

## **Week 2. Connect the computers in LAN, Study of basic network commands and network configuration commands.**

**Objective:** To show how the computers are connected in LAN and Analyze the Host information, Packet Information and details of network by using different network commands and network configuration commands.

**Outcome:** Student will able to Connect Computers in LAN and implement basic network commands and configuration commands.

### **Procedure:**

#### **Procedure to connect the computers in LAN:**

On the host computer, follow these steps to share the Internet connection:

1. Log on to the host computer as Administrator or as Owner.
2. Click Start, and then click Control Panel.
3. Click Network and Internet Connections.
4. Click Network Connections.
5. Right-click the connection that you use to connect to the Internet. For example, if you connect to the Internet by using a modem, right-click the connection that you want under Dial-up/other network available.
6. Click Properties.
7. Click the Advanced tab.
8. Under Internet Connection Sharing, select the Allow other network users to connect through this computer's Internet connection check box.
9. If you are sharing a dial-up Internet connection, select the Establish a dial-up connection whenever a computer on my network attempts to access the Internet check box if you want to permit your computer to automatically connect to the Internet.
10. Click OK. You receive the following message: When Internet Connection Sharing is enabled; your LAN adapter will be set to use IP address 192.168.0.1. Your computer may lose connectivity with other computers on your network. If these other computers have static IP addresses, it is a good idea to set them to obtain their IP addresses automatically. Are you sure you want to enable Internet Connection Sharing.
11. Click Yes.

The connection to the Internet is shared to other computers on the local area network (LAN). The network adapter that is connected to the LAN is configured with a static IP address of 192.168.0.1 and a subnet mask of 255.255.255.0

#### **On the client computer:**

To connect to the Internet by using the shared connection, you must confirm the LAN adapter IP configuration, and then configure the client computer.

To confirm the LAN adapter IP configuration, follow these steps:

1. Log on to the client computer as Administrator or as Owner.
2. Click Start, and then click Control Panel.
3. Click Network and Internet Connections.
4. Click Network Connections.
5. Right-click Local Area Connection and then click Properties.

6. Click the General tab, click Internet Protocol (TCP/IP) in the connection uses the following items list, and then click Properties.

7. In the Internet Protocol (TCP/IP) Properties dialog box, click Obtain an IP address automatically (if it is not already selected), and then click OK.

Note: You can also assign a unique static IP address in the range of 192.168.0.2 to 254. For example, you can assign the following static IP address, subnet mask, and default gateway.

8. IP Address 192.168.31.202

9. Subnet mask 255.255.255.0

10. Default gateway 192.168.31.1

11. In the Local Area Connection Properties dialog box, click OK.

12. Quit Control Panel.

### Create a LAN Connection using two computers with a LAN Cable:

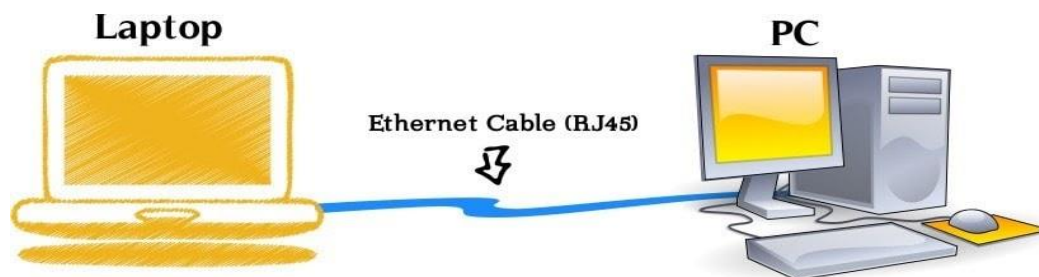
#### Setup Two Computers Via LAN For Sharing:

The first thing you'll have to make sure is, you do have a crossover cable in your hand to connect to two computers **because cross-over and straight cable both looks same but works differently**. Mainly **to connect two different networking devices** we need to use a **straight Ethernet cable** and **to connect two same devices** we need to use a **crossover Ethernet cable**, and the actually different in these two different kinds of cables is the internal wire connection.

So, make sure you have a **crossover cable** because it's the only way to connect two computers without a modem or switch, or otherwise you can use a straight cable if both of your computers is connected to the **network device** like a **Router, Network Switch** or a **Modem**.

#### Step 1 – Creating A Physical Connection:

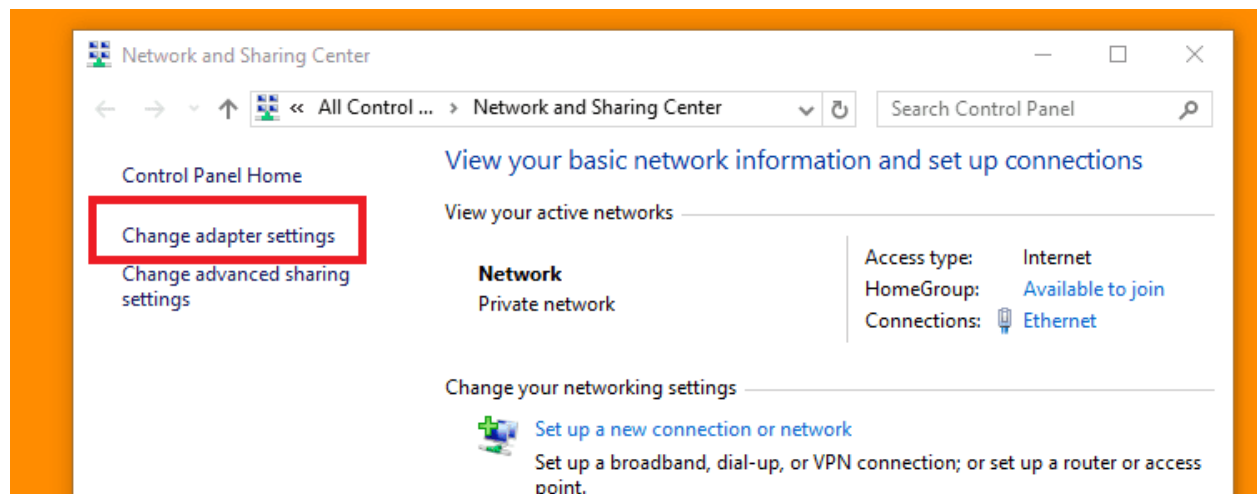
Now the first thing what you'll need to do is to connect each end of your **LAN** cable into both of your computer's **Ethernet Port** to connect both computers with each other. If you're using a **modem** or **router switch** then make sure everything is connected properly.



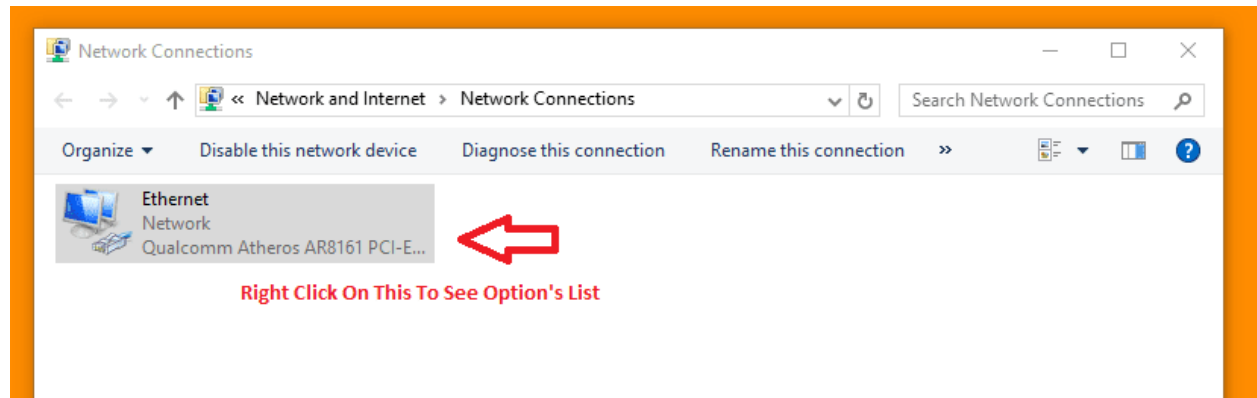
#### Step 2 –LAN Connection Setting

After connecting everything now it's time to setup an **IP address** in both your computers to make your computer to identify the connection. You'll just need to follow this same procedure in both of your computers or maybe laptops.

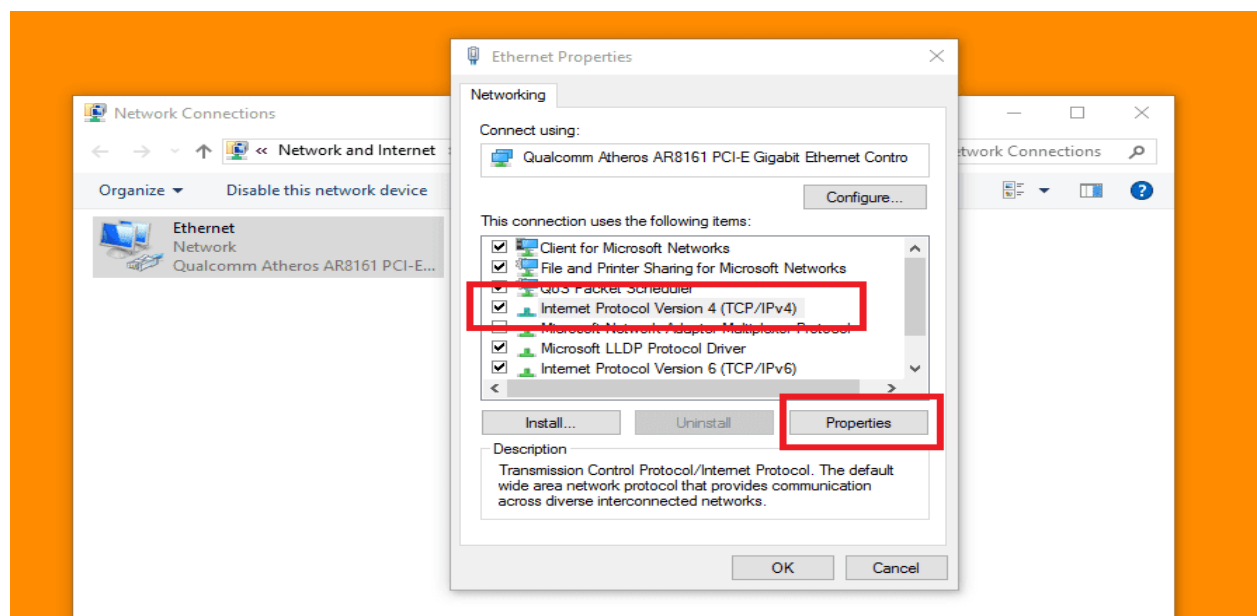
- Open your **Windows Control Panel**, or you can search for “**Network and Sharing Center**” in the **Start Menu**.
- Select the **Network and Sharing Center** option.
- From the left sidebar, click on “**Change Adapter Settings**” option.



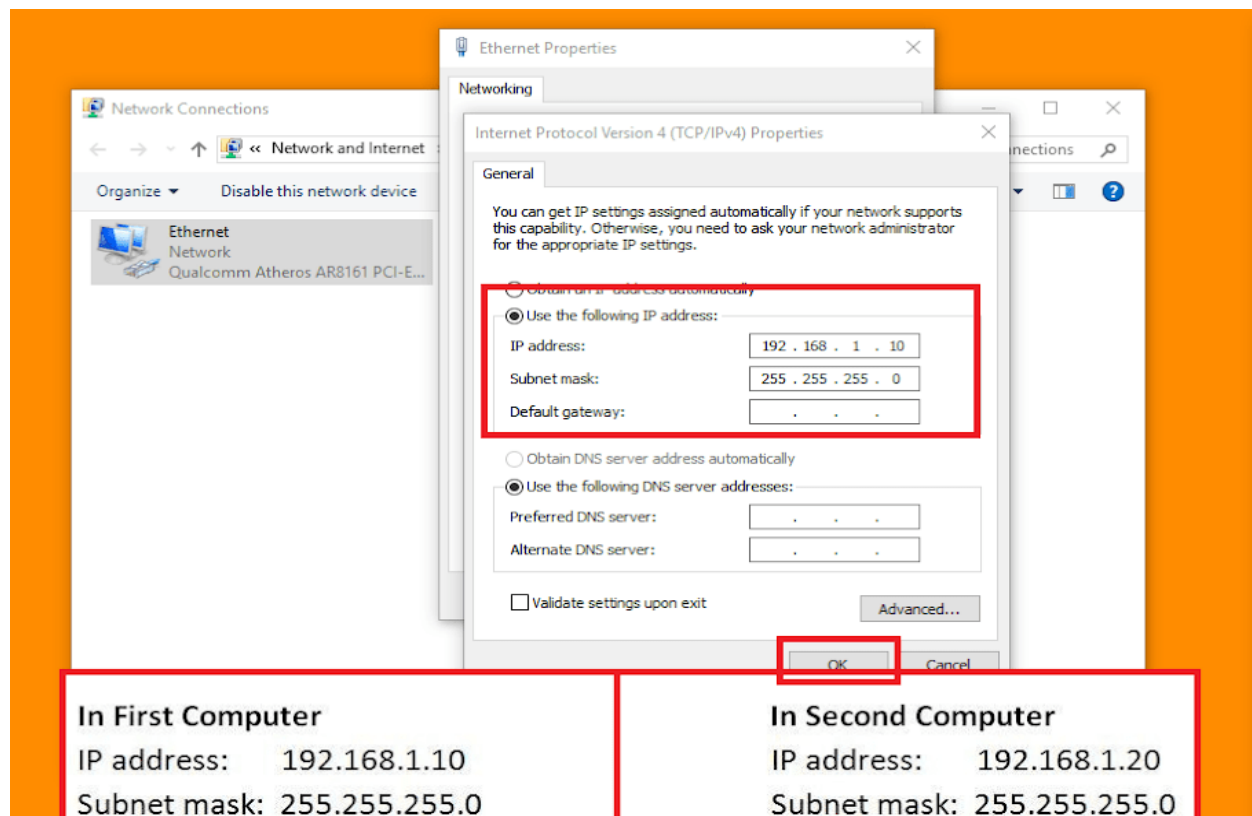
- After that, open your “**Local Area Connection**” or I say **Ethernet Adaptor’s** properties.



- Now select the “**Internet Protocol Version 4 (TCP/IPv4)**” option and then click on its “**Properties**” button.



- Now when the “**Internet Protocol Version 4 (TCP/IPv4) properties**” windows get popped up. Enter the IP address manually as shown in the picture given below and click on the “**Ok**” button after entering it.



This IP address given the picture is only going to work when you connect both of your computers via crossover cable.

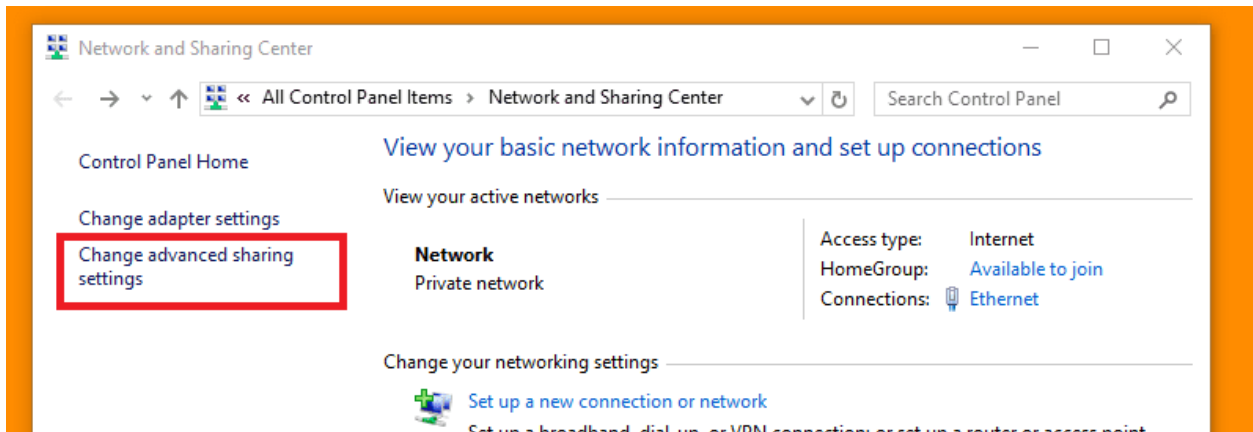
**NOTE:** If you have a **modem** or **WIFI router**, then you'll have to add the gateway IP as well. In that case, your **IP** should need to look like this –

In First Computer	In Second Computer	For Third, Fourth And So On
IP address: 192.168.1.10	IP address: 192.168.1.20	← change the last two digit no. and it will be differ for all different computers
Subnet mask: 255.255.255.0	Subnet mask: 255.255.255.0	
Default gateway: 192.168.1.1	Default gateway: 192.168.1.1	

### Step 3 – Change Default Sharing Setting:

After entering the **IP Address** in both of your computers, now you'll need to change the sharing setting of your computers to permit **access rights** for another computer.

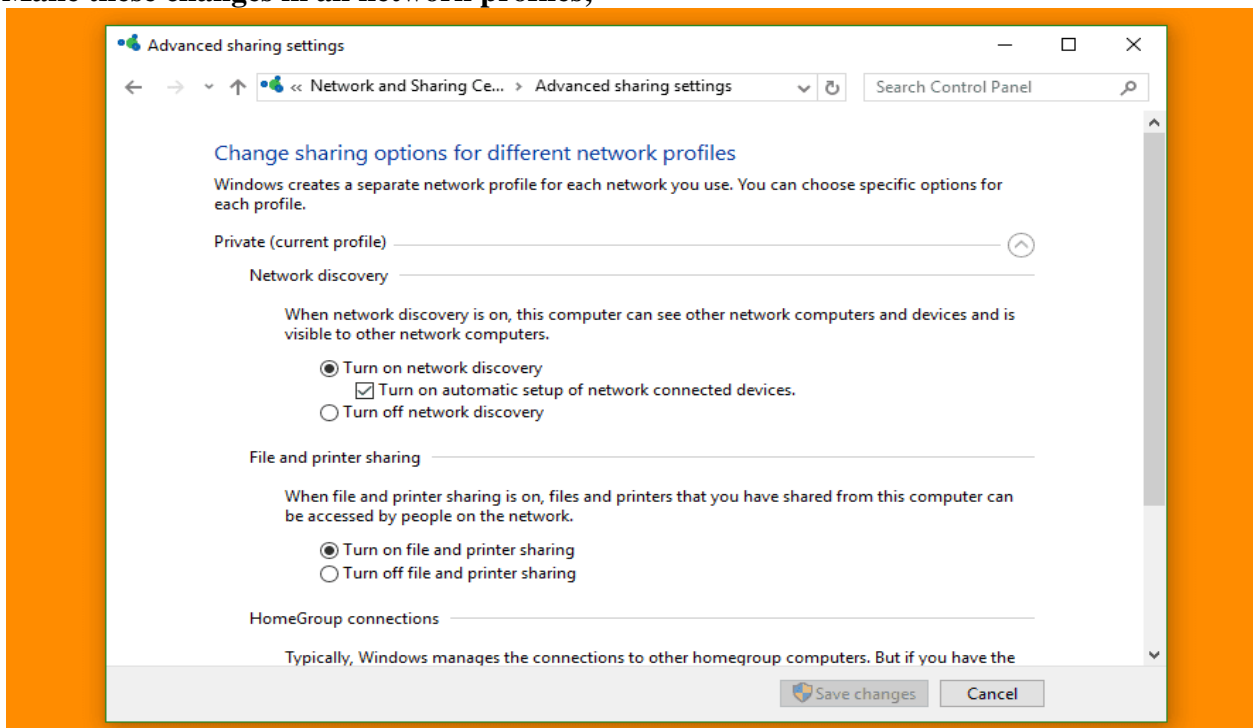
To do that, first, you'll again have to go back to the Network and Sharing Center settings page of your Windows and then select the “**Advanced sharing settings**” option to see all your computers network sharing setting.



After when the sharing setting window gets opened, now you'll need to change your network setting to those options as shown listed below:

- **Turn on** network discovery
- **Turn on** file and printer sharing
- **Allow** windows to manage homegroup connection (recommended)
- **Turn on** sharing so anyone with network access can read and write files in the public folders
- **Use 128-bit** encryption to help protect files sharing connections (recommended)
- **Turn off** password protected sharing.

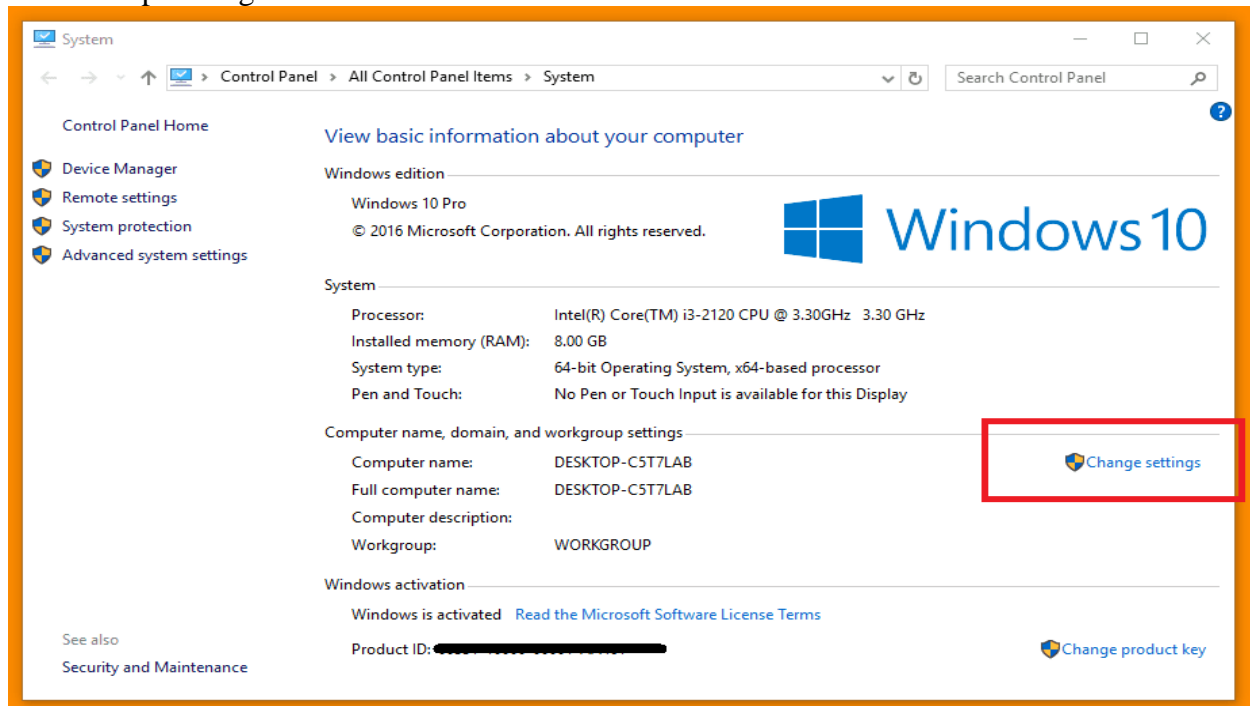
**Make these changes in all network profiles;**



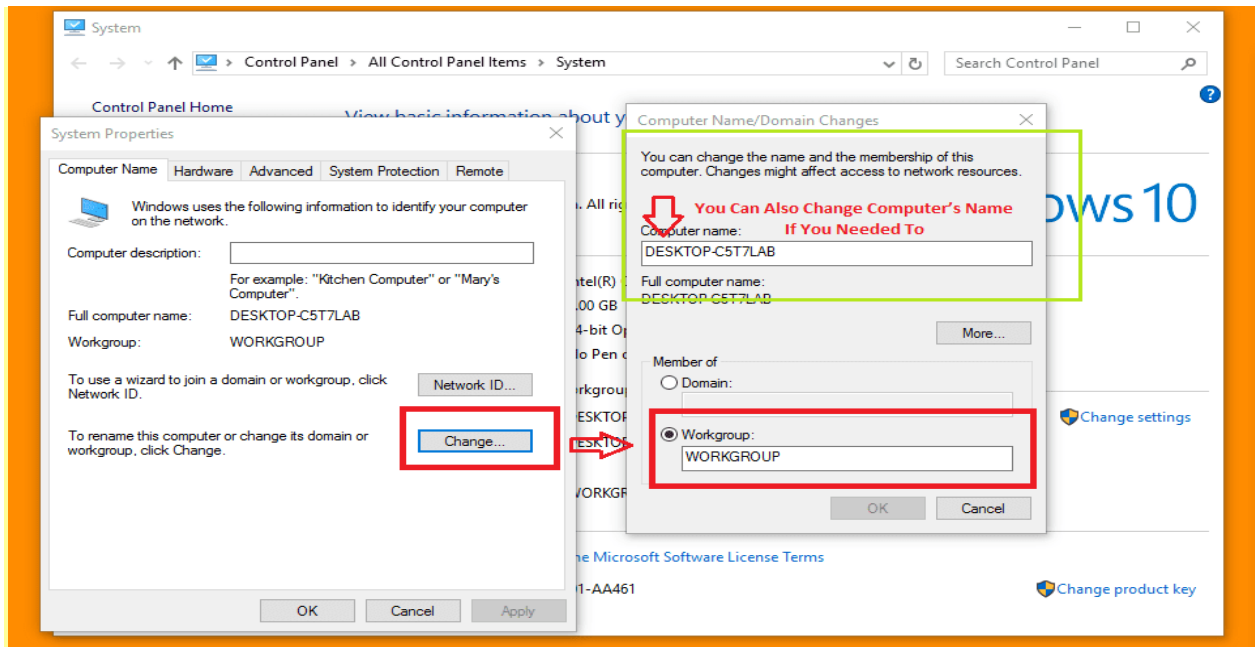
## Step 4 – Change Default Workgroup Setting

By the use of this setting, you can create the same **workgroup** for both computers to start sharing, by connected both of them in the same workgroup. **Workgroup setting** must be same in both your computers but the computer's name should be different to identify both.

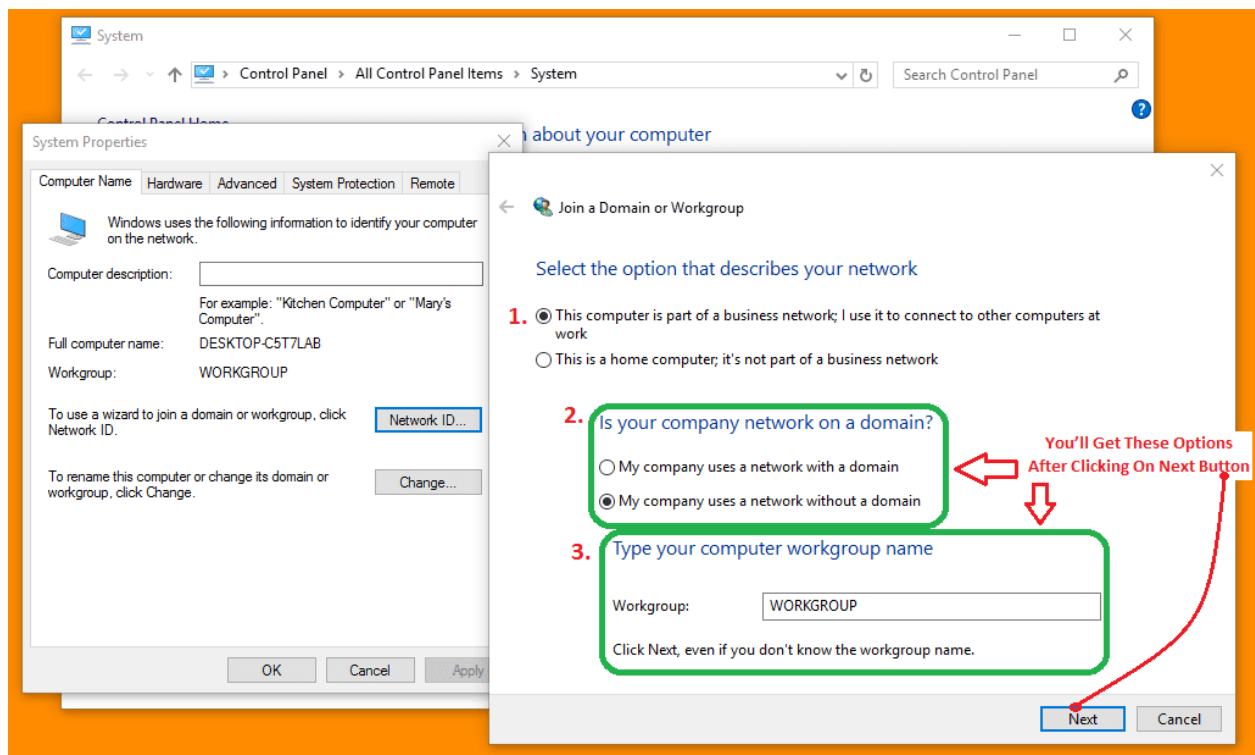
- First, you'll have to Right click on Computer and then select properties option. (or) press **Windows + Pause Break** Key on your keyboard to open your system's properties window.
- After that, click on “**Change setting**” in workgroup settings category as shown in the picture given below.



Now in the System properties, you'll need to click on the change button, and then you will be able to see the other options for changing your **Computer's Name**. So first, click on the “**Change**” button then type “**WORKGROUP**” in the ‘Workgroup:’ options and then click on “ok”. After that, you'll have to do the same thing again on your different computer which you wanted to connect (or maybe on all computers of your LAN sharing computers).



After that click on “**Network ID**” and do this manual setting as given in the picture given below:



After that click on **Finish** and restart both of your computers.

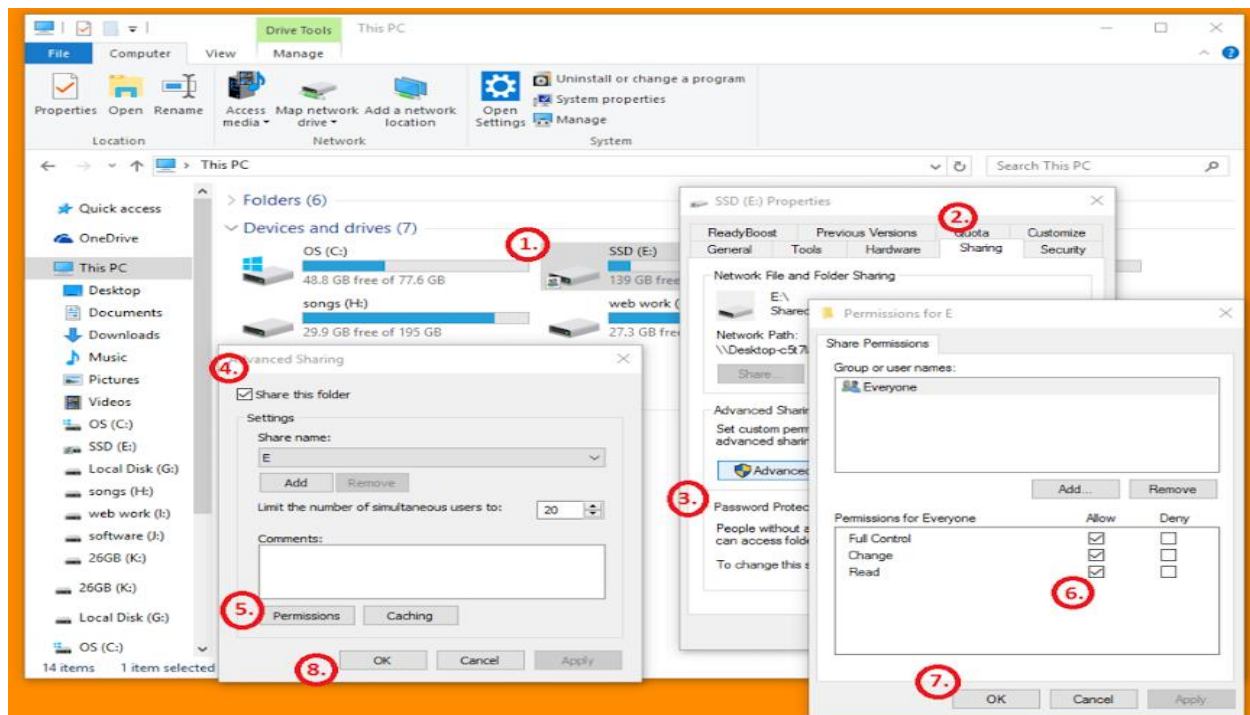


### Step 5- At Last, Turn On Drive Sharing:

Now you will be able to see your both computer in your windows network place location and to share your drive via network you'll just need to Turn On the drive sharing by making some changes in that drive's properties.

Here's the list of some steps what you can follow to turn on the drive sharing in your computer or laptop:

- Right click on your drive and select **Properties**.
- Then, select **"Sharing"**.
- Then, click on **"Advanced Sharing"**.
- Then, tick the **"Share this folder"**.
- Then, click on **"Permissions"**.
- Then, tick on **"Full control"**.
- Then, click on **"OK"**.
- At last, click on **"OK"** again and that's it.



**Result:** LAN Connection created successfully using Two Computers with a LAN cable.



## **Basic network commands and network configuration commands:**

### **C:>ping**

Ping is the most basic TCP/IP command, and it's the same as placing a phone call to your best friend. You pick up your telephone and dial a number, expecting your best friend to reply with "Hello" on the other end. Computers make phone calls to each other over a network by using a Ping command. The Ping commands main purpose is to place a phone call to another computer on the network, and request an answer. Ping has 2 options it can use to place a phone call to another computer on the network. It can use the computers name or IP address.

### **C:>ipconfig**

The ipconfig command displays information about the host (the computer your sitting at)computer TCP/IP configuration. TCP : transmission control protocol  
IP :internet protocol

### **C:>ipconfig /all**

This command displays detailed configuration information about your TCP/IP connection including Router, Gateway, DNS, DHCP, and type of Ethernet adapter in your system.

### **C:>ipconfig /release**

This command allows you to drop the IP lease from the DHCP server.

### **C:>ipconfig /renew**

Using this command will renew all your IP addresses that you are currently (leasing) borrowing from the DHCP server. This command is a quick problem solver if you are having connection issues, but does not work if you have been configured with a static IP address.

### **C:\>nbtstat -a**

This command helps solve problems with NetBIOS name resolution. (Nbt stands for NetBIOS over TCP/IP) Definitions

### **C:\>arp -a**

it is short for address resolution protocol, It will show the IP address of your computer along with the IP address and MAC address of your router.

### **C:\>hostname:**

This is the simplest of all TCP/IP commands. It simply displays the name of your computer.

### **C:\>Ipconfig /renew:**

Using this command will renew all your IP addresses that you are currently (leasing) borrowing from the DHCP server. This command is a quick problem solver if you are having connection issues, but does not work if you have been configured with a static IP address.

### **C:\>Ipconifg /release:**

This command allows you to drop the IP lease from the DHCP server.

### **C:\>ipconfig /flushdns:**

This command is only needed if you're having trouble with your networks DNS configuration. The best time to use this command is after network configuration frustration sets in, and you really need the computer to reply with flushed.

**C:\>nbtstat -a:**

This command helps solve problems with NetBIOS name resolution. (Nbt stands for NetBIOS over TCP/IP) Definitions.

**C:\>netdiag:**

Netdiag is a network testing utility that performs a variety of network diagnostic tests, allowing you to pinpoint problems in your network. Netdiag isn't installed by default, but can be installed from the Windows XP CD after saying no to the install. Navigate to the CD ROM drive letter and open the support\tools folder on the XP CD and click the setup.exe icon in the support\tools folder.

**C:\>netstat:**

Netstat displays a variety of statistics about a computers active TCP/IP connections. This tool is most useful when you're having trouble with TCP/IP applications such as HTTP, and FTP.

**C:\>nslookup:**

nslookup is used for diagnosing DNS problems. If you can access a resource by specifying an IP address but not it's DNS you have a DNS problem.

**C:\>pathping:**

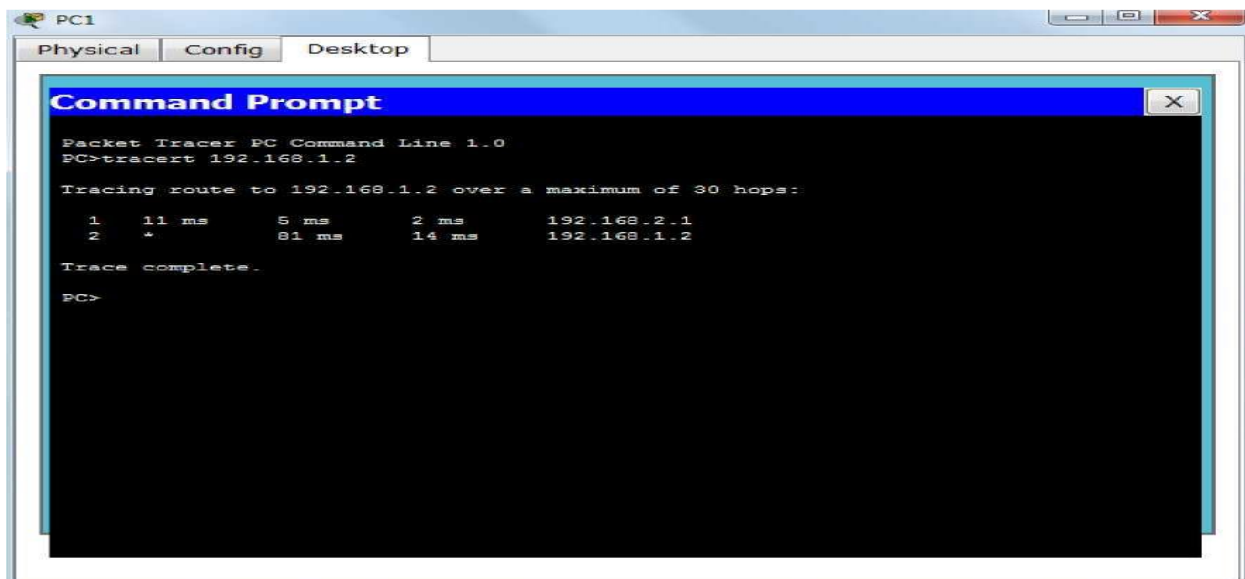
Pathping is unique to Window's, and is basically a combination of the Ping and Tracert commands. Pathping traces the route to the destination address then launches a 25 second test of each router along the way, gathering statistics on the rate of data loss along each hop.

**C:\>route:**

The route command displays the computers routing table. A typical computer, with a single network interface, connected to a LAN, with a router is fairly simple and generally doesn't pose any network problems. But if you're having trouble accessing other computers on your network, you can use the route command to make sure the entries in the routing table are correct.

**C:\>tracert:**

The tracert command displays a list of all the routers that a packet has to go through to get from the computer where tracert is run to any other computer on the internet.

**Input/Output:**

The screenshot shows a Packet Tracer PC Command Line window for PC1. The window has tabs for Physical, Config, and Desktop. The Command Prompt is open, displaying the output of the 'tracert 192.168.1.2' command. The output shows a successful trace to 192.168.1.2 over 2 hops.

```
Packet Tracer PC Command Line 1.0
PC>tracert 192.168.1.2

Tracing route to 192.168.1.2 over a maximum of 30 hops:

  0  11 ms    5 ms     2 ms    192.168.2.1
  1  *         81 ms    14 ms    192.168.1.2

Trace complete.

PC>
```

## Discussion Topics:

### 1. What are ipconfig and ifconfig?

**Ipconfig** stands for Internet Protocol Configuration and this command is used on Microsoft Windows to view and configure the network interface.

The command ipconfig is useful for displaying all TCP/IP network summary information currently available on a network. It also helps to modify the DHCP protocol and DNS setting.

**Ifconfig** (Interface Configuration) is a command that is used on Linux, Mac, and UNIX operating system. It is used to configure, control the TCP/IP network interface parameters from CLI i.e. Command Line Interface. It allows you to see the IP addresses of these network interfaces.

### 2. What is the purpose of DHCP?

DHCP stands for Dynamic Host Configuration Protocol and it automatically assigns IP addresses to the network devices. It completely removes the process of manual allocation of IP addresses and reduces the errors caused due to this. This entire process is centralized so that TCP/IP configuration can also be completed from a central location. DHCP has “pool of IP addresses” from which it allocates the IP address to the network devices. DHCP cannot recognize if any device is configured manually and assigned with the same IP address from the DHCP pool.

### 3. Compare LAN, WAN, MAN?

There are 4 major types of network.

- **Personal Area Network (PAN):** It is a smallest and basic network type that is often used at home. It is a connection between the computer and another device such as phone, printer, modem tablets etc
- **Local Area Network (LAN):** LAN is used in small offices and internet cafe to connect a small group of computers to each other. Usually, they are used to transfer a file or for playing the game in a network.
- **Metropolitan Area Network (MAN):** It is a powerful network type than LAN. The area covered by MAN is a small town, city etc. A huge server is used to cover such a large span of area for connection.
- **Wide Area Network (WAN):** It is more complex than LAN and covers a large span of area typically a large physical distance. The Internet is the largest WAN which is spread across the world. WAN is not owned by any single organization but it has distributed ownership.

### 4. What is the use of nslookup and Tracert Command?

**nslookup** : Displays information from Domain Name System (DNS) name servers.

**Traceroute:** Tracert is a command which can show you the path a packet of information takes from your computer to one you specify. It will list all the routers it passes through until it reaches its destination, or fails to and is discarded. In addition to this, it will tell you how long each 'hop' from router to router takes.

### 5. Distinguish between multicasting and broadcasting.

In the **broadcast**, the packet is forwarded to all the hosts connected to the network whereas, in **multicast**, the packet is forwarded only to intended recipients.

In **broadcast**, the transmission of a packet is one-to-all whereas, in **multicast** the transmission of a packet is one-to-many. No group management is required in **broadcasting** whereas; the group management is required in **multicasting** to define the networks in which at least one host is interested in receiving the packet.