Basics of Networking Devices

1) Cables :

Cables connect different devices to each other, allowing data to be transmitted over them.

- Most Network Cables used today can be split into two categories.

-- 1 – Copper
-- 2 – Fiber

(1) Copper Cable

- Copper Cables are the most common form of networking cable. They are made up of multiple pairs of copper wires inside plastic insulator.

- The most common forms of copper twisted-pair cables used in networking are Cat5, Cat5e and Cat6 cables. (Category Cables)

- Cat5 is older and has been mostly replaced by Cat5e and Cat6 cables.

- Cat5e cables have mostly replaced those older Cat5 cables, because their internal reduce crosstalk.

-- **Crosstalk** : When an electrical pulse on one wire is accidentally detected on another wire.

- Cat5e cable make it less likely that data needs to be retransmitted. That means on average, you can expect more data to be transferred in the same amount of the time.

- Cat6 cables, following even more strict specification to avoid crosstalk. Making those cables more expensive.

- Cat6 cables can transfer data faster and more reliably than Cat5e cables can, but because of their internal arrangement, they have a shorter maximum distance when used at higher speeds.

(2) Fiber Optic Cables :

- Fiber Cable contain individual optical fibers, which are tiny tubes made out of glass about the width of a human hair.

- These tubes of glass can transport beams of light.

--- Copper : which uses electrical voltages.
--- Fiber : which uses pulses of light to represent the ones and zeros of the underlying data.

- Fiber is even sometimes used specifically in environments where there’s a lot of electromagnetic interference from outside sources because this can impact data being sent across copper wires.

- Fiber cables can generally transport data quicker than copper cables can, but they are much more expensive and fragile.

Hubs and Switches :

- Cables allow you to form point – to – point networking connections. These are networks where only a single device at each end of the link exists.

--- There are network devices that allow for many computers to communicate with each other.

HUB : Hub is a Physical Layer device that allows for connections from many computers at once.

- All the devices connceted to a hub will end up talking to all other decvices at the same time. It’s up to each system connected to the hub to determine if the incoming data was meant for them, or to ignore it if it isn’t.

- That’s lots of traffic in network and creates Collision Domain.

-- Collision Domain : Collision Domain a network segment where only one device can communicate at a time.

--- If multiple systems try sending data at the same time, the electrical pulses sent across the cable can interfere with each other.

- It really slows down network communications and is the primary reason hubs are fairly rare.

- Hub : Physical Layer Device

SWITCH : A Switch is very similar to a hub since you can connect many devices to it so they can communicate.

- Switch : Data Link Layer Device

- Switch can actually inspect the contents of the ethernet protocol data being sent around the network.

- Determine which system the data is intended for and then only send that data to that one system.

--- This reduces or even completely eliminates the size of collision domains on the network.

ROUTERS :

Hubs and Switches are usually referred to as a LAN, or Local Area Network.

Router : A device that knows how to forward data between independent networks.

- Router : Layer Three : Network Layer.

- A Router can inspect IP data to determine where to send things. Routers store internal tables containing information about how to route traffic between lots of different networks all over the world.

- The purpose of these Routers is mainly just to take traffic originating from inside the home or office LAN and to forward it along to the ISP (Internet Service Provider).

- Routers share data with each other via a protocol known as BGP (Border Gateway Protocol)

--- **BGP** : Which learn about the most optimal paths to forward traffic.