# Networking Intro

## What *is* a Network?

Any connection in between or more people which results in an exchange of information, is a network.

A network of people, a network of real world information, a network of electrical things connected together, a network of devices, all of these are *Networks*.

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## So networks translate to an exchange of information. What next?

In the context of computers, a network can be machines connected together, for example, the CCTV cameras that we use in day-to-day scenarios, they are a network.

Another example is simply connecting your mobile device to a speaker or headphones, they too, are a part of a network.

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## How does a mobile phone playing music via Bluetooth equate to a network situation?

The mobile phone, has your audio, in the form of a file, which is just data or information stored on it.

This information is transmitted to your audio device of choice by Bluetooth, so in a sense, the devices are connected in a network, with Bluetooth as the medium of connection.

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## The Internet

The largest, and the most ubiquitous example of networks that almost everyone interacts with on a daily basis is the internet.

The Internet is a hyper-amalgamation of many smaller networks, all put together in a world wide large network of networks, that makes information accessible to everyone.

## How do you access information through the internet?

Some of the apps, websites or services that most of us either use on a daily basis or have heard about are:

1. Google --> This is a *Search Engine*
2. Google Chrome / Edge / Firefox / Brave / Internet Explorer --> These are *Browsers*
3. Instagram/Twitter/Facebook --> These are *Websites* (And web applications, but more on them later)

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## An analogy for the internet (A Library)

Let us think about the Internet as a very, very large library.

Each Website is a new book, and each page on that website, each YouTube video for example, is a page in the book.

To locate a book in the library, you usually ask the librarian. Think of your Search Engine as the librarian, whom you ask where to find a certain piece of information.

The information is then retrieved and sent over to the Browser, which you can think of as a Photocopy machine, which allows us to view and take home the contents of the book/manuscript as required.

> Networking is the glue that holds all of this together. The Networks are thliente Shelves in which the books are lined up, the cabinets that hold multiple shelves, the floors that hold hundreds of cabinets, and then the entire building is the largest network of them all, the Internet.

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## How you fetch data from a Website (What the browser does)

Whenever we want to retrieve any bit of data from the entire, there are *transactions* that occur.

These transactions, like very human transaction, essentially occur between "people" :

1. The Server

2. The Client

// As is evident by the name, the Server *serves* or provides us with the information requested (the video you want to watch, the picture you want to download, the post you want to view)

// And the Client is us, the person that is visiting the Website and Requesting for this information.

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# The Three-way Handshake

So, we've established that the "Server" is the one that has what we need, and the Client is the us, or the person that is requesting the information.

So, essentially, each time we click on a video, or a post, or any website on Google the transaction that takes place is

1. Our device requests a connection to the server and asks for permission to connect (We send a SYN packet)
2. If the Server is free and has permission and bandwidth available for connection it says "yes, I'm available" (The SYN-ACK packet)
3. Our device then, sends back the "Okay, thank you" message back to the server (The ACK packet)

> And now a connection, a communication channel, is formed between the 2 parties.

**Once a connection is established, now, the client and server can start working together on a request and response based framework.**

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# Requests and Responses

Each time we need something from someone in the real world, could be an object or some information about something, we ask the person for it, we "request"

And the other person, according to their judgement, then gives us some sort of "response."

The Response could be the information we asked for, or directions related to the information, or simply, a No, or denial.

This is how Communication over the Internet works as well.

1. We request some information or piece of media.

2. The connected Server evaluates if it has the information and we are allowed to access it
3. And then it sends us a response, and sends us the Information.

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## The Browser

However, as simple as this sounds, we all know this is not as easy to implement in the real, wide world.

So, often, like most information in digital format, the information *served* by the server is in the form of some weird jargon, indecipherable to us humans.

This is where the Browser comes into play.

The Browser is the Application that is responsible for taking this response and presenting it to us in a human-readable format, in a way that we can understand.

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> Now connect this to how to connect to the Internet (The physical devices, and components)

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