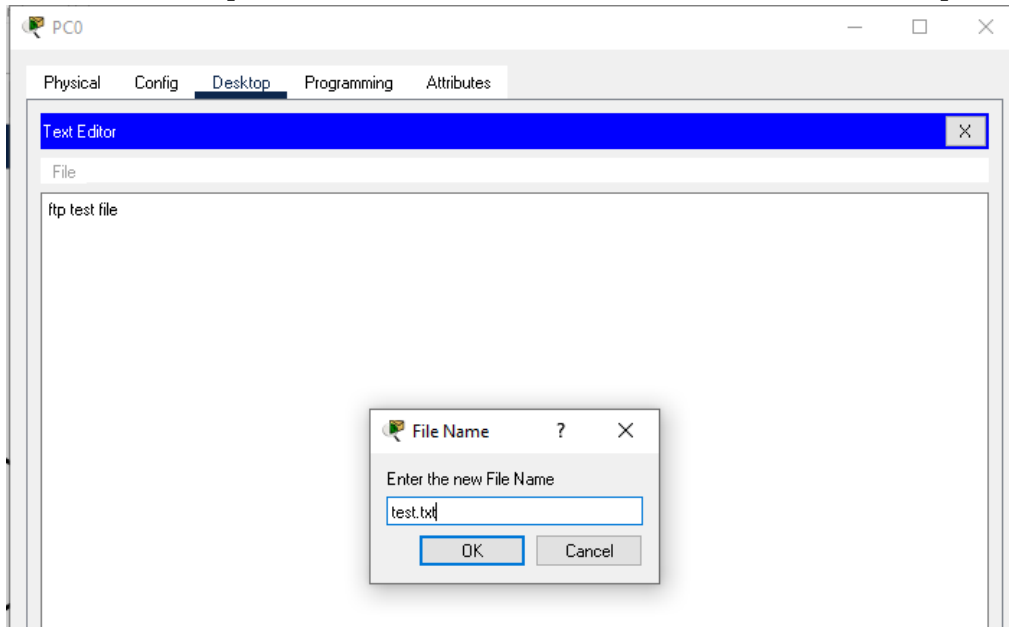- Assign static ip address to the FTP server as follows

- Enable the FTP service and create two users: admin (with write ,read, delete, rename, list options) and user (with read and list only)

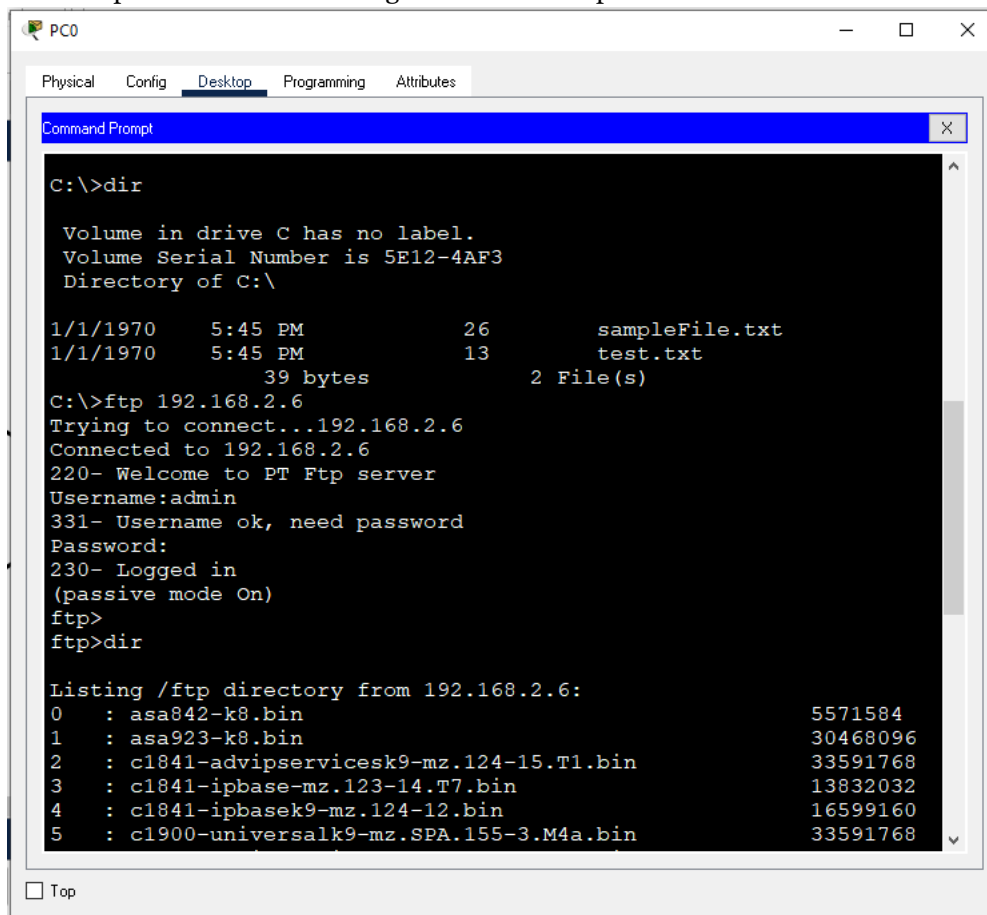- Go to PC0>Desktop>Text Editor, create a file **test.txt** and save it on the desktop

- Go to Desktop>Command Prompt and verify the created file using **dir** command then login into the ftp server as follows using admin user and password

- Use **PUT** command to upload **test.txt** into the FTP Server as follows:

```
ftp>
ftp>
ftp>
ftp>put test.txt

Writing file test.txt to 192.168.2.6:
File transfer in progress...

[Transfer complete - 13 bytes]

13 bytes copied in 0.087 secs (149 bytes/sec)
ftp> dir
```

- Verify the uploaded file using the command **dir**

```
24   : cgr1000-universalk9-mz.SPA.154-2.CG          15
25   : cgr1000-universalk9-mz.SPA.156-3.CG          18
26   : ir800-universalk9-bundle.SPA.156-3.M.bin     16
27   : ir800-universalk9-mz.SPA.155-3.M             61
28   : ir800-universalk9-mz.SPA.156-3.M             63
29   : ir800_yocto-1.7.2.tar                        28
30   : ir800_yocto-1.7.2_python-2.7.3.tar           69
31   : pt1000-i-mz.122-28.bin                       55
32   : pt3000-i6q4l2-mz.121-22.EA4.bin              31
33   : test.txt                                     13
ftp>
```

- Go to Laptop0>Desktop>Command Prompt, connect to the FTP server using user account and password and use **GET** command to download file **test.txt** into the desktop. After the transfer type **dir** command to verify it.