

Department of Commerce (CA)

CORE PAPER-X-INTERNET AND WEB DESIGNING

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**UNIT1:Introduction to internet-resources of internet-
H/Wand S/W requirements of internet-service
provider-protocols-concepts-internet clients and
internet servers.**

REFERENCE BOOK:

- The internet complete reference- Harley Hahn
- Dynamic web publishing – Shelly powers

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What is the Internet?

The Internet is a worldwide telecommunications system that provides connectivity for millions of other, smaller networks; therefore, the Internet is often referred to as a network of networks. It allows computer users to communicate with each other across distance and computer platforms.

The Internet began in 1969 as the U.S. Department of Defense's Advanced Research Project Agency (ARPA) to provide immediate communication within the Department in case of war. Computers were then installed at U.S. universities with defense related projects. As scholars began to go online, this network changed from military use to scientific use. As ARPAnet grew, administration of the system became distributed to a number of organizations, including the National Science Foundation (NSF). This shift of responsibility began the transformation of the science oriented ARPAnet into the commercially minded and funded Internet used by millions today.

The Internet acts as a pipeline to transport electronic messages from one network to another network. At the heart of most networks is a server, a fast computer with large amounts of memory and storage space. The server controls the communication of information between the devices attached to a network, such as computers, printers, or other servers.

An Internet Service Provider (ISP) allows the user access to the Internet through their server. Many teachers use a connection through a local university as their ISP because it is free. Other ISPs, such as America Online, telephone companies, or cable companies provide Internet access for their members.

You can connect to the Internet through telephone lines, cable modems, cellphones and other mobile devices.

What makes up the World Wide Web?

The Internet is often confused with the World Wide Web. The misperception is that these two terms are synonymous. The Internet is the collection of the many different systems and protocols. The World Wide Web, developed in

1989, is actually one of those different protocols. As the name implies, it allows resources to be linked with great ease in an almost seamless fashion.

The World Wide Web contains a vast collection of linked multimedia pages that is ever-changing. However, there are several basic components of the Web that allow users to communicate with each other. Below you will find selected components and their descriptions.

TCP/IP protocols

In order for a computer to communicate on the Internet, a set of rules or protocols computers must follow to exchange messages was developed. The two most important protocols allowing computers to transmit data on the Internet are Transmission Control Protocol (TCP) and Internet Protocol (IP). With these protocols, virtually all computers can communicate with each other. For instance, if a user is running Windows on a PC, he or she can communicate with iPhones.

Domain name system

An Internet address has four fields with numbers that are separated by periods or dots. This type of address is known as an IP address. Rather than have the user remember long strings of numbers, the Domain Name System (DNS) was developed to translate the numerical addresses into words. For example, the address fcit.usf.edu is really 131.247.120.10.

URLs

Addresses for web sites are called URLs (Uniform Resource Locators). Most of them begin with http (HyperText Transfer Protocol), followed by a colon and two slashes. For example, the URL for the Florida Center for Instructional Technology is <https://fcit.usf.edu/>.

Some of the URL addresses include a directory path and a file name. Consequently, the addresses can become quite long. For example, the URL of a web page may be: <https://fcit.usf.edu/holocaust/default.htm>. In this example, "default.htm" is the name of the file which is in a directory named "holocaust" on the FCIT server at the University of South Florida.

Top-level domain

Each part of a domain name contains certain information. The first field is the host name, identifying a single computer or organization. The last field is the top-level domain, describing the type of organization and occasionally country of origin associated with the address.

Top-level domain names include:

.com	Commercial
.edu	Educational
.gov	US Government
.int	Organization
.mil	US Military
.net	Networking Providers
.org	Non-profit Organization

Domain name country codes include, but are not limited to:

.au	Australia
.de	Germany
.fr	France
.nl	Netherlands
.uk	United Kingdom
.us	United States

Paying attention to the top level domain may give you a clue as to the accuracy of the information you find. For example, information on a "com" site can prove useful, but one should always be aware that the intent of the site may be to sell a particular product or service. Likewise, the quality of information you find on the "edu" domain may vary. Although many pages in that domain were created by the educational institutions themselves, some "edu" pages may be the private opinions of faculty and students. A common convention at many institutions is to indicate a faculty or student page with a ~ (tilde) in the address. For instance, <https://fcit.usf.edu/~kemker/default.htm> is a student's personal web page.

Why do I need a browser?

Once you have an account with an Internet service provider, you can access the Web through a browser, such as Safari or Microsoft Internet Explorer. The browser is the application responsible for allowing a user's computer to read and display web documents.

Hypertext Markup Language (HTML) is the language used to write web pages. A browser takes the HTML and translates it into the content you see on the screen. You will note your cursor turns into a pointing finger over some images or text on the page. This indicates a link to additional information and it can be either a link to additional web pages, email, newsgroups, audio, video, or any number of other exciting files.

For example, if you were to click on [Florida Department of Education](#) your browser would link to the Florida Department of Education home page and that web page would open in your screen.

How do I navigate on the Web?

Your browser is equipped with many useful features to assist you in navigating through the Web. Some of these features are:

Menu bar

The menu bar, located at the very top of the screen, can be accessed using the mouse. When you hold down the mouse button over an item in the main menu, a sub menu is "pulled down" that has a variety of options. Actions that are in black can be performed, while actions that cannot be performed will be in gray or lightened. The submenus provide keyboard shortcuts for many common actions, allowing you to implement the functions faster than using the mouse.

Tool bar

The tool bar is located at the top of the browser; it contains navigational buttons for the Web. Basic functions of these buttons include:

<u>Command</u>	<u>Function</u>
Home	Opens or returns to starting page
Back	Takes you to the previous page
Forward	Takes you to the next page
Print	Prints current page
Stop	Stops loading a page
Reload	Refresh/redisplays current page
Search	Accesses search engine

Location bar

The location bar, below the tool bar, is a box labeled "Location," "GoTo," or "Address." You can type in a site's address, and press the Return or Enter key to open the site.

Status bar

The status bar is located at the very bottom of the browser window. You can watch the progress of a web page download to determine if the host computer has been contacted and text and images are being downloaded.

Scroll bar

The scroll bar is the vertical bar located on the right of the browser window. You can scroll up and down a web page by placing the cursor on the slider control and holding down the mouse button.

Electronic mail



Probably the most popular Internet service is electronic mail, more commonly known as email. This consists of the sending of messages composed on the computer, via a network, directly to the computer of the recipient who reads the message on his/her computer. Knowledge workers with access to e-mail write five to ten times as many e-mail messages as hand-written notes. The following are just some of the advantages of e-mail. .

- Reliability: although there is no guarantee, you will normally receive quick feedback if the address does not exist or there is a similar delivery problem. .
- Efficiency: many short-cut tools exist to increase your efficiency when composing messages. You can use your computer's cut-and-paste function, you can have managed address books and lists, when replying to another message you can automatically incorporate any part of the message to which you are, etc. And it is just as easy to send a

message to one as to a whole list of addressees. (Admittedly, this results in a lot of abuse and information overload on the recipient's side.)

- Digital: e-mail is composed on a computer and remains in computer-readable format all the way to its destination. Thus one can also easily incorporate other computer data such as graphics or document files.
- Cheap: because the capacity of the Internet and disk storage is increasing all the time, the cost of a sending and storing a one-page e-mail message is negligible.
- Speed: messages are generally delivered across the world in a matter of seconds.

The e-mail address

Just like with ordinary postal mail (now usually referred to as snail-mail), you need to know the recipient's address before you can send your message. Internet e-mail addresses have a standard format: `username@domain`. The username is often the name that your addressee uses to connect to the network, e.g. "jvanbelle" or sometimes a long number. This username is allocated by the LAN administrator. The domain identifies the file server, which acts as the local post office for your recipient's e-mail. The domain consists of several parts, separated by full stops or dots. The international standard for domain identification is

- The country code is the international two-letter code for the country (e.g., *au* for Australia, *za* for South Africa, *sa* for Saudi-Arabia, *uk* for Great Britain, etc).
- The two most common types of organizations are *co* for a commercial organization and *ac* for an academic institution . Less frequent are *org* for (not-for-profit) organizations, *mil* for military, *net* for networks and *gov* for government agencies.
- Each country has a national Internet naming body that allows its organizations to chose their own name, as long as no one has claimed the same name before. Examples of South African domain names are *anc.org.za*, *uct.ac.za*, *fnb.co.za*.
- Large organizations often refine the domain further by adding the name of their LAN servers, e.g *mail.uct.ac.za*.

Examples of possible e-mail addresses are: `JaneDoe@stats.uct.ac.za` (Jane working in the statistics department at the University of Cape Town in South Africa); `info@anc.org.za` (information department at the ANC, a political party) or `SoapJoe@marketing.bt.co.uk` (Joe Soap in the marketing department of British Telekom in the U.K.).

The US Americans, having "invented" the Internet, use a slightly different way for their addresses. They leave off their country code (*us*) and use *com* for commercial organization or *edu* for educational institution. Since the majority of Internet users hail from the US, you will encounter many addresses such as `JWood@mit.edu` or `Bill@microsoft.com`.

Netiquette

Just as in any other social interaction environment, there are some rules and guidelines for appropriate social behavior on the Net: Netiquette (etiquette on the Internet). The following are some illustrative examples pertaining primarily to e-mail.

- Shouting, THE PRACTICE OF TYPING ENTIRE SENTENCES IN UPPER CASE, is generally seen as novice (newbie) behavior and frowned upon. Perhaps it stems from the disgust with old teletypes and mainframe terminals that did not have lower-case

: -)	Happy face
: -(Sad or sorrow
; -)	Wink
: -O	Shock
: -\	Sarcasm
: ^]	Wide grin
: -x	Blowing a kiss
: '(Teary-eyed
: -P	Sticking out tongue
8 -)=	Beard and glasses
: --)%	Boy on skateboard
<g>	Grin
<w>	Whisper
{ {} }	Hug you

characters.

- The use of emoticons to indicate the emotive content of a sentence is highly recommended. Typed text does not reveal any body language and a joking remark can easily be interpreted the wrong way. Whenever one writes something in jest or with humorous intent, it is advisable to add an emoticon. An emoticon (an icon indicating emotional content) consists of a series of text characters which are meant to be rotated a quarter turn and represent a laughing :-) (i.e. equivalent to J or the smiley) winking ;-) or sad face :- (
- Flaming is the carrying on of a heated personal emotional debate between two or more individuals on a public Internet forum. A flame war is generally a sign of immature behavior by individuals who cannot take perspective and should really take the discussion off-line.
- Netizens (inhabitants of the Internet i.e. frequent net surfers) often use standard but, to the non-initiated, cryptic abbreviations. Examples are: BTW = by the way ; ROFL = rolling on the floor with laughter ; TPTB = the powers that be; BRB = Be Right Back. This vocabulary has been adopted and expanded with the growth of Short Message Service (SMS) use on cellular phones.

The Web

The Internet service that has received the most attention from the public media is the WorldWide Web or the Web for short (sometimes also called WWW or W3). The Web is a vast collection of multimedia information located on Web servers attached to the Internet.

Its popularity is due to a number of reasons.

- Information links are transparent. Links to any other piece of information located anywhere on the Internet can be inserted in a web document. A simple click of the mouse takes the reader completely automatically from one Web server to another, quite possibly in another country.
- Information can be presented in a hypertext link format whereby one can jump immediately from one concept to a related concept or explanation. No need to read text in the traditional top-to-bottom sequential way.
- It allows for multimedia information. A Web document can incorporate rich and colourful graphics, animation, video clips, sound etc. Just think of the marketing opportunities!
- The Web supports interactive applications. Web applications can request information from visiting users and documents can include programming instructions. Users can even download small programs (often written in Java) that could perform some processing on the user's computer or display special visual effects.



Reading or accessing information on the Web is called surfing the Net because one jumps from one hypertext link to another following whatever takes your fancy. In order to surf the Net you need some special browser program that understands the Web protocols and formats and presents the information to suit your computer monitor. You also need an access point or connection to the Internet. Your Internet connection may be automatic if your computer is connected to a (corporate) LAN that connects directly to the Internet, or it may be by means of a special subscription to a business that specializes in providing Internet access for others: the Internet Service Provider (ISP). Access to the ISP for individual users is usually via a dial-up connection i.e. using a modem and telephone.

Once a newbie (new user) is connected to the Internet (online), she faces the daunting task of finding her way amongst the huge variety of information offered. The easiest way in is usually by means of a search engine: a Web site that tries to catalogue the

information available on the Internet. By entering one or more search words, the engine will provide you with a couple of adverts and a list of documents that contain the word(s) for which you are looking.

All information on the Web is uniquely identified by the URL (Uniform Resource Location), which is really the full Internet address of a Web document. The URL consists again of the Web server's domain address, followed by the access path and file name on the server. Examples of URLs are www.hotbot.com/sports/main.html (the main page on the sports section of the HotBot search engine) or <http://www.commerce.uct.ac.za/informationssystem/> (containing details about UCT's department of information systems). Note the similarities and differences between an URL and an e-mail address.

Other Internet services

A number of other services are available on the Internet. The Usenet consists of ongoing discussion fora (or newsgroups) on an extremely wide variety of topics, from forensic psychology to Douglas Adams, from Star Trek to cryptography. The discussion happens entirely by means of e-mail and, when you subscribe to a given newsgroup, you can browse through the contributions of the last few days and reply with your own contribution.

More specialized services exist, such as ftp (file transfer protocol) for the transfer of large computer files, and telnet, the remote access of computers elsewhere, but they are used less frequently. In any way, these services are now being performed transparently by most Web browsers. Similarly, older services such as Gopher and Veronica have really been replaced almost entirely by the Web.

Internet protocols and standards

Different computers and networks can communicate via the Internet because a number of basic Internet communication standards have been defined. Any network connected to the Internet will translate its own standards and protocols into those used on the Internet by means of a bridge.

The most fundamental and "lowest level" protocol is the TCP/IP (Transmission Control Protocol/Internet Protocol). This protocol is also the native protocol of computers using the Unix operating system, which explains why Unix computers are so popular as Internet servers.

On top of TCP/IP are the "mid-level" protocols defined for the various Internet services. Perhaps the best known of these is http (Hypertext Transmission Protocol), which specifies how the Web information is made available and transmitted across the Internet. Other protocols and standards are STMP and MIME (for e-mail) or ftp.

```
94 <img alt="Image placeholder" data-bbox="250 89 739 105"/>
95 <div class="container">
96 <div class="carousel-caption">
97 <h1>One more for good measure.</h1>
98 <p>Cras justo odio, dapibus ac facilisis in, egestas eget quam. Donec id elit non mi porta ante dapibus.
99 </p>
100 </div>
101 </div>
102 <a class="left carousel-control" href="#myCarousel" role="button" data-slide="prev">
103 <span class="glyphicon glyphicon-chevron-left" aria-hidden="true"></span>
104 <span class="sr-only">Previous</span>
105 </a>
106 <a class="right carousel-control" href="#myCarousel" role="button" data-slide="next">
107 <span class="glyphicon glyphicon-chevron-right" aria-hidden="true"></span>
108 <span class="sr-only">Next</span>
109 </a>
110 </div><!-- /.carousel -->
111 <!--Featured Content Section-->
112 <div class="container">
113 <div class="row">
114 <div class="col-md-4"></div>
115 <div class="col-md-4"><h2>FEATURED CONTENT </h2> </div>
116 <div class="col-md-4"></div>
117 </div></div>
```

HTML

Information made available via the Web is usually formatted using a special standard: the Hypertext Markup Language (HTML), which actually consists of plain text files with visual formatting commands inserted between the text. Most desktop productivity software allows you to save your document directly in the HTML format. Special HTML editors allow much finer control over the final layout of your Web document. A later development is Extensible Markup Language (XML), which increases the flexibility of web documents by allowing them to be viewed not only using a web browser, but also on different platforms such as a PDA or cellular telephone.

Reading: E-Commerce

Introduction



Business was quick to grasp the marketing and business potential offered by the Internet. Initially, businesses used the Internet to facilitate communication by means of e-mail. This was quickly followed by tapping the web's potential for the dissemination of product and other marketing information. The provision of advertising space {banners}

on frequently visited web sites is the main source of income for search engines (sites allowing you to search the Internet for information) and web portals (web sites that provide additional value-added personal services such as news, financial information, weather forecasts, items of interest etc.)

A number of specialized companies have realized that the Internet can be a direct and extremely cost-effective channel of distribution. Some companies already have a physical infrastructure and use the web to enhance their distribution channel e.g. you can now order your pizza, bank statements or movie tickets via the web. Other, virtual companies have almost no physical infrastructure and are mere “conductors” for the flow of products or services.

Important categories of e-commerce include:

- Business-to-consumer (B2C) in which organizations provide information online to customers, who can in turn place orders and make payments via the internet
- Business-to-business (B2B) in which business partners collaborate electronically
- Consumer-to-consumer (C2C) in which individuals sell products or services directly to other individuals.

The technologies that are needed to support electronic commerce include the network infrastructure (Internet, intranets, extranets), software tools for web site development and maintenance, secure ordering and payment methods, and resources for information sharing, communication and collaboration. When e-commerce is done in a wireless environment, such as through the use of cellphones, this is referred to as mobile commerce (m-commerce).

B2C e-Commerce

Electronic retailing is similar in principle to home shopping from catalogues, but offers a wider variety of products and services, often at lower prices. Search engines make it easy to locate and compare competitor’s products from one convenient location and without being restricted to usual shopping hours. Electronic malls provide access to a number of individual shops from one website. On-line auctions have also proved a popular way of disposing of items that need a quick sale.

Business-to-consumer commerce allows customers to make enquiries about products, place orders, pay accounts, and obtain service support via the Internet. Since customers can enter transactions at any time of the day or night, and from any geographical location, this can be a powerful tool for expanding the customer base of a business. However, the existence of a website does not guarantee that customers will use it, or that they will return to it after a first visit. Firms investing in electronic commerce need to consider a number of factors in developing and maintaining their e-commerce sites.

A successful web site should be attractive to look at and easy to use. In addition, it should offer its customers good performance, efficient service, personalization, incentives to purchase and security. Inadequate server power and communications capacity may cause customers to become frustrated when browsing or selecting products.

Many sites record details of their customers' interests, so that they can be guided to the appropriate parts of the site. Customer loyalty can also be developed by offering discussion forums and links to related sites, and by providing incentives such as discounts and special offers for regular customers. And if you expect customers to purchase goods, and not just browse, then it is vital that customers should have complete confidence in the security of their personal information, and in the ability of the web store to deliver the goods as requested.

Much of the business value of the Internet lies in the ability to provide increased value to customers, with the focus on quality of service rather than simply price. By opening additional channels of communication between the business and its customers, businesses can find out the preferences of their customers, and tailor products to their needs. Customers can use the Internet to ask questions, air complaints, or request product support, which increase customer involvement in business functions such as product development and service.

However, although businesses may increase their markets while gaining from reduced advertising and administration costs, problems that have emerged include alienation of regular distributors, difficulty in shipping small orders over large distances, fierce competition and inadequate profit margins. Because of the delivery problem for physical products, many successful e-commerce firms have focused on the delivery of services, such as banking, securities trading, employment agencies and travel bureaus. Of course, every problem can be regarded as an opportunity – a local software developer has created and marketed a route scheduling application which provides optimized route sheets, with maps for individual routes and step-by-step driving instructions for effective and timeous order management, based on powerful geographical information systems to provide a user-friendly interface.

B2C e-commerce has also made it easier for firms to conduct market research, not only by collecting shopping statistics, but also by using questionnaires to find out what specific groups of customers want. This in turn has enabled the personalization of products to meet customer preferences.

B2B e-Commerce



Business-to-business e-commerce comprises the majority of electronic transactions, involving the supply chain between organizations and their distributors, resellers, suppliers and other partners. Efficient management of the supply chain can cut costs, increase profits, improve relationships with customers and suppliers, and gain competitive advantage. To achieve this, firms need to

- Get the right product to the right place at the least cost;
- Keep inventory as low as possible while meeting customer requirements;
- Reduce cycle times by speeding up the acquisition and processing of raw materials.

Information technologies used to support business-to-business e-commerce include email, EDI and EFT, product catalogues, and order processing systems. These functions may be linked to traditional accounting and business information systems, to ensure that inventory and other databases are automatically updated via web transactions. Intranets provide a facility for members of an organization to chat, hold meetings and exchange information, while at the same time sensitive information is protected from unauthorized access by means of a firewall. An extranet provides a means of access to the intranet for authorized users such as business consultants.

Electronic data interchange (EDI) involves the electronic exchange of business transaction documents over computer networks, between organizations and their customers or suppliers. Value-added networks provided by third parties are frequently used for this purpose. Documents such as purchase orders, invoices and requests for quotations are electronically interchanged using standard message formats, which are specified by international protocols. EDI eliminates printing, postage and manual handling of documents, reducing time delays and errors, and thus increasing productivity. It also provides support for implementing a Justin-Time approach, which reduces lead time, lowers inventory levels, and frees capital for the business.

Marketing to other businesses is done by means of electronic catalogues and auction sites, which can increase sales while reducing advertising and administrative costs. From the buyer's perspective, reverse auctions can be used to advertise requests for quotation in a bidding marketplace in order to attract potential suppliers. Third party vendors can make use of group purchasing to aggregate a number of separate small orders in order to increase negotiating power.

Collaborative commerce involves long-term relationships between organizations in areas such as demand forecasting, inventory management, and product design and manufacture. However, this presents a number of business challenges such as software integration, compatibility of technologies, and building of trust between firms.

C2C e-Commerce

Auctions are the most popular method of conducting business between individuals over the Internet. (Unfortunately, auction fraud was also the most common type of crime reported to the Internet Fraud Complaint Centre in 2002.) Other C2C activities include classified advertising, selling of personal services such as astrology and medical advice, and the exchange of files especially music and computer games.







Electronic funds transfer

Electronic payment systems can be used to transfer funds between the bank accounts of a business and its suppliers, or from a customer to the business. In retail stores, wide area networks may connect POS terminals in retail stores to bank EFT systems. In most cases, an intermediary organization acts as an automated clearinghouse, which debits and credits the relevant accounts.

The most popular payment method used by individual consumers is the credit card, which requires the merchant to pay a commission to the bank on each transaction. For transactions involving small amounts that do not justify the payment of commission, merchants may accept electronic money in the form of digital cash. In this case, the customer “buys” money from the bank in the form of a unique cash number, which is transmitted to the merchant at the time of purchase and “deposited” in an account at a participating bank. In South Africa several banks have developed their own forms of digital cash, such as e-bucks from First National Bank.

Select Payment Type

Payment Type

-    
-
-  Save time. Check out securely.
Pay without sharing your financial information.
-
-  Pay with Bitcoin
-

Continue

An important issue in electronic commerce is the security of Internet transactions. Data is commonly encrypted to reduce the vulnerability of credit card transactions. Secure Sockets Layer (SSL) and Secure Electronics Transaction (SET) are two of the standards used to secure electronic payments on the Internet. Secure sites usually have URLs that begin with https instead of the usual http.

Hardware and Software Requirements for Internet connection:

The following are the methods of connecting a computer to the Internet using software and hardware peripherals.

Three

- Connecting a computer using Wireless Broadband
- Connecting a computer using an Ethernet Cable
- Connecting a Computer Using Dial-Up Community

Hardware Requirement :

- To connect the Internet, any one of the following is mandatory.
- Modem is used to connect Internet through Telephone connection.
- NIC- Network Interface Card(wired/ wireless) facility is the most important hardware required to connect Internet. For example, the Laptop can be connected Internet through the wired/wireless.
- Dongle is used to connect the Internet using cellular network
- Wi-Fi router or Hotspot is used to connect the Internet using wireless network
- Electronic device which supports cellular network
- Internet Connectivity such as Dial-up connection, ISDN, DSL, Cable TV, wired and wireless (Cellular) Network.

Software Requirement

- The operating system should support TCP (Transfer Control Protocol) / IP (Internet Protocol), SMTP (Simple Mail Transfer Protocol), FTP (File Transfer Protocol), HTTP (Hyper Text Transfer Protocol) and HTTPS (Hyper Text Transfer Protocol Secured) protocols.
- Browsers and other Internet clients access to the web applications such as Outlook, Gmail, Whatsapp, Facebook, Twitter and etc.

Connection Types:

The following methods are able to connect internet.

Dial-up Connection :

A dial-up connection is established when two or more data communication devices use a **Public Switched Telephone Network (PSTN)** to connect to an Internet Service Provider (ISP) from computers. Many remote locations depend on Internet dial-up connections because broadband and cable are rare in remote areas with low population. Internet Service Providers often provide dial-up connections, a feasible alternative for budget-conscious subscribers.

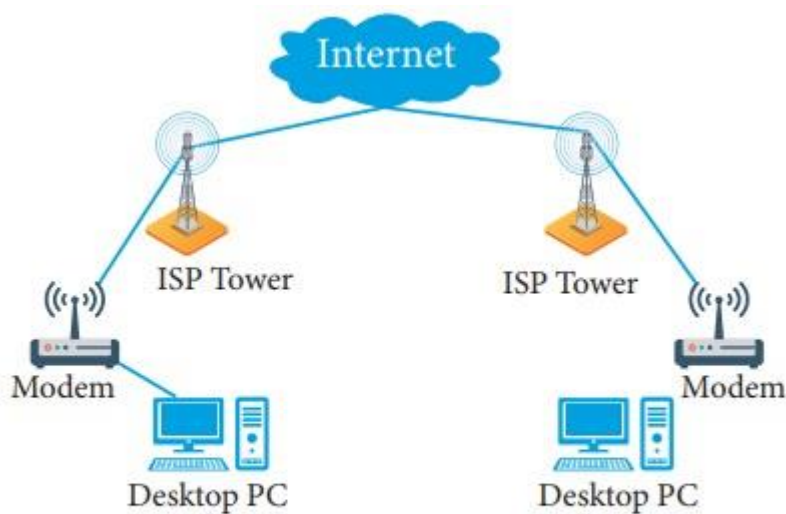
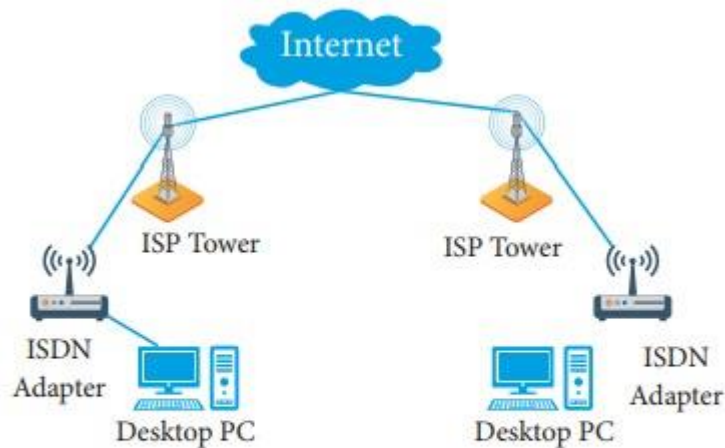


Figure 15.3 Dial-up Connection

ISDN

ISDN is the acronym of **Integrated Services Digital Network**. It establishes the connection using the phone lines (PSTN) which carry digital signals instead of analog signals. It is a set of communication standards for simultaneous digital transmission of data, voice, video, and other services over the traditional circuits of the public switched telephone network. There are two techniques to deliver ISDN services such as Basic Rate Interface (BRI) and Primary Rate Interface (PRI).

The following diagram shows accessing internet using ISDN connection:



*Figure 15.4a Integrated Services
Digital Network*

DSL:

Digital Subscriber Line (DSL) is a high-speed Internet service for homes and businesses that competes with cable and other forms of broadband Internet. DSL provides high-speed networking over ordinary Telephone lines using broadband modem technology. The technology behind DSL enables Internet and telephone service to work over the same phone line without requiring customers to disconnect either their Voice or Internet connections.

Cable TV Internet Connection (setup box):

The cable TV network can be used for connecting a computer or a local network to the Internet, competing directly with DSL (Digital Subscriber Line) technology.

This type of network is classified as HFC (**Hybrid Fiber-Coaxial**), as it uses both fiber optics and coaxial cables. The connection between the cable TV company to the distribution points (Optical nodes) is made using fiber optics, with distances up to

25 miles (40 km). Each optical node is typically serves between 500 and 2,000 clients (customers).

The following diagram shows that how internet is accessed using Cable TV connection:

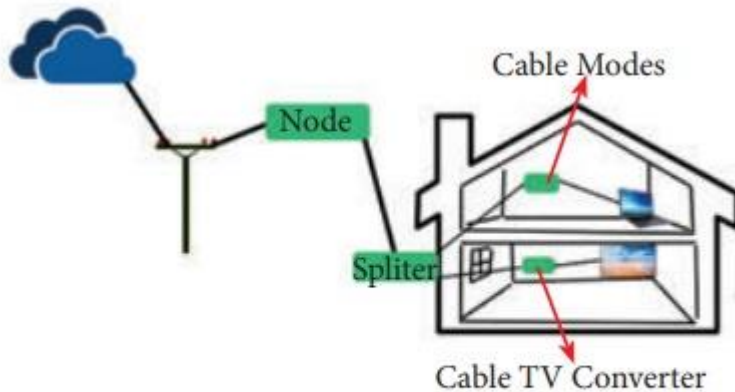


Figure 15.4b Cable TV Connection

Satellite Internet Connection:

Satellite Internet access is Internet access provided through satellite communication for domestic and enterprise usage. The facility of modern consumer grade satellite Internet service is typically provided to individual users through geostationary satellites . It provides fairly high data speeds, along with latest satellites using Ka-band to attain downstream data speeds up to 50 Mbps internet speed.

Wireless Internet Connection:

It is a technology for wireless local area networking with devices based on the IEEE 802.11 standards. Devices that can use Wi-Fi technology include personal computers, video-game consoles, phones and tablets, digital cameras, smart TVs, digital audio players and modern printers. Wi-Fi compatible devices can connect to

the Internet via a WLAN and a wireless access point. Such an access point (or hotspot) has a range of about 20 meters (66 feet) indoors and a greater range of outdoors. Hotspot coverage can be as small as a single room with walls that block radio waves, or as large as many square kilometres achieved by using multiple overlapping access points.

Services Available on the Internet:

- Data Transfer
- Internet banking
- E-commerce
- E-Learning
- E-Governance
- Browsing and Chating
- E-Mail

Data Transfer:

Data transfer is the process of using computing techniques and technologies to transmit or transfer electronic or analog data from one computer node to another. Data is transferred in the form of bits and bytes over a internet digital or analog medium, and the process enables digital or analog communications and its movement between devices. Data transfer is also known as data transmission.

Internet Banking:

Traditionally, customers used to access banking services through Retail/ corporate branch. But in this digital era Online Banking has taken vital role. The online banking is also called as internet banking, virtual banking or e-banking. This is a value added application to connecting the core banking system and provide the self service bank facilities for customers via online. The **Figure 15.5** is the Screen Shot of the login screen of internet banking.



Figure 15.5 login screen of internet banking

Features:

- A bank customer can perform transactional and non-transactional tasks through online banking, including
- Viewing account balances, transactions, statements of customer

- Viewing images of paid cheques, request for cheque books
- Funds transfers between the customer's linked accounts
- Paying third parties, including bill payments and third party fund transfers
- Register utility billers and make bill payments

Advantages

- Permanent online access for the banking transactions.
- Access anywhere using the application via mobile or computer
- Less time consuming, easy to use and safe
- Customer can manage their funds instantly and accurately

E-commerce:

E-commerce application is a transaction of buying or selling good and services through online. Electronic commerce attraction technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems.

E-commerce businesses may also employ some or all of the followings:

- Online shopping web sites for retail sales direct to consumers
- Providing or participating in online market places, which process third-party business-to-consumer or consumer-to-consumer sales

- Business-to-business buying and selling;
- Gathering and using demographic data through web contacts and social media
- **Business-to-business** (B2B) electronic data interchange
- Marketing to prospective and established customers by e-mail or fax (for example, with newsletters)
- Engaging in pretail for launching new products and services
- Online financial exchanges for currency exchanges or trading purposes.

e-Marketing: (Electronic Marketing)

E-Marketing is the process of marketing a product or service using the internet. It also includes marketing done via e-mail and wireless media. It also called Digital Marketing.



Figure 15.6 e-Marketing

Professionals working in e-marketing must design and implement Internet marketing plans. But they also must have a broad understanding of what makes these plans effective. Those working in e-marketing must be able to carry out many tasks:

- Following business market trends
- Consulting with companies about digital marketing needs
- Resolving issues businesses have in reaching customers oriented problems
- Creating e-marketing objectives for business challenges
- Developing marketing strategies competitive bussiness model.
- Choosing cost-effective marketing methods
- Launching digital marketing campaigns and monitoring results

E-Learning :

A learning system based on electronic resources is known as E-learning. The use of computers and the Internet forms the major component of E-learning. The E-learning can also be termed as a network enabled transfer of skills and knowledge and the delivery of education is made to a large number of recipients at the same or different times.

E-Governance:

E-governance is the application of **Information and Communication Technology** (ICT) for delivering government services, exchange of information, communication transactions, integration of various stand-alone systems and services between government-to-citizen (G2C), **Government-to-business (G2B)**, **Government-to-Government (G2G)**, **Government -to-Employees** (G2E) as well as back office processes and interactions within the entire government framework. Through e-governance, government services will be made available to citizens in a convenient, efficient and transparent manner. The three main target groups that can be distinguished in governance concepts are government, citizens and businesses/ interest groups. In e-governance there are no distinct boundaries.

It classify four basic models they are :

- Government-to-Citizen (customer)
- Government-to-Employees
- Government-to-Government
- Government-to-Business

Examples of e- Governance:

- Aadhaar Card is a 12-digit unique identity number issued to all Indian residents based on their biometric and demographic data.
- Inspector General of Registration portal - Tamil Nadu – www.tnreginet.gov.in used for Land and legal registrations



Figure 15.7 e- Governance Methodology

Online Chatting:

Online chat refers to any kind of communication via the Internet that offers a real-time transmission of text messages from sender to receiver. The chat messages are generally short in order to enable other participants to respond quickly. Online chat may address point-to-point communications as well as multicast communications

from one sender to many receivers and voice and video chat and web conferencing service.

WWW Operation:

The World Wide Web is the universe of network-accessible information, an expression of human knowledge. All the resources and users on the Internet that are using the Hypertext Transfer Protocol HTTP.

It is a way of exchanging information between computers on the Internet, tying them together into a vast collection of interactive multimedia resources.

Internet and Web is not the same thing: Web uses internet to pass over the information.

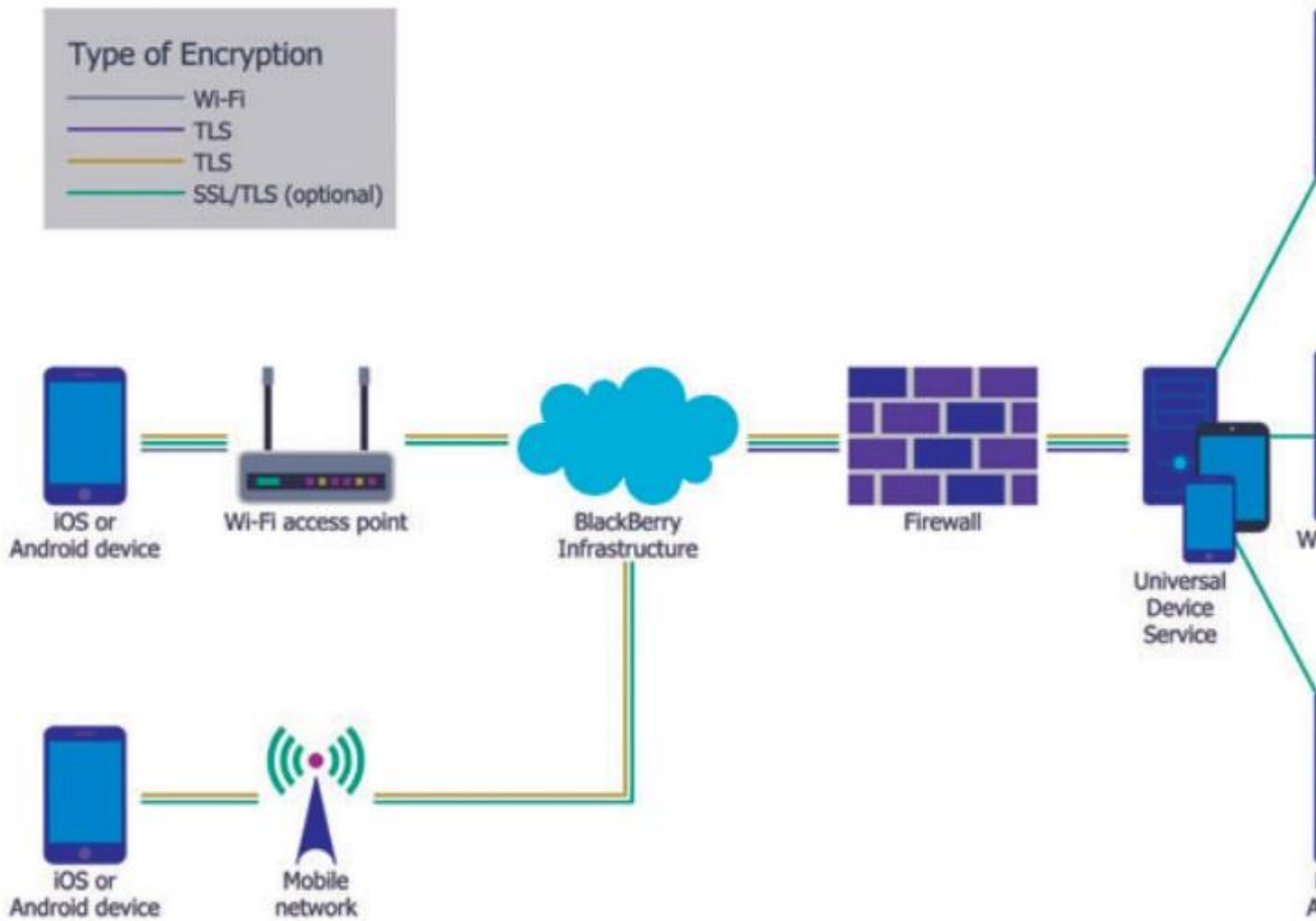


Figure 15.8 World Wide Web Architecture

Web Page:

Webpage is a document commonly written in HyperText Markup Language (HTML) that is accessible through the Internet or other network using an Internet browser. A web page is accessed by entering a URL address and may contain text, graphics and hyperlinks to other web pages and files. The page you are reading now is an example of a web page.

Domain Name:

A domain name is an identification a string that defines a area of administrative autonomy, authority or control within the Internet. 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 used in various networking backgrounds and application-specific naming and addressing purposes. In general, a domain name represents an Internet Protocol (IP) resource, such as a personal computer used to access the Internet, a server computer hosting a web site.

There are several domain names available:

- Generic domain names such as **.com, .edu, .gov, .net**.
- Country level domain names such as **au, in, za, us**.

The following table shows the Generic Top-Level Domain names:

Table 15.1 Top-Level Domain names

Table 15.1 Top-Level Domain names

Domain Name	Meaning
Com	Commercial business
edu	Education
gov	U.S. Government agency
int	International entity
mil	U.S. military

Web Browser:

A web browser also called browser. It is a software application for retrieving, presenting and traversing information resources on the World Wide Web. An information resource (web data) is identified by a Uniform Resource Identifier (URI/URL) that may be a web page, image, video or other piece of content available in web server. Browsers are primarily use the World Wide Web, they can also be used to access information provided by web servers in private networks or files in file systems.



Figure 15.9 Web Browser

Introduction to Types of Networking Protocols

A [Network Protocol](#) is a group of rules accompanied by the network. Network protocols will be formalized requirements and plans composed of rules, procedures, and types that describe communication among a couple of devices over the network. The protocol can be described as an approach to rules that enable a couple of entities of a communication program to transfer information through any type of variety of a physical medium. The protocol identifies the rules, syntax, semantics as well as, synchronization of

communication as well as, feasible error managing methods. In this article, we will discuss the different types of networking protocols.

Different Types of Networking Protocols

Below are the different types of Networking Protocols.

1. HTTP or HTTPS

- This stands for **Hypertext Transfer Protocol** or **Hypertext Transfer Protocol (secure)**. The secure version is encrypted, meaning that we are going to encrypt all the data as we send it from the client to the server.



Application Layer (7) **HTTP** **HTTPS**

Transport Layer (4) **80** **443**

- Now client and server here become very important with application layer protocol. Nearly all application-layer protocols use this model

using one device on the network being the client, the other device on the network being the server.

- Now when we are using **HTTP** or **HTTPS** or a transfer a file. Transferring a file in the format of the hypertext. Hypertext is readable by a web browser. The client software you are likely very familiar with. This is either Google Chrome or Firefox, which may be Microsoft Edge or Apple's Safari browser. These are all web clients that support the use of HTTP or HTTPS.
- The server side also running some software. It's running server software. For the website, we are usually using Apache, which is open-source software that is a web server, which can run on either Linux or Windows. We have nginx which is used in very large website deployments and can be run on UNIX. We have Microsoft's Internet Information Services or IIS, which can be run on Microsoft systems. So there are several web server options out that a server administrator can install in order to host a website on the internet. So the whole purpose of the client-server here is to have client software like a web browser and the web server like Apache, to work in conjunction with each other, to transfer these

hypertext documents in order to get the website from the server to the client.

- The Port number uniquely identifies the layer-7 protocol being used at layer 4. What we can do is we can use these port numbers to easily identify traffic at layer 4, The HTTP by default we have port 80, and for HTTPS by default, we have port 443 as the transport layer protocols.

2. FTP (File Transfer Protocol)

- The FTP allows us to transfer files from a client to a server or from a server to a client.



File Transfer



File Transfer

- We can do it in both directions here, and this protocol is either going to be FTP, sFTP, or TFTP.



File Transfer

FTP

sFTP

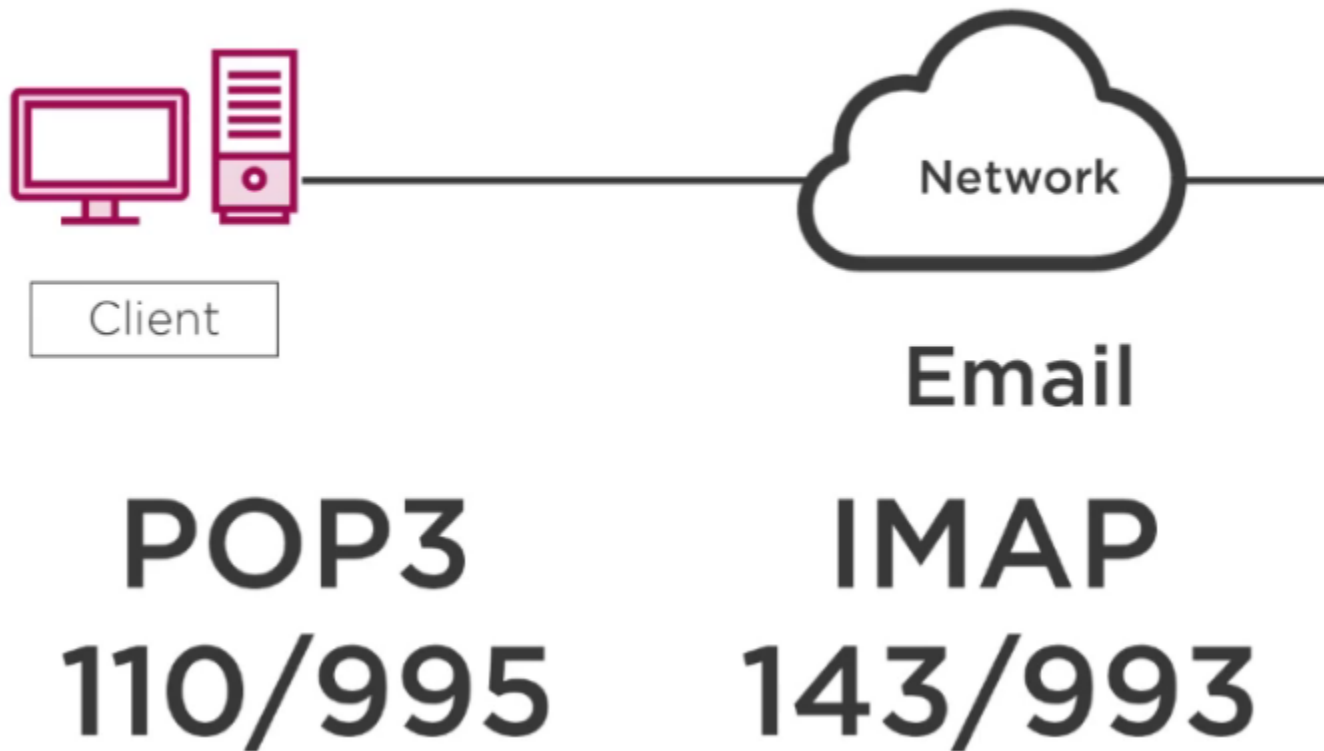
20 21

22

- FTP is a **File Transfer Protocol**, SFTP is **Secure File Transfer Protocol**, and TFTP is [Trivial File Transfer Protocol](#).
- FTP and SFTP are pretty similar to one another. These protocols are going to transfer files from one device to the other, and there is client and server software specifically designed to do this.

- TFTP works a little bit differently. It's really meant for sending tiny files between two devices or to have simple setups where you can transfer a file quickly without having to worry about authentication or having any issues with firewalls causing your traffic to be knocked down.
- FTP and SFTP typically require both a username and a password in order to transfer these files. TFTP does not require this. SFTP specifically here is going to encrypt the traffic.
- FTP is going to use both ports 20 and 21; one is used for authentication, the other one is used for transferring information. Port 22 is used for SFTP and the reason for that is port 22 is actually the port number for another protocol we are going to look at called Secure Shell or SSH, and what happens here is we actually take the FTP protocol and we put it inside of an SSH session, which allows us to encrypt traffic and is why the port numbers are the same for both SFTP and SSH. TFTP uses port number 69.

3. Email Protocols (POP3, IMAP, SMTP)



- Email is specifically designed for transferring files. We are transferring files that are actually in the format of these email documents. For email, we have three protocols we use. Two of them are used by a client to retrieve mail from a server. So POP and IMAP are explicitly used to take email messages that live currently on a server, maybe Gmail or maybe your company's email server, and they use it to transfer those email

messages over to your client, some type of mail client that resides on your workstation.

- SMTP however, is [Simple Mail Transfer Protocol](#). This protocol takes a message that you create on a client email application and it uses it then to send that email to an SMTP server. SMTP is used to forward the email to the server, the server then figures out how to get messages to the recipient that you intended.
- POP stands for Post Office Protocol, we are using version 3 there.
- IMAP is Internet Message Access Protocol, and then like SMTP is the Simple Mail Transfer Protocol. All these protocols work either in unencrypted or encrypted modes.
- So here with POP3, for unencrypted traffic we will use port 110; for encrypted traffic, we will use port 995. IMAP, we are going to use port 143 for the unencrypted traffic, port 993 for encrypted traffic, and for SMTP we are going to use port 25 for unencrypted and 465 for encrypted.

4. TCP(Transmission Control Protocol) and UDP(User Datagram Protocol)

There are two common network protocols used to send data packets over a network. Together TCP as well as, UDP ahead the data packets through your device applying ports to different routers until they will connect with the last destination. Also, they are utilized to send out the packets towards the IP address with the receiver. Equally TCP as well as, UDP focus on the top of IP, or Internet Protocol.

TCP/IP

UDP/IP, which is used very often, but they are just referred to as TCP and UDP.

- TCP is among the most widely used protocol using the internet.
- TCP is a two-way conversation.
- TCP is focused on stability.
- Packets will be instructed and numbered.
- Packets will be error-checked.

UDP

UDP would not perform all of the error-checking made by TCP

- Error checking slower points down.
- Packets are simply delivered to the recipient.

Utilized once speed is desired as well as, error modification will be required

- Live broadcasts

here are various types of protocols that support a major and compassionate role in communicating with different devices across the network. These are:

1. Transmission Control Protocol (TCP)
2. Internet Protocol (IP)
3. User Datagram Protocol (UDP)
4. Post office Protocol (POP)
5. Simple mail transport Protocol (SMTP)
6. File Transfer Protocol (FTP)
7. Hyper Text Transfer Protocol (HTTP)
8. Hyper Text Transfer Protocol Secure (HTTPS)
9. Telnet
10. Gopher

Let's discuss each of them briefly:

1. **Transmission Control Protocol (TCP):** TCP is a popular communication protocol which is used for communicating over a network. It divides any message into series of packets that are sent from source to destination and there it gets reassembled at the destination.
2. **Internet Protocol (IP):** IP is designed explicitly as addressing protocol. It is mostly used with TCP. The IP addresses in packets help in routing them through different nodes in a network until it reaches the destination system. TCP/IP is the most popular protocol connecting the networks.

3. **User Datagram Protocol (UDP):** UDP is a substitute communication protocol to Transmission Control Protocol implemented primarily for creating loss-tolerating and low-latency linking between different applications.
4. **Post office Protocol (POP):** POP3 is designed for receiving incoming E-mails.
5. **Simple mail transport Protocol (SMTP):** SMTP is designed to send and distribute outgoing E-Mail.
6. **File Transfer Protocol (FTP):** FTP allows users to transfer files from one machine to another. Types of files may include program files, multimedia files, text files, and documents, etc.
7. **Hyper Text Transfer Protocol (HTTP):** HTTP is designed for transferring a hypertext among two or more systems. HTML tags are used for creating links. These links may be in any form like text or images. HTTP is designed on Client-server principles which allow a client system for establishing a connection with the server machine for making a request. The server acknowledges the request initiated by the client and responds accordingly.
8. **Hyper Text Transfer Protocol Secure (HTTPS):** HTTPS is abbreviated as Hyper Text Transfer Protocol Secure is a standard protocol to secure the communication among two computers one using the browser and other fetching data from web server. HTTP is used for transferring data between the client browser (request) and the web server (response) in the hypertext format, same in case of HTTPS except that the transferring of data is done in an encrypted format. So it can be said that https thwart hackers from interpretation or modification of data throughout the transfer of packets.
9. **Telnet:** Telnet is a set of rules designed for connecting one system with another. The connecting process here is termed as remote login. The system which requests for connection is the local computer, and the system which accepts the connection is the remote computer.
10. **Gopher:** Gopher is a collection of rules implemented for searching, retrieving as well as displaying documents from isolated sites. Gopher also works on the client/server principle.

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