1. Basic Network Components

Components of Network

Modem

Modem stands for **Modulator-Demodulator**

- **Modulation**: It converts digital signals from your device into analog signals that can travel over physical media (like phone or cable lines).
- **Demodulation**: It takes incoming analog signals from the ISP and converts them back into digital signals for your devices.

A **modem** is a device that allows a computer or router to communicate with your Internet Service Provider (ISP) over a telephone line (DSL), cable line, or fiber line.

DSL: Stands for **Digital Subscriber Line**.

Router

Is the network gate way in your local area, it maybe receive data which doesn't belong to you(LAN you are subscribed on) and it will reject it immediately.

Its main purpose after receiving the digital data from the modem to evaluate it and allow it either entering in the network or not.

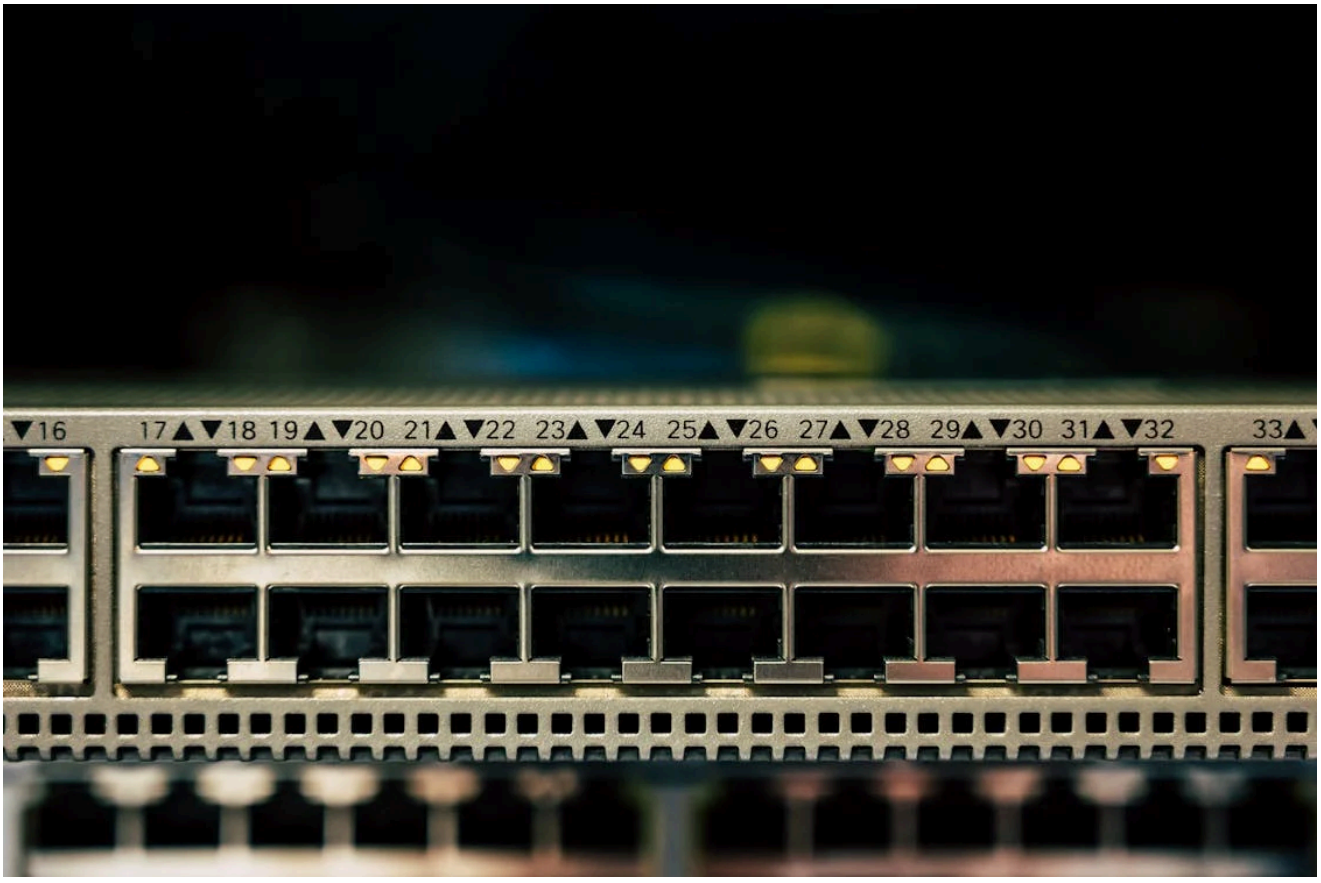
A **router** connects **multiple networks together** and directs data **between them**, choosing the best path for the data to travel.

- It connects your **internal network (LAN)** to the **external network (WAN/Internet)**.
- Routes data between your **devices** and the **modem/internet**.
- **Assigns IP addresses** to devices (using DHCP).
- Can provide **firewall**, **NAT**, **port forwarding**, and **wireless access (if Wi-Fi capable)**.

Hub(It's rarely used now-days)

It constructs a local network between devices but its main disadvantage was forwarding any data it receives from any device to all the devices connected on the same network.

Switch



A more intelligent hub that receives the digital signal and sends it only to the machine demanding this signal through the machine **MAC address**.

The physical address and the port which the device is connected with on the switch are mapped on a table on the switch.

A **switch** connects multiple devices in a **Local Area Network (LAN)** and efficiently **forwards data only to the intended recipient** device.

- **Learns MAC addresses** of devices on its ports.
- Builds a **MAC address table** (or forwarding table).

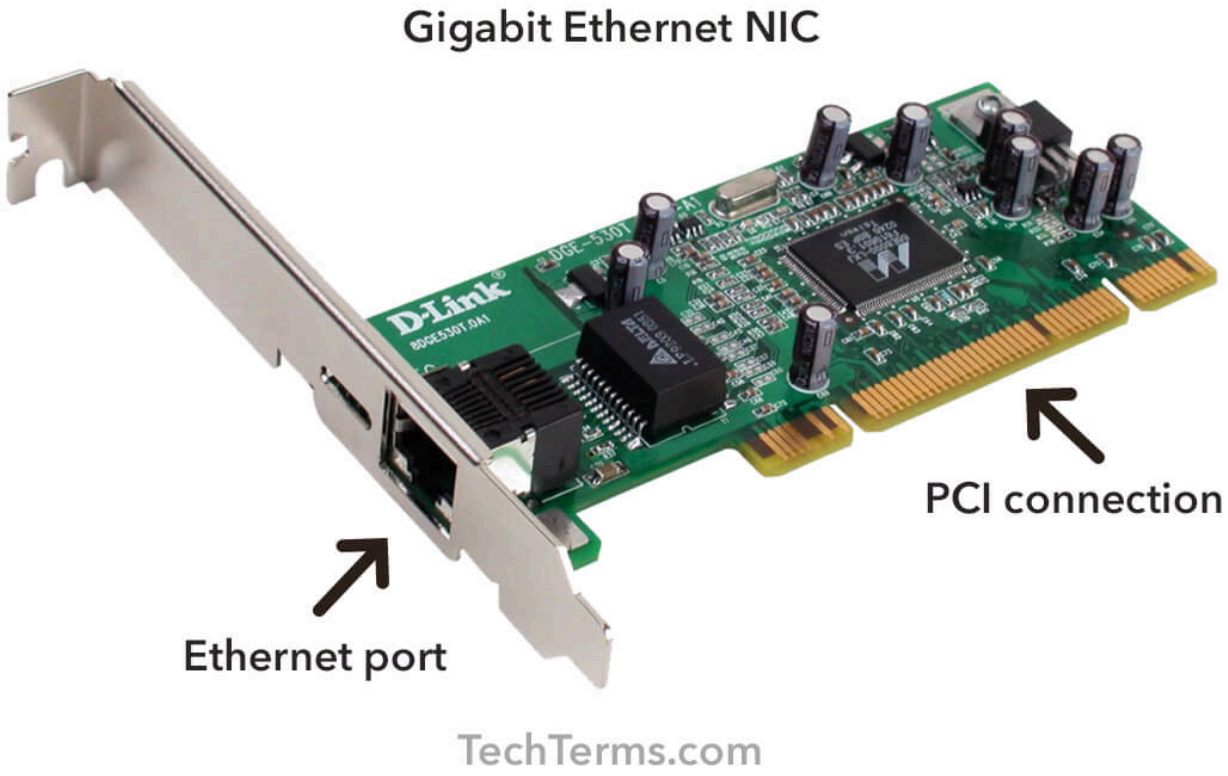
- When data arrives, it looks up the **destination MAC address** and **sends the data only to the correct port**, not to all.

Home Router

It isn't only a router it's a multi-functional router and its a :

- Modem
- Router
- Switch
  In the same device.

NIC



NIC stands for **Network Interface Card** and this is the card which should exist on your computer to be capable to connect to the network.

Even if you don't have am Ethernet terminal you have a Network card but its a WiFi network card.

If we have a device that has `WiFi` and `Ethernet` thus it will contains two MAC addresses.

Repeater

Each network cable has specification which states the distance that a signal can travel via the cable before it's lost.

A **repeater** is used to **regenerate and amplify signals** in a network to **extend the range** of data transmission.