Computer Networks-Lab 05

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IP Helper-Addresses

The ip helper-address command is generally used to configure a DHCP Relay Agent on a Layer 3 interface on a Cisco IOS device. Broadcast messages are not forwarded from one subnet to another by a router. In order for DHCP clients on each subnet to receive their IP configuration via DHCP, we would need to deploy a DHCP server on each subnet. This could quickly become expensive and cumbersome to manage as the number of subnets grows.

A more scalable solution would be to deploy a single DHCP server to serve clients on all the subnets - as long as we have some way of forwarding all the broadcast DHCP messages from all the different subnets to this single DHCP server.

Problem

You want to configure your router to pass DHCP requests from local clients to a centralized DHCP server.

Solution

The *ip helper-address* configuration command allows the router to forward local DHCP requests to one or more centralized DHCP servers:

```
Router1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router1(config)#interface Ethernet0
Router1(config-if)#ip helper-address 172.25.1.1
Router1(config-if)#ip helper-address 172.25.10.7
Router1(config-if)#exit
Router1(config)#end
Router1#
```

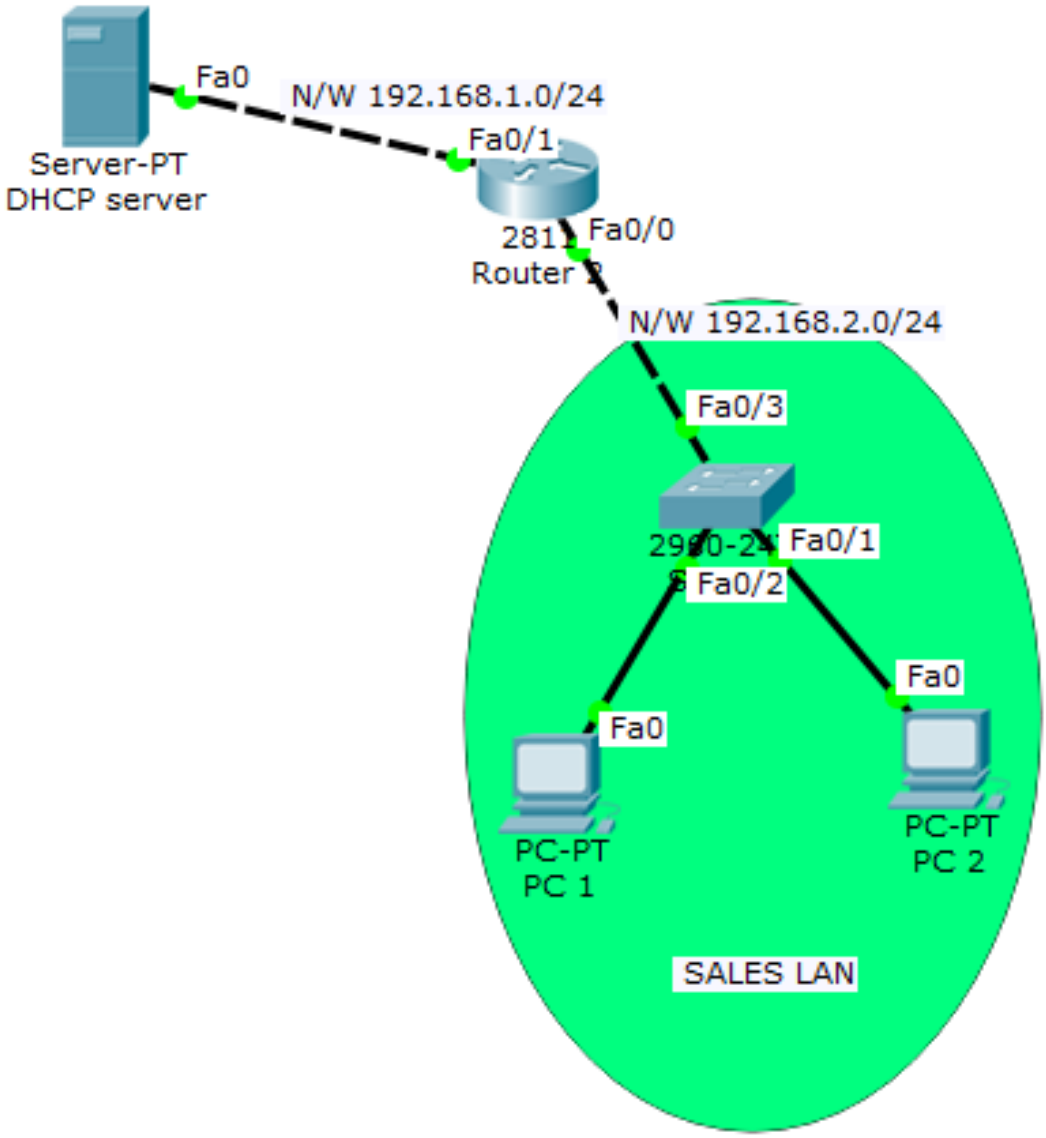
The traditional role of routers in DHCP has been simply to act as a proxy device, forwarding information between the client and server. Since IOS level 12.0(1)T, Cisco routers also have DHCP server and client features. But the DHCP proxy function is still the most common for routers.

Because the initial DHCP request comes from a client that typically doesn't have an IP address, it must find the server using a Layer 2 broadcast. So, if the router was not able to function as a proxy for these broadcasts, it would be necessary to put a DHCP server on every network segment.

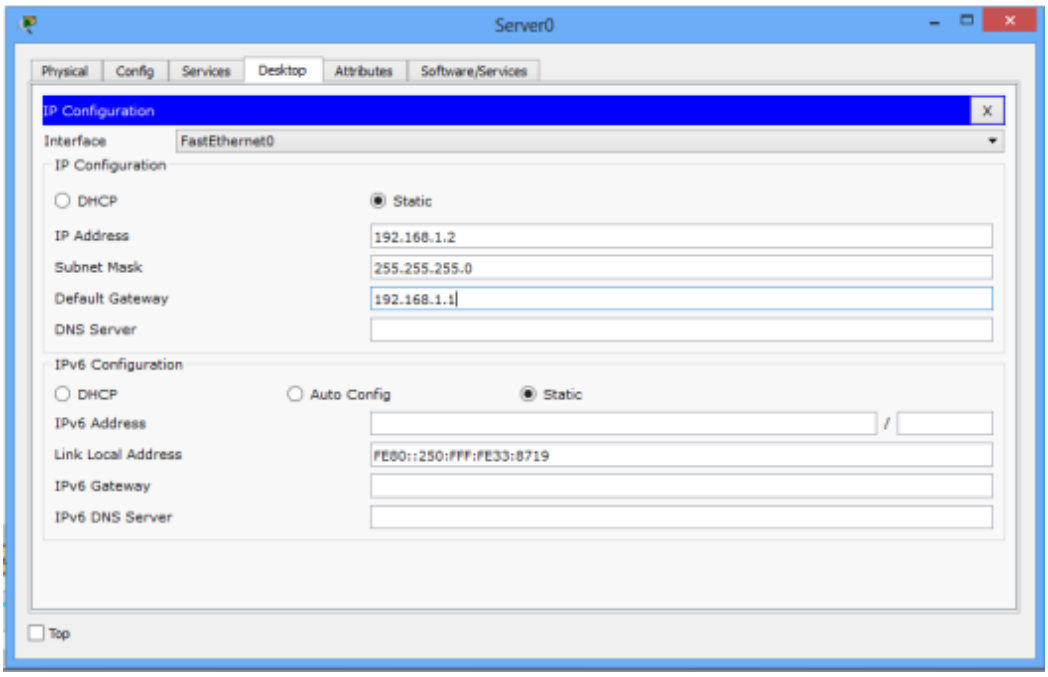
The DHCP server needs two critical pieces of information before it can allocate an IP address to the client. It must know the subnet that the client is connected to, and it needs the client device's MAC address. The subnet information is needed to ensure that the address that the server allocates will actually work on client's network segment. And the MAC ...

Configuring an IP helper address

1. Create the following topology:



2. Assign a static IP address to the server.
   Server: IP address: 192.168.1.2 **Subnet mask:** 255.255.255.0 **Default gateway**: 192.168.1.1



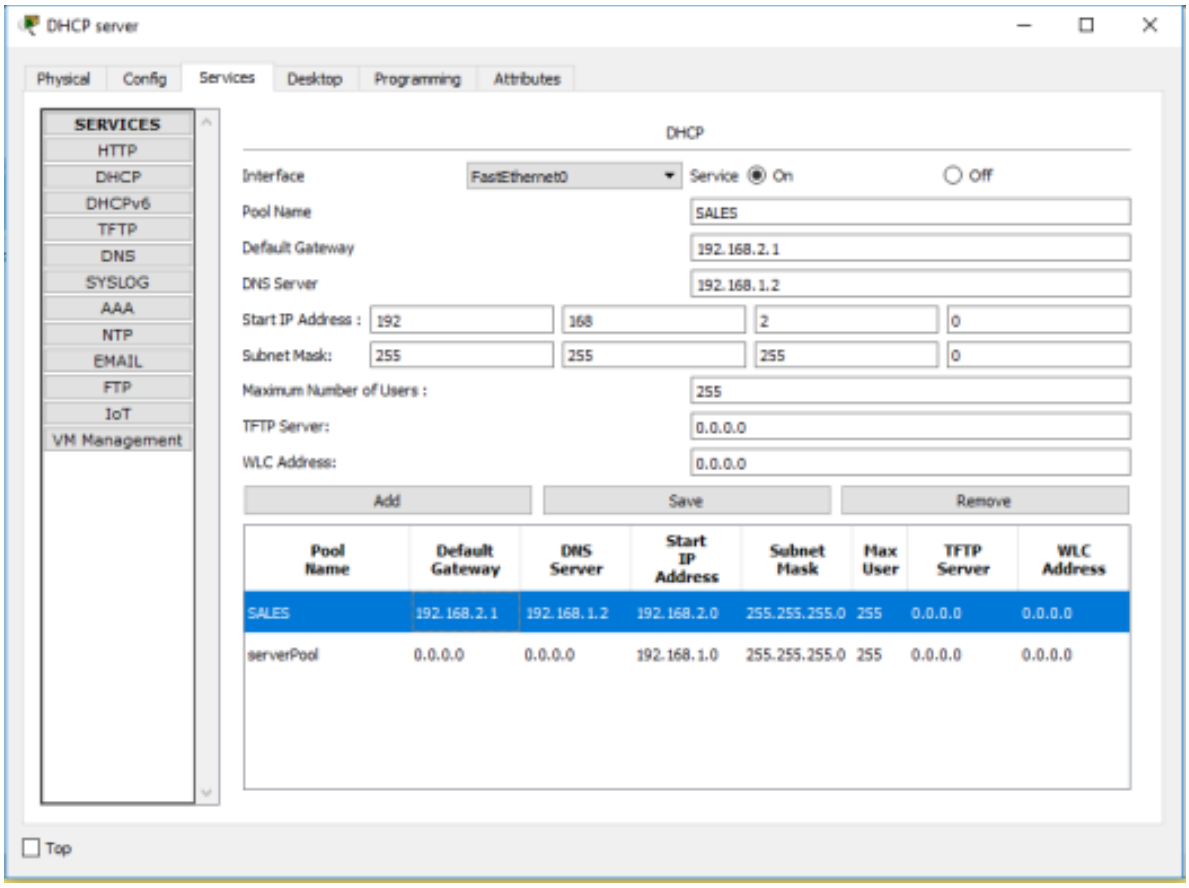
3. Router interface configurations

```
Router2(config)#interface fa 0/0
Router2(config-if)#ip address 192.168.2.1 255.255.255.0
Router2(config-if)#no shutdown
Router2(config-if)#
Router2(config-if)#interface fa 0/1
Router2(config-if)#ip add 192.168.1.1 255.255.255.0
Router2(config-if)#no shutdown
```

4. Click on **DHCP Server->Services->DHCP.**

Turn **ON** the DHCP service on the server. We'll configure DHCP server pool named **SALES** on the generic server (Located on the network 192.168.1.0/24). This pool will provide IP addresses to hosts in **SALES LAN** (Network 192.168.2.0/24). Here we go:

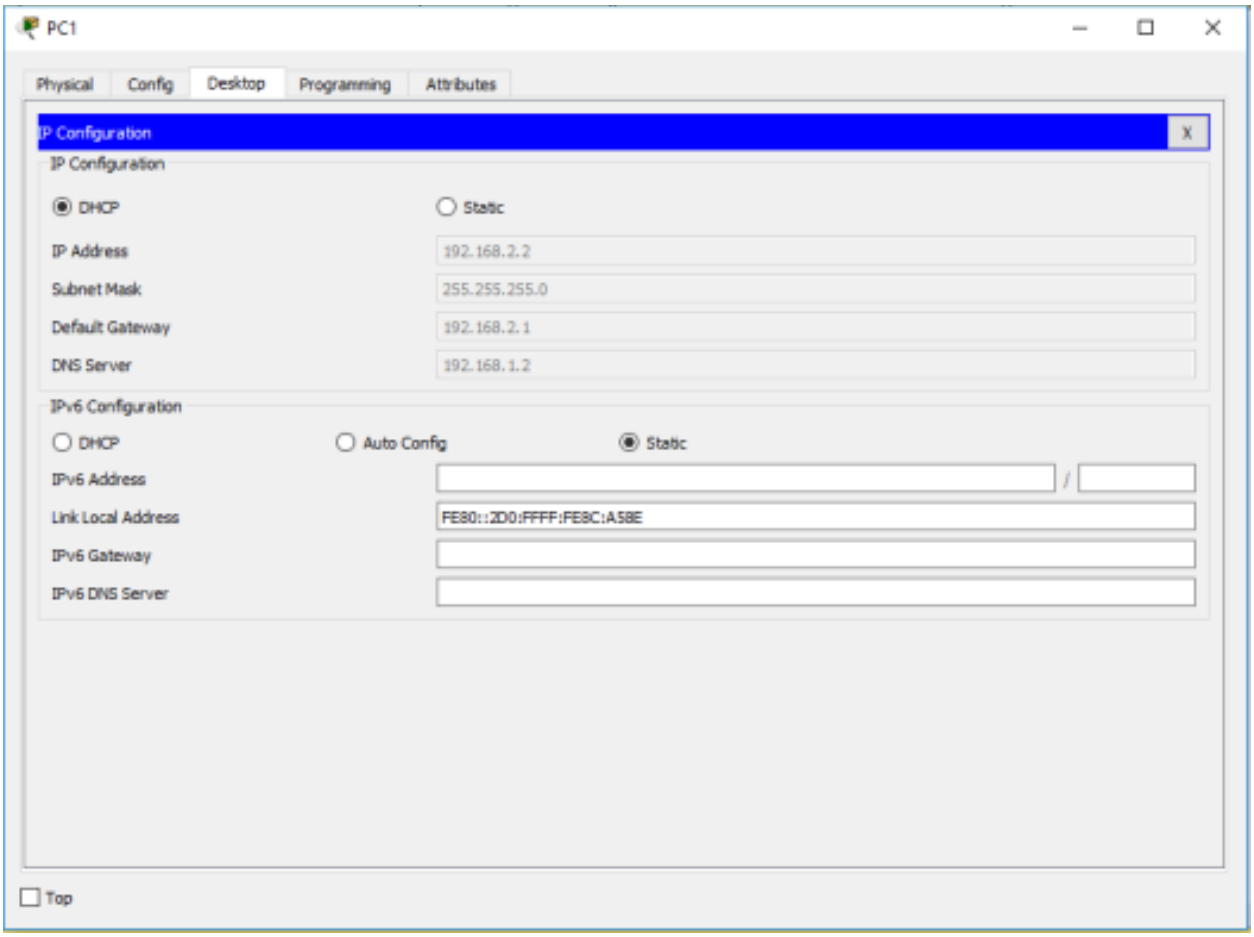
Pool Name: SALES **Default Gateway:** 192.168.2.0 **DNS server:** 192.168.1.2 **Start IP address:** 192.168.2.0 **Subnet Mask:** 255.255.255.0 **Maximum no. of Users:** 255



5. Add the command *ip helper-address 192.168.1.2* on the interface configuration mode of fa 0/0 of **Router 2,** just as we've done before.

```
Router2(config)#interface fa0/0
Router2(config-if)#ip helper-address 192.168.1.2
```

6. Lastly enable DHCP on the PCs in SALES LAN. The PCs will obtain their address from the DHCP server.



Lab Task

Students should make the scenario exactly implemented in Lab 4 and implement the following:

1. We have three website each of them is stored on separate Web Server,
   - (www.slate.nu.edu.pk or state.nu.edu.pk) having IP address 192.168.1.5
   - (www.pwr.nu.edu.pk or pwr.nu.edu.pk) having IP address 192.168.1.6
   - (www.flex.nu.edu.pk or flex.nu.edu.pk) having IP address 192.168.1.7

2. A DHCP server and a DNS server configured as follow:
   - DHCP IP : 192.168.1.9
   - DNS Server IP : 192.168.1.4

3. We are going to make Two Labs "**Lab A**" and "**Lab B**". In each Lab there are three PC's. We want to use DHCP Server to avoid static IP's. We also have our own DNS Server. Use the Class C IP Address like 192.168.1.0 or 192.168.2.0

Computer Networks Lab 5

General Steps:

1. Understand the problem
2. Build the Topology in Packet Tracer
3. Set up router configuration using CLI. **(give your name as router host name)**
4. Setup Web Server for each website.
5. Configuration of DNS Server
6. Configuration of DHCP Server.
7. Test it in Simulation mode and observe how DNS and Webserver are working.
    a. Observe: when the first time you hit an IP address from a PC , Is this PC will directly send request to web server or to DNS Server ?
    b. Observe: when the first time you hit URL from a PC, Is this PC will directly send request to web server or to DNS Server ? Observer same thing for 2nd and 3rd time.

Sharing Files Between Two Computers Using LAN Cable

Over the years, Wi-Fi has grown tremendously but sharing huge files or for that matter, a whole drive is still not efficient. You get cramped up speed and your data is running through a public channel. On that note, the following is the step by step guide to transfer files between PC's using an Ethernet cable.

Just in case, if the file you want to transfer is small and the systems are in the same network then consider doing it over Wi-Fi.

When to Use LAN Cable

Dropping an Ethernet cable makes things simple with faster data speed. The cheapest of CAT5e cable supports speeds up to 1000 Mbps. To give you some perspective, USB 2.0 supports speeds up to 480 Mbps. So, transferring data over Ethernet should be the obvious choice.

The advantage of LAN cable Over others

The main advantage of using the ethernet cable method is faster transfer speeds, at least faster than your regular flash drives and Wi-Fi. If you have a lot of data to transfer then using the ethernet cable is the best way to go. We have tested this on all mainstream Windows versions. i.e, on Windows 7, 8, and 10.

Getting Started

Sharing Files Between Two Windows Computer

Requirements

- Two Windows computers obviously
- A LAN cable, CAT 6 will work fine
- A bit of time and patience (if it's your first time)

Goal

Share Files Between Two Computers Using LAN Cable

Step1: Connect Both PC's With LAN Cable

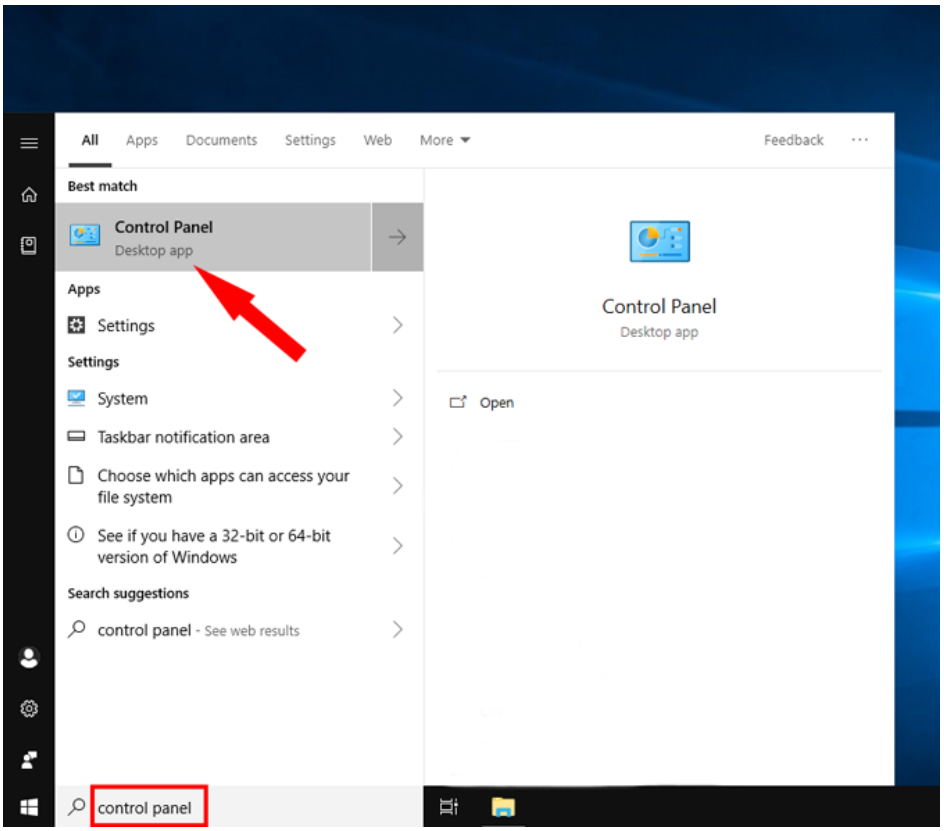
Connect both computers to a LAN cable. You can use any LAN cable (crossover or ethernet cable); it doesn't matter on a modern computer. Because both of them use the same port and have very few functional differences.

Step 2: Enable Network Sharing on Both PCs

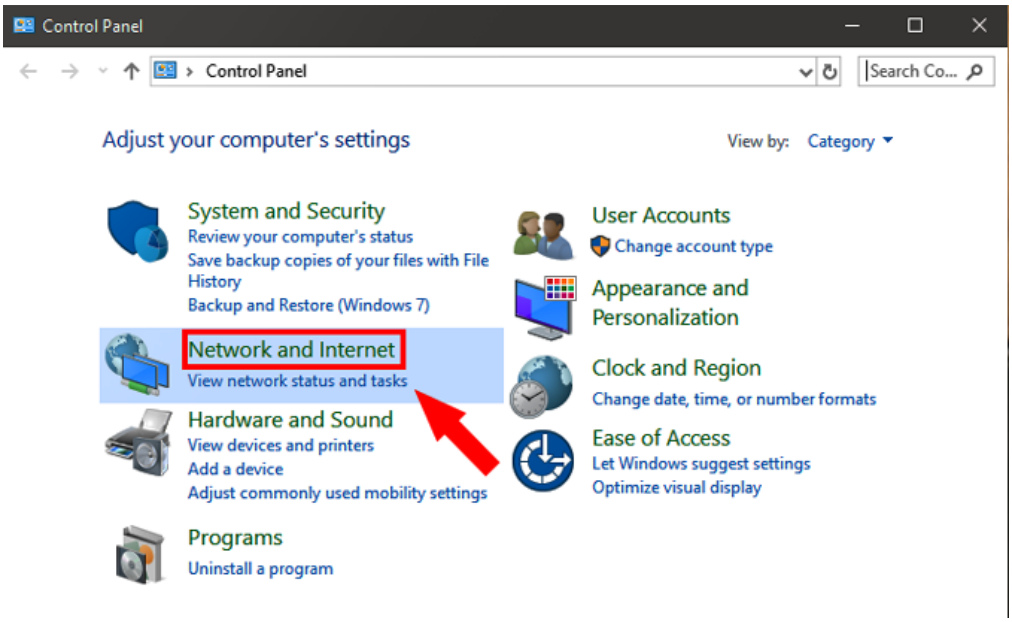
Computer Networks Lab 5

Now that you have physically connected both PCs with a LAN cable, we have to turn on Network Sharing on both computers to exchange files between them. It is a simple step-by-step process. Make sure you do this on both PCs.

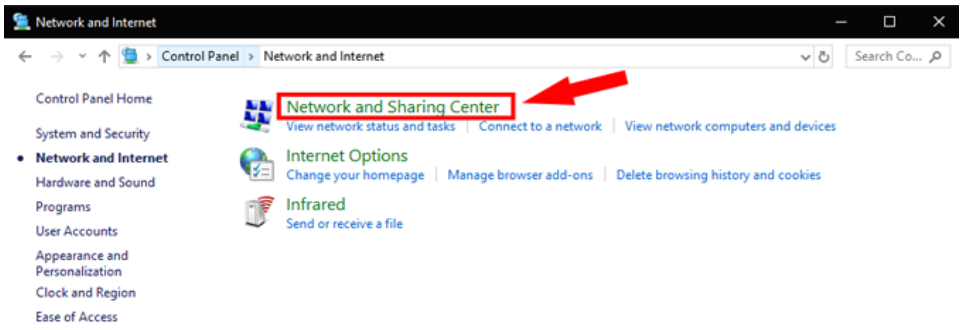
To enable sharing, go to the Start menu and search “Control Panel”. Once you see it, click on it, to open it.



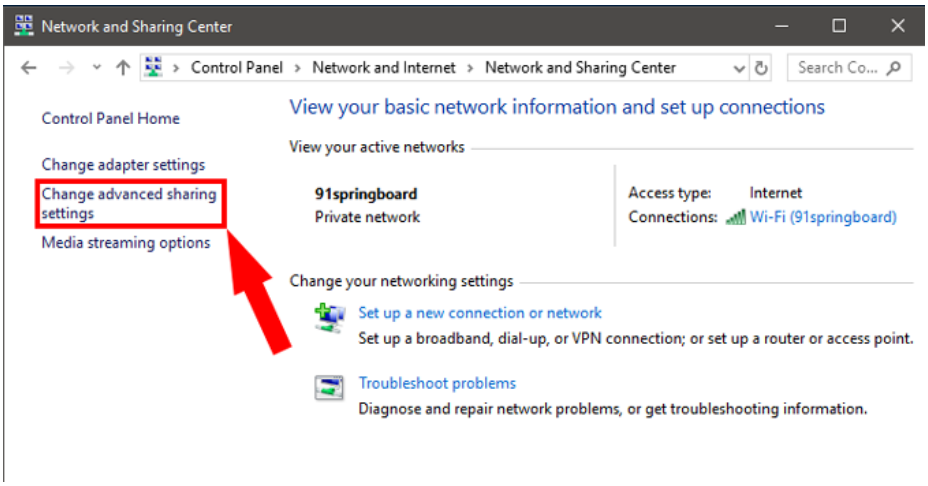
Once the Control Panel window opens, click on Network and Internet.



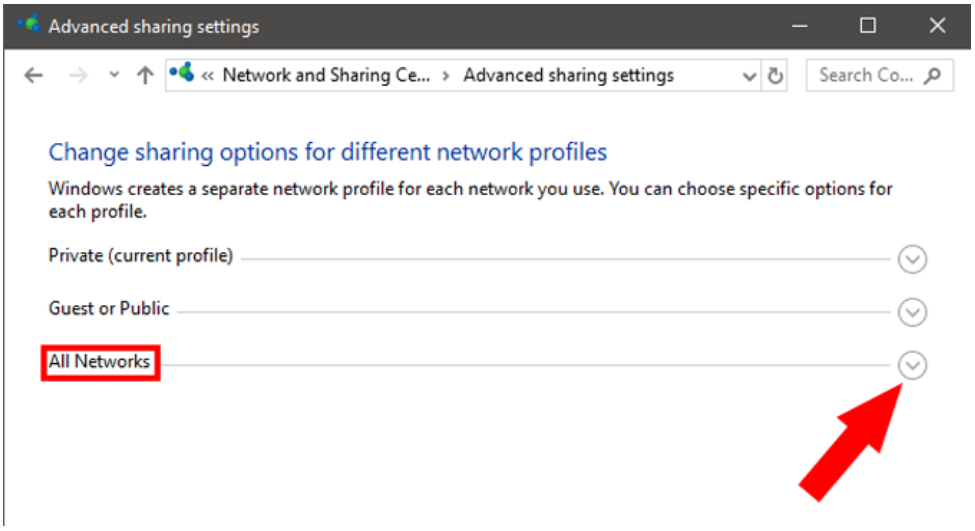
In the next dialogue box, open Network and Sharing Center. Alternatively, you can also type "Control Panel\Network and Internet\Network and Sharing Center" in the search box of Control Panel and hit Enter key. This will redirect you from Control Panel to Network and Sharing Center.



On the left-hand side of 'Network and Sharing Center' window, click on "Change advanced sharing settings".



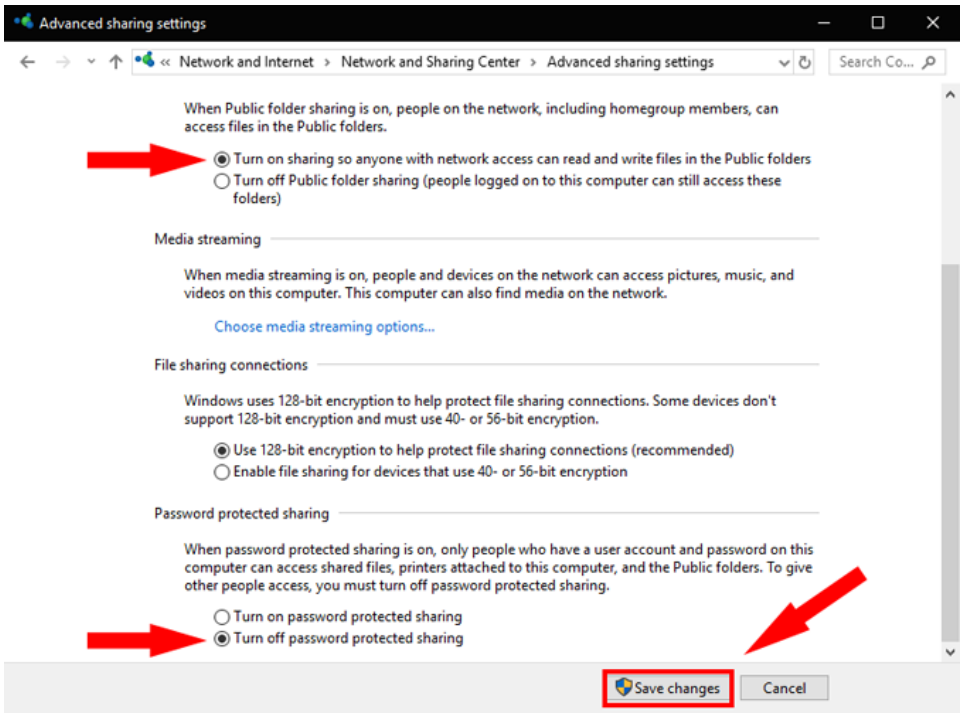
Here, you'll find three networks – Public, Private and All Network. Public Network is for places like airports and coffee shops, Private network is for an organization or your home network and All Network comprises of both. To make sure, the setup is flawless, we'll recommend you choose "All Networks".



Next, expand All Networks by clicking on the drop-down icon. Here, we need to enable Public Sharing so that the PCs can access files from each other over the LAN cable. To avoid more configuration, just Turn off password protected sharing.

By doing so, you enable the other computer to access shared data without providing any credentials. This is not a good security practice by since you are sharing your data with people you trust, you can make this one-time exception. Once you are done with file sharing, make sure you Turn on password protected sharing.

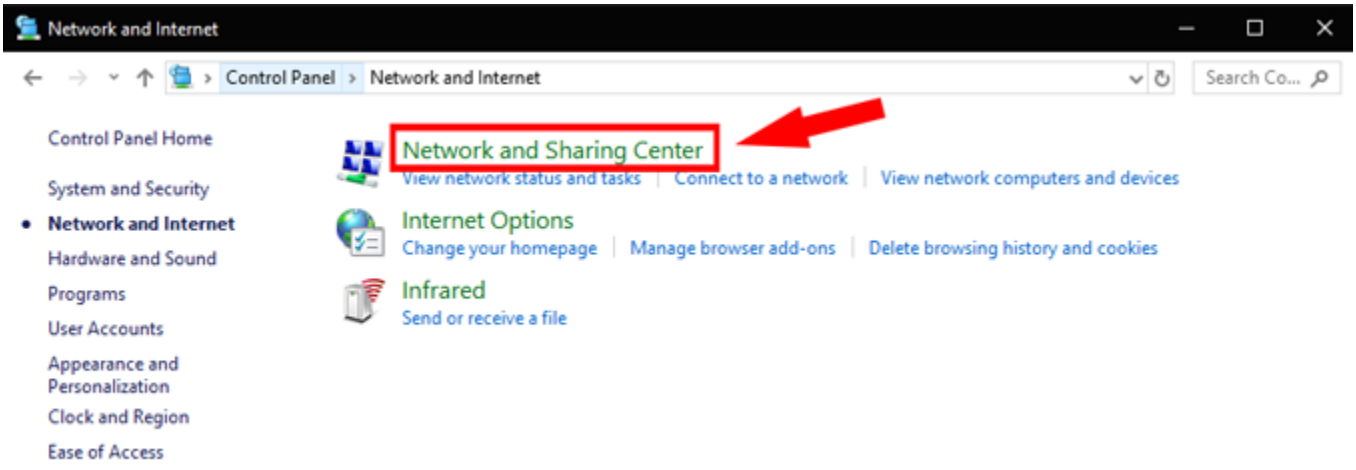
Once done, click Save Changes. Just as I said in the beginning, repeat the same steps for the other PC.



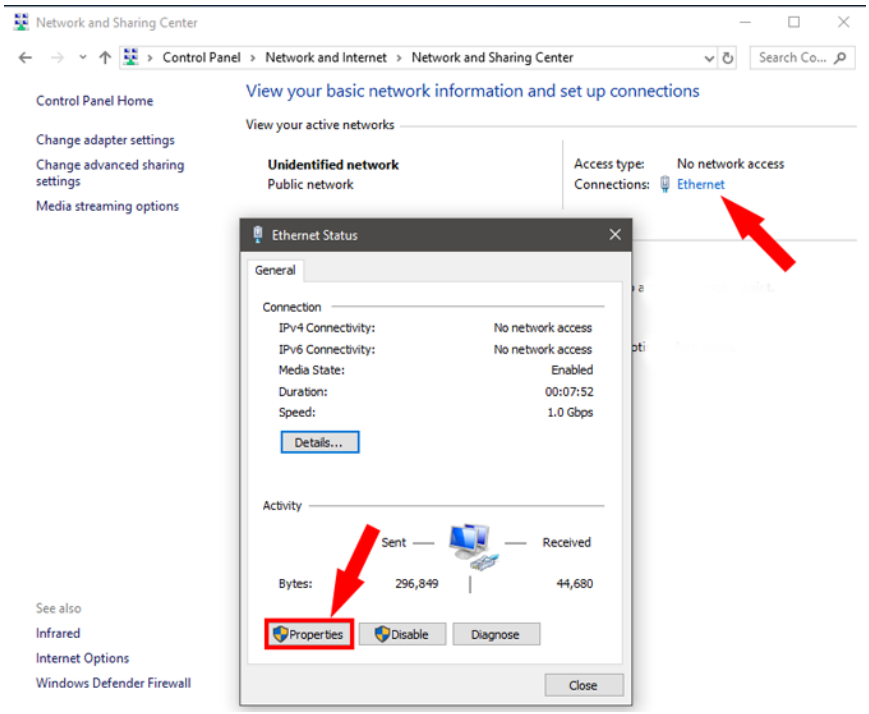
Step 3: Setup Static IP

Now that you have enabled network sharing on both PCs, it's time to bring both the computers on to the same network. We will do this by setting a static IP address of the same class. Just like the previous step, you need to do this on both PCs. The following are the steps.

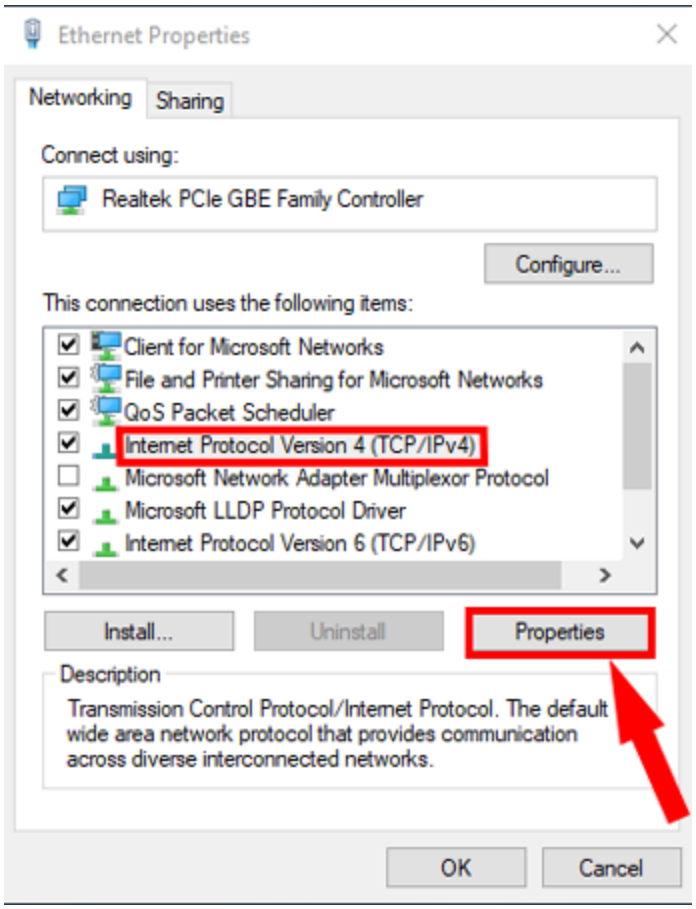
1. To set up a Static IP, open Control Panel, browse to Network and Internet and click on Network Sharing Center. Alternatively, you can also right-click on the Start Menu and select Network Connections.



2. On the next window, you will see the active connections which should be Ethernet, since both PCs are connected with a physical LAN cable. Click on the Ethernet link. A new dialog box will open, here click on the Properties button.



3. In the next pop-up, select “Internet Protocol Version 4 (TCP/IPv4)”. Now, click on Properties. This will open another dialogue box.

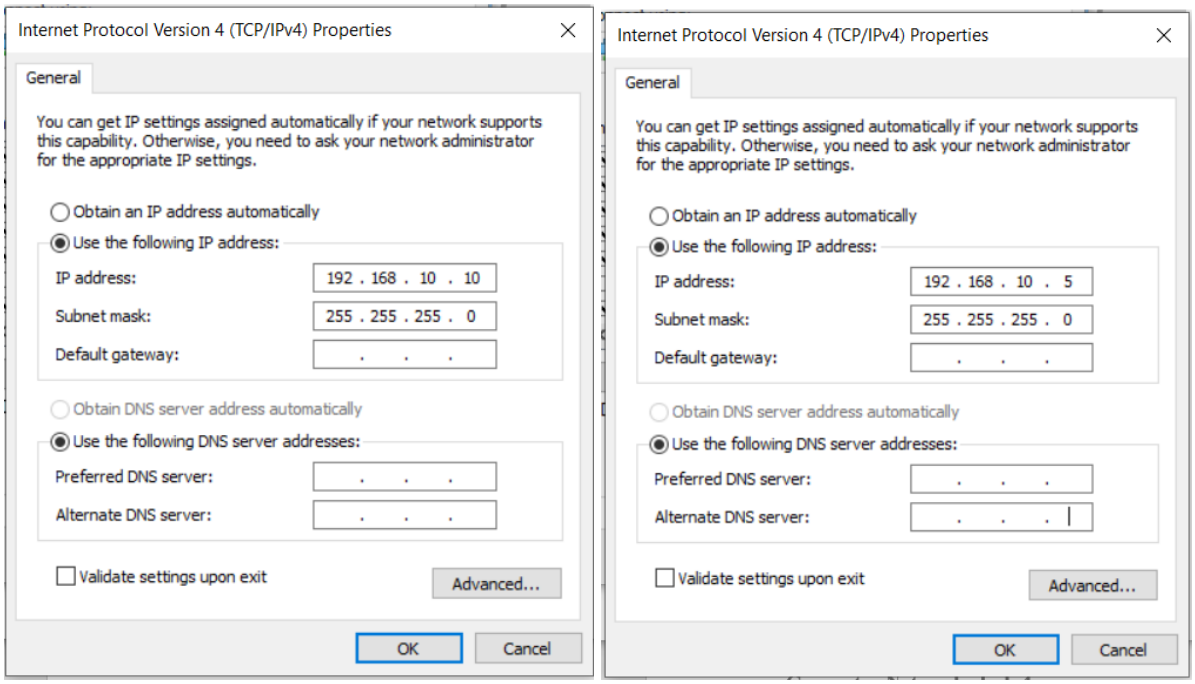


4. Here, you need to configure the two PCs with different IP settings.

   On computer 1, select the option "Use the following IP address." and, put the following values:
   IP Address: 192.168.10.10
   Subnet mask: 225.225.225.0
   Default gateway: empty

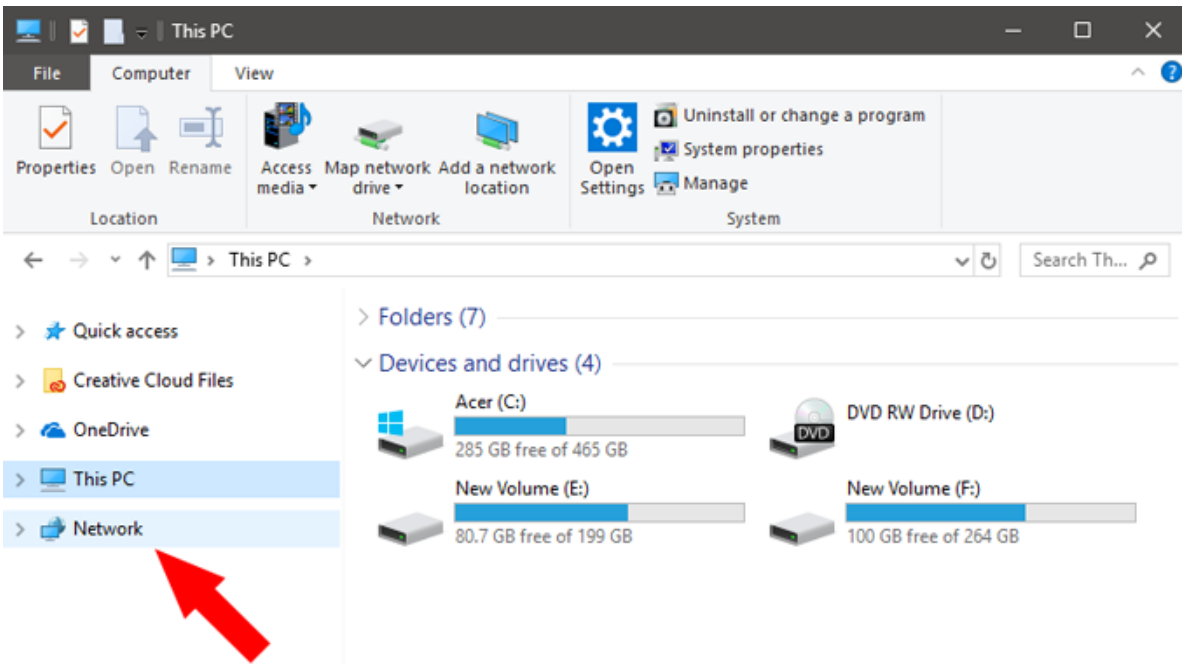
   Of course, it's not necessary you use these IP addresses. You can use any Class A or B IP address. In case you are not sure what this all means, better stick with this example.

   On the second computer, do similar steps, but flip the IP address and Default gateway values:
   IP address: 192.168.10.5
   Subnet mask: 225.225.225.0
   Default gateway: empty

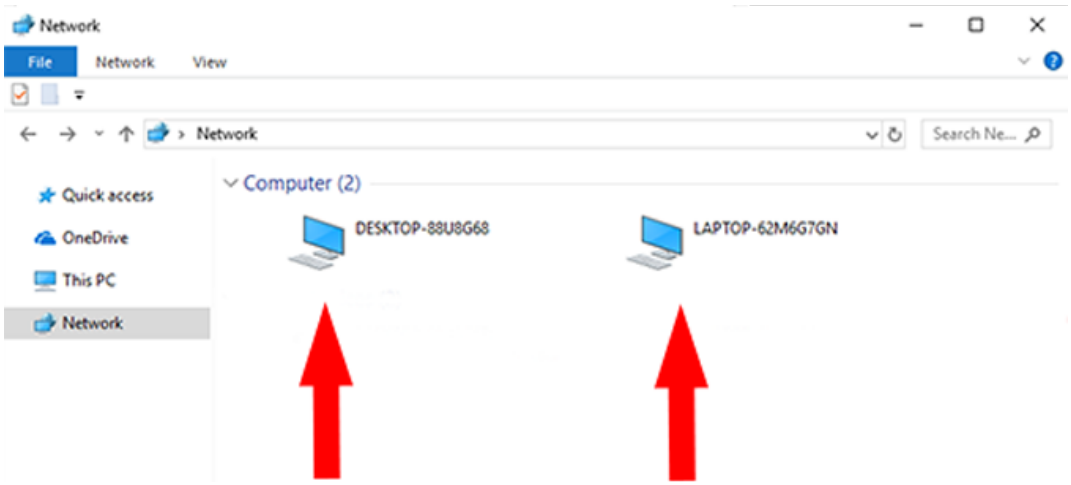


What we are doing is keeping the subnet mask the same and changing the IP address.

Next, open your Window's File Explorer and click on Network tab at the left side of the window.

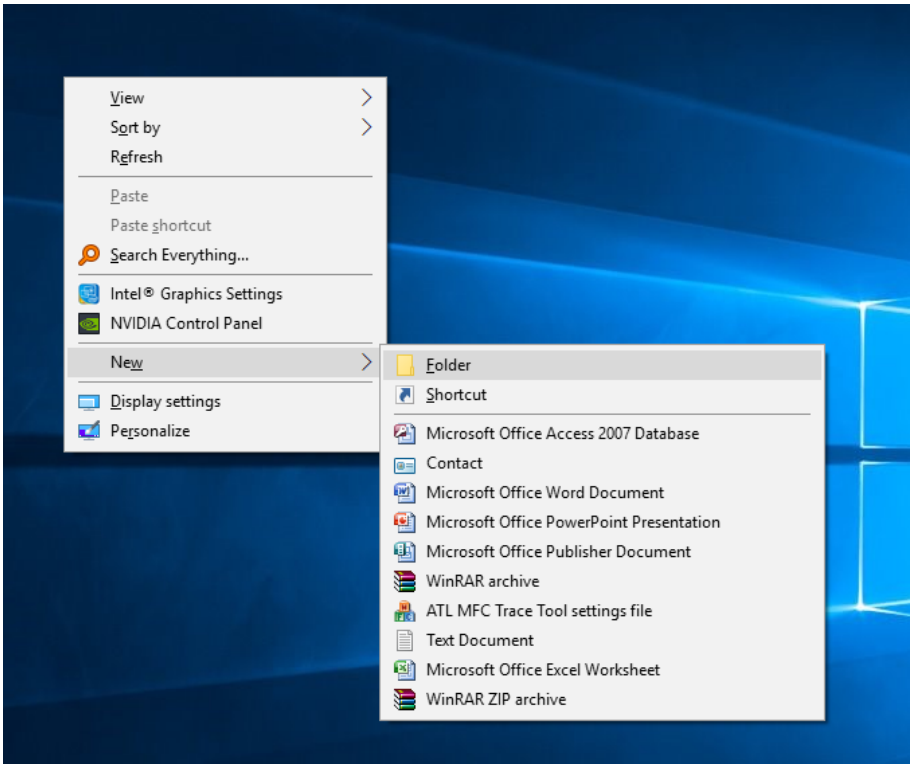


If you have set up everything right, both the PCs should appear in this Network window on both computers. Now, you can just click on the other PC's icon and browse the file. But wait, you still need to configure one last setting.

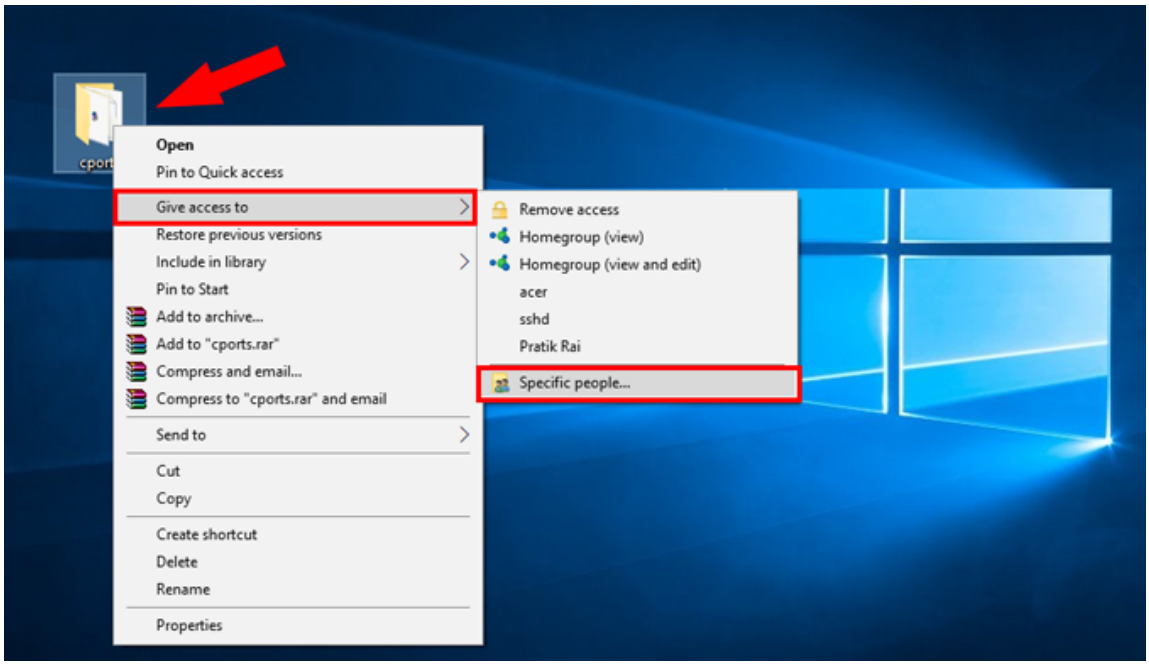


Step 4: Share a folder

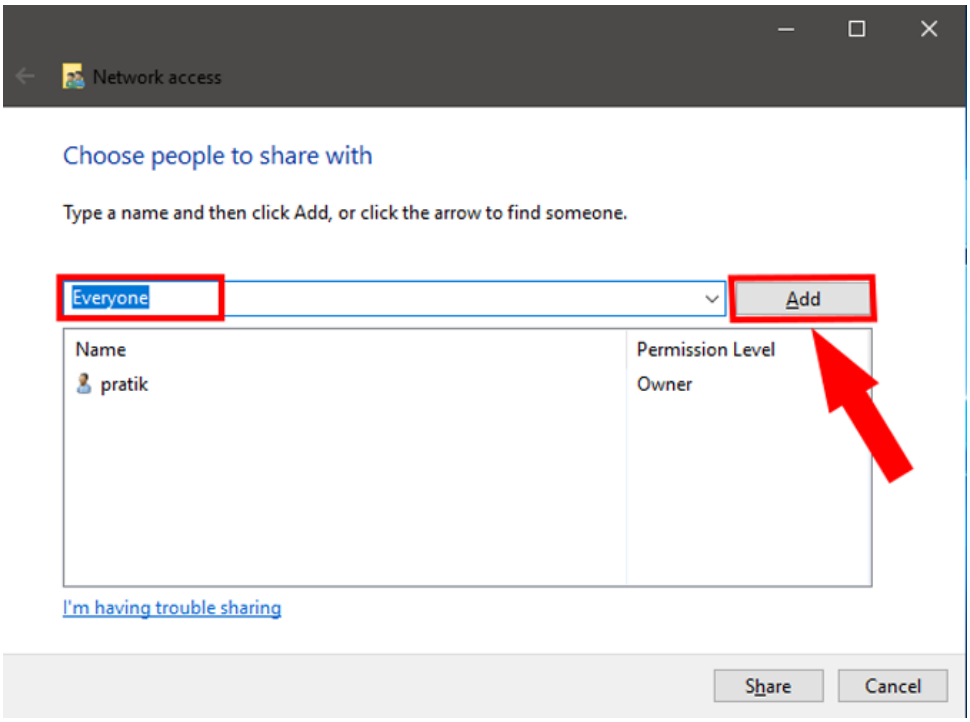
Assuming that you have connected the cable properly, enabled the sharing options, and configured the IP addresses. Now, it is time to send files from one PC to another. For that, you first need to share the target folder on LAN. I'll recommend, you can create a new folder on your desktop, and copy paste all the files that you want to move to another computer in that folder.



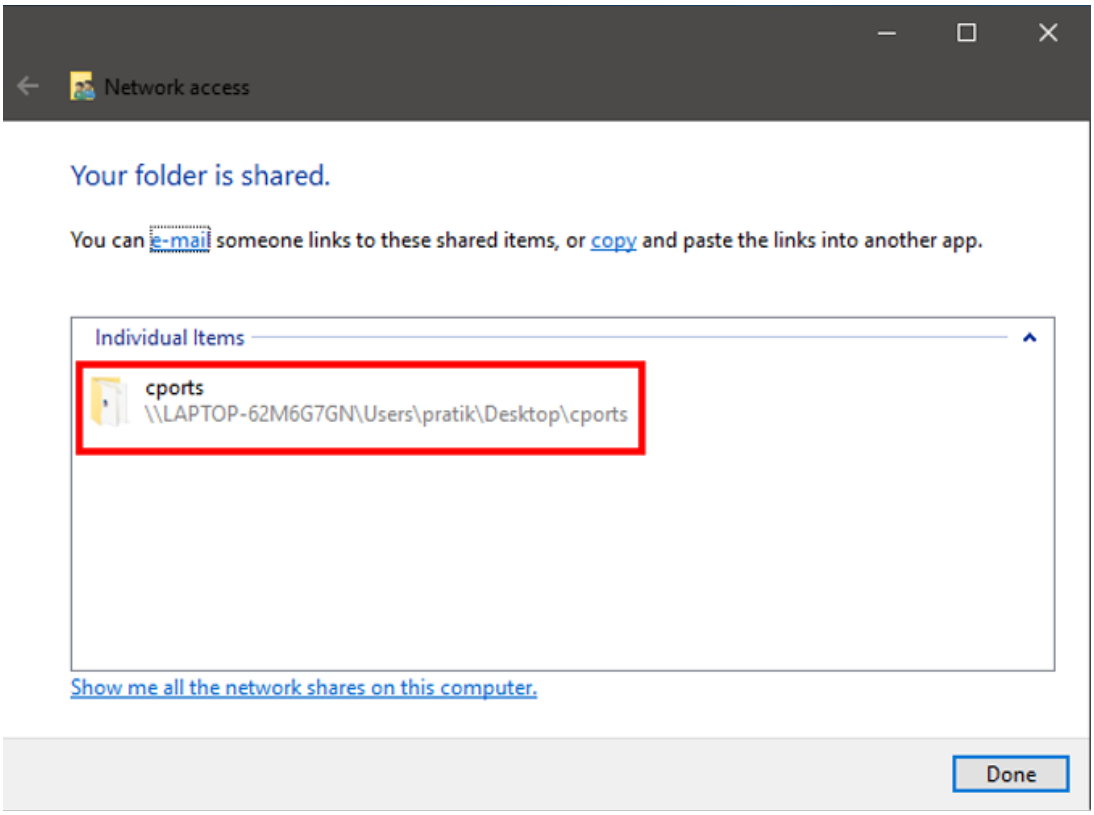
Next, select the folder you want to share and right-click on it. From the context menu, navigate to "Give access to" and select the option "Specific People."



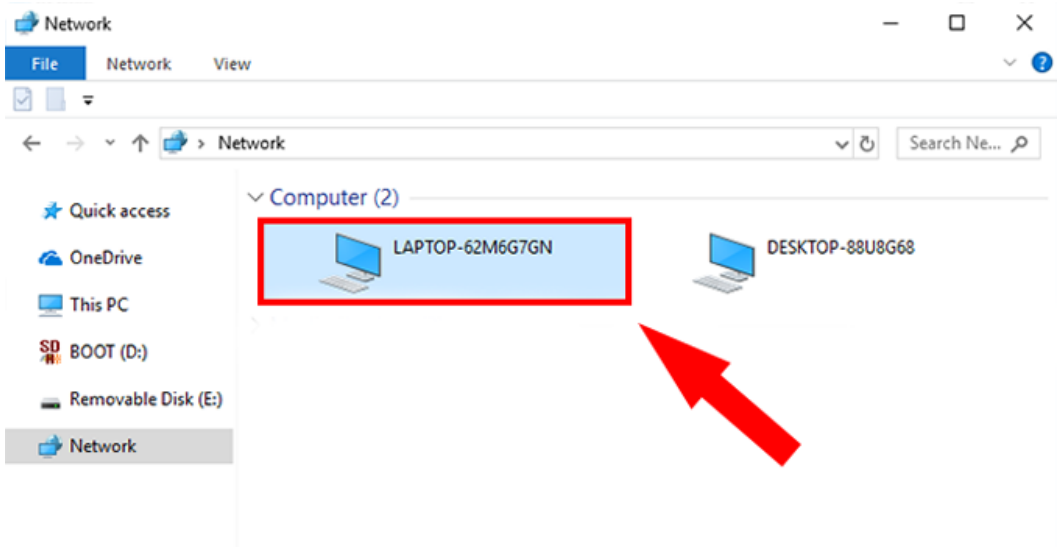
In the File Sharing window, choose Everyone from the drop-down menu. Click on the Add button next to it and finally hit the Share button.



Once you have shared it, the next window will show you the network location of the folder.

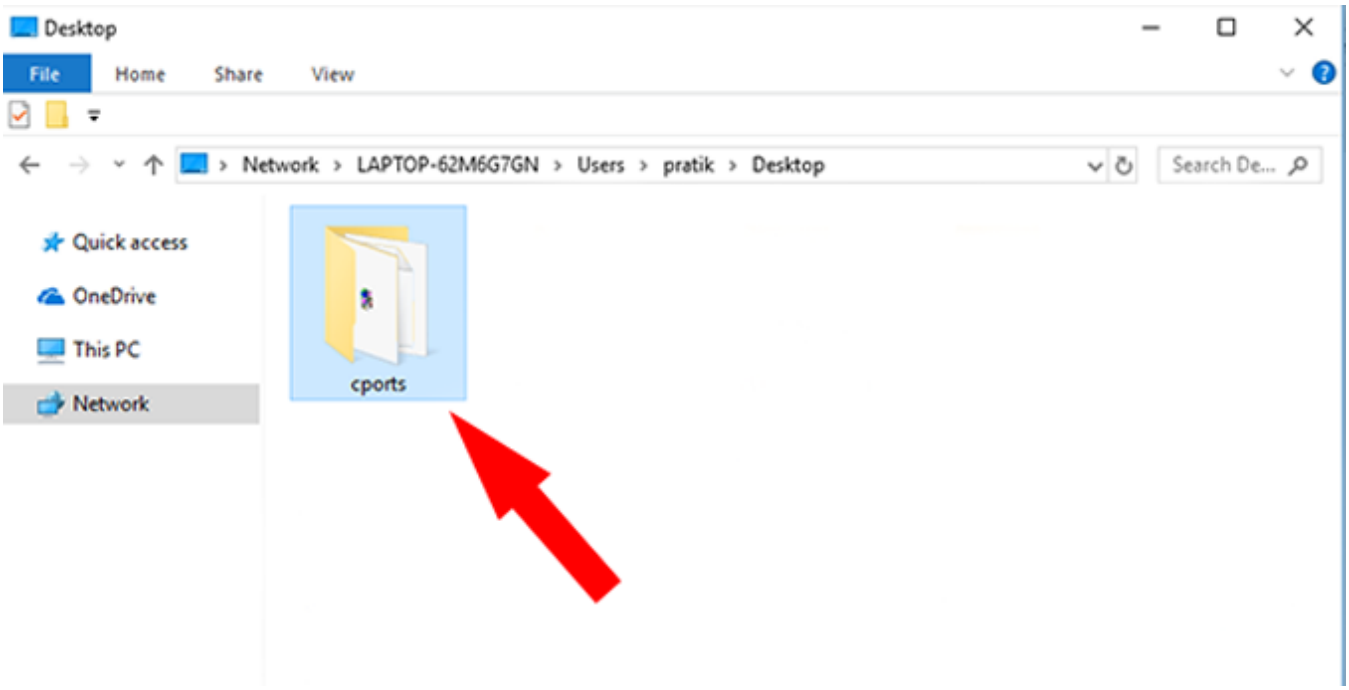


That's it. Just go back to the other PC from where you want to access the file, open the Networks panel and click on the other computer's name.



Here, you will see the folder you just shared. From there, just open the folder and transfer the files and folders as you normally do. i.e, by copy and paste. Similarly, you can repeat the same steps from the other computer.

Computer Networks Lab 5



Sharing Files Between Windows and Mac Computers

Requirements

- One Windows computer
- One MacBook
- A LAN cable, CAT 6 will work fine
- A bit of time and patience (if it's your first time)

Goal

Share Files Between Windows and MacBook

Step1: Connect Both PC's With LAN Cable

Connect both computers to a LAN cable. You can use any LAN cable (crossover or ethernet cable); it doesn't matter on a modern computer. Because both of them use the same port and have very few functional differences.

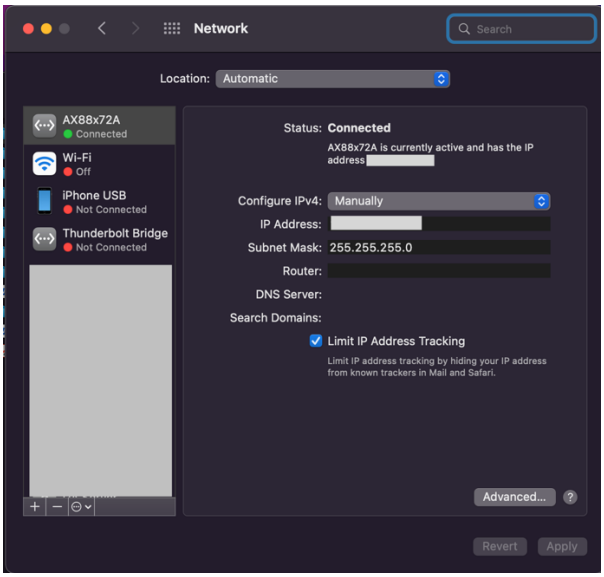
Step 2: Setup Windows PC

For Windows PC follow the same process as describe earlier.

- Enabling Network Sharing on Windows PC
- Setup Static IP
- Share a Folder

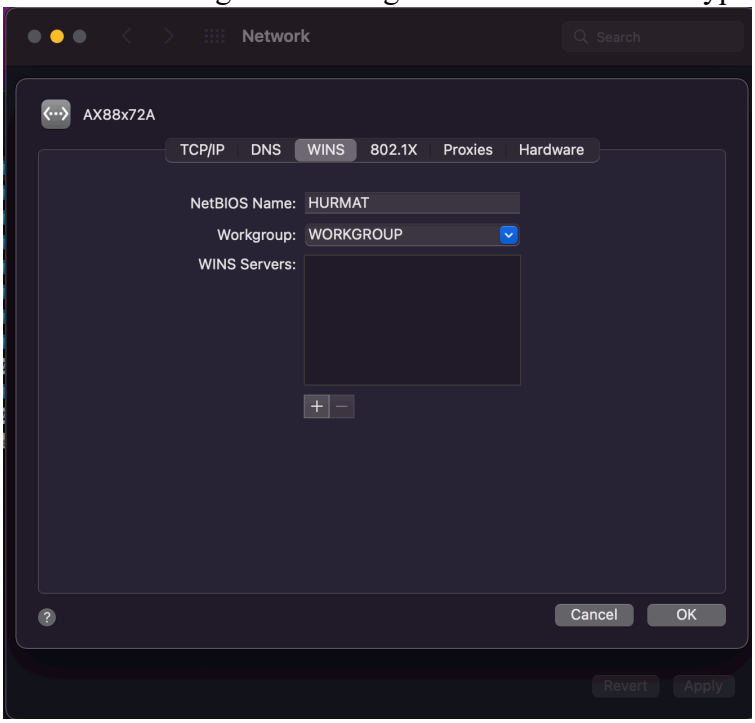
Step 3: Setup MacBook

1. Click on the Apple menu and select System preferences: then click Network. Make sure Wi-Fi is off.



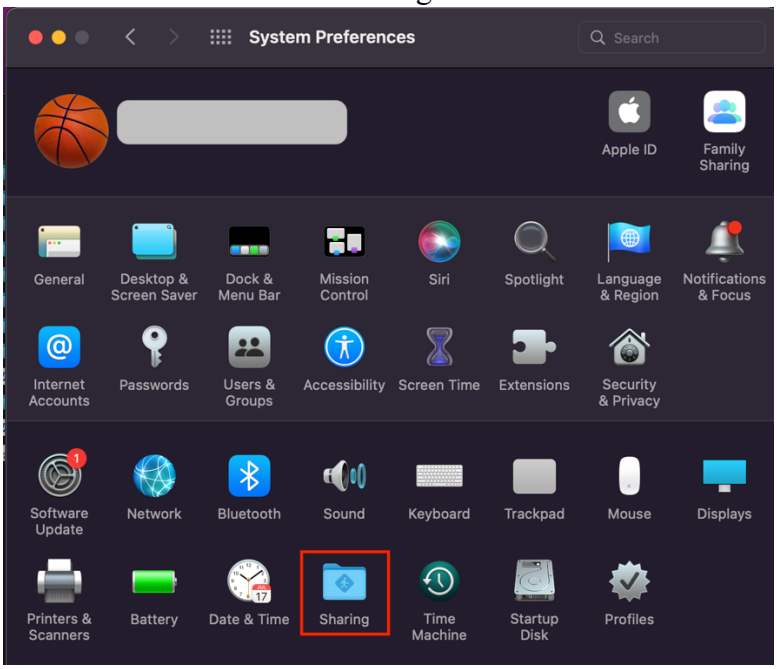
2. Configure IPv4 using Manual Option. Type IP address with subnet mask e.g
   IP address 192.168.1.22 Subnet mask 255.255.255.0

3. Now if you want to change the name of your mac that will be visible to others, click on Advanced Setting button and go to the WINS tab and type in the NetBIOS Name.

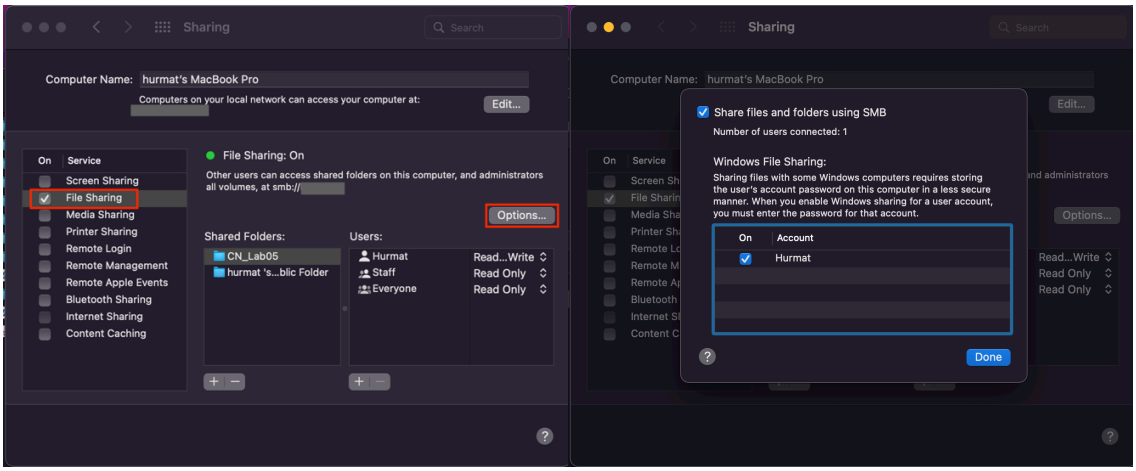


Then click on OK and then Apply button.

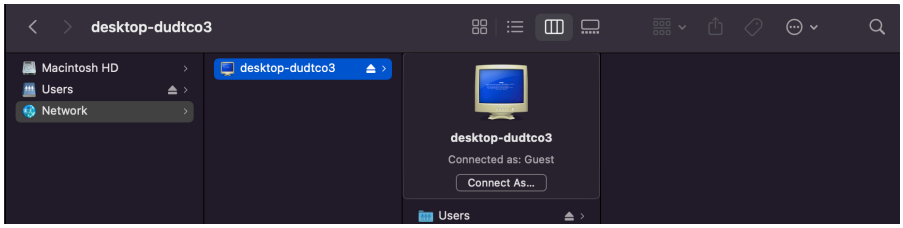
4. Next to back to preference and then select Sharing.



5. Turn on File Sharing and click on Options, turn on Share files and folder using SMB, select Account and click done.



Once you are done, go to firewall and turn off the firewall. Finally proceed to the File Sharing. On windows machine create a folder and share the folder as described earlier. Now on your MacBook, Go to Network and Connect to the Windows PC.



Note: Revert Your Firewall and Network Settings, After completing your file transfer process.