Unit 3

Computer Networking

Computer network is defined as a set of interconnected autonomous systems that facilitate distributed processing of information. It results in better performance with high speed of processing.

Advantages of Network:
These are main advantages of Computer Networks:

1. **Central Storage of Data –**
   Files can be stored on a central node (the file server) that can be shared and made available to each and every user in an organization.
2. **Anyone can connect to a computer network –**
   There is a negligible range of abilities required to connect to a modern computer network. The effortlessness of joining makes it workable for even youthful kids to start exploiting the data.
3. **Faster Problem solving –**
   Since an extensive procedure is disintegrated into a few littler procedures and each is taken care of by all the associated gadgets, an explicit issue can be settled in lesser time.
4. **Reliability –**
   Reliability implies backing up of information. Due to some reason equipment crash, and so on, the information gets undermined or inaccessible on one PC, another duplicate of similar information is accessible on another workstation for future use, which prompts smooth working and further handling without interruption.
5. **It is highly flexible –**
   This innovation is known to be truly adaptable, as it offers clients the chance to investigate everything about fundamental things, for example, programming without influencing their usefulness.
6. **Security through Authorization –**
   Security and protection of information is additionally settled through system. As just the system clients are approved to get to specific records or applications, no other individual can crack the protection or security of information.
7. **It boosts storage capacity –**
   Since you will share data, records and assets to other individuals, you need to guarantee all information and substance are legitimately put away in the framework. With this systems administration innovation, you can do the majority of this with no issue, while having all the space you requirement for capacity.

Disadvantages of Network:
These are main disadvantages of Computer Networks:

1. **It lacks robustness –**
   If a PC system's principle server separates, the whole framework would end up futile. Also, if it has a bridging device or a central linking server that fails, the entire network would

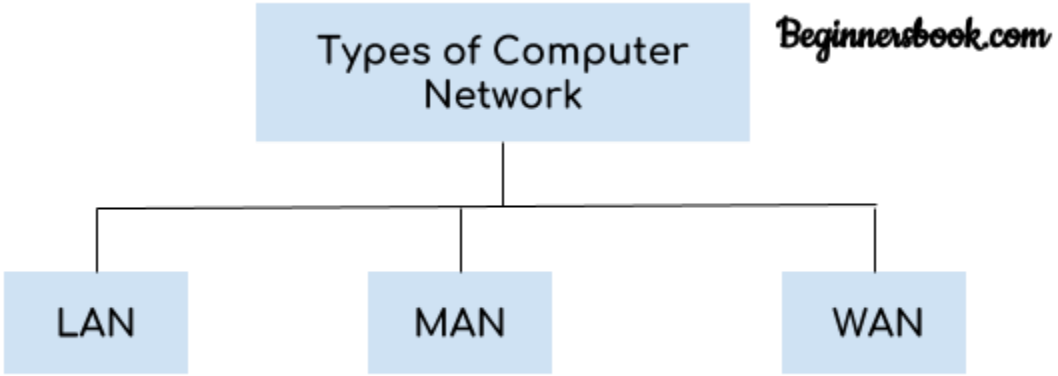
also come to a standstill. To manage these issues, gigantic systems ought to have a ground-breaking PC to fill in as document server to influence setting to up and keeping up the system less demanding.

2. **It lacks independence –** PC organizing includes a procedure that is worked utilizing PCs, so individuals will depend a greater amount of PC work, rather than applying an exertion for their jobs that needs to be done. Beside this, they will be subject to the primary document server, which implies that, in the event that it separates, the framework would end up futile, making clients inactive.
3. **Virus and Malware –** On the off chance that even one PC on a system gets contaminated with an infection, there is a possibility for alternate frameworks to get tainted as well. Infections can spread on a system effectively, in view of the between availability of different gadgets.4. Lack of Independence
4. **Cost of network –** The expense of executing the system including cabling and equipment can be expensive.

Types of Computer Network: LAN, MAN and WAN

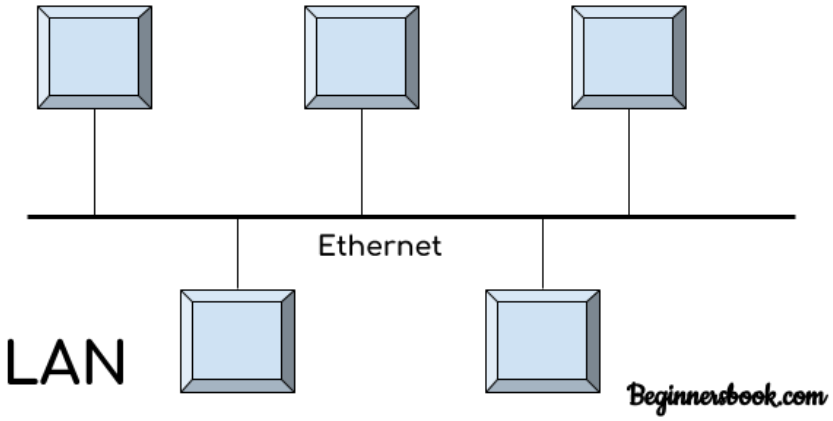
A computer network is a group of computers connected with each other through a transmission medium such as cable, wire etc. In this guide, we will discuss the types of computer networks in detail.

Types of Computer Network



There are mainly three types of computer networks based on their size:
1. Local Area Network (LAN)
2. Metropolitan Area Network (MAN)
3. Wide area network (WAN)

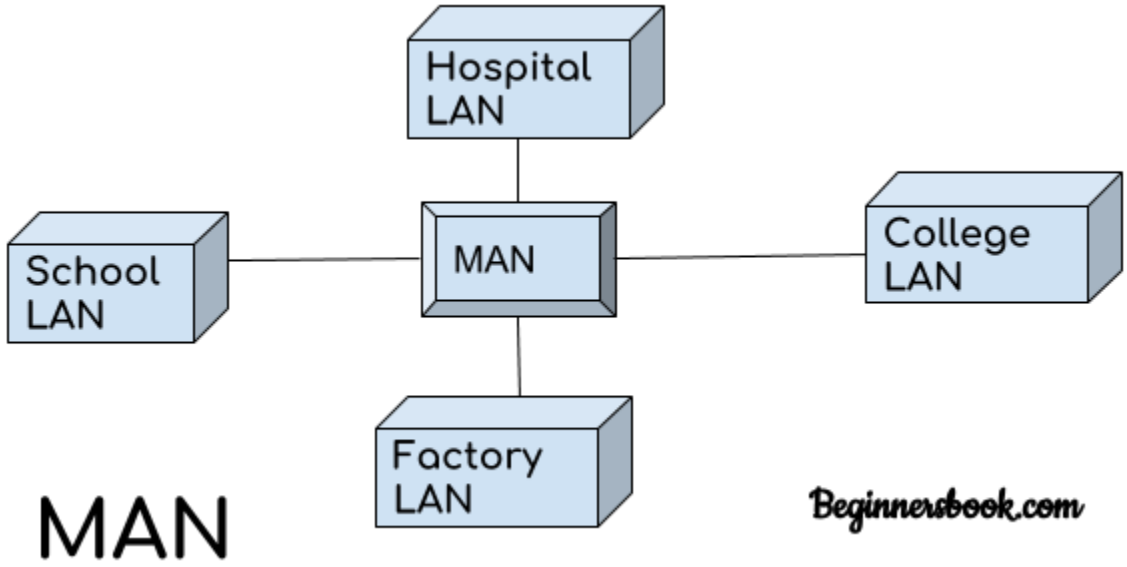
1. Local Area Network (LAN)



1. Local area network is a group of computers connected with each other in a small places such

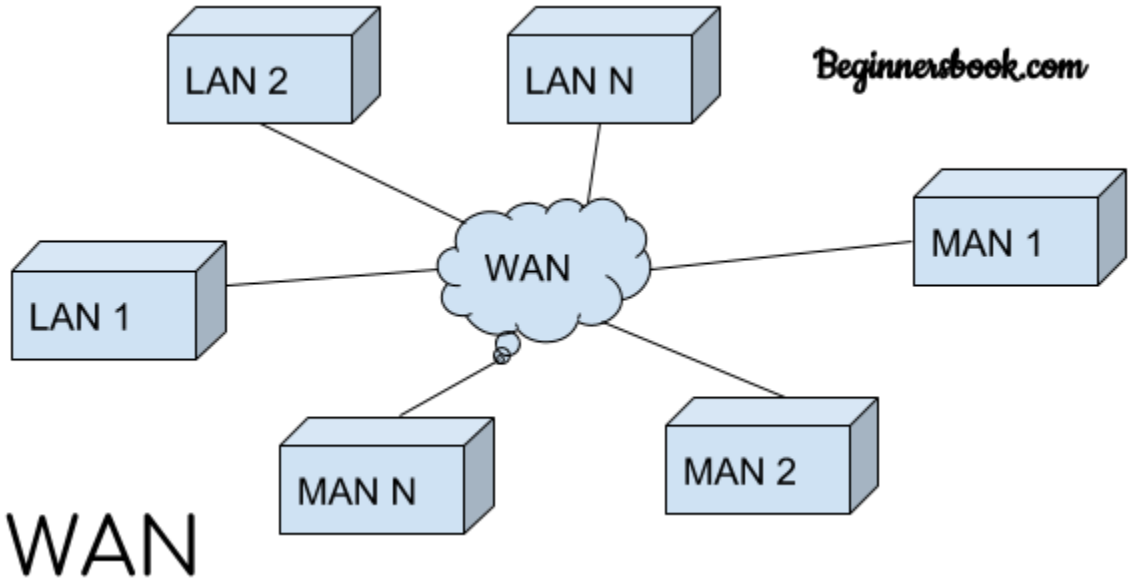
as school, hospital, apartment etc.
2. LAN is secure because there is no outside connection with the local area network thus the data which is shared is safe on the local area network and can't be accessed outside.
3. LAN due to their small size are considerably faster, their speed can range anywhere from 100 to 100Mbps.
4. LANs are not limited to wire connection, there is a new evolution to the LANs that allows local area network to work on a wireless connection.

2. Metropolitan Area Network (MAN)



MAN network covers larger area by connections LANs to a larger network of computers. In Metropolitan area network various Local area networks are connected with each other through telephone lines. The size of the Metropolitan area network is larger than LANs and smaller than WANs(wide area networks), a MANs covers the larger area of a city or town.

3. Wide area network (WAN)



Wide area network provides long distance transmission of data. The size of the WAN is larger than LAN and MAN. A WAN can cover country, continent or even a whole world. Internet connection is an example of WAN. Other examples of WAN are mobile broadband connections such as 3G, 4G etc.

Advantages of WAN:

Centralized infrastructure: One of the main advantage of WAN is the that we do not need to maintain the backup and store data on local system as everything is stored online on a data centre, from where we can access the data through WAN.

Privacy: We can setup the WAN in such a way that it encrypts the data that we share online that way the data is secure and minimises the risk of unauthorized access.

Increased Bandwidth: With the WAN we get to choose the bandwidth based on the need, a large organization can have larger bandwidth that can carry large amount of data faster and efficiently.

Area: A WAN can cover a large area or even a whole world though internet connection thus we can connect with the person in another country through WAN which is not possible is other type of computer networks.

Disadvantages of WAN:

Antivirus: Since our systems are connected with the large amount of systems, there is possibility that we may unknowingly download the virus that can affect our system and become threat to our privacy and may lead to data loss.
Expensive: Cost of installation is very high.
Issue resolution: Issue resolution takes time as the WAN covers large area, it is really difficult to pin point the exact location where the issues raised and causing the problem.

Difference between Internet and Intranet

Generally, most of people confused between internet and intranet. While there is exist lots of differences to differentiate them.

Internet:

Internet is used to connect different network of computers simultaneously. It is a public network therefore anyone can access the internet. In internet, there are multiple users and it provides unlimited number of information to the users.

Intranet:

Intranet is the type of internet which is used by privately. It is a private network therefore anyone can't access intranet. In intranet, there are limited number of users and it provides limited number of information to its users.

Now, we shall see the difference between internet and intranet:

	INTERNET	INTRANET
1.	Internet is used to connect different network of computers simultaneously.	Intranet is owned by private firms.
2.	In internet, there are multiple users.	In intranet, there are limited users.
3.	Internet is unsafe.	Intranet is safe.
4.	In internet, There are more number of visitors.	In intranet, There are less number of visitors.
5.	Internet is a public network.	Intranet is a private network.
6.	Anyone can access Internet.	In this, anyone can't

		access the Intranet.
7.	Internet provides unlimited information.	Intranet provides limited information.

Advantages and Disadvantages of Internet

Advantages:

1) Information on almost every subject imaginable.
2) Powerful search engines
3) Ability to do research from your home versus research libraries.
4) Information at various levels of study. Everything from scholarly articles to ones directed at children.
5) Message boards where people can discuss ideas on any topic. Ability to get wide range of opinions. People can find others that have a similar interest in whatever they are interested in.
6) The internet provides the ability of emails. Free mail service to anyone in the country.
7) Platform for products like SKYPE, which allow for holding a video conference with anyone in the world who also has access.
8) Friendships and love connections have been made over the internet by people involved in love/passion over similar interests.
9) Things such as Yahoo Answers and other sites where kids can have readily available help for homework.
10) News, of all kinds is available almost instantaneously. Commentary, on that news, from every conceivable viewpoint is also available.

Disadvantages:

1) There is a lot of wrong information on the internet. Anyone can post anything, and much of it is garbage.
2) There are predators that hang out on the internet waiting to get unsuspecting people in dangerous situations.
3) Some people are getting addicted to the internet and thus causing problems with their interactions of friends and loved ones.
4) Pornography that can get in the hands of young children too easily.
5) Easy to waste a lot of time on the internet. You can start surfing, and then realize far more time has passed than you realized. Internet and television together of added to the more sedentary lifestyles of people which further exacerbates the obesity problem.
6) Internet has a lot of “cheater” sites. People can buy essays and pass them off as their own far more easily than they used to be able to do.
7) There are a lot of unscrupulous businesses that have sprung up on the internet to take advantage of people.
8) Hackers can create viruses that can get into your personal computer and ruin valuable data.

9) Hackers can use the internet for identity theft.
10) It can be quite depressing to be on the internet and realize just how uneducated so many people have become in today's society.

Advantages & Disadvantages of Intranet

Advantages of Intranet

There are number of advantages of intranet discussed below

- Intranets offering workforce productivity which can help user to find and observe information very fast. User may also use applications according to their roles and tasks. Through web browser a user can get access to entire contents of any website from anywhere or any time. Intranet also increase the ability of employee's by performing their job confidently very fast, and accurately.
- Intranet permits business companies to share out information to employees according to their need or requirements. Employees may also link to appropriate data at their expediency.
- The best advantage offered by intranet is communications within an organization or business company, landscape or portrait. Intranets are helpful to converse planned initiative that has an international reach all through the organization. The well known examples of transportation are chat, email, and blogs. A actual world example of Intranet is Nestle had a number of food processing plants.
- The most significant advantage of Intranet is Web publishing which permits burdensome corporate knowledge to be continued and effortlessly access all through the company using Web technologies and hypermedia. The familiar examples of web publishing consist of training, news feed, company polices, documents, and employee manual. Intranet can be accessed general internet standards such as CGI applications, Flash files, and Acrobat files. Each unit can bring up to date the online copy of a document and intranet always provides the most recent version to employees.
- Intranet offering business operations and administration solutions because it also being used as a platform of mounting and organizing applications across the internet world.
- Another advantage of Intranet is time saving because there is no need to maintain physical documents such as procedure manual, requisition forms, and internet phone list.
- Now intranet facilitates their user o view and gets information and data via web browser. Intranet also save the money of any organization on printing, publishing and overall maintenance.
- Through Intranet common corporate culture every user can view the similar information.
- Intranet offer improve teamwork through which teamwork is enabled and all certified users can get access to information.
- Intranet providing cross platform capability for UNIX, Mac, Windows.
- Intranet offering their user to write applications on their browser without cross-browser compatibility issues.
- Intranet is a Web-based tool that permits users to produce a customized site according their requirements. You can pull all Internet actions and most wanted contented into a single page which make easier to access.

Disadvantages of Intranet

- Intranet has great features for interconnected manners but has some disadvantages too

- Management does need to stop control of specific information, this problem can be minimized but with appropriate prudence.
- The other disadvantage of Intranet is security issue
- Intranet gathered everything in one location which is really good but if it is not prearranged then you will spoil everything.
- The cost of intranet is very high but has lots of advantages after implementing.

What is an ISP?

What is the definition of ISP?

ISP is an acronym that stands for *Internet Service Provider*. An Internet Service Provider is a company that provides Internet access to organizations and home users.

What exactly do ISPs do?

In short, an ISP provides you with Internet access, usually for a fee. Without an ISP, you wouldn't be able to shop online, access Facebook, or read this page. Connecting to the Internet requires specific telecommunications, networking, and routing equipment. ISPs allow users access to networks that contain the required equipment, enabling users to establish Internet connectivity.

ISPs are responsible for making sure you can access the Internet, routing Internet traffic, resolving domain names, and maintaining the network infrastructure that makes Internet access possible.

While the core function of an ISP is to provide Internet access, many ISPs do much more. ISPs also offer services like web hosting, domain name registration, and email services.

Can I connect to the Internet without an ISP?

No, organizations and home users need an ISP to be able to access the Internet. If your ISP is down, you will not be able to access the Internet unless you have access through another ISP. Organizations that require redundant Internet connections may use a cellular service provider or secondary ISP connection to another provider for backup. A popular way for home users to work around Internet connectivity outages is to use their cell phone to continue working or as a mobile "hotspot".

Are there any free ISPs?

Yes, there are still some "freenets". Freenets are ISPs that offer free Internet access. Generally these ISPs offer limited hours of access and limited speeds. Additionally, freenets often include banner ads to generate revenue. Two ISPs that still offer some level of free access, both supported by ads, are Juno and Net Zero.

What is Modem? Describe its role in Data Communication.

Modem is the short form of Modulator-Demodulator. It is a device through which computer send and receive data from telephone lines.

Computer generates discrete data. They cannot be send through telephone lines which are designed for carrying analog signals. Modem accepts the data from **computer** and convert into analog signals using modulation procedure called ASK (Amplitude Shift Keying), PSK (Phase Shift Keying) or FSK (Frequency Shift Keying) or a variant of these modulation methods. These analog signals are send over telephone lines. The signals that come through telephone lines are reconverted back to binary (discrete) form by demodulator part of the modem. A modem can accept as well as transmit data serially simultaneously. Normal data transfer rates are 56 kbps, 144 kbps or 288 kbps.

Web browser

A **web browser** (commonly referred to as a **browser**) is a software application for accessing information on the World Wide Web. When a user requests a particular website, the web browser retrieves the necessary content from a web server and then displays the resulting web page on the user's device.

A web browser is not the same thing as a search engine, though the two are often confused. For a user, a search engine is just a website, such as Google Search, Bing, or DuckDuckGo, that stores searchable data about other websites. However, to connect to a website's server and display its web pages, a user must have a web browser installed.[3]

Web browsers are used on a range of devices, including desktops, laptops, tablets, and smartphones. In 2019, an estimated 4.3 billion people used a browser.[4] The most used browser is Google Chrome, with a 64% global market share on all devices, followed by Safari with 17%.

What is the primary function of the Web browsers?

- Web browser functions are to provide the resources or information to the user when asked by them.

- It processes the user inputs in the form of URL like http://www.google.com in the browser and allows the access to that page.

- URL is used to identify the resources and fetch them from the server and displays it to the client.

- It allows the user to interact with the web pages and dynamic content like surveys, forms, etc.

- It also allows the user to navigate through the complete web page and see its source code in the HTML format.

- It provides security to the data and the resources that are available on the web that is by using the secure methods.

URL - Uniform Resource Locator

URL** is the abbreviation of* **U**niform **R**esource **L**ocator and is defined as the global address of documents and other resources on the World Wide Web. To visit this website, for example, you'll go to the URL ***www.webopedia.com.

We all use URLs to visit webpages and other resources on the web. The URL is an address that sends users to a specific resource online, such as a webpage, video or other document or resource. When you search Google, for example, the search results will display the URL of the resources that match your search query. The title in search results is simply a hyperlink to the URL of the resource.

A URL is one type of ***U**niform **R**esource **I**dentifier* (***URI***); the generic term for all types of names and addresses that refer to objects on the World Wide Web.

What Are the Parts of a URL?

The first part of the URL is called a *protocol identifier* and it indicates what protocol to use, and the second part is called a *resource 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.

http://www.webopedia.com/

For example, the two URLs below point to two different files at the domain *webopedia.com.* The first specifies an executable file that should be fetched using the FTP protocol; the second specifies a webpage that should be fetched using the HTTP protocol:

ftp://www.webopedia.com/stuff.exe

http://www.webopedia.com/index.html

Accessing a URL that ends in .com, .html, or .htm will display a webpage located at that address. If, for example, you visit a URL that ends in .jpg or .png you can expect to view an image file.

Web Address is a URL with HTTP/HTTPS

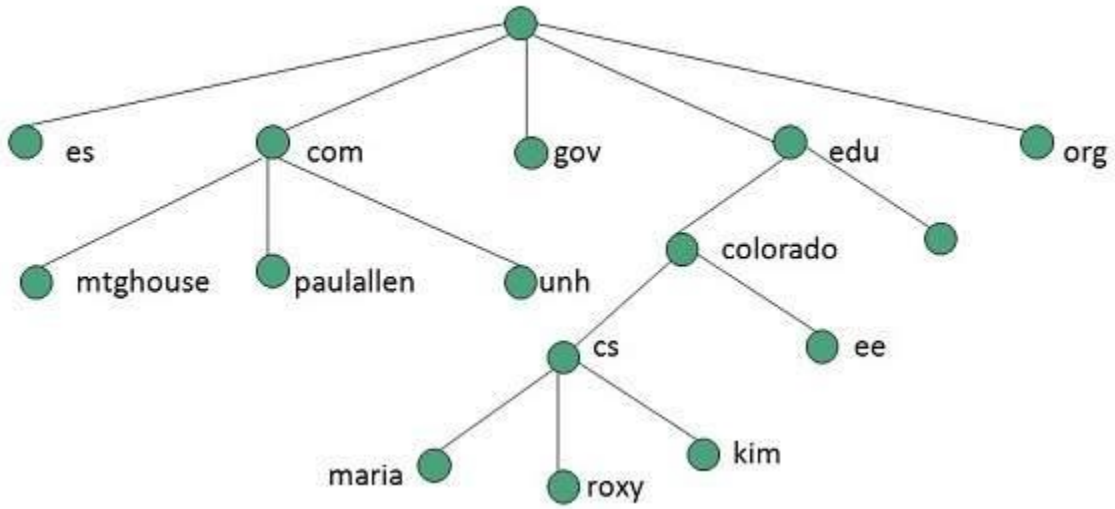
The term "web address" is a synonym for a URL that uses the HTTP or HTTPS protocol. The Uniform Resource Locator (URL) was developed by Tim Berners-Lee in 1994 and the Internet Engineering Task Force (IETF) URI working group. Today, the format of the URL has not changed. The URL format is specified in RFC 1738 Uniform Resource Locators (URL).

World Wide Web(WWW)

WWW stands for **World Wide Web.** A technical definition of the World Wide Web is : all the resources and users on the Internet that are using the Hypertext Transfer Protocol (HTTP).

In simple terms, The World Wide Web 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.



Evolution

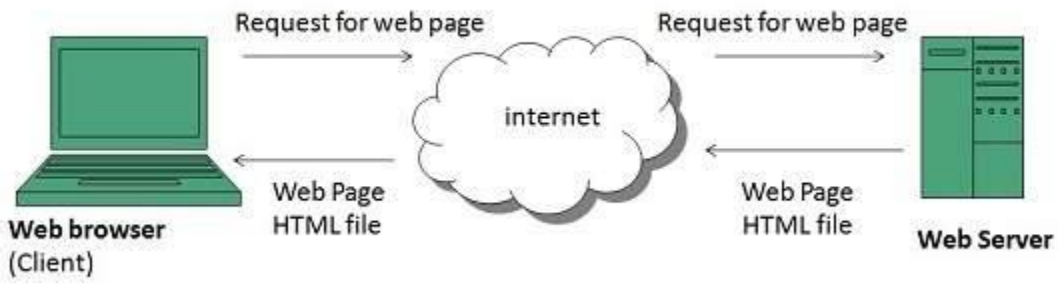
World Wide Web was created by **Timothy Berners Lee** in 1989 at **CERN** in **Geneva.** World Wide Web came into existence as a proposal by him, to allow researchers to work together effectively and efficiently at **CERN.** Eventually it became **World Wide Web.**

WWW Operation

WWW works on client- server approach. Following steps explains how the web works:

1. User enters the URL (say, **http://www.tutorialspoint.com**) of the web page in the address bar of web browser.
2. Then browser requests the Domain Name Server for the IP address corresponding to www.tutorialspoint.com.
3. After receiving IP address, browser sends the request for web page to the web server using HTTP protocol which specifies the way the browser and web server communicates.

4. Then web server receives request using HTTP protocol and checks its search for the requested web page. If found it returns it back to the web browser and close the HTTP connection.
5. Now the web browser receives the web page, It interprets it and display the contents of web page in web browser's window.



Future

There had been a rapid development in field of web. It has its impact in almost every area such as education, research, technology, commerce, marketing etc. So the future of web is almost unpredictable.

Apart from huge development in field of WWW, there are also some technical issues that W3 consortium has to cope up with.

User Interface

Work on higher quality presentation of 3-D information is under deveopment. The W3 Consortium is also looking forward to enhance the web to full fill requirements of global communities which would include all regional languages and writing systems.

Technology

Work on privacy and security is under way. This would include hiding information, accounting, access control, integrity and risk management.

Architecture

There has been huge growth in field of web which may lead to overload the internet and degrade its performance. Hence more better protocol are required to be developed.

FTP

- FTP stands for File transfer protocol.
- FTP is a standard internet protocol provided by TCP/IP used for transmitting the files from one host to another.
- It is mainly used for transferring the web page files from their creator to the computer that acts as a server for other computers on the internet.
- It is also used for downloading the files to computer from other servers.

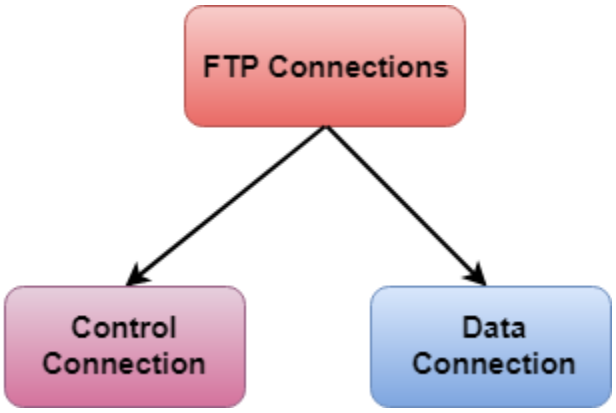
Objectives of FTP

- It provides the sharing of files.
- It is used to encourage the use of remote computers.
- It transfers the data more reliably and efficiently.

Why FTP?

Although transferring files from one system to another is very simple and straightforward, but sometimes it can cause problems. For example, two systems may have different file conventions. Two systems may have different ways to represent text and data. Two systems may have different directory structures. FTP protocol overcomes these problems by establishing two connections between hosts. One connection is used for data transfer, and another connection is used for the control connection.

There are two types of connections in FTP:



- **Control Connection:** The control connection uses very simple rules for communication. Through control connection, we can transfer a line of command or line of response at a time. The control connection is made between the control processes. The control connection remains connected during the entire interactive FTP session.

- **Data Connection:** The Data Connection uses very complex rules as data types may vary. The data connection is made between data transfer processes. The data connection opens when a command comes for transferring the files and closes when the file is transferred.

FTP Clients

- FTP client is a program that implements a file transfer protocol which allows you to transfer files between two hosts on the internet.
- It allows a user to connect to a remote host and upload or download the files.
- It has a set of commands that we can use to connect to a host, transfer the files between you and your host and close the connection.
- The FTP program is also available as a built-in component in a Web browser. This GUI based FTP client makes the file transfer very easy and also does not require to remember the FTP commands.

Advantages of FTP:

- **Speed:** One of the biggest advantages of FTP is speed. The FTP is one of the fastest way to transfer the files from one computer to another computer.
- **Efficient:** It is more efficient as we do not need to complete all the operations to get the entire file.
- **Security:** To access the FTP server, we need to login with the username and password. Therefore, we can say that FTP is more secure.
- **Back & forth movement:** FTP allows us to transfer the files back and forth. Suppose you are a manager of the company, you send some information to all the employees, and they all send information back on the same server.

Disadvantages of FTP:

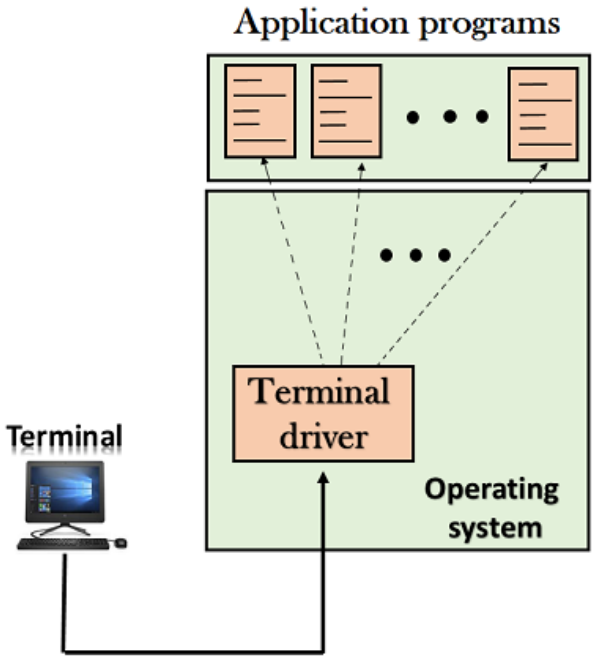
- The standard requirement of the industry is that all the FTP transmissions should be encrypted. However, not all the FTP providers are equal and not all the providers offer encryption. So, we will have to look out for the FTP providers that provides encryption.
- FTP serves two operations, i.e., to send and receive large files on a network. However, the size limit of the file is 2GB that can be sent. It also doesn't allow you to run simultaneous transfers to multiple receivers.
- Passwords and file contents are sent in clear text that allows unwanted eavesdropping. So, it is quite possible that attackers can carry out the brute force attack by trying to guess the FTP password.
- It is not compatible with every system.

Telnet

- The main task of the internet is to provide services to users. For example, users want to run different application programs at the remote site and transfers a result to the local site. This requires a client-server program such as FTP, SMTP. But this would not allow us to create a specific program for each demand.
- The better solution is to provide a general client-server program that lets the user access any application program on a remote computer. Therefore, a program that allows a user to log on to a remote computer. A popular client-server program Telnet is used to meet such demands. Telnet is an abbreviation for **Terminal Network**.
- Telnet provides a connection to the remote computer in such a way that a local terminal appears to be at the remote side.

There are two types of login:

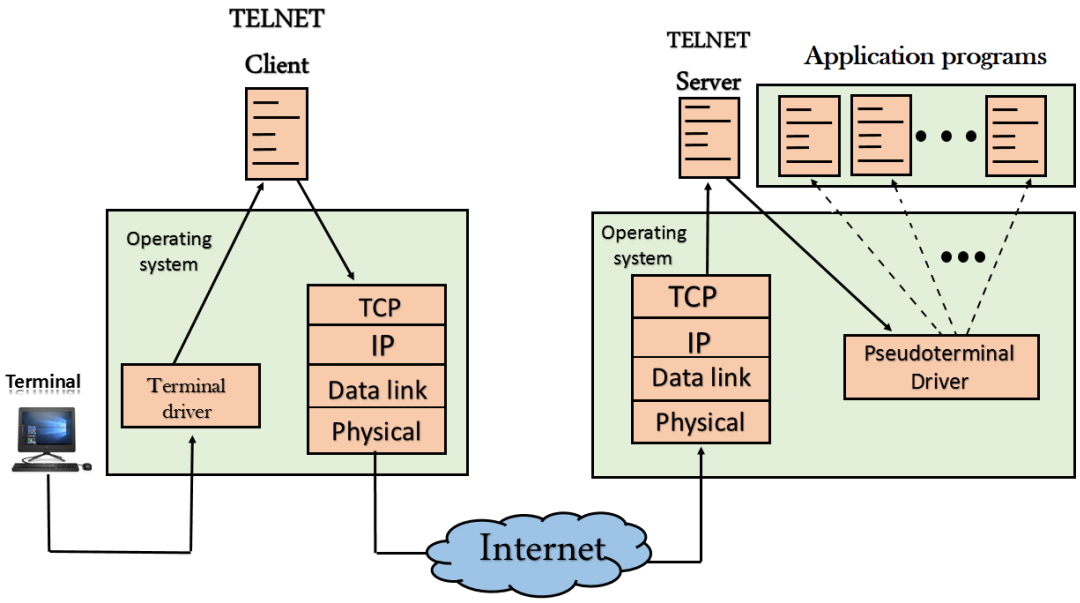
Local Login



- **When a user logs into a local computer, then it is known as local login.**
- **When the workstation running terminal emulator, the keystrokes entered by the user are accepted by the terminal driver. The terminal driver then passes these characters to the operating system which in turn, invokes the desired application program.**

- **However, the operating system has special meaning to special characters. For example, in UNIX some combination of characters have special meanings such as control character with "z" means suspend. Such situations do not create any problem as the terminal driver knows the meaning of such characters. But, it can cause the problems in remote login.**

Remote login



- When the user wants to access an application program on a remote computer, then the user must perform remote login.

Email

Email or electronic mail or e-mail digital messages from an author to one or more recipient Now a days it had become a basic source of communication whether personal, professional or socially. It is a common way by which now everyone communicates.

E-mail is a system of creating, sending and storing textual data in digital form over a network.

Earlier, the e-mail system was based on Simple Mail Transfer Protocol (SMTP) mechanism, a protocol used in sending the e-mails from one server to another.

Today's e-mail technology uses the store-and-forward model. In this model, the users sends and receives information on their own computer terminal.

However, the computer is used only for connecting to the e-mail architecture. The creation, transmission and storage of e-mail takes place, only when the connection with this e-mail architecture is established.

E-mail is one of the many technological developments that has influenced our lives.

It has changed the medium of communication.

So, it becomes necessary for us to check out the benefits and harmful effects of this popular tool used on the Internet.

Parts of an email message

An email message consists of the following general components:

Headers

The message headers contain information concerning the sender and recipients. The exact content of mail headers can vary depending on the email system that generated the message. Generally, headers contain the following information:

- **Subject.** Subject is a description of the topic of the message and displays in most email systems that list email messages individually. A subject line could be something like "2010 company mission statement" or, if your spam filtering application is too lenient, "Lose weight fast!!! Ask me how."
- **Sender (From).** This is the sender's Internet email address. It is usually presumed to be the same as the Reply-to address, unless a different one is provided.
- **Date and time received (On)**. The date and time the message was received.
- **Reply-to.** This is the Internet email address that will become the recipient of your reply if you click the Reply button.

- **Recipient (To:).** First/last name of email recipient, as configured by the sender.
- **Recipient email address.** The Internet mail address of the recipient, or where the message was actually sent.
- **Attachments**. Files that are attached to the message.

Body

The body of a message contains text that is the actual content, such as "Employees who are eligible for the new health care program should contact their supervisors by next Friday if they want to switch." The message body also may include signatures or automatically generated text that is inserted by the sender's email system.

Advantages and disadvantages of using email

Advantages

- Emails are delivered extremely fast when compared to traditional post.
- Emails can be sent 24 hours a day, 365 days a year.
- Webmail means emails can be sent and received from any computer, anywhere in the world, that has an internet connection.
- Cheap - when using broadband, each email sent is effectively free. Dial-up users are charged at local call rates but it only takes a few seconds (for conventional email, eg text only) to send an email.
- Emails can be sent to one person or several people.

Disadvantages

- The recipient needs access to the internet to receive email.
- Viruses are easily spread via email attachments (most email providers scan emails for viruses on your behalf).
- **Phishing** - sending an email to a user falsely claiming to be a legitimate company to scam the user into providing information, such as personal information and bank account numbers on a bogus website. The details will then be used for identity theft.
- No guarantee the mail will be read until the user logs on and checks their email.
- **Spam** - unsolicited email, ie junk mail.

Different Connection Methods.

1 Dial-up Internet access

Dial-up Internet access is a form of Internet access that uses the facilities of the public switched telephone network (PSTN) to establish a connection to an Internet service provider (ISP) by dialing a telephone number on a conventional telephone line. Dial-up connections use modems to decode audio signals into data to send to a router or computer, and to encode signals from the latter two devices to send to another modem.

Dial-up connections to the Internet require no additional infrastructure other than the telephone network and the modems and servers needed to make and answer the calls. Because telephone access is widely available, dial-up is often the only choice available for rural or remote areas, where broadband installations are not prevalent due to low population density and high infrastructure cost.[8] Dial-up access may also be an alternative for users on limited budgets, as it is offered free by some ISPs, though broadband is increasingly available at lower prices in many countries due to market competition.

Dial-up requires time to establish a telephone connection (up to several seconds, depending on the location) and perform configuration for protocol synchronization before data transfers can take place. In locales with telephone connection charges, each connection incurs an incremental cost. If calls are time-metered, the duration of the connection incurs costs.

Dial-up access is a transient connection, because either the user, ISP or phone company terminates the connection. Internet service providers will often set a limit on connection durations to allow sharing of resources, and will disconnect the user—requiring reconnection and the costs and delays associated with it. Technically inclined users often find a way to disable the auto-disconnect program such that they can remain connected for more days than one.

Performance

Modern dial-up modems typically have a maximum theoretical transfer speed of 56 kbit/s (using the V.90 or V.92 protocol), although in most cases, 40–50 kbit/s is the norm. Factors such as phone line noise as well as the quality of the modem itself play a large part in determining connection speeds.[*citation needed*]

Some connections may be as low as 20 kbit/s in extremely noisy environments, such as in a hotel room where the phone line is shared with many extensions, or in a rural area, many miles from the phone exchange. Other factors such as long loops, loading coils, pair gain, electric fences (usually in rural locations), and digital loop carriers can also slow connections to 20 kbit/s or lower.

Dial-Up Advantages

One of the benefits of dial-up service is that if you have a land line, all that you need is a dial-up account and the modem built into your computer to connect to the Internet. You don't need to have a special line installed or have a special DSL modem box. Furthermore, you can take your dial-up account with you and connect to the Internet anywhere there's a phone line you can access. This can be useful if you are frequently in areas where you cannot access high speed Internet services.

Dial-Up Disadvantages

The key disadvantage of dial-up Internet access is that it is slow. As of the date of publication, the fastest dial-up modems available have a maximum speed of 53 kilobits per second -- this equates to 0.053 megabits per second. Furthermore, when you're using dial-up service, your landline is tied up.

2 Broadband

This article is about telecommunications signalling methods. For high-speed Internet access, see Internet access.

In telecommunications, **broadband** is wide bandwidth data transmission which transports multiple signals and traffic types. The medium can be coaxial cable, optical fiber, radio or twisted pair.

In the context of Internet access, **broadband** is used to mean any high-speed Internet access that is always on and faster than dial-up access over traditional analog or ISDN PSTN services.

Broadband Internet service truly is the most used form of Internet access because of its high access speeds; it is offered in four different forms, DSL (or Digital Subscriber Line), also fiber-optic, cable, and satellite. The old dial-up connection is the only non-broadband internet service available, and even though it is cheaper, most Internet users are moving towards the faster broadband Internet connection.

Advantages of a broadband connection:

1. High speeds
2. The telephone line is not necessary
3. Your Internet connection stays active
4. Your phone line is open for telephone calls

Your main advantage associated with using a broadband connection (DSL or cable modem) is fast download speeds and the availability of huge streams of bandwidth. You can expect between 2-25 Mbps when using a broadband connection for your online training programs, depending on the amount of congestion on the line and your distance from a base station. Lighting fast download speeds allow you to complete online training programs using streaming video and interactive online applications without hassle or delays. To use a broadband connection, a landline is not necessary to connect to your ISP. This allows your phone line to be left open to receive important phone calls from your friends or family throughout the day or night. Another advantage associated with a broadband connection is the fact that your Internet connection can be left on for extended periods of time. Precious time you spend connecting to the Internet and annoying busy signals are avoided using broadband solutions.

Disadvantages of a broadband connection:

1. High price
2. Security concerns – firewall
3. Congestion on the lines

The main drawback associated with a broadband connection is the high prices necessary to connect to the World Wide Web. month to surf the web and complete online training programs. The exuberant price of online services can be a huge drawback for your family. Also, security concerns can be an enormous downside to using a broadband connection. For a computer to be protected during online viewing, you must purchase and calibrate some form of a firewall to protect your personal computer from hackers. There have been many documented cases of attempts by hackers to gain control of computers and steal valuable information and files from individuals. In the age of online banking and bill payments solutions, security concerns are paramount. In addition, you may experience congestion while using a broadband connection, which can ultimately slow down your online service. In addition, if an ISP experiences high volume traffic on their fiber optic lines, ISP's may even put a cap on the amount of bandwidth you can use on their broadband connection. This can tremendously hinder the completion of your online training program.

With the popularity of online training programs being implemented within corporate America and throughout school districts, a broadband connection is the wave of the future. A broadband connection will allow you to complete and interact with online training programs with great ease.

3 Integrated Services Digital Network (ISDN)

Integrated Services Digital Network (**ISDN**) is a set of communication standards for simultaneous digital transmission of voice, video, data, and other network services over the traditional circuits of the public switched telephone network. It was first defined in 1988 in the CCITT "Red Book".[1] Prior to ISDN, the telephone system was viewed as a way to transport voice, with some special services available for data. The key feature of ISDN is that it integrates speech and data on the same lines, adding features that were not available in the classic telephone system. The ISDN standards define several kinds of access interfaces, such as Basic Rate Interface (BRI), Primary Rate Interface (PRI), Narrowband ISDN (N-ISDN), and Broadband ISDN (B-ISDN).

ISDN is a circuit-switched telephone network system, which also provides access to packet switched networks, designed to allow digital transmission of voice and data over ordinary telephone copper wires, resulting in potentially better voice quality than an analog phone can provide. It offers circuit-switched connections (for either voice or data), and packet-switched connections (for data), in increments of 64 kilobit/s. In some countries, ISDN found major market application for Internet access, in which ISDN typically provides a maximum of 128 kbit/s bandwidth in both upstream and downstream directions. Channel bonding can achieve a greater data rate; typically the ISDN B-channels of three or four BRIs (six to eight 64 kbit/s channels) are bonded.

ISDN Advantages

- The basic advantage of ISDN is to facilitate the user with multiple digital channels. These channels can operate concurrently through the same one copper wire pair.
- The digital signals broadcasting transversely the telephone lines.
- ISDN provides high data rate because of digital scheme which is 56kbps.
- ISDN network lines are able to switch manifold devices on the single line such as faxes, computers, cash registers credit cards readers, and many other devices. These all devices can work together and directly be connected to a single line.
- ISDN takes only 2 seconds to launch a connection while other modems take 30 to 60 second for establishment.

ISDN Disadvantages

- The disadvantage of ISDN lines is that it is very costly than the other typical telephone system.
- ISDN requires specialized digital devices just like Telephone Company.

4 Leased line

A **leased line** is a private bidirectional or symmetric telecommunications circuit between two or more locations provided according to a commercial contract. It is sometimes also known as a **private circuit**, and as a **data line** in the UK.

Unlike traditional telephone lines in the public switched telephone network (PSTN) leased lines are generally not switched circuits, and therefore do not have an associated telephone number. Each side of the line is permanently connected and dedicated to the other. Leased lines can be used for telephone, Internet, or other data communication services. Some are ringdown services, and some connect to a private branch exchange (PBX) or network router.

Typically, leased lines are used by businesses to connect geographically distant offices. Unlike dial-up connections, a leased line is always active. The primary factors affecting the recurring lease fees are distance between end points and the bandwidth of the circuit. Since the connection does not carry third-party communications, the carrier can assure a given level of quality.

An Internet leased line is a premium Internet connectivity product, normally delivered over fiber, which provides uncontended, symmetrical bandwidth with full duplex traffic. It is also known as an Ethernet leased line, dedicated line, data circuit or private line.

For example, a T1 provides a maximum transmission speed of 1.544 Mbit/s. The user can channelize the T1 to separate the 24 DS0 channels for voice communication, partial the T1 for data and voice communications, or aggregate the channels into a single data circuit.

Advantages of a dedicated line

Reliability

If your business relies on the internet for its day to day running, you will know that DSL broadband is simply not reliable enough.

Your business needs a reliable connection to the web that is consistent and ‘uncontended’ at all times. A leased line provides your business with a dedicated line with no contention from other businesses or individuals.

Better Support

If your broadband connection goes down, you could be without an internet connection for days. This could have disastrous consequences for your business.

Therefore, a leased line comes with a Service Level Agreement (SLA), which guarantees that major connectivity issues will be resolved quickly and efficiently.

Faster upload speeds and download speeds

A dedicated line offers bandwidth transmission speeds of between 10 Mbps and 10 Gbps upstream and downstream, called a synchronous connection, for a standard leased line. Redundancy and resilient options can also be added for further to provide further peace of mind.

However, unlike a Digital Subscriber Line (DSL) or cable modem Internet connection, you are able to control how the bandwidth is distributed on a dedicated line, because you are the only locations using the line. That means larger files get the bandwidth they need to travel quickly from location to location.

Security

A leased line is also referred to as a dedicated internet access (DIA) line because it is exclusively dedicated to only the two locations it is connecting. Combined with appropriate router and firewall settings, a dedicated internet access line, reduces the security risks due to it not being a shared service as with DSL circuits.

Disadvantages of a dedicated line

Cost

There is no escaping the fact that leased lines are a lot more expensive than Asymmetric Digital Subscriber (ADSL) or FTTC connections.

The cost will be affected by factors such as how much bandwidth you need on your dedicated line, the speed of connection you want, service availability in your area, whether you would like voice capability as well as data transmission as part of the service, and ultimately how far your budget can stretch.

Longer wait times

Installing a leased line can take considerably longer (months rather than weeks) because it is more complex than installing a standard ADSL connection.

5 Very-small-aperture terminal (VSAT)

A **very small aperture terminal** (**VSAT**)[1] is a two-way satellite ground station with a dish antenna that is smaller than 3.8 meters. The majority of VSAT antennas range from 75 cm to 1.2 m. Data rates, in most cases, range from 4 kbit/s up to 16 Mbit/s. VSATs access satellites in geosynchronous orbit or geostationary orbit to relay data from small remote Earth stations (terminals) to other terminals (in mesh topology) or master Earth station "hubs" (in star topology).

VSATs are used to transmit narrowband data (e.g., point-of-sale transactions using credit cards, polling or RFID data, or SCADA), or broadband data (for the provision of satellite Internet access to remote locations, VoIP or video). VSATs are also used for transportable, on-the-move (utilising phased array antennas) or mobile maritime communications.

Advantages of VSAT

Following are the **advantages of VSAT**:

➡Installation: VSAT services are deployed in hours or minutes.

➡Coverage: It can be available anywhere with clear line of sight between VSAT antenna disc and satellite over the earth. It is popular in hilly areas where other mode of communication is either not available or difficult to install.

➡Price: VSAT terminals are cheaper.

➡Upgradaion: It is flexible to add a VSAT site and increase the bandwidth as per future requirements.

➡Service charges: It depends on the bandwidth allocated as per user requirements.

➡Most modern VSAT systems use TCP/HTTP and other acceleration protocols to have superior performance inspite of latency limitation as outlined below.

➡VSAT provides same quality of service and speed at all the locations across the entire VSAT network.

➡VSAT services are independant of other wired and wireless mediums used as transmission network service provider. Hence it is a great backup system which is available during disaster and emergency situations.

➡VSAT terminals and indoor/outdoor hardwares can be installed on truck or van and can be used even in mobility conditions.

➡There are no last mile issues in VSAT operation.

Disadvantages of VSAT

Following are the **disadvantages of VSAT**:

➡As mentioned it requires clear Line of Sight between VSAT dish and satellite in the space.

➡The malfunctioning of satellite and Hub station (in case of star topology) will lead to disruption of VSAT services. To avoid this situation, redundant systems and switch over units are needed to have backup systems available for hot switching in faulty situations. But this increases overall cost of the VSAT system as a whole.

➡Latency for packet transmission from source to destination is higher due to distance of satellite from earth is about 36000 Km. Latency further increases in star topology of VSAT, as it requires two hops to reach at final destination.

➡VSAT services get affected in bad weather conditions.

➡As information transmitted by VSAT goes over the air till it reaches destination, it is prone to intrusion by hackers. Hence encryption-decryption units are needed to have secure communication. This increases the overall VSAT terminal cost.

IP Addressing

The "IP" part of IP address stands for "Internet Protocol." The "address" part refers to a unique number that gets linked to all online activity you do...somewhat like a return address on a letter you'd send out. (All this happens in milliseconds.)

An Internet Protocol (IP) address is a unique number assigned to every device on a network. Just as a street address determines where a letter should be delivered, an IP address identifies computers on the Internet. Network devices use IP addresses to communicate with each other.

The Internet uses DNS (Domain Name System) to enable people to use words instead of numbers for Internet addresses. You can think of DNS as an Internet address book, mapping domain names to IP addresses.

When you type a URL into your browser, your browser looks up that domain name in DNS. For example, if you type www.google.com into your browser, your browser would ask DNS for Google's IP address. DNS would return the IP address assigned to Google's domain name (74.125.239.35). Your browser then connects to that IP address.

What is the difference between a dynamic and static IP address?

When a device is assigned a *static* IP address, the address does not change. Most devices use *dynamic* IP addresses, which are assigned by the network when they connect and change over time.

When static IPs are needed

Most users don't need static IP addresses. Static IP addresses normally matter more when external devices or websites need to remember your IP address. One example is VPN or other remote access solutions that trust (whitelists) certain IPs for security purposes. A static IP address is not required if you are hosting a server, although it can simplify the setup process. Google Fiber provides two options.

Function

An IP address serves two principal functions. It identifies the host, or more specifically its network interface, and it provides the location of the host in the network, and thus the capability of establishing a path to that host. Its role has been characterized as follows: "A name indicates what we seek. An address indicates where it is. A route indicates how to get there."[2] The header of each IP packet contains the IP address of the sending host, and that of the destination host.

IP Address Anatomy

Every IP address is made up of 32 bits. Here's an illustration of what that means:

Let's take the IP address 76.240.249.145. My computer—and all of the networking hardware and software—sees it as a 32-bit address in binary form that is subdivided into four 8-bit parts, called "octets."

76	in binary form is	01001100 (the first 8-bit segment, or octet)
240	" "	11110000 (octet)
249	" "	11111001 (octet)
145	" "	10010001 (octet)

Or you can simply see it in four parts: **part1.part2.part3.part4.**

What are the four parts about?

- Every IP address—such as 76.240.249.145—is also divided into two sections that define 1) your network and 2) your computer, or host.
- Those two sections comprise the basic structure of IP addresses: the network ID and the host ID. All computers on the same network share the same network ID. Each computer (sometimes called a "network interface") has its own unique host ID.
- The four IP address parts do NOT have to be divided equally—it's not always the case that two parts make up the network ID and two address parts make up the host ID. The network ID may be one, two or three of the parts, leaving the last part for the host ID.

How the parts come together to define the IP address's network ID and host ID also determines what Class of network that IP address is associated with.

- If an IP address's network ID is defined by the first part of the IP address, the computer is connected to a Class A network. Class A networks are very large and could have approximately 17 million hosts/computers connected to it!
- If the network ID is comprised of the first two parts of the address, the computer is connected to a Class B network. Class B networks are smaller than Class A ones and can have about 65,000 hosts.
- If the network ID is comprised of parts 1, 2 and 3 of the IP address, the computer is connected to Class C network. A Class C network can accommodate only about 254 computers...but there can be more than two million Class C networks.

Domain Name Server (DNS)

What is DNS?

The Domain Name System (DNS) is the phonebook of the Internet. Humans access information online through domain names, like nytimes.com or espn.com. Web browsers interact through Internet Protocol (IP) addresses. DNS translates domain names to IP addresses so browsers can load Internet resources.

Each device connected to the Internet has a unique IP address which other machines use to find the device. DNS servers eliminate the need for humans to memorize IP addresses such as 192.168.1.1 (in IPv4), or more complex newer alphanumeric IP addresses such as 2400:cb00:2048:1::c629:d7a2 (in IPv6).

How does DNS work?

The process of DNS resolution involves converting a hostname (such as www.example.com) into a computer-friendly IP address (such as 192.168.1.1). An IP address is given to each device on the Internet, and that address is necessary to find the appropriate Internet device - like a street address is used to find a particular home. When a user wants to load a webpage, a translation must occur between what a user types into their web browser (example.com) and the machine-friendly address necessary to locate the example.com webpage.

In order to understand the process behind the DNS resolution, it’s important to learn about the different hardware components a DNS query must pass between. For the web browser, the DNS lookup occurs “ behind the scenes” and requires no interaction from the user’s computer apart from the initial request.

Web search engine

A **web search engine** or **Internet search engine** is a software system that is designed to carry out **web search** (**Internet search**), which means to search the World Wide Web in a systematic way for particular information specified in a textual web search query. The search results are generally presented in a line of results, often referred to as search engine results pages (SERPs). The information may be a mix of links to web pages, images, videos, infographics, articles, research papers, and other types of files. Some search engines also mine data available in databases or open directories. Unlike web directories, which are maintained only by human editors, search engines also maintain real-time information by running an algorithm on a web crawler. Internet content that is not capable of being searched by a web search engine is generally described as the deep web.

List of Top 10 Most Popular Search Engines In the World (Updated 2019)

- Google
- Bing
- Yahoo
- Baidu
- Yandex.ru
- DuckDuckGo
- Ask.com
- AOL.com
- WolframAlpha
- Internet Archive

Social Networking Sites

The social networking sites are the major platform on the internet for communication and exchange of information since the early 21st century. The social media platforms get updated regularly with features depending upon the need of the users and usage pattern.

In the early stage of the social networking era, people from all around the world started using to connect with friends and families to share and communicate through photos or text messages. Since the development and rapid growth on the internet speed, the usages increased more towards generating and sharing media such as photos, GIFs and videos.

There are many different social networking sites for a different purpose, for example, Linkedin is a social network for professionals, while Snapchat is a social network mostly for teenagers. There are also many drawbacks and benefits of social media.

Social Networking – Advantages and Disadvantages

Modern social networking sites are not just about connecting and sharing information, such platforms are being used for many different purposes. Most people are still using social networks for "social purpose" while many are using for the business purpose. Government, security agencies, researchers, etc are also using social networks for official purposes.

Advantages of Social Networking Sites

Social networking sites are the tools for anyone to make the best use out of it. Millions of people around the world are using social media platforms for, fundraising, social awareness, promoting local business, and so many good things. There are so many benefits of social networking sites if used properly.

1. Networking without border

One of the primary goals of any social networking site, networking is a primary feature any social media platform has to offers to consider the platform as a social networking site. One of the most important and noteworthy advantages of social networking sites is that it enables everyone to connect no matter which country they belong to.

2. Instant News and Information

Before the social media era, we used to communicate on email and instant messengers like Yahoo, AOL, and MSN. All those IMs and communication tools were mostly one to one communication. But in Social networking sites, communication can be one-to-many instantly. We do not have to look for the news visiting different news websites, the news will find us on the modern social networking sites like Facebook, Twitter.

3. Great marketing channel for Business

Social networking sites are one of the best marketing channel available in this world. Social Media Marketing is the term described for the marketing technique used on social networking sites or platforms like Facebook, Instagram, Twitter, YouTube, etc. There are currently over 4 billion social media users globally ready to discover your information about your business or service.

4. Awareness and Activism

We have already witnessed the great modern revolutions and events around the world. Social networking sites played a very important role in such revolutions and events like Occupy Wallstreet, Arab Spring, The Libyan Revolution, Hongkong protests, etc.

Almost all internet users do use at least one social media platform. It is easy to spread the message and invite many people to take part in events for awareness and activism.

5. Exchange of ideas and Collaboration

Social networking sites like Facebook do have collaboration features like Group and Document sharing. One can create a group and start to share ideas and information for a specific purpose. Social networking sites are very useful to collect feedback and comments on the various idea.

Disadvantages of Social Networking Sites

Like any other tool available for humans, Social Networking Sites also have many disadvantages if you do not use consciously.

1. Addiction

The compulsive behaviour developed due to social networking sites like Facebook, Instagram, YouTube, etc leads to negative effects. Social networking addict constantly checks Social Media Feed or checks out people's profiles for hours and hours. The compulsion to use social media can make one social media addict. Researchers at Chicago University concluded that social media addiction can be stronger than addiction to cigarettes and alcohol.

2. Mental Illness

Social networking sites are linked to increased risk of mental health problems like depression, anxiety, and loneliness. Too much time spent scrolling through social media can result in symptoms of anxiety and/or depression. Teenager's mental health is often negatively affected by this culture of comparison as well.

3. Frauds & Scams

This is yet another challenge for social media companies. There are billions of fake accounts on various social networking sites including Facebook, Instagram, and Twitter. Facebook removes more than 3 billion fake accounts in six months and Five per cent of Facebook's monthly active users are fake, the company said.

4. Misleading Information

This is probably the most challenging problem for social networking companies. Fake news and misleading information can go viral in no time on social media platforms. On Facebook, more than 80% of people who react on the link do not read the complete article or content. Due to which many publishers and spammers are misusing the platforms by sharing fake and misleading information.

5. Cyberbullying

Since anyone can use and express on social networking sites, many use it to express hatred and aggression. The public figures are the commonly targeted victims of cyberbullying. Teenagers, in particular, are at risk of cyberbullying through the use of social networking sites like Facebook, Instagram, Snapchat etc.

Cyberbullying is also associated with depression, anxiety and an elevated risk of suicidal thoughts.

6. Hacking

Most of the users of social networking sites are not fully aware of the security measures they need to take care of while using social media platforms. People share thoughts, personal experience, photos, etc on social media sites. Such information can be helpful for hackers to hack your accounts in social media, emails or even your phone.

Several personal twitter and Facebook accounts have been hacked in the past that have affected the individuals' personal lives.

7. Privacy Issues

Your behaviour on social media can help people or companies know who you are. It is not hard to find how many friends you meet daily, interact, or what type of food you like. Based on your check-ins on social media, one can easily find where you hang out. Based on your check-ins, browsing history, interaction on various Facebook pages, groups, friends or even links, bots can suggest the products or services.

PROS & CONS OF
SOCIAL NETWORKING SITES

PROS	CONS
1. Networking Without Border.	1. Addiction.
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5. Exchange of Ideas and Collaboration.	5. Cyberbullying.
	6. Hacking,
	7. Privacy Isssues.

HONESTPROSCONS.COM

Internet security

Internet security is a branch of computer security specifically related to not only Internet, often involving browser security and the World Wide Web but also network security as it applies to other applications or operating systems as a whole. Its objective is to establish rules and measures to use against attacks over the Internet.[1] The Internet represents an insecure channel for exchanging information, which leads to a high risk of intrusion or fraud, such as phishing online viruses, trojans, worms and more.

Many methods are used to protect the transfer of data, including encryption and from-the-ground-up engineering. The current focus is on prevention as much as on real time protection against well known and new threats.

Types of Internet Secuirty Threats.

Spam

Spam is one of the most common security threats. A lot of people are affected every year. Canada has a new **anti-spam legislation** aiming to fix this major security issue. Spam occurs when you receive several unsolicited emails that will phish for your information by tricking you into following links.

Pharming

Its objective is to convince you to visit a malicious and illegitimate website by redirecting the legitimate URL. You may then give your personal information to this malicious person.

Phishing

Phishing in unfortunately very easy to execute. It consists of fake emails or messages that look exactly like emails from legitimate companies. You are deluded into thinking it's the legitimate company and you may enter your personal and financial information.

Ransomware

Ransomware went viral last month because of "Wannacry" and "Petya Or NotPetya". Hackers sneak into computers and restrict the access to your system and files. Then they ask for a payment in exchange for regaining access to your system.

Computer worm

This is a very common security threat. A worm works on its own, lives in your computer, and propagates by sending itself to other computers.

Spyware / Trojan Horse

A Trojan Horse is a malicious program that looks like a legitimate software. While installed on your computer it runs automatically and will spy on your system, or delete your files.

Distributed denial-of-service attack

The attack strategy is to contact a specific website or server over and over again. It increases the volume of traffic and shuts down the website / server. The malicious user usually uses a network of zombie computers.

Network of zombie computers

This is a way to execute several security threats. The malicious user takes control of several computers and controls them remotely.

Malware

This is the common name given to several security threats that infiltrate and damage your computer.

Virus

A virus is always hidden in a legitimate software or website and infects your computer as well as the computers of everyone in your contact list.

5 Ways to secure the system

Protecting your company is a must. Here are 5 security measures to implement.

1. Bolster Access Control

Access control is an important part of security. Weak access control leaves your data and systems susceptible to unauthorized access.

Boost access control measures by using a strong password system. You should have a mix of uppercase and lower case letters, numbers, and special characters. Also, always reset all default passwords.

Finally, create a strong access control policy.

2. Keep All Software Updated

As pesky as those update alerts can be, they are vital to your network's health.

From anti-virus software to computer operating systems, ensure your software is updated. When a new version of software is released, the version usually includes fixes for security vulnerabilities.

Manual software updates can be time-consuming. Use automatic software updates for as many programs as possible.

3. Standardize Software

Keep your systems protecting by standardizing software. Ensure that users cannot install software onto the system without approval.

Not knowing what software is on your network is a huge security vulnerability. Make sure that all computers use the same:

- Operating system
- Browser
- Media player
- Plugins

Standardization also makes system updates less of a hassle.

4. Use Network Protection Measures

Protecting your network is crucial. To keep your network and its traffic secured:

- Install a firewall
- Ensure proper access controls
- Use IDS/IPS to track potential packet floods
- Use network segmentation
- Use a virtual private network (VPN)
- Conduct proper maintenance

5. Employee Training

Sometimes external threats are successful because of an insider threat. The weakest link in data protection can be your own employees.

Ensure your employees understand network security. Your employees should be able to identify threats. They should also know who to contact to avoid a security breach.