# Internet - 2

## Agenda

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# Protocol

- An agreed-upon format for transmitting data between two devices. The protocol determines the following:
  - ✓ the type of error checking to be used
  - ✓ data compression method, if any
  - ✓ how the sending device will indicate that it has finished sending a message
  - ✓ how the receiving device will indicate that it has received a message

- From a user's point of view, the only interesting aspect about protocols is that your computer or device must support the right ones if you want to communicate with other computers. The protocol can be implemented either in hardware or in software.

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# IP and TCP

- IP **specifies the format of packets** (*datagrams),* and the **addressing scheme**.
- IP is something like the **postal system**. It allows you to address a package and drop it in the system, but there's no direct link between you and the recipient.
- *Transmission Control Protocol (TCP)* - **connection-oriented protocol**, which establishes a virtual connection between a destination and a source - two hosts so that they can send messages back and forth for a period of time.
- ***T**ransmission **C**ontrol **P**rotocol / **I**nternet **P**rotocol,* TCP/IP is the suite of communications protocols used to connect hosts on the Internet. TCP/IP uses several protocols, the two main ones being TCP and IP.
- TCP/IP - de facto standard

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# Protocols in TCP/IP Suit

- IP – Internet Protocol
- TCP – Transmission Control Protocol
- UDP - User Datagram Protocol
- HTTP – Hyper Text Transfer Protocol
- SMTP – Simple Mail Transfer Protocol
- FTP – File Transfer Protocol
- SNMP – Simple Network Management Protocol
- Telnet - Terminal Emulation Protocol
- ARP - Address Resolution Protocol
- ICMP - Internet Control Message Protocol
- IGMP - Internet Group Management Protocol
- RIP - Routing Information Protocol

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# How TCP/IP works???

- When a Web server sends an HTML file to a client, it uses the HTTP protocol to do so.
- The HTTP program layer asks the TCP layer to set up the connection and send the file. The TCP stack divides the file into packets, numbers them and then forwards them individually to the IP layer for delivery.
- Although each packet in the transmission will have the same source and destination IP addresses, packets may be sent along multiple routes.
- The TCP program layer in the client computer waits until all of the packets have arrived, then acknowledges those it receives and asks for the retransmission on any it does not (based on missing packet numbers), then assembles them into a file and delivers the file to the receiving application.

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# IP address

- An **Internet Protocol address** is a numerical label assigned to each device participating in a computer network that uses the Internet Protocol for communication.
- A name indicates what we seek. An address indicates where it is. A route indicates how to get there.
- Principal functions:

1. host or network interface identification and
2. location addressing

- The designers of the Internet Protocol defined an IP address as a 32-bit number and this system, known as Internet Protocol Version 4 (IPv4).

- Due to

1. the enormous growth of the Internet and
2. the predicted depletion of available addresses,

   a new version of IP (IPv6), using 128-bits for the address (1995)

   and its deployment has been ongoing since the mid-2000s.

- IP addresses are binary numbers, but they are stored in text files and displayed, such as

1. 172.16.254.1(for IPv4), and
2. 2001:db8:0:1234:0:567:8:1(for IPv6).

- The Internet Assigned Numbers Authority (IANA) - IP address space allocations delegates five regional Internet registries (RIRs) to allocate IP address blocks to local Internet registries (Internet service providers) and other entities.

# WWW

- The **World Wide Web** (**WWW**) is a system of interlinked hypertext documents that are accessed via the Internet. With a web browser, one can view web pages that may contain text, images, videos, and other multimedia and navigate between them via hyperlinks.
- Tim Berners-Lee, a British computer scientist is the inventor of the Web.
- The Internet is a global system of interconnected computer networks.
- In contrast, the World Wide Web is **one of the services transferred over** these networks. It is a collection of text documents and other resources, linked by hyperlinks and URLs, usually accessed by web browsers from web servers.

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Internet ≠ WWW

# HTTP

- HTTP defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands. For example, when you enter a URL in your browser, this actually sends an HTTP command to the Web server directing it to fetch and transmit the requested Web page.
- The other main standard that controls how the World Wide Web works is HTML, which covers how Web pages are formatted and displayed.
- HTTP functions as a request-response protocol in the client-server computing model.

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# HTTPS

- Hypertext Transfer Protocol Secure (HTTPS) is a communications protocol for secure communication over a computer network, with especially wide deployment on the Internet.
- Technically, it is not a protocol; rather, it is the result of simply layering the Hypertext Transfer Protocol (HTTP) on top of the SSL/TLS protocol, thus adding the security capabilities of SSL/TLS to standard HTTP communications.
- The main motivation for HTTPS is to prevent wiretapping and man-in-the-middle attacks.

# E - mail

- Electronic mail, most commonly referred to as e-mail since 1993
- It is a method of exchanging digital messages from an author to one or more recipients. Modern email operates across the Internet or other computer networks
- Today's email systems are based on a store-and-forward model. Email servers accept, forward, deliver, and store messages. Neither the users nor their computers are required to be online simultaneously; they need connect only briefly, typically to a mail server, for as long as it takes to send or receive messages.
- It uses technology to communicate a digital message over the Internet.


# E – m@il

YAHOO! Mail

Windows Live™ Hotmail

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# Website

- A website is a set of related web pages typically served from a single web domain.
- All publicly accessible websites collectively constitute the World Wide Web.
- The pages of a website can usually be accessed from a simple Uniform Resource Locator (URL) called the web address.
- Hyperlinking between them conveys the reader's perceived site structure and guides the reader's navigation of the site which generally includes a home page with most of the links to the site's web content, and a supplementary about, contact and link page.

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# FTP

- ***File Transfer Protocol,*** the protocol for exchanging files over the Internet. FTP works in the same way as HTTP and SMTP.
- FTP uses the Internet's TCP/IP protocols to enable data transfer.
- FTP is most commonly used to download a file from a server using the Internet or to upload a file to a server (e.g., uploading a Web page file to a server).

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# Web Server

- Web servers are computers that deliver (*serves up*) Web pages. Every Web server has an IP address and possibly a domain name.
- For example, if you enter the URL *https://www.facebook.com/ identify?ctx=recover* in your browser, this sends a request to the Web server whose domain name is *facebook.com*. The server then fetches the page named *identify?ctx=recover* and sends it to your browser.
- Any computer can be turned into a Web server by installing server software and connecting the machine to the Internet.

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# Web Browser

- Web browser is a software application used to **locate, retrieve and display content** on the World Wide Web, including Web pages, images, video and other files.
- As a client/server model, the browser is the client run on a computer that contacts the Web server and requests information. The Web server sends the information back to the Web browser which displays the results on the computer or other Internet-enabled device that supports a browser.
- WorldWideWeb, Internet Explorer, Mozilla Firefox, SeaMonkey, Opera, Chrome.

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# Search Engines

- Search engines are programs that search documents for specified keywords and return a list of the documents where the keywords were found.

### *Web Search Engines*

- Web search engines work by sending out a ***spider*** to fetch as many documents as possible.
- Another program "***indexer***", then reads these documents and creates an index based on the words contained in each document. Each search engine uses a proprietary algorithm to create its indices such that, ideally, only meaningful results are returned for each *query*.
- ***Spider*** *or* ***Web crawler*** is a program that automatically fetches Web pages. Spiders are used to feed pages to search engines.
- It's called a spider because it ***crawls*** over the Web. Because most Web pages contain links to other pages, a spider can start almost anywhere. As soon as it sees a link to another page, it goes off and fetches it.

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# URL

- Uniform Resource Locator (URL) it is the global address of documents and other resources on the World Wide Web.
- The first part of the URL is called a protocol identifier and it indicates what protocol to use, and the second part is called are source name and it specifies the IP address or the domain name where the resource is located. The protocol identifier and the resource name are separated by a colon and two forward slashes.

✓ *https://www.facebook.com/* ***or*** *https://www.google.co.in/*

- A URL is one type of Uniform Resource Identifier (URI); the generic term for all types of names and addresses that refer to objects on the World Wide Web.
- Web address = URL uses the HTTP / HTTPS protocol.

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# Domain name

- Domain names are used to identify one or more *IP addresses*. For example, the domain name *microsoft.com* represents about a dozen IP addresses.
- Domain names are used in URLs to identify particular Web pages. For example, in the URL *https://accounts.google.com/*, the domain name is *gmail.com.*

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- Every domain name has a suffix that indicates which top level domain (TLD) it belongs to. There are only a limited number of such domains. For example:

✓ **.gov** - Government agencies

✓ **.edu** - Educational institutions

✓ **.org** - Organizations (nonprofit)

✓ **.mil** - Military

✓ **.com** - commercial business

✓ **.net** - Network organizations

✓ **.ca** - Canada

✓ **.th** - Thailand

✓ **.in** – India

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# Thank You !!!!!

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