

Assignment # 1

HTTP & HTTPS

What is protocol?

A Protocol is a set of rules that we use for specific purposes. In the current scenario, when we are talking about *protocols*, it is about communication- the way we talk to each other. For instance, a newsreader speaks in English and because you understand English, you are able to understand. English is the protocol.

Now, talking about the web, in particular, multiple protocols are used to communicate. Primarily for end users, the most important and visible protocols are HTTP and HTTPS. Though there are many other protocols as well, HTTP and HTTPS protocols cater to most of the population.

What is http?

HTTP means **Hypertext Transfer Protocol**. **HTTP** is the underlying protocol used by the World Wide Web and this **protocol** defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands

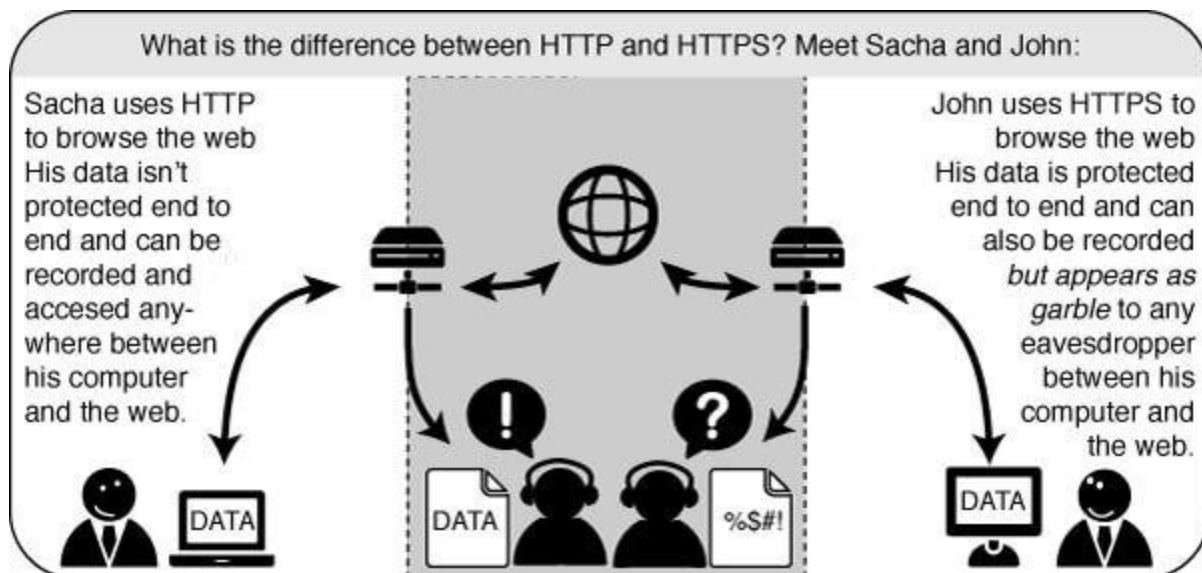
What is https?

Hyper Text Transfer Protocol Secure (HTTPS) is the secure version of HTTP, the protocol over which data is sent between your browser and the website that you are connected to. The 'S' at the end of HTTPS stands for 'Secure'. It means all communications between your browser and the website are encrypted. HTTPS is often used to protect highly confidential online transactions like online banking and online shopping order forms.

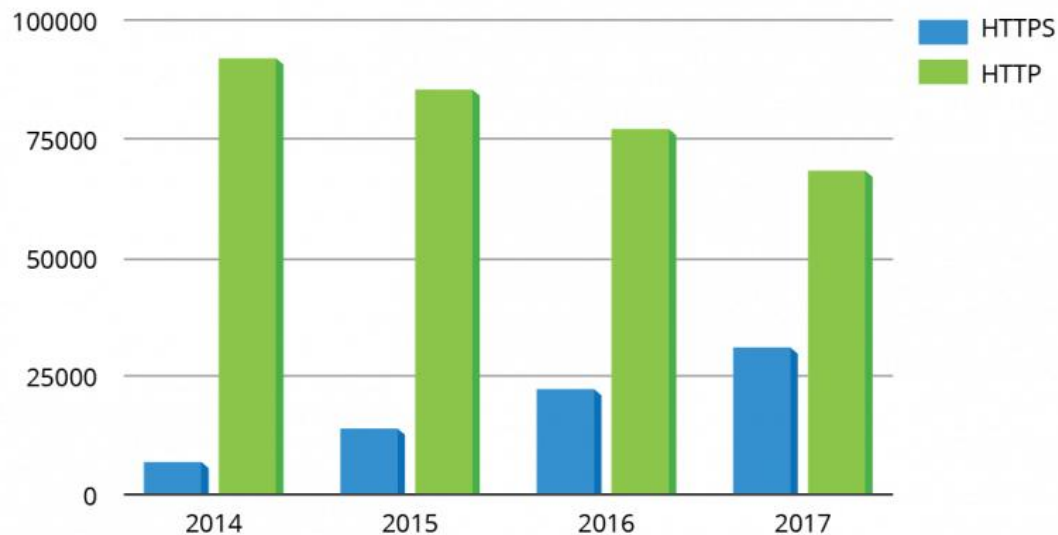
Encryption and Encryption Levels:

Encryption in simple terms is a hiding information. There are various ways to do so. You must have heard these terms - 128 bit encrypt HTTPS and 64 bit encrypt HTTPS. 128-bit Encrypt is a high encryption technique and it's very difficult to decrypt (decode). In the case of HTTPS when the data is being transferred on the wires, the man in the middle may still know what is being transferred, but cannot make sense out of it as the data is encrypted. Only the browser will decrypt it and show it, and the server will decrypt it and use it for transactions.

Deciding between HTTP and HTTPS:



HTTPS USAGE AMONG TOP 100K DOMAINS*



*Using SEMrush Rank



IP addressing:

The **Internet Protocol (IP)** is the principal communications protocol in the Internet protocol suite for relaying datagrams across network boundaries. Its routing function enables internetworking, and essentially establishes the Internet.

IP has the task of delivering packets from the source host to the destination host solely based on the IP addresses in the packet headers. For this purpose, IP defines packet structures that encapsulate the data to be delivered. It also defines addressing methods that are used to label the datagram with source and destination information.

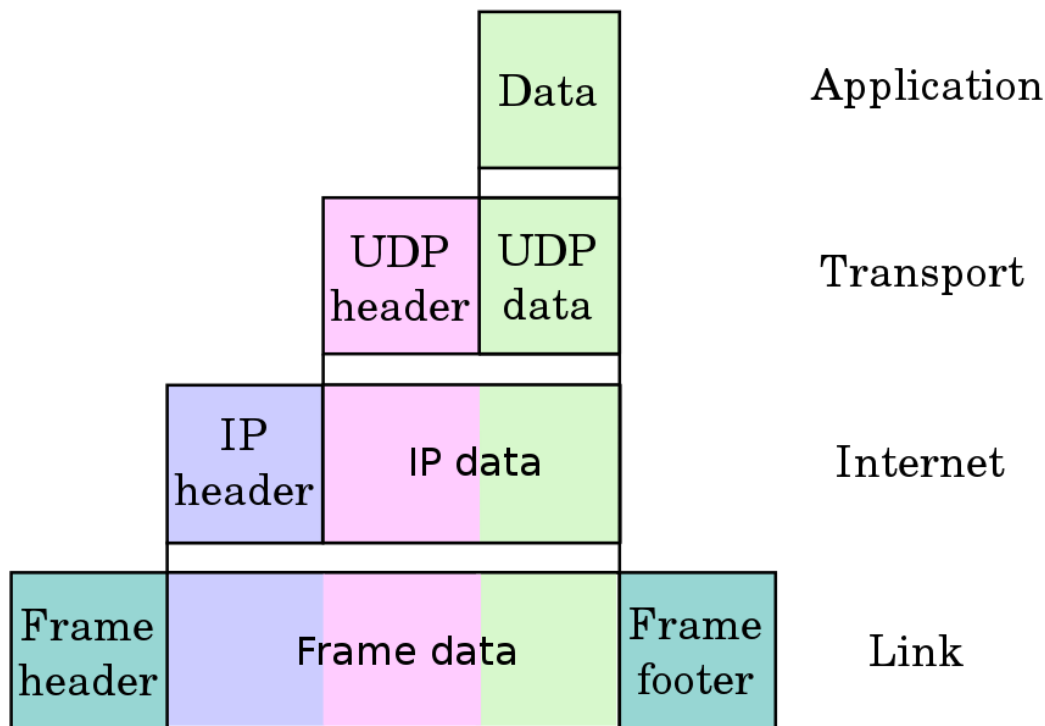
Functions:

The Internet Protocol is responsible for addressing host interfaces, encapsulating data into datagrams (including fragmentation and reassembly) and routing datagrams from a source host interface to a destination host interface across one or more IP networks.^[1] For these purposes, the Internet Protocol defines the format of packets and provides an addressing system.

Each datagram has two components: a header and a payload. The IP header includes source IP address, destination IP address, and other metadata needed to route and deliver the datagram. The payload is the data that is transported. This method of nesting the data payload in a packet with a header is called encapsulation.

IP addressing entails the assignment of IP addresses and associated parameters to host interfaces. The address space is divided into sub networks, involving the designation of network prefixes. IP routing is performed by all hosts, as well as routers, whose main function is to transport packets

across network boundaries. Routers communicate with one another via specially designed routing protocols, either interior gateway protocols or exterior gateway protocols, as needed for the topology of the network.



Static IP addressing:

A **static** Internet Protocol (**IP**) address (**static IP** address) is a permanent number assigned to a computer by an Internet service provider (ISP). **Static IP** addresses are useful for gaming, website hosting or Voice over Internet Protocol (VoIP) services.

Dynamic IP:

A **dynamic** Internet Protocol address (**dynamic IP** address) is a temporary **IP** address that is assigned to a computing device or node when it's connected to a network. A **dynamic IP** address is an automatically configured **IP** address assigned by a DHCP server to every new network node.

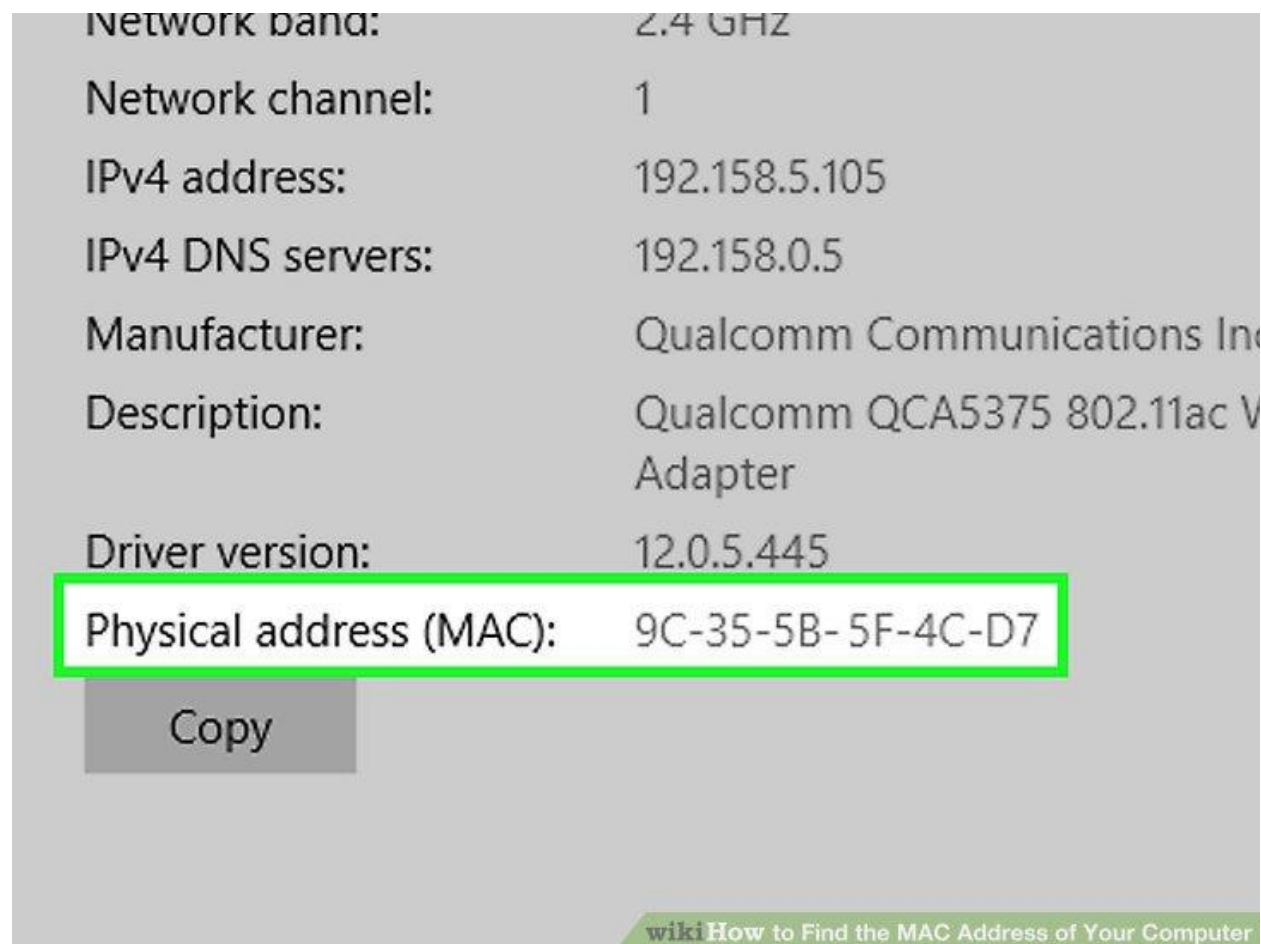
MAC ADDRESS:

A **media access control address (MAC address)** of a device is a unique identifier assigned to a network interface controller (NIC). For communications within a network segment, it is used as a network address for most IEEE 802 network technologies, including Ethernet, Wi-Fi, and Bluetooth. Within the Open Systems Interconnection (OSI) model, MAC addresses are used in the medium access control protocol sub layer of the data link layer. As typically represented, MAC addresses are recognizable as six groups of two hexadecimal digits, separated by hyphens, colons, or no separator (see Notational conventions below).

A MAC address may be referred to as the **burned-in address**, and is also known as an **Ethernet hardware address**, **hardware address**, and *physical address* (not to be confused with a memory physical address).

A network node with multiple NICs must have a unique MAC address for each. Sophisticated network equipment such as a multilayer switch or router may require one or more permanently assigned MAC addresses.

MAC addresses are most often assigned by the manufacturer of network interface cards. Each is stored in hardware, such as the card's read-only memory or by a firmware mechanism. A MAC address typically includes the manufacturer's organizationally unique identifier (OUI). MAC addresses are formed according to the principles of two numbering spaces based on Extended Unique Identifiers (EUI) managed by the Institute of Electrical and Electronics Engineers (IEEE): **EUI-48**, which replaces the obsolete term **MAC-48**,^[1] and **EUI-64**.^[2]



The image is a screenshot of a network configuration window. It lists several network parameters in a two-column format. The 'Physical address (MAC)' entry is highlighted with a green rectangular border. Below the list is a 'Copy' button. At the bottom right, there is a green banner with the text 'wikiHow to Find the MAC Address of Your Computer'.

Network band:	2.4 GHz
Network channel:	1
IPv4 address:	192.158.5.105
IPv4 DNS servers:	192.158.0.5
Manufacturer:	Qualcomm Communications Inc
Description:	Qualcomm QCA5375 802.11ac V Adapter
Driver version:	12.0.5.445
Physical address (MAC):	9C-35-5B- 5F-4C-D7

Copy

wikiHow to Find the MAC Address of Your Computer

Domain name:

A **domain name** is an identification string that defines a realm of administrative autonomy, authority or control within the Internet. Domain names are used in various networking contexts and for application-specific naming and addressing purposes. In general, a domain name identifies a network domain, or it represents an Internet Protocol (IP) resource, such as a personal computer used to access the Internet, a

server computer hosting a web site, or the web site itself or any other service communicated via the Internet. In 2017, 330.6 million domain names had been registered.^[1]

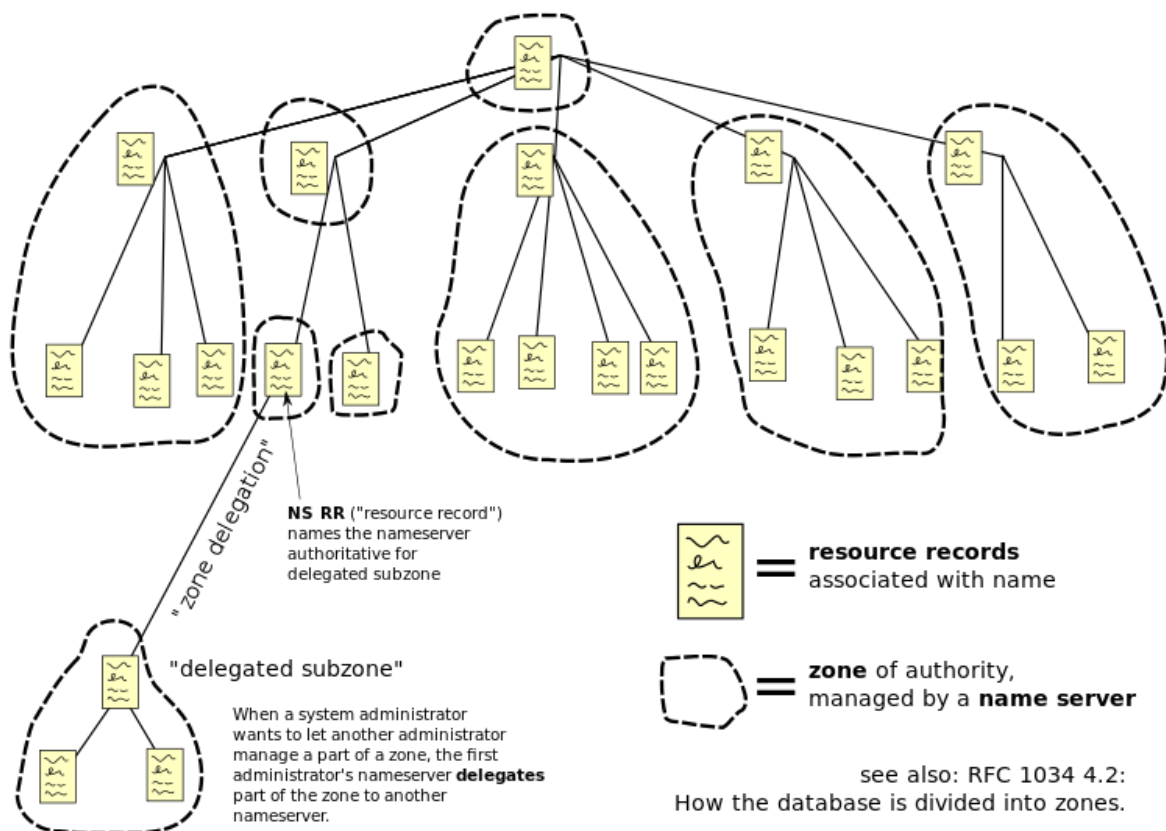
Domain names are formed by the rules and procedures of the Domain Name System (DNS). Any name registered in the DNS is a domain name. Domain names are organized in subordinate levels (subdomains) of the DNS root domain, which is nameless. The first-level set of domain names are the top-level domains (TLDs), including the generic top-level domains (gTLDs), such as the prominent domains com, info, net, edu, and org, and the country code top-level domains (ccTLDs). Below these top-level domains in the DNS hierarchy are the second-level and third-level domain names that are typically open for reservation by end-users who wish to connect local area networks to the Internet, create other publicly accessible Internet resources or run web sites.

The registration of these domain names is usually administered by domain name registrars who sell their services to the public.

Domain name space

Today, the Internet Corporation for Assigned Names and Numbers (ICANN) manages the top-level development and architecture of the Internet domain name space. It authorizes domain name registrars, through which domain names may be registered and reassigned. The domain name space consists of a tree of domain names. Each node in the tree holds information associated with the domain name. The tree sub-divides into *zones* beginning at the DNS root zone.

Domain Name Space



URL:

A uniform resource locator (URL) is the address of a resource on the Internet. A URL indicates the location of a resource as well as the protocol used to access it.

A URL contains the following information:

- The protocol used to access the resource
- The location of the server (whether by IP address or domain name)
- The port number on the server (optional)
- The location of the resource in the directory structure of the server
- A fragment identifier (optional)

Also known as a Universal Resource Locator (URL) or Web address. A URL is a type of uniform resource identifier (URI). In common practice, the term URI isn't used, or is used synonymously with URL, even though this is technically incorrect.

Host:

A **host** (also known as "network **host**") is a computer or other device that communicates with other **hosts** on a network. **Hosts** on a network include clients and servers -- that send or receive data, services or applications.