

TCP/IP in simple terms

S.GURUMANICKAM

Prologue: MISSING THE WOOD FOR THE TREES: Very few understand the TCP/IP fully. Everyone knows what an IP is and some have heard about MAC addresses. Ask them what is TCP, what is its role? A blank stare would be the reply. Add the MAC; it's really a jungle out there. It just throws anyone away. It would be really nice to know, where they fit, how they interact with each other. Isn't it.

I had wanted to understand it in simpler terms and burnt many a midnight oil towards that goal. After an eon and after having learned to some extent, I would like to share with anyone who doesn't want to go through that ordeal.

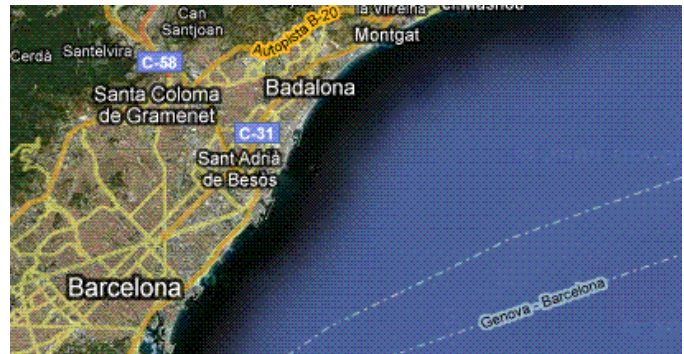
It is truly missing the wood for the trees when you get lost in anyone of the seven layers of OSI model. Wait. I am not going to detail what an OSI model is, here.

With a real world example, I will try to explain what is actually happening in an allegorical way relating to the TCP/IP.

Let us suppose, in a typical office setup, a boss wants to send a letter to a customer of his at the city of **Badalona** on the Mediterranean sea, near Barcelona in **Spain**.

Sender: M/s. Vidtronics, Chennai, India

Recipient: M/s. Servicios de Video Inc, Badalona, Spain



We serialize the process here in simple terms.....

No	Process	Protocol
1	The Boss wants a letter to be sent to his counterpart of his Customer office and dictates to PA	HTTP/FTP
2	He trusts his PA to complete this job. The PA scrutinizes and sends to the dispatch section	TCP
3	The dispatch section receives and addresses the letter	IP
4	The dispatch section in turn sends it to its Courier service	MAC/PPP
5	Actual transportation according to the destination address	PHYSICAL MEDIUM
6	The Receiving Courier Service receives the letter	MAC/PPP
7	The diary section of the customer receives the letter	IP
8	The PA of the customer, receives and acknowledges the letter	TCP
9	The boss receives the letter	HTTP/FTP

Some detailed flow of the onward journey of the letter.

Sending Section

(The **APP**) Here, the boss wants a letter to be sent to the intended recipient. He doesn't know (need not know) the nitty gritty of the dispatch mode.

(**TCP**) The PA tracks, the delivery of the letter with her counterpart. She too doesn't know (need not know) how it is going to reach them. If after 2 or 3 days, the letter doesn't reach the recipient, either she asks the dispatch section to look into it, or asks the dispatch section to resend it, or decides to do it herself all over again. She decides and ensures. (TCP)

(**IP**) Dispatch section puts the address and sends it to the courier. Since, it is sending/receiving many letters, it merely records; if a letter to be dispatched is sent from that office or not. It is immaterial to them to know about the actual receipt of the letter by the destination. (IP). It is either the job of the PA or the courier service itself. (TCP) or (MAC) for prompt delivery. No dispatch section in any office, takes the responsibility for the receipt of the letter by the recipient. They are responsible only to send it.

(**MAC**) The courier service will decide how the destination address is going to be reached. Since the recipient is in a small city in Spain, if the address is typed in English, the recipient courier may not understand it. If it is typed in Spanish then the Chennai courier will not understand for sure. So, the courier in Chennai will decide that, till it reaches Spain, the address will be in English. Once, it reaches Spain, the address would be changed to Spanish.

(**PHYSICAL TRAVEL**) The MAC will decide how the letter is going to travel physically. The first path may be from Chennai to Mumbai by flight (KingFisher). It will travel from Mumbai to Barcelona (Spain) by SwissAir. (The courier [the Bridge – in TCP/IP] located here, will change the address to Spanish from English). From Barcelona to Badalona the letter will travel by a local flight. The actual delivery will be by a motorcycled-delivery-man.

Receiving section

(**MAC**) The Courier service in Barcelona changes the language to Spanish and forwards across to Badalona. Badalona office sends the motorcycled-delivery-man to the address (Diary section of M/s. Servicios de Video Inc). It is acknowledged there. The acknowledgement is sent back to the courier service at Chennai, in almost the same path.

(**IP**) The diary at the customer office, after giving the acknowledgement to the courier, sends the letter to the PA of the boss.

(**TCP**) The PA ensures the pack is received in good condition and sends it to her boss. She immediately sends an acknowledgement of the letter to her counterpart.

(The **APP**) The Boss finally opens the letter and decides to do whatever he wants.....

Epilogue: Figuring out the wood

Ultimately we want to apply this analogy to the real world Ethernet/Broadband networking. Bear in mind that any particular layer is unaware of the functioning of the other layers.

Visualize how the PA talked to recipient PA in case of a problem, the courier service talks to courier service only. Similarly, in actual TCP/IP model, the TCP layer talks to the TCP layer, IP layer talks to its corresponding IP layer.

- Simply put, TCP ensures the packets are sent and received properly. Every packet is individually acknowledged to the sending end TCP.
- IP layer takes care of only addressing. It doesn't know anything else (Just imagine your office's dispatch/diary section). They don't care about anything.
- The MAC layer (in Ethernet) co-ordinates with the physical layer. In case of any errors, this layer ensures that the frames are re-sent again.
- On a dial-up networking the job of the MAC layer is done by PPP.
- In a dial-up internet broadband, the first mile is negotiated with PPP and further internet jungle will be with Ethernet. You need both here. And hence, they invented PPPoE (PPP over Ethernet).

- A Router works at the IP layer level. They understand IP addresses and routes them accordingly.
- A Switch (or hub) or Bridge works at the MAC layer level. They don't know IP addresses, instead uses MAC addresses to map IP addresses.

Remember, I have truly and heavily abstracted the actual layers in a massive way. Actual layers are too deep and too complicated in detail. Refer any good book on OSI model for detailed study.

Hope I have addressed properly. Any suggestions and comments are welcome.

S.GURUMANICKAM.

www.sgm.site50.net

www.sgm.site50.net