Physical Layer

- The Physical Layer consists of devices and means of transmetting bits across computer networks.

Bit : A Bit is the smallest representation of data that a computer can understand, it’s ones and zero.

- These ones and zeros sends across networks at the lowest level are what make up the frames and packets of data the we will learn about when we cover the other layers.

- A standard copper network cable, ones connected to devices on both ends, will carry a constant electrical charge.

- Ones and Zeros are sent across those network cables through a process called modulation.

Modulation : A way of varying the voltage of this charge moving across the cable.

When used for computer networks, this kind of modulation is more specifically known as line coding.

Line Coding : It allows devices on either end of a link to understand that an electrical charge in a certain state is a zero, and in another state is a one.

The Most common type of cabling used for connecting computing devices is known as twisted pair cables.

- It’s called twisted pair cable because it features pairs of copper wires that are twisted together.

- A standard Cat6 cable has eight wires consisting of four twisted pairs inside a single jacket.
    - How many pairs are actually in use depends on the transmission technology being used.

-- Twisted pair cable allows for Duplex Communication :

Duplex Communication : The concept that information can flow in bith direction across the cable.

On the flip side :

Simplex Communication : The One way direction Process.

Full Duplex Communication : Devices on either side of a networking link can both communication with each other at the exact same time, this is known Full duplex.

Half Duplex Communication : Network link degrade and report itself as operating as half duplex.

- Half duplex means that, while communication is possible in each direction, only one device can communicating at a time.

Twisted Pair network cables are terminated with a plug that takes the individual internal wires and exposes them.

- The most common plug is known as RJ45 (Registered Jack 45).

- A network cable with an RJ45 plug can connect to an RJ45 network port.

-- **Network Ports** : Network Ports are generally directly attached to the devices that make up a computer network.

-- Most Network Ports have two small LEDs.

1) Link LED
2) Activity LED

(1) Link LED : The Link LED will be lit when a cable is properly connected to two devices that are both powered on.

(2) Activity LED : The Activity LED would flash when data actively transmitted across the cable.

--- Sometimes a network ports is not connected directly to a device.

Instead, there might be network ports mounted on a wall or underneath your desk.

---- These ports are generally connected to the network via cables, run through the walls that eventually end at a “patch panel”.

Patch Panel :: A Patch Panel, is a device containing many network ports. But it does no other work.

- It just a container for the endpoints of many runs of cable.

- Additional cables are then generally ran from a patch panel, to switche, or routers to provide network acces, to the computers at the other end of those links.