INTERNET & E-GOVERNANCE

B.Com VI Semester

(Computer Science)

As Per Syllabus of Vijayanagara Sri Krishnadevaraya University, Bellary

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A Complete Reference Material for

B.Com VI Semester, Computer Science

SYLLABUS

PAPER 6.5 INTERNET & E-GOVERNANCE
(B.Com VI Semester - Computer Science)

Unit I – Computer Networking :
Introduction, Communication concept, remote terminals, Communication Networks, LAN and WAN, Protocols and OSI Model.

Unit II – Internet :
Introduction, Objectives, Network, TCP/IP, Client Server Model, E-mail, Finger and Top, USENET, News Groups, Internet Programming WWW, Hyper Text, http, URL, HTML Programming.

Unit III – E-Governance :
Introduction to E-Commerce, E-Commerce framework, Anatomy of E-Commerce Applications, NSFNET: Architecture and Components, National Research Educational Network, Globalization of Academic Network, Internet Governance – The Internet Society, An overview of Internet Applications.

Unit IV – E-Security :
Client Server Network Security, Encrypted documents and E-mail, Architectural frames work for E-Commerce - WWW as architecture, hypertext publishing, Electronic Data Interchange (EDI), Information based marketing, advertising on the Internet.

Unit V – E-Governance applications in administration and planning.

Practicals : 2 hours per week

Practical Assignments to gain hands on experience of Internet Access, Searching the web, Downloads, Web Design using HTML/XML.

Recommended Books :

1. William A Shay, Understanding Data Communications and Networks, 2nd Edition, Thomson Learning, Vikas Publishing House (1998)
2. Ravi Kalkota and Andrec Whinston, Frontiers of Electronic Commerce, Addision Wesley (1998)
3. Bharath Bhaskar, Electronic Commerce, Tata McGraw Hill (2003).

UNIT I : COMPUTER NETWORKING

Introduction :

It is a set of computers connected together for the purpose of data sharing and communication. The most common resource shared today is connection to the Internet. Other shared resources can include a printer or a file server.

Characteristics of Network :

1. **Performance :** It can be measured in the following ways:
   - **Transit time** : It is the time taken to travel a message from one device to another.
   - **Response time** : It is defined as the time elapsed between enquiry and response.
2. **Reliability :** It decides the frequency at which network failure take place. More the failures are, less is the network's reliability.
3. **Security** : It refers to the protection of data from any unauthorized user or access. While travelling through network, data passes many layers of network, and data can be traced if attempted.

Properties of a good Network :

1. **Interpersonal Communication:** We can communicate with each other efficiently and easily. Example: E-mails, Chat rooms, Video conferencing etc, all of these are possible because of computer networks.
2. **Resources can be shared:** We can share physical resources by making them available on a network such as printers, scanners etc.
3. **Sharing files, data:** Authorized users are allowed to share the files on the network.

Data Communication :

When we communicate, we are sharing information. This sharing can be local or remote between individuals, local communication usually occurs face to face, while remote communication takes place over distance. The term **Telecommunication**, which includes Telephony, Telegraphy, and television, means communication at a distance.

The data refers to facts, concepts and instruction presented in whatever form is agreed upon by the parties creating and using the data. In the context of computer information system data represented by binary information units produced and consumed in the form of 0's and 1's.

Data Communications is the transfer of data or information between a source and a receiver. The source transmits the data and the receiver receives it. The actual generation of the information is not part of Data Communications nor is the resulting action of the

information at the receiver. Data Communication is interested in the transfer of data, the method of transfer and the preservation of the data during the transfer process.

The purpose of Data Communications is to provide the rules and regulations that allow computers with different disk operating systems, languages, cabling and locations to share resources. The rules and regulations are called protocols and standards in Data Communications.

For data communication to occur, the communicating devices must be part of a communication system made up of a combination of hardware and software. The effectiveness of a data communication system depends on the three fundamental characteristics:

1. Delivery: The System must deliver data to the correct destination. Data must be received by the intended device or user and only by that device or user.

2. Accuracy: The system must deliver data accurately. Data that have been altered in transmission and left uncorrected are rustles.

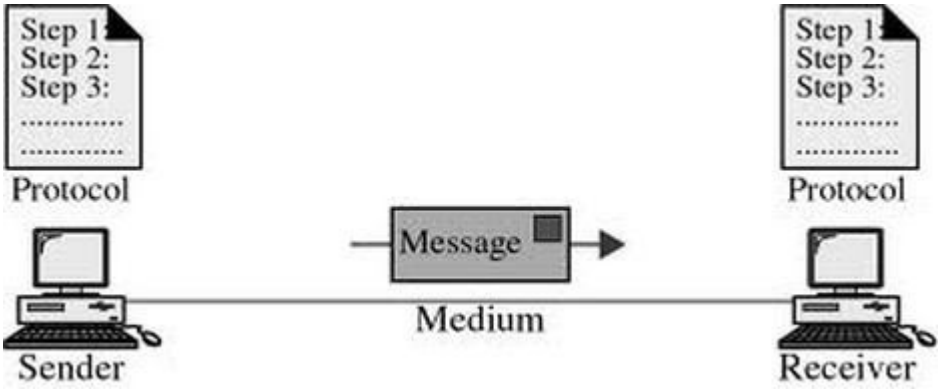
3. Timeliness: The system must deliver data in a timely manner. Data delivered late are useless. In the case of video, audio, and voice data, timely delivery means delivering data as they are produced, in the same order that they are produced, and without significant delay. This kind of delivery is called real-time transmission.

COMPONENTS

Basic Components of a Communication System

The following are the basic requirements for working of a communication system.

1. The sender (source) who creates the message to be transmitted.
2. A medium that carries the message
3. The receiver (sink) who receives the message



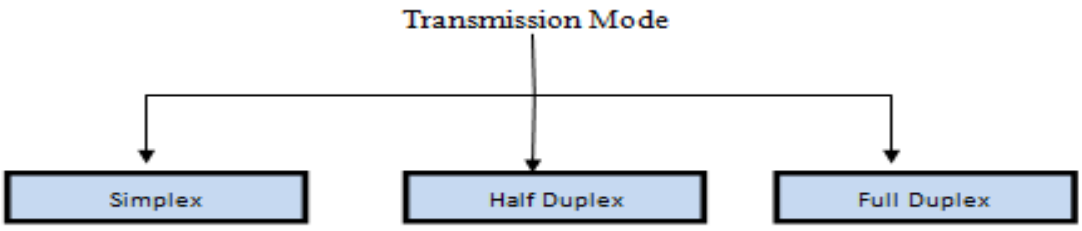
Data Communication system components

1. **Message:** A **message** in its most general meaning is an object of communication. It is a vessel which provides information. Yet, it can also be this information. Therefore, its meaning is dependent upon the context in which it is used; the term may apply to both the information and its form.
2. **Sender:** The sender will have some kind of meaning he/she wishes to convey to the receiver. It might not be conscious knowledge; it might be a sub-conscious wish for communication. What is desired to be communicated would be some kind of idea, perception, feeling, or datum. It will be a part of her reality that she wishes to send to somebody else.
3. **Receiver:** These messages are delivered to another party. No doubt, you have in mind a desired action or reaction you hope your message prompts from the opposite party. Keep in mind, the other party also enters into the communication process with ideas and feelings that will undoubtedly influence their understanding of your message and their response. To be a successful communicator, you should consider these before delivering your message, then acting appropriately.
4. **Medium:** Medium is a means used to exchange / transmit the message. The sender must choose an appropriate medium for transmitting the message else the message might not be conveyed to the desired recipients. The choice of appropriate medium of communication is essential for making the message effective and correctly interpreted by the recipient. This choice of communication medium varies depending upon the features of communication. For instance - Written medium is chosen when a message has to be conveyed to a small group of people, while an oral medium is chosen when spontaneous feedback is required from the recipient as misunderstandings are cleared then and there.
5. **Protocol:** A **protocol** is a formal description of digital message formats and the rules for exchanging those messages in or between computing systems and in telecommunications. Protocols may include signaling, authentication and error detection and correction syntax, semantics, and synchronization of communication and may be implemented in hardware or software, or both.
6. **Feedback:** Feedback is the main component of communication process as it permits the sender to analyze the efficacy of the message. It helps the sender in confirming the correct interpretation of message by the decoder. Feedback may be verbal (through words) or non-verbal (in form of smiles, sighs, etc.). It may take written form also in form of memos, reports, etc.

Transmission Modes/Communication Modes

Transmission mode refers to the mechanism of transferring of data between two devices connected over a network. It is also called **Communication Mode**. These modes direct the direction of flow of information. There are three types of transmission modes. They are:

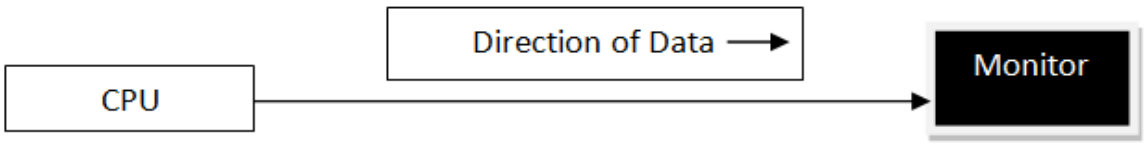
1. Simplex Mode
2. Half duplex Mode
3. Full duplex Mode



SIMPLEX Mode

In this type of transmission mode, data can be sent only in one direction i.e. communication is unidirectional. We cannot send a message back to the sender. Unidirectional communication is done in Simplex Systems where we just need to send a command/signal, and do not expect any response back.

Examples of simplex Mode are loudspeakers, television broadcasting, television and remote, keyboard and monitor etc.

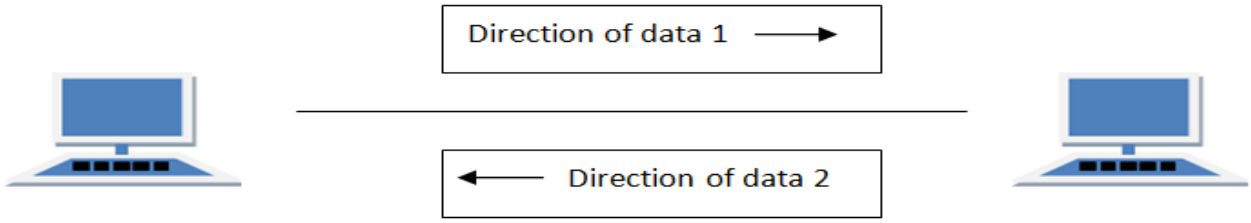


HALF DUPLEX Mode

Half-duplex data transmission means that data can be transmitted in both directions on a signal carrier, but not at the same time.

For example, on a local area network using a technology that has half-duplex transmission, one workstation can send data on the line and then immediately receive data on the line from the same direction in which data was just transmitted. Hence half-duplex transmission implies a bidirectional line (one that can carry data in both directions) but data can be sent in only one direction at a time.

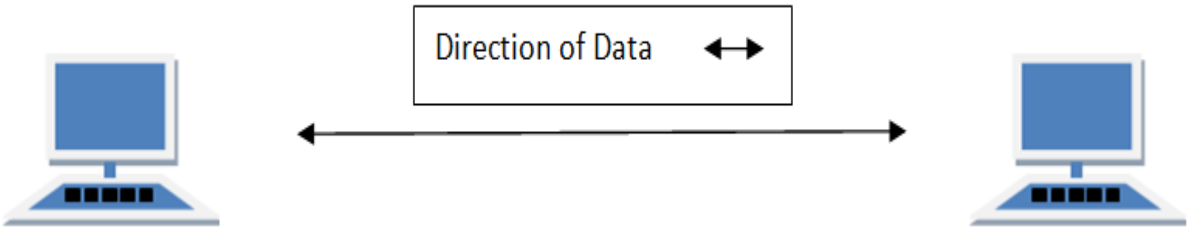
Example of half duplex is a walkie- talkie in which message is sent one at a time but messages are sent in both the directions.



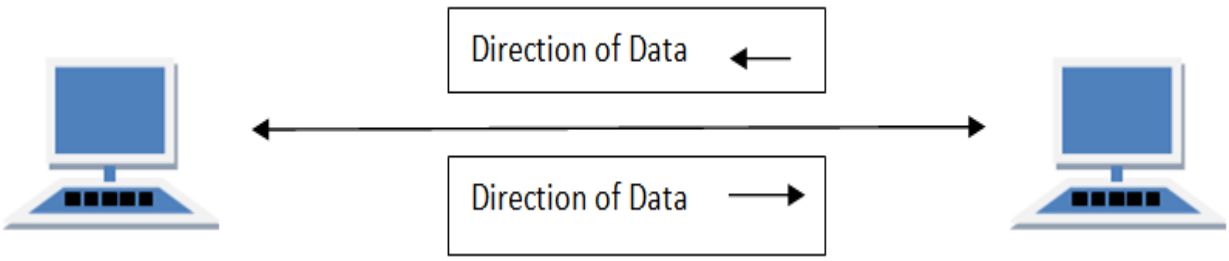
FULL DUPLEX Mode

In full duplex system we can send data in both the directions as it is bidirectional at the same time in other words, data can be sent in both directions simultaneously.

Example of Full Duplex is a Telephone Network in which there is communication between two persons by a telephone line, using which both can talk and listen at the same time.



In full duplex system there can be two lines one for sending the data and the other for receiving data.



Remote Terminal Units

A remote terminal unit (RTU) is a multipurpose device used for remote monitoring and control of various devices and systems for automation. It is typically deployed in an industrial environment and serves a similar purpose to programmable logic circuits (PLCs) but to a higher degree. An RTU is considered a self-contained computer as it has all the basic parts that, together, define a computer: a processor, memory and storage. Because of this, it can be used as an intelligent controller or master controller for other devices that, together, automate a process such as a portion of an assembly line.

Remote terminal units are also known as remote telecontrol units.

Applications :

Remote Terminal Units are used to remote monitoring of function and instrumentation for :

1) Oil & Gas (Oil wells, Pump stations on pipelines)
2) Network of pump stations
3) Environmental monitoring system (Pollution, Air quality)
4) Mine Sites
5) Air Traffic equipments
6) Hydrographic (Water supply, Reservoir)
7) Electrical Power Transmission network and associated equipments.
8) Natural gas networks & equipments
9) Outdoor warning sirens
10) Projects

Advantages :

1. Access to systems from anywhere and anytime

With more mobility being the norm rather than the exception, business executives and employees need robust access to their contacts, calendars and documents regardless of where they are and what time it is. Terminal Services or Remote Desktop Services is an old, but great solution for today's mobility requirements. Just like wide ties; keep them long enough and they'll come back in fashion. So it is with Terminal Services. It's enjoying a second look because of its overall simplicity and low cost.

2. Single point of maintenance

In a Terminal Services environment, applications are installed on a terminal server rather than on individual desktops. As a result, application updates become much easier because there is only one copy of each application. You no longer have to make sure that application-level patches are applied to every desktop in the organization. It is worth noting, though, that each desktop retains its own operating system, which must still be kept up to date.

3. Install once, use many

The Installation of applications only happens once and everyone receives the upgrade at the same time. Once an organization has adopted Terminal Services, desktops can be configured to run a minimal configuration. This makes the process of provisioning desktops a lot easier. Image files become smaller and can therefore be deployed much more quickly. The issue of application compatibility testing (at the desktop level) also goes away.

4. Reduced licenses expense

Businesses will see a reduction in application costs with concurrent licenses instead of per device licenses.

5. Solid Security

The network administrators can lockdown file and system access from a single point. Terminal Servers also vastly limit the ability for the remote sites to take data from an organization.

6. "Death to sneaker support"

With one location running the systems for all the sites there is no longer a need to be at each site for maintenance or support. In this way site support can occur instantaneously keeping users working when you need them most.

7. Power Savings with a juicy ROI

Businesses can see ongoing power savings with the use of Thin Clients (dummy terminals). Thin clients use 1/5 th the power required by a desktop or laptop. This one item alone—the investment in terminal server with thin client—typically pays for itself in 16 months just in the reduction of electricity bills.

8. More time on the job

Gone are snow days or other human resources challenges associated with absentee staff. Access and productivity are no longer issues as well. Users can pull up their desktop from home so personal matter need not impact your staff's ability to continue where they left off at the office.

9. Per user monthly cost drops from $55 to $20

With the right outsourced IT provider, thin client costs drop to under $1 per day. Depending on the size of the company, the savings become very significant very quickly.

10. Hardware no longer an issue

When Terminal Services debuted with Windows NT, server hardware was hard-pressed to support multiple server sessions. Furthermore, 10 Mbps networks were still the standard at that time and could easily become saturated by network-intensive applications, such as Terminal Services. Today, server hardware is far more powerful than it has ever been, and running multiple operating system instances on a server is the norm. Today's servers are well equipped to handle the demands of hosting Terminal Service sessions.

Disadvantages:

1. Video playback limitations

Terminal Services is not meant to play HD video through the terminal. Though users can roughly watch a YouTube video, the video and audio are often not in sync.

2. Peripheral support not supported

USB devices such as cameras and external storage are not supported.

3. Heavy graphics requirements not ideal

Terminal Services is not recommended for heavy graphic applications such as Adobe and AutoCAD as they are heavy on resource use. For these users standalone desktops are still the recommendation.

Communication Network :

A communication network is the pattern of directions in which information flows in the organization. It is a method that employees pass on information to other employees in an organization. Channels of communication (networks by which information flows) are either formal networks or informal networks. Formal networks follow the authority chain and are limited to task-related communications. The informal network (grapevine) is free to move in any direction, skip authority levels, and is as likely to satisfy group member's social needs as it is to facilitate task accomplishments.

Types of Communication Networks

1. Local Area Network (LAN)
2. Metropolitan Area Network (MAN)
3. Wide Are Network (WAN)

Local Area Network :

It is also called LAN and designed for small physical areas such as an office, group of buildings or a factory. LANs are used widely as it is easy to design and to troubleshoot. Personal computers and workstations are connected to each other through LANs. We can use different types of topologies through LAN, these are Star, Ring, Bus, Tree etc.

LAN can be a simple network like connecting two computers, to share files and network among each other while it can also be as complex as interconnecting an entire building. LAN networks are also widely used to share resources like printers, shared hard-drive etc.

Characteristics of LAN :

- LAN's are private networks, not subject to tariffs or other regulatory controls.
- LAN's operate at relatively high speed when compared to the typical WAN.
- There are different types of Media Access Control methods in a LAN, the prominent ones are Ethernet, Token ring.
- It connects computers in a single building, block or campus, i.e. they work in a restricted geographical area.

Applications of LAN :

- One of the computers in a network can become a server serving all the remaining computers called clients. Software can be stored on the server and it can be used by the remaining clients.
- Connecting locally all the workstations in a building to let them communicate with each other locally without any internet access.
- Sharing common resources like printers etc are some common applications of LAN.

Advantages of LAN :

- **Resource Sharing:** Computer resources like printers, modems, DVD-ROM drives and hard disks can be shared with the help of local area networks. This reduces cost and hardware purchases.
- **Software Applications Sharing:** It is cheaper to use same software over network instead of purchasing separate licensed software for each client a network.
- **Easy and Cheap Communication:** Data and messages can easily be transferred over networked computers.
- **Centralized Data:** The data of all network users can be saved on hard disk of the server computer. This will help users to use any workstation in a network to access their data. Because data is not stored on workstations locally.
- **Data Security:** Since, data is stored on server computer centrally, it will be easy to manage data at only one place and the data will be more secure too.
- **Internet Sharing:** Local Area Network provides the facility to share a single internet connection among all the LAN users. In Net Cafes, single internet connection sharing system keeps the internet expenses cheaper.

Disadvantages of LAN :

- **High Setup Cost:** Although the LAN will save cost over time due to shared computer resources, but the initial setup costs of installing Local Area Networks is high.
- **Privacy Violations:** The LAN administrator has the rights to check personal data files of each and every LAN user. Moreover he can check the internet history and computer use history of the LAN user.
- **Data Security Threat:** Unauthorized users can access important data of an organization if centralized data repository is not secured properly by the LAN administrator.
- **LAN Maintenance Job:** Local Area Network requires a LAN Administrator because, there are problems of software installations or hardware failures or cable disturbances in Local Area Network. A LAN Administrator is needed at this full time job.

- **Covers Limited Area:** Local Area Network covers a small area like one office, one building or a group of nearby buildings.

Metropolitan Area Network :

It was developed in 1980s.It is basically a bigger version of LAN. It is also called MAN and uses the similar technology as LAN. It is designed to extend over the entire city. It can be means to connecting a number of LANs into a larger network or it can be a single cable. It is mainly hold and operated by single private company or a public company.

Characteristics of MAN :

- It generally covers towns and cities (50 km)
- Communication medium used for MAN are optical fibers, cables etc.
- Data rates adequate for distributed computing applications.

Advantages of MAN :

- Extremely efficient and provide fast communication via high-speed carriers, such as fiber optic cables.
- It provides a good back bone for large network and provides greater access to WANs.
- The dual bus used in MAN helps the transmission of data in both directions simultaneously.
- A MAN usually encompasses several blocks of a city or an entire city.

Disadvantages of MAN :

- More cable required for a MAN connection from one place to another.
- It is difficult to make the system secure from hackers and industrial espionage (spying) graphical regions.

Wide Area Network (WAN) :

It is also called WAN. WAN can be private or it can be public leased network. It is used for the network that covers large distance such as cover states of a country. It is not easy to design and maintain. Communication medium used by WAN are PSTN or Satellite links. WAN operates on low data rates.

Characteristics of WAN :

- It generally covers large distances (states, countries, continents).
- Communication medium used are satellite, public telephone networks which are connected by routers.

Advantages of WAN :

- Covers a large geographical area so long distance business can connect on the one network.
- Shares software and resources with connecting workstations.
- Messages can be sent very quickly to anyone else on the network. These messages can have picture, sounds or data included with them(called attachments).
- Expensive things(such as printers or phone lines to the internet) can be shared by all the computers on the network without having to buy a different peripheral for each computer.
- Everyone on the network can use the same data. This avoids problems where some users may have older information than others.

Disadvantages of WAN :

- Need a good firewall to restrict outsiders from entering and disrupting the network.
- Setting up a network can be an expensive, slow and complicated. The bigger the network the more expensive it is.
- Once set up, maintaining a network is a full-time job which requires network supervisors and technicians to be employed.
- Security is a real issue when many different people have the ability to use information from other computers. Protection against hackers and viruses adds more complexity and expense.

Protocols :

A protocol is a set of rules to govern the data transfer between the devices. The rules are used for the following purposes.

1. For compressing the data.
2. For sending device to indicate that it has finished sending a message.
3. For receiving device to indicate that it has received a message.

The protocol defines the following things

1. **Syntax** : It defines the structure or format of data. It tells the order in which it is to be sent is decided. In this we will come to know that what is to be communicated.
2. **Semantics** : It defines the interpretation of the data that is being sent. In this we will come to know that “How it is to be communicated”.
3. **Timings** : It defines an agreement between the sender and the receiver about the data transmission rates & duration. In this we will come to know that when it should be communicated.

Types of Protocols :

There are different types of Protocol such as:

1. Transmission control Protocol (TCP)
2. Internet Protocol (IP)
3. Internet Address Protocol (IP Address)
4. Post office Protocol (POP)
5. Simple mail transport Protocol (SMTP)
6. File Transfer Protocol (FTP)
7. Hyper Text Transfer Protocol (HTTP)
8. Ethernet
9. Telnet
10. Gopher

1. Transmission control Protocol (TCP)

This is a **communication protocol** that a computer uses to communicate over a network. TCP divides message into stream of packets which are sent and then reassembled at the destination.

2. Internet Protocol (IP)

Internet protocol is **addressing protocol**. It is always used together with TCP. IP addresses of packet, routes them through different nodes and networks until it reaches its final destination. TCP/IP is perhaps the most used standard protocol for connecting computer networks.

3. Internet Address Protocol (IP Address)

This is the address that identifies a computer on a network using TCP/IP. An IP address contains series of four numbers unique to the computer concerned Eg : 90.399.424.34. This address is usually supplied by an Internet Service Provider.

4. Post office Protocol (POP)

This is used to **receive incoming E-mail** .

5. Simple mail transport Protocol (SMTP)

This protocol is used for **sending and distributing outgoing E-Mail** .

6. File Transfer Protocol (FTP)

This is a system that allows users to **transfer files** from one computer to another computer. Files that can be transferred may include program files, text files and multimedia files etc. This method of file transfer is faster than that using HTTP.

7. Hyper Text Transfer Protocol (HTTP)

HTTP is used to transfer a hyper text between two or more computers. Hyper text is the text that is coded using the language called HTML. HTML codes are used to create links. This link may be in any format such as text or graphics.

HTTP is based on the **Client/server principles**. HTTP allows a client to establish connection with a server and make a request. The server accepts the connection initiated by the client and send back the response. An HTTP request identifies the resources that the client is interested it and tells the server what action to take on the resource.

8. Ethernet

Ethernet is a most popular protocol used for LAN communication. It transfers the information in digital packets. Every computer that uses this protocol contains the **Ethernet Network Interface Card (NIC).**

This card is a unique address code embedded in microchip. This address is used to identify the system. When a packet is placed on a network, the packet is sent to every computer on the networks but only the computer which has the same address as Network Interface Card address is allowed to claim that packet and receive the digital information contained with it.

Only one packet is placed at a time in the network, if two systems placed packets on the network on same time. When NIC tries to place a packet, it first looks whether a packet already exits or not. If it exits the NIC is forced to wait for random milliseconds before trying again. This continues until a 'gap' is found then the packet can be successfully transmitted on to a network.

9. Telnet

Telnet is a set of rules used to connect one computer to another computer. The process of this connection is called as **remote login**. The computer who request connection is called local computer, who accept the connection is called remote computer. If you type commands in local computer remote login these commands executed in the remote computer. You can see in your monitor what is the process going on in this remote computer.

Telnet also operates on the client/server principle. The establishment of connection and display data on the local computer uses a Telnet server program to accept the connection and send responses to requests for information back to the local computer.

10. Gopher

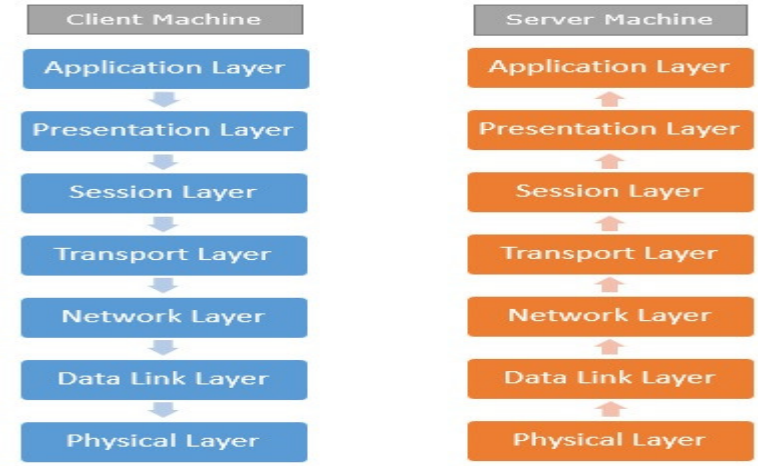
Gopher is a set of rules used to search, retrieve and display documents from remote sites. It is possible to initiate on-line connections with other systems through Gopher. It also operates on client/server principal.

OSI Model :

OSI model is not a **network architecture** because it does not specify the exact services and protocols for each layer. It simply tells what each layer should do by defining its input and output data. It is up to network architects to implement the layers according to their needs and resources available.

These are the seven layers of the OSI model :

- **Physical layer** : It is the first layer that physically connects the two systems that need to communicate. It transmits data in bits and manages simplex or duplex transmission by modem. It also manages Network Interface Card's hardware interface to the network, like cabling, cable terminators, topography, voltage levels, etc.
- **Data link layer** : It is the firmware layer of Network Interface Card. It assembles datagram into frames and adds start and stop flags to each frame. It also resolves problems caused by damaged, lost or duplicate frames.
- **Network layer** : It is concerned with routing, switching and controlling flow of information between the workstations. It also breaks down transport layer datagram into smaller datagram.
- **Transport layer** : Till the session layer, file is in its own form. Transport layer breaks it down into data frames, provides error checking at network segment level and prevents a fast host from overrunning a slower one. Transport layer isolates the upper layers from network hardware.
- **Session layer** : This layer is responsible for establishing a session between two workstations that want to exchange data.
- **Presentation layer** : This layer is concerned with correct representation of data, i.e. syntax and semantics of information. It controls file level security and is also responsible for converting data to network standards.
- **Application layer** : It is the topmost layer of the network that is responsible for sending application requests by the user to the lower levels. Typical applications include file transfer, E-mail, remote logon, data entry, etc.



It is not necessary for every network to have all the layers.

For example, network layer is not there in broadcast networks.

When a system wants to share data with another workstation or send a request over the network, it is received by the application layer. Data then proceeds to lower layers after processing till it reaches the physical layer.

At the physical layer, the data is actually transferred and received by the physical layer of the destination workstation. There, the data proceeds to upper layers after processing till it reaches application layer.

At the application layer, data or request is shared with the workstation. So each layer has opposite functions for source and destination workstations. For example, data link layer of the source workstation adds start and stop flags to the frames but the same layer of the destination workstation will remove the start and stop flags from the frames.

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UNIT II : INTERNET

Introduction :

The Internet is the world's largest network because it's a collection of computers and servers that are connected to each other globally using routers and switches. The Internet works the same way a network would in a home or office but has millions of more computers, routers, and switches.

Internet is a network of many computer networks. It connects LANs, WANs and even our own personal computer. It is also called the Information Super Highway. We can access any information from any place at anytime on the Internet. We can download to our PC the research papers, send mails to the friends and relatives, watch a movie, deposit or withdraw money online and sell or buy products and services.

Brief History of Internet :

- **1958**: The United States government creates the Advanced Research Projects Agency, which is later responsible for ARPANet and the Internet.
- **1967:** Dr. Lawrence Roberts writes the paper "Multiple Computer Networks and Intercomputer Communications," which helps define ARPANet. Meanwhile, Wesley Clark coins the term "Interface Message Processors" (IMP), which refers to packet-switching devices that later evolve into modern network routers.
- **1969:** ARPANet is formed out of the need for redundancy in communications to defend against nuclear attack. It provides a means to connect different networks to each other, primarily those owned by military and educational institutions.
- **1971:** The first network computer virus, Creeper, infects ARPANet. Written by a BBN programmer named Robert Thomas, it was intended as an experiment in self-replicating software.
- **1974.** The word "Internet" first appeared in print—in a DARPA-published Request for Comments document on TCP/IP, a new set of communications and networking protocols for managing data transmissions on the new system. TCP/IP is still integral to the present-day Internet. In the meantime, Arpanet was growing fast as more universities, science centers, and army installations got connected.
- **1976.** Queen Elizabeth of England became the first head of state to send an email. Jimmy Carter followed suit and used email several times while campaigning.
- **1981:** The Computer Science Network, or CSNET, is created by University of Wisconsin-Madison computer science professor Lawrence Landweber. CSNET succeeds in connecting many universities as well as international computer science networks to each other as well as bringing nationwide attention to the benefits of

networking. It also makes the TCP/IP protocol mainstream within the networking community

- **1983.** The Domain Name System (DNS) was invented. Whereas site's names had been obtuse sequences of letters and numbers, they would now be easy-to-remember names with endings such as .gov, .edu, or .mil.
- **1985.** The National Science Foundation (NSF) funded construction of Arpanet's biggest upgrade yet: the NSFNET, a command hub of five supercomputers to serve as highways for all data traffic. NSFNET could transmit data at 56 kilobits per second—slower than some present-day modems.
- **1986:** The National Science Foundation Network, or NSFNET, goes online. This enabled multiple university supercomputer centers to connect, and it later evolved into a major route for data moving through the Internet, an Internet backbone.
- **1989:** Tim Berners-Lee invents the World Wide Web using the Hypertext Transfer Protocol (HTTP) and the Hypertext Markup Language (HTML). It becomes the primary medium of global Internet-based communications years later.
- **1990.** Tim Berners-Lee invented HTML and a text browser, as well as a hypertext graphical user interface (GUI) browser. Then he established the first successful communication between a Hypertext Transfer Protocol client and a server via the Internet. These inventions, put together, were the makings of Web pages as we know them today. Lee also made up the term "World Wide Web." The synonym Information Superhighway would follow in a few more years
- **1991.** The NSF allowed commercial enterprises to use the Internet for the first time.
- **1993:** W3Catalog becomes the first World Wide Web search engine. It indexes the Web, enabling users to find Web pages.
- **1994.** Jeff Bezos founded Amazon. A whole new world of e-commerce was born.
- **1995.** The NSF ceased funding the Internet altogether, leaving it a completely self-sustaining industry. Also noteworthy, Sun Microsystems first released Java, still an immensely popular Internet programming language to this day.
- **1998.** Google opened its first office.
- **2001:** Jimmy Wales and Larry Sanger found Wikipedia, forming a user-made encyclopedia online.
- **2004-2005.** Facebook was launched in December 2004. YouTube debuted the next year. The social-media revolution had begun.
- **2006.** Google CEO Eric Schmidt introduced the term "cloud computing" at an industry conference. "The Cloud" would become another synonym for the Internet soon thereafter.

- **2007.** Mobile and smart phones technologies going commercial and growing rapidly. Consumers would no longer need a personal computer to go online. The Internet would be reachable wherever they could find a wireless signal.
- **2008.** Google Index reaches 1 trillion URLs. Google launched Chrome. Spotify launched. Apple launched App Store. Dozens of space images are transmitted to and from a Nasa science spacecraft located more than 32 million km from Earth.
- **2009.** Mobile data traffic exceeded voice traffic every single month. Globally, mobile data exceeded an Exabyte (a billion gigabytes) for the first time. Foursquare launched – users start "check in" at locations all over the world. Kichstarter is founded in April: crowd funding becomes popular with start-ups.
- **2010.** The number of registered domains reaches 200 million. Apple launches iPad, many other producers followed. 4G wireless networks launches in US. Instagram and Pinterest launched. Astronaut T.J. Creamer uploads the first tweet from space.
- **2011**. The number of Internet users reaches 2 billion. Google+ launched. Microsoft buys Skype. The Stop Online Piracy Act is introduced in the US.
- **2012.** Worldwide internet users breaks 2.4 billion. Nasa's Curiosity Rover checks in on Mars using FourSquare.
- **2013 – 2015.** Apple releases Apple Watch, other producers followed – smart watches industry was created. Google releases Google Classes. Mobile Internet surpasses desktop. Almost a half of the world's populations become Internet users. Superfast Gigablast Internet (100 times faster then DSL) is introduced to residential customers.
- **2016.** Donald Trump victory on the US presidential elections claimed to be premised on huge digital campaign investment. 40% of global internet users, or more than 1 billion people, buy products or goods online. Live Streaming goes popular.

Connect to the Internet

In order to connect to the Internet, you must connect via an Internet Service Provider (ISP). Every computer on the Internet (including the one you're using right now) is called a host. A general understanding of ISPs and host computers is important in understanding how communication over the Internet works. Let's explore both of these.

Internet Service Providers

Everyone connects to the Internet through Internet Service Providers (ISP). ISPs are organizations that have permanent connections to the Internet and offer access to their customers for a fee.

The backbone of the Internet is operated by several large telecommunications companies like BSNL, JIO, AIRTEL and Wireless, and Worldcom. We use several of these

companies as ISPs to connect to the Internet. They also pay their ISPs a fee for the Internet access.

If you connect to the Internet at home you probably do so in one of three ways:

- To an ISP through your telephone line with a modem attached to your computer.
- To an ISP using your cable television line.
- To an ISP using a DSL (digital service loop) which is your own permanent or dedicated line to your service provider

OBJECTIVES OF INTERNET :

1. It provides a key asset for the communication.
2. It helps the user to access useful information.
3. It helps to buy and sell goods and services.
4. It helps in educating the community on what the internet has to offer and the formation of environment will bring people with diverse interest & backgrounds together.
5. It enables the interconnection & integration of the physical world & the cyber space.
6. It is used to coordinate & help to increase & optimize the utilization of results.
7. It is powerful to share text, images, sound, videos and also for exchanging raw data.
8. It offers effective information sharing & communication globally.
9. It is essential for advancing research in science, medicine, engineering & design as well as in maintaining global defense with better access.
10. It not only provides social connection & entertainment it also provides academic & scientific information.

TCP/IP (TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL)

TCP/IP, or the Transmission Control Protocol/Internet Protocol, is a suite of communication protocols used to interconnect network devices on the internet. TCP/IP can also be used as a communications protocol in a private network (an intranet or an extranet).

THE HISTORY OF TCP/IP

The Defense Advanced Research Projects Agency (DARPA), the research branch of the U.S. Department of Defense, created the TCP/IP model in the 1970s for use in ARPANET, a wide area network that preceded the internet. TCP/IP was originally designed for the Unix operating system, and it has been built into all of the operating systems that came after it.

TCP/IP is highly scalable and, as a routable protocol, can determine the most efficient path through the network.

The entire internet protocol suite -- a set of rules and procedures -- is commonly referred to as TCP/IP, though others are included in the suite.

TCP/IP specifies how data is exchanged over the internet by providing end-to-end communications that identify how it should be broken into packets, addressed, transmitted, routed and received at the destination. TCP/IP requires little central management, and it is designed to make networks reliable, with the ability to recover automatically from the failure of any device on the network.

The two main protocols in the internet protocol suite serve specific functions. TCP defines how applications can create channels of communication across a network. It also manages how a message is assembled into smaller packets before they are then transmitted over the internet and reassembled in the right order at the destination address.

IP defines how to address and route each packet to make sure it reaches the right destination. Each gateway computer on the network checks this IP address to determine where to forward the message.

Importance of TCP/IP

TCP/IP is nonproprietary and, as a result, is not controlled by any single company. Therefore, the internet protocol suite can be modified easily. It is compatible with all operating systems, so it can communicate with any other system. The internet protocol suite is also compatible with all types of computer hardware and networks.

How TCP/IP works

TCP/IP uses the client/server model of communication in which a user or machine (a client) is provided a service (like sending a webpage) by another computer (a server) in the network.

Collectively, the TCP/IP suite of protocols is classified as stateless, which means each client request is considered new because it is unrelated to previous requests. Being stateless frees up network paths so they can be used continuously.

The transport layer itself, however, is stateful. It transmits a single message, and its connection remains in place until all the packets in a message have been received and reassembled at the destination.

The TCP/IP model differs slightly from the seven-layer Open Systems Interconnection (OSI) networking model designed after it, which defines how applications can communicate over a network.

TCP/IP model layers

TCP/IP functionality is divided into four layers, each of which include specific protocols.

- *The application layer* provides applications with standardized data exchange. Its protocols include the Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), Post Office Protocol 3 (POP3), Simple Mail Transfer Protocol (SMTP) and Simple Network Management Protocol (SNMP).
- *The transport layer* is responsible for maintaining end-to-end communications across the network. TCP handles communications between hosts and provides flow control, multiplexing and reliability. The transport protocols include TCP and User Datagram Protocol (UDP), which is sometimes used instead of TCP for special purposes.
- *The network layer*, also called the internet layer, deals with packets and connects independent networks to transport the packets across network boundaries. The network layer protocols are the IP and the Internet Control Message Protocol (ICMP), which is used for error reporting.
- *The physical layer* consists of protocols that operate only on a link -- the network component that interconnects nodes or hosts in the network. The protocols in this layer include Ethernet for local area networks (LANs) and the Address Resolution Protocol (ARP).

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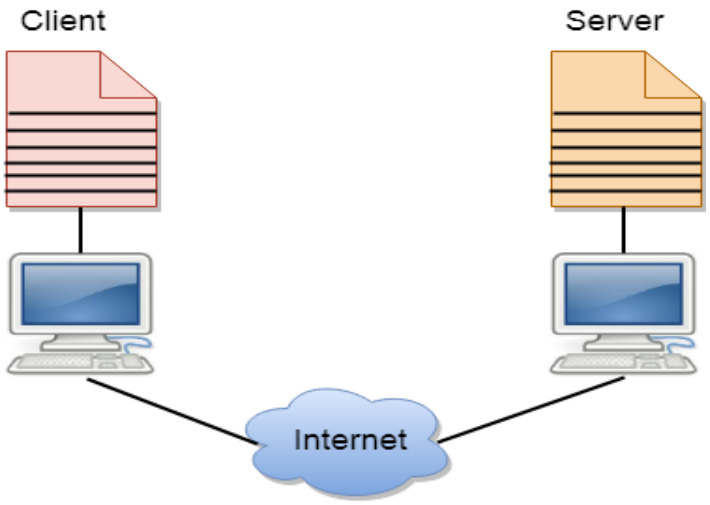
CLIENT AND SERVER MODEL

- A client and server networking model is a model in which computers such as servers provide the network services to the other computers such as clients to perform a user based tasks. This model is known as client-server networking model.
- The application programs using the client-server model should follow the given below strategies:



An application program is known as a client program, running on the local machine that requests for a service from an application program known as a server program, running on the remote machine.

- A client program runs only when it requests for a service from the server while the server program runs all time as it does not know when its service is required.
- A server provides a service for many clients not just for a single client. Therefore, we can say that client-server follows the many-to-one relationship. Many clients can use the service of one server.
- Services are required frequently, and many users have a specific client-server application program. For example, the client-server application program allows the user to access the files, send e-mail, and so on. If the services are more customized, then we should have one generic application program that allows the user to access the services available on the remote computer.

CLIENT

A client is a program that runs on the local machine requesting service from the server. A client program is a finite program means that the service started by the user and terminates when the service is completed.

SERVER

A server is a program that runs on the remote machine providing services to the clients. When the client requests for a service, then the server opens the door for the incoming requests, but it never initiates the service.

A server program is an infinite program means that when it starts, it runs infinitely unless the problem arises. The server waits for the incoming requests from the clients. When the request arrives at the server, then it responds to the request.

Advantages of Client-server networks:

- **Centralized:** Centralized back-up is possible in client-server networks, i.e., all the data is stored in a server.
- **Security:** These networks are more secure as all the shared resources are centrally administered.
- **Performance:** The use of the dedicated server increases the speed of sharing resources. This increases the performance of the overall system.
- **Scalability:** We can increase the number of clients and servers separately, i.e., the new element can be added, or we can add a new node in a network at any time.

Disadvantages of Client-Server network:

- **Traffic Congestion** is a big problem in Client/Server networks. When a large number of clients send requests to the same server may cause the problem of Traffic congestion.
- It does not have a robustness of a network, i.e., when the server is down, then the client requests cannot be met.
- A client/server network is very decisive. Sometimes, regular computer hardware does not serve a certain number of clients. In such situations, specific hardware is required at the server side to complete the work.
- Sometimes the resources exist in the server but may not exist in the client. For example, if the application is web, then we cannot take the print out directly on printers without taking out the print view window on the web.

E-mail (Electronic Mail)

Short for **electronic mail**, **e-mail** or **email** is information stored on a computer that is exchanged between two users over telecommunications. More plainly, e-mail is a message that may contain text, files, images, or other attachments sent through a network to a specified individual or group of individuals.

The first e-mail was sent by Ray Tomlinson in 1971. Tomlinson sent the e-mail to himself as a test e-mail message, containing the text "something like QWERTYUIOP." However, despite sending the e-mail to himself, the e-mail message was still transmitted through ARPANET.

By 1996, more electronic mail was being sent than postal mail.

E-mail address breakdown

support@computerhope.com

- The first portion of all e-mail addresses, the part before the @ symbol, contains the alias, user, group, or department of a company. In our above example, **support** is the Technical Support department at Computer Hope.
- Next, the @ (at sign) is a divider in the e-mail address; it's required for all SMTP e-mail addresses since the first message was sent by Ray Tomlinson.
- Finally, **computerhope.com** is the domain name to which the user belongs. The .com is the TLD (top-level domain) for our domain.

How to send and receive e-mail

To send and receive e-mail messages, you can use an **e-mail program**, also known as an **e-mail client**, such as Microsoft Outlook or Mozilla Thunderbird. When using an e-mail client, you must have a server that stores and delivers your messages, hosted by your ISP or in some cases, another company. An e-mail client needs to connect to a server to download new e-mail, whereas e-mail stored online is always available, from any of your devices connected to the Internet. For more information about cloud e-mail service, see the difference between webmail and an e-mail client, below.

Online e-mail

An alternative way of sending and receiving e-mail (and the more popular solution for most people) is an online **e-mail service** or webmail. Examples include Hotmail (now Outlook.com), Gmail, and Yahoo Mail. Many of the online e-mail services, including the ones we mentioned, are free or have a free account option.

Writing an e-mail

When writing an e-mail message, it should look something like the example window below. As you can see, several fields are required when sending an e-mail:

- The **To** field is where you type the e-mail address of the person who is the recipient of your message.
- The **From** field should contain your e-mail address.
- If you are replying to a message, the **To:** and **From:** fields are automatically filled out. If it's a new message, you'll need to specify the recipients in the **To:** field, either by selecting them from your contact list, or manually typing the full email addresses. If you are manually specify more than one recipient (as in a group e-mail), the addresses should be separated by a comma and a space, or by pressing the Tab key.

- The **Subject** should consist of a few words describing the e-mail's contents. The subject lets the recipient see what the e-mail is about, without opening and reading the full e-mail. This field is optional.
- The CC ("Carbon Copy") field allows you to specify recipients who are not direct addressees (listed in the "To" field). For instance, you can address an e-mail to Jeff and CC Linda and Steven. Although the e-mail is addressed to Jeff, Linda and Steven will also receive a copy of the message, and their addresses will be visible to Jeff, and to each other. This field is optional.
- The BCC ("blind carbon copy") field is similar to CC, except the recipients are secret. Each BCC recipient will receive the e-mail, but will not see who else received a copy. The addressees (anyone listed in the "To" field) remain visible to all recipients. This field is optional.
- Finally, the **Message Body** is the location you type your main message. It often contains your signature at the bottom; similar to a handwritten letter.

Advantages of e-mail

There are many advantages of e-mail and the usage of e-mail versus postal mail. Some of the main advantages are listed below.

- **Free delivery** - Sending an e-mail is virtually free, outside the cost of Internet service. There is no need to buy a postage stamp to send a letter.
- **Global delivery** - E-mail can be sent to nearly anywhere around the world, to any country.
- **Instant delivery** - An e-mail can be instantly sent and received by the recipient over the Internet.
- **File attachment** - An e-mail can include one or more file attachments, allowing a person to send documents, pictures, or other files with an e-mail.
- **Long-term storage** - E-mails are stored electronically, which allows for storage and archival over long periods of time.
- **Environmentally friendly** - Sending an e-mail does not require paper (paperless), cardboard, or packing tape, conserving paper resources.

Disadvantages of e-Mail

1. Information overload

Too many people send too much information. They cover their backs citing ‘need to know’ as the justification. Learn how to use email effectively and you’ll reduce time wasted on this.

2. Lacking the Personal Touch

Some things are best left untyped. Email will never beat a hand written card or letter when it comes to relationships.

3. Misunderstandings

Emails from people who don't take the time to read what they write before clicking 'send'. Time is wasted, either to clarify or, worse, acting on a misinterpretation of the message.

4. Pressure to Reply

Once it's in your inbox, you feel an ever increasing obligation to act on it. Procrastinating doesn't making it go away. Do it, dump it or delegate it.

5. Spam

Having to deal with spam and spoofs is one of the worst avoidable time wasters online. Use some anti spam software.

6. Sucks up Your Time

Over checking a message is so common, but it is time wasted on a low value, passive activity. Better to check once or twice a day.

7. Viruses

A virus could seriously affect your computer. If you want to know how to use email effectively, it's worth learning how to deal with these.

USENET

What is Usenet?

Usenet can be defined as a network where people exchange news. It is used for several purposes by people and support groups for sharing information. Its' main purpose is to offer a network where users can post information freely, which is then distributed. This allows others to access the information easily and as quickly as possible.

Usenet is regarded as one of the oldest networks. In fact, it was conceived in 1979. This means that it was implemented before the World Wide Web. The fact that it is a distributed network means it is not controlled by any single source. It also means that it remains largely uncensored. In order to access Usenet Newsgroups you will need Best Usenet Provider. The best USENET providers are Newshosting, Ereka, Supernews, Newsgroupdirect, Easynews etc.,

Usenet was created by two graduate students of Duke University in North Carolina, Jim Ellis and Tom Truscott worked on their idea of connecting different computers to exchange information within the UNIX community, and thus created a network that allowed the exchange of information and served as a bulletin-board.

It began as a small, restricted communication network between some of the universities in the United States. It was used for news, trade information and research results.

Usenet became popular in university campuses and early Usenet users enjoyed discussing a broad range of ideas with fellow students and discussed Politics, Technology, Science, Philosophy, Music, Science Fiction and much more. Students from the universities would meet in various newsgroups via their computers and freely voice their opinions, seek advice / consultation, and also interact with other users from different universities who shared the same interests.

Advantages :

1. There are individuals with some questions so that, there will be almost definite answers to all of our questions.
2. We can make our own group if we can't find the one we are looking for.

Disadvantages :

1. It is over complicated for first users.
2. Most of the files are archived.
3. It is difficult to find old groups.
4. The discussion that we found wasn't very helpful.

What is a Newsgroup?

A newsgroup is an active online discussion forum that is easily accessible through Usenet. Each newsgroup on the server contains discussions about some specific topic, which is often indicated in the name or title of the newsgroup. Users who are looking for a particular newsgroup can browse and follow them. Users can also post or reply to the topics they are interested in, using a newsreader software. Access to these newsgroups also requires a Usenet subscription. Most of the Usenet Providers have monthly subscription.

A newsgroups can be either moderated or unmoderated. In moderated newsgroups, all posts must be approved by a moderator first if the user wants to become a part of the discussion. In unmoderated group, there is no restriction of any sort, and everything posted by users becomes part of the discussion. Some of the newsgroups also use bots to moderate the content. These bots can automatically eliminate posts that are deemed as offensive or off topic.

Below are a few examples of active online newsgroups. The first part that is before the first dot tells users about the primary category or the newsgroup.

- politics
- binaries.multimedia.comedy
- religion
- software.testing
- physics
- binaries.documentaries

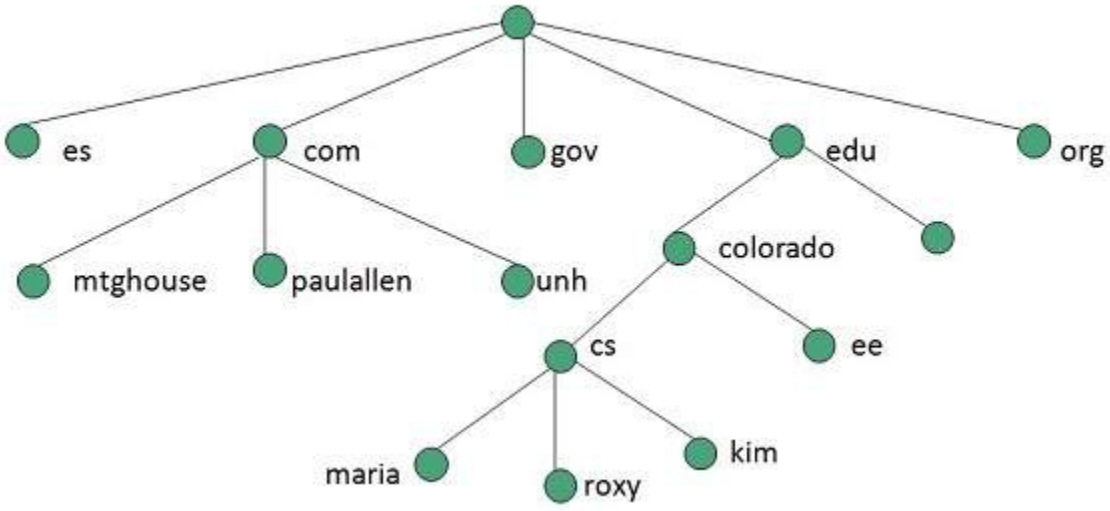
Internet Programming WWW

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

A broader definition comes from the organization that Web inventor **Tim Berners-Lee** helped found, the **World Wide Web Consortium (W3C).**

The World Wide Web is the universe of network-accessible information, an embodiment of human knowledge.

In simple terms, The World Wide Web is a way of exchanging information between computers on the Internet, tying them together into a vast collection of interactive multimedia resources.



Evolution

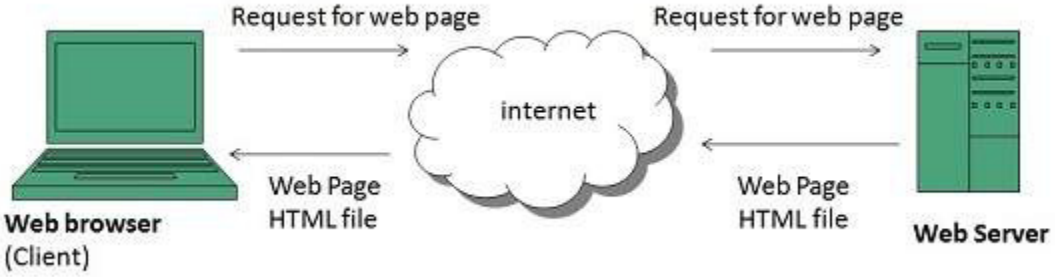
World Wide Web was created by **Timothy Berners Lee** in 1989 at **CERN** in **Geneva.** World Wide Web came into existence as a proposal by him, to allow researchers to work together effectively and efficiently at **CERN.** Eventually it became **World Wide Web.**
The following diagram briefly defines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

Web 1.0	Web 2.0	Web 3.0
• Static Web Pages • Brochure ware • Mostly publishing • No Communities	• Social Media • Keyword search • Rich user experience • Tagging	• Highly mobile • Open ID • Semantic Search • Micro Blogging

WWW Operation :

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

1. User enters the URL (say, **http://www.tutorialspoint.com**) of the web page in the address bar of web browser.
2. Then browser requests the Domain Name Server for the IP address corresponding to www.tutorialspoint.com.
3. After receiving IP address, browser sends the request for web page to the web server using HTTP protocol which specifies the way the browser and web server communicates.
4. Then web server receives request using HTTP protocol and checks its search for the requested web page. If found it returns it back to the web browser and close the HTTP connection.
5. Now the web browser receives the web page, It interprets it and display the contents of web page in web browser's window.



URL

URL (or **URL-address**) is a special form of individual address of a certain resource on the Internet. It can refer to the website, some particular document, or an image. The Internet user just needs to insert this code into the location bar to find the needed website, document, folder, or image. In plain language, it means the following: due to the URL address, the user gets information about where the needed information is located.

What does URL stand for? URL is an abbreviation which stands for the term **Uniform Resource Locator**. It contains a link to the server which is storage of the searched resource. In general, URL meaning is the track from the server to the final gadget (which is a platform of the user's work) can be illustrated rather simply. The upper element is the resource server, the lowest one – the user's device. All the points in between the two are additional servers. A URL is also a specific type of **Uniform Resource Identifier** (URI).

URL structure

URL address has a determined structure which includes:

- method of access to the resource that is also named the network protocol;
- access authorization;
- hosts – DNS address that is inscribed as IP address;
- port – one more obligatory detail included in combination with IP address;
- track – determines the information about the method of gaining access;
- parameter – the internal information of resource about the file.

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UNIT III : E-GOVERNANCE

INTRODUCTION TO E-COMMERCE

The term e-commerce was coined back in the 1960s, with the rise of electronic commerce – the buying and selling of goods through the transmission of data – which was made possible by the introduction of the electronic data interchange. Fast forward fifty years and **e-commerce has changed the way in which society sells goods and services.**

E-commerce has become one of the **most popular methods of making money online** and an attractive opportunity for investors. For those interested in buying an e-commerce business, this article serves to provide an introduction to e-commerce, covering **the reasons for its popularity**, the **main distribution models** and a **comparison of the major e-commerce platforms** available.

'E-commerce' and 'online shopping' are often used interchangeably but at its core e-commerce is much broader than this – it **embodies a concept for doing business online**, incorporating a multitude of different services e.g. **making online payments, booking flights etc.**

E-Commerce refers to the paperless exchange of business information using electronic data interchange, electronic mail, electronic bulletin boards, electronic funds transfer, worldwide web and other network based technologies.

E-Commerce is the business environment in which information for the buying, selling and transportation of goods and services moves electronically. E-Commerce includes any technology that enables a company to do business electronically.

E-Commerce is the application of communication and information sharing technologies among trading partners to pursuit of business objectives. E-Commerce is associated with the buying and selling of information, products and services via computer networks. It is a new way of conducting, managing and executing business transactions using computer and telecommunication networks.

Some of the direct benefits of Electronic Commerce are :

1) Improved Productivity
2) Cost Savings
3) Streamlined Business Processes
4) Better Customer Service
5) Opportunities for New Businesses

1) Improved Productivity:

Using electronic commerce, the time required to create, transfer and process a business transaction between trading partners is significantly reduced. Furthermore, human errors and other problems like duplications of records are largely eliminated with the reduction of data entry and re-entry in the process. This improvement in speed and accuracy, plus the easier access to document and information, will result in increase in productivity.

2) Cost Savings:

Based on the experience of a wide variety of early adopters of electronic commerce. Forrester Research has estimated that doing business on the Internet can result in cost savings of about 5% to 10% of sales. This cost savings stem from efficient communication, quicker turnaround time and closer access to markets.

3) Streamlines Business Processes:

Cost savings are amplified when businesses go a step further and adapt their internal processes and back-end legacy systems to take advantage of electronic commerce. Inventories can be shaved if businesses use the Internet to share such information as promotional plans, point-of-sale data, and sales forecasts. Business processes can also be made more efficient with automation.

4) Better Customer Service:

With electronic commerce, there is better and more efficient communication with customers. In addition, customers can also enjoy the convenience of shopping at any hour, anywhere in the world.

5) Opportunities for New Businesses:

Businesses over the Internet have a global customer reach. There are endless possibilities for businesses to exploit and expand their customer base.

E-COMMERCE FRAMERWORK:

The term **E-commerce Framework** is related to software frameworks for e-commerce applications. They offer an environment for building e-commerce applications quickly.

E-Commerce frameworks are flexible enough to adapt them to your specific requirements. As result, they are suitable for building virtually all kinds of online shops and e-commerce related (web) applications like the Aimeos E-commerce Framework does.

An E-commerce framework must provide

- Common business services, for facilitating the buying and selling process.
- Messaging and information distribution, as a means of sending and retrieving information.
- Multimedia content and network publishing, for creating a product and a means to communicate about it.
- The Information Superhighway – the very foundation – for providing the highway system along which all e-commerce must travel.

The two pillars supporting all e-commerce-applications and infrastructure are just as indispensable:

- Public policy, no govern such issues as universal access, privacy, and information pricing.
- Technical standards, to dictate the nature of information publishing, user interfaces, and transport in the interest of compatibility across the entire network.

Examples of E-commerce frameworks are

- Aimeos (Laravel, Symfony, TYPO3, SlimPHP, Flow)
- Spryker (Symfony only)
- Sylius (Symfony only)

E-Commerce Applications

- Supply chain management
- Video on demand
- Remote Banking
- Procurement and purchasing
- Online marketing and advertising
- Home shopping

They provide an overall structure for e-commerce related applications. Furthermore, they implement the general program flow e.g. how the checkout process works. Contrary to monolithic shop systems, existing program flow can not only be extended but completely changed according to your needs.

ANATOMY OF E-COMMERCE APPLICATIONS

1. Multimedia Content for E-Commerce Applications
2. Multimedia Storage Servers & E-Commerce Applications
   a) Client-Server Architecture in Electronic Commerce
   b) Internal Processes of Multimedia Servers
   c) Video Servers & E-Commerce
3. Information Delivery/Transport & E-Commerce Applications
4. Consumer Access Devices

1. Multimedia Content for E-Commerce Applications:

- Multimedia content can be considered both fuel and traffic for electronic commerce applications.
- The technical definition of multimedia is the use of digital data in more than one format, such as the combination of text, audio, video, images, graphics, numerical data, holograms, and animations in a computer file/document.
- Multimedia is associated with Hardware components in different networks.
- The Accessing of multimedia content depends on the hardware capabilities of the customer.

2. Multimedia Storage Servers & E-Commerce Applications:

- E-Commerce requires robust servers to store and distribute large amounts of digital content to consumers.
- These Multimedia storage servers are large information warehouses capable of handling various content, ranging from books, newspapers, advertisement catalogs, movies, games, & X-ray images.
- These servers, deriving their name because they serve information upon request, must handle large-scale distribution, guarantee security, & complete reliability

a) Client-Server Architecture in Electronic Commerce

- All e-commerce applications follow the client-server model
- Clients are devices plus software that request information from servers or interact known as message passing.
- Mainframe computing , which meant for “dump”.
- The client server model, allows client to interact with server through request-reply sequence governed by a paradigm known as message passing.
- The server manages application tasks, storage & security & provides scalability ability to add more clients and client devices (like Personal Digital Assistants to PC’s)

b) Internal Processes of Multimedia Servers

- The internal processes involved in the storage, retrieval & management of multimedia data objects are integral to e-commerce applications.
- A multimedia server is a hardware & software combination that converts raw data into usable information & then dishes out.
- It captures, processes, manages, & delivers text, images, audio & video.
- It must do to handle thousands of simultaneous users.
- Include high-end symmetric multiprocessors, clustered architecture, and massive parallel systems.

c) Video Servers & E-Commerce:

- The electronic commerce applications related to digital video will include
    1. Telecommunicating and video conferencing.
    2. Geographical information systems that require storage & navigation over maps.
    3. Corporate multimedia servers.
    4. Postproduction studios.
    5. Shopping kiosks.
- Consumer applications will include video-on-demand.
- The figure which is of video–on demand consist video servers, is an link between the content providers (media) & transport providers (cable operators)

3. Information Delivery/Transport & E-Commerce Applications

- Transport providers are principally telecommunications, cable, & wireless industries.

Information Transport Providers	Information Delivery Methods
• Telecommunication companies	• Long-distance telephone lines; local telephone lines
• Cable television companies	• Cable TV coaxial, fiber optic & satellite lines
• Computer-based on-line servers	• Internet; Commercial online service providers
• Wireless communications	• Cellular & radio networks; paging systems

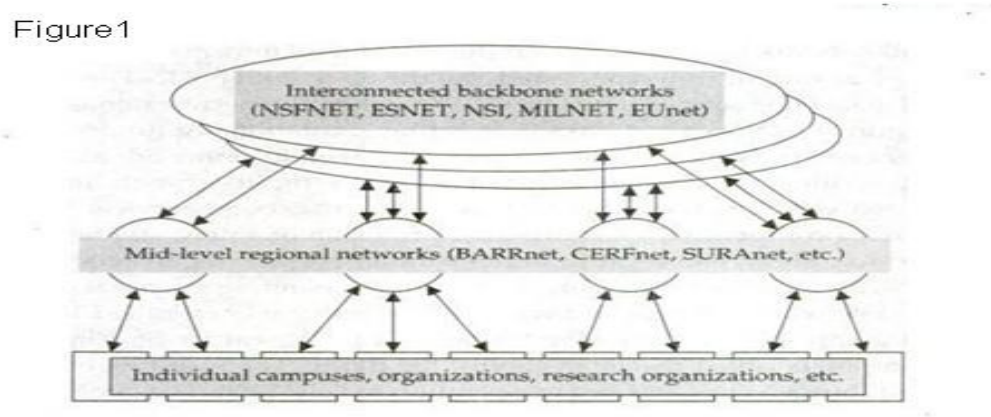
4. Consumer Access Devices

Information Consumers	Access Devices
• Computer with Audio & Video capabilities.	• Personal/desktop computing, Mobile Computing
• Telephonic devices	• Videophone
• Consumer electronics	• Television + Set-top Box, Game Systems
• Personal Digital Assistance (PDAs)	• Pen-based computing, voice-driven computing

NSFNET: ARCHITECTURE AND COMPONENTS:

- National Science Foundation (NFS) has created five super computer centers for complex and wider range of scientific explorations in mid-1980s. Until then, supercomputers were limited to military researchers and other who can afford to buy.
- NSF wanted to make supercomputing resources widely available for academic research. And the logic is that the sharing of knowledge, databases, software, and results was required. So NSF initially tried to use the ARPANET, but this strategy failed because of the military bureaucracy and other staffing problems. So, NSF decided to build its own network, based on the ARPANET's IP technology.
- The NFSNER backbone is initially connected to five supercomputing networks with initial speed 56 kbps telephone leased lines. It was considered fast in 1985 but it is too slow according to modern standards.
- Since every university could not be connected directly to the center, need of access structure was realized and accordingly each campus joined the regional network that was connected to the closest center. With this architecture, any computer could communicate with any other by routing the traffic through its regional networks, where the process was reserved to reach the destination. This can be depicted in the three level hierarchical models as shown in the figure1:

Figure1



This abstraction is not completely accurate because it ignores commercial network providers, international networks, and interconnections that bypass the strict hierarchy.

- Water distribution systems may be useful analogy in understanding the technology and economics of the NSFNET program.
    1. We can think of the data circuits as pipes that carry data rather than water.
    2. The cost to an institution was generally a function of the size of the data pipe entering the campus.
    3. The campuses installed plumbing and appliances such as computers, workstations and routers. And Service cost as an infrastructure cost such as classrooms, libraries and water fountains.
- But there is no extra charge for data use.
- The mid-level networks acted like cooperatives that distributed data from the national backbone to the campuses. They leased data pipes from the telephone companies, and added services and management. So each member could access the pipe and either consume or send data.
- Some funding was also provided by the federal government.
- This model was a huge success but became a victim of its own success and was no longer effective. One main reason for it was-the network's traffic increased until, eventually, the computer controlling the network and the telephone lines connecting them became saturated. The network was upgraded several times over the last decade to accommodate the increasing demand.

The NSFNET Backbone

- The NSFNET backbone service was the largest single government investment in the NSF-funded program. This backbone is important because almost all network users throughout the world pass information to or from member institutions interconnected to the U.S. NSFNET.
- The current NSFNET backbone service dated from 1986, when the network consisted of a small number of 56-Kbps links connecting six nationally funded supercomputer centers. In 1997, NSF issued a competitive solicitation for provision of a new, still faster network service.
- In 1988, the old network was replaced with faster telephone lines, called T-1 lines that had a capacity of 1.544 Mbps compared to the earlier 56 Kbps, with faster computers called routers to control the traffic.

- By the end of 1991, all NSFNET backbone sites were connected to the new ANS-provided T-3 backbone with 45 Mbps capacity. Initial 170 networks in July 1988 to over 38,000 and traffic of initial 195 million packets to over 15 terabytes. Discussions of electronic commerce were due to the economic factor. The cost to the NSF for transport of information across the network decreased.
- It fell from approximately $10 per megabyte in 1987 to less than $1.0 in 1989. At the end of 1993, the cost was 13 cents. These cost reduction occurred gradually over a six-year period. Cost reductions were due to new faster and more efficient hardware and software technologies.

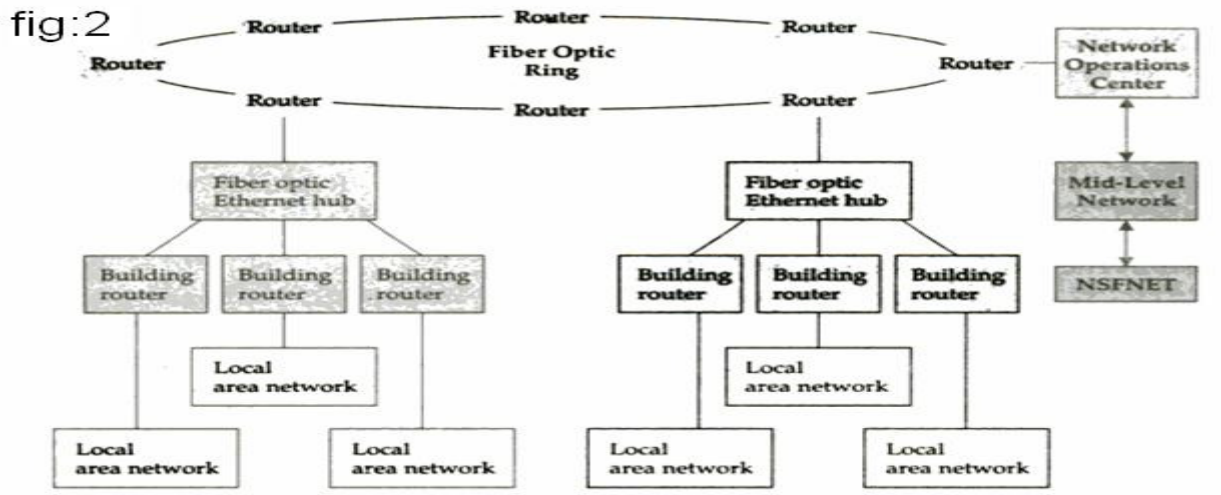
Mid-Level Regional Networks

- Mid level Regional Networks are often referred to as regional networks, are one element of the three-tier NSFNET architecture.
- They provide a bridge between local organizations, such as campuses and libraries, and the federally funded NSFNET backbone service.
- The service of Mid Level Regional Networks tends to vary from sub state, statewide and multistate coverage.

State and Campus Networks

- State and campus networks link into regional networks.
- The mandate for state networks is to provide local connectivity and access to wider area services for state governments, K-12 schools, higher education, and research institutions.
- Campus networks include university and college campuses, research laboratories, private companies, and educational sites such as K-12 school districts.
- These are the most important components of the network hierarchy, as the investment in these infrastructures far exceeds that of the government's investments in the national and regional networks.

fig:2



NATIONAL RESEARCH AND EDUCATION NETWORK

The NSFNET has evolved into the National Research and Education Network (NREN). The NREN is a five-year project approved by Congress as part of the High Performance Computing and Communications Acts in fall 1991. NREN represents the first phase of the HPCC project. The intent is to create a next-generation Internet to interconnect the nation's education and research communities at more than one gigabit (one billion bits per second) data rates, thereby facilitating enhanced access to information resources and computational capabilities.

Development and deployment of NREN is planned to occur in three phases. The first phase begun in 1988, involved upgrading all telecommunication links within the NSFNET backbone to 1.544 Mbps (T-1). This upgrade has been completed for most agencies. In phase two which began in 1991, the NSFNET backbone was upgraded to 45 Mbps (T-3). The second phase also provides upgraded services for 200 to 300 research facilities directly linked to this backbone. The third phase, which will result in a phased implementation of a gigabit-speed network operating at roughly 20-50 time T-3 speeds, to expected to begin during the mid 1990s if the necessary technology and funding are available.

NREN activities can be broadly split into two classifications:

1. Establishment and deployment of a new network architecture for very high bandwidth networks (vBNS)
2. Research to yield insights into the design and development of gigabit network technology.

GLOBALIZATION OF THE ACADEMIC INTERNET

By the late 1980s, the Internet had spread globally, including Canada, Australia, Europe, South Africa, South America, Asia and Japan. Today the global network environment reaches over 140 countries. Asian countries, see the Internet as way of expanding business and trade. Eastern European countries, longing for western scientificties, have wanted to participate and development is progressing rapidly. Other countries see the internet as a way to raise their education and technology levels.

At present, the Internet's international expansion is hampered by the lack of good supporting infrastructure, namely, a decent telephone system.

International Computer Networks:

- In 1970, United Kingdom and Norway were connected to the ARPANET.
- National Network Project was JANET (Joint Academic Network) in United Kingdom, JUNE in Japan, DFN in Germany, UNINET in Norway and SDN in Korea.

- In 1980, CSNET, BITNET (Because It's Time Network) and UUCP (Unix and Unix Copy) all developed international links.
- In 1984, CSNET was operating e-mail gateways between USA, Canada, Korea, Israel, Japan, France, Germany, Australia and Scandinavia.
- NSFNET and European networks are connected by two high speed circuits linking the NSFNET at New York to INRIA.
- In 1989, RIPE (Reseaux IP European) began coordinating the Internet operation in Europe.
- In 199, other international links to NSFNET were established. The connection between California's regional network CERFnet and UFRJ is intended to provide Internet access to a regional network located within the state of Rio de Janeiro.
- NSFNET in November 1991 with a 64 Kbps satellite link to the CERFnet via the Mexican satellite was brought online.
- China was CNPAC (China National Public Data Network) was designed to carry data at speeds varying between 1.2 and 9.6 Kbps.

INTERNET GOVERNANCE: THE INTERNET SOCIETY

No one body controls the Internet. In effect, the system itself polices such things: if any organization strays from the collective standards, it loses the benefits of global connectivity which was the whole point of becoming part of the Internet. Groups do exist that carry out central management functions for the Internet, such as the InterNIC (www.internic.net), which, among other things, registers companies that are connected to the Internet, and the Internet Society (www.isoc.org). The Internet Society has various engineering committees that help make technical recommendations for the future development of the Internet. But none has the power to force a particular direction or action on the Internet community.

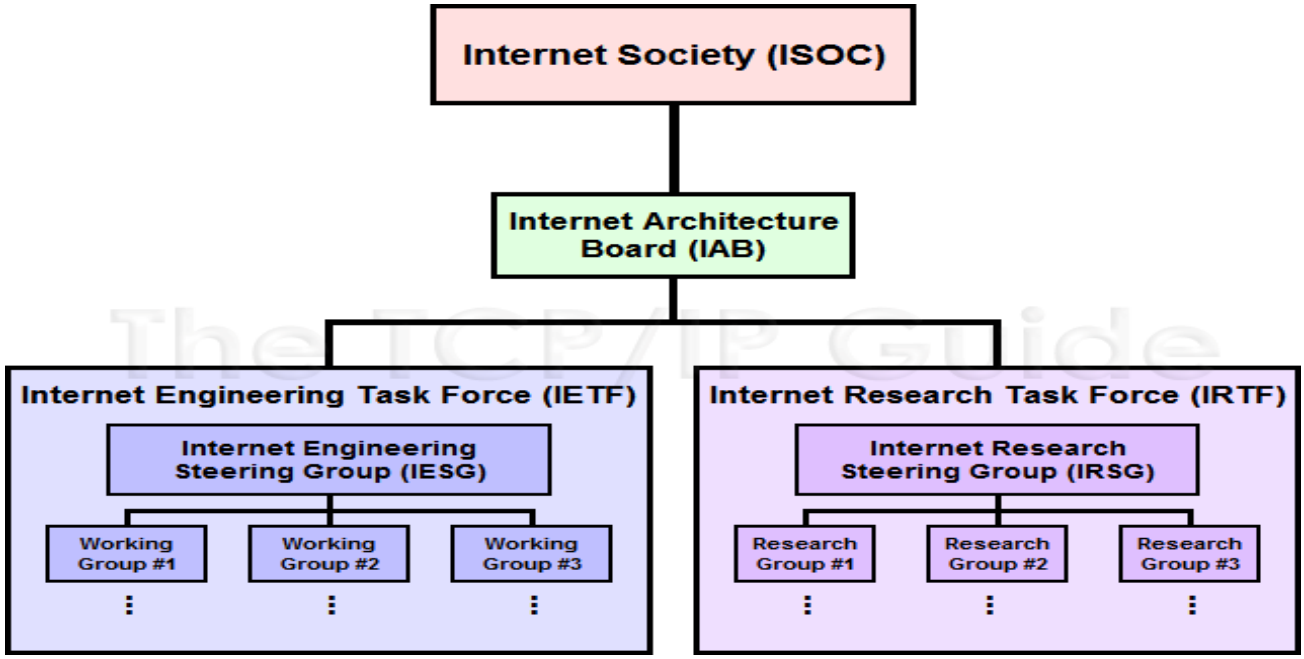
The ultimate authority for the technical direction of the Internet rests with the Internet Society (ISOC). This professional society is concerned with the growth and evolution of the worldwide Internet. It is a voluntary organization whose goal is to promote global information exchange. The four groups in the structure are the ISOC and its Board of Trustees, the Internet Architecture Board (IAB), the IESC, and the IETP itself.

ISOC appoints a council IAB that has responsibility for the technical management and direction of the Internet. The IAB is responsible for overall architectural considerations in the Internet. It is also serves to adjudicate disputes in the standards process and is responsible for the setting the technical direction, establishing standards, and resolving problems in the Internet. IAB also keeps track of various network addresses. Each host computer has a

unique 32 bit address called an IP Address; no two computers in the world can have the same address.

The IAB is supported by the Engineering Task Force (IETF), the protocol engineering and development arm of the Internet. The IETF is a large open international community of the network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet.

The internal management of the IETF is handled by the area directors. Together with the chair of the IETF, they form the Internet Engineering Steering Group (IESG). The operational management of the Internet standards process is handled by the IESG under the auspices of the Internet Society.



AN OVERVIEW OF INTERNET APPLICATIONS

To understand why the Internet is being commercialized, we need to understand what Internet applications people are interested in and are actively seeking. The Internet provides a broad range of services to address a variety of user needs:

- *Individual to group communication*, group conferencing, tele-meeting services, with interactive multimedia and conferencing, negotiation, decision support systems; mailing lists, list services – for research collaboration and distance education across institutional, state and national boundaries.
- *Information transfer and delivery services*, text-based e-mail, multimedia e-mail, e-mail/fax interface e-mail/EDI interface; news groups/bulletin boards/directories; digital audio and video communication.

- *Information databases,* access to citation, full-text databases and "virtual" libraries containing both text and multimedia information. These databases are accessible using Internet tools like Gopher, World Wide Web, file transfer, remote log-in, resource discovery services, and news-gathering agents.
- *Information processing services,* remote access to a variety of software programme including operations research (OR) tools, statistics, simulation and visualization tools.
- *Resource-sharing services,* access to printers, fax machines, and rather processing services that enable the utilization of spare capacity on underutilized machines.

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UNIT IV : E-SECURITY

CLIENT-SERVER NETWORK SECURITY

Client-Server network security is one of the biggest headaches system administrators face as they balance the opposing goals of user maneuverability and easy access and site security and confidentiality of local information.

Network security on the Internet is a major concern for commercial organizations, especially top management. By connecting to the Internet, a local network organization may be exposing itself to the entire population on the Internet. Internet connection effectively breaches the physical security perimeter of the corporate network and opens itself to access from other networks comprising the public Internet.

Organizations must pay attention to security. For many commercial operations, security will simply be a matter of making sure that existing system features, such as passwords and privileges, are configured properly. They need to audit all access to the network. A system that records all log on attempts – the unsuccessful ones – can alert managers. Hackers can use password guessing, password trapping, security holes in programs, or common network access procedures to impersonate users and thus pose a threat to the server.

Client Server network security problems manifest themselves to three ways:

1. *Physical security h*oles result when individuals gain unauthorized physical access to a computer. A good example would be a public workstation room, where it would be easy for a wandering hacker to reboot a machine into single user mode and tamper with the files. Hackers gain access to network systems by guessing password of various users.
2. *Software security holes* result when badly written programs or "privileged" software are "compromised" into doing things they shouldn't. The most famous example of this category is that "send mail" hole, which brought the Internet top its knees in 1988. A more recent problem was the "rlogin" hole in the IBM RS-6000 workstations which enabled a cracker to create a "root" shell or super user access mode. It could be used to delete the entire file system, or create a new account or password file resulting in incalculable damage.
3. *Inconsistent usage holes* result when a system administrator assembles a combination of hardware and software such that the system is seriously flawed from a security point of view. The incompatibility of attempting two unconnected but useful things creates the security hole. Problems like this are difficult to isolate. So it is better to carefully build the system with them in mind. This type of problem is becoming common as software becomes more complex.

PROTECTION METHODS:

Over the years, several protection methods have been developed, including trust based security, security through obscurity, password schemes and biometric systems.

1. Trust Based Security:

Quite simply, trust based security means to trust everyone and do nothing extra for protection. It is possible not to provide access restrictions of any kind and to assume that all users are trustworthy and competent in their use of the shared network. This approach worked in the past, when the system administrator had to worry about a limited threat. Today, this is no longer the case.

2. Security through Obscurity

Most organization in the mainframe era practiced a philosophy known as security through obscurity (STO) – the notion that any network can be secure as long as nobody outside its management group is allowed to find out anything about its operational details and users are provided information on a need to know basis. Hiding account passwords in binary files or scripts with the presumption that "nobody will ever find them".

This method was quite successful with stand alone systems. But the users are free to move around the file system, have a great understanding of programming techniques, and have immense computing power at their fingertips. Then STO becomes less effective and make this method of security useless.

3. Password Schemes

One straightforward security solution, a password scheme, erects a first level barrier to accidental instruction. In actuality, however, password scheme do little about deliberate attack, especially when common words or proper names are selected as passwords. The simplest method used by most hackers is dictionary comparison – comparing a list of encrypted user passwords against a dictionary of encrypted common words.

To counter these threats, various approaches have been suggested for creating one time passwords, including smart cards, randomized tokens, and generate a token that a computer system can recognize – the token is derived from a cryptographic function of the clock time and some initialization information, and a personal identification number (PIN) is required to complete the authentication process.

4. Biometric Systems

Biometric systems, the most secure level of authorization, involve some unique aspect of the person's body. Past biometric authentication was based on comparisons of fingerprints, palm prints, retinal patterns, or on signature verification or voice recognition. Biometric systems are very expensive to implement.

Biometric device variations are appearing, such as system that recognize keyboard typing patterns or read infrared facial patterns from passersby using only a simple video camera for image capture.

ENCRYPTED DOCUMENTS AND ELECTORNIC MAIL

E-mail users who desire confidentiality and sender authentication are using encryption. Encryption is simply indeed to keep personal thoughts personal. E-mail is typically encrypted for the reason that all network correspondence is open for eavesdropping. Internet e-mail is obviously far less secure than the postal system, where envelopes protect correspondence from casual snooping.

E-mail software is increasingly incorporating specific options that simplify encryption and decryption. Examination of encrypted information is nontrivial each file must be decrypted even before it can be examined.

There are two schemes for e-mail encryption that are being deployed on the Internet.

1. Privacy Enhanced Mail Standard

PEM is the Internet Privacy Enhanced Mail standard, designed, proposed but not yet officially adopted, by the Internet Activities Board to provide secure electronic mail over the Internet. PEM includes encryption, authentication, and key management, and allows use of both public key and secret key cryptosystems. The system supports multiple cryptographic tool: for each mail message, the specific encryption algorithm, digital signature algorithm, hash function, and so on are specified in the header.

Trusted Information Systems, Inc. has developed a free non-commercial implementation of PEM, and other implementations should soon be available as well. RIPEM, a program developed by Mark Riordan, enables secure Internet e-mail; it provides both encryption and digital signatures, using RSA and DES routines from RSAREF. It does not fully support certificates.

2. Pretty Good Privacy (PGP)

Pretty Good Privacy (PGP) is a implementation of public key cryptography based on RSA. It is a free software package developed by Philip Zimmerman that encrypts e-mail. Since being published in the US as freeware in June 1991, PGP has spread rapidly and has since become the de facto worldwide standard for encryption of e-mail.

PGP provides secure encryption of documents and data tiles that even advanced supercomputers are hard pressed to “crack”. For authentication PGP employs the RSA public key encryption scheme and the MDS developed by Rivest, a one-way hash function to form a digital signature that assures the receiver that an incoming message is authentic.

ARCHITECTURAL FRAMESWORK FOR ELECTRONIC COMMERCE

The software framework necessary for building electronic commerce applications is little understood in existing literature. In general, a framework is intended to define and create tools that integrate the information found in today's closed systems and allows the development of e-commerce applications. It is important to understand that the aim of the architectural frame-work itself is not to build new database management systems, data repository, computer languages, software agent based transaction monitors, or communication protocols rather, the architecture should focus on synthesizing the diverse resources already in place incorporations to facilitate the integration of data and software for better applications. The electronic commerce application architecture consists of six layers of functionality, or services: (1) Applications; (2) Brokerage services, data or transaction management; (3) Interface, and; support layers" (4) Secure messaging, security and electronic document Interchange; (5) Middle ware and structured document interchange; and (6) Network infrastructure and basic communications services.

Application services	Customer-to- business, Business-to-business, Intra-organizational
Brokerage and data management	Order processing-mail order houses, Payment schemes-electronic cash, Clearing House or Virtual mail
Interface layer	Interactive catalogues, Directory support functions, Software agents
Secure messaging	Secure hypertext transfer protocol Encrypted e-mail, EDI Remote programming (RPC)
Middle ware services	Structured documents (SCML, HTML) Compound documents (OLE, OpenDocs)
Network infrastructure	Wireless - cellular, radio, PCs Wire line– POTS, coaxial, fiber optic

These layers cooperate to provide a seamless transition between today's computing resources and those of tomorrow by transparently integrating information access and exchange within the context of the chosen application.

Electronic Commerce Application Services

Three distinct classes of electronic commerce application can be distinguished: customer to business, business-to-business, and intra organization.

Consumer-to-Business Transactions

This category is also known as marketplace transaction. In a marketplace transaction customers learn about products differently through electronic publishing, buy them differently using electronic cash and secure payment systems, and have them delivered differently. In light of this, the organization itself has to adapt to a world where the traditional concepts of brand differentiation no longer hold-where "quality" has a new meaning, where "content" may not be equated to "product," where "distribution" may not automatically mean "physical transport".

Business-to Business Transactions

This category is known as market-link transaction. Here, businesses, governments, and other organizations depend on computer-to-computer communication as a fast, an economical, and a dependable way to conduct business transactions. Business-to-business transactions include the use of EDI and electronic mail for purchasing goods and services, buying information and consulting services, submitting requests for proposals, and receiving proposals. Each year the trading partners exchange millions of invoices, checks, purchase orders, financial reports, and other transactions.

The current manual process of printing, mailing is costly, time consuming, and error-prone. Given this situation and faced with the need to reduce costs, small businesses are looking toward electronic commerce as a possible saviour.

Intra-organizational Transactions

This category is known as market-driven transactions. A company becomes market driven by dispersing throughout the firm information about its customers and competitors; by spreading strategic and tactical decision making so that all units can participate; and by continuously monitoring their customer commitment by making improved customer satisfaction an ongoing objective. To maintain the relationships that are critical to delivering superior customer value, management must pay close attention to service, both before and after sales. In essence, a market-driven business develops a comprehensive understanding of its customers business and how customers in the immediate and downstream markets perceive value.

Three major components of market-driven transactions are

- Customer orientation through product and service
- Customization; cross-functional coordination through enterprise
- Integration; and advertising, marketing, and customer service

Information Brokerage and Management

The information brokerage and management layer provides service integration through the notion of information brokerages, the development of which is necessitated by the increasing information resource fragmentation. The notion of information brokerage is used to represent an intermediary who provides service integration between customers and information providers, given some constraint such as a low price, fast service, or profit maximization for a client. Information brokers, for example, are rapidly becoming necessary in dealing with the voluminous amounts of information on the networks. As on-line databases migrate to consumer information utilities, consumers and information professionals will have to keep up with the knowledge, and owner-ship/of all these systems. With all the complexity associated with large numbers of on-line databases and service bureaus, if it is impossible to expect humans to do the searching. It will have to be software programs information brokers or software agents, to use the more popular term-that act on the searcher's behalf.

Information brokerage does more than just searching. It addresses the issue of adding value to the information that is retrieved. For instance, in foreign exchange trading, information is retrieved about the latest currency exchange rates in order to hedge currency holdings to minimize risk and maximize profit.

Another aspect of the brokerage function is the support for data management and traditional transaction services. Brokerages may provide tools to accomplish more sophisticated, time-delayed updates or future compensating transactions. These tools include software agents, distributed query generator, the distributed transaction generator, and the declarative resource constraint base which describes a business's rules and environment information. Software agents are mobile programs that have been called "healthy viruses", "digital butlers" and "intelligent agents". Agents are encapsulations of users' instruction that perform all kinds of tasks in electronic marketplaces spread across networks. Information brokerages dispatch agents capable of information resource gathering, negotiating deals, and performing transactions.

Interface and Support Services

The third layer, interface and support services will provide interfaces for electronic commerce applications such as interactive catalogues and will sup-port directory services-functions necessary for information search and access. These two concepts are very different. Interactive catalogs are the customized interface to consumer applications such as home shopping. An interactive catalog is an extension of the paper-based catalog and incorporates additional features such as sophisticated graphics and video to make the advertising more attractive. Directories, on the other hand, operate behind the scenes and attempt to organize

the enormous amount of information and transactions generated to facilitate electronic commerce. Directory services databases make data from any server appear as a local file. In the case of electronic commerce, directories would play an important role in information management functions.

Secure Messaging and Structured Document Interchange Services

In Integrated Messaging: a group of computer services that through the use of a network send, receive, and combine messages, faxes, and large data files. Some better-known examples are electronic mail, enhanced fax, and electronic data interchange. Broadly defined, messaging is the software that sits between the network infrastructure and the clients or electronic commerce applications, masking the peculiarities of the environment. Others define messaging as a frame-work for the total implementation of portable applications, divorcing you from the architectural primitives of your system. In general, messaging products are not applications that solve problems; they are more enablers of the applications that solve problems. Messaging services offer solutions for communicating non formatted (unstructured) data-letters, memos, reports as weft as formatted (structured) data such as purchase orders, shipping notices, and invoices. Unstructured messaging consists of fax, e-mail, and form-based systems like Lotus Notes

Middleware Services

Middleware is a relatively new concept that emerged only recently. Users in the 1970s, when vendors, delivered homogeneous Over the years, there developed the need to solve all the interface, translation, transformation, and interpretation problems that were driving application developers crazy. As the cry for distributed computing spread, users demanded interaction between dissimilar systems, networks that permitted shared resources and applications that could be accessed by multiple software programs. Middleware is the ultimate mediator between diverse software programs that enables them talk to one another. Another reason for middleware is the computing shift from application centric to data centric i.e. remote data controls all of the applications in the network instead of applications controlling data.

WORLD WIDE WEB (WWW) AS THE ARCHITECTURE

Web provides the functionality necessary for electronic commerce. Electronic commerce depends on the unspoken assumption that computers cooperate efficiently for seamless information sharing.

The web community of developers and users is tackling the complex problems. The web began in March 1989, when Tim Berners-Lee of the European Laboratory for particle

Physics proposed the web project for research collaboration. Information sharing has been a goal of CERN, whose members are located in a number of European countries, for many years.

The initial proposal outline a simple system of using networked hypertext to quickly disseminate documents among colleagues. There was no intention of supporting sound, video, or images in this proposal. By the end of 1990, an implementation of the web was placed on a NEXT machine at CERN. The software had the capability to edit documents on the screen using a very primitive line mode browser.

Hundreds of people throughout the world have contributed by writing and modifying web software and documents. The project reached global proportions by the middle of 1993 with the introduction of the NCSA Mosaic – a multimedia front end to all the information served by the web.

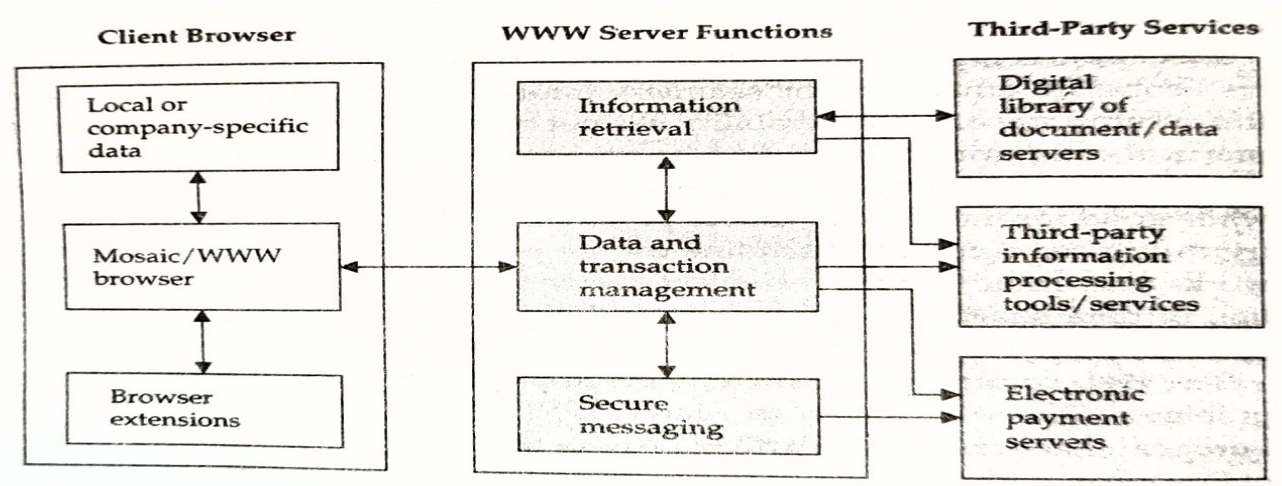

Figure 6.4 Block diagram depicting an electronic commerce architecture

The web architecture is made up of three primary entities : client browser, web server and third party services. The client browser usually interacts with the www server, which acts as an intermediary in the interaction with third party services.

The client browser resides on the user's PC or workstation and provides an interface to the various types of content. For instance, if the user retrieves a graphics file from a web server, the browser automatically starts up the graphics files are available – JPEG, GIF, TIFF, BMO, among others. The browser has to be smart to understand what file it is downloading and what browser extension it needs to activate to display the file.

Web server functions can be categorized into information retrieval, data and transaction management, and security. The third-party services could be other web servers that make up the digital library, information processing tools, and electronic payment systems.

HYPERTEXT PUBLISHING

Hyper Media on the Internet (called distributed or global hypermedia) has accelerated sharply following the success of the web and browsers such as the NCSA Mosaic. This success has been aided by more powerful workstations, high resolution graphics displays, faster network communications, and decreased cost for large online storage.

Hypertext versus Hypermedia

Hypertext is an approach to information management in which data are stored in a network of documents connected by links. These links represent relationships between nodes. A hypermedia system is made of nodes (documents) and links (pointers). A node usually represents a single concept or idea. Nodes can contain text, graphics, animation, audio, video, images or programs. The nodes, and in some systems the network itself, are meant to be viewed through an interactive browser and manipulated through a structure editor.

Nodes are connected to other nodes by links. The node from which a link originates is called the reference or anchor, and the node at which a link ends is called the referent. The movement between nodes is made possible by activating links, which connect related concepts or nodes. In the web, links are not types. Links can be either referential or hierarchical. Hypertext is a very simple concept based on the association of nodes through links.

Hypermedia contains links not only to other pieces of text but also to other forms of media – sounds, images, and movies. Images themselves can selected to link to sounds or documents. In short, hypermedia combines qualities of hypertext and multimedia.

Benefits of Hypermedia Documents

- Hypermedia documents are much more flexible than conventional documents. For example, one can read a hypermedia article just as one reads a conventional newspaper article. However, once also read the sections in different order depending on what captures the reader's interest.
- Hypermedia documents are also convenient. Hypermedia documents offer sound, video sequences, animation, even computer programs that execute when the links are selected.
- Hypermedia links and nodes can change dynamically. Information in individual nodes can be uploaded, new nodes can be linked into overall hypermedia structure, and new links can be added to show new relationships.

- Hypermedia systems are taking off as a new class of document authoring and management systems.
- These systems allows people to create, annotate, link together, and share information from a variety of media such as text, graphics, audio, video, animation, and programs.

ELECTRONIC DATA INTERCHANGE (EDI)

EDI can be used to electronically transmit documents such as purchase orders, invoices, shipping notices, receiving advices, and other standard business correspondence between trading partners. EDI can also be used to transmit financial information and payments in electronic form. When used for affecting payments, EDI is usually referred to as Financial EDI and Electronic Funds Transfer (EFT).

As the EDI is fast, accurate, & economical in handling business document, more and more companies are adopting this method to increase the efficiency of the organization. It is the paperless exchange of information by using E-mail, Electronic Bulletin Boards, Electronic Fund Transfer & other similar technologies. It is also known as "Paperless Trading".

Electronic data interchange is the electronic transfer from one computer to another computer processable data using an agreed standard to structure the data.

BENEFITS OF EDI

Computers have speeded up the production of invoices, purchase orders, etc. When these documents are produced by high-speed printers, however, they must still be detached, inserted, and mailed; copies must also be filed by the originating organization. Originals must be physically transported to the addressee, opened, carried to the appropriate individual within the addressee organization, and processed, which usually entails keying of the data into an MIS system, manually.

The use of EDI eliminates many of the problems associated with traditional information flow, which are mentioned below.

- EDI helps organization by automatically processing information.
- EDI reduces associated expenses of storage, printing, postage, mailing and recycling
- EDI minimizes data entry errors, improves accounts payable/receivable times as processes become streamlined and can be used for forecasting.
- Your business cycle is improved and stock levels are kept constantly up to date and visible.

- EDI transfer ensures real-time processing and eliminates times associated with manually sending, receiving and entering orders.
- EDI reduces the time it takes your staff to manually create invoices and process purchase orders.
- EDI eliminates paper trails and ensures paper usage is kept to a minimum.

Another advantage in the use of EDI is that it generates a functional acknowledgement whenever an EDI message is received, and it is electronically transmitted to the sender. This acknowledgement states that the message is received.

It is most suited in areas where any of the following characteristics exists.

- A large volume of repetitive standard actions.
- Very light operating margins.
- Strong competition requiring significant productivity improvement.
- Operational time constraint.
- Trading partners request for paperless exchange of documents.

LIMITATIONS OF EDI

1. **Cost of Implementation:** It is true that EDI provides massive cost savings benefits but for small businesses re-designing and implementing software applications to fit in EDI into current applications can be quite costly. Such limitations of EDI must be considered if you plan on implementing such system.
2. **Electronic System Safety:** EDI also necessitates substantial investment in computer networks and security systems for maximum security. Any EDI system installed would require protection from hacking, malware, viruses, and other cyber security threats.
3. **Preliminary Setup Consumes Time:** Not only is the implementation of EDI system expensive to install, but it also consumes a considerable amount of time to set up the essential parts. Thus, such limitations of EDI can hinder fast-tracking of services if urgently required.
4. **Several Standards to maintain:** Numerous businesses looking to implement EDI also consider the several standards involved. These limitations of EDI do not allow small businesses to exchange data with larger establishments that make use of latest edition of a document standard. Some known measures include ANSI ASC X12, GS1 EDI, HL7, TRADACOMS, and UN/EDIFACT.
5. **Suitable Backup System:** EDI implementation also requires regular maintenance as the business functionality is highly dependent on it. Some robust data backup system is needed in case of system crash or for statistical purpose. Such limitations of EDI can cost some substantial amount to implement.

THE NEW AGE OF INFORMATION-BASED MARKETING

Interactive marketing brought on by electronic commerce will change the roles of small business, retailers, manufacturers, and media companies.

1. Retailers versus Manufacturers

The role of Retailers and manufacturers are fast reversing in electronic commerce. Now days, retailers have an advantage over manufacturers because they can measure customer response and get first crack at the broadest range of information. Indeed, point-of-sale (POS) scanning systems have played a major role in shifting power from manufacturers to retailers, as large innovators like Wal-Mart have amply proven.

Information based marketing can offer manufacturers and retailers a means to do market research and customer prospecting; to establish branch loyalty, market presence, and distribute redeemable coupons; and to create customized product bundles.

Retailer's vs Manufacturers have the following methods:

1. Market research and customer prospecting
2. Market presence method
3. Product or services building method
4. Information-based products pricing and priority method

2. Target and Micro Marketing:

Electronic commerce, technology has put target and micromarketing within the research of small business. It gives information to the micro marketers not only about its own business but also consumer's information. Consumer target is two-way flow of communication between seller and buyer. Direct mail and telemarketing are two fast growing ways to micro market. Technology is an essential tool in micromarketing. There are two main types of micro marketing:

- Direct-relationship micromarketing is aimed at stimulating sales at retail establishments through direct contacts with consumers.
- Direct-order micromarketing is focused on selling products directly to consumers in their homes or businesses.

3. Small Business versus Large Business:

The key distinction between small and large business remains access to national and international marketing for advertising purposes.

4. Regulatory and Legal implications of Cyberspace Marketing:

Today, exorbitant advertising cost represents the barrier to reaching the customer effectively. Internet and other networks plays good role in advertising. The major difference between the internet and other I-way advertising media are ownership and membership fees. Due to the empowering effect of internet-facilitated advertising however, the balance of power between large and small companies may change in future

ADVERTISING ON THE INTERNET

Internet advertising has been around since 1994, but things have changed quite a bit in the last quarter century. From simple banner ads to pop ups, to now video production ads. Internet advertising provides businesses with billions of opportunities to reach target customers via computer and now mobile phones.

Internet Advertising Channels: Search, Social and Display

Internet advertising can split into three categories: search, social and display.

Paid Search:

Search advertising, also known as paid search and search engine marketing (SEM), are online ads that appear in search engine results on platforms like Google AdWords or Bing Ads.

So, whenever a person uses a major search engine to look up a certain product, search advertisements are the ones that will be appear in the top areas of your Google or Bing search.

For example, if I wanted to buy a dog bed for my French bulldog Nigel, I could Google "dog bed" and get the results

As you can see, paid search advertising is solely focused on intent-based results! You are marketing with the intent to buy!

This is a great way to advertise because you're giving the potential customer products and services they want! This leads to high conversion rates and value.

So how do you pay for search advertising?

Paid search advertising uses a pay-per-click (PPC) advertising model, which means that every time your ad is clicked you pay the search engine for that traffic.

Paid Social

Social advertising or paid social ads are advertisements that appear on social media platforms. Social media platforms like Twitter, Facebook and Instagram are paid to promote a business through boosted posts, offers and promotions.

Social ads help you target potential customers by personal, professional, demographic and behavioral parameters which allow you to reach the people who are most relevant instead of buyer intent!

An example of this would be a "sponsored" Facebook post that is used to increase the post's presence or a Instagram advertisement:

Using paid social advertisements, you are able to use effective targeting, call to action buttons, useful tracking and analytics to see fast results in relevant platforms everyone uses daily!

Display Advertising

Display ads are the ad boxes that are on the tops or sides of a website. They can be traditional banner ads or even videos. These types of ads appear on sections reserved for paid advertising and are aimed at generating call to action.

For example, many news websites are full of video ads and clickable banner ads that are even that much more aggressive making you watch five seconds of a video before you can get into the content you came for.

Display advertisements are effective as they have a wide spread across millions of websites reached by Google's Display Networks. These search engines share your ads to websites and apps based on keywords targeting preferences.

Online Advertising: Campaign Elements

There is much more to online advertising than simply placing an ad on the Internet and hoping for the best. The most effective advertising campaigns combine numerous interconnected elements, all of which perform unique functions to maximize the campaign's potential. Not every online advertising campaign will have every element, but the following components of a digital marketing initiative will be common to many campaigns.

Text and Visual Ads

Google AdWords and Bing Ads offer advertisers the choice of either text-based ads or more visual advertisements, such as banners. Text-based ads are often referred to simply as PPC ads, whereas banners and similar ad formats are commonly referred to as display ads. In addition, social media platforms such as Facebook offer highly visual advertising formats that include some ad copy, which can be thought of as a combination of both. There are dozens of advertising formats available to today's advertisers, allowing you to choose the format and advertising network that best suits the needs of your campaigns.

Landing Pages

Landing pages are specialized, optimized web pages that visitors are taken to upon clicking an ad. Landing pages can feature specific products featured in the advertisements themselves, or they may include prompts for users to provide the advertiser with more information, such as web forms. Landing pages can be used to convince prospects to complete an action, such as making a purchase, or function as another step in a longer "funnel," such as requesting additional information or downloading a piece of content for lead generation purposes.

Call Tracking

To many advertisers, phone calls are the most valuable source of leads. For this reason, advertisers can choose to track phone calls generated from online advertising

campaigns. WordStream Advisor, our comprehensive PPC and paid social management platform, offers fully integrated call tracking functionality, allowing you to determine the precise ad and keyword that prompted a prospective customer to call your business.

Sponsored Content

Many advertisers choose to utilize sponsored content as an element of their online advertising campaigns. Sponsored content can take many forms, from advertorial-style editorial content featured on websites (commonly known as native advertising), to sponsored updates on social media platforms. Both Facebook and Twitter offer advertisers this feature, with both platforms boasting a wide range of sponsored update options, such as Facebook's Promoted Posts and Twitter's Sponsored Tweets.

Analytics

Advertisers do not simply publish ads to the web and hope for the best – they must know exactly how well their ads are performing, and from where their traffic is coming. This is why analytics is a crucial component of any online advertising strategy. Analytics tools such as those found within WordStream Advisor offer a wealth of information about an advertising campaign, from impression share and click-through rate to cost-per-conversion and trends over time. Analytics tools are also invaluable in determining how consumers discover and ultimately interact with your website, a process known as attribution modeling.

Email Marketing

Email marketing is one of the most common elements in an online advertising campaign. Some advertisers launch email-only campaigns to highlight time-specific offers or content downloads, whereas others use email to complement their other digital marketing channels. Email marketing can be highly effective, making it a popular choice for today's advertisers.

Remarketing

Consumers rarely discover a website and decide to make a purchase immediately. The customer journey can be lengthy and complex, and take place across multiple devices and websites over prolonged periods of time. For this reason, remarketing has become one of the most important tools in a digital marketer's toolbox. Remarketing allows you to track users who have visited your website – but failed to convert or take action – once they leave your site, and serve ads to them on other websites. This not only significantly increases brand awareness, but also provides numerous further opportunities for the user to revisit your website and convert at a later time. Remarketing can be enabled on search and display campaigns, as well as social advertising initiatives.

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UNIT V : E-GOVERNANCE

DEFINITION:

E-governance, expands to **electronic governance**, is the integration of **Information and Communication Technology (ICT)** in all the processes, with the aim of enhancing government ability to address the needs of the general public. The basic purpose of e-governance is to simplify processes for all, i.e. government, citizens, businesses, etc. at National, State and local levels.

In short, it is the use of electronic means, to **promote good governance**. It connotes the implementation of information technology in the government processes and functions so as to cause **simple, moral, accountable and transparent governan**ce. It entails the access and delivery of government services, dissemination of information, communication in a quick and efficient manner.

Characteristics of E-Governance

1. Easy access to single point delivery of public service to citizens.
2. Higher penetration due to automation.
3. Increased efficiency due to connectivity.
4. Increased accountability.
5. Reduction in cost of delivery services.
6. Increased transparency.
7. Higher availability of public domain information.
8. Reduced corruption.

Benefits of E-governance

- Reduced corruption
- High transparency
- Increased convenience
- Growth in GDP
- Direct participation of constituents
- Reduction in overall cost.
- Expanded reach of government

Through e-governance, the government plans to **raise the coverage and quality of information and services provided to the general public**, by the use of ICT in an easy, economical and effective manner. The process is extremely complicated which requires, the proper arrangement of hardware, software, networking and indeed re-engineering of all the processes to facilitate better delivery of services.

E-Governance Maturity Model

The design of the maturity model takes into account the assumption that the Government Ministry/Department, that has made the service available to its beneficiaries, knows the exact true state of its service and the beneficiary, that avails this services, can provide the true state of service that it has experienced while availing the service.

The model proposes to conduct two kinds of assessments by requiring the Government Ministry/Department and beneficiary to fill two different questionnaires for each of the service offered by the Government Ministry/Department.

- **Top-down Assessment** : This assessment is required to arrive at the digital maturity of services being offered a Government Ministry/Department. The questionnaire for the top-down assessment can be filled by the Government official responsible for delivering the services or any of the authorized representative of the Government Ministry / Department such as agency that has consulted the Government Ministry / Department and / or implemented the service, etc.
- **Bottom-up Assessment** : This assessment is required to arrive at the level of comfort that the beneficiary experiences while availing the service. The questionnaire for the bottom-up assessment is required to be mandatorily filled-in by the beneficiary.

The model provides the outside-in perspective of the government services (delivery view) and not necessarily the inside-out view (e.g. governance or developer view). The model requires services to be categorized into Informational and Transactional types to give weightages for the purpose of aggregation at Ministry / Department level and identify their maturity level for all the e-Governance services offered by it. The framework considers the maturity based on the availability of services, and not by their uptake.

Digital Maturity Pillars

The model is based on the three pillars of cashless, paperless and faceless which are the key tenets for improving service delivery to citizens. The three pillars of the model are depicted in the following diagram.

Cashless :

Any service rendered to a beneficiary through any service delivery channel enabled with option of electronic/digital payment modes.

Paperless :

Any service that is entirely dematerialized and requires no physical paper at any level for rendering of that service to the beneficiary.

Faceless :

Any service in which a beneficiary is not required to come in contact with government personnel, unless it's a legal requirement, and that requires no human interface for delivery of that service to the beneficiary.

The E-Governance proceeded through four stages

1. **Presence** : This stage is classified by a simple information-providing Web site of a passive nature, sometimes described as "brochure ware," indicating the same level of functions as a paper brochure.
2. **Interaction**: The interaction stage offers simple interactions between government and citizen (G2C), government to business (G2B), or government agency to government agency (G2G). Interaction stage Web sites provide e-mail contact and interactive forms that generate informational responses.
3. **Transaction**: The transaction stage enables transactions such as paying for license renewals online, paying taxes or fees, or submitting bids for procurement contracts.
4. **Transformation**: The highest stage, most closely aligned with the concept of governance, involves a reinvention of how government functions are conceived and organized.

Types of Interactions in E-Governance :

1. **G2G (Government to Government)**: When the exchange of information and services is within the periphery of the government, is termed as G2G interaction. This can be both horizontal, i.e. among various government entities and vertical, i.e. between national, state and local government entities and within different levels of the entity.
2. **G2C (Government to Citizen)**: The interaction amidst the government and general public is G2C interaction. Here an interface is set up between government and citizens, which enables citizens to get access to wide variety of public services. The citizens have the freedom to share their views and grievances on government policies anytime, anywhere.
3. **G2B (Government to Business)**: In this case, the e-governance helps the business class to interact with the government seamlessly. It aims at eliminating red-tapism, saving time, cost and establish transparency in the business environment, while interacting with government.
4. **G2E (Government to Employees)**: The government of any country is the biggest employer and so it also deals with employees on a regular basis, as other employers do. ICT helps in making the interaction between government and employees fast and efficient, along with raising their level of satisfaction by providing perquisites and add-on benefits.

E-governance can only be possible if the government is ready for it. It is not a one day task, and so the government has to make plans and implement them before switching to it. Some of the measures include Investment in telecommunication infrastructure, budget resources, ensure security, monitor assessment, internet connectivity speed, promote awareness among public regarding the importance, support from all government departments and so forth

E-governance has a great role to play, that **improves and supports all tasks performed by the government department and agencies,** because it simplifies the task on the one hand and increases the quality of work on the other.

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