



### Topic: 1.2.3 Internet principles of operation

#### WORKING OF THE INTERNET

Whenever you need to send a message or retrieve information from another computer, the TCP/IP protocols are what make the transmission possible. Your request goes out over the network, hitting domain name servers (DNS) along the way to find the target server. The DNS points the request in the right direction. Once the target server receives the request, it can send a response back to your computer. The data might travel a completely different path to get back to you. This flexible approach to data transfer is part of what makes the Internet such a powerful tool.

#### BROWSER

Browser, short for *web browser*, is a software application used to enable computers users to locate and access web pages. Browsers translates the basic HTML (Hypertext Mark Up Language) code that allows us to see images, text videos and listen to audios on websites, along with hyperlinks that let us travel to different web pages. The browser gets in contact with the web server and requests for information. The web server receives the information and displays it on the computer.

There are several types of browsers but the one thing they have in common is that they carry out the same function; they transfer hypertext. Here are some familiar common web browsers:

- Zak Google Chrome
- Zak Mozilla Firefox
- Zak Microsoft Edge

Every browser features a toolbar that allows you to perform various functions like:

- Zak Go back to the first page you started on the internet which is called Home.
- Zak Bookmark your favorite websites
- Zak Print content you find interesting on web pages
- Zak Check your web history, like the websites you visited in the past
- Zak You can go forward and backwards to see the previous sites you viewed

There are two basic ways that you can navigate through the browser:

- Zak You can click on links on different web pages. Those links will lead you to other web pages.
- Zak If you know the URL or the address of the website you can type it in write in the browser's box all the way at the top. There's no need to type in the: `http://` part when inserting the address because the browser automatically places it in. Then you have to click enter.





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So every time you click on a link or enter a URL, your browser will request the information from the web server. If your browser returns to the page with an error message, the address you typed in could be wrong or you may not be connected to the internet.

#### What are Internet Servers?

In general, all of the machines on the Internet can be categorized as two types: servers and clients. Those machines that provide services (like Web servers or FTP servers) to other machines are **servers**. And the machines that are used to connect to those services are **clients**. When you connect to "Yahoo!" at [www.yahoo.com](http://www.yahoo.com) to read a page, Yahoo! is providing a machine (probably a cluster of very large machines), for use on the Internet, to service your request. Yahoo! is providing a server. Your machine, on the other hand, is probably providing no services to anyone else on the Internet. Therefore, it is a user machine, also known as a client. It is possible and common for a machine to be both a server and a client, but for our purposes here you can think of most machines as one or the other.

A server machine may provide one or more services on the Internet. For example, a server machine might have software running on it that allows it to act as a Web server, an [e-mail](#) server and an [FTP](#) server. Clients that come to a server machine do so with a specific intent, so clients direct their requests to a specific software server running on the overall server machine. For example, if you are running a Web browser on your machine, it will most likely want to talk to the Web server on the server machine. Your [Telnet](#) application will want to talk to the Telnet server, your e-mail application will talk to the e-mail server, and so on.





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#### Hypertext Transfer Protocol (http)

Short for Hypertext Transfer Protocol, the underlying [protocol](#) used by the World. 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](#). There is much more to HTTP than simply sending the message that an end user wants to see a web page. HTTP actually identifies eight different methods which indicate what the desired action is and what action should be performed. These eight different methods are:

- Zak** HEAD – Asks for the material in a GET request, but without the response body.
- Zak** GET – Requests the representation of a specified source with a response body.
- Zak** POST – Submits the data to be processed from an HTML form to the identified source.
- Zak** PUT – Uploads a representation of the source that has been specified.
- Zak** DELETE – Deletes a specific source.
- Zak** TRACE – This echoes back a specific request so that the user can see what servers are adding or changing the request.
- Zak** OPTIONS – Used to check the functionality of a web server by returning the HTTP methods that the server supports for a specified URL.
- Zak** CONNECT – Facilitates SSL-encrypted communication through an unencrypted HTTP proxy by converting the request connection to a transparent TCP/IP tunnel.

Important to communication and the way the entire Internet works, the hypertext transfer protocol or HTTP is a necessary protocol.

The other main standard that controls how the World Wide Web works is [HTML](#), which covers how Web pages are formatted and displayed.

#### HTML

HTML is an abbreviation that stands for Hypertext Markup Language. It is the language of web pages—the markup language that browsers read to render web pages.

HTML refers to a markup language that has several versions and web browsers and other user agents have varying levels of support for these versions. In general, the earlier a version is, the more browser support there is for that version.

To publish information for global distribution, one needs a universally understood language, a kind of publishing mother tongue that all computers may potentially understand. The publishing language used by the World Wide Web is HTML (from Hypertext Markup Language).

HTML gives authors the means to:

- Zak** Publish online documents with headings, text, tables, lists, photos, etc.
- Zak** Retrieve online information via hypertext links, at the click of a button.





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- Design forms for conducting transactions with remote services, for use in searching for information, making reservations, ordering products, etc.
- Include spread-sheets, video clips, sound clips, and other applications directly in their documents.

#### HTML Structure & Presentation

When doing HTML coding we should know that there is difference between the HTML presentation and HTML structure.

STRUCTURE defines the semantics and structural markup of the HTML document, whereas PRESENTATION is what we see when the HTML appears in browser. Commonly called style and includes appearance and use of multimedia.

These two are commonly written separately and called document and cascade style sheet (CSS). CSS controls every aspect of webpage presentation.

#### Media Access Control (MAC) address

The MAC address is a unique value associated with a network adapter. MAC addresses are also known as hardware addresses or physical addresses. They uniquely identify an adapter on a LAN.

MAC addresses are 12-digit hexadecimal numbers (48 bits in length). By convention, MAC addresses are usually written in one of the following two formats:

MM:MM:MM:SS:SS:SS  
MM-MM-MM-SS-SS-SS

The first half of a MAC address contains the ID number of the adapter manufacturer. These IDs are regulated by an Internet standards body. The second half of a MAC address represents the serial number assigned to the adapter by the manufacturer.

In the example "00:A0:C9:14:C8:29"

The prefix "00A0C9"

Indicates the manufacturer is Intel Corporation.

#### Why MAC Addresses?

Recall that TCP/IP and other mainstream networking architectures generally adopt the OSI model. In this model, network functionality is subdivided into layers. MAC addresses function at the data link layer (layer 2 in the OSI model). They allow computers to uniquely identify themselves on a network at this relatively low level.





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#### URL (Uniform Resource Locator) definition

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A URL (Uniform Resource Locator, previously Universal Resource Locator) - usually pronounced by sounding out each letter but, in some quarters, pronounced "Earl" - is the unique address for a file that is accessible on the Internet. A common way to get to a Web site is to enter the URL of its home page file in your Web browser's address line. However, any file within that Web site can also be specified with a URL. Such a file might be any Web (HTML) page other than the home page, an image file, or a program such as a common gateway interface application or Java applet. The URL contains the name of the protocol to be used to access the file resource, a domain name that identifies a specific computer on the Internet, and a pathname, a hierarchical description that specifies the location of a file in that computer.

On the Web (which uses the Hypertext Transfer Protocol, or HTTP), an example of a URL is:

<http://www.ietf.org/rfc/rfc2396.txt>

which specifies the use of a HTTP (Web browser) application, a unique computer named www.ietf.org, and the location of a text file or page to be accessed on that computer whose pathname is /rfc/rfc2396.txt.

A URL for a particular image on a Web site might look like this:

<http://searchnetworking.techtarget.com/WhatIs/images/coaxla.gif>

A URL for a file meant to be downloaded using the File Transfer Protocol (FTP) would require that the "ftp" protocol be specified like this hypothetical URL:

<ftp://www.somecompany.com/whitepapers/widgets.ps>

#### Cookies

Cookies are very small text files placed on your computer by a Web server when you view some sites online (not all Web sites place cookies). They're used to store data about you and your preferences so that the Web server doesn't have to repeatedly request this information, potentially slowing down load time.

Cookies are commonly used to store personal registration data like your name, your address, the contents of a shopping cart, and your preferred layout for a Web page, what map you might be looking at, and so on. Cookies make it easy for Web servers to personalize information to fit your specific needs and preferences when you're visiting a Web site.

#### Implications of Cookies

The easiest answer is that cookies, in and of themselves, are completely harmless. However, some Web sites use them to track users as they browse the Web, collecting highly personal information and often discreetly transferring that information to other Web sites without permission or warning. This is why we often hear about Web cookies in the news.



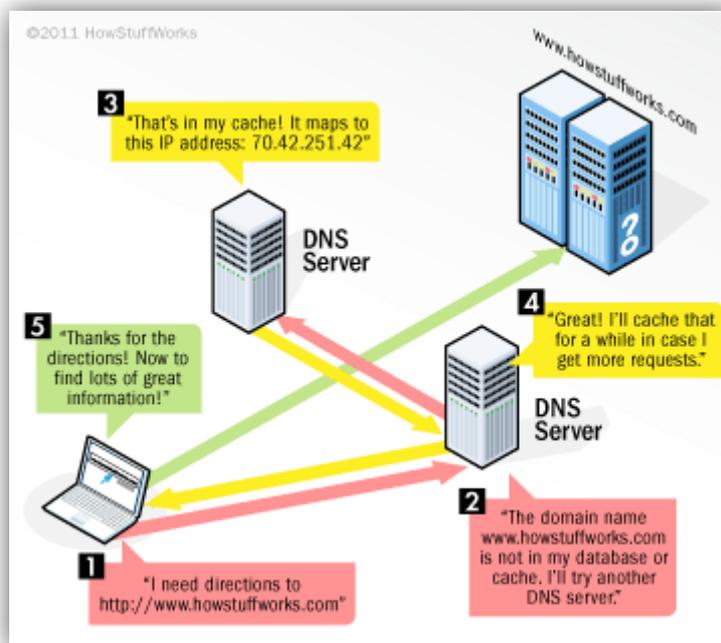


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#### DNS

It's like your computer's GPS for the Internet. Its basic job is to turn a user-friendly domain name like "google.com" into an Internet Protocol (IP) address like 64.233.167.104 that computers use to identify each other on the network.

Computers and other network devices on the Internet use an IP address to route your request to the site you're trying to reach. This is similar to dialing a phone number to connect to the person you're trying to call. Thanks to DNS, though, you don't have to keep your own address book of IP addresses. Instead, you just connect through a domain name server, also called a DNS server or name server, which manages a massive database that maps domain names to IP addresses.



#### Internet Protocol (IP) address

Every machine on a network has a unique identifier. Just as you would address a letter to send in the mail, computers use the unique identifier to send data to specific computers on a network. Most networks today, including all computers on the Internet, use the TCP/IP protocol as the standard for communicating on the network. In the TCP/IP protocol, the unique identifier for a computer is called its IP address.

There are two standards for IP addresses: IP Version 4 (IPv4) and IP Version 6 (IPv6). All computers with IP addresses have an IPv4 address, and many are starting to use the new IPv6 address system as well. Here's what these two address types mean:

 IPv4 uses 32 binary bits to create a single unique address on the network. An IPv4 address is expressed by four numbers separated by dots. Each number is the decimal (base-10)





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representation for an eight-digit binary (base-2) number, also called an octet. For example:  
216.27.61.137

- Zak IPv6 uses 128 binary bits to create a single unique address on the network. An IPv6 address is expressed by eight groups of hexadecimal (base-16) numbers separated by colons, as in 2001:cdba:0000:0000:0000:0000:3257:9652. Groups of numbers that contain all zeros are often omitted to save space, leaving a colon separator to mark the gap (as in 2001: cdba: 3257:9652).

#### MAC vs. IP Addressing

The MAC address generally remains fixed and follows the network device, but the IP address changes as the network device moves from one network to another. IP networks maintain a mapping between the IP address of a device and its MAC address.

