TCP IP FIVE LAYER NETWORK MODEL

To really understand networking we need to know all the thing that is involved from cable to the protocols there are a lot of models thats describes how a computer communicates with other like

1)osi model
2)DOD model
3)TCP/IP model

we are going to talk about the TCP/IP model

#	Layer Name	Protocol	Protocol Data Unit	Addressing
5	Application	HTTP, SMTP, etc..	Messages	n/a
4	Transport	TCP/UDP	Segment	Port #'s
3	Network	IP	Datagram	IP address
2	Data Link	Ethernet, Wi-Fi	Frames	MAC Address
1	Physical	10 Base T, 802.11	Bits	n/a

lets start with the physical layer.
Its just like it sounds when we talk about the physical layer we ment the hardware that connects the computer it can be the different cable and their specifications and their connectors.

Then comes the data link layer in the data link layer we apply our dirst protocols. actually the data link layer is responsible for interpreting this signal in a common way that every network devices can communicate with each other.Lots of protocols are exists in this layer .But the most common on is the **ethernet.**Although the wireless become more and more popular.The ethernet standerds also define a protocol responsible for getting data to node on the same network

Then comes the network Layer.It allow multiple /different network to communicate with each other through the devices known as router.one of the most popular example is the internet

[remember data link layer responsible for a single link on the other hand the network is responsible for a bunch of network. If you think about the Client and Server Its the network layer that helps to do that]
but what protocol is used in the network layer??

IP [internet protocol] ip protocol is not a connection oriented protoccol like TCP because it dot give us the confirmation for the data receive.IP is the heart of the internet and most smaller networks around the world

Then comes the transport layer.Ever wonder that you are on the same router wifi using you devices and even so your mail comes to your mail client and if you run a server it data will go to the server (even you are on the single node) Thats because of the transport layer.
Network layer gives the data to the node The transport layer figure out which client and server supposed to get the data.the protocol that is used in the Transport layer is the TCP protocol.
[other transport protocol also use the IP like udp too.but TCP is the protocol that ensure that the data is sent correctly on the other hand the udp dont]

then come the application layer.they are the applicatoion like firefox like different software

NETWORKING DEVICES AND NETWORKING CABLES

.

Lot of different cables and network deviecs are used to communicate with different network

lets talk about different network components of a wired network

1)cables: cables connect different devices to each other allowing the data to be transmitted over them. Most of the network cable are divided into two categories copper and fiber.copper cable are the most common for the networkig cables.They are made up wuth multiple copper cable inside the plastic wrapper/ insulators.you already know that computer communicate in binary form in the cable the binary data is sent by changing the voltages.the system at the receving end can interpret the voltage change as binary ones and zeros.the most common cable are the cat5,cat5e and the cat6 cables

this cat is known as category this category is separated by different categories also like the transfer rate and the different twisted.the cat5 is old tech and mostly

replaced by the cat5e.and cat5e is replaced by the cat6.They maybe look like the same but for the data sending speed are very different .

Cat5 had a problem in its cable which is called CROSSTALK

WHAT IS CROSSTALK

when an electric pulse in one wire is accidentally detected by another wire .so the receiving end cant understand whats the data is because of the network error.Higher lavel protocol have functionality for detecting the missing data and asking a request for them but this process takes more time but the CAT5e does this thing very less thats why more data can be transferred win CAT5e is a given time

CAT6 cable are more strict to crosstalk .Cross talk is very very less in the CAT6 cable thats make it more expensive They can transform more reliably and in more speed BUT there is a problem too.because of the internal structure of the CAT6 cable it has a shorter maximum distance when data is sending on max speed

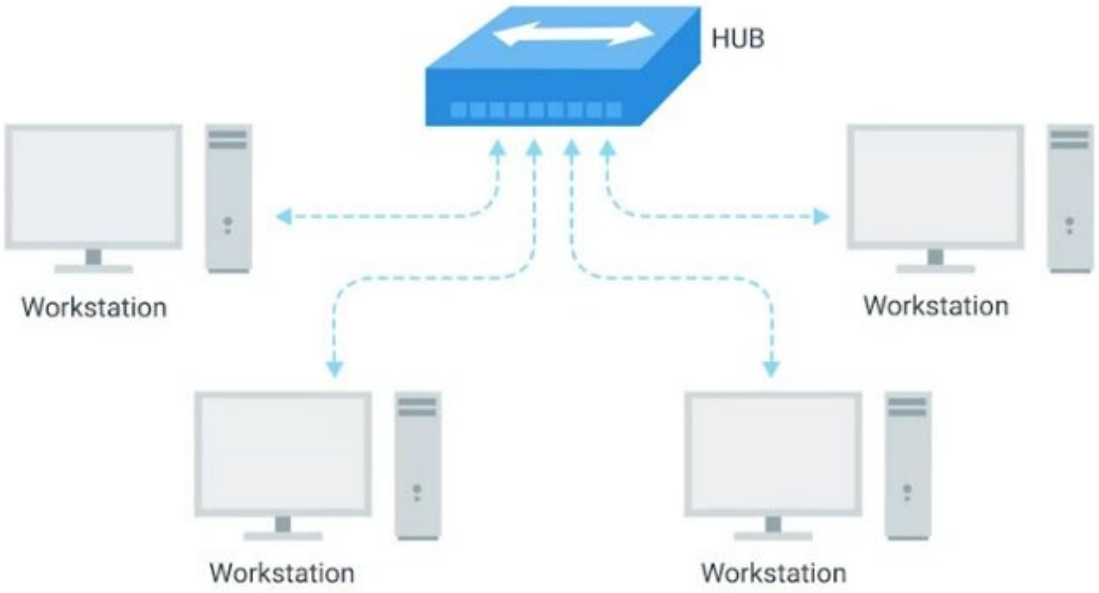
THEN COMES THE FIBER which isn a short form of the fiber optic cable

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

Copper cable uses voltage change and the fiber use the pulse of the light to transfer the data.fire is preferable in a place where there is a lot of electrical and magnetic interference fiber cable can transport more speed and more distance but they are expensive and fragile

HUBS AND SWITCHES

cable allow you to make a point to point networks but it works on a single devices on each side .it is not very useful when a lot of computer try to reach each other. There are network devices that allow multiple node to connect with each other .one of the simpliest devices is the HUB.HUN is a physical devices that allow a computer to communicate with multiples computer at once



all the devices connected to the hub is end up talking with all the computer at once.But the node have to check every single time that the data that is broadcasting by another computer is ment for it or other .if meant for it then accept other wise reject.This cause a lot of problem and make a collision domain.

WHATS A COLLISION DOMAIN:

remember in a network segment only one devices can communicate at a time but if the multiple system try sending data at the same time.the electrical pulses sent across the cable can interfere with each other. Because of this situation the computer have to wait until they gat a chance to send the data.it casuse a lot of time and slow down the data communication process.thts why the HUB are not used

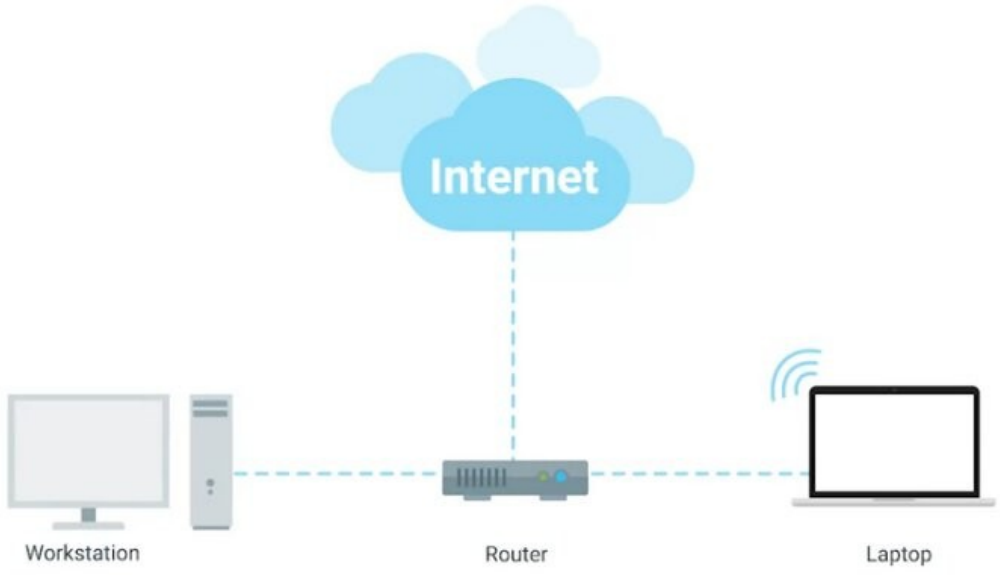
[REMEMBER HUB IS A PHYSICAL LAYER DEVICES]

on the other hand the Switchs are a little bit different than the hubs [SWITCHES ARE IN THE DATA LINK LAYER] and for that the switch can aactually inspect the data and determine which computer it has to send and then only send to that computer .that reduces the collision domain and the size of the data that is sending

ROUTERS

HUBS and SWITCHES are used to connect computers on a single network usually referred to the LAN or LOCAL area network.but sometimes we need to send data on other independent network.thats where the routers come .
Routers are the devices that knows how to forward data between independent networks

HUB is a layer 1 devices
SWITCHS are layer 2 devices
and the
ROUTER is the layer3 (network layer) devices



like a switch A router can inspect IP data to find where to send this data.Router store Routing table with different network address find out where to send the data

Most common are the home use or small office.these kinds of routers dont have a very detailed routing table.Their main target is to take data from home/office and send them to the ISP(internet service provider).once its in ISP then more sophisticated router takes over .These core routers form the backbone of the internet.and these router are responsible for how we send and receive data every single day.These are the core routers and they have to connect to many other routers and they have to make a decision in which router that have to send the data in a particular time

Router Share data between the each other with a protocol name BGP (Border Gateway Proticol) this protocol allows the router to find the most optimal path to forward traffic.
When you open a browser and visit a website the data have to pass a lot of routers to get to your computer. Routers are the guide to find the right place in the complicated internet

SERVER AND CLIENT

we used the word server and client very often but it has a larger meaning in the network.
We are calling these in one word is node.
What is a server:
server is some that provides data to someone who is requesting this
and client is simply who is requesting this or reciving the data
so why we use the term node. because individual application inside a computer can act like a server or a node at the same time .In the communication system most devices are not exactly a client or a server they can be both at the same time depending on their purpose.for example suppose you are running a email

server so this is a server no doubt but this can be a client of Other DNS server. To make this distinction that is it a server or a client you have to understand what is its primary purpose.we use the word server and client to identify the primary purpose of that node.when a node can be a server and a client depending on different point of view for example for serving email that email sevrer is server but fro the DNS server point of view that email server is actually a client

A physical layer is responsible for sending bit from one computer to another computer

whats a bit?
A bit is the smallest representation of data that a computer can understand. its either one or zero.it does not matter what are you sending or receiving .you can s