Public ip or external IP address – this public ip address of a device will help any device over the internet to connect to this device

Private ip – this is useful when you

All public IPs assigned to Routers of ISPs or Routers connecting to Internet are unique. but private IPs of two hosts can be the same if both are connected to different public networks. So the combination of public and private IP identifies your device uniquely.

DNS: translated Domain Name to IP address

Ex: **Domain**: abc.com, **IP address:** IP address assigned to abc.com: ex: 172.25.46.35

If you type abc.com or 172.25.46.35 you will be routed to website of abc

# Introduction to DCCN:

Links:

[https://www.tutorialspoint.com/data\_communication\_computer\_network/data\_communication\_computer\_network\_overview.htm#](https://www.tutorialspoint.com/data_communication_computer_network/data_communication_computer_network_overview.htm)

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Data communication: transmission of digital data between 2 or more computers

Computer Network or Data Network: a tele communications network that allows data transfer between 2 computers and/or computerized peripherals (such as printer)

## Networking basics:

Router vs hub vs switch:

All the above 3 are used to transfer data, but the mode in which they transfer differs. Router transfers data in form of packets, hub transfers data in form of bits, switch transfers data in form of frames

### Protocol:

A set of rules which are used in digital communication between devices in a network and to exchange information between them.

#### Types of protocols:

TCP/IP (Transmission Protocol/Internet Protocol): one of the **basic networking** protocol (This protocol is used by other protocols when it comes to data transfer). TCP establishes connection, IP shares data

TCP is used to establish a connection and transfer data (by converting it in to small packets) through internet to destination network. IP is used to transfer data to target device within the target network.

* HTTP (Hyper Text transfer protocol): an internet protocol which we use to request and receive web pages, when we type in HTTP request and based on HTTP rules, it will go to the target server and post the typed information, if the information sent by user is accurate, the server responds with information, that is sent back to user and is viewed in browser

Port number: 80

HTTPS also serves the same purpose, but it is secure as well, whereas HTTP is unsecure.

https port number: 443

* DNS: port 53
* FTP (File Transfer Protocol): used to transfer Files between client and server. It internally uses TCP/IP.

Port number: 20 – for transferring transmitting and forwarding data across the network., 21

* SMTP (Simple Mail Transfer Protocol): to send/recieve mail from network to netowork, both computers need to be online, cannot download mails using this protocol

Port number: 25

* POP (Post Office Protocol): this protocol can send mail to another computer, but if the other computer is not online, then the mail is stored midway somewhere and is sent once the other computer is online, can be used to download emails, once email is downloaded, it is deleted from the server.
* IMAP (Internet Message Access Protocol): can have access to mails, as long as you are connected to internet. an improved version of POP. Unlike POP, IMAP can be used to retrieve the mail in case if the mail is deleted at reciever’s end

Port number: 143

* PPP (Point to Point Protocol): used to transfer data between 2 directly connected devices

Port number: 110

* UDP (User Datagram Protocol) : it is an unreliable and connectionless protocol, no connection is established and devices between which the data is being transferred should be short. It uses IP service to transfer data (without establishing connection)
* RDP : port 3389
* telnet: port 23

a terminal emulation program that is used to access remote servers, a command line tool that runs on your computer and allows you to send commands (such as run programs, create folders, delete files, transfer files, start/stop services) over keyboard, can manage and configure other network devices such as routers and switches, information is transferred in plain text, so no security. also used to check whether ports are close/open on a server, not suggested to use over the internet as it is not encrypted, suggested for use in private network

* Ssh: does everything a telnet does and is secure, so it is a better alternative to telnet to remote into server/host. All the communication will be encrypted. SSH prevents from data being stolen or attacked

port number – 22

* DHCP (Dynamic Host Configuration Protocol): port number 67,68 – automatically assigns IP addresses to every device on your network. Port 67- to acknowledge an IP address request, 68- to assign an IP address.

### Ports:

Ports are similar to doors of a house, to go from your house to some one else’s house you need to open your door and then go to the other house and then open the other house’s door.

There are 65535 ports in a computer

#### Source port

The port from which you are raising request

#### Destination port

Port to where you want to go

#### Which port to use

For every defined protocol, there is an protocol dedicated to it, for example: if you want to execute a request in internet you can use http request with destination port as 80, or a https request with destination port as 443.

## Network Engineering:

Network engineering is a complicated task, it involves software, firmware, hardware, chip level engineering and electronic pulses. to ease this task whole network engineering process is divided in to a set of layers, each layer performs a specific task and is independent of the other layer. But as a whole, all network tasks depend on all of these layers .Each layer is dependent on the layer only for the data it receives from one layer or the data that it sends to other layer

## Internet:

* Largest network of network on the earth
* Connects all WAN’s and have connection to LAN’s and home network
* **Uses TCP/IP protocol suite** and uses **IP** as its **addressing protocol**
* **Widely implemented using IPV4 and moving towards IPV6** because of **shortage of remaining addresses in IPV4**
* Enables users to share and access enormous amount of information worldwide using **www, FTP, email services, audio and video streaming.**
* Works on **client-server** model

Diagram

Description automatically generated

* Uses very highspeed backbone of fiber optics.

### Types of Computer networks:

Computer network based on its requirements can fall under below categories:

1. Geographical Span based
2. Interconnectivity based
3. Administration based
4. Architecture based

## Computer Network types:

Generally, networks are distinguished based on Geographical span, distinguished network can be as small as confined to a person devices to as large as the internet itself

Network classification based on geographical range falls in to below categories:

* PAN
* LAN – uses a LAN technology called internet and follows star topology
* MAN
* WAN
* Internetwork (internet)

### LAN technologies:

* Ethernet – widely deployed LAN technology
* Fast Ethernet
* Giga Ethernet
* Virtual LAN or VLAN

# Network Topologies:

An arrangement with which the computers and other devices in the network are connected to each other. A network topology can be a physical topology or a virtual topology, physical and virtual topologies can be in same or different network.

Types of Network Topologies:

* Point to Point topologies
* Bus topology
* Ring topology
* Mesh topology
* Star topology
* Daisy chain
* Hybrid topology
* Tree topology