Department of Information Science and Engineering

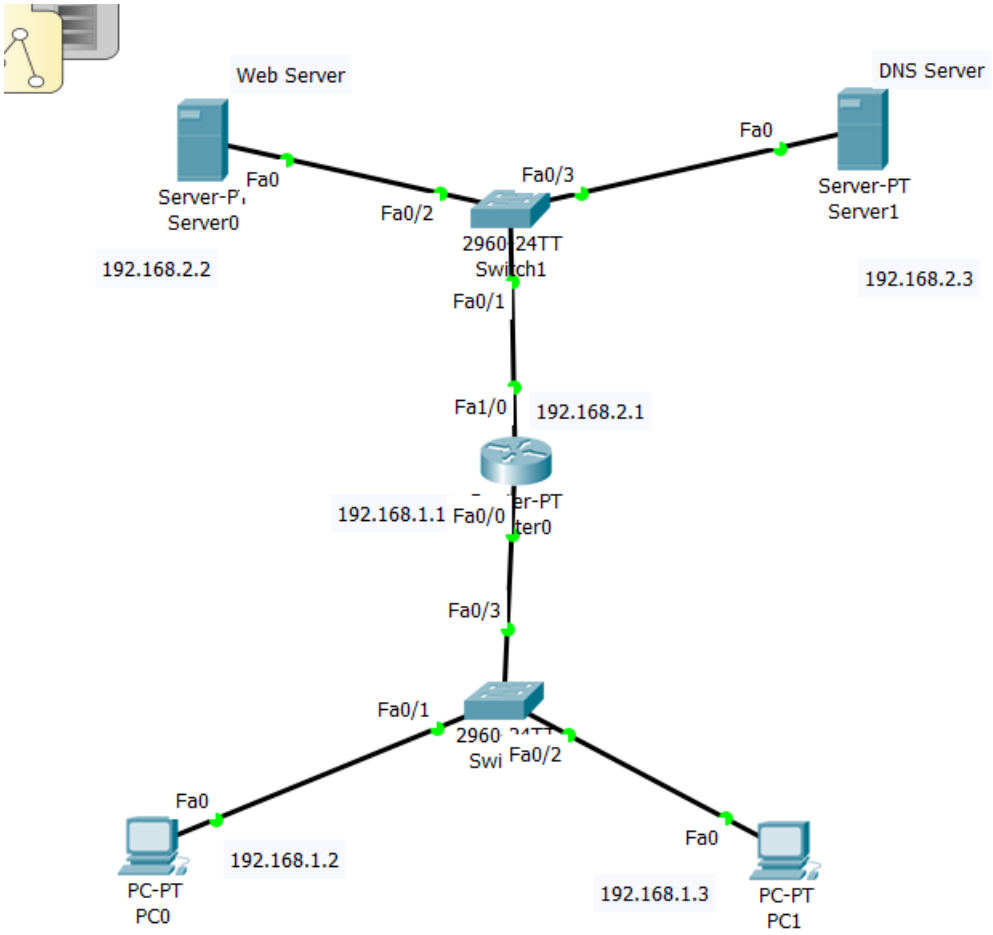
LAB PROGRAMS FOR COMPUTER NETWORKS-1

DNS server configuration in Packet Tracer

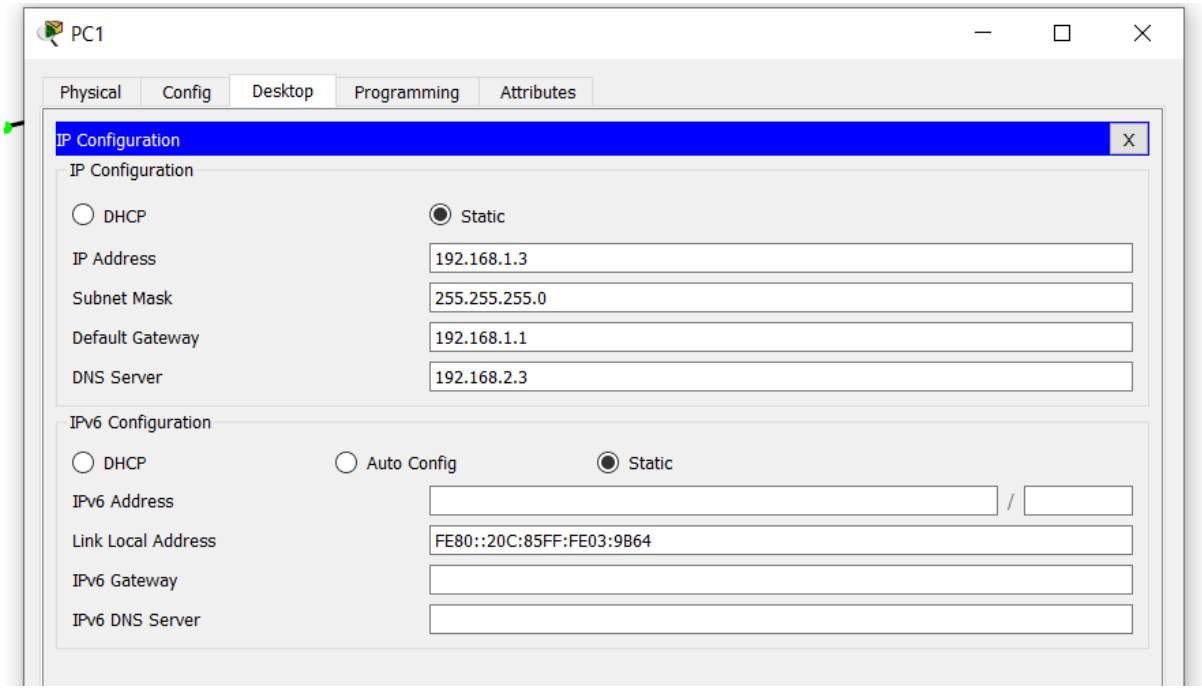
A Domain Name Service(**DNS**) server resolves host names into IP addresses. Although we can access a network host using its IP address, DNS makes it easier by allowing us use domain names which are easier to remember. For example its much easier to access google website by typing http://www.google.com as compared to typing http://208.117.229.214. In either case, you'll access google website, but using domain name is obviously easier.

Now, before any host can use a DNS service, we must configure a DNS server first. For example, when you type the URL http://www.google.com in your browser, the host will query the DNS server for the IP address of http://www.google.com. The DNS server will resolve http://www.google.com into an IP address then answer back the host with the IP address.

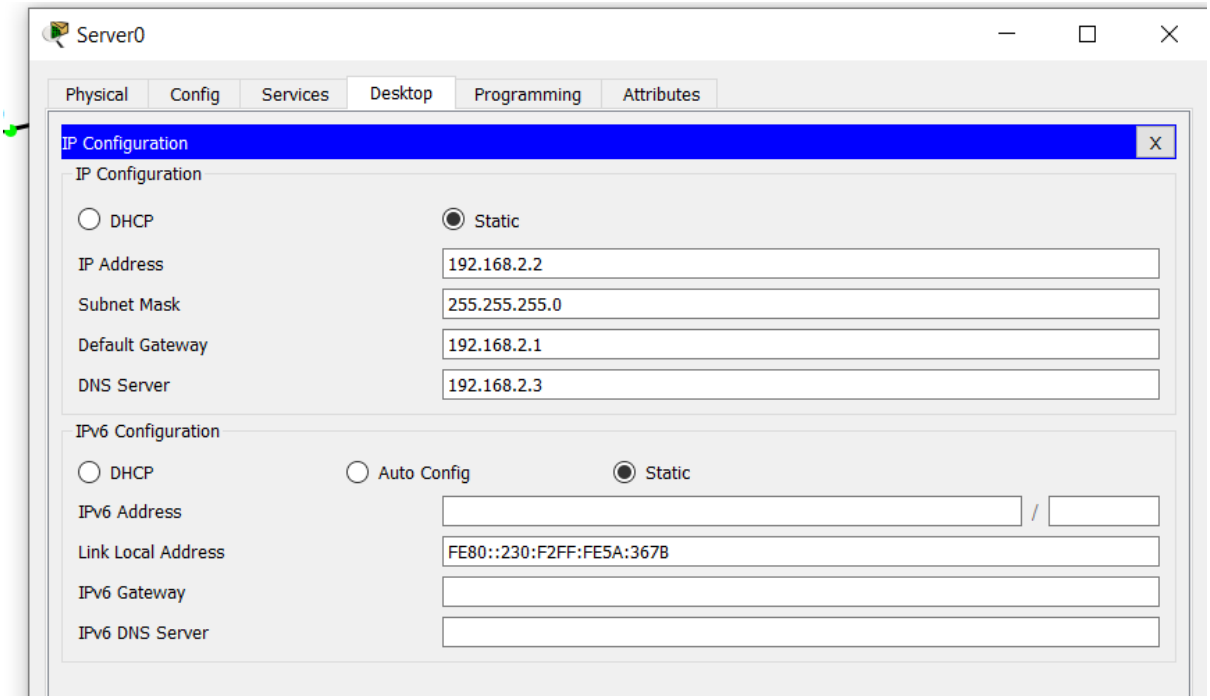
An HTTP server is a web server. It stores web resources that can be accessed by a web client. Your PC's browser(a web client) requests for web resources from a web server over the internet.Web resources are files such as text and images that the server will give to the client on request.

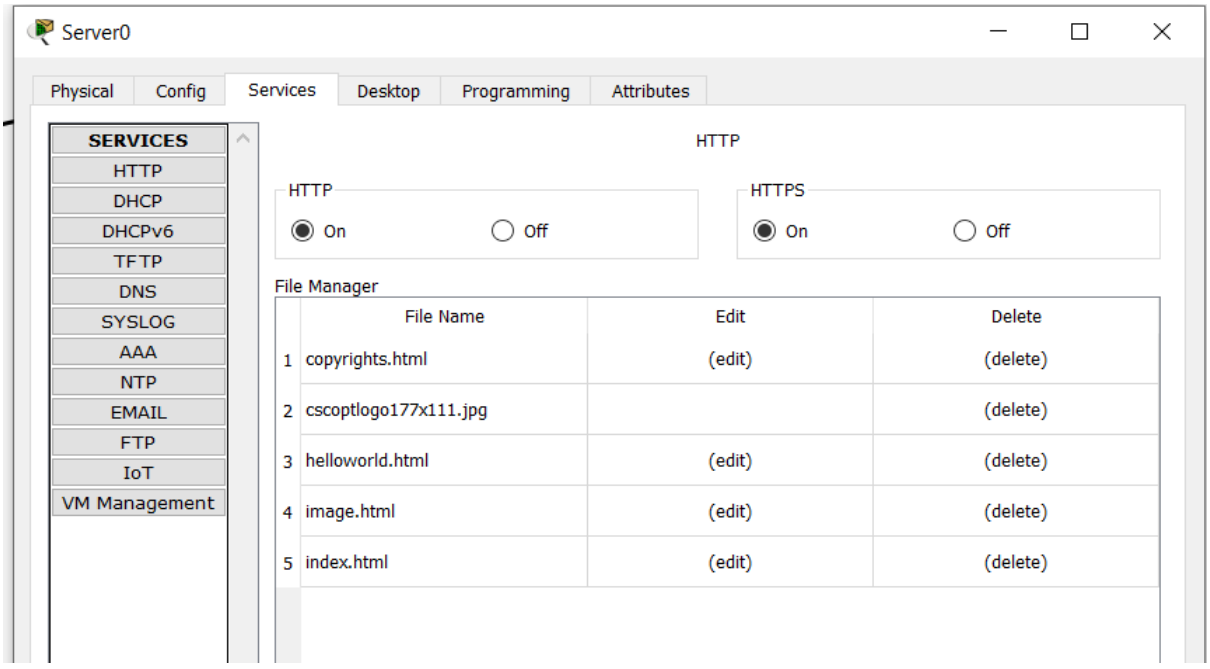


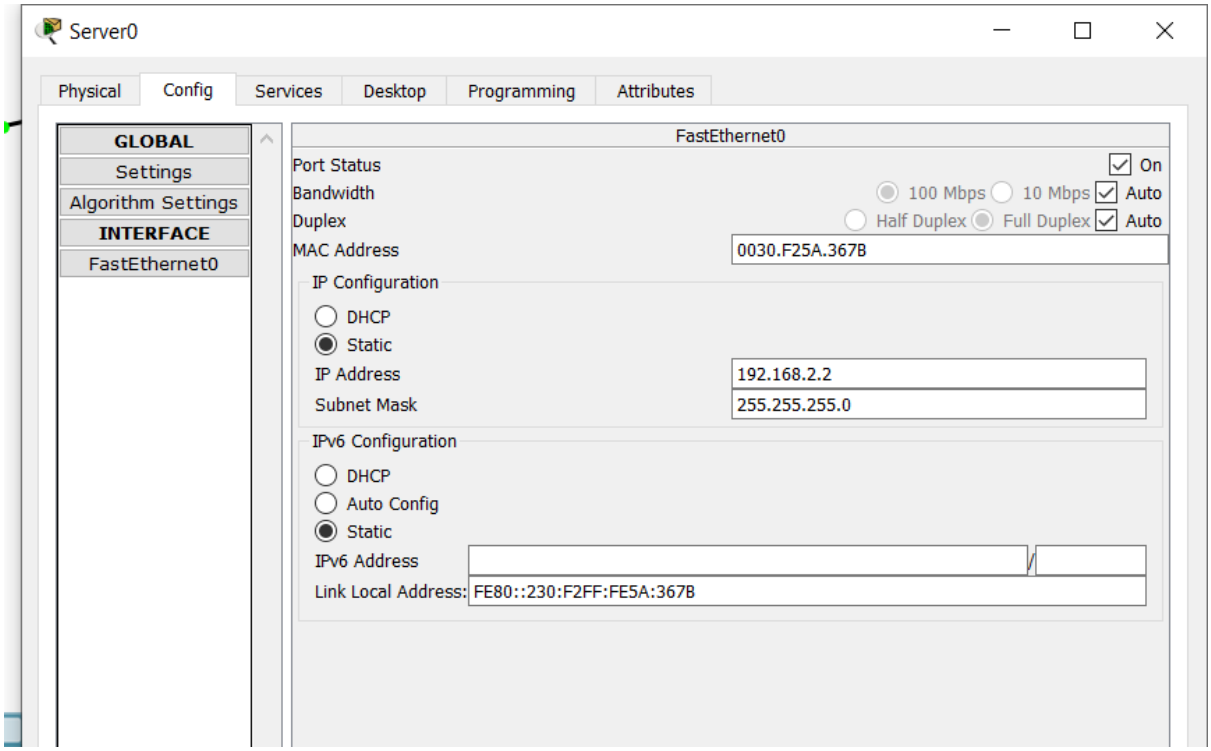
Configuration of PC



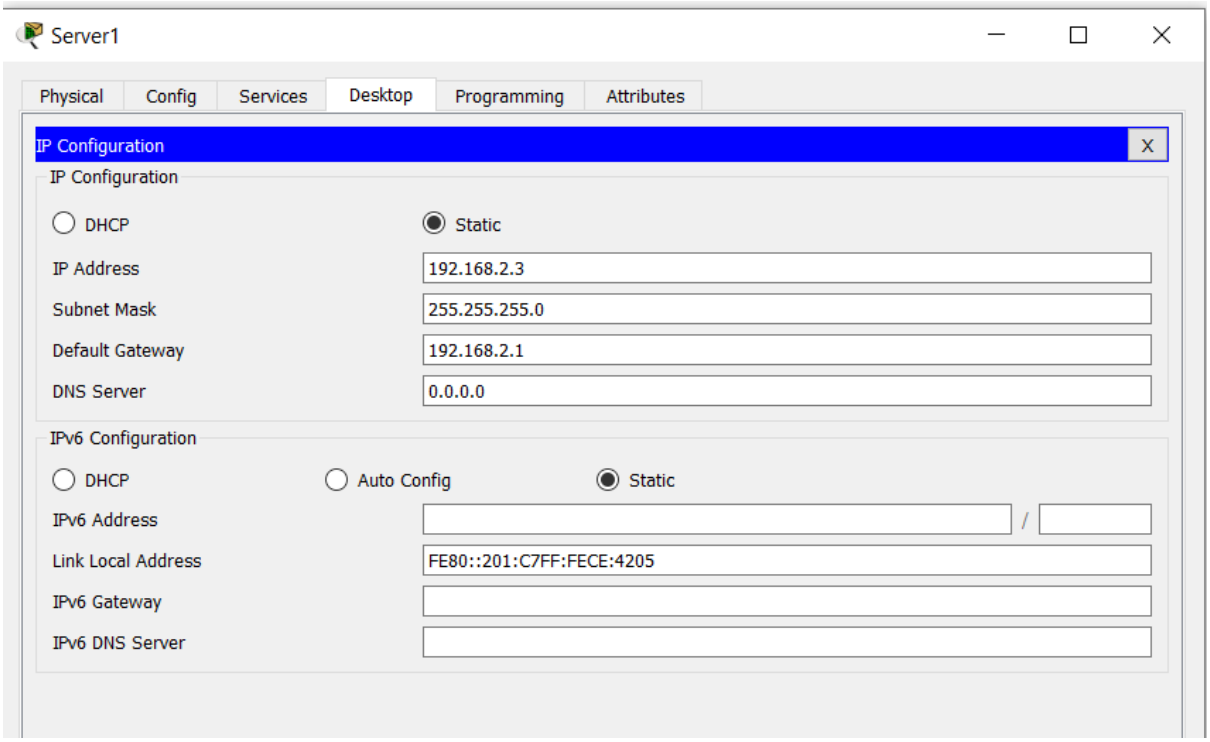
Configuration of Web Server

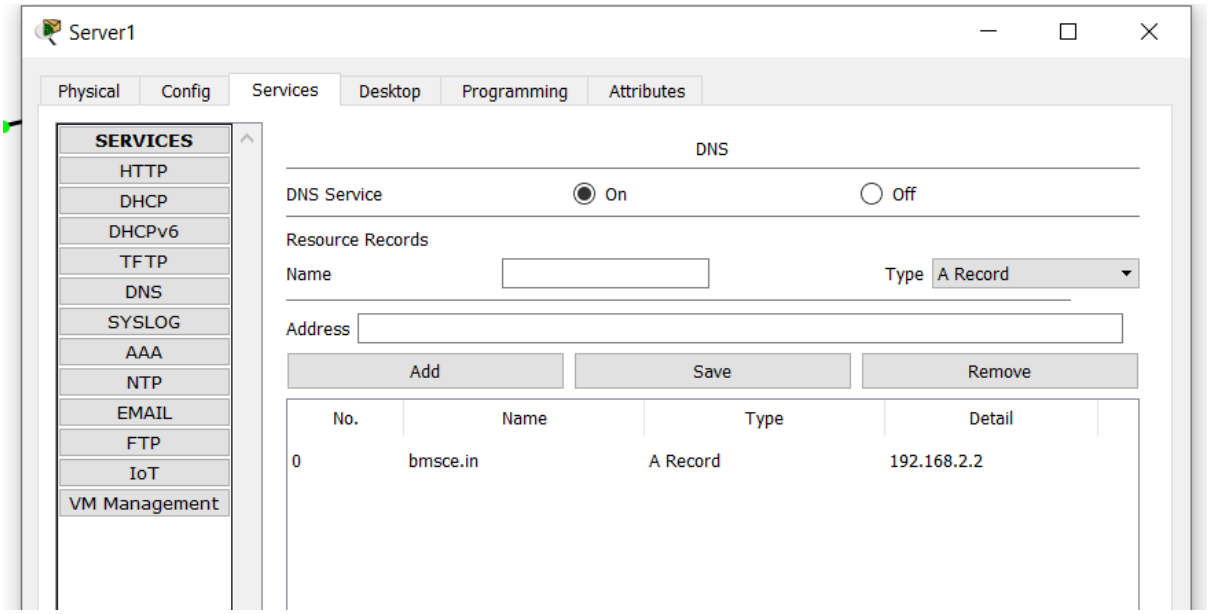

Server0
Physical
Config
Services
Desktop
Programming
Attributes
IP Configuration
X
IP Configuration
DHCP
Static
IP Address
192.168.2.2
Subnet Mask
255.255.255.0
Default Gateway
192.168.2.1
DNS Server
192.168.2.3
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::230:F2FF:FE5A:367B
IPv6 Gateway
IPv6 DNS Server


Server0
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
HTTP
HTTP
On
Off
HTTPS
On
Off
File Manager
File Name
Edit
Delete
1 copyrights.html (edit) (delete)
2 cscoptlogo177x111.jpg (delete)
3 helloworld.html (edit) (delete)
4 image.html (edit) (delete)
5 index.html (edit) (delete)


Server0
Physical
Config
Services
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
FastEthernet0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0030.F25A.367B
IP Configuration
DHCP
Static
IP Address
192.168.2.2
Subnet Mask
255.255.255.0
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address:
FE80::230:F2FF:FE5A:367B

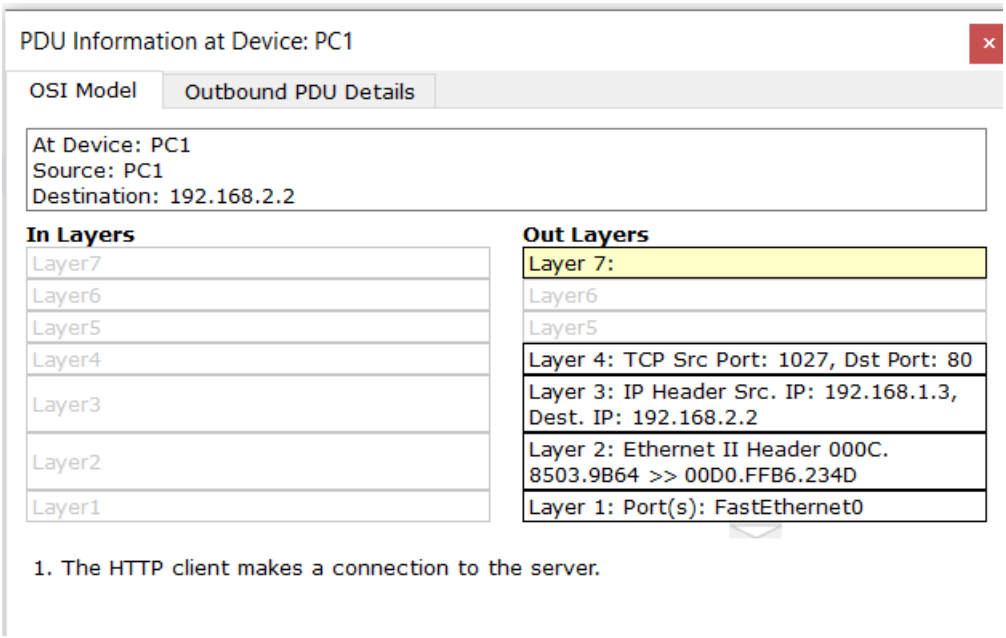
Configuration of DNS Server



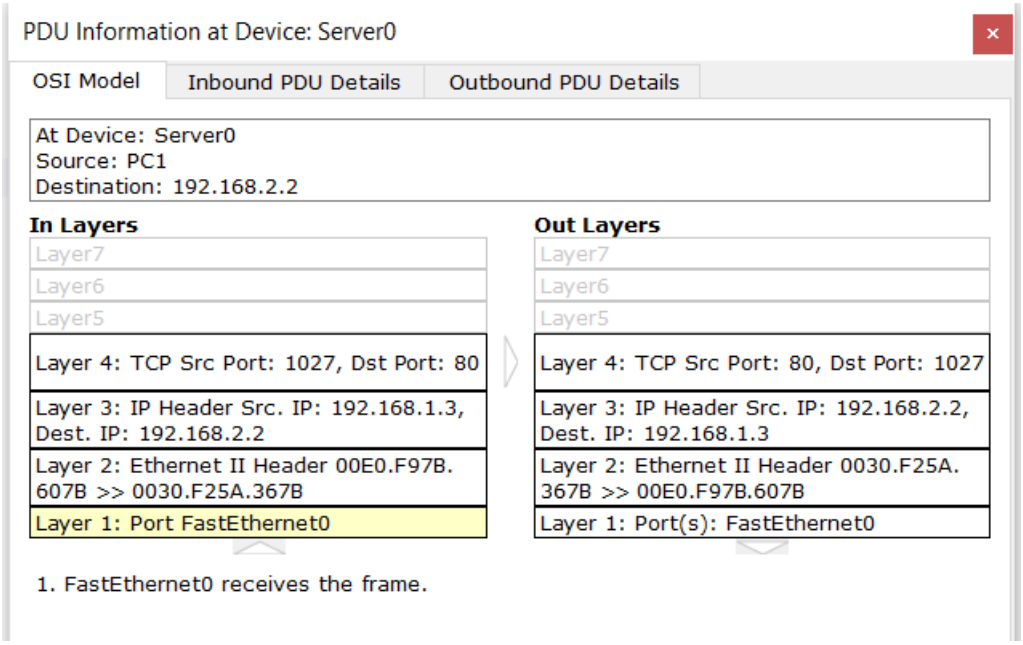


Demo of TCP and HTTP using Cisco packet tracer

1.Use Simulation Mode Select the PC with IP Address 192.168.1.3 . Click on the webBrowser and type 192.168.2.2 . Show the Demo of TCP by right clicking on the Envelop. Note down the values at every Layer.

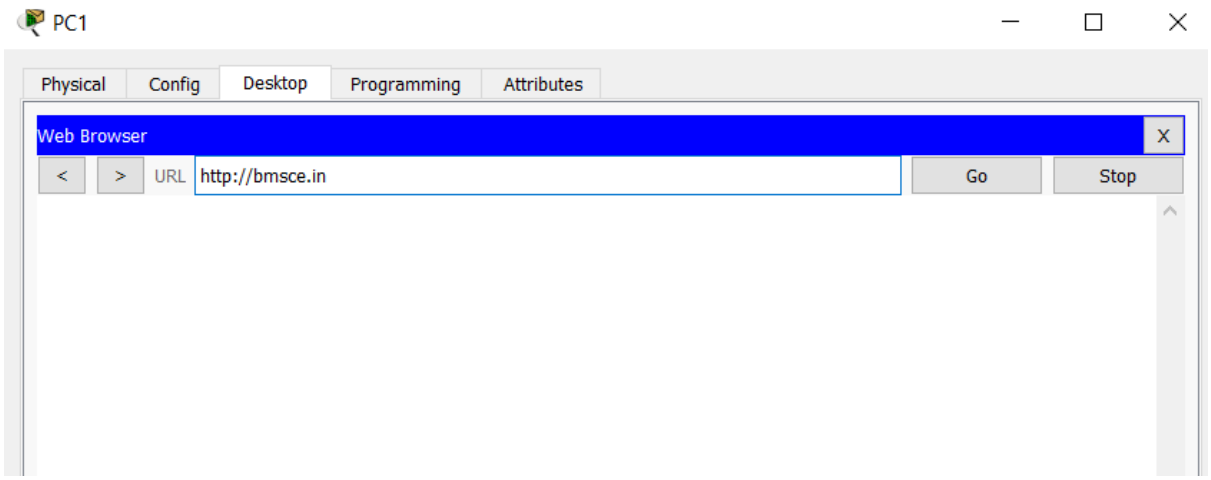


PDU information at Web server

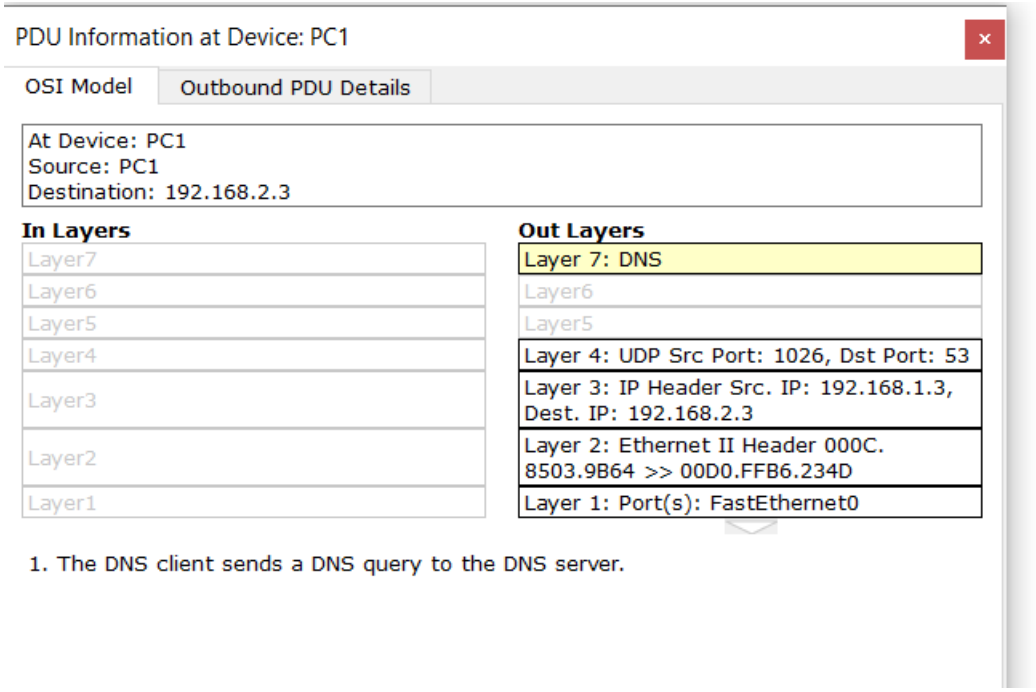


Demo of UDP with DNS

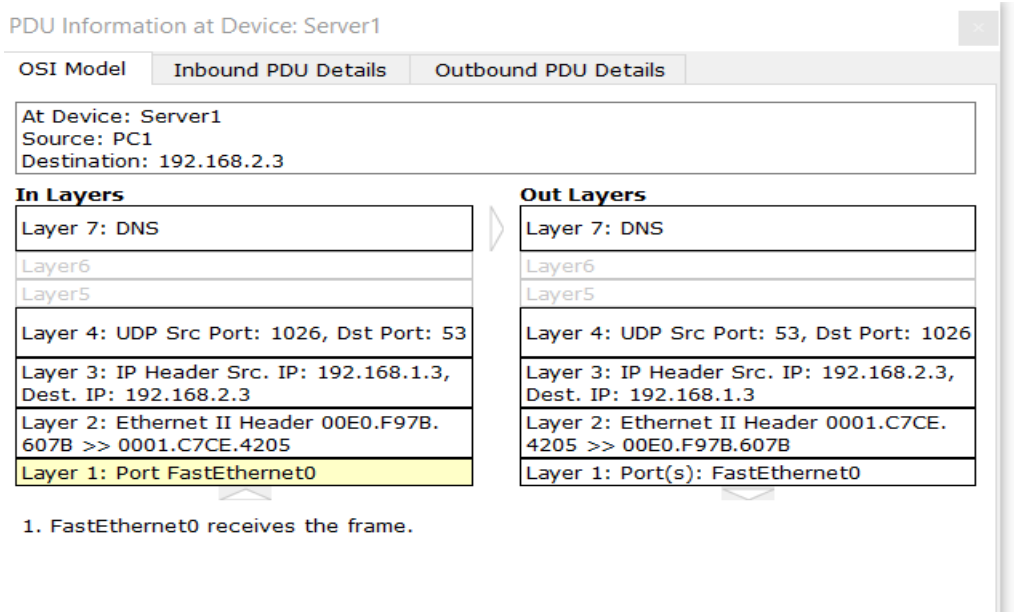
1. At the same PC in Simulation mode select web Browser and type bmsce.in



2. Show the demo of UDP with DNS



3. At the DNS Server



Note down the output at each level with neat explanation.

Network Address Translation

Design a network that provides a pool of private IP addresses at each LANs. The LAN s in turn connected to a WAN Gate way Router with a pubic IP address provided by ISP.

For a computer to communicate with the Internet as a whole, it must have an IP address. Using the IPv4 system, these are unique, 32-bit numbers that are broken up into four different binary octets. It doesn't matter whether it's a server, or a computer, or an Xbox. If it doesn't have an IP address, it's not getting online.

But, there simply isn't enough IP addresses to go around to give each host their own address. So, in order to make better use of the extremely limited address space available, we use Network Address Translation.

Network Address Translation allows a single device to sit between a local area network and the Internet, and forward traffic to the appropriate host. You probably know this as your router. The advantage of this is multiple computers can share the same IP public address.

This single device (usually **a router**, switch, or hardware firewall) modifies IP packet headers on the fly, ensuring that the contents of the packet get to the intended destination. However, it comes with a downside, as it becomes exponentially harder for hosts outside the local network to communicate with servers that are located behind the router.

There are multiple ways in which Network Address Translation can work, with the three of the most common being Dynamic NAT, Static NAT, and Overloading.

1) Dynamic NAT

With Dynamic NAT, a router will maintain a list of public IP addresses. When a host behind the network needs to transmit or receive, the router will select one of the public IP addresses that is not currently in use, and forward any packets accordingly. As a result, this means a host's IP address can change at any given moment.

But crucially, it means a large pool of hosts can share a significantly smaller pool of IP addresses. This was vital, given the impending exhaustion of the available pool of IPv4 addresses.

2) Overloading (PAT)

A common way of performing network address translation is through something called 'Overloading', where multiple internal IP addresses are mapped to a single public IP address. This is done by giving each internal host a corresponding port. For instance, suppose you've got three computers on an internal network, and a public IP address of 212.18.123.123. Each of those internal computers could theoretically be accessible via 212.18.123.123:2001, 212.18.123.123:2002 and 212.18.123.123:2003.

This is commonly known as Port Address Translation (PAT), Single-Address NAT, and port-level multiplexed NAT.

3) Static NAT

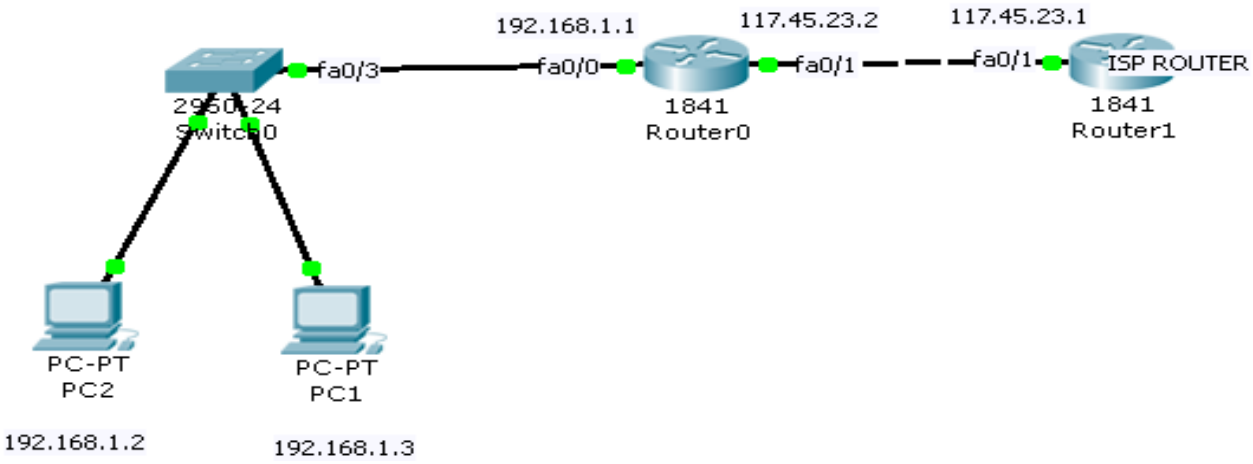
Finally, let's talk about Static NAT.

Internal networks, like your home or office network, do not use the same IP addressing system that's used on the public Internet. Any networked device effectively has two IP addresses. The first is a private one, and that's only reachable from within that network. The second is the one that's externally accessible.

Static NAT makes it possible to create a direct, one-to-one link between a private IP address and a **static, public IP address**.

Dynamic Network Address Translation

Step 1: Draw the topology as shown below



Configure the devices with the IP address as shown in above figure.

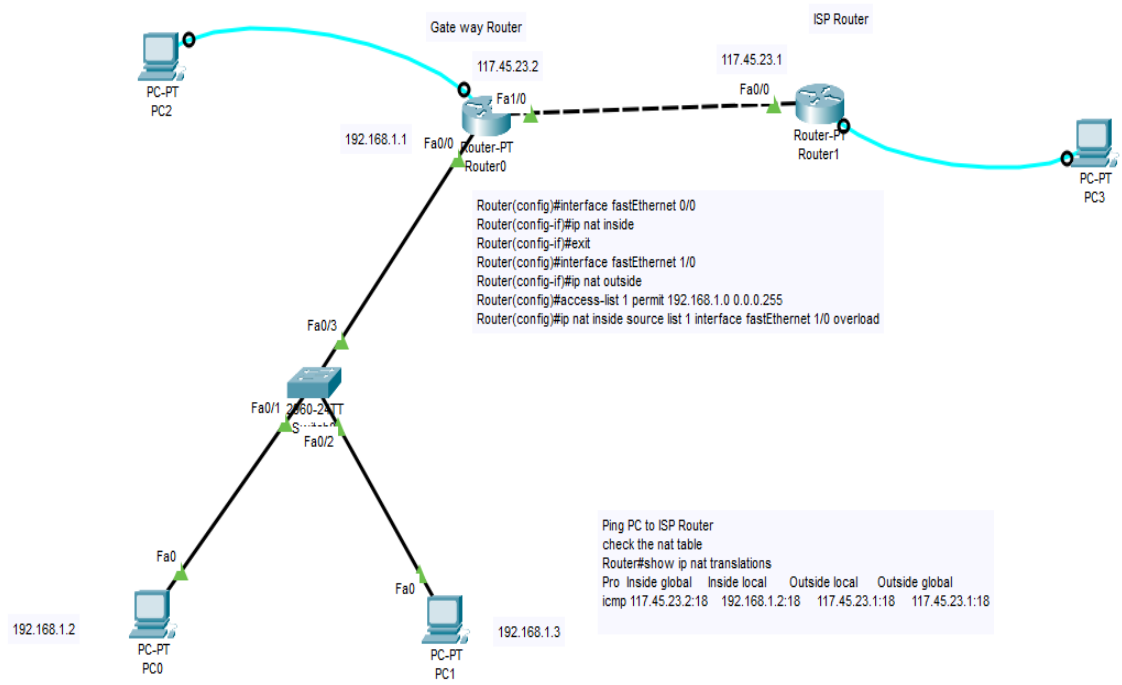
Step 2: Configure the router 0 as below

- Click on the router 0
- Select CLI
- Execute the following commands

```
Router>enable
Router#configure terminal
Router(config)#interface fastethernet 0/0
Router(config)#ip nat inside
Router(config)#interface fastethernet 0/1
Router(config)#ip nat outside
Router(config)# access-list 1 permit 192.168.1.0 0.0.0.255
Router(config)#ip nat pool public-ips 117.45.23.2 117.45.23.5 netmask 255.255.255.0
Router(config)#ip nat inside source list 1 pool public-ips overload
```

Step 3: Ping from PC2 to Router 1 and check the NAT table

To see NAT table select inspect tool at right side and click on router 0 then select NAT table.

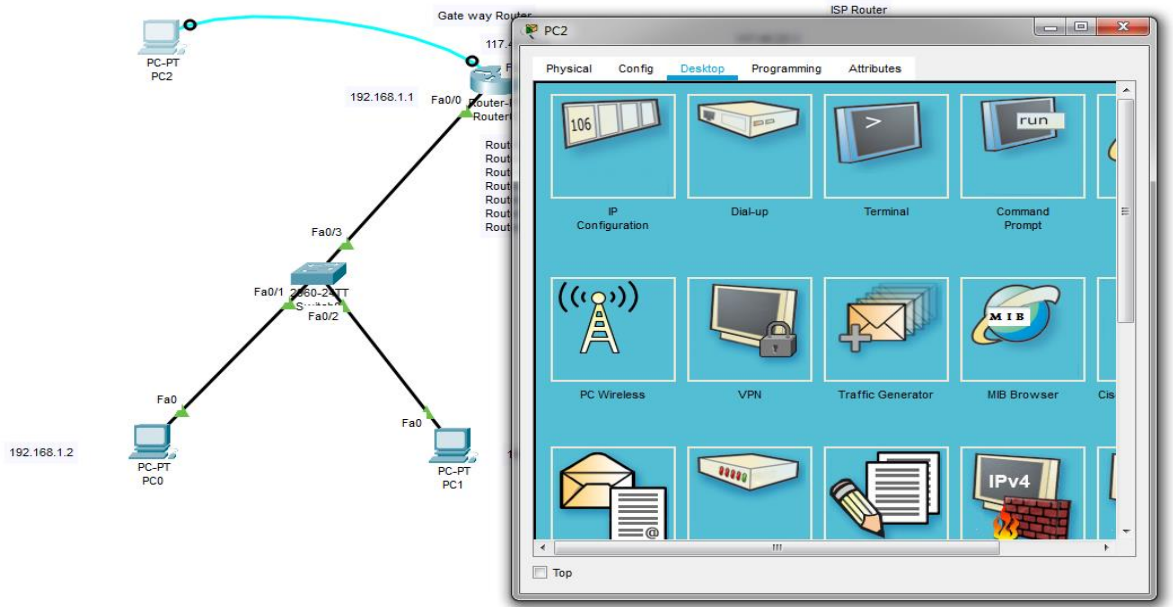


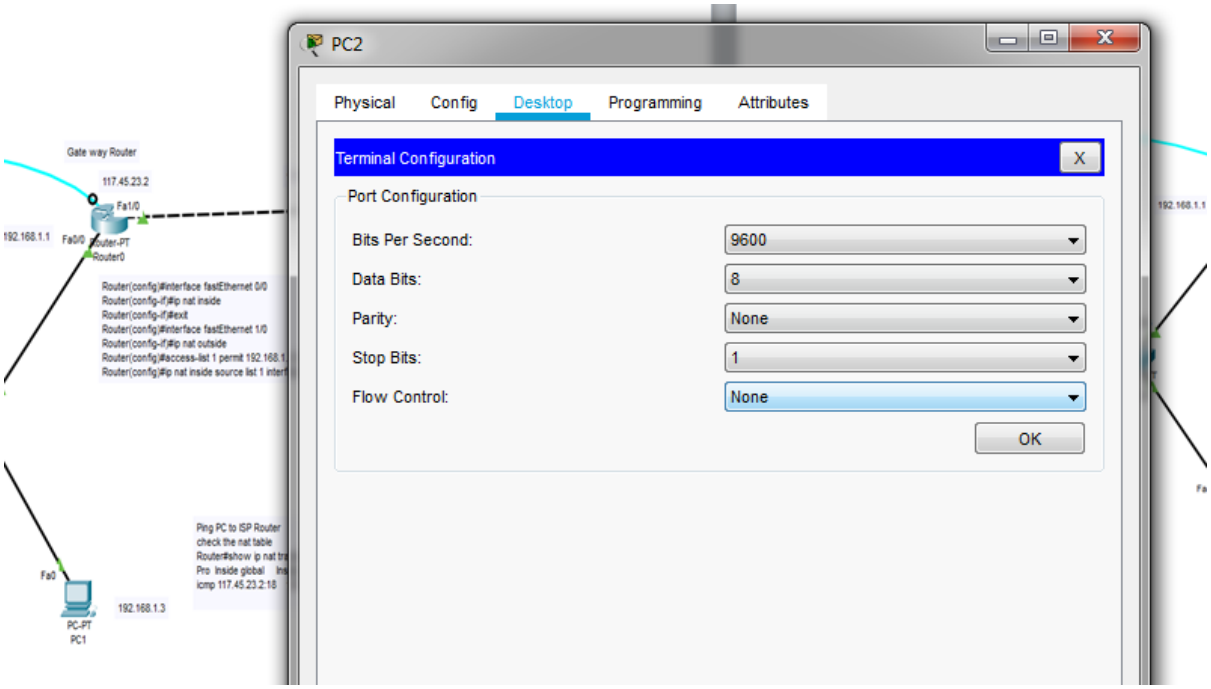
Step 1: Design the network as shown in the figure.

Step 2: To configure the routers use the Console.

Procedure to Configure the Router Using Console

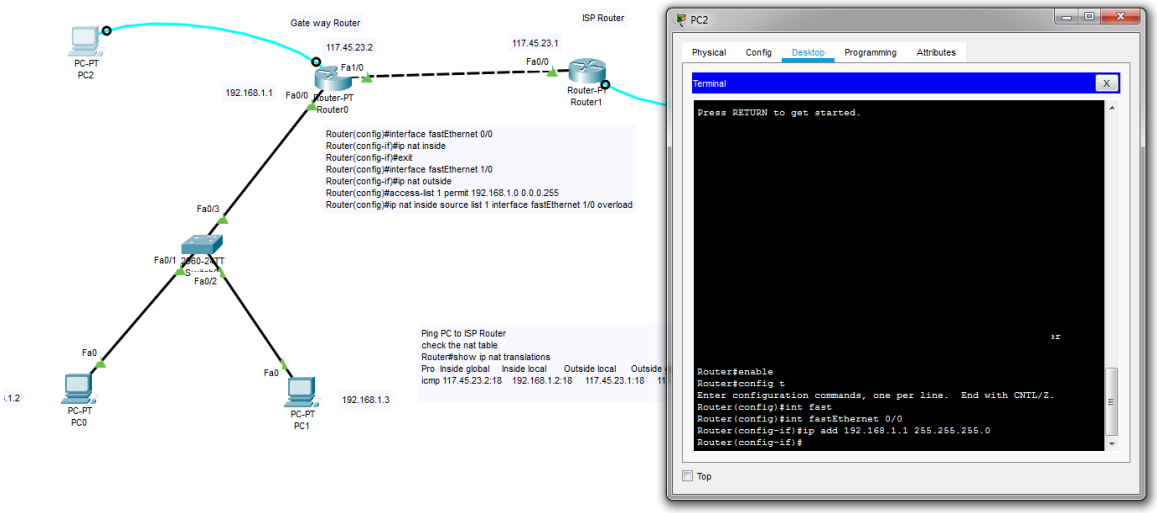
1. Connect PC and Router using Console Cable.
2. PC using RS232C and Router to Console Port.
3. Click on PC
4. Select Terminal. Click OK. Now the PC will be used to configure the Router.





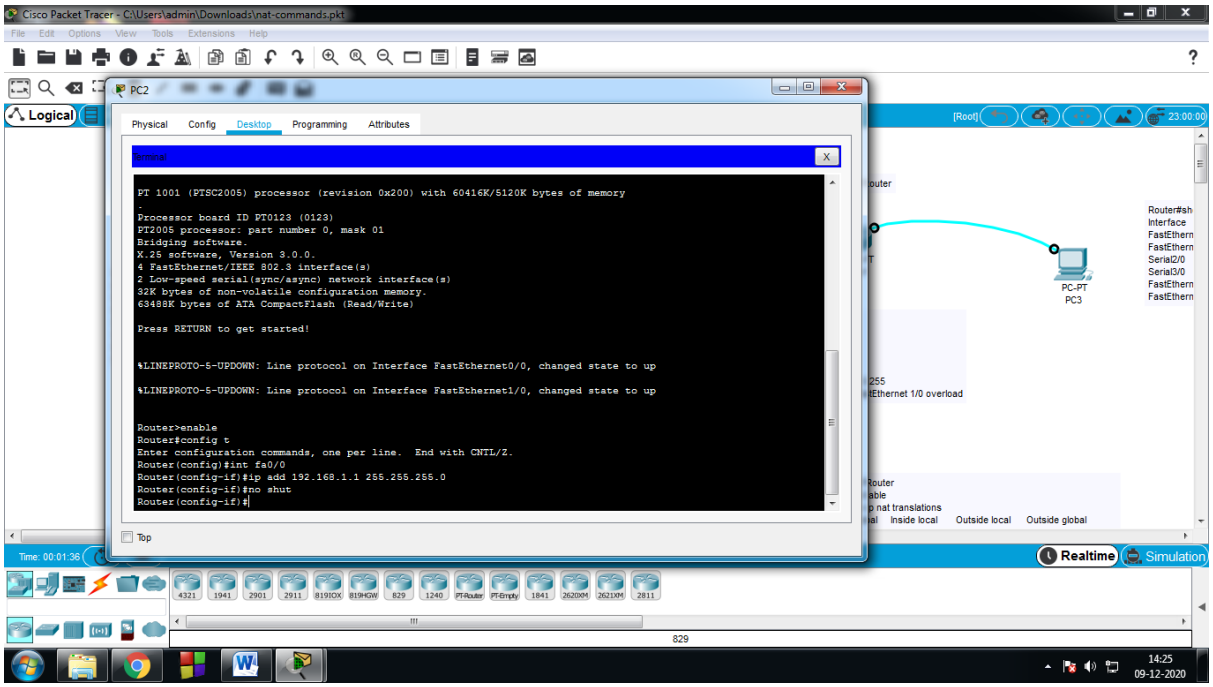
Step 3: configure two ports fast0/0 and fast1/0

Step 4: Configure Default Gateway of Router – Gateway Router

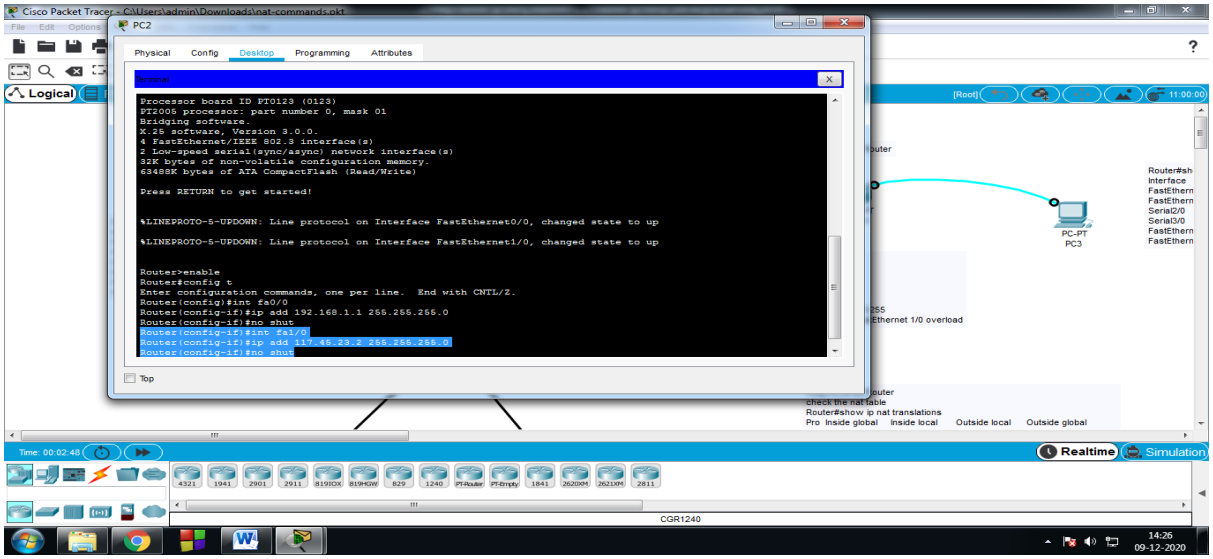


Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#int fa0/0
Router(config-if)#ip add 192.168.1.1 255.255.255.0
Router(config-if)#no shut

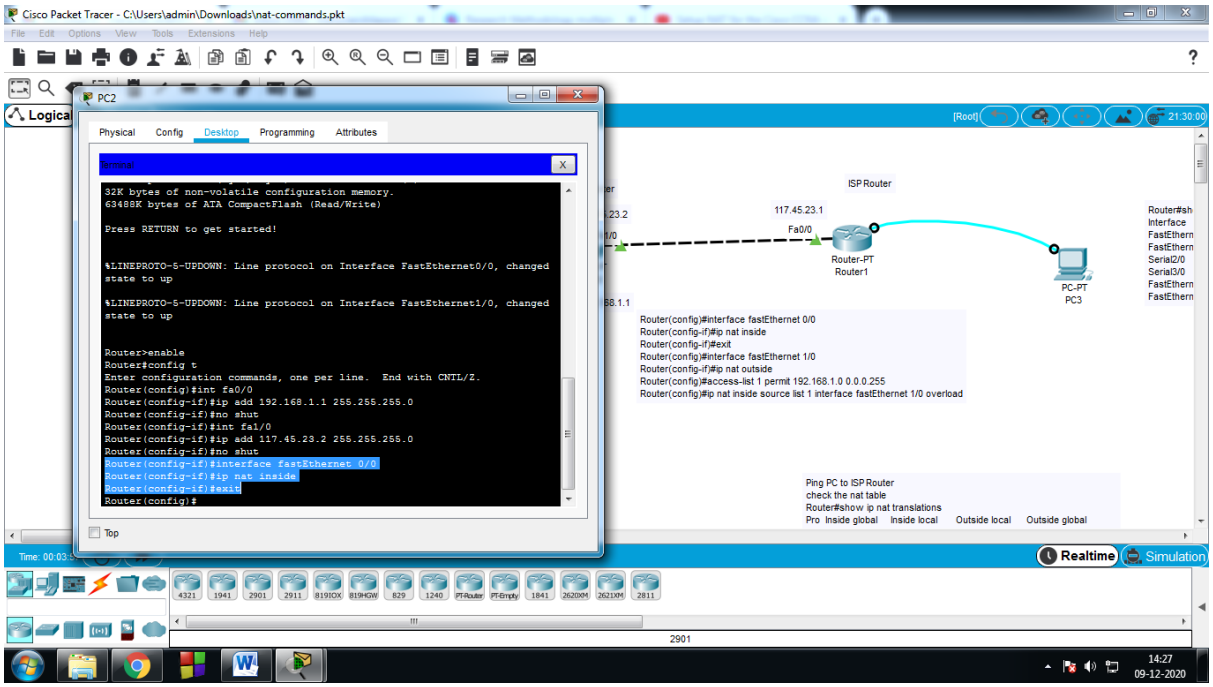


Router#enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa1/0
Router(config-if)#ip add 117.45.23.2 255.255.255.0
Router(config-if)#no shut

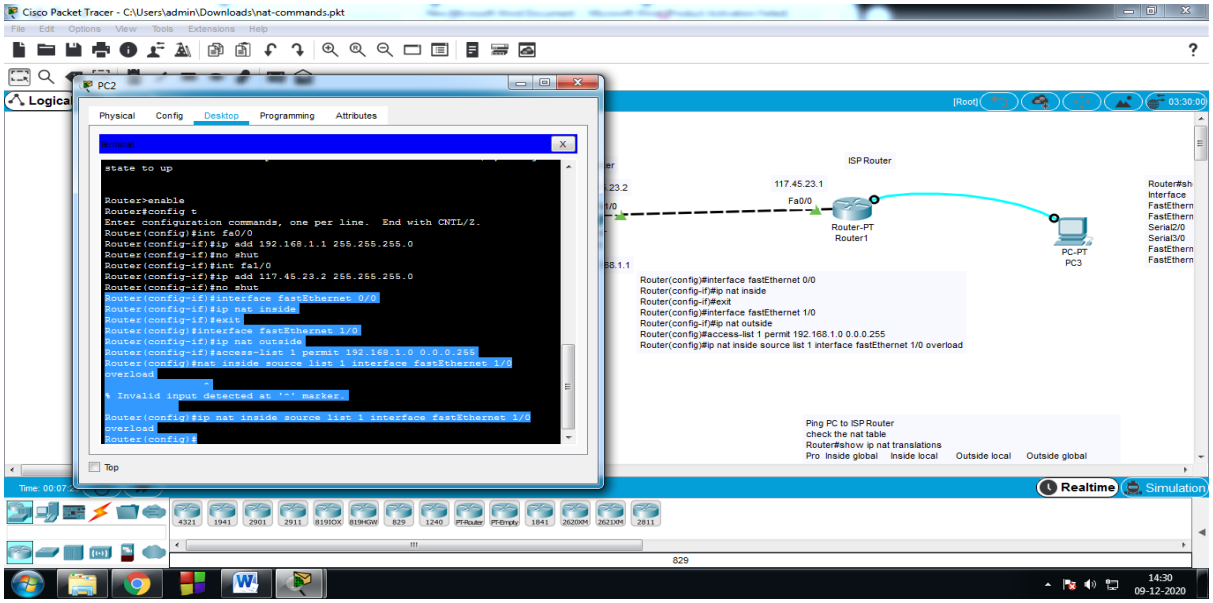


Step 5: configure NATing at Gate way Router

Router(config-if)#interface fastEthernet 0/0
Router(config-if)#ip nat inside
Router(config-if)#exit

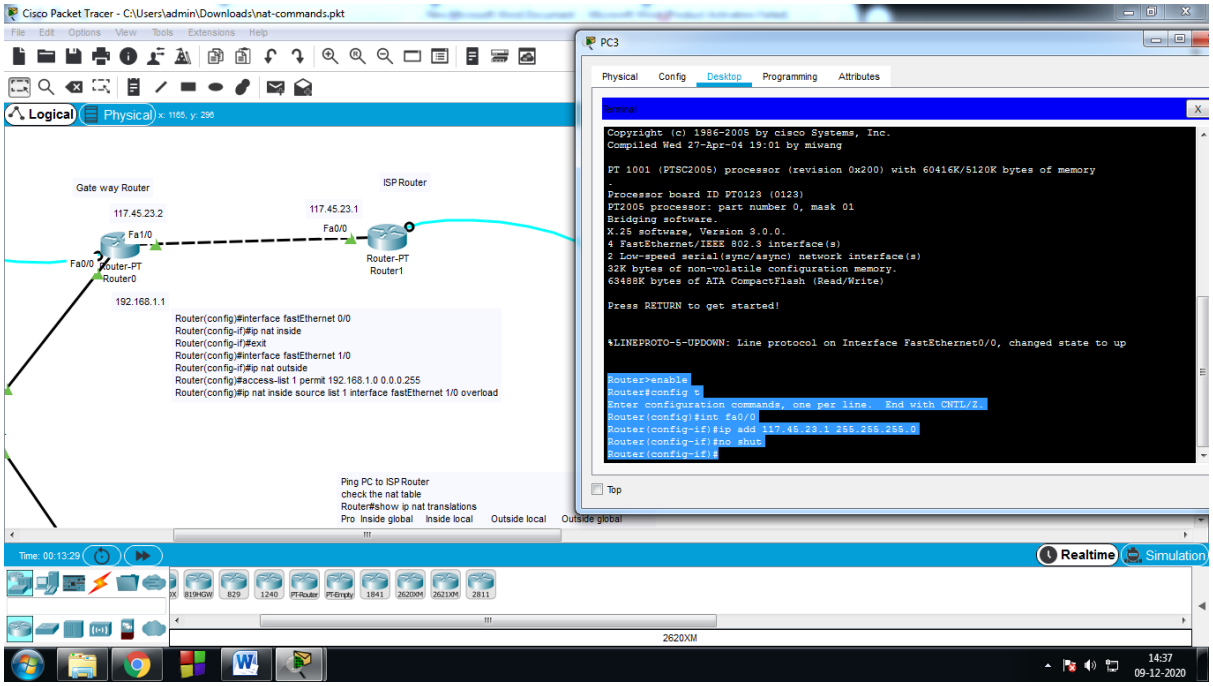


Router(config-if)#interface fastEthernet 0/0
Router(config-if)#ip nat inside
Router(config-if)#exit
Router(config)#interface fastEthernet 1/0
Router(config-if)#ip nat outside
Router(config-if)#access-list 1 permit 192.168.1.0 0.0.0.255
Router(config)#ip nat inside source list 1 interface fastEthernet 1/0 overload
Router(config)#

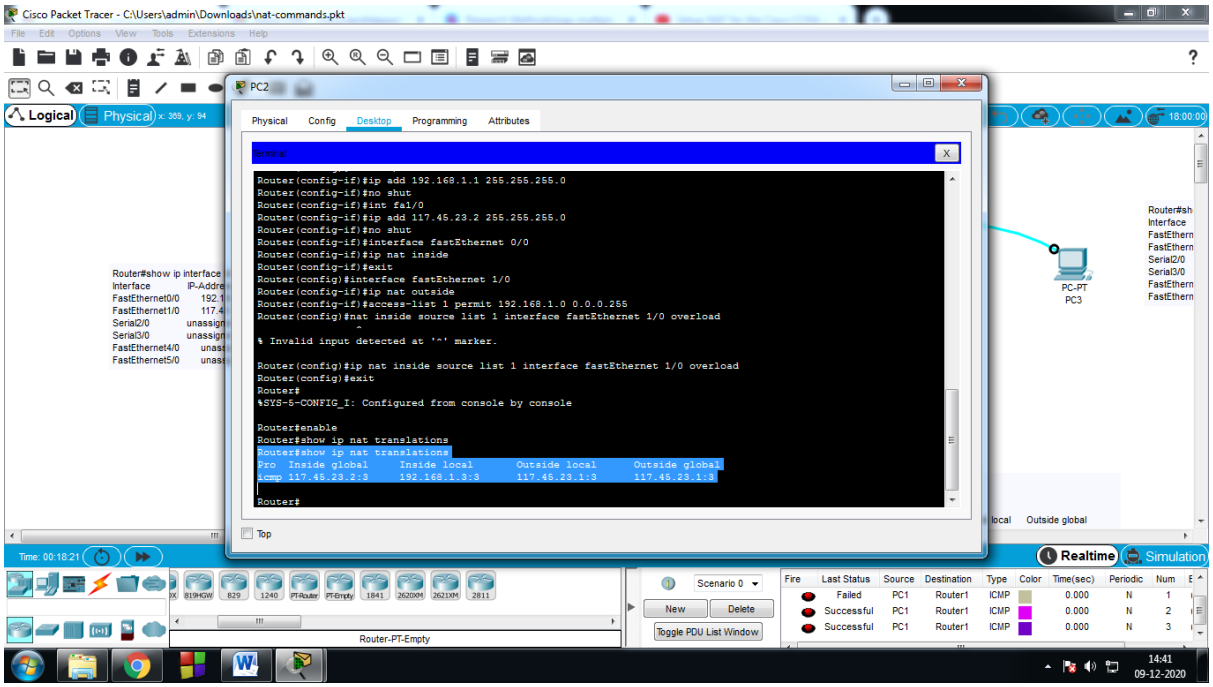


Step 7: Click on PC3 and configure the ports fast0/0

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip add 117.45.23.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#



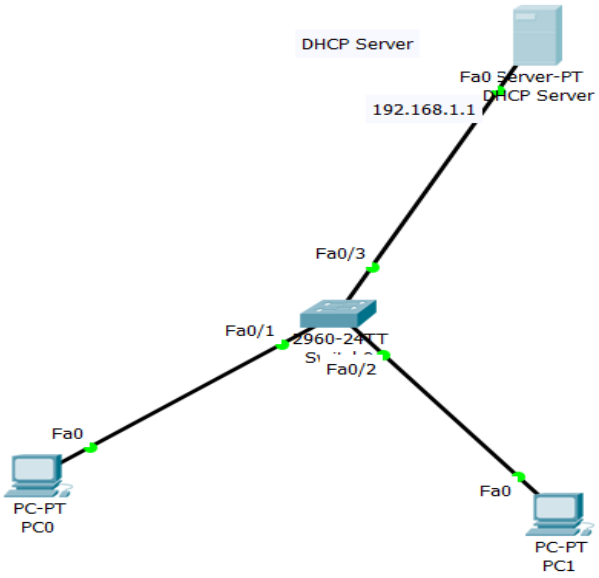
Step 8: Ping PC to ISP Router and check the nat table
Router#enable
Router#show ip nat translations

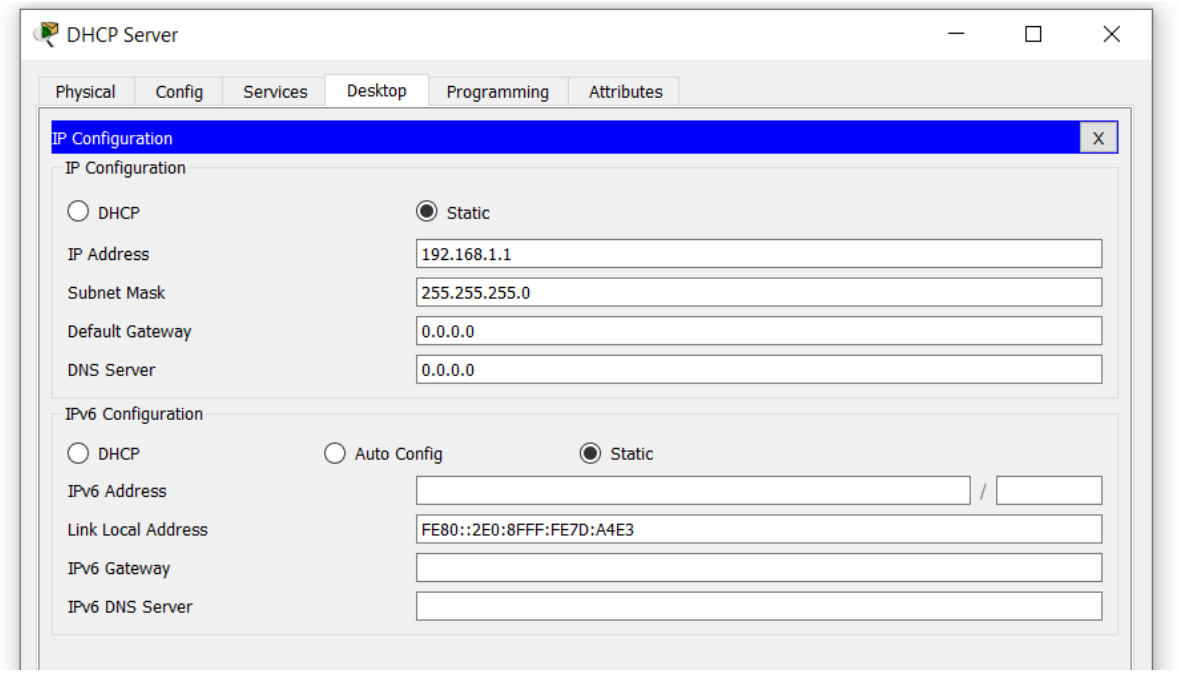


Department of Information Science and Engineering

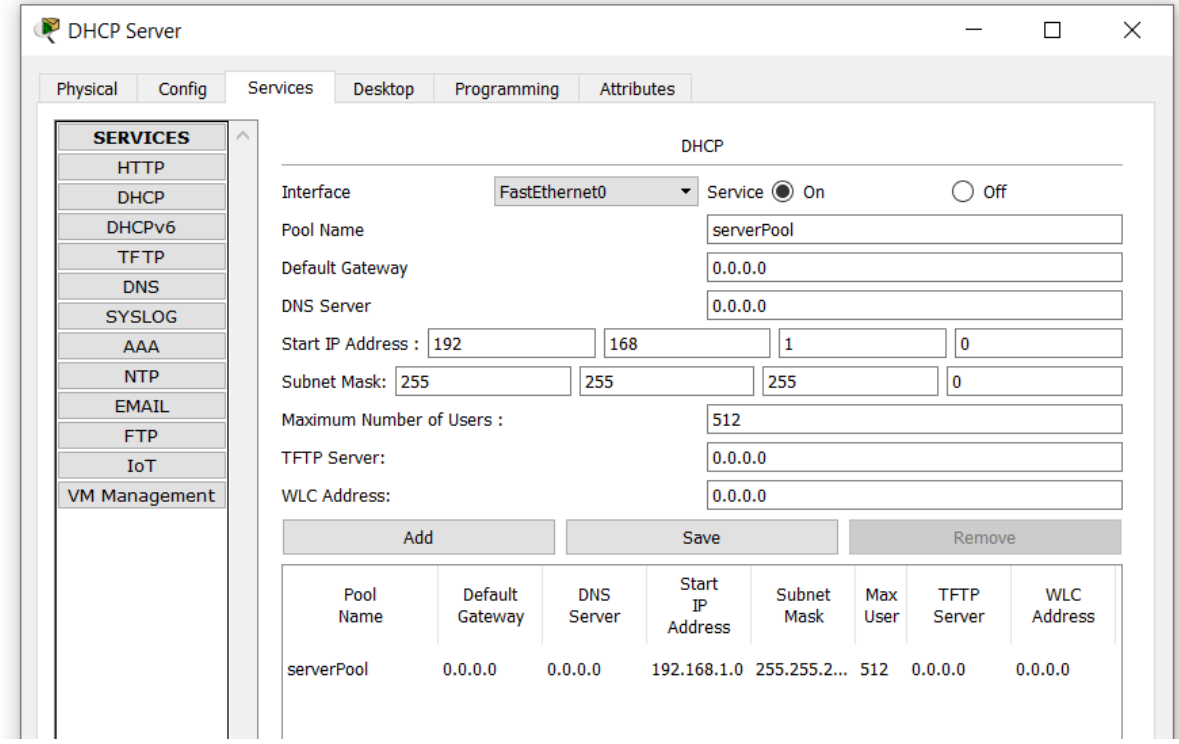
LAB PROGRAMS FOR COMPUTER NETWORKS-1

DHCP Server:- The DHCP (Dynamic Host Configuration Protocol) is a network protocol used to assign IP automatically to the systems with the help of a machine called DHCP server. A DHCP Server allows computers to request an IP address and networking parameters automatically. If you do not have a DHCP Server to configure IP addresses automatically to the PCs then you need to assign a static or manual IP address on the Computers. So in simple words, we can say that DHCP Server is only used for assigning the IP addresses to the Systems automatically.

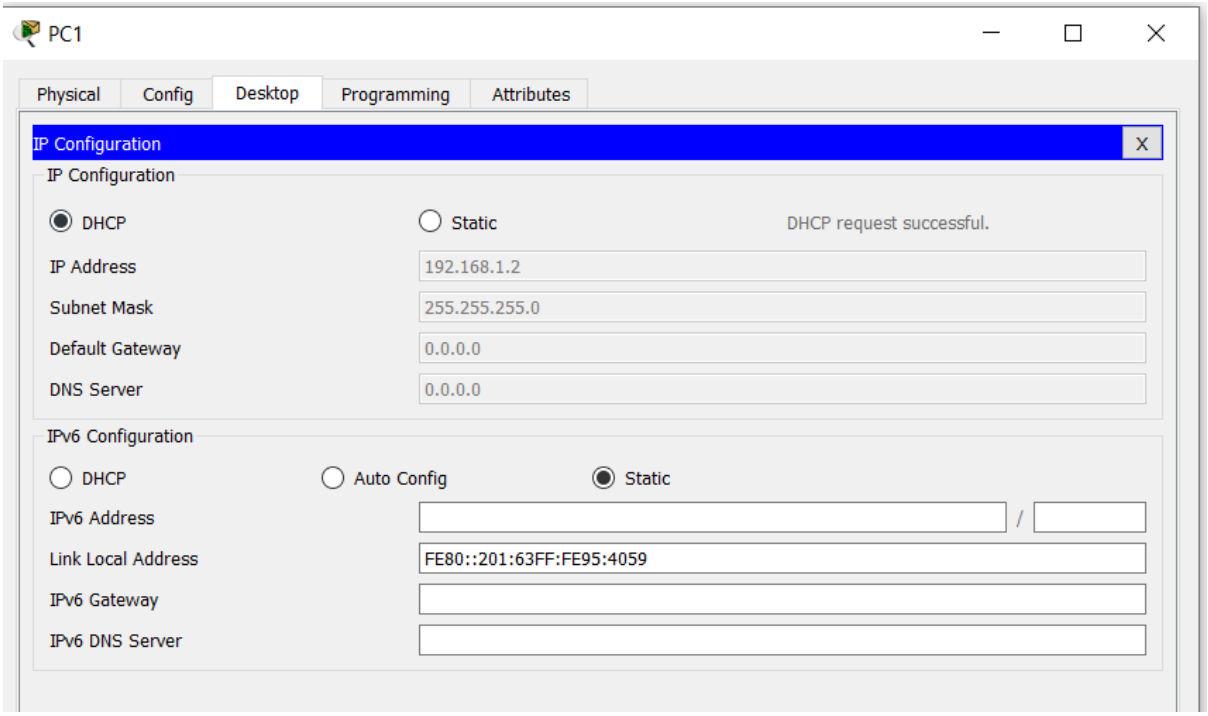




Configuration of DHCP Server



Assign IP address to the PC


PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
IP Configuration
DHCP
Static
DHCP request successful.
IP Address
192.168.1.2
Subnet Mask
255.255.255.0
Default Gateway
0.0.0.0
DNS Server
0.0.0.0
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
/
Link Local Address
FE80::201:63FF:FE95:4059
IPv6 Gateway
IPv6 DNS Server