SYLLABUS

Class – B.Com. II Year

Subject – Internet and E- Commerce

UNIT – I	Internet: Evolution, Concepts, Growth of Internet, ISP, ISP in India, Types of connectivity, Dial-up, leased line, DSL, Broadband, RF, VSAT etc., Methods of sharing of Internet connection, Use of proxy server. Internet Services: USENET, GOPHER, WAIS, ARCHIE and VERONICA, IRC, Concept of Search Engines, Search engines types, searching the Web, Web Servers, TCPIP and other main protocols used on the Web. E-Mail: Concepts of e-mailing, POP and WEB Based E-mail, merits, address, Basics of Sending & Receiving, E-mail Protocols, Mailing List, Free E-mail services, e-mail servers and e-mail client programs.
UNIT – II	Introduction to E-Commerce: Emergence of the Internet, Commercial use of the Internet, Emergence of World Wide Web, Advantages and Disadvantages of E-Commerce, Transition to E-Commerce in India, E-Commerce opportunities for Industries
UNIT – III	Models: Business Models for E-commerce, Models based on Relationship of Transaction Brokerage Model, Aggregator Model, Infomediary Model, and Community Model. Value Chain parties: B2C,B2B,C2C, C2B:Models based on Model, Manufacturer Model, Advertising Model, Subscription Model, Affiliate Model.
UNIT – IV	E-Marketing versus Traditional Marketing: Identifying Web Presence Goals, Browsing Behavior Model, Online Marketing, E-advertising, Internet Marketing Trends, E-branding and E-Marketing strategies.
UNIT – V	E-Security: Information system security, security on the internet, E-business Risk management issues, information security environment in India. E-Payment Systems: Digital payment requirements, Digital Token based e-payment systems, properties of Electronic cash, risk and e-payment systems and designing e-payment systems. Secure Business, Web store, Online Payment, Internet Barking. Security- E-commerce security issues, Cryptography, Digital Signature & Authentication protocol, Digital Certificates. Online Security, Secure Electronic Transaction (SET)

UNIT I

1.1 Internet - The Internet is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link devices worldwide. It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. It is a computing advanced, peer-to-peer (P2P) communication was gradually delivered and enhanced. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing.

1.2 Evolution of Internet

• **1957:** The USSR launches Sputnik, the first artificial earth satellite. In response, the United States forms the Advanced Research Projects Agency (ARPA) within the Department of Defense (DoD) to establish a U.S. lead in science and technology.
• **1962:** Paul Baran publishes the paper "On Distributed Communications Networks," a predecessor to the concept of packet-switching networks.
• **1969:** ARPANET is commissioned by the DoD for research into networking. The first node (a mainframe computer) is at the University of California Los Angeles (UCLA) Network Measurements Center. The next three nodes consisted of Stanford Research Institute (SRI), the University of California Santa Barbara (UCSB), and the University of Utah. The first router is an Information Message Processor (IMP), a Honeywell 516 mini-computer with 12K of memory developed by Bolt Beranek and Newman, Inc. (BBN).
• **1969:** The first Request for Comments (RFC) is written: "Host Software," by Steve Crocker.
• **1971:** Fifteen nodes (23 hosts) are on the ARPANET: UCLA, SRI, UCSB, University of Utah, BBN, Massachusetts Institute of Technology (MIT), RAND Corporation, System Development Corporation (SDC), Harvard University, MIT's Lincoln Lab, Stanford University, University of Illinois at Urbana-Champaign, Case Western Reserve University, Carnegie-Mellon University, and NASA/Ames Research Center.
• **1971:** Ray Tomlinson of BBN invents an email program to send messages across a distributed network.
• **1973:** Bob Metcalfe's Harvard Ph.D. thesis outlines the idea for Ethernet.
• **1973:** The File Transfer Protocol (FTP) specification is written (RFC 454).
• **1974:** Vint Cerf and Bob Kahn publish the paper "A Protocol for Packet Network Intercommunication," which specified in detail the design for Transmission Control Protocol (TCP).
• **1982:** ARPA establishes TCP/IP as the protocol suite for the ARPANET. This leads to one of the first definitions of an "Internet" as a connected set of networks that use TCP/IP.
• **1982:** The External Gateway Protocol (RFC 827) specification is written. EGP is used as the routing protocol between networks and is later replaced by Border Gateway Protocol (BGP) in 1994 (RFC 1656).
• **1983:** The Internet transitions from Network Control Protocol (NCP) to TCP/IP on January 1.
• **1984:** The Domain Name System (DNS) is introduced with RFC 920.
• **1984:** The number of hosts on the Internet breaks 1000.
• **1986:** The National Science Foundation Network (NSFNET) initiates operations with a backbone speed of 56 kbps.
• **1987:** The number of hosts on the Internet breaks 10,000.
• **1988:** The NSFNET backbone is upgraded to T1 (1.544 Mbps).

• **1988:** Internet Relay Chat (IRC) is developed by Jarkko Oikarinen.

• **1989:** The number of hosts on the Internet breaks 100,000.

• **1989:** *Cuckoo's Egg*, written by Clifford Stoll, tells the real-life tale of a German cracker group that infiltrated numerous U.S. facilities.

• **1990:** The first remotely operated machine to be hooked up to the Internet, the Internet Toaster, makes its debut at Interop (IT Expo and Conference).

• **1991:** The World Wide Web (WWW) is released by CERN; it was developed by Tim BernersLee.

• **1991:** The NSFNET backbone is upgraded to T3 (44.736 Mbps).

• **1992:** The number of hosts on the Internet breaks 1,000,000.

• **1992:** The term "surfing the Internet" is coined by Jean Armour Polly.

• **1993:** The U.S. White House comes online with www.whitehouse.gov. President Bill Clinton: president@whitehouse.gov and Vice President Al Gore: vice-president@whitehouse.gov.

• **1994:** Shopping on the Internet begins.

• **1994:** Pizza from Pizza Hut can be ordered using the World Wide Web.

• **1995:** WWW surpasses FTP as the service with the greatest amount of traffic on the Internet.

• **1995:** Online dialup providers Compuserve, America Online, and Prodigy begin to provide Internet access.

• **1995:** The Vatican comes online.

• **1996:** Internet phones catch the attention of U.S. telecommunication companies, which request the U.S. Congress to ban the technology.

• **1996:** The controversial U.S. Communications Decency Act (CDA) becomes law in the United States to prohibit distribution of indecent materials over the Internet. A few months later, a three-judge panel imposes an injunction against its enforcement. The U.S. Supreme Court unanimously rules most of it unconstitutional in 1997.

• **1996:** MCI upgrades its Internet backbone, bringing the effective speed from 155 Mbps to 622 Mbps.

• **1996:** The WWW browser war, fought primarily between Netscape and Microsoft, rushes in a new age in software development, whereby new releases are made quarterly with the help of Internet users eager to test upcoming (beta) versions.

• **1996:** Restrictions are put in place for Internet use around the world (Source: Human Rights Watch):

• China requires users and Internet service providers (ISP) to register with the police.

• Germany cuts off access to some newsgroups carried on CompuServe.

• Saudi Arabia confines Internet access to universities and hospitals.

• Singapore requires political and religious content providers to register with the state.

• New Zealand classifies computer disks as "publications" that can be censored and seized.

• **1997:** 101,803 Name Servers are in the "who is" database.

• **1997:** The number of hosts on the Internet breaks 19,000,000. The Internet is a dynamic environment. IPv4, and its 4.3 billion possible addresses, was introduced in 1983 when there were less than 600 hosts on the Internet. Although many of the same concepts of packet switching apply today, the number of users on the Internet and how it is used are vastly different today.

1.3 Advantages of Internet

Internet covers almost every aspect of life, one can think of. Here, we will discuss some of the advantages of Internet:
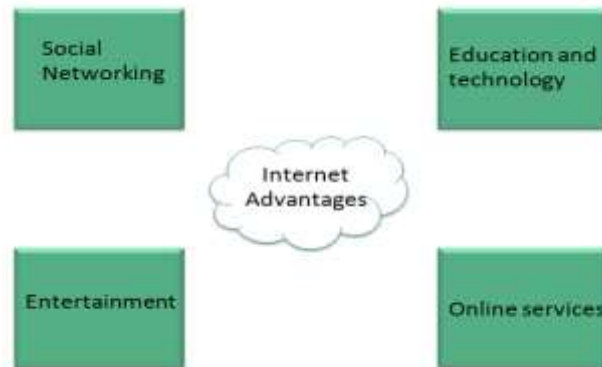
- Internet allows us to communicate with the people sitting at locations. There are various apps available on the wed that uses Internet as a medium for communication. One can find various social networking sites such as:

  o Facebook

  o Twitter

  o Yahoo

  o Google+

  o Flickr

  o Orkut

- One can surf for any kind of information over the internet. Information regarding various topics such as Technology, Health & Science, Social Studies, Geographical Information, Information Technology, Products etc can be surfed with help of a search engine.

- Apart from communication and source of information, internet also serves a medium for entertainment. Following are the various modes for entertainment over internet.

  o Online Television

  o Online Games

  o Songs

  o Videos

  o Social Networking Apps

- Internet allows us to use many services like:

  o Internet Banking

  o Matrimonial Services

  o Online Shopping

  o Online Ticket Booking

  o Online Bill Payment

  o Data Sharing

  o E-mail

- Internet provides concept of electronic commerce, that allows the business deals to be conducted on electronic systems

1.4 Disadvantages of Internet

However, Internet has proved to be a powerful source of information in almost every field, yet there exists many disadvantages discussed below:
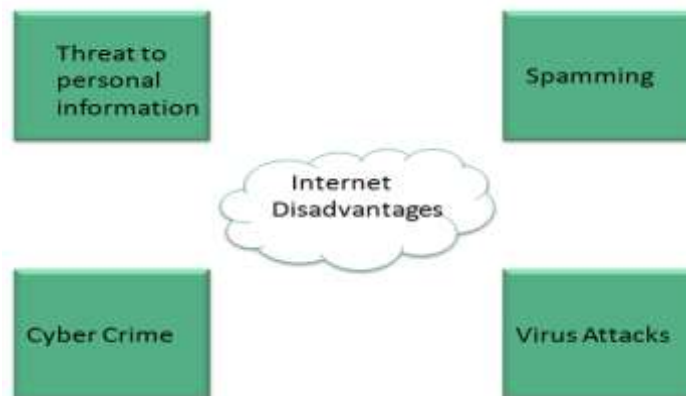
- There are always chances to loose personal information such as name, address, credit card number. Therefore, one should be very careful while sharing such information. One should use credit cards only through authenticated sites.

- Another disadvantage is the Spamming. Spamming corresponds to the unwanted e-mails in bulk. These e-mails serve no purpose and lead to obstruction of entire system.

- Virus can easily be spread to the computers connected to internet. Such virus attacks may cause your system to crash or your important data may get deleted.

- Also a biggest threat on internet is pornography. There are many pornographic sites that can be found, letting your children to use internet which indirectly affects the children healthy mental life.

- There are various websites that do not provide the authenticated information. This leads to misconception among many people.

1.5 Basic WWW Concepts

1. **BROWSER** -- A WWW browser is software on your computer that allows you to access the World Wide Web. Examples include Netscape Navigator and Microsoft Internet Explorer. Please know that a browser can't work its magic unless you are somehow connected to the Internet. At home, that is normally accomplished by using a modem that is attached to your computer and your phone line and allows you to connect to, or dial-up, an Internet Service Provider (ISP). At work, it may be accomplished by connecting your workplace's local area network to the Internet by using a router and a high speed data line.
2. **HYPERTEXT AND HYPERMEDIA** -- Hypertext is text that contains electronic links to other text. In other words, if you click on hypertext it will take you to other related material. In addition, most WWW documents contain more than just text. They may include pictures, sounds, animations, and movies. Documents with links that contain more than just text are called hypermedia.

3. **HTML (HYPERTEXT MARKUP LANGUAGE)** -- HTML is a set of commands used to create World Wide Web documents. The commands allow the document creator to define the parts of the document. For example, you may have text marked as headings, paragraphs, bulleted text, footers, etc. There are also commands that let you import images, sounds, animations, and movies as well as commands that let you specify links to other documents. If you wanted to create your own web page, you would need to know HTML.
4. **URL (UNIFORM RESOURCE LOCATOR)** -- Links between documents are achieved by using an addressing scheme. That is, in order to link to another document or item (sound, picture, movie), it must have an address. That address is called its URL. The URL identifies the host computer name, directory path, and file name of the item. It also identifies the protocol used to locate the item such as hypertext, gopher, ftp, telnet or news. For example, the URL for the main page of the OPEN (Oregon Public Education Network) website is http://www.open.k12.or.us
5. **HTTP (HYPERTEXT TRANPORT PROTOCOL)** -- HTTP is the protocol used to transfer hypertext or hypermedia documents.
6. **HOME PAGE** -- A home page is usually the starting point for locating information at a WWW site. Currently, the home page for Roseburg High School's web site is located at http://schools.rosenet.net/roseburg/rhs/
7. **CLIENTS AND SERVERS** -- If a computer has a web browser installed, it is known as a client. A host computer that is capable of providing information to others is called a server. A server requires special software in order to provide web documents to others.

1.6 ISP - An Internet service provider (ISP) is a company that provides Internet access to customers. Data may be transmitted using several technologies, including dial-up, DSL, cable modem, wireless or dedicated high-speed interconnects.

Typically, ISPs also provide their customers with the ability to communicate with one another by providing Internet email accounts, usually with numerous email addresses at the customer's discretion. Other services, such as telephone and television services, may be provided as well. The services and service combinations may be unique to each ISP. An Internet service provider is also known as an Internet access provider (IAP).

The Internet began as a closed network between government research laboratories and universities and colleges. As universities and colleges began giving Internet access to their faculty and other employees, ISPs were created to provide Internet access to those employees at home and elsewhere. The first ISP began in 1990 as The World, based in Brookline, Massachusetts. Individual customers and businesses pay ISPs for Internet Access. ISPs are interconnected to one another at network access points. In turn, ISPs pay other, larger ISPs for their Internet access, which in turn pay still other ISPs.

Early ISPs provided Internet access through dial-up modems. This type of connection took place over regular phone lines and was limited to 56 Kbps. In the late 1990s, ISPs began offering faster broadband Internet access via DSL (Digital Subscriber Line) and cable modems. Some ISPs now offer high-speed fiber connections, which provide Internet access through fiber optic cables. Companies like Comcast and Time Warner provide cable connections while companies like AT&T and Verizon provide DSL Internet access.

ISP in India

The following table shows the top 10 ISPs in India by total subscriber base as on 30 September 2017. Broadband is defined as "an always-on Internet connection with download speed of 512 kbit/s

or above." The number of internet users are 493.96 million, out of which 81.35 million are narrowband subscribers and 412.60 million are broadband subscribers.

Rank	ISP	Narrowband	Broadband	Total
1	Jio	0	215,560,828	215,560,828
2	Airtel	30,580,187	85,667,724	116,247,911
3	Vodafone	21,736,495	45,975,013	67,711,508
4	Idea Cellular	8,589,570	29,614,167	38,203,737
5	BSNL	10,915,589	21,242,487	32,158,076
6	Reliance Communications	10,697,647	5,523,074	16,220,721
7	Aircel	7,142,722	9,073,153	16,215,875
8	Tata Teleservices	4,690,205	4,316,099	9,006,304
9	Telenor India	7,969,328	331,339	8,300,667
10	MTNL	484,517	1,408,903	1,893,420

1.7 Types of connectivity - There are many ways a personal electronic device can connect to the internet. They all use different hardware and each has a range of connection speeds. As technology changes, faster internet connections are needed to handle those changes. I thought it would be interesting to list some of the different types of internet connections that are available for home and personal use, paired with their average speeds.

Dial-Up (Analog 56K).

Dial-up access is cheap but slow. A modem (internal or external) connects to the Internet after the computer dials a phone number. This analog signal is converted to digital via the modem and sent

over a land-line serviced by a public telephone network. Telephone lines are variable in quality and the connection can be poor at times. The lines regularly experience interference and this affects the speed, anywhere from 28K to 56K. Since a computer or other device shares the same line as the telephone, they can't be active at the same time. The computer, which provides Internet access, is known as 'Host' and the computer that receives the access, is 'Client' or 'Terminal'. In dial-up connection to Internet, Host carries all the command that are typed on a client machine and forward them to Internet. It also receives the data or information from the Internet on behalf of the 'Client' and passes it to them.

This type of connection can further be divided into three categories.

1 Shell Connection:

In this type of Internet Connection, the user will get only textual matter of a Web Page. This connection does not support Graphics display. Shell Accounts were the only type of Internet access available for many years before the Internet entered in to the world of graphics and became more users friendly.

2 TCP/IP Connections:

Today's graphical World Wide Web browsers provide easier access with multimedia sound and pictures. The major difference between Shell and TCP/IP account is that, Shell account can only display text and does not support graphics display, whereas TCP/IP can display both.

3 ISDN:

ISDN (Integrated Services Digital Network) offers Internet connectivity at speeds of up to 128 Kbps through the use of digital phone lines. ISDN is a dial-up service that has been provided by telephone companies for many years.

To access any of these dial-up accounts you need the followings;

• Computer
• Modem
• Telephone Connection
• Shell or TCP/IP/ISDN account from the ISP
• Internet client software such as Internet browser

1.8 DSL

Digital Subscriber Line (DSL) is a family of technologies that provides digital data transmission over the wires of a local telephone network. DSL originally stood for digital subscriber loop. In telecommunications marketing, the term DSL is widely understood to mean Asymmetric Digital Subscriber Line (ADSL), the most commonly installed DSL technology. DSL service is delivered simultaneously with wired telephone service on the same telephone line. This is possible because DSL uses higher frequency bands for data separated by filtering

The data bit rate of consumer DSL services typically ranges from 256 kbit/s to 40 Mbit/s in the direction to the customer (downstream), depending on DSL technology, line conditions, and service-level implementation. In ADSL, the data throughput in the upstream direction, (the direction to the service provider) is lower, hence the designation of asymmetric service. In Symmetric Digital Subscriber Line (SDSL) services, the downstream and upstream data rates are equal. DSL stands for Digital Subscriber Line. Users get a high speed bandwidth connection from a phone wall jack on an

existing telephone network. DSL works within the frequencies that the telephone doesn't so you can use the Internet while making phone calls.

DSL work - Consider DSL Internet the big brother to dial-up. Many local phone services provide DSL offering High Speed Internet access delivered through existing telephone networks. Telephone wires carry hundreds of thousands of frequencies. Only a few thousand are for telephone communications so the telephone and DSL modem can work at the same time. There are two main types of DSL technology.
Symmetrical DSL– Symmetrical connections offer equal bandwidth for upload and download speeds.
Asymmetrical DSL– This is the most popular type of DSL connection. Most people download more information than they are uploading. Because of this, an asymmetrical connection has more downstream bandwidth and less upstream bandwidth.

Advantages:

• Security - Unlike cable modems, each subscriber can be configured so that it will not be on the same network. In some cable modem networks, other computers on the cable modem network are left visibly vulnerable and are easily susceptible to break in as well as data destruction.
• Integration - DSL will easily interface with ATM and WAN technology.
• High bandwidth
• Cheap line charges from the phone company.
• Good for "bursty" traffic patterns

Disadvantages

• No current standardization - A person moving from one area to another might find that their DSL modem is just another paperweight. Customers may have to buy new equipment to simply change ISPs.
• Expensive - Most customers are not willing to spend more than $20 to $25 per month for Internet access. Current installation costs, including the modem, can be as high as $750. Prices should come down within 1-3 years. As with all computer technology, being first usually means an emptier wallet.
• Distance Dependence - DSL Access Multiplex, r the lower the data rate. The longest run lengths are 18,000 feet, or a little over 3 miles.

Cable. Cable provides an internet connection through a cable modem and operates over cable TV lines. There are different speeds depending on if you are uploading data transmissions or downloading. Since the coax cable provides a much greater bandwidth over dial-up or DSL telephone lines, you can get faster access. Cable speeds range from 512K to 20 Mbps.

Wireless. Wireless, or Wi-Fi, as the name suggests, does not use telephone lines or cables to connect to the internet. Instead, it uses radio frequency. Wireless is also an always on connection and it can be accessed from just about anywhere. Wireless networks are growing in coverage areas by the minute so when I mean access from just about anywhere, I really mean it. Speeds will vary, and the range is between 5 Mbps to 20 Mbps.

1.9 VSAT.

Short for very small aperture terminal, an earthbound station used in satellite communications of data, voice and video signals, excluding broadcast television. A VSAT consists of two parts, a transceiver that is placed outdoors in direct line of sight to the satellite and a device that is placed indoors to interface the transceiver with the end user's communications device, such as a PC. The transceiver receives or sends a signal to a satellite transponder in the sky. The satellite sends and receives signals from a ground station computer that acts as a hub for the system. Each end user is interconnected with the hub station via the satellite, forming a star topology. The hub controls the entire operation of the network. For one end user to communicate with another, each transmission has to first go to the hub station that then retransmits it via the satellite to the other end user's VSAT. In fact, the National Stock Exchange (NSE) of India has one of the largest VSAT networks in the world and offers it as one of its connectivity options. As of 2017, the NSE supported 2500 VSAT and 3000 leased lines, making it the largest private wide area network in the country.

Advantages and Disadvantages of a VSAT Network

VSAT networks have a big advantage when it comes to deployment. Because the ground station is communicating with satellites, there is fewer infrastructures required to service remote locations. This was one of the reasons Walmart chose VSAT as it started out heavily leveraged to rural America where telecommunications infrastructure was less dense than in the cities. VSAT is also independent of local telecommunications networks, making it an ideal system to back up wired systems and reduce business recovery risk. If the wired network goes down, business can still go on using the VSAT network.

However, VSAT does have limitations. The most obvious is latency, as it takes time for information to reach the dish and the station due to one part of the system being way up in geosynchronous orbit above the earth. The signal quality can also be affected by the weather and other buildings getting in the way.

Cellular. Cellular technology provides wireless Internet access through cell phones. The speeds vary depending on the provider, but the most common are 3G and 4G speeds. A 3G is a term that describes a 3rd generation cellular network obtaining mobile speeds of around 2.0 Mbps. 4G is the fourth generation of cellular wireless standards. The goal of 4G is to achieve peak mobile speeds of 100 Mbps but the reality is about 21 Mbps currently.

1.10 Leased Line

A leased line, also known as a dedicated line, connects two locations for private voice and/or data telecommunication service. A leased line is not a dedicated cable; it is a reserved circuit between two points. The leased line is always active and available for a fixed monthly fee. Leased lines can span short or long distances. They maintain a single open circuit at all times, as opposed to traditional telephone services that reuse the same lines for many different conversations through a process called switching.

What Are Leased Lines Used For

Leased lines are most commonly rented by businesses to connect branch offices of the organization. Leased lines guarantee bandwidth for network traffic between locations. For example, T1 leased

lines are common and offer the same data rate as symmetric DSL. Individuals can theoretically rent leased lines for high-speed internet access, but their high cost deters most people, and far more affordable home options are available with higher bandwidth than a simple dial-up phone line, including residential DSL and cable internet broadband service.

1.11 Broadband - 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.

Broadband includes several high-speed transmission technologies such as:

- Digital Subscriber Line (DSL)
- Cable Modem
- Fiber
- Wireless
- Satellite
- Broadband over Powerlines *(BPL)*

1.12 RF - Radio frequency (RF) is a measurement representing the oscillation rate of electromagnetic radiation spectrum, or electromagnetic radio waves, from frequencies ranging from 300 GHz to as low as 9 kHz. With the use of antennas and transmitters, an RF field can be used for various types of wireless broadcasting and communications.
Radio frequency is measured in units called hertz, which represent the number of cycles per second when a radio wave is transmitted. One hertz equals one cycle per second; radio waves range from thousands (kilohertz) to millions (megahertz) to billions (gigahertz) of cycles per second. Microwaves are a type of radio wave with higher frequencies. In a radio wave, the wavelength is inversely proportional to the frequency. If f is the frequency in megahertz and s is the wavelength in meters, then As the frequency is increased beyond that of the RF spectrum, electromagnetic energy takes the form of infrared (IR), visible, ultraviolet, X-rays and gamma rays.

RF technology - Many types of wireless devices make use of RF fields. Cordless and cell phones, radio and television broadcast stations, Wi-Fi and Bluetooth, satellite communications systems, and two-way radios all operate in the RF spectrum. In addition, other appliances outside of communications, including microwave ovens and garage-door openers, operate at radio frequencies. Some wireless devices, like TV remote controls, some cordless computer keyboards and computer mice, operate at IR frequencies, which have shorter electromagnetic wavelengths.
The RF spectrum is divided into several ranges, or bands. With the exception of the lowest-frequency segment, each band represents an increase of frequency corresponding to an order of magnitude (power of 10).

1.13 Internet Connection Sharing and Access Methods
There are several ways or methods of connecting to the Internet.
There are two access methods **direct and Indirect** and these can be either **fixed or mobile.**
Indirect Access - This is most common method used in home and office networks.
The device e.g. computer connects to a network using **Ethernet or WiFi** and the network connects to the Internet using ADSL, cable or fibre.

Direct Access - This is most common method used when traveling. The device e.g. smart phone connects directly to the Internet using 3G/4G mobile networks or public Wi-Fi.
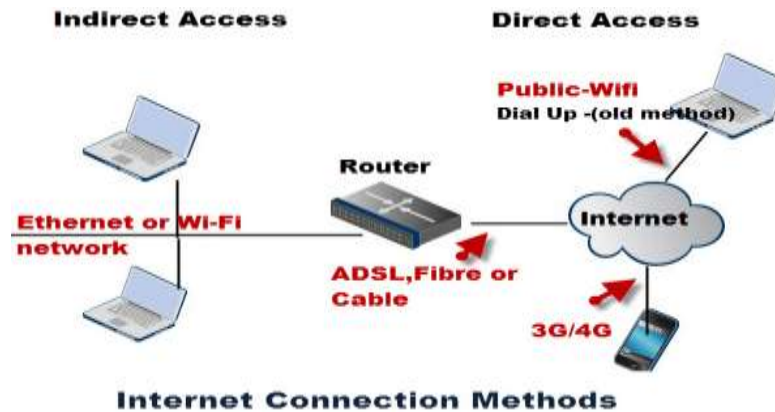
Fixed Internet- Home/Office
Fixed access is usually much faster and reliable than mobile, and is used for connecting homes/offices. The main Access mechanisms are:
- ADSL over traditional Phone Lines (most common).
- Cable (limited to cable TV areas)
- Fibre broadband – Currently being Rolled out

Advantages
- Very Fast and reliable
- Good for streaming video
- Cheap when compared to Mobile
- Can easily share the connection

Disadvantages
- Requires a fixed connection
- Not usable when at a remote location
Fixed access is the most common way that businesses and home uses use for connecting to the Internet

Mobile Internet
When traveling away from the fixed location mobile access is used.
Mobile Internet tends to be mainly a secondary access mechanism. The main access methods are:
- Mobile broadband over 3G Network (common but slow) or 4G
- Public/ Private Wi-FI (common)

Advantages
- No fixed connection required
- Available from remote locations

Disadvantages
- Not as Fast and reliable as Fixed Access
- Not good for streaming video
- Expensive

- Can't easily share the connection

ADSL Broadband over Existing Phone Lines
This is probably the most common way to connect to the Internet for home and small business users. Connection to the Internet for home/home offices is usually accomplished with ADSL *(Asymmetric digital subscriber line)* which uses the **existing telephone cabling infrastructure.**
In the UK BT (British Telecom) provide the familiar telephone connection to most homes, and these same telephone wires are used to provide broadband internet using **ADSL** technology.

ADSL Over Phone Lines
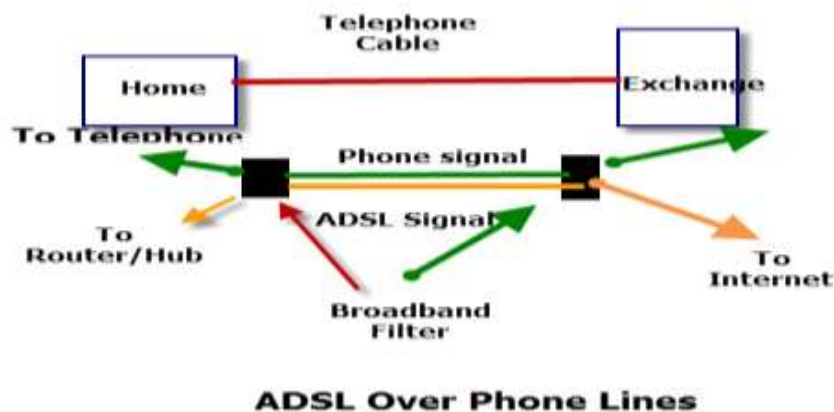
Cable Broadband
Cable connects you to the Internet through a coaxial cable usually using the same line as your TV service.
Cable connections offer very high connection speeds, but the connection may be shared with other users.
This means that you can experience much slower speeds due to congestion.

Fiber Broadband
This is currently being rolled out in the UK by BT, and offers download speeds of 76Mbit/s.
BT offers two types depending on your location:
- fiber to home
- fiber to cabinet

Fiber to the home – It is the fastest and means that the connection from the home to the exchange is all fiber. This service requires new hardware.
Fiber to the cabinet – It is slower than fiber to the home as the entire connection isn't fiber but only the connection from the exchange to the street cabinet.

Mobile Broadband 3G and 4G
3G and 4G networks are provided by mobile phone operators.
3G mobile phone networks are the most common, and have the widest coverage area, whereas the newer 4G networks are less common with restricted coverage area.
Mobile Internet services are available on a contract or pay as you go basis.

3G -
- 3G mobile networks were designed mainly for phone calls (voice) but with improved internet access speeds when compared to the earlier 2G standard.
- A 3G mobile phone can make voice calls, and also access the Internet using a data channel.

- Mobile phone operators usually have two separate plans – standard voice plans and a data plan.
- Data plans tend to have restricted download limits and exceeding them can be expensive.
- Internet access speeds will vary depending on technology and location, but you can expect between 200kbps and 7.2Mbps.

4G Broadband.

– This is currently in the initial phases of being rolled out in the UK. It uses HSPA+ access mechanism with speeds of up to 168 Mbit/s in the downlink and 22 Mbit/s in the uplink.
- 4G networks are expected eventually to offer download speeds of up to 1Gbits/s (LTE advanced).
- 4G mobile networks are designed primary for carrying data using the IP protocol.
- Capability is already built into Google Nexus 7 (mobile data model) and the Nexus 4 mobile phone.

1.14 Proxy Server

Proxy server is an intermediary server between client and the internet. Proxy servers offer the following basic functionalities:

- Firewall and network data filtering.
- Network connection sharing
- Data caching

Proxy servers allow hiding and making your network id anonymous by hiding your IP address.

Purpose of Proxy Servers

Following are the reasons to use proxy servers:

- Monitoring and Filtering
- Improving performance
- Translation
- Accessing services anonymously
- Security

Monitoring and Filtering

Proxy servers allow us to do several kind of filtering such as:

- Content Filtering
- Filtering encrypted data
- Bypass filters
- Logging and eavesdropping

Improving performance - It fastens the service by process of retrieving content from the cache which was saved when previous request was made by the client.

Translation - It helps to customize the source site for local users by excluding source content or substituting source content with original local content. In this the traffic from the global users is routed to the source website through Translation proxy.

Accessing services anonymously - In this the destination server receives the request from the anonymzing proxy server and thus does not receive information about the end user.

Security - Since the proxy server hides the identity of the user hence it protects from spam and the hacker attacks.

1.15 Type of Proxies

Following table briefly describes the type of proxies:

Web Proxy - is the most common type of proxy application, which responds to the user requests by accessing resources from cached web pages and files available on remote web servers. This facilitates quick and reliable access to data for local network clients. If the requested resource is not found in the cache, then a web proxy fetches the file from the remote server, and saves a copy in the cache before returning it to the client.

Transparent Proxy - is mostly used for caching websites and overcoming simple IP bans. However, such proxies do not provide any user anonymity since user's original IP address is exposed. Transparent proxies are not specifically configured on the client computers.

Forward Proxies - In this the client requests its internal network server to forward to the internet.
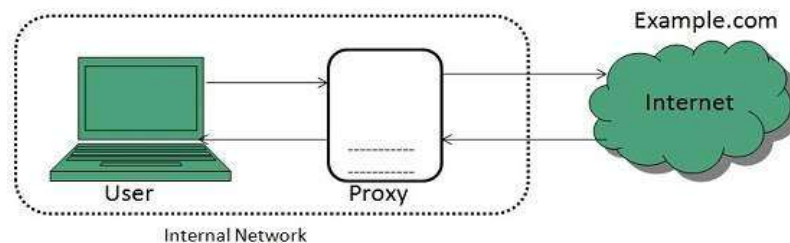
Open Proxies - Open Proxies helps the clients to conceal their IP address while browsing the web.
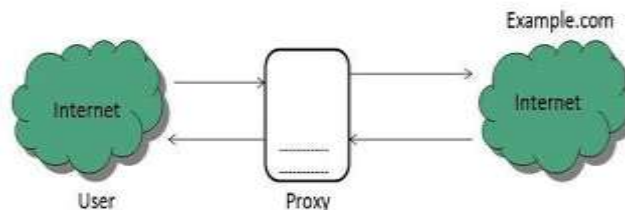
Reverse Proxies - In this the requests are forwarded to one or more proxy servers and the response from the proxy server is retrieved as if it came directly from the original Server.
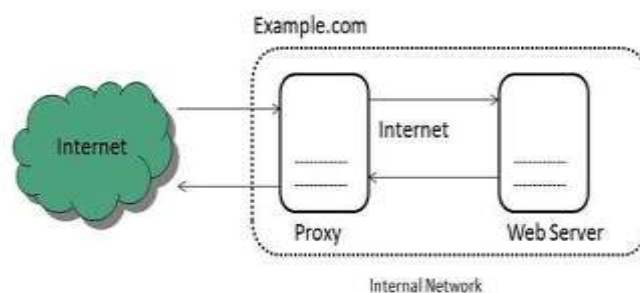
Uses of Proxy

Control Internet Usage - One of the most important reasons why proxies are widely used in corporate networks is that they provide control over what employees are accessing and using on the Internet. For example, many companies ban certain websites so that they are not accessed by employees during work hours. For example, they may ban adult websites, popular social networks or time wasting websites like 9gag.com.
Forcing employees to access the Internet only through your company's proxy also means that you have detailed logs of all the websites & content they accessed, when, for how long, etc. Detailed usage reports are available about each employee and the company can easily identify misbehaving users.

Bandwidth Savings & Improved Speed - Another reason why companies use proxy servers is that it helps them save precious bandwidth. Proxy servers can compress traffic, cache files and web pages from the Internet and even strip ads from websites before they reach your computer. This allows companies to save bandwidth, especially when they have hundreds or thousands of employees, accessing mostly the same popular websites (e.g. CNN news, New York Times, etc).

When a web page is accessed, a proxy server can store it and, when the next person requests it, it first checks if the page has changed. If it hasn't changed, it forwards the local copy without re-downloading the whole page. This both saves bandwidth for the company and makes the loading process faster for the next person that requests the same resource.

Privacy Benefits: Hide Your IP Address, Location & Other Information - When you have a direct connection to the Internet, when you load a website on the Internet, the server where it is hosted can see your IP address. With the help of this address it can approximate your geographical location. Also, the browser sends its user agent information and the website knows what browser you are using. On top of this, cookies are stored on your computer which provide further personal information.

Proxy servers can hide your IP address (if they are set to do this), can send a different user agent so that your browser is not identified and can block cookies or accept them but not pass them to your PC or device. Therefore, when using a proxy server, you can be a lot more anonymous than when using a direct connection to the Internet.

Proxy Servers Can Improve Security - Proxy servers may also have a role in improving security, especially when used in business networks. They can be set to block access to malicious websites that distribute malware and they can also provide encryption services so that your data is not easily sniffed by third-parties that want to get their hands on it.

They Provide Access to Blocked Resources on the Internet - A very popular use for proxy servers is the bypassing of Internet censorship. For example, countries like China or Iran censor access to many websites and services on the Internet. Users in those countries can use proxy servers to circumvent this censorship and get access to them.

Also, there are services which are available only in specific countries. For example, Hulu works only for users based in US and Japan. People in Europe can use a proxy server based in the US to access it.

Security Problems Generated by Proxy Servers - Using proxy servers is not all about benefits and good stuff. They can pose problems like:
- When using unencrypted connections, the proxy server can alter the responses you receive, both in good and bad ways. For example, an infected or malicious proxy server can be used to load malware into your browser or redirect you to a phishing website.
- A proxy can alter the requests you make to a website or service on the Internet to generate results that meet someone else's intentions.
- A proxy server monitors and logs your activity. Therefore, it stores lots of information about you that can be used for identification at a later date.
- Depending on how it was configured, a proxy server can provide unencrypted data where encrypted data was previously provided by the website or service you are using. This can expose you to network sniffing and having others monitor what you are doing on the Internet.

1.16 USENET - Usenet is a worldwide system for Internet discussion that consists of a set of newsgroups that are organized by subject. Users post articles or messages to these newsgroups. The articles are then broadcast to other computer systems, most of which now connect via the Internet. Usenet was conceived in 1979, making it one of the oldest network communications systems still in use today. It is also the predecessor of many of the forums online today.

Usenet was conceived in 1979 and publicly established in 1980, at the University of North Carolina at Chapel Hill and Duke University, over a decade before the World Wide Web was developed and the general public received access to the Internet, making it one of the oldest computer network communications systems still in widespread use.

Newsgroup Names and Hierarchies - Each Usenet group has a unique name. The name consists of two or more parts, separated by periods. For example, here are the names of several groups:
alt.celebrities
biz.marketplace.international
k12.news
news.newusers.questions
rec.parks.theme
sci.chem
soc.women
talk.environment

1.17 GOPHER - Gopher was conceived in 1991 as one of the Internet's first data/file access protocols to run on top of a TCP/IP network. Gopher was designed to access a Web server or database via the Internet. Gopher was an Internet application in which hierarchically-organized text files could be brought from servers all over the world to a viewer on your computer. Especially in universities, Gopher was a step toward the World Wide Web's Hypertext Transfer Protocol (HTTP), which effectively replaced it within a short time. With hypertext links, the Hypertext Markup Language (HTML), and the arrival of a graphical browser, Mosaic, the Web quickly transcended Gopher. Gopher was developed at the University of Minnesota, whose sports teams are called "the Golden Gophers."

1.18 WAIS - Wide Area Information Server, are databases containing mostly text-based documents, (although WAIS documents may contain sound, pictures or video as well). WAIS databases are referred to as sources. The databases may be organized in different ways, using various database systems, but the user is not required to learn the query languages of the different databases. The WAIS client uses natural language queries to find relevant documents and the result of a query is a set of documents which contain the words of the query. WAIS databases are available on topics ranging from Agriculture to Social Science. You must be on the international TCP/IP network (the Internet) in order to use a WAIS client on your computer to access WAIS sources.

1.19 ARCHIE - Archie is a program that allows you to search for files available on one or more FTP servers. It was commonly used in the early 1990s, but has been replaced by standard web-based search engines and peer-to-peer (P2P) file sharing services. In the early days of the Internet, large files were often available only through FTP servers. In order to download a specific file, users would have to navigate to the appropriate directory and then find the correct file before downloading it. This made it difficult for people to locate files unless they knew exactly where they were stored on the server. Archie made it possible for users to actually search FTP servers rather than browsing through all the directories. While Archie is rarely used today, some websites still offer an Archie

search feature. You can often identify an Archie search engine by a URL that begins with "archie" rather than "www." Most Archie search engines allow you to search for filenames based on either substrings or exact matches. You can also specify if a search should be case sensitive or not. Additionally, you can use Boolean operators such as AND and OR to search for multiple filenames at once.

1.20 VERONICA - Veronica is a search tool used in <u>Gopher</u>. Veronica was developed by Steve Foster and Fred Barrie at the University of Nevada in the United States and was released in 1992. This search tool is considered to be the first text-based search engine, you can then enter search keywords into the Veronica system to search all Gopher sites at once.

1.21 IRC - Internet Relay Chat (IRC) is a system for chatting that involves a set of rules and conventions and client/server software. On the Web, certain sites such as Talk City or IRC networks such as the Undernet provide servers and help you download an IRC client to your PC. Talk City also offers an IRC client applet that it downloads for you as part of their home page so that you can start chatting right away.

You can start a chat group (called a channel) or join an existing one. There is a protocol for discovering existing chat groups and their members. Depending on the type of network, nicknames can be reserved (registered) or just used during the session. Some channels encourage you to register a nickname that you always use and even offer space for a personal profile, picture, and personal home page link.

Popular ongoing IRC channels are #hottub and #riskybus. A number of channels are set up and conducted in foreign languages. The most common IRC networks are IRCnet (mostly European), EFnet (mostly North American), Undernet, and Dalnet. Popular IRC clients include mIRC for Windows, IRCle for Mac OS, and irc2 (the original client) for UNIX-base operating systems.

1.22 Search Engine
A search engine is a software program or script available through the Internet that searches documents and files for keywords and returns the results of any files containing those keywords. Today, there are thousands of different search engines available on the Internet, each with their own abilities and features. The first search engine ever developed is considered Archie, which was used to search for FTP files and the first text-based search engine is considered Veronica. Today, the most popular and well-known search engine is Google. Other popular search engines include AOL, Ask.com, Baidu, Bing and Yahoo.
Concept of search Engine

Search Engine Type - *Different Types of Search Engines*

Search engines are classified into the following three categories based on how it works.

1. Crawler based search engines
2. Human powered directories
3. Hybrid search engines
4. Other special search engines

Let us discuss all types of search engines in detail in the following sections.

1. Crawler Based Search Engines

All crawler based search engines use a crawler or bot or spider for crawling and indexing new content to the search database. There are four basic steps, every crawler based search engines follow before displaying any sites in the search results.

- Crawling
- Indexing
- Calculating Relevancy
- Retrieving the Result

1.1. Crawling - Search engines crawl the whole web to fetch the web pages available. A piece of software called crawler or *bot* or spider, performs the crawling of the entire web. The crawling frequency depends on the search engine and it may take few days between crawls. This is the reason sometimes you can see your old or deleted page content is showing in the search results. The search results will show the new updated content, once the search engines crawl your site again.

1.2. Indexing - Indexing is next step after crawling which is a process of identifying the words and expressions that best describe the page. The identified words are referred as keywords and the page is assigned to the identified keywords. Sometimes when the crawler does not understand the meaning of your page, your site may rank lower on the search results. Here you need to optimize your pages for search engine crawlers to make sure the content is easily understandable. Once the crawlers pickup correct keywords your page will be assigned to those keywords and rank high on search results.

1.3. Calculating Relevancy - Search engine compares the search string in the search request with the indexed pages from the database. Since it is likely that more than one page contains the search string, search engine starts calculating the relevancy of each of the pages in its index with the search string.

There are various algorithms to calculate relevancy. Each of these algorithms has different relative weights for common factors like keyword density, links, or meta tags. That is why different search engines give different search results pages for the same search string. It is a known fact that all major search engines periodically change their algorithms. If you want to keep your site at the top, you also need to adapt your pages to the latest changes. This is one reason to devote permanent efforts to SEO, if you like to be at the top.

1.4. Retrieving Results - The last step in search engines' activity is retrieving the results. Basically, it is simply displaying them in the browser in an order. Search engines sort the endless pages of search results in the order of most relevant to the least relevant sites.

1.23 Examples of Crawler Based Search Engines

Most of the popular search engines are crawler based search engines and use the above technology to display search results. Example of crawler based search engines:

- Google

- Bing
- Yahoo!
- Baidu
- Yandex

Besides these popular search engines there are many other crawler based search engines available like DuckDuckGo, AOL and Ask.

2. Human Powered Directories

Human powered directories also referred as open directory system depends on human based activities for listings. Below is how the indexing in human powered directories work:

- Site owner submits a short description of the site to the directory along with category it is to be listed.
- Submitted site is then manually reviewed and added in the appropriate category or rejected for listing.
- Keywords entered in a search box will be matched with the description of the sites. This means the changes made to the content of a web pages are not taken into consideration as it is only the description that matters.
- A good site with good content is more likely to be reviewed for free compared to a site with poor content.

Yahoo! Directory and DMOZ were perfect examples of human powered directories. Unfortunately, automated search engines like Google, wiped out all those human powered directory style search engines out of the web.

3. Hybrid Search Engines

Hybrid Search Engines use both crawler based and manual indexing for listing the sites in search results. Most of the crawler based search engines like Google basically uses crawlers as a primary mechanism and human powered directories as secondary mechanism. For example, Google may take the description of a webpage from human powered directories and show in the search results. As human powered directories are disappearing, hybrid types are becoming more and more crawler based search engines.

But still there are manual filtering of search result happens to remove the copied and spammy sites. When a site is being identified for spammy activities, the website owner needs to take corrective action and resubmit the site to search engines. The experts do manual review of the submitted site before including it again in the search results. In this manner though the crawlers control the processes, the control is manual to monitor and show the search results naturally.

4. Other Types of Search Engines

Besides the above three major types, search engines can be classified into many other categories depending upon the usage. Below are some of the examples:

- Search engines have different types of bots for exclusively displaying images, videos, news, products and local listings. For example, Google News page can be used to search only news from different newspapers.

- Some of the search engines like Dogpile collects meta information of the pages from other search engines and directories to display in the search results. This type of search engines are called metasearch engines.
- Semantic search engines like Swoogle provide accurate search results on specific area by understanding the contextual meaning of the search queries.

1.24 Searching the Web

There are a number of various search engines available and some of them may seem familiar to you. The top web search engines are Google, Bing, Yahoo, Ask.com, and AOL.com. For the purpose of this course, we will be searching using the Google Chrome web browser, and search first with the Google search engine and then Microsoft's Bing search engine.

Searching on Chrome - Your supervisor at Rowan Retail asked you to find out what the most popular kids toys are this year. He wants to have those toys stocked in the store for the upcoming holiday season. In order for you to find out that information, you turn on a computer and get ready to conduct a search on the internet.

The first step is to open a Chrome browser by clicking on the desktop icon or the icon on the computer desktop's taskbar. Once the browser window is open, type www.google.com into the address bar on the top of the browser window and press the Enter (or Return) key on the keyboard.


The browser now displays the large Google search bar. As you begin to enter the phrase *most popular toys of 2017* into the search bar, notice how the search bar moves to the top of the screen as the words are typed. This movement is normal; continue to type the phrase.

Microsoft Bing Search - The general manager of the Rowen Retail asks you for ideas to improve the store's customer service experiences. She wants to be able to hear about customers' experiences in a timely manner and address any service issues that are discovered. She would also like to generate ideas for creating delightful experiences for the store customers. You decide to try

searching for ideas on the Bing search engine, so you turn on a computer and get ready to conduct search on the internet.
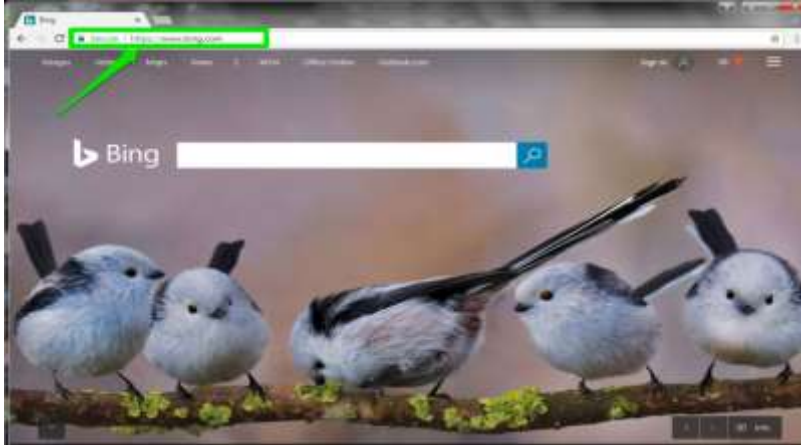
The first step is to open a Chrome browser by clicking on the desktop icon or the icon on the computer desktop's taskbar. With the browser window now open, type www.bing.com in the browser's address bar and press the Enter (or Return) key. Notice that with Bing, the main web page is always a photograph or picture.

1.25 Web Server

The primary function of a web server is to store, process and deliver web pages to clients. The communication between client and server takes place using the Hypertext Transfer Protocol (HTTP). Pages delivered are most frequently HTML documents, which may have images, style sheets and scripts in addition to the text content. The process is an example of the client/server model. All computers that host Web sites must have Web server programs. Leading Web servers include Apache (the most widely-installed Web server), Microsoft's Internet Information Server (IIS) and nginx (pronounced engine *X*) from NGNIX. Other Web servers include Novell's NetWare server, Google Web Server (GWS) and IBM's family of Domino servers.

Web servers often come as part of a larger package of Internet- and intranet-related programs for serving email, downloading requests for File Transfer Protocol (FTP) files, and building and publishing Web pages. Considerations in choosing a Web server include how well it works with the operating system and other servers, its ability to handle server-side programming, security characteristics, and the particular publishing, search engine and site building tools .

1.26 OSI Protocol

The International Standards Organization (ISO) developed the Open Systems Interconnection (OSI) model. It divides network communication into seven layers. Layers 1-4 are considered the lower layers, and mostly concern themselves with moving data around. Layers 5-7, the upper layers, contain application-level data. Networks operate on one basic principle: "pass it on." Each layer takes care of a very specific job, and then passes the data onto the next layer.

The 7 Layers of the OSI

In the OSI model, control is passed from one layer to the next, starting at the application layer (Layer 7) in one station, and proceeding to the bottom layer, over the channel to the next station and back up the hierarchy. The OSI model takes the task of inter-networking and divides that up into what is referred to as a *vertical stack* that consists of the following 7 layers.

- Layer 7 - Application
- Layer 6 - Presentation
- Layer 5 - Session
- Layer 4 - Transport

- Layer 3 - Network
- Layer 2 - Data Link
- Layer 1 - Physical

Application (Layer 7)

OSI Model, Layer 7, supports application and end-user processes. Communication partners are identified, quality of service is identified, user authentication and privacy are considered, and any constraints on data syntax are identified. Everything at this layer is application-specific. This layer provides application services for file transfers, e-mail, network software services. Telnet and FTP are applications that exist entirely in the application level. Tiered application architectures are part of this layer.

Layer 7 Application examples include WWW browsers, NFS, SNMP, Telnet, HTTP, FTP

Presentation (Layer 6)

This layer provides independence from differences in data representation (e.g., encryption) by translating from application to network format, and vice versa. The presentation layer works to transform data into the form that the application layer can accept. This layer formats and encrypts data to be sent across a network, providing freedom from compatibility problems. It is sometimes called the syntax layer.

Layer 6 Presentation examples include encryption, ASCII, EBCDIC, TIFF, GIF, PICT, JPEG, MPEG, MIDI.

Session (Layer 5)

This layer establishes, manages and terminates connections between applications. The session layer sets up, coordinates, and terminates conversations, exchanges, and dialogues between the applications at each end. It deals with session and connection coordination.

Layer 5 Session examples include NFS, NetBios names, RPC, SQL.

Transport (Layer 4)

OSI Model, Layer 4, provides transparent transfer of data between end systems, or hosts, and is responsible for end-to-end error recovery and flow control. It ensures complete data transfer.

Layer 4 Transport examples include SPX, TCP, UDP.

Network (Layer 3)

Layer 3 provides switching and routing technologies, creating logical paths, known as virtual circuits, for transmitting data from node to node. Routing and forwarding are functions of this layer, as well as addressing, internetworking, error handling, congestion control and packet sequencing.

Layer 3 Network examples include AppleTalk DDP, IP, IPX.

Data Link (Layer 2)

At OSI Model, Layer 2, data packets are encoded and decoded into bits. It furnishes protocol knowledge and management and handles errors in the physical layer, flow control and frame synchronization. The data link layer is divided into two sub layers: The Media Access Control (MAC) layer and the Logical Link Control (LLC) layer. The MAC sub layer controls how a computer on the network gains access to the data and permission to transmit it. The LLC layer controls frame synchronization, flow control and error checking.

Layer 2 Data Link examples include PPP, FDDI, ATM, IEEE 802.5/ 802.2, IEEE 802.3/802.2, HDLC, Frame Relay.

Physical (Layer 1)

OSI Model, Layer 1 conveys the bit stream - electrical impulse, light or radio signal — through the network at the electrical and mechanical level. It provides the hardware means of sending and receiving data on a carrier, including defining cables, cards and physical aspects. Fast Ethernet, RS232, and ATM are protocols with physical layer components.
Layer 1 Physical examples include Ethernet, FDDI, B8ZS, V.35, V.24, RJ45.

1.27 TCP/IP Protocol

Transmission Control Protocol (TCP) and Internet Protocol (IP) are two distinct computer network protocols. A protocol is an agreed-upon set of procedures and rules. When two computers follow the same protocols—the same set of rules—they can understand each other and exchange data. TCP and IP are so commonly used together, however, that TCP/IP has become standard terminology for referring to this suite of protocols. Transmission Control Protocol divides a message or file into packets that are transmitted over the internet and then reassembled when they reach their destination.

Three of the most common TCP/IP protocols

- **HTTP** - Used between a web client and a web server, for non-secure data transmissions. A web client (i.e., Internet browser on a computer) sends a request to a web server to view a web page. The web server receives that request and sends the web page information back to the web client.
- **HTTPS** - Used between a web client and a web server, for secure data transmissions. Often used for sending credit card transaction data or other private data from a web client (i.e., Internet browser on a computer) to a web server.
- **FTP** - Used between two or more computers. One computer sends data to or receives data from another computer directly.

Different Layers of TCP/IP Reference Model

Below we have discussed the 4 layers that form the TCP/IP reference model:

Layer 1: Host-to-network Layer

1. Lowest layer of the all.
2. Protocol is used to connect to the host, so that the packets can be sent over it.
3. Varies from host to host and network to network.

Layer 2: Internet layer

1. Selection of a packet switching network which is based on a connectionless internetwork layer is called a internet layer.
2. It is the layer which holds the whole architecture together.
3. It helps the packet to travel independently to the destination.
4. Order in which packets are received is different from the way they are sent.
5. IP (Internet Protocol) is used in this layer.
6. The various functions performed by the Internet Layer are:
   o Delivering IP packets
   o Performing routing
   o Avoiding congestion

Layer 3: Transport Layer

1. It decides if data transmission should be on parallel path or single path.
2. Functions such as multiplexing, segmenting or splitting on the data is done by transport layer.
3. The applications can read and write to the transport layer.
4. Transport layer adds header information to the data.
5. Transport layer breaks the message (data) into small units so that they are handled more efficiently by the network layer.
6. Transport layer also arrange the packets to be sent, in sequence.

Layer 4: Application Layer

The TCP/IP specifications described a lot of applications that were at the top of the protocol stack. Some of them were TELNET, FTP, SMTP, DNS etc.

1. **TELNET** is a two-way communication protocol which allows connecting to a remote machine and run applications on it.
2. **FTP**(File Transfer Protocol) is a protocol, that allows File transfer amongst computer users connected over a network. It is reliable, simple and efficient.
3. **SMTP**(Simple Mail Transport Protocol) is a protocol, which is used to transport electronic mail between a source and destination, directed via a route.
4. **DNS**(Domain Name Server) resolves an IP address into a textual address for Hosts connected over a network.
5. It allows peer entities to carry conversation.
6. It defines two end-to-end protocols: TCP and UDP
   - **TCP(Transmission Control Protocol):** It is a reliable connection-oriented protocol which handles byte-stream from source to destination without error and flow control.
   - **UDP(User-Datagram Protocol):** It is an unreliable connection-less protocol that do not want TCPs, sequencing and flow control. Eg: One-shot request-reply kind of service.
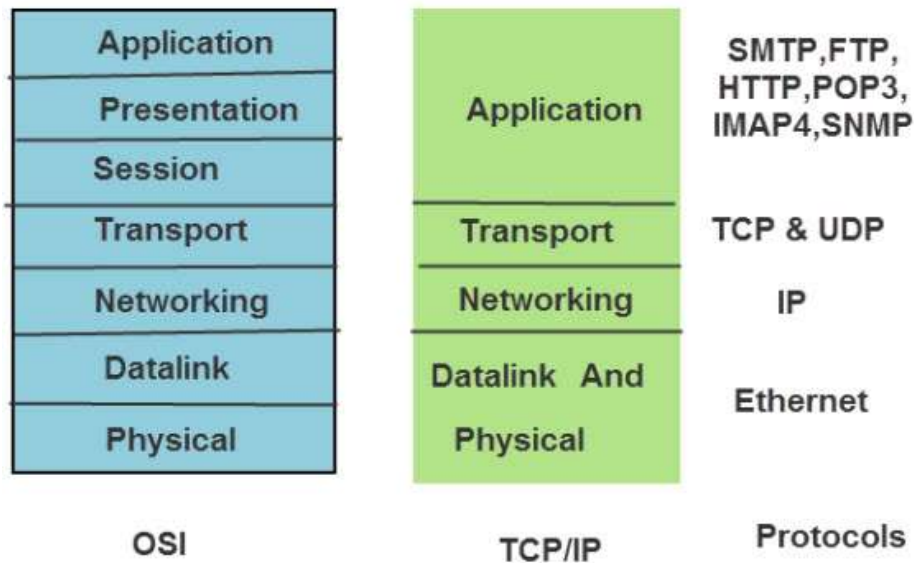
Merits of TCP/IP model

1. It operated independently.
2. It is scalable.
3. Client/server architecture.
4. Supports a number of routing protocols.
5. Can be used to establish a connection between two computers.

Demerits of TCP/IP

1. In this, the transport layer does not guarantee delivery of packets.
2. The model cannot be used in any other application.
3. Replacing protocol is not easy.
4. It has not clearly separated its services, interfaces and protocols.

OSI & TCP/IP Protocol-Stacks and Protocols

OSI	TCP/IP	Protocols
Application	Application	SMTP,FTP, HTTP,POP3, IMAP4,SNMP
Presentation		
Session		
Transport	Transport	TCP & UDP
Networking	Networking	IP
Datalink	Datalink And Physical	Ethernet
Physical		

1.28 FTP

File Transfer Protocol (**FTP**) is the commonly used protocol for exchanging files over the Internet. FTP uses the Internet's TCP/IP protocols to enable data transfer. FTP uses a client-server architecture, often secured with SSL/TLS. FTP promotes sharing of files via remote computers with reliable and efficient data transfer

How FTP Works - FTP works in the same way as HTTP for transferring Web pages from a server to a user's browser and SMTP for transferring electronic mail across the Internet in that, like these technologies.

FTP uses a client-server architecture. Users provide authentication using a sign-in protocol, usually a username and password, however some FTP servers may be configured to accept anonymous FTP logins where you don't need to identify yourself before accessing files. Most often, FTP is secured with SSL/TLS.

How to FTP - Files can be transferred between two computers using FTP software. The user's computer is called the local host machine and is connected to the Internet. The second machine, called the remote host, is also running FTP software and connected to the Internet.

- The local host machine connects to the remote host's IP address.
- The user would enter a username/password (or use anonymous).
- FTP software may have a GUI, allowing users to drag and drop files between the remote and local host. If not, a series of FTP commands are used to log in to the remote host and transfer files between the machines.

Common Uses of FTP - FTP is most commonly used to download a file from a server using the Internet or to upload a file to a server (e.g., uploading a web page file to a Web server).

1.29 Email

Short for e*lectronic* **mail**, **email** (or **e-mail**) is defined *as* the transmission of messages over communications networks. Typically the messages are notes entered from the keyboard or electronic files stored on disk. Most mainframes, minicomputers and computer networks have an email system.

Most email systems include a rudimentary text editor for composing messages, but many allow you to edit your messages using any editor you want. Some systems will also provide basic formatting, including bold, italics, font color and HTML. You can use the program to send the message to a recipient by specifying the recipient's address. You can also send the same message to several users at once. This is called *broadcasting*.

Sent messages are stored in electronic mailboxes until the recipient fetches them. To see if you have any mail, you may have to check your electronic mailbox periodically, although many systems alert you when mail is received. After reading your mail, you can store it in a text file, forward it to other users, or delete it. Copies of memos can be printed out on a printer if you want a paper copy.

Web based E-mail - Webmail are web-based email accounts. These are usually free email accounts that are operated from a website. Examples include Hotmail, GMail and Yahoo Mail. Webmail allows the users to access their emails as long as they have access to an Internet connection and a web browser. This also means that the user cannot read an old email or draft a new email offline. Examples of webmail providers are AOL. Mail, Gmail, Outlook.com/Hotmail.com and Yahoo! Mail. Many webmail providers also offer email access by a desktop email client using standard email protocols, while many internet service providers provide a webmail client as part of the email service included in their internet service package.

As the 1990s progressed and into the 2000s, it became more common for the general public to have access to webmail because:

- many Internet service providers (such as EarthLink) and web hosting providers (such as Verio) began bundling webmail into their service offerings (often in parallel with POP/SMTP services);
- many other enterprises (such as universities and large corporations) also started offering webmail as a way for their user communities to access their email (either locally managed or outsourced);
- Webmail service providers (such as Hotmail and RocketMail) emerged in 1996 as a free service to the general public, and rapidly gained in popularity.

In some cases, webmail application software is developed in-house by the organizations running and managing the application, and in some cases it is obtained from software companies that develop and sell such applications, usually as part of an integrated mail server package (an early example being Netscape Messaging Server). The market for webmail application software has continued into the 2010s.

1.30 Mailing List

A mailing list is a list of people who subscribe to a periodic mailing distribution on a particular topic. On the Internet, mailing lists include each person's e-mail address rather than a postal address. Mailing lists have become a popular way for Internet users to keep up with topics they're interested in. Many software producers and other vendors are now using them as a way to keep in touch with customers.

Free E-mail Services - In spite of the social network buzz, email still remains the core of business communication on the Internet. In good email services, you should watch out for an effective spam filter, enough storage space, user-friendly interface, mobile access and maybe the availability of a desktop client. If you haven't attempted to explore other free email services, this may be a starting point for you.

1. Gmail

Gmail is arguably the best free email service provider at the moment. Gmail is simple and user-friendly. It offers over 10GB of free storage, has excellent spam filter and enables access via mobile devices. Its built-in chat allows voice and video chat as well the regular chatting by text. It offers search capability to find lost or old messages. Also, Gmail messages are grouped nicely with relevant replies such that you can read messages in the context. Gmail also offers customized email service for businesses, individuals and organizations.

2. Zoho Mail

Zoho mail is aimed at professionals. It features calendar, task manager, notes and instant chat as well as other business app found in Google apps for business. It is easy to set up and manage. Impressively, Zoho mail does not display adds to protect your privacy. Email messages are not even scanned for keywords for the purpose of marketing. You can opt for their free Lite Plan that features 5GB mail storage per user, push mail, mobile sync and email support. You can register only one domain name on the free Lite Plane, and your email address will appear as username@your.

3. Outlook.com (Reinvented Hotmail)

Outlook.com is the new, reinvented Hotmail.com email service. It builds off the power of Outlook on PCs and Macs, and it features more tidy user interface without display ads. It is built based on the latest trends in Internet communication. You can connect with social networks from inside your email account, integrate skydrive which include Office Web Apps for Word, Excel and PowerPoint files.

4. Yahoo! Mail

The new Yahoo! mail stands among the best free email services available on the web and mobile devices. They offer unlimited email storage, social networking, instant messaging and SMS texting. You can view slideshows, photos and videos right from inside your mailbox. You can send up to 50 files or 100MB file size in a single email. Your messages are automatically sorted, and lower priority messages like newsletters and coupons are organized into folders.

5. Fastmail

You should also consider using FastMail. They have been online for 10 years now. They boast of reliable junk mail protection, temporary secure SMS passwords, web folders for photos and files and much more. Their free or guest plan offers 25MB email storage, IMAP and 120 days inactivity time.

1.31 E-mail Protocol

E-mail Protocols are set of rules that help the client to properly transmit the information to or from the mail server. Here we will discuss various protocols such as SMTP, POP, and IMAP.

SMPTP - SMTP stands for Simple Mail Transfer Protocol. It was first proposed in 1982. It is a standard protocol used for sending e-mail efficiently and reliably over the internet.

Key Points:

- SMTP is application level protocol.
- SMTP is connection oriented protocol.
- SMTP is text based protocol.
- It handles exchange of messages between e-mail servers over TCP/IP network.
- Apart from transferring e-mail, SMPT also provides notification regarding incoming mail.
- When you send e-mail, your e-mail client sends it to your e-mail server which further contacts the recipient mail server using SMTP client.
- These SMTP commands specify the sender's and receiver's e-mail address, along with the message to be send.
- The exchange of commands between servers is carried out without intervention of any user.
- In case, message cannot be delivered an error report is sent to the sender which makes SMTP a reliable protocol.

IMAP - IMAP stands for Internet Mail Access Protocol**.** It was first proposed in 1986. There exist five versions of IMAP as follows:
1. Original IMAP
2. IMAP2
3. IMAP3
4. IMAP2bis
5. IMAP4

Key Points:
- IMAP allows the client program to manipulate the e-mail message on the server without downloading them on the local computer.
- The e-mail is hold and maintained by the remote server.
- It enables us to take any action such as downloading, delete the mail without reading the mail. It enables us to create, manipulate and delete remote message folders called mail boxes.
- IMAP enables the users to search the e-mails.
- It allows concurrent access to multiple mailboxes on multiple mail servers.

POP

POP stands for Post Office Protocol. It is generally used to support a single client. There are several versions of POP but the POP 3 is the current standard.
Key Points
- POP is an application layer internet standard protocol.
- Since POP supports offline access to the messages, thus requires less internet usage time.
- POP does not allow search facility.
- In order to access the messaged, it is necessary to download them.
- It allows only one mailbox to be created on server.
- It is not suitable for accessing non mail data.
- POP commands are generally abbreviated into codes of three or four letters. Eg. STAT.

Comparison between POP and IMAP

S.N.	POP	IMAP

1	Generally used to support single client.	Designed to handle multiple clients.
2	Messages are accessed offline.	Messages are accessed online although it also supports offline mode.
3	POP does not allow search facility.	It offers ability to search emails.
4	All the messages have to be downloaded.	It allows selective transfer of messages to the client.
5	Only one mailbox can be created on the server.	Multiple mailboxes can be created on the server.
6	Not suitable for accessing non-mail data.	Suitable for accessing non-mail data i.e. attachment.
7	POP commands are generally abbreviated into codes of three or four letters. Eg. STAT.	IMAP commands are not abbreviated, they are full. Eg. STATUS.
8	It requires minimum use of server resources.	Clients are totally dependent on server.
9	Mails once downloaded cannot be accessed from some other location.	Allows mails to be accessed from multiple locations.
10	The e-mails are not downloaded automatically.	Users can view the headings and sender of e-mails and then decide to download.
10	POP requires less internet usage time.	IMAP requires more internet usage time.

1.32 E-mail Server

An email server is a computer with mail transfer agent (MTA) functions. Mail is exchanged between email servers running special software, which is built around standardized protocols for handling messages and their varied (multimedia) content. An email server receives mail from another MTA, a mail user agent (MUA) or a mail submission agent (MSA) with the details of the transmission being defined by SMTP. When an MTA receives a mail and the recipient of the mail is not hosted locally, the mail is forwarded to another MTA. Every time this happens the MTA adds a "received" trace header on the top header of the message. This shows all the MTAs that have handled the message before it arrived in the recipient's inbox. This useful feature allows administrators to see whether an optimal path was taken.

E-mail Client Program

Email client primarily is a desktop application that enables users to receive and send emails directly on their desktop. Typically, email client requires an email address to be setup and configured before user can start using email service. These configuration and settings generally include email address, password, POP3/IMAP and SMTP address, port number, email aliases and other related preferences.

How Does an Email Client Differ from an Email Server

An email server transports and stores mail centrally, most usually for more than one user, sometimes millions. An email client, by contrast, is what a single user like you interacts with. Typically, the client will download messages from the server for local use and upload messages to the server for delivery to its recipients.

What Can I Do with an Email Client

The email client lets you read, organize and reply to messages as well as send new emails, of course. To organize email, email clients typically offer folders (each message in one folder), labels (where you can apply multiple labels to each message) or both. A search engine lets you find messages by meta-data such as sender, subject or time of receipt as well as, often, the emails' full-text content. In addition to email text, email clients also handle attachments, which lets you exchange arbitrary computer files (such as images, documents or spreadsheets) via email.

1.33 How Does an Email Client Communicate with Email Servers

Email clients can use a number of protocols to send and receive emails via email servers. The messages are either stored only locally (typically when POP (Post Office Protocol) is used to download mail from the server), or emails and folders are synchronized with the server (usually when the IMAP and Exchange protocols are employed). With IMAP (Internet Message Access Protocol) and Exchange, email clients accessing the same account see the same messages and folders, and all actions automatically synchronize.

To send email, email clients use SMTP (Simple Mail Transfer Protocol) almost exclusively. (With IMAP accounts, the sent message is usually copied to the "Sent" folder, and all clients can access it.). Email protocols other than IMAP, POP and SMTP are, of course, possible. Some email services offer APIs (application programming interfaces) for email clients to access mail on their servers. These protocols may offer additional features such as delayed sending or setting aside emails temporarily.

1.34 Address

An Internet address uniquely identifies a node on the Internet. Internet address may also refer to the name or IP of a Web site (URL). The term Internet address can also represent someone's e-mail address.

1) An Internet address or IP address is a unique computer (host) location on the Internet (expressed either as a unique string of numbers or as its associated domain name).
Example of an IP address expressed in dot notation: 205.245.172.72
Example of the domain name version: whatis.com

2) A file (or home page) address is expressed as the defining directory path to the file on a particular server. (A Web page address is also called a Uniform Resource Locator, or URL.)
Example: http://www.hitmill.com/computers/computerhx1.html

3) An e-mail address is the location of an e-mail user (expressed by the user's e-mail name followed by an "at" sign followed by the user's server domain name.)
Example: missmuffet@tuffet.org

4) In a computer, a storage address is the beginning location of a sequence of data that is stored on some electronic storage medium.
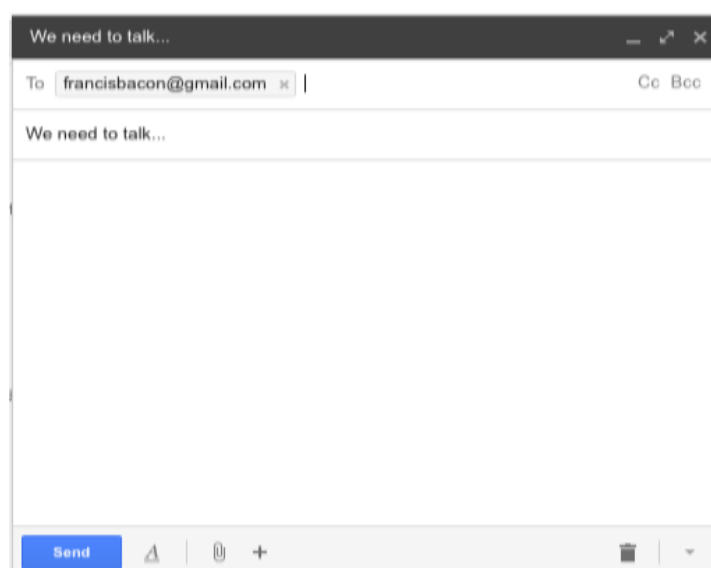
1.35 Basic of sending and receiving

Follow these step-by-step instructions to send an email
 Step 1: Log in to your Gmail account so that you are on the dashboard (main page) of your mail account.
 Step 2: Click Compose.
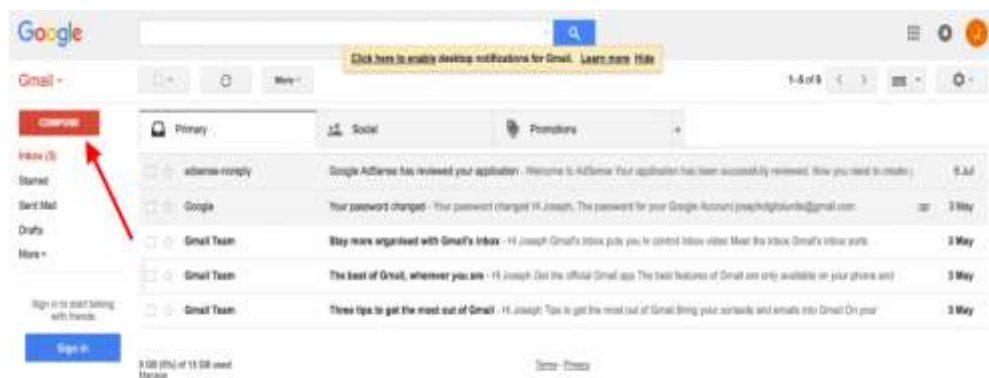
Step 3: A new blank email window will open up. In the 'To' box, type in the email address of the recipient.

Step 4: You might want to include someone else in your email to 'keep them in the loop'. You can do this by clicking Cc or Bcc, which will open another field. 'Cc' means 'carbon copy' and 'Bcc'

means 'blind carbon copy'. Adding an email address to the 'Cc' field means that that person will receive a copy of the email and all the other recipients will see their email address. If an email address is put into the 'Bcc' field, the person will get a copy of the email but no other recipient will see that address.

If you are sending the same email to lots of different people, it's a good idea to put all the email addresses in the 'Bcc' field to keep your 'mailing list' confidential. That way, there's no chance that it could fall into the hands of a spammer or hacker.
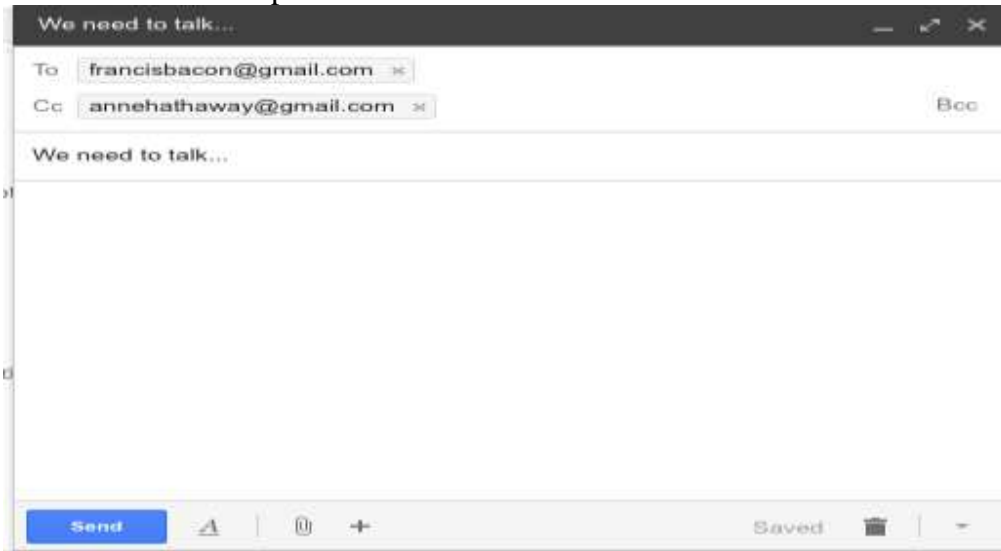

Step 5: The subject field allows you to give the recipient an idea of the topic of your email, like a heading. You don't have to put anything in the subject box, but it can help when viewing and sorting email.

Step 6: Email text can be formatted in a similar way to text in a word document. You can change the font style, colour and size using the formatting icons. You can also create bullet points and check the spelling of your email. Choose your formatting from the menu shown.
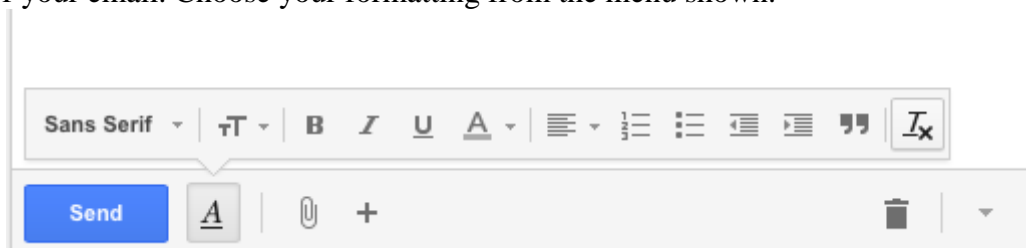

**Step 7:** Type your message in the main body field of your email.
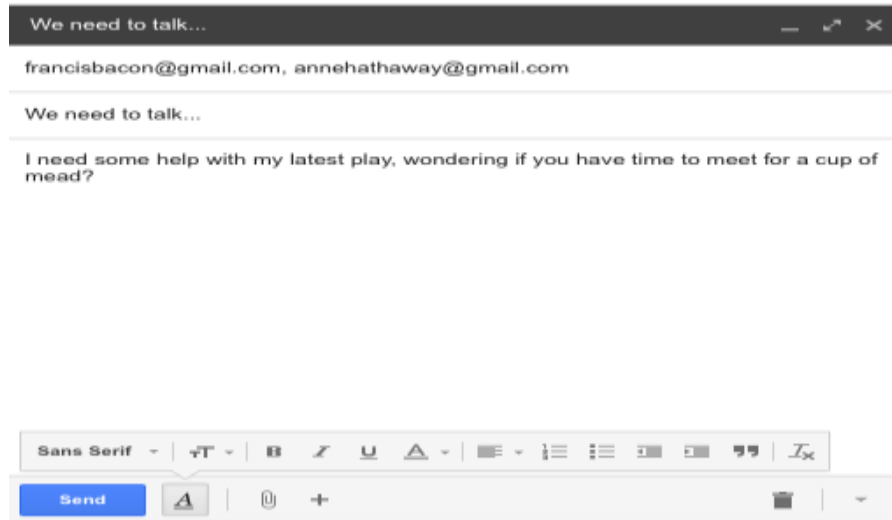
You can format your email using the options that are available on the toolbar. To add a link in the body of your email click on the insert link icon, then add the **'Text to display'** and then a web or email address, finally click **OK**.
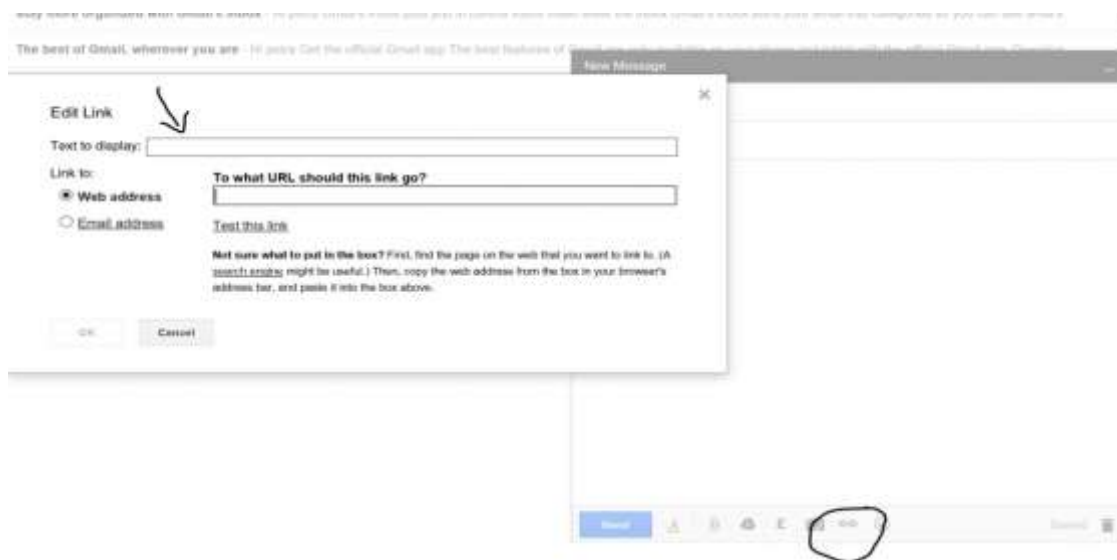
Step 8: When you're happy with your email, click the blue **Send** button at the bottom of the compose window.
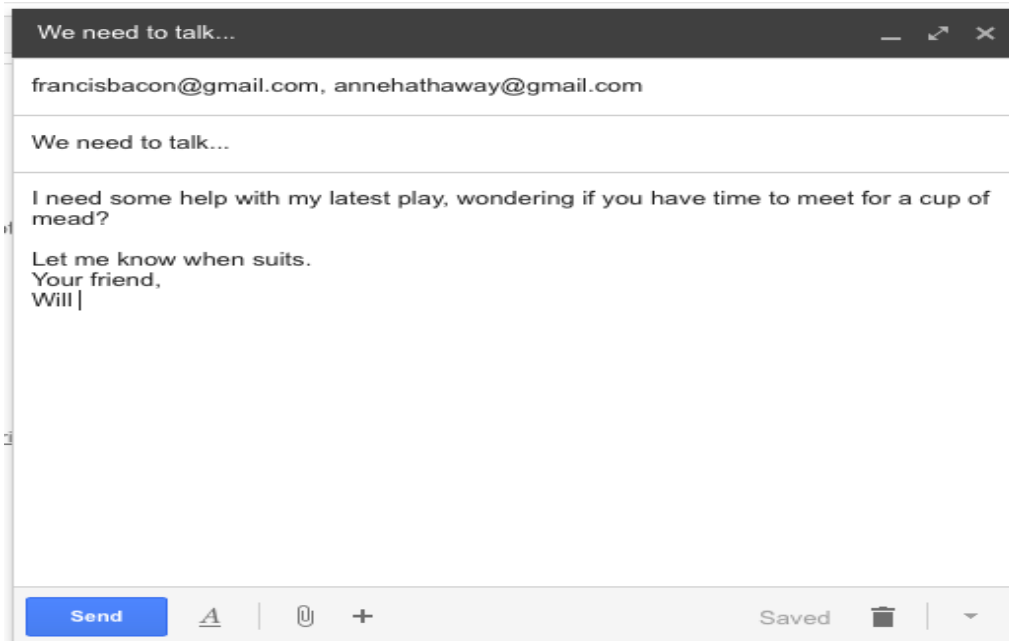
Step 9: The email you've sent will now be stored in the 'Sent Mail' folder on your Gmail dashboard. You may have to run your mouse pointer over the Inbox folder link to see the other folders.
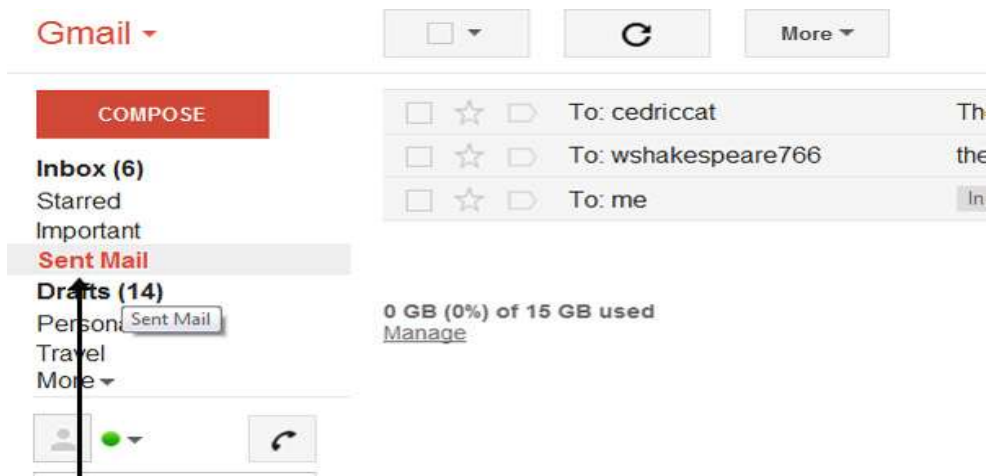
Step 10: You may start an email but then decide to come back to it later rather then sending it straightaway. Gmail saves your drafts automatically. So you can simply close the email and the unfinished email will be saved to your 'Drafts' folder. When you decide that you're ready to send it, you can retrieve it from the 'Drafts' folder by clicking **Drafts** and then clicking the correct item in the 'Drafts' folder list. Finish the email and click **Send** as normal.

Emergence of Internet

The Internet Today Page 2 In the early days, most people just used the internet to search for information. Today's internet is a constantly evolving tool, that not only contains an amazing variety of information, but also provides new ways of accessing, interacting and connecting with people and content. As a result, new terms are constantly appearing as new technologies are introduced.

What is the Internet?

The internet is the largest computer network in the world, connecting millions of computers. A network is a group of two or more computer systems linked together. There are two main types of computer networks: v **Local Area Network (LAN**): A LAN is two or more connected computers sharing certain resources in a relatively small geographic location, often in the same building. Examples include home networks and office networks.

Wide Area Network(WAN)

It is a computer network that covers a broad area, e.g., cross metropolitan, regional, or national boundaries.

Emergence of World Wide Web (WWW)

When most people think of the internet, the first thing they think about is the World Wide Web. Nowadays, the terms "internet" and "World Wide Web" are often used interchangeably— but they're actually not the same thing.

- The internet is the physical network of computers all over the world.
- The World Wide Web is a virtual network of web sites connected by hyperlinks (or "links"). Web sites are stored on servers on the internet, so the World Wide Web is a part of the internet

What is E-commerce?

E-Commerce is the ability of a company to have a dynamic presence on the Internet which allowed the company to conduct its business electronically, in essence having an electronic shop. Products can be advertised, sold and paid for all electronically without the need for it to be processed by a human being.

The biggest advantage of E-Commerce is the ability to provide secure shopping transactions via the internet and coupled with almost instant verification and validation of credit card transactions. This has caused E-Commerce sites to explode as they cost much less than a store front in a town and has the ability to serve many more customers.

In the broad meaning electronic commerce (E-Commerce) is a means of conducting business using one of many electronic methods, usually involving telephones, computers (or both). E-Commerce is not about the technology itself, it is about doing business using the technology. Electronic commerce is generally considered to be the sales aspect of e-business. It also consists of the exchange of data to facilitate the financing and payment aspects of the business transactions.

E-Commerce Overview

E-Commerce or Electronics Commerce is a methodology of modern business, which addresses the need of business organizations, vendors and customers to reduce cost and improve the quality of

goods and services while increasing the speed of delivery. Ecommerce refers to the paperless exchange of business information using the following ways −

Features

E-Commerce provides the following features −

- **Non-Cash Payment** − E-Commerce enables the use of credit cards, debit cards, smart cards, electronic fund transfer via bank's website, and other modes of electronics payment.

- **24x7 Service availability** − E-commerce automates the business of enterprises and the way they provide services to their customers. It is available anytime, anywhere.

- **Advertising / Marketing** − E-commerce increases the reach of advertising of products and services of businesses. It helps in better marketing management of products/services.

- **Improved Sales** − Using e-commerce, orders for the products can be generated anytime, anywhere without any human intervention. It gives a big boost to existing sales volumes.

- **Support** − E-commerce provides various ways to provide pre-sales and post-sales assistance to provide better services to customers.

- **Inventory Management** − E-commerce automates inventory management. Reports get generated instantly when required. Product inventory management becomes very efficient and easy to maintain.

- **Communication improvement** − E-commerce provides ways for faster, efficient, reliable communication with customers and partners.

Traditional Commerce v/s E-Commerce

Sr. No.	Traditional Commerce	E-Commerce
1	Heavy dependency on information exchange from person to person.	Information sharing is made easy via electronic communication channels making little dependency on person to person information exchange.
2	Communication/ transaction are done in synchronous way. Manual intervention is required for each communication or transaction.	Communication or transaction can be done in asynchronous way. Electronics system automatically handles when to pass communication to required person or do the transactions.
3	It is difficult to establish and maintain standard practices in	A uniform strategy can be easily established and maintain in e-commerce.

	traditional commerce.	
4	Communications of business depends upon individual skills.	In e-Commerce or Electronic Market, there is no human intervention.
5	Unavailability of a uniform platform as traditional commerce depends heavily on personal communication.	E-Commerce website provides user a platform where al l information is available at one place.
6	No uniform platform for information sharing as it depends heavily on personal communication.	E-Commerce provides a universal platform to support commercial / business activities across the globe.

E-Commerce - Advantages

E-Commerce advantages can be broadly classified in three major categories −

- Advantages to Organizations
- Advantages to Consumers
- Advantages to Society

Advantages to Organizations

- Using e-commerce, organizations can expand their market to national and international markets with minimum capital investment. An organization can easily locate more customers, best suppliers, and suitable business partners across the globe.

- E-commerce helps organizations to reduce the cost to create process, distribute, retrieve and manage the paper based information by digitizing the information.

- E-commerce improves the brand image of the company.

- E-commerce helps organization to provide better customer services.

- E-commerce helps to simplify the business processes and makes them faster and efficient.

- E-commerce reduces the paper work.

- E-commerce increases the productivity of organizations. It supports "pull" type supply management. In "pull" type supply management, a business process starts when a request comes from a customer and it uses just-in-time manufacturing way.

Advantages to Customers

- It provides 24x7 support. Customers can enquire about a product or service and place orders anytime, anywhere from any location.

- E-commerce application provides users with more options and quicker delivery of products.

- E-commerce application provides users with more options to compare and select the cheaper and better options.

- A customer can put review comments about a product and can see what others are buying, or see the review comments of other customers before making a final purchase.

- E-commerce provides options of virtual auctions.

- It provides readily available information. A customer can see the relevant detailed information within seconds, rather than waiting for days or weeks.

- E-Commerce increases the competition among organizations and as a result, organizations provides substantial discounts to customers.

Advantages to Society

- Customers need not travel to shop a product, thus less traffic on road and low air pollution.

- E-commerce helps in reducing the cost of products, so less affluent people can also afford the products.

- E-commerce has enabled rural areas to access services and products, which are otherwise not available to them.

- E-commerce helps the government to deliver public services such as healthcare, education, social services at a reduced cost and in an improved manner.

E-Commerce - Disadvantages

The disadvantages of e-commerce can be broadly classified into two major categories −

- Technical disadvantages
- Non-Technical disadvantages

Technical Disadvantages

- There can be lack of system security, reliability or standards owing to poor implementation of e-commerce.

- The software development industry is still evolving and keeps changing rapidly.

- In many countries, network bandwidth might cause an issue.

- Special types of web servers or other software might be required by the vendor, setting the e-commerce environment apart from network servers.

- Sometimes, it becomes difficult to integrate an e-commerce software or website with existing applications or databases.

- There could be software/hardware compatibility issues, as some e-commerce software may be incompatible with some operating system or any other component.

Non-Technical Disadvantages

- **Initial cost** − The cost of creating/building an e-commerce application in-house may be very high. There could be delays in launching an e-Commerce application due to mistakes, and lack of experience.

- **User resistance** − Users may not trust the site being an unknown faceless seller. Such mistrust makes it difficult to convince traditional users to switch from physical stores to online/virtual stores.

- **Security/ Privacy** − It is difficult to ensure the security or privacy on online transactions.

- Lack of touch or feel of products during online shopping is a drawback.

- E-commerce applications are still evolving and changing rapidly.

- Internet access is still not cheaper and is inconvenient to use for many potential customers, for example, those living in remote villages.

UNIT -3

A business model describes the rationale of how an organization creates, delivers, and captures value, in economic, social, cultural or other contexts. The process of business model construction and modification is also called business model innovation and forms a part of business strategy.

Electronic commerce business model that enables a firm to generate revenue streams on hundreds (even thousands) of items without carrying inventories, managing orders, processing payments, or handling packaging and shipping. In this arrangement, a website concentrates on a relationship with a very specific group of individuals as its core competence (see core competencies). It develops and continuously upgrades content and services to attract and retain the patronage of this group. Once it has a sizable number of regular visitors, it can generate revenue by carrying ads or links to merchants with products that its visitors seek or are interested in.

E-Commerce - Business Models

E-commerce business models can generally be categorized into the following categories.
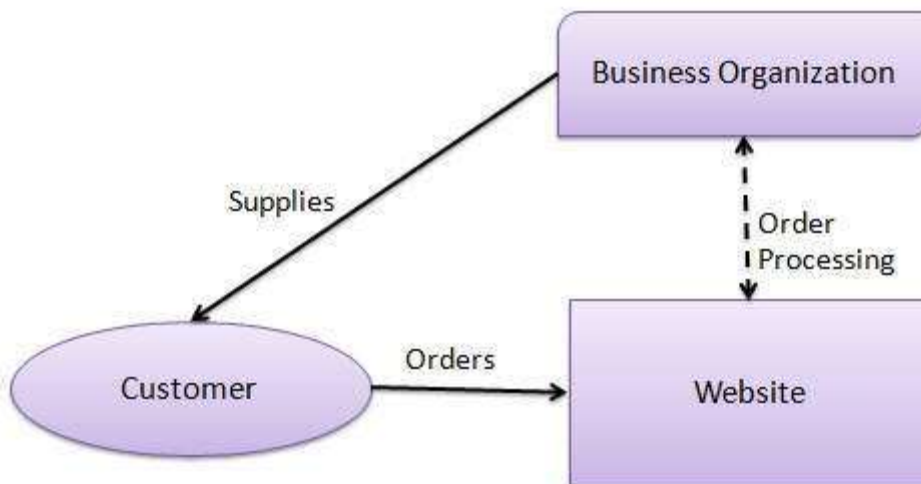
Business - to - Business

A website following the B2B business model sells its products to an intermediate buyer who then sells the product to the final customer. As an example, a wholesaler places an order from a company's website and after receiving the consignment, sells the end product to the final customer who comes to buy the product at one of its retail outlets.
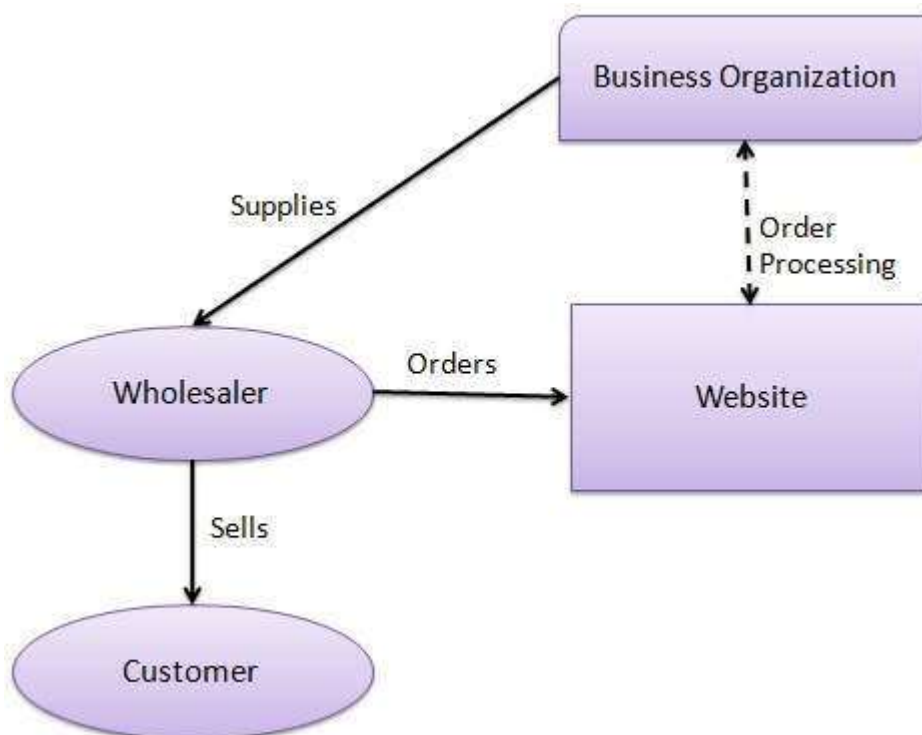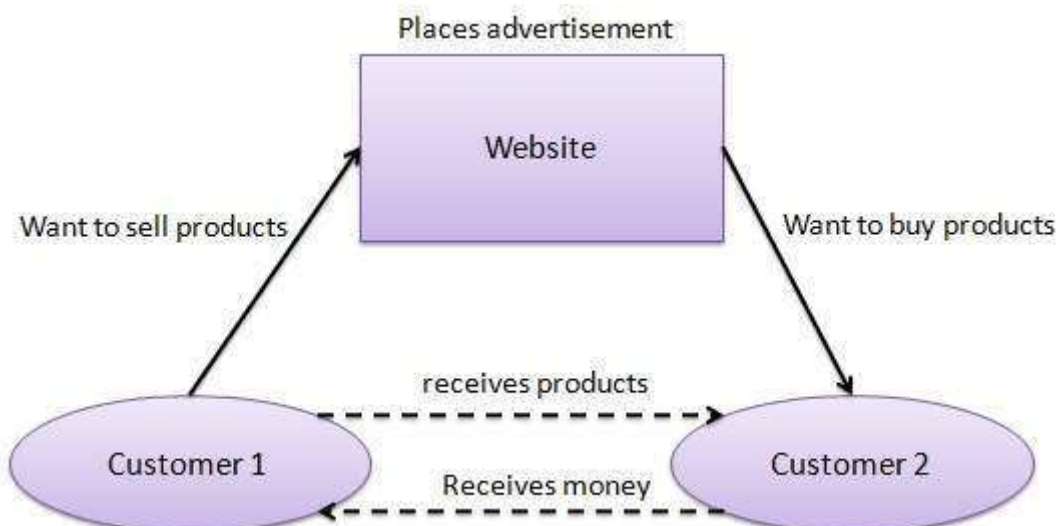

Business - to - Consumer

A website following the B2C business model sells its products directly to a customer. A customer can view the products shown on the website. The customer can choose a product and order the same. The website will then send a notification to the business organization via email and the organization will dispatch the product/goods to the customer.

Consumer - to - Consumer

A website following the C2C business model helps consumers to sell their assets like residential property, cars, motorcycles, etc., or rent a room by publishing their information on the website. Website may or may not charge the consumer for its services. Another consumer may opt to buy the product of the first customer by viewing the post/advertisement on the website.


Consumer - to - Business

In this model, a consumer approaches a website showing multiple business organizations for a particular service. The consumer places an estimate of amount he/she wants to spend for a particular

service. For example, the comparison of interest rates of personal loan/car loan provided by various banks via websites. A business organization who fulfills the consumer's requirement within the specified budget, approaches the customer and provides its services.
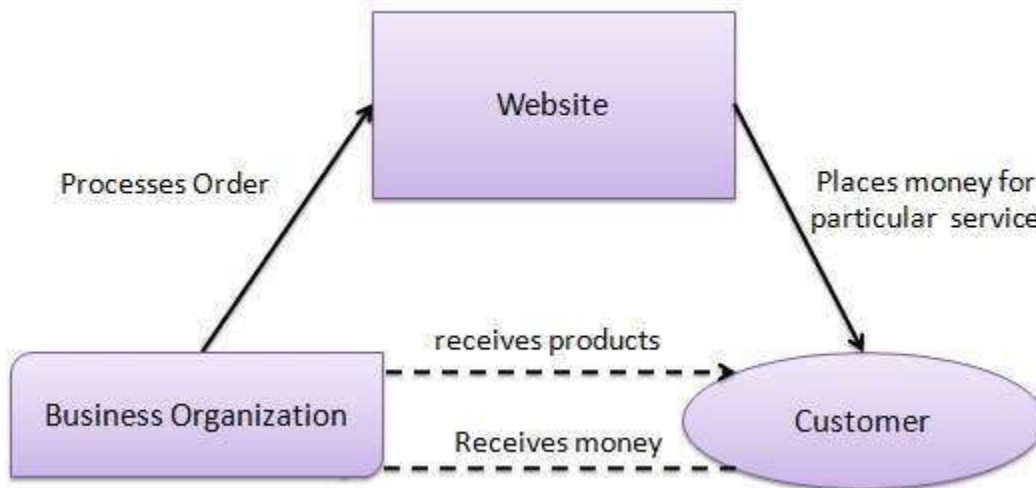
Business - to - Government

B2G model is a variant of B2B model. Such websites are used by governments to trade and exchange information with various business organizations. Such websites are accredited by the government and provide a medium to businesses to submit application forms to the government.
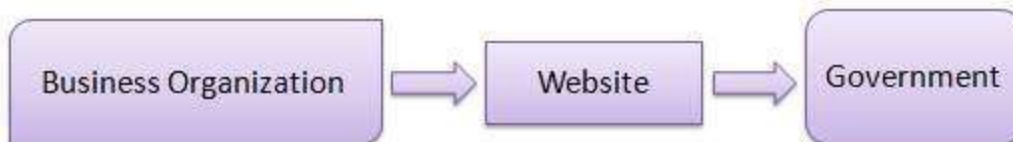
Government - to - Business

Governments use B2G model websites to approach business organizations. Such websites support auctions, tenders, and application submission functionalities.

Government - to - Citizen

Governments use G2C model websites to approach citizen in general. Such websites support auctions of vehicles, machinery, or any other material. Such website also provides services like registration for birth, marriage or death certificates. The main objective of G2C websites is to reduce the average time for fulfilling citizen's requests for various government services.

Brokerage Model

Brokers are market-makers: They bring buyers and sellers together and facilitate transactions. Brokers play a frequent role in business-to-business (B2B), business-to-consumer (B2C), or consumer-to-consumer (C2C) markets. Usually a broker charges a fee or commission for each transaction it enables.

Aggregator Business Model

Aggregator Business Model is a network model where the firm collects the information about particular good/service providers, make the providers their partners, and sell their services under its own brand. Since the aggregator is a brand, it has to provide services which have a uniform quality and price.

Characteristics of Aggregators
- Customers
- Industry
- Partnership Model
- Brand
- Quality
- Contract

Community Model

The **community model** is a method of developing an online presence in which several individuals or groups are encouraged to join and participate in on-going interaction designed around a common purpose.

- **Physical Community**
  The physical community business model involves a storefront business serving a specific community. Examples of a physical community business model include a corner convenience store or deli as well as service businesses such as a tax-preparation service or bank
- **Professional Affiliations**
  A community is not always congregated in one convenient location. Communities can be created by professional affiliation. For example, doctors and dentists tend to require similar staffing, equipment and services.
- **Internet Communities**
  The Internet has changed the dynamic of community business models, using viral marketing means to increase community members and product awareness. The major players in Internet communities include the social networking giants, Facebook, Twitter and MySpace. Other

social and professional networking communities found online are smaller, specifically working with one demographic, such as divorce communities, cancer communities and dating communities.

Each community has a different set of needs, and an Internet community business model focuses products and services directly at the target community. A business can accomplish this via blogs, web banners and becoming active forum participants in the designated community.

Infomediary Model

The infomediary. An infomediary collects, analyzes and sells information on consumers and their buying behavior to other parties who want to reach those consumers. Typically, the infomediary offers the consumers something for free, such as free hardware or free Internet access

Value Chain Model

A value chain is a high-level model developed by Michael Porter used to describe the process by which businesses receive raw materials, add value to the raw materials through various processes to create a finished product, and then sell the finished product to customers.

Advertising Model

A common option used by online companies is third-party platforms. These are **businesses** that serve as go-betweens for **advertisers** and publishers or site owners. You essentially set up an account, place **ads** and collect **revenue** based on exposure or clicks to your on-site **ads**.
There are four basic **models** for the sale of **advertising**. The most common **models** are cost per impression and **revenue** share, although cost-per-click and cost-per-acquisition deals are gaining in popularity. Cost-per-impression (CPM) deals are usually experienced as banner **ads** while you surf the Web.

Subscription Business Model

The **subscription business model** is a **business model** where a customer must pay a **subscription** price to have access to a product or service. The **model** was pioneered by magazines and newspapers, but is now used by many **businesses s**and websites.

There are different categories of subscriptions:

A subscription for a fixed set of goods or services, such as one copy of each issue of a newspaper or magazine for a definite period of time. The subtypes are:

- Paid circulation
- Non-paid circulation
- Controlled circulation

Manufacturer Model

A manufacturing business is any business that uses components, parts or raw materials to make a finished good. These finished goods can be sold directly to consumers or to other manufacturing businesses that use them for making a different product.

It is connectivity that gives the Internet its power. Selling directly, via the manufacturer model, often resulted in higher profits for manufacturers and more savings for consumers. Selling products or services directly to consumers is at the heart of the business model known as the manufacturer model ...

UNIT-4

Traditional Marketing:

Traditional marketing refers to any type of promotion, advertising or campaign that has been in use by companies for years, and that has a proven success rate. Methods of traditional marketing can include print advertisements, such as newsletters, billboards, flyers and newspaper print ads. Other forms of traditional marketing include television spots or commercials, as well as radio spots advertising a business, product or service.

Traditional Marketing Methods are:

- Newspaper
- Flyers
- Radio.
- Television
- Billboard advertising along roads and highways
- Magazine ads

This is the reason why Traditional Marketing is not successful in the market.

- Interrupts instead of offering something valuable.
- Hold attention only short period of time.
- Tends to be expensive, especially all the campaigns are not successful.

Digital Marketing:

Digital Marketing:

Conducting marketing process of products or services through digital technologies, mobile phones, and display advertising is a part of digital marketing. The process of the marketing implies particularly on the internet or on any of the trending social media platforms.

Digital Marketing method involves:

Digital marketing not only involves the Social Media Marketing but also some key methods like the Search Engine Optimization (SEO), Search Engine Marketing (SEM), Pay Per Click management (PPC), mobile marketing, email marketing, and e-commerce marketing.

Importance of the digital marketing

- Cost Effective
- Impactful Content
- Access to the mobile users
- Better ROI (Return on Investment)
- Higher Conversion
- Web Analytics
- Social Media support
- Customer's trust
- Compete with your rivals

In the current moment, digital marketing is a vast aspect of any business. Why do you stay behind your rivals? You can achieve a good result using the digital marketing tricks. In addition to the **importance of digital marketing today**

E-marketing means using **digital** technologies such as websites, mobile devices and social networking to help reach your customers, create awareness of your brand and sell your goods or services. The basics of **marketing** remain the same - creating a **strategy** to deliver the right messages to the right people.

E-marketing strategies

An organization's **strategy** that combines all of its **marketing** goals into one comprehensive plan. A good **marketing strategy** should be drawn from **market** research and focus on the right product mix in order to achieve the maximum profit potential and sustain the business.

Internet marketing refers to the **strategies** that are used to **market** a product or service **online**, including: Website design **strategies**. Search engine optimization and search engine submission

- Right web design
- Search Engine marketing and optimization
- E-mail marketing
- social networking, social media marketing and web intelligence
- web analytics
- Blogs

e-marketing strategy development. The four stages are:

1**. Strategic analysis**. Continuous scanning of the micro and macro-environment of an organization are required with particular emphasis on the changing needs of customers, actions and business models of competitor and opportunities afforded by new technologies. Techniques include resource analysis, demand analysis and competitor analysis, applications portfolio analysis, SWOT analysis and competitive environment analysis.

2. **Strategic objectives**. Organizations must have a clear vision on whether digital media will complement or replace other media and their capacity for change. Clear objectives must be defined and in particular goals for the online revenue contribution should be set.

3. **Strategy definition**. We will discuss strategy definition by asking eight questions. These will be considered in next month's article:

'Brand'

The sum of the characteristics of a product or service as perceived by the user.Brand value reflects how a product's name, or company name, is perceived by

E-branding

It is the creation and development of communications strategies specifically for brands to have meaning for brands to have meaning and context on the web.

Internet branding is a brand management technique that uses the World Wide Web as a medium for positioning a brand in the marketplace. Branding in the digital age is increasingly important with the advancements of the internet

To successfully build a brand is to communicate your key value communicate your key value proposition to the proposition to the key customer key customer segment, and do so in an integrated and consistent way

You must create an association between yourself and the person you want to influence, the results they want to have

Components of E-Branding

- Strategy
- Design
- Online Marketing
- Analytics and Monitoring

E-BRANDING AND ITS FEATURES

- Constant presence
- Interactivity
- Speed
- Constantly expanding audience
- Build trust

E-BRANDING DISTRIBUTION CHANNELS

- o Social media
- o Content marketing
- o Websites
- o Buzz marketing

Browsing Behaviour Model

A **Model** of Web Site **Browsing Behaviour**. Estimated on Clickstream Data. Since the commercial inception of the Internet, the ability of Web sites to track the **behaviour** of their visitors has been.
Online marketing

Online marketing is a set of tools and methodologies used for promoting products and services through the internet. Online marketing includes a wider range of marketing elements than traditional business marketing due to the extra channels and marketing mechanisms available on the internet.

Online marketing can deliver benefits such as:

- Growth in potential
- Reduced expenses
- Elegant communications
- Better control
- Improved customer service
- Competitive advantage

Online marketing is also known as internet marketing, web marketing, digital marketing and search engine marketing (SEM).

Online marketing has several advantages, including:

- Low costs: Large audiences are reachable at a fraction of traditional advertising budgets, allowing businesses to create appealing consumer ads.

- Flexibility and convenience: Consumers may research and purchase products and services at their leisure.

- Analytics: Efficient statistical results are facilitated without extra costs.

- Multiple options: Advertising tools include pay-per-click advertising, email marketing and local search integration (like Google Maps).

- Demographic targeting: Consumers can be demographically targeted much more effectively in an online rather than an offline process.

The main limitation of online marketing is the lack of tangibility, which means that consumers are unable to try out, or try on items they might wish to purchase. Generous return policies are the main way to circumvent such buyer apprehension.

UNIT-5

Information Security issues

Information security is protection of e-commerce assets from unauthorized access, use, alteration, or destruction.

- **Confidentiality** − Information should not be accessible to an unauthorized person. It should not be intercepted during the transmission.

- **Integrity** − Information should not be altered during its transmission over the network.

- **Availability** − Information should be available wherever and whenever required within a time limit specified.

- **Authenticity** − There should be a mechanism to authenticate a user before giving him/her an access to the required information.

- **Non-Repudiability** − It is the protection against the denial of order or denial of payment. Once a sender sends a message, the sender should not be able to deny sending the message. Similarly, the recipient of message should not be able to deny the receipt.

- **Encryption** − Information should be encrypted and decrypted only by an authorized user.

- **Auditability** − Data should be recorded in such a way that it can be audited for integrity requirements.

Threats and Risks in E-security

- Computer Viruses
- Trojan horses
- Malwares
- Key loggers
- Adware
- Hackers
- Phishing

Risk Management

- Firewalls
- Anti-virus Protection
- Employee Education
- Network, Website security and intruder detection program
- Security policies and procedures
- Measures to ensure Security

Internet banking

Internet banking (also online banking) a service provided by banks so that people can find out information about their bank account, paybills etc using the Internet.
Internet banking allows customers to carry out transactions, money transfers and other business 24 hours a day.

Common online services of Internet banking
- **The Transactional** activities like bill pay, loan pay etc.
- **Non Transactional** Activities e.g. request for cheque book, online statement

Advantages of Internet Banking

- Convenient to use
- 24X7 services available
- Easy to operate
- Simple, fast and efficient

Disadvantages of Internet Banking
- If person is not techno friendly it may be difficult initially.
- Needs an Internet Connection
- Security can be a big issue
- If Bank's server is down then can't use it.

E-Commerce Security Issues

E-commerce security is the protection of e-commerce assets from unauthorized access, use, alteration, or destruction. Security is an essential part of any transaction that takes place over the internet. Customers will lose his/her faith in e-business if its security is compromised. Following are the essential requirements for safe e-payments/transactions –

- Privacy
- Secure Socket Layer (SSL)
- Peripheral Component Interconnection(PCI)
- Secure Electronic Transactions(SET)
- **Encryption** − It is a very effective and practical way to safeguard the data being transmitted over the network. Sender of the information encrypts the data using a secret code and only the specified receiver can decrypt the data using the same or a different secret code.
- **Digital Signature** − Digital signature ensures the authenticity of the information. A digital signature is an e-signature authenticated through encryption and password.
- **Security Certificates** − Security certificate is a unique digital id used to verify the identity of an individual website or user.

Wireless Security

A home network can be wired (using Ethernet cables) or wireless (using Wi-Fi). It may also be a mixture of the two, with some devices connecting with Ethernet and others connecting wirelessly. Wireless is generally

more convenient; however, you'll need to think about wireless security. Below are some important security terms that you'll need to know: v SSID: A service set identifier, commonly called the SSID, is the name of a wireless network. You should change the default SSID to something unique that you'll remember. You may not want to use your actual name, but you can use a hobby or other interest (for example, rockclimbing1). v Encryption password: An encryption password is a series of characters that is used to control access to the network. For even greater security, some people use a passphrase, which is longer (and therefore more secure) than a password. You should choose a password or passphrase that's easy for you to remember, but hard for other people to guess. v Encryption: Encryption prevents unauthorized people from reading the data that is transmitted over your wireless network. The data is coded into an unreadable form, and it can only be decoded by a computer that has the correct password (or passphrase). The most common types of encryption for wireless networks are WPA (Wi-Fi Protected Access) and WPA2

E-Commerce Payment Systems

E-Commerce or Electronics Commerce sites use electronic payment where electronic payment refers to paperless monetary transactions. Electronic payment has revolutionized the business processing by reducing paper work, transaction costs, labor cost. Being user friendly and less time consuming than manual processing, helps business organization to expand its market reach / expansion. Some of the modes of electronic payments are following.

- Credit Card
- Debit Card
- Smart Card
- E-Money
- Electronic Fund Transfer (EFT)

Credit Card

Payment using credit card is one of most common mode of electronic payment. Credit card is small plastic card with a unique number attached with an account. It has also a magnetic strip embedded in it which is used to read credit card via card readers. When a customer purchases a product via credit card, credit card issuer bank pays on behalf of the customer and customer has a certain time period after which he/she can pay the credit card bill. It is usually credit card monthly payment cycle. Following are the actors in the credit card system.

- The card holder - Customer
- The merchant - seller of product who can accept credit card payments.
- The card issuer bank - card holder's bank
- The acquirer bank - the merchant's bank
- The card brand - for example , visa or mastercard.

Credit card payment process

Step	Description
Step 1	Bank issues and activates a credit card to customer on his/her request.
Step 2	Customer presents credit card information to merchant site or to merchant from whom he/she want to purchase a product/service.
Step 3	Merchant validates customer's identity by asking for approval from card brand company.
Step 4	Card brand company authenticates the credit card and paid the transaction by credit. Merchant keeps the sales slip.
Step 5	Merchant submits the sales slip to acquirer banks and gets the service chargers paid to

Step 6	Acquirer bank requests the card brand company to clear the credit amount and gets the payment.
him/her.	
Step 6	Now card brand company asks to clear amount from the issuer bank and amount gets transferred to card brand company.

Debit Card

Debit card, like credit card is a small plastic card with a unique number mapped with the bank account number. It is required to have a bank account before getting a debit card from the bank. The major difference between debit card and credit card is that in case of payment through debit card, amount gets deducted from card's bank account immediately and there should be sufficient balance in bank account for the transaction to get completed. Whereas in case of credit card there is no such compulsion.

Debit cards free customer to carry cash, cheques and even merchants accepts debit card more readily. Having restriction on amount being in bank account also helps customer to keep a check on his/her spending.

Smart Card

Smart card is again similar to credit card and debit card in appearance but it has a small microprocessor chip embedded in it. It has the capacity to store customer work related/personal information. Smart card is also used to store money which is reduced as per usage.

Smart card can be accessed only using a PIN of customer. Smart cards are secure as they stores information in encrypted format and are less expensive/provide faster processing. Mondex and Visa Cash cards are examples of smart cards.

E-Money

E-Money transactions refers to situation where payment is done over the network and amount gets transferred from one financial body to another financial body without any involvement of a middleman. E-money transactions are faster, convenient and saves a lot of time.

Online payments done via credit card, debit card or smart card are examples of e-money transactions. Another popular example is e-cash. In case of e-cash, both customer and merchant both have to sign up with the bank or company issuing e-cash.

Electronic Fund Transfer

It is a very popular electronic payment method to transfer money from one bank account to another bank account. Accounts can be in same bank or different bank. Fund transfer can be done using ATM (Automated Teller Machine) or using computer.

Now a day, internet based EFT is getting popularity. In this case, customer uses website provided by the bank.

Digital Payment Requirements

For any digital payment to succeed, the following requirements are needed

- Acceptability
- Anonymity
- Usability

- Reliability
- Efficiency
- Convertibility
- Integration
- Security
- Scalability

Risk in E-Payment System

- Data Protection
- Data Reliability
- Taxation

Digital Token Based E-Payment System

Categories of Electronic Tokens

- Cash or Real Time
- Prepaid or Debit
- Post Paid or Credit

E-Cash or Electronic cash

E-Cash or Electronic Cash is a new concept to execute cash payment using computers connected with network. E-cash is an electronic medium for making payments. The primary function of e-cash is to facilitate transactions on the Internet. Many of these transactions may be small in size and would not be cost efficient through other payment medium such as credit cards.

Electronic money [also known as e-currency, e-money, electronic cash, electronic currency, digital money, digital cash or digital currency] refers to money or scrip which is exchanged only electronically. Typically, this involves the use of computer networks, the internet and digital stored value systems. Electronic Fund Transfer and direct Deposit are all examples of electronic money.

E-cash is a system of purchasing cash credits in relatively small amounts, storing the credits in our computer, and then spending them when making electronic purchases over the Internet. The e-cash is the creation of electronic money or tokens, usually by a bank, which buyers and sellers trade for goods and services. It consists of a token, which may be authenticated independently of the issuer. This is commonly achieved through the use of self-authenticating tokens or tamper proof hardware. It includes credit cards, smart cards, debit cards, electronic fund transfer etc.

An e-cash system must have the following properties:-

- Digital cash must have a monetary value. It must be backed by cash
- Digital cash must be exchangeable.
- It should be storable and retrievable
- It should not be easy to copy or tamper with while it is being exchanged

E-cash can be used for making or receiving payments between buyer and seller. The bank's server computer sends a secure e-cash packet to the customer effect the network currency server of the bank is issuing a bank note with a serial number for a specified amount. The bank uses its private key to digitally sign such a bank note

Electronic Payment Systems
The ease of purchasing and selling products over the Internet has helped the growth of electronic commerce and electronic payments services are a convenient and efficient way to do financial transactions. Current e-payment technologies depend on using traditional methods that are common to non-electronic systems. Due to the nature of Internet, security and authenticity of payments and participants cannot be guaranteed with technologies that are not specifically designed for electronic commerce. We need an e-payment system that would not only provide secure payments but should also have properties like online customer and merchant authentication, unforgeable proof of transaction authorization by the customer both to the merchant and the bank, privacy of customer and transaction data.

Designing Electronic Payment systems

It includes several factors:

·   **Privacy**. A user expects to trust in a secure system; just as a telephone is a safe

·   **Security.** A secure system verifies the identity of two-party transactions through "user authentication" & reserves flexibility to restrict information/services through access control

·   **Intuitive interfaces**. The payment interface must be as easy to use as a telephone.

·   **Database integration**. With home banking, for ex, a customer wants to play with all his accounts.

·   **Brokers.** A "network banker"-someone to broker goods & services, settle conflicts, & 'financial transactions electronically-must be in place

·   **Pricing.** One fundamental issue is how to price payment system services. For e.g., from cash to bank payments, from paper-based to e-cash. The problem is potential waste of resources.

·   **Standards.** Without standards, the welding of different payment users into different networks & different systems is impossible.

Generic E-Payment System
1. Entities
Electronic payments involve a payer and a payee. A payer (buyer or customer), is an entity who makes a payment. A payee (seller or merchant), is an entity who receives a payment. The main

purpose of an electronic payment protocols is to transfer monetary value from the payer to the payee. The process also involves a financial institution (bank or mint).
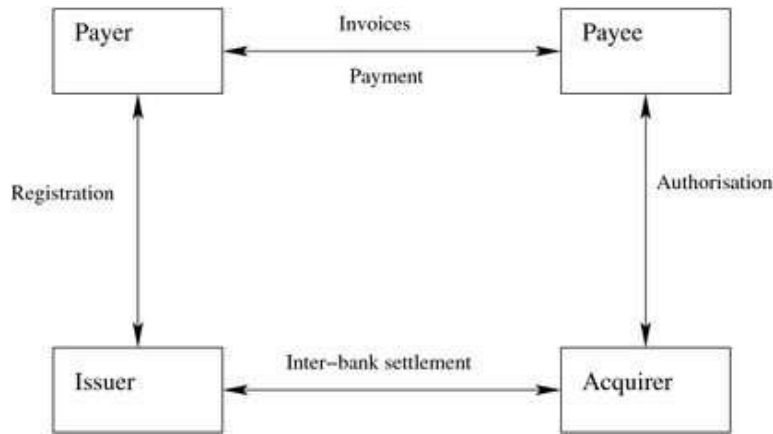

Figure 1: Generic E-payment Protocol

2. Phases in E-Payment
An electronic payment typically involves the following phases:
1. Registration: This phase involves the registration of the payer and the payee with the issuer and acquirer respectively. Most electronic payments designed require registration of payers and payees with their corresponding banks so there is a link between their identities and their accounts held at the bank.
2. Invoicing: In this phase, the payee obtains an invoice for payment from the payee. This is accomplished by either browsing and selecting products for purchase from the merchant's (payee's) website in case of purchases made through the internet or obtaining an electronic invoice using other electronic communication medium like e-mail. This phase typically is performed in an unsecured environment and normally excluded while designing payment protocols. The importance of this phase is that, it sets the mandatory and optional data variables that should be included in a payment protocol.
3. Payment selection and processing: In this phase the payer selects type of payment, (card based, e-cash, e-cheque, etc.,) based on the type of payment the payee accepts. Based on the selection, the payer then sends the relevant payment details like account number, unique identifiers of the payer to the payee along with accepted amount based on the invoice. Certain protocols might also require the payer to obtain preauthorised token (like bank drafts) from the issuer before the payer sending the payment information to the payee.
4. Payment authorisation and confirmation: In this phase, the acquirer on receiving payment details from the payee authorises the payment and issues a receipt containing the success or failure of the payment to the payee. The payee based on the message may also issue a receipt of payment to the payer.

Classification of Payment Systems
As previously mentioned, electronic commerce can be broadly categorised into two groups, business-to-business (B2B) and business to consumer (B2C).

Payment instruments: There are three common electronic payment instruments, namely cash, cheque and card. Cash payment systems consist of self-authenticating divisible tokens that can be

processed offline. Cheque payment system is typically linked to a payer's account and payment is indivisible. Card payment schemes provide a payment mechanism through the existing credit card payment infrastructure.

Pre-paid, Pay-now and Post-pay: In pre-paid system the payment is debited from the payer's account before a payment is processed and hence the term "pre-paid". In pay-now system, when an electronic transaction is processed, the payer's account is debited and the payee's account is credited with the payment amount. Even though availability of funds depends on the time when inter-bank settlements are carried out, the payer's and payee's account are updated to show the debited and credited balances immediately after an transaction is carried out. Credit card based system, like Secure Electronic Transaction, Verified by Visa (VBV), MasterCard secure-code fall into this category. In post-pay systems the payer's account is debited only when the payee's makes a request for payment settlement with the acquirer. Most cheque based systems fall into this category.

Offline and Online: Based on communicational characteristics, electronic payments systems are classified as offline and online systems.
In an offline system, the communication does not involve any third party, i.e., an electronic transaction takes place only between the payer and the payee.
In an on-line system, the payee typically connects to the bank to obtain a payment authorisation, thus increasing the communication requirements for the payment system.

Prepaid - Cash like system
The best-known subclass in pre-paid systems is the anonymous e-cash system introduced by Chaum

Basic model of e-cash system: An anonymous off-line e-cash consists of three probabilistic, polynomially-bounded parties, a bank B, payer P, and payee R, and three main sub protocols: withdrawal, payment and deposit. Payer and payee maintain their accounts with the bank. The payer withdraws electronic coins from their account with the bank, by performing a withdrawal protocol over an authenticated channel. The payer spends coins by participating in a payment protocol with the payee over an anonymous channel. In effect, the payee performs a deposit protocol, to deposit the coins into their account. The e-cash system also includes setup protocols: system setup, payer setup and payee setup which performs system initialisation functions, namely creating and publishing public keys and opening payer and payee bank accounts.
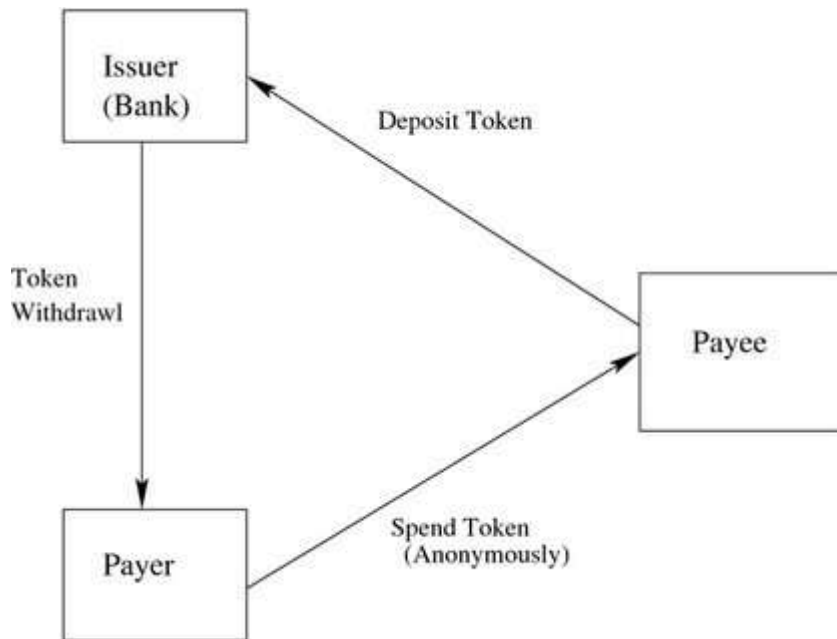
Pay now or Card based system

The most common method for "on-line" payment is card-based systems. Most payment systems in this category are specifically designed for transaction conducted through the Internet.

Pay later or Cheque based system

Customers generally tend to use credit card payment methods for low and middle value payments, whereas, cheque is the preferred method for large value payments.

Mobile Payments

Due to the phenomenal success of mobile communicational devices, there has been increasing effort to used mobile devices as "electronic wallets" to store payment and account information.

Cryptography

In computer science, *cryptography* refers to secure information and communication techniques derived from mathematical concepts and a set of rule-based calculations called algorithms to transform messages in ways that are hard to decipher**. Cryptography** not only protects data from theft or alteration, but can also be used for user authentication. Description: Earlier cryptography was effectively synonymous with encryption but nowadays cryptography is mainly based on mathematical theory and computer science practice

Digital Signature

A digital signature is a mathematical technique used to validate the authenticity and integrity of a message, software or digital document. The digital equivalent of a handwritten signature or stamped seal, a digital signature offers far more inherent security, and it is intended to solve the problem of tampering and impersonation in digital communications.

How digital signatures work

Digital signatures are based on public key cryptography, also known as asymmetric cryptography. Using a public key algorithm, such as RSA, one can generate two keys that are mathematically linked: one private and one public.

Digital signatures work because public key cryptography depends on two mutually authenticating cryptographic keys. The individual who is creating the digital signature uses their own private key to encrypt signature-related data; the only way to decrypt that data is with the signer's public key. This is how digital signatures are authenticated.

Digital signature technology requires all the parties to trust that the individual creating the signature has been able to keep their own private key secret. If someone else has access to the signer's private key, that party could create fraudulent digital signatures in the name of the private key holder.
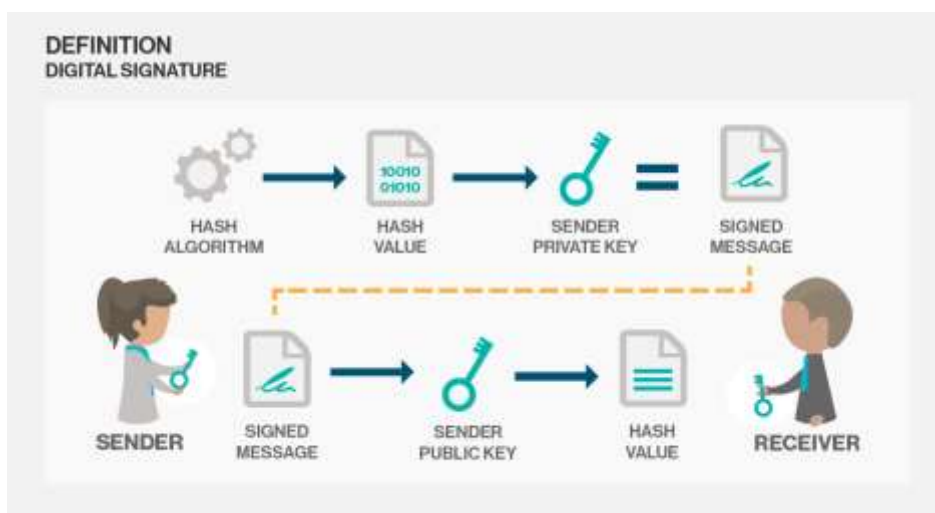
Security Protocols in Internet

We will discuss here some of the popular protocols used over the internet to ensure secured online transactions.

Secure Socket Layer (SSL)

It is the most commonly used protocol and is widely used across the industry. It meets following security requirements −

- Authentication

- Encryption

- Integrity

- Non-reputability

"https://" is to be used for HTTP urls with SSL, where as "http:/" is to be used for HTTP urls without SSL.

Secure Hypertext Transfer Protocol (SHTTP)

SHTTP extends the HTTP internet protocol with public key encryption, authentication, and digital signature over the internet. Secure HTTP supports multiple security mechanism, providing security to the end-users. SHTTP works by negotiating encryption scheme types used between the client and the server.

Secure Electronic Transaction

It is a secure protocol developed by MasterCard and Visa in collaboration. Theoretically, it is the best security protocol. It has the following components −

- **Card Holder's Digital Wallet Software** − Digital Wallet allows the card holder to make secure purchases online via point and click interface.

- **Merchant Software** − This software helps merchants to communicate with potential customers and financial institutions in a secure manner.

- **Payment Gateway Server Software** − Payment gateway provides automatic and standard payment process. It supports the process for merchant's certificate request.

- **Certificate Authority Software** − This software is used by financial institutions to issue digital certificates to card holders and merchants, and to enable them to register their account agreements for secure electronic commerce.

Digital Certificate

An attachment to an electronic message used for security purposes. The most common use of a **digital certificate** is to verify that a user sending a message is who he or she claims to be, and to provide the receiver with the means to encode a reply.

Types of digital certificates

There are three different types of digital certificates used by web servers and web browsers to authenticate over the internet. These digital certificates are used to link a web server for a domain to the individual or organization that owns the domain.

These certificates are usually referred to as SSL certificates even though the SSL protocol has been superseded by the Transport Layer Security (TLS) protocol.

- Domain Validated (DV SSL) certificates offer the least amount of assurance about the holder of the certificate. Applicants for DV SSL certificates need only demonstrate that they have the right to use the domain name. While these certificates can give assurance that data is being sent and received by the holder of the certificate, they give no guarantees about who that entity is.

- Organization Validated (OV SSL) certificates provide additional assurances about the holder of the certificate; in addition to confirming that the applicant has the right to use the domain,

OV SSL certificate applicants undergo additional confirmation of their ownership of the domain.

- Extended Validation (EV SSL) certificates are issued only after the applicant is able to prove their identity to the satisfaction of the CA. The vetting process includes verification of the existence of the entity applying for the certificate, verifying that identity matches official records, verifying that the entity is authorized to use the domain and confirming that the owner of the domain has authorized the issuance of the certificate.

Secure Electronic Transaction (SET)

Secure Electronic Transaction or SET is a system which ensures security and integrity of electronic transactions done using credit cards in a scenario. SET is not some system that enables payment but it is a security protocol applied on those payments.
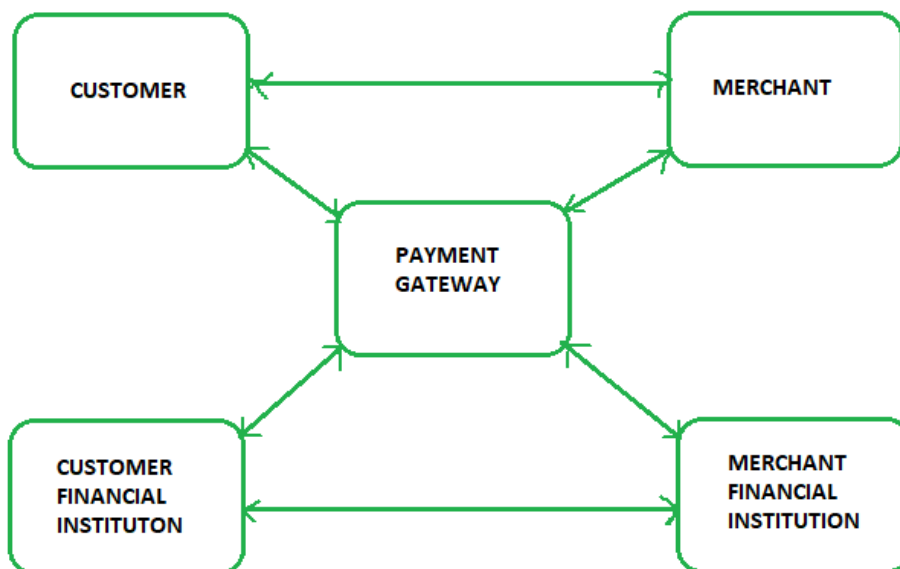
Secure Electronic Transaction (SET) is a system for ensuring the security of financial transactions on the Internet. It was supported initially by Mastercard, Visa, Microsoft, Netscape, and others. With SET, a user is given an electronic wallet (digital certificate) and a transaction is conducted and verified using a combination of digital certificates and digital signatures among the purchaser, a merchant, and the purchaser's bank in a way that ensures privacy and confidentiality. SET makes use of Netscape's Secure Sockets Layer (SSL), Microsoft's Secure Transaction Technology (STT), and Terisa System's Secure Hypertext Transfer Protocol (S-HTTP). SET uses some but not all aspects of a public key infrastructure (PKI).

Here's how SET works:

Assume that a customer has a SET-enabled browser such as Netscape or Microsoft's Internet Explorer and that the transaction provider (bank, store, etc.) has a SET-enabled server.

1. The customer opens a Mastercard or Visa bank account. Any issuer of a credit card is some kind of bank.
2. The customer receives a digital certificate. This electronic file functions as a credit card for online purchases or other transactions. It includes a public key with an expiration date. It has been through a digital switch to the bank to ensure its validity.
3. Third-party merchants also receive certificates from the bank. These certificates include the merchant's public key and the bank's public key.
4. The customer places an order over a Web page, by phone, or some other means.
5. The customer's browser receives and confirms from the merchant's certificate that the merchant is valid.
6. The browser sends the order information. This message is encrypted with the merchant's public key, the payment information, which is encrypted with the bank's public key (which can't be read by the merchant), and information that ensures the payment can only be used with this particular order.
7. The merchant verifies the customer by checking the digital signature on the customer's certificate. This may be done by referring the certificate to the bank or to a third-party verifier.
8. The merchant sends the order message along to the bank. This includes the bank's public key, the customer's payment information (which the merchant can't decode), and the merchant's certificate.
9. The bank verifies the merchant and the message. The bank uses the digital signature on the certificate with the message and verifies the payment part of the message.
10. The bank digitally signs and sends authorization to the merchant, who can then fill the order.