
AI

15. STUDY OF VARIOUS LAN DEVICES.

Aim: Study of various LAN Devices

Description :

A Local Area Network (LAN) is a computer network that connects devices within a limited geographic area, such as a building or a campus. LANs typically allow computers and other devices to share resources such as printers, files, and Internet access.

Here are key points for each of the LAN devices you mentioned:

1. Hub:

- Hubs are simple devices used for network connectivity that allow multiple devices to be connected to a LAN.
- They receive signals from a device and send them out to all other connected devices, regardless of whether the signal is intended for them or not.
- Hubs are considered outdated technology and have largely been replaced by switches.

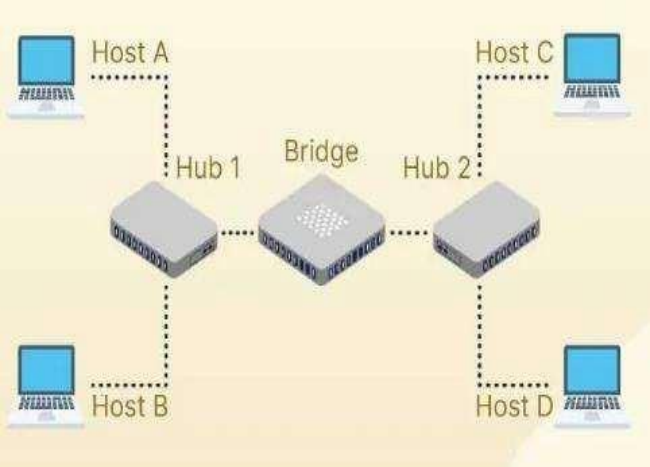
2. Switch:

- Switches are used to connect multiple devices to a LAN and enable communication between them.
- They operate by forwarding data packets only to their intended destination, which reduces network traffic and improves overall network performance.
- Switches are also used for network security as they allow administrators to monitor and control traffic flow.

3. Router:

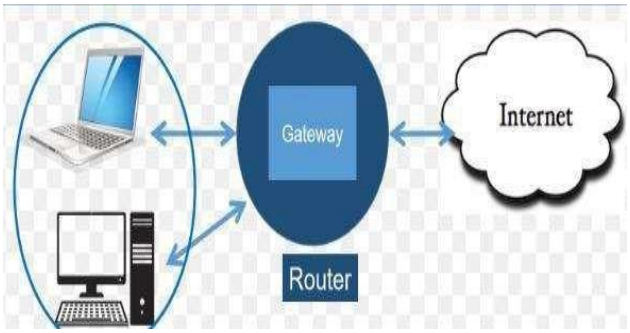
- Routers are networking devices that connect LANs together or connect a LAN to a larger network, such as the Internet.
- They are responsible for directing network traffic between devices on different networks and ensuring that data is sent to its correct destination.
- Routers provide security features such as firewalls and access controls to protect networks from unauthorized access.

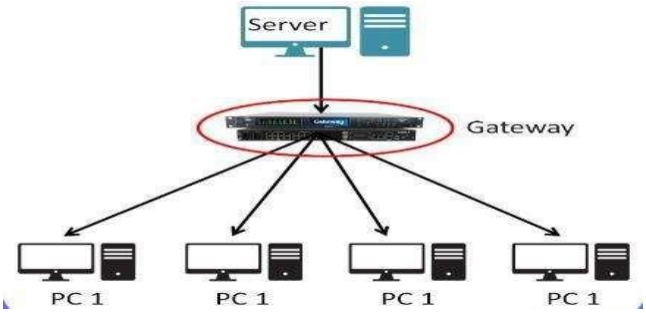
4. Bridge:



- Bridges are used to connect two LANs together and allow communication between them.
- They work by forwarding data packets between the two networks and filtering out unnecessary traffic.
- Bridges are useful in extending the reach of a LAN and can be used to connect LANs in different buildings or locations.

5. Gateway:

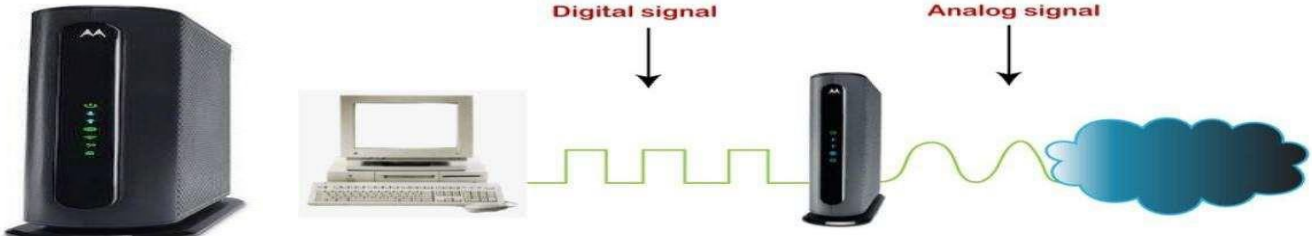




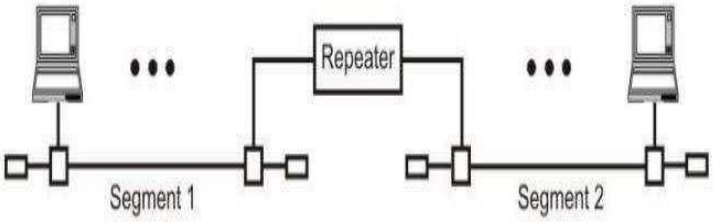
- Gateways are used to connect different types of networks together, such as connecting a LAN to the Internet.
- They translate data between different protocols and network architectures, allowing communication between networks that use different standards.
- Gateways are essential for enabling communication between networks with different technologies.

6. Modem:

- Modems are used to connect a LAN to the Internet over a telephone or cable line.
- They translate digital data from a LAN into analog signals that can be transmitted over telephone or cable lines, and vice versa.
- Modems are commonly used by households and small businesses to access the Internet.



7. Repeater:

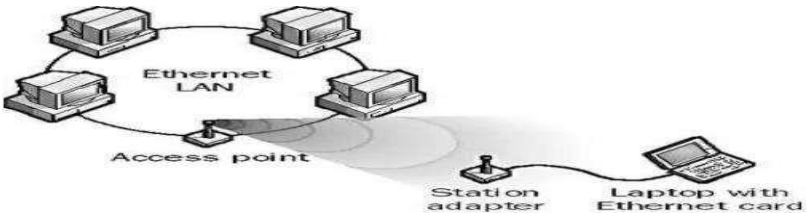


- Repeaters are used to extend the range of a LAN by regenerating signals and sending them on to the next device.
- They amplify signals to compensate for signal loss over long distances or through interference.
- Repeaters are useful for connecting LANs in different buildings or locations, where signals may need to be transmitted over longer distances.

8. Access Point:

Access Points are wireless devices used to connect devices to a wireless LAN.

- They allow multiple devices to connect to a LAN using Wi-Fi, and can provide Internet access to these devices.
- Access Points are commonly used in public places such as airports, cafes, and hotels to provide WiFi access to customers.



Result : We have learnt about some of LAN Devices.

16. INSTALL AND CONFIGURE WIRED AND WIRELESS NIC

Aim: Installation of Network Interface card

Tools Required: NIC card, Screw driver, System

Theory: NIC Short for **Network Interface Card,** the **NIC** is also referred to as an **Ethernet card** and **network adapter.** It is an expansion card that enables a computer to connect to a network; such as a home network, or the Internet using an Ethernet cable with an RJ-45 connector. Due to the popularity and low cost of the Ethernet standard, most new computers have a network interface build directly into the motherboard.

INSTALLATION OF WIRED NIC CARD:

- First step is to read the user's guide and familiarize yourself with the new card.
- Power down PC and remove the AC power cord.
- Open the computer case.
- Find an available Peripheral Component Interconnect (PCI) slot on the motherboard and remove slot insert if one exists.
- Carefully remove the network card from its static-proof plastic envelope, and slide it into the slot.
    - Seat the card in the slot firmly with gentle pressure along the length of the card, especially right about the slot itself.
    - screw the card to the computer frame, but do not over tighten.
- Close the computer case.
- Plug your computer in and power it up.

INSTALLATION OF WIRELESS NIC CARD:

1. Shut down your computer and unplug it completely. If you're installing a full card (not just a USB adapter), make sure the machine is off and unplugged.
2. Open the cover of your desktop. For most PCs, this involves pulling down the side panel or removing part of the case. Some older PCs may require unscrewing connector pins at the back of the case.

3. Locate the correct slot for the wireless card: Find an empty PCI slot. Remove the faceplate for that port before installing the card.
4. Insert the wireless card: Insert the card firmly into the PCI slot. Use a head screwdriver to attach any screws associated with the card. Attach the antenna to the outside of the card.
5. **Close your case** and run any software that came with your wireless card.

INSTALLATION OF USB NIC :

1. Unpack the USB Wi-Fi adapter and verify that it comes with the installation CD.
2. Insert the installation CD into your computer's CD/DVD drive.
3. Follow the on-screen instructions to complete the Wi-Fi adapter software installation.
4. Plug the USB WiFi adapter into an available USB port on your computer.
5. Wait for Windows 10 to recognize the new device and install the necessary drivers.
6. Once the installation is complete, restart your computer.

To verify and install NIC driver :

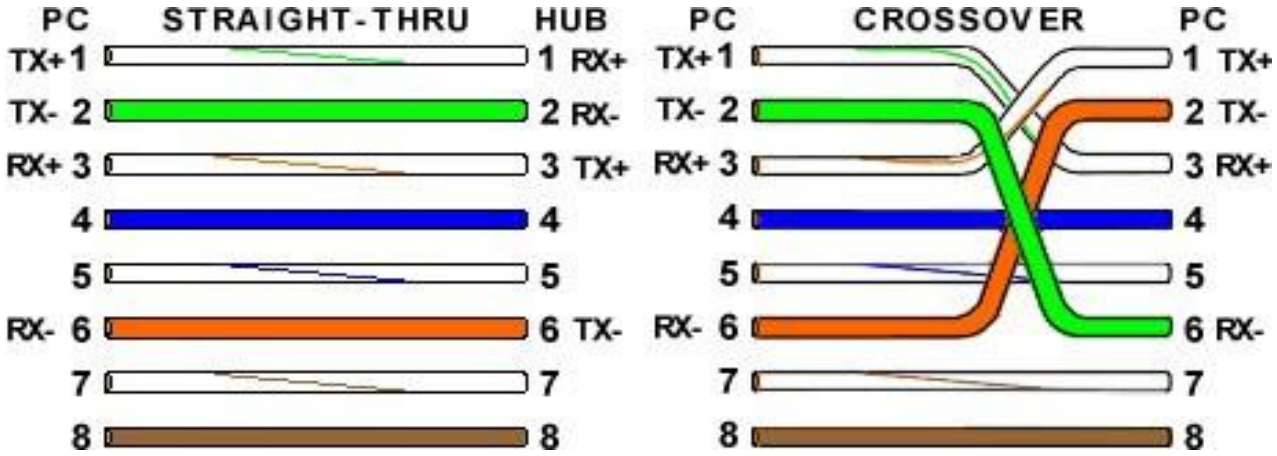
- Click start and click Control Panel.
- In Category view, click Hardware and Sound, and then, under Devices and Printers, click the Device Manager link.
- From the Device Manager window displayed, double-click on Network Adapters to display the network adapter in your computer.
- If you see the NIC and it doesn't have a problem icon (an exclamation mark), Windows thinks that the NIC driver is installed and running properly. If you double-click the device, you should see the device status - This device is working properly.
- If you see your NIC with a problem icon, double-click the NIC. You will most likely see a device status message telling you that a driver was not installed.
- If you don't see your NIC in the Device Manager window, click the Action menu, and click the Add legacy hardware option.
- From the Add Hardware Wizard window displayed. Click Next button to continue.
- Select the option Install the hardware that I manually select from a list (Advanced) and click Next button.
- From the window displayed, scroll down and double-click on Network adapters in the Common hardware types list. A list of network adapters appears. If your NIC had been on the list, Windows would have found and install the driver for it.
- So click on Have Disk button. Then, click Browse button to locate the appropriate drive or folder for the NIC driver, and click Open.
- You will see the driver path is displayed on the Install From Disk window, click OK, and click Next button to continue. When told that the device will be installed, click Next again.
- You may see a message stating that the driver you are about to install does not have a Microsoft digital signature. Click Yes to continue install it.
- When finish, click Finish.

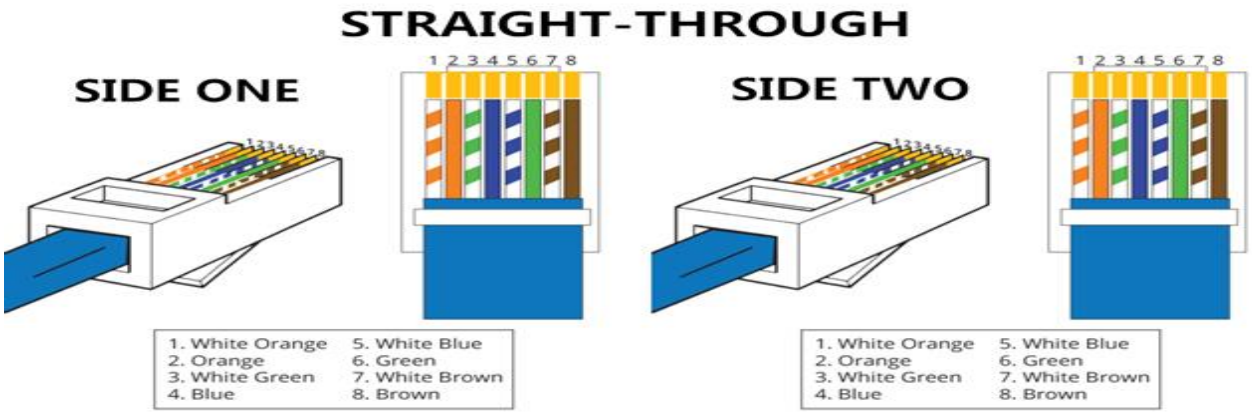
17. PREPARING THE UTP CABLE (CAT-5 OR CAT-6) FOR CROSS AND STRAIGHT CONNECTIONS USING CRIMPING TOOL.

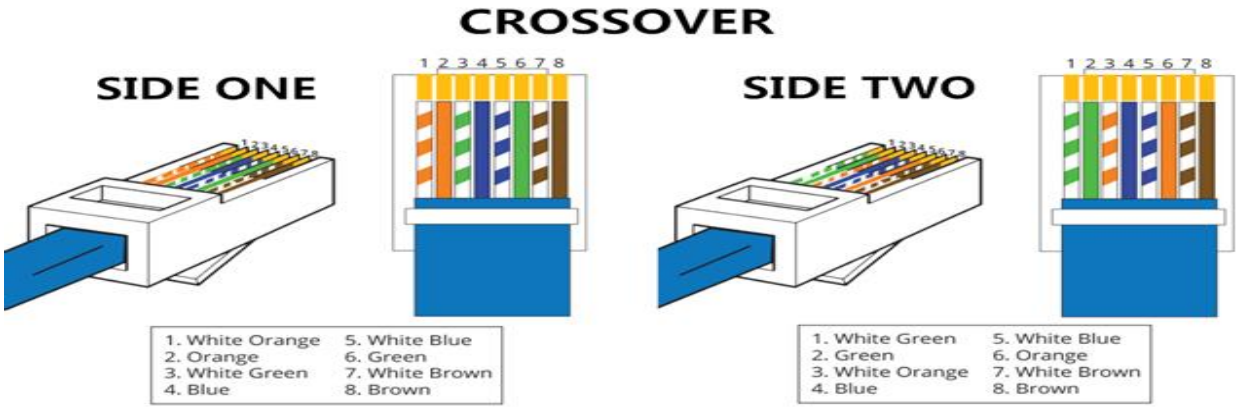
Aim: To Prepare the Straight and Cross over Ethernet cable.

Tools required: Crimping Tool, CAT 5 Cable, RJ45 Connectors

Procedure: Color codes for Straight and Cross Over cables is as follows







Step 1: Pull the cable off the reel to the desired length and cut. The total length of wire segments between a PC and a hub or between two PC's cannot exceed 100 Meters (328 feet) .

Step 2: Start on one end and strip the cable jacket off (about 1") using a stripper or a knife. Be extra careful not to nick the wires, otherwise you will need to start over.

Step 3: Spread, untwist the pairs, and arrange the wires in the order of the desired cable end. Flatten the end between your thumb and forefinger. Trim the ends of the wires so they are even with one another, leaving

only 1/2" in wire length.

Step 4: Hold the RJ-45 plug with the clip facing down or away from you. Push the wires finnly into the plug. Inspect each wire is flat even at the front of the plug. Check the order of the wires. Double check again. Check that the jacket is fitted right against the stop of the plug. Carefully hold the wire and firmly crimp the RJ-45 with the crimper.

Step5: Check the color orientation, check that the crimped connection is not about to come apart, and check to see if the wires are flat against the front of the plug. If even one of these are incorrect, you will have to start over. Test the Ethernet cable.

Ethernet Cable Tips:

1. A straight-thru cable has identical ends.
2. A crossover cable has different ends.
3. A straight-thru is used as a patch cord in Ethernet connections.
4. A crossover is used to connect two Ethernet devices without a hub or for connecting two hubs.
5. A crossover has one end with the Orange set of wires switched with the Green set.
6. Looking at the RJ-45 with the clip facing away from you, Brown is always on the right, and pin 1 is on the left.
7. No more than 1/2" of the Ethernet cable should be untwisted otherwise it will be susceptible to crosstalk.
8. Do not deform, do not bend, do not stretch, do not staple, do not run parallel with power cables, and do not run Ethernet cables near noise inducing components.

Result: Successfully prepared straight and cross over cables using RJ45 connectors

18. INSTALL AND CONFIGURE NETWORK DEVICES: HUB, SWITCH.

INSTALATION OF HUB:

Aim: Install and write the configuration of a hub.

Resources Required: Computers ,a hub,ethernet cable and power source.

Procedure:

Step 1:Find the WAN or uplink port of the Ethernet hub. Typically, it is located on the rear of the unit, and it is often separate from the LAN ports.

Step 2:Connect an Ethernet cable from the WAN port of the hub to an expanding network(internet)

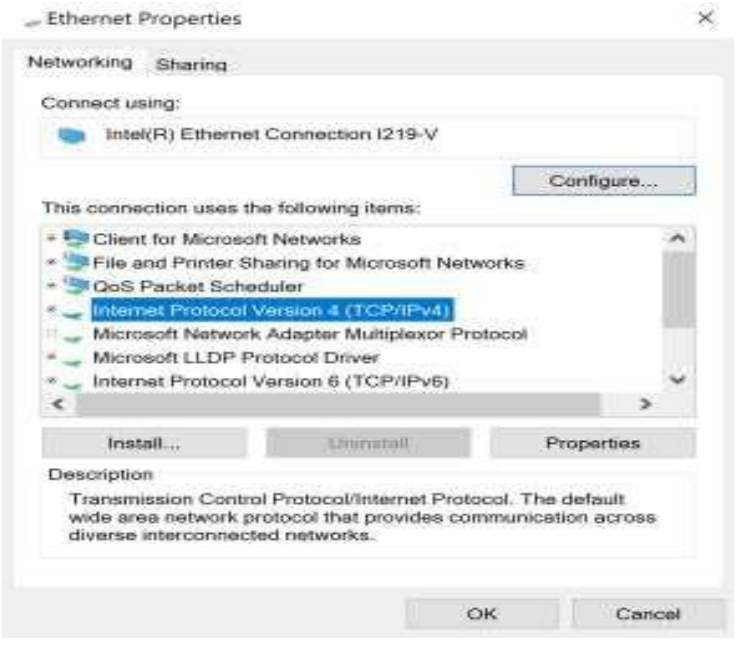
Step 3:Plug an Ethernet cable into one of the LAN ports on the Ethernet hub and connect the other end of cable to the computer or device that will be added to the network. Repeat for any other devices that will need to be on the network.

Step 4:Power up the Ethernet hub and the computers or other devices attached to it. On the front of the hub will be a series of LEDs.

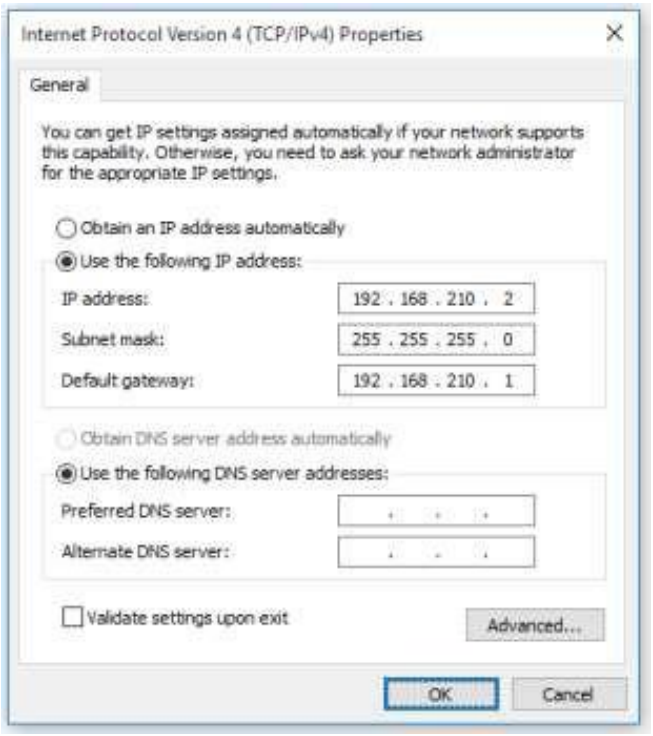
Every port that has a cable plugged into it should have one or more of the LEDs lit that represent that port. If not, check the connections and swap out the Ethernet cable if necessary.

Step 5:Configure the network settings on each connected computer.

1. Click the "Start" button in Windows> "Control Panel" and double-click the icon "Network Connections."
2. Right-click the icon for the Ethernet adapter and select "Properties." Click on the check box marked "Internet Protocol (TCP/IP)" and press the "Properties" button



3. Select "Use the following IP address." Enter a unique IP address for the computer and the applicable subnet mask. Press the **"OK"** button and reboot if necessary.



4. Enable file and printer sharing from the "Properties" dialog for the Ethernet card if files will be transferred between the networked computers.
5. Click the "Start" button> "Control Panel" and double-click on the "System" icon.
6. Select the "Computer Name" tab and click on "Change" to set the computer's network name.
7. In the "Member of' section, choose "Workgroup" and enter the workgroup of the network. If setting up a new network, this name can be change but all computers on the network must share the same workgroup name.
8. Verify that all computers can access the network and the Internet if connected.

Configuration:

Brand	TP-Link
Number of Ports	8
Switch Type	Flow Switch
Platform	Windows CE
Data Transfer Rate	100 Megabits Per Second

Result: We have successfully installed a network using a hub.

INSTALATION OF SWITCH:

Aim: Install and write the configuration of a switch.

Resources Required: Computers ,a switch, ethernet cable and power source.

Procedure:

Step 1: Provide power to the switch, if required.

Step 2: Connect the incoming network cable to the switch (use the first slot so anyone can quickly identify the incoming cable).

Step 3: Connect a Cat5 or Cat6 cable to another slot in the network switch. Connect the other end to a computer you want connected to the network.

Step 4: Repeat this process until a11 the computers are connected or a11 slots are fi11ed.

Every port that has a cable plugged into it should have one or more of the LEDs lit that represent that port. If not, check the connections and swap out the Ethernet cable if necessary.

Step 5:Connect an additional switch if all the ports on first switch are filled. This can be done by connecting ethernet cable from one numbered port of one switch to another numbered port on other switch.

Step 6:Configure the network settings on each connected computer.

Types of Network Switches:

Managed Switch.
Unmanaged Switch.

Managed Switch:A managed network switch is a technology that allows Ethernet devices to communicate with each other and that contains features to configure, manage and monitor traffic on a Local Area Network. A managed network switch provides more control over how data travels over the network and who can access it.

Unmanaged Switch: These don't provide any interface to control the switch and hence cant be controlled.

Configuration:

Manufacturer TP Link
Connectivity technology ethernet

Data Transfer Rate	1000 Mbps
Number of Ports	8
Wattage	4.5 watts

Result: We have successfully installed a network using a switch.

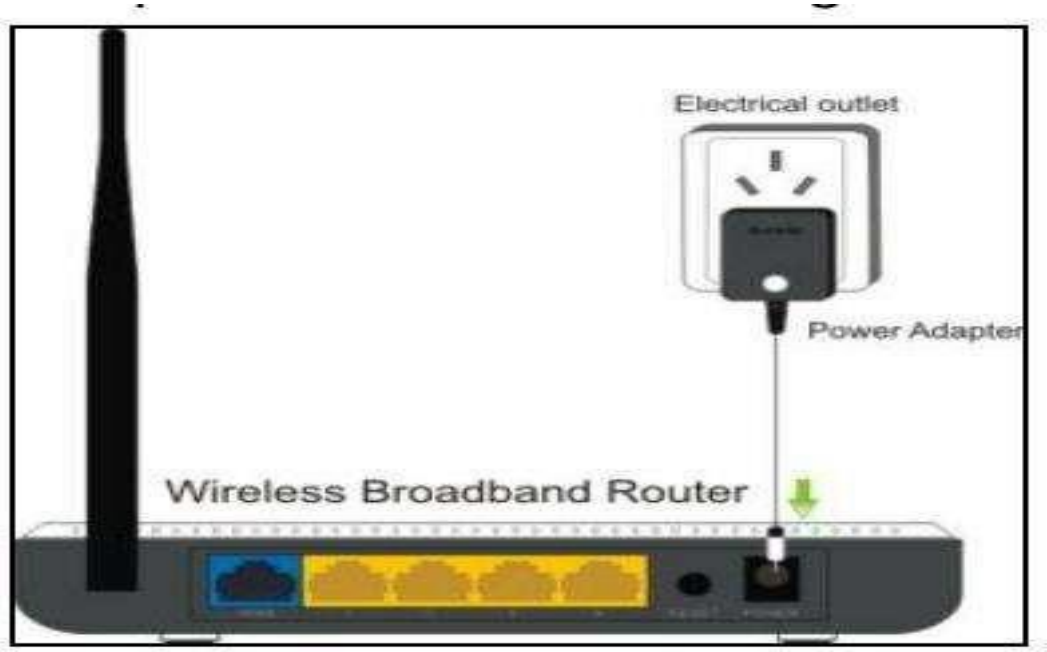
19. INSTALL AND CONFIGURE ROUTER (NORMAL OR WIRELESS)

Aim: Implementation ofWi-Fi Network

Tools required: Crimping Tool, CAT 5 Cable, RJ45 Connectors

Procedure:

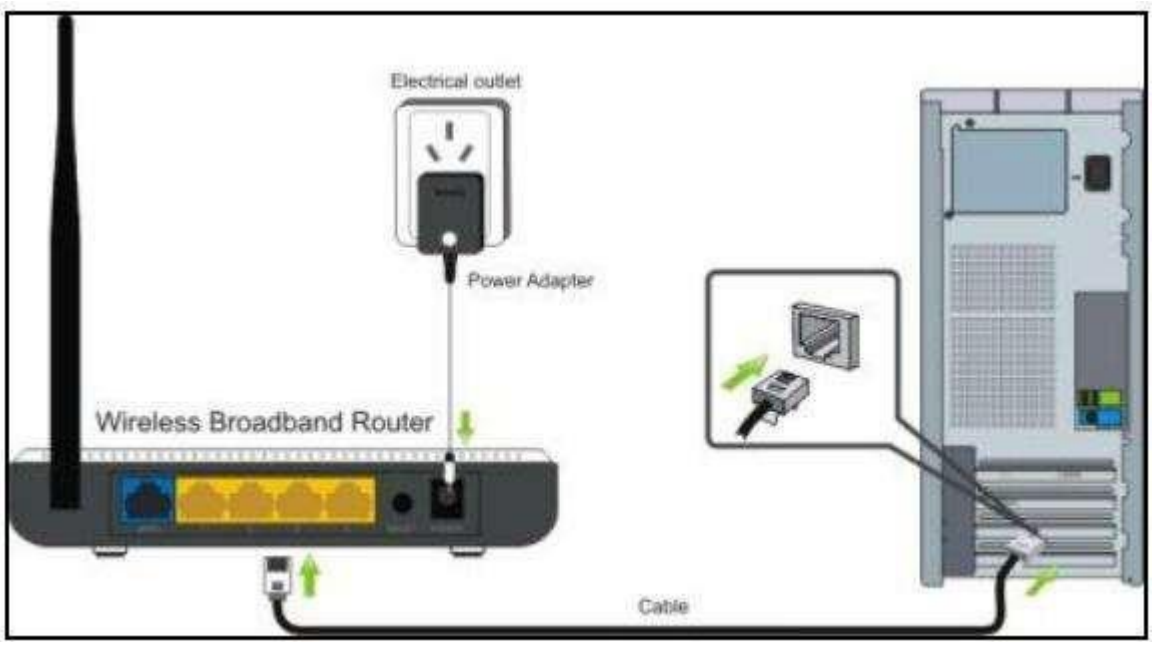
- Please use only the included power adapter to power your router. (NOTE: Use of an unmatched power adapter could cause damage to this product).



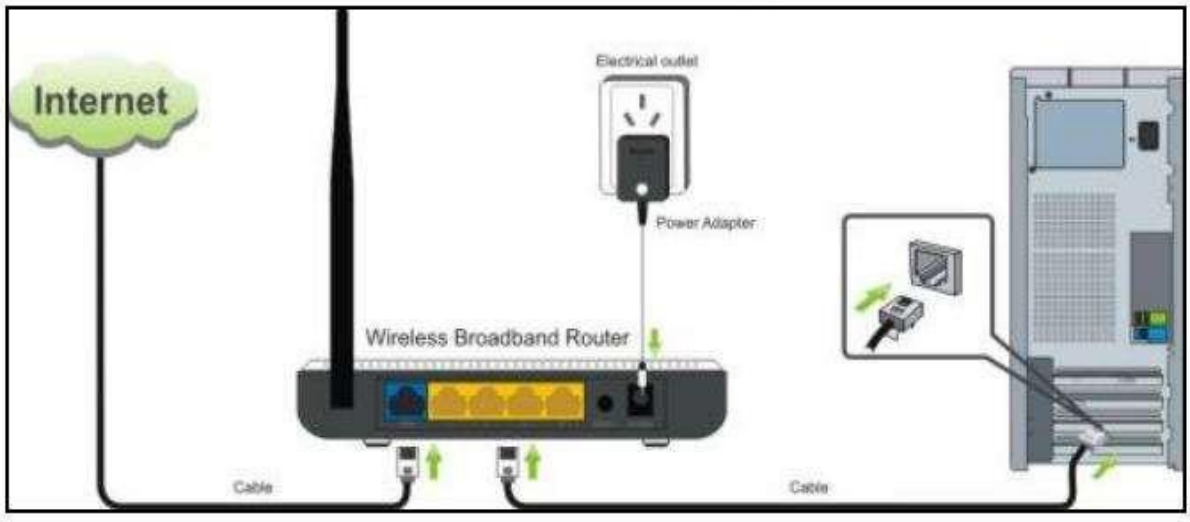
Back panel port description

Port/Button	Description
WAN	Can be connected to Ethernet devices such as MODEM, Switch, Router, etc.. Usually it is used to connect DSL MODEM or Cable MODEM, or ISP network cable for connecting to the Internet.
LAN (1/2/3/4)	Can be connected to an Ethernet switch, Ethernet router, or NIC card. Mostly they are used to connect to computers, Ethernet switches, etc.
RESET/ WPS	The system reset/ WPS button. Press and hold this button for 7 seconds and all of the settings will be deleted and router settings will be restored to factory default. Hold the button for 1 second and the WPS feature will be enabled. The WPS LED will flash when communicating in this mode.
POWER	The jack is for power adapter connection. Please use the included standard power adapter.

- Please connect the router's LAN port to your computer with an Ethernet cable as shown below.



- Please connect your broadband line provided by your ISP to the router's WAN port.



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How to Set the Network Configurations:

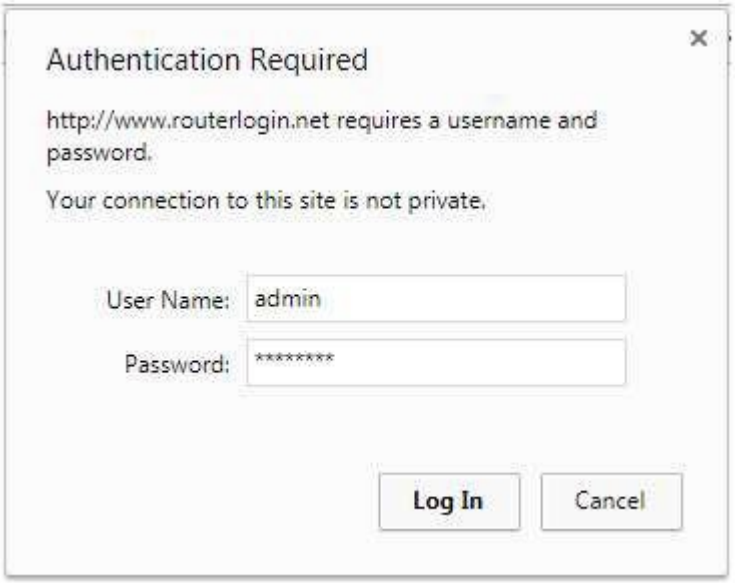
Network Configurations under windows 7 1.

- Click the network icon on the lower right comer of your computer desktop, and then click" Open Network and Sharing Center".
- Click "Change adapter settings" on the left side of the window
- Right click "Local Area Connection" and select "Properties".
- Double click" Internet Protocol Version 4(TCP/IPv4)"
- Select "Obtain an IP address automatically" and "Obtain DNS server address automatically". Click "OK" to save the configurations.

Use the following steps to gain access to your router admin page:

I.First ensure you are using the proper web address, user name, and password.

- Web address: **www.routerlogin.net** or **www.routerlogin.com**
- User Name: **admin**
- Password: **password**



If you receive an error when attempting to access the routerlogin.com or routerlogin.net web address, try clearing your internet browser cache using the following links:

- Google Chrome
- Internet Explorer
- Mozilla Firefox
- Apple Safari

Once you are logged in, Click on **Wireless Settings** under **Setup**
Change the name (SSID) and/or password
Remember to click Apply to save the changes.

- Go to Home page
- Select **ADVANCED> Setup> LAN Setup.**
  The LAN page displays.
- In the Address Reservation section, click the Add button.
  The page adjusts.
- Select an Internet Address radio button:
  1. **Get Dynamically from ISP.** Your ISP uses DHCP to assign your IP address. Your ISP automatically assigns these addresses.
  2. **Use Static IP Addresses.** Enter the IP address, **IP** subnet mask, and the gateway IP address that your ISP assigned. The gateway is the ISP router to which your router connects.

- Click the **Apply** button.Your settings are saved.

Go to BASIC Home page:

- Select **Wireless.The** Wireless Settings page displays.
- Under the Security Options, select a WPA option.
  The WPA2 options use the newest standard for the strongest security. WPA2-PSK (AES) is the default setting.
  The Password field displays.
- In the **Password** field, enter a new password (network key).
  It is a text string from 8 to 63 characters.
- Write down the new password and keep it in a secure place for future reference.
- Click the **Apply** button.
  Your settings are saved.

20. CONNECT THE COMPUTERS IN LOCAL AREA NETWORK.

Aim: To transfer files between two PC's

Tools required: LAN cable **(Cross Cable),** Two Computers with Ethernet ports.

LAN Cable with RJ45 LAN Port

PROCEDURE:

- Start up both the computers.
- Network two of them with the LAN Cable. i.e, insert the jack of one end into one of the Computers, and obviously, the other goes into the second Computer.

Insert IP address in both computer :

- Open **control panel** window.
- Choose **Network and Sharing Center** button.
- Then you find a pop up box of **Network and Sharing Center.** Here, click on **Change adapter setting.**
- In Network Connections Pop-up Window, right click on correctly installed LAN Card hardware adapter in your computer and select its **properties.**
- Then Local Area Connection (LAN) properties window is appearing. Choose **Internet protocol Version 4 (TCP/IPv4)** button and click on **properties** option.
- Now enter IP (Internet protocol) address in both computers manually according to below and select **OK** Option.

First computer (computer name-NAVIN - PC)

EnterIP Address: -192.168.0.1

Enter Subnet mask: - 255.255.255.0

Second computer (**computer name- ABHISHEK - PC)**

EnterIP Address: - 192.168.0.2

Enter Subnet mask: - 255.255.255.0

- After inserting IP address in both computer properly, restart it.
- when computer will load windows 7, click on start search box and type **network.** click on this link.
- In network tab, you find all connected computers in networking under similar workgroup.

How to share computer drives to transfer files over network ?

When both computers are showing in network tab and want to share computer drives

- At first, open computer explorer window of the first computer, press right click on opted drive partition which we want to share with another computer over network.
- From drop down menu list, choose **share with** option.
- Now select **Advance Sharing** button.
- A new tab of opted drive properties is appearing. click on **Advance Sharing** option.
- **check this box - share this folder** option and now click on **ok** button.

Now we have done drive sharing in LAN networking successfully.

Result: We have done drive sharing in LAN networking successfully.

PYTHON

Python is a high-level, interpreted, and versatile programming language known for its simplicity and readability. It was created by **Guido van Rossum** in 1991 and is widely used in web development, data analysis, artificial intelligence, machine learning, automation, and more.

Key Features of Python:

1. **Simple and Easy to Learn**: Its syntax is clean and mirrors natural language, making it beginner-friendly.
2. **Interpreted Language**: Python executes code line by line, allowing for easy debugging and interactive coding.
3. **Cross-Platform**: It works seamlessly on various operating systems like Windows, macOS, and Linux.
4. **Extensive Libraries**: Python has a rich set of libraries like NumPy, Pandas, TensorFlow, etc., for various tasks.
5. **Dynamic Typing**: You don't need to declare variable types explicitly.
6. **Community Support**: Python has a vast and active community, ensuring quick help and robust resources.

Applications of Python:

1. **Web Development**: Frameworks like Django and Flask.
2. **Data Science**: Libraries like Pandas and Matplotlib.
3. **Machine Learning and AI**: Using TensorFlow, Keras, etc.
4. **Game Development**: Libraries like Pygame.
5. **Automation**: Scripting repetitive tasks.
6. **IoT Projects**: Working with microcontrollers using MicroPython.

Criteria	List	Tuple	Set
Mutability	Mutable: Elements can be modified after creation	Immutable: Elements cannot be modified after creation	Mutable: Elements can be modified after creation
Order	Ordered: Elements have a specific order	Ordered: Elements have a specific order	Unordered: Elements have no specific order
Duplicates	Duplicates allowed	Duplicates allowed	Duplicates not allowed
Indexing	Access elements by index	Access elements by index	No indexing

List Vs Set Vs Dictionary Vs Tuple

Lists	Sets	Dictionaries	Tuples
List = [10, 12, 15]	Set = {1, 23, 34} Print(set) -> {1, 23,24} Set = {1, 1} print(set) -> {1}	Dict = {"Ram": 26, "mary": 24}	Words = ("spam", "egss") Or Words = "spam", "eggs"
Access: print(list[0])	Print(set). Set elements can't be indexed.	print(dict["ram"])	Print(words[0])
Can contains duplicate elements	Can't contain duplicate elements. Faster compared to Lists	Can't contain duplicate keys, but can contain duplicate values	Can contains duplicate elements. Faster compared to Lists
List[0] = 100	set.add(7)	Dict["Ram"] = 27	Words[0] = "care" ->TypeError
Mutable	Mutable	Mutable	Immutable - Values can't be changed once assigned
List = []	Set = set()	Dict = {}	Words = ()
Slicing can be done print(list[1:2]) -> [12]	Slicing: Not done.	Slicing: Not done	Slicing can also be done on tuples
Usage: Use lists if you have a collection of data that doesn't need random access. Use lists when you need a simple, iterable collection that is modified frequently.	Usage: - Membership testing and the elimination of duplicate entries. - when you need uniqueness for the elements.	Usage: - When you need a logical association b/w key:value pair. - when you need fast lookup for your data, based on a custom key. - when your data is being constantly modified.	Usage: Use tuples when your data cannot change. A tuple is used in comibnation with a dictionary, for example, a tuple might represent a key, because its immutable.

Python offers numerous advantages that make it a highly preferred programming language. Its simplicity and readability, along with an intuitive syntax, make it easy to learn and use, even for beginners. Python supports multiple programming paradigms, including object-oriented, procedural, and functional programming, making it versatile for various applications such as web development, data analysis, artificial intelligence, and automation.

Its extensive standard library and third-party libraries simplify complex tasks, eliminating the need to write code from scratch. Being cross-platform, Python ensures that code written on one operating system can run seamlessly on another. The dynamic typing feature allows developers to write flexible and concise code without specifying variable types.

Furthermore, Python integrates well with other programming languages like C, Java, and .NET, and its strong community support ensures access to comprehensive documentation, tutorials, and quick

problem resolution. These features, combined with Python's suitability for rapid prototyping and automation, make it a powerful and efficient tool for developers worldwide.