



ଓଡ଼ିଶା ରାଜ୍ୟ ମୁକ୍ତ ବିଶ୍ୱବିଦ୍ୟାଳୟ, ସମ୍ବଲପୁର, ଓଡ଼ିଶା
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Certificate in E-Commerce

CEC

CEC-1

Architectural Framework of E commerce

Block

2

Unit-1 : World Wide Web and TCP/IP Protocols

Unit-2 : Web Browser and Web Servers

Unit-3 : Network Infrastructure for E-commerce



Unit -1 World Wide Web and TCP/IP Protocols

Learning objectives

After reading this unit you will

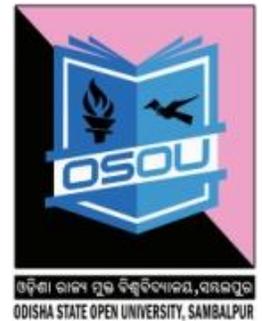
1. Understand what is WWW and TCP/IP Protocol.
2. Know the origin of WWW and TCP/IP.
3. Know what are the Features and working of WWW and TCP/IP

Structure

- 1.1 Introduction
- 1.2 Meaning of WWW
- 1.3 Terms of WWW
- 1.4 Basic Features of WWW
- 1.5 Nature of WWW
- 1.6 Historical Perspective of WWW
- 1.7 Architecture of WWW
- 1.8 Meaning of TCP/IP
- 1.9 Origin of TCP/IP
- 1.10 Features of TCP/IP
- 1.11 Working of TCP/IP
- 1.12 Let us sum up
- 1.13 Key Terms
- 1.14 Self – Assessment Questions
- 1.15 Further Readings
- 1.16 Model Questions
- 1.17 Self – Assessment Questions and Answers

1.1 INTRODUCTION

The World-Wide Web is one of the most used and predominately services of the Internet. Basically, the World-Wide Web is a client-server system that integrates diverse between the types of information on the global Internet and enterprise networks platform. Further, Clients and servers on the Web communicate using the Hyper-Text Transfer Protocol (HTTP), which is layered on the TCP/IP(Transmission control Protocol and Internet Protocol). A protocol is just a standard set of rules and regulation which allow a client and server to



communicate. For a client and server to communicate, they must speak the same protocol.

In this connection, the client and server system, the client is a Web Browser, such as Internet Explorer or any software that can make a HTTP request for a HTML (Hyper-Text Markup Language) file and is able to show it graphically to the user.

1.2 MEANING OF WORLD WIDE WEB (WWW)

World Wide Web (WWW). Web means to a specific kind of internet interface. The web documents contain links that lead to other web pages. The World Wide Web is one of the ways of accessing information over the medium of the internet. It is an information-sharing model that is built on top of the internet. It is an internet based global information system that makes available multimedia information from over millions of computers around the world. Web uses the HTTP (Hyper Text Transfer Protocol) to communicate with server computers and transmit data.

It is one of the newest and most popular hypertext-based internet tools. It allows users to access and display documents and graphics stored on any server on the internet. In 1989, Tim Berners-Lee, a computer scientist at the CERN particle physics lab in Switzerland, designed the WWW. There are many interfaces to the WWW, such as Mosaic, a GUI(Graphical User Interface) based on hypertext browser, and Netscape, which allows users to easily navigate the internet and access the services.

1.3 TERMS OF WWW

The following popular Terms of WWW are as follows;

- 1) **CGI**- Common gateway interface. A specification for a communication interface between external systems and a web server.
- 2) **HTML**- Hyper-Text markup Language. A text formatting language used to create web pages.
- 3) **HTTP**- Hyper-Text Transport Protocol. The communications protocol between a web server and a client.
- 4) **Image Map**- A text file that defines regions using graphics files that users can click on to navigate.
- 5) **MIME**- Multipurpose Internet Mail Extensions. An internet standard for sending and receiving multimedia E-mail.

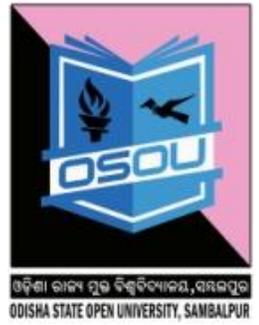


- 6) **Server-Side**- A web server feature that lets HTML pages be parsed “on the fly” filling in parts of the page with information from external files.
- 7) **S-HTTP**- Secure Hyper-Text Transport Protocol. An extension of HTTP that provides communication and transaction security for web clients and servers.
- 8) **SSL**- Secure Socket Layer. A transport mechanism developed by Netscape communication for transmitting secure data over a network.
- 9) **URL**- Uniform Resource Locator. An address that specifies the location of a web page.

1.4 BASIC FEATURES OF WWW

- (A) **Non Linear Information**- WWW allows the user to access any types of information in a non sequential manner or through any path of his own choice. The text messages , music, sound and any other information can be linked together in a non sequential way and allow the user to browse through related topics.
- (B) **Multimedia facility**- Web has the capability to display multimedia information such as images, graphics, text, sounds, music, animation, video and many other multimedia data types.
- (C) **web navigation or Hyperlinks**- It is also called as a web navigation element that allows the user to move or navigate between the pages. It is possible to download audio, video and other types of multimedia files. There are three types of hyperlinks such as text, image and image maps.
- (D) **World over Reach**-The information over the internet is widely dispersed all over the web that can be easily accessed by anyone at anytime i.e. 24 hours and 7days because web has a global reach. By using hyperlinks one can move from one site to another site that may be located in different parts of the world.
- (E) **Cross platform**- One needs to have a browser (Internet explorer or any other) to access an internet and once on the internet by using any platform that may be windows or any workstation, it is easy to retrieve any information. WWW is independent of the platform being used by the machine and not limited to any kind of machine. That’s why the Web is entirely cross platform.
- (F) **Interactivity**-It is the ability of the web which allows the client to converse back to the server. In case of web one can talk back to the

server by way of using hyperlinks and other is video conferencing by using internet audio phones and video communication.



1.5 NATURE OF WORLD WIDE WEB (WWW)

- a) WWW is a platform independent in nature.
- b) Available all over the world.
- c) There is client server architecture.
- d) Integration of legacy systems.
- e) Millions of users are used.
- f) Quick response and easy access to information.
- g) Quick retrieval of information.
- h) GUI(Graphical User Interface) application creation is very simple and wide.
- i) Development of applications is quick and responsiveness.
- j) Multi protocols have common interface.
- k) Support of Hypermedia.
- l) Computing is distributed.
- m) Cheaper access of cost.
- n) Reliability.
- o) Secure connections.

1.6 HISTORICAL PERSPECTIVE OF WORLD WIDE WEB (WWW)

The World Wide Web (WWW) is a distributed hypermedia system which relies on some of the internet's services. Further, the naming service provided by the Domain Name Service (DNS). It is quite reliable connection-oriented transmission service provided by the Transmission Control Protocol (TCP).

The concept of web was originally conceived from Tim Berners-Lee, a scientist at CERN (CERN is the European Organization for Nuclear Research), invented the World Wide Web (WWW) in 1989. During 1993: First usable browser (MOSAIC) has been issued, further, during 1994, the Foundation of World Wide Web Consortium (W3C). – W3C then started then, developing HTML, HTTP and Style Sheets.

HTML: HyperText Markup Language is the main markup language for creating web pages and other information that can be displayed in a web browser.

HTTP: HTTP (Hypertext Transfer Protocol) is the set of rules for transferring files (text, graphic images, sound, video, and other multimedia files) on the World Wide Web. HTTP(Hypertext Transfer Protocol) is an information

dissemination tool generally used on the Internet. It uses a common display format to publish non-formatted multimedia messages in various environments. When the Web user opens their Web browser, the user is indirectly making use of HTTP. HTTP is an application protocol that runs on top of the TCP/IP suite of protocols (the foundation protocols for the Internet use). Hyper-Text Transfer Protocol is the communications protocol used to connect to Web servers on the Internet or on a local network (intranet). Its primary function is to establish a connection with the server and send HTML pages back to the user's browser. It is also used to download files from the server either to the browser or to any other requesting application that uses HTTP.

Client-server model the client-server model is an approach to computer network programming developed at Xerox PARC during the 1970s. It is now prevalent in computer networks. Email, the World Wide Web, and network printing all apply the client-server model.

Internet Technologies

- Distributed Client / Server Architecture
- World Wide Web (WWW, the Web)
- Domain Name System (DNS)
- TCP/IP (Transmission Control Protocol) and Sockets

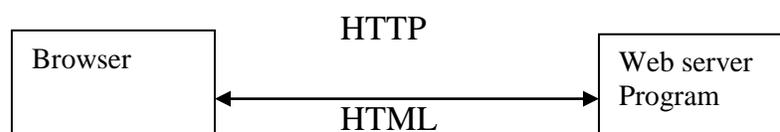
1.7 ARCHITECTURE OF WORLD WIDE WEB (WWW)

The WWW architecture has three service aspects. They are as follows:

1. Client Browser.
2. WWW server function.
3. Third party services.

The www is a global network of millions of web servers and web browsers connected by the HTTP.

KEY FUNCTIONS OF HTTP



Client browser provides local or specific data by has mosaic or WWW browser and browser extensions. It is fixed on the user's PC(Personal computer) or workstation. It provides interface to the various types of contents. Web

servers provide information retrieval service, data and transaction management and secure messaging.

The third party services include the digital library of documents, data servers, information processing tools, electronic payment servers etc.

Web architecture components can be divided into three parts. They are:

1. Hypertext Mark-up Language (HTML)
2. Hypertext transfer protocol (HTTP)
3. Common gateway interface (CGI)

Web browser is the software that enables the users to access the database. It is a graphical interface between the user and the server or the provider. HTML is the Hyper Text Mark-up Language that is used for formatting web pages and for hyperlinks. HTTP is the Hyper Text transfer Protocol that enables communication between the web server and the clients.

Architecture Client and Server:

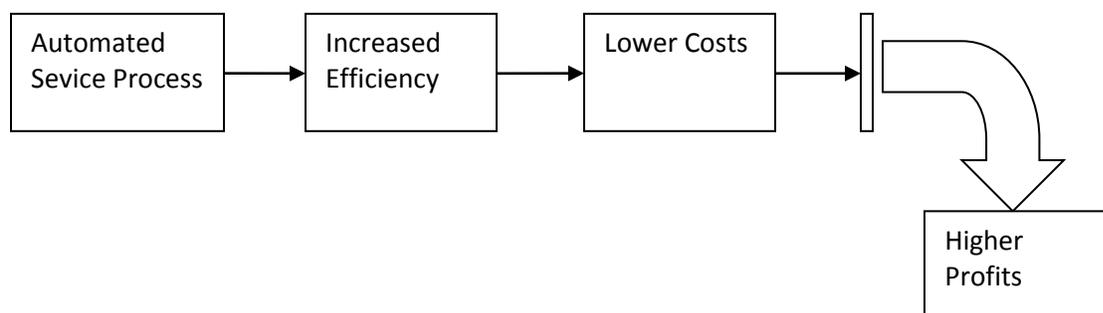
1. A server acts as a resource manager for a collection of resources of a given type.
2. A client performs a task that requires access to some shared hardware and software resources. In the client / server model, all resources are held by servers. Clients issue requests whenever they need to access one of the resources.

Examples of Architecture Client Server

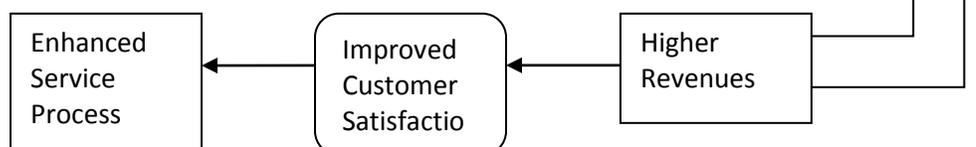
1. A web server (HTTP, http) manages a collection of web (HTML) pages.
2. A web client (HTTP client, a web browser) requests web pages.

Web Service's Approaches to Profitability and Customer Retention

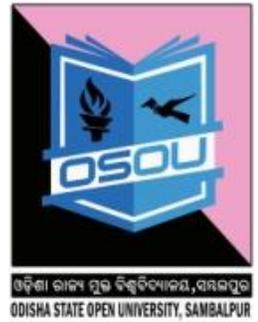
Traditional Approach



Web Service Approach



TRANSMISSION CONTROL PROTOCOL / INTERNET PROTOCOL (TCP/IP)



1.8 MEANING OF TCP/IP

Protocol means rules or regulations. Whenever two computers communicate, the set of rules and regulations they follow are known as communication protocols. TCP/IP (Transmission Control Protocol/Internet Protocol) is a communication language. Further, it is also called as protocol of the Internet. Further, it is **commonly known as the Internet Protocol Suite**. It can also be used as a communications protocol in a private network i.e. intranet or extranet. TCP and IP are communication protocols. A communication protocol specifies the exact format and meaning of data a computer sends and also conditions under which the data should be sent, etc. Most importantly, communication protocols are independent of the software and the hardware used.

Internet protocols (IP) is the primary network protocol used on the Internet, developed in the 1970s. The internet protocols consist of a suite of communication protocols, of which the two best known are the Transmission Control Protocol (TCP) and the Internet Protocol (IP). The Internet Protocol (IP) is a protocol used for communicating data across a packet-switched internetwork using the Internet Protocol suite, also referred to as TCP/IP. IP is a datagram service. It basically provides internetwork routing services without any regard to the destination program, TCP formats, error control, packet sequencing, etc. Its function in life is to get the packet to the right network and eventually to the right node. IP allows for expedited routing of packets that need to get to a destination quicker than other, routine packets. With the exception of routing priority, IP functionality is similar to Ethernet packet handling.

1.9 ORIGIN OF TCP/IP

- 1) The comprehensive set of communications protocols called TCP/IP. It became widely available and well-known only when Berkeley Software Distribution released Berkeley UNIX 4.2 BSD in September 1983.
- 2) TCP/IP protocols are based on standards originally developed for the US government and US research community.
- 3) It was developed to allow free interchange of data among all machines, independent of type, manufacturer, hardware or operating system.

- 4) In the late 1980s, TCP/IP received a further boost to its fortunes when Sun Microsystems published the specification for Open Network Computing (ONC), often called the Network File System (NFS). NFS adds important functions to TCP/IP and is now very widely available and is regarded as an integral part of the TCP/IP protocol suite.
- 5) The suite of protocols commonly referred to as TCP/IP (US Military Standards 1778 and 1777) was developed by the United States Department of Defense for its A.R.P.A (Advanced Research Project Agency) network.
- 6) This is a very large scale wide area network linking many major commercial, university and military establishments.
- 7) The relevance of TCP/IP to LANs is two-fold. First, as it is a datagram based protocol, it is well suited to LAN access methods, particularly Ethernet. Secondly, it is particularly popular within the UNIX community, giving it a large user base, many of whom wish to use LANs.

1.10 FEATURES OF TCP/IP

1. It is the first networking protocols used for the internet, which a standard for communicating between the computers over the internet. These communication protocols are also used for other similar other networks.
2. Transmission Control Protocol (TCP), which uses a set of rules to exchange messages with other internet points at the information packet level.
3. Internet Protocol (IP), which uses a set of rules to send and receive messages at the internet address level.
4. A set of protocols that provides the basis for operating the internet.
5. TCP/IP used by the networks for data transmission and exchange.
6. TCP uses a set of rules to exchange messages and data with other internet points by dividing the information at packet level. It breaks the data into small packets.
7. IP is used to address and pass the packets from one host to another host and make them reach at their destination.
8. IP uses a set of rules to send and receive messages at the internet address level.

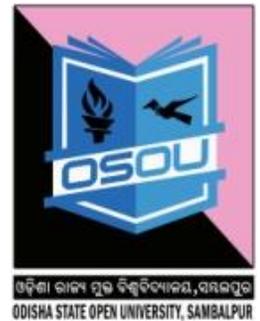
9. It is also a two-layer program. One is higher layer and second is lower layer. The higher layer, Transmission Control Protocol, manages the assembling of a message or file into smaller packets that are transmitted over the Internet and received by a TCP layer that reassembles the packets into the original message.
10. TCP/IP uses the client/server model of communication in which a computer user (a client) requests and is provided a service (such as sending a Web page) by another computer (a server) in the network.
11. TCP/IP communication is primarily point-to-point, meaning each communication is from one point (or host computer) in the network to another point or host computer.
12. Additional protocols that include the Hypertext Transfer Protocol (HTTP) and File Transfer Protocol (FTP), each with defined sets of rules to use with corresponding programs elsewhere on the internet.

TCP/IP offers the following networking functions to the internet:

- ❖ Look out for Addressing
- ❖ Internet connection establishment
- ❖ Connection release
- ❖ Data flow control
- ❖ Routing and management
- ❖ Name control and translation
- ❖ Status of translation and communication
- ❖ Internet fragmentation and reassembly

The lower layer, Internet Protocol, which handles the address part of each packet so that it gets to the right destination. Each gateway computer on the network checks this address to see where to forward the message. Even though some packets from the same message are routed differently than others, they'll be reassembled at the destination.

TCP/IP and the higher-level applications that use it are collectively said to be "stateless" because each client request is considered a new request unrelated to



any previous one (unlike ordinary phone conversations that require a dedicated connection for the call duration). Being stateless frees network paths so that everyone can use them continuously. (Note that the TCP layer itself is not stateless as far as any one message is concerned. Its connection remains in place until all packets in a message have been received.)

Moreover, many Internet users are familiar with the even higher layer application protocols that use TCP/IP to get to the Internet. These include the World Wide Web's Hypertext Transfer Protocol (HTTP), the File Transfer Protocol (FTP), Telnet (Telnet) which lets you logon to remote computers, and the Simple Mail Transfer Protocol (SMTP). These and other protocols are often packaged together with TCP/IP as a "suite."

1.11 WORKING OF TCP/IP

The working of TCP/IP are as follows:

FTP (File Transfer Protocol) - FTP is a client and server protocol. The computer on a network is running an FTP server in order to access files on a computer via FTP. It is an old method of accessing a remote computer's disks over a network. It is a connection-oriented protocol, that is, after the request is served, the connection between the client and server remains intact. It allows a user to copy files between the remote computers disk and the disk (s) on the local computer. Its main features are:

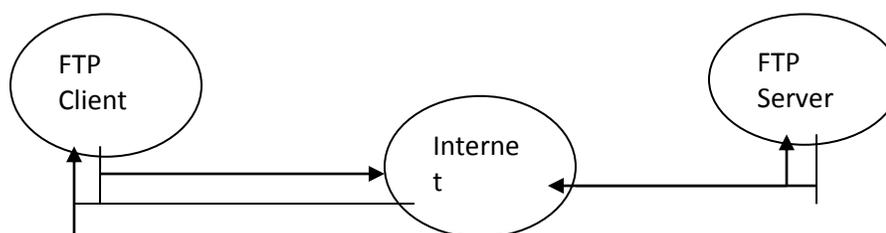
- 1) File transfer facilities are usually provided for by a mechanism known as the File Transfer Protocol (FTP).
- 2) FTP is a simple featured file-moving utility that allows a record oriented transfer, a block transfer, or an image transfer.
- 3) FTP knows about EBCDIC and ASCII and may provide some rudimentary conversion facilities before a transfer begins.
- 4) FTP has evolved in some cases to special implementations that know how to convert specific file formats between certain types of machine architectures.
- 5) It is a useful feature to have when transferring very large files.
- 6) FTP is software that allows the transfer of files between the machines. (i.e. servers to clients and vice versa).
- 7) A file may contain any type of digital information, text, image, movie, sound, software etc.
- 8) The user can upload and download a file by using an FTP server.

- 9) FTP server can be anonymous that can be used by a user as a guest login for transferring files.
- 10) FTP server can be non-anonymous where user can login only through ID and password.

How FTP Works

FTP works on the client server model. FTP client is a program running on the user's computer that enables the user to talk to, and get files from remote computers. FTP server is the remote computer from which files are accessed by the FTP client. The FTP client server works as follows:

- The FTP client gives the ftp command with the address of FTP server, using a URL.
- When the FTP client gets connected to FTP server, the user enters the User Login and password.
- Further, the user can login to a FTP server even if they don't have an account on the FTP server. For this, the user uses the anonymous login, where the User login is anonymous and password is the e-mail address of the FTP client.
- FTP server verifies the user login and password to allow the FTP client to access its files.
- FTP client looks in the directory for files in the FTP server.
- FTP client gets the requested file and quits.



HTTP (Hypertext Transfer Protocol) - It is a client-server protocol, which is used for the transmission of the hypertext between the two computers. It is also known as a simple request and response protocol which is run over a TCP/IP protocol. HTTP is a connection-less protocol because as soon as the request is made and fulfilled, the connection between the client and server is terminated. Its main features are:

1. A protocol for moving hypertext files across the network.
2. It is used by World Wide Web (WWW) for transmission of hypertext.



3. It is based on client/server technology.
4. The data transferred may be plain text, images, graphics etc.

TELNET (Telecommunication Network) - TELNET means a remote login. It works on the principle of client server technology. It establishes a connection through internet between remote clients with the remote host on the basis of the IP address given by the user. Telnet clients are also known as terminal emulation programs because telnet emulates the operating system on which the user is sitting and activates the operating system of the remote host which is login. Therefore, the main features of Telnet are as follows:

- a) Telnet is a virtual terminal facility that allows a user to connect to a remote system as if the user's terminal were hard-wired to that remote system.
- b) It provides a basic protocol handling facility and a negotiation facility that allows for the inclusion of different types of terminal protocols and signaling mechanisms.
- c) Telnet service was one of the first to be provided in a standard way by the TCP/IP architecture.
- d) It allows terminal and workstation users to gain access to a host system and to display host data on their screens.
- e) It provides a low cost connection.
- f) It is used connect to another computer.
- g) This process is called remote login.
- h) It specifies exactly how remote login client and remote login server interact.
- i) The telnet client software locates the host over the internet and establishes the remote login session to the host.

GOPHER (Protocol/Service) - It is used for searching, retrieving and displaying documents from remote websites on the internet. It is based on client server technology. Gopher client application is required on the system to search and retrieve the information.

WAIS (Wide Area Information Service) - It is an internet search tool used for information retrieval. It searches for strings of text, provided by the user. WAIS breaks up the sentences into words and searches this word combination.

SMTP (Simple Mail Transfer Protocol) - It is a standard protocol used to transfer mail messages between computers. It specifies the format in which a mail message has to be composed. It is a simple mail ASCII protocol.



POP (Post Office Protocol) - It is a protocol designed to allow a single user to read a mail from a server. Its main function is to fetch a mail from the remote mailbox and stores it on the user machine to read later.

IMAP (Interactive Mail Access Protocol) – It is designed to help the user who uses multiple computers, a workstation in the office, a PC at home or a laptop on the road. The basic idea behind IMAP is to maintain a central repository that can be accessed from any machine.

Trivial File Transfer Protocol: The Trivial File Transfer Protocol (TFTP) is a simple program with minimal facilities, designed to be implemented in permanent memory (PROM). It is often used in conjunction with the boot protocol. TFTP lacks the security features of FTP and it is normal to disable the TFTP server on hosts which do not provide a boot service.

Simple Mail Transfer Protocol: It provides a mechanism by which a user can specify a destination address, a particular path to follow and a message. It provides for return receipts, forwarding of mail, and other similar features. It is heavily used in the defense area.

Network File System: It was developed by Sun Microsystems Inc. It provides user services familiar to any user of a proprietary resource-sharing LAN(Local Area Network) such as NetWare. It uses the UDP(User Datagram Protocol) transport protocol. It provides the mechanism for true distributed computing, where processing power, not just data, is shared among networked machines.

Personal computer users with an analog phone modem connection to the Internet usually get to the Internet through the Serial Line Internet Protocol (SLIP) or the Point-to-Point Protocol (PPP). These protocols encapsulate the IP packets so that they can be sent over the dial-up phone connection to an access provider's modem.

Protocols related to TCP/IP include the User Datagram Protocol (UDP), which is used instead of TCP for special purposes. Other protocols are used by network host computers for exchanging router information. These include the Internet Control Message Protocol (ICMP), the Interior Gateway Protocol (IGP), the Exterior Gateway Protocol (EGP), and the Border Gateway Protocol (BGP).

PROCEDURE OF UPLOAD THROUGH BROWSER

Step1: Firstly, upload through browser provided that ISP(Internet Service Provider) and browser permit that function.

Step2: Put Web address (where you want the files to be uploaded to), ID (user name) and password before upload to the ISP's server. The ISP will provide this information if it is not available.

Step3: Then open the browser and look for a function that will allow to upload files to the Web. This could be Upload, Web Wizard, FTP, etc.

Step4: Move through the folders on the disk until it have selected the Web pages that has to upload.

Step5: Initiate the upload, entering the Web address, ID and passwords when prompted.

Step6: Follow any specific instructions provided by ISP.

Step7: Enter the URL of Web site in the Address window of browser. Then, click Enter. Which uploaded Web site should display in the browser window.

PROCEDURE OF UPLOAD BY USING AN FTP CLIENT

Step1: Open the FTP client. Enter the information that need to access the site. This will include the Web address (where you want to put the files you're uploading), further, the ID or user name, and password. The ISP will provide with this information if it is not available.

Step2: When the FTP client has connected with the ISP's Web server, It will see two windows, both showing a file structure. The window on the left represents the folders and files on computer or disk. Then, move through the folders until it locate the Web pages to be uploaded. Then select the files.

Step3: The window on the right represents the files on the ISP's Web server. If it is first upload, this window will probably be empty.

Step4: Then, drag the selected files in the left window and drop them in the right window.

Step5: The files will upload and their names will appear in the right window.

Step6: Open the browser and enter the URL (address) of Web site. The Web page should appear.

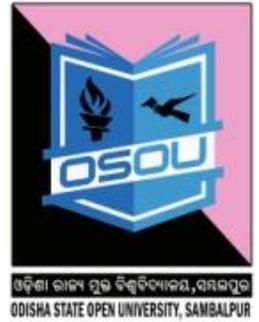
1.12 LET US SUM UP

The WWW is essentially a client-server system with millions of servers distributed worldwide. Each server maintains a collection of documents; each document is stored as a file (although documents can also be generated on request). A server accepts requests for fetching a document and transfers it to the client. In addition, it can also accept requests for storing new documents. The simplest way to refer to a document is by means of a reference called a

Uniform Resource Locator (URL). TCP is a connection-oriented protocol. TCP controls assembly of the message into smaller packets before it is transmitted over the Internet. It also controls the reassembly of packets at the destination sites. The IP protocol consists of rules for routing individual data packets from their source to their destination. IP ensures that each data packet is labeled with the correct destination address. Domain names are text-based string corresponding to numeric IP address. Hypertext format is used to create documents on the web. HTTP protocol transfers hypertext document on the web.

1.13 KEY TERMS

- ✓ **Web Architecture** is defined as the combination of hardware, software and development tools taken together to form a platform to deliver web applications. This includes all components to operate and maintain web applications as well as development tools to create web applications.
- ✓ **URL (Universal Rude Locator)** is defined as a combination of the name of the protocol followed by the characters % followed by the domain name used for getting a resource. E.g. web pages from the web server.
- ✓ **Server** is defined as a computer that is used to provide or serve files, programs or information requested by the client connected through internet or any other network.
- ✓ **Client** is defined as program that is used to get an internet service e.g. HTTP for getting web pages from the server.
- ✓ **Browser** means a client interacts with Web servers through a special application known as a browser. A browser is responsible for properly displaying a document
- ✓ **World Wide Web (WWW)** is a distributed hypermedia system that relies on some of the internet's services. WWW is a global web in which millions of users are communicating with each other with the help of computers.
- ✓ **Protocol** is a collection of rules for formatting, ordering, and error-checking data sent across a network. Protocols determine how the sending device indicates that it has finished sending a message and how



the receiving device will indicate that it has received (or not received) the message.

- ✓ **TCP controls** assembly of the message into smaller packets before it is transmitted over the Internet. It also controls the reassembly of packets at the destination sites.
- ✓ **IP protocol** consists of rules for routing individual data packets from their source to their destination. IP ensures that each data packet is labeled with the correct destination address.
- ✓ **FTP:** It is an internet tool used for copying files from one computer to another.
- ✓ **Telnet:** It uses the telecommunication network facility that allows a computer to access the contents of another computer.
- ✓ **FTP:** FTP server is the host computer from which files are accessed by the FTP client.

1.14 SELF-ASSESSMENT QUESTIONS

1. What is WWW ?
2. What is TCP/IP?

1.15 FURTHER READINGS

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1.16 MODEL QUESTIONS

1. What is the function of TCP in the TCP/IP protocol?
2. What is the function of IP in TCP/IP protocol?
3. What are the basic requirements to connect to the Internet?
4. When do you use FTP?

SELF-ASSESSMENT QUESTIONS AND ANSWERS

1. What is WWW ?

Ans: World Wide Web (WWW). Web means to a specific kind of internet interface. The web documents contain links that lead to other web pages. The World Wide Web is one of the ways of accessing information over the medium of the internet. The World Wide Web (WWW) is a distributed hypermedia system which relies on some of the internet's services. Further, the naming service provided by the Domain Name Service (DNS). It is quite reliable connection-oriented transmission service provided by the Transmission Control Protocol (TCP).

The concept of web was originally conceived from Tim Berners-Lee, a scientist at CERN (CERN is the European Organization for Nuclear Research), invented the World Wide Web (WWW) in 1989. During 1993: First usable browser (MOSAIC) has been issued, further, during 1994, the Foundation of World Wide Web Consortium (W3C). – W3C then started then, developing HTML, HTTP and Style Sheets.



2. What is TCP/IP?

Ans: TCP/IP (Transmission Control Protocol/Internet Protocol) is a communication language. Further, it is also called as protocol of the Internet. Further, it is **commonly known as the Internet Protocol Suite**. It can also be used as a communications protocol in a private network i.e. intranet or extranet. TCP and IP are communication protocols. A communication protocol specifies the exact format and meaning of data a computer sends and also conditions under which the data should be sent, etc. Most importantly, communication protocols are independent of the software and the hardware used.

Internet protocols (IP) is the primary network protocol used on the Internet, developed in the 1970s. The internet protocols consist of a suite of communication protocols, of which the two best known are the Transmission Control Protocol (TCP) and the Internet Protocol (IP). The Internet Protocol (IP) is a protocol used for communicating data across a packet-switched internetwork using the Internet Protocol suite, also referred to as TCP/IP. IP is a datagram service.



Unit-2: Web Browser and Web Servers

Learning objectives

After reading this unit you will

1. Understand the concept of Browser.
2. To know the historical perspective of Web browser and Web server.
3. To discuss the steps of working of web browser.

Structure

- 2.1 Introduction
- 2.2 Meaning of Browser
- 2.3 Definition of a Browser
- 2.4 How a Browser Retrieves a Webpage
- 2.5 Architecture of Web Browser
- 2.6 Steps of Working of Web Browser
- 2.7 Meaning of Web Server
- 2.8 History of Web Server
- 2.9 Let us sum up
- 2.10 Key Terms
- 2.11 Self – Assessment Questions
- 2.12 Further Readings
- 2.13 Model Questions
- 2.14 Self – Assessment Questions and Answers



2.1 INTRODUCTION

The internet was conceived in 1969, when the Advanced Research Projects Agency that is Department of Defense Organization funded research of computer networking. The Internet could end up like EDI without the emergence of World Wide Web in 1990s. The web became a popular mainstream medium. The web users and contents were increasing at an accelerated rate. Besides the availability of technical infrastructures, the popularity of the web is largely attributed to the low cost access.

The software program or server computer equipped to offer the World Wide Web access. Web servers allow to serve content over the Internet by using the Hyper Text Markup Language (HTML). A Web Browser acts as an interface between the user and the Web server. The Web server accepts requests from browsersv like Netscape and Internet Explorer and then returns the appropriate HTML documents. Web browser is software that provides a friendly interface on the web. It display the web page and moves between the sites.

Examples of WEB browsers: MOSAICA, Netscape Navigator, internet Explorer, Google Chrome and Mozilla Firefox etc.

2.2 MEANING OF BROWSER

Web browsers are the intermediary services applications in between an user and the world wide web. A Web browser is a software application which enables a user to display and interact with text, images, videos, music, games and other information typically located on a Web page at a Web site on the World Wide Web or a local area network. Web browsers are the software applications that are used to access information from the World Wide Web.

The World Wide Web (WWW) is a shared information system operating on top of the Internet. Web browsers retrieve content and display from remote web servers using a stateless and anonymous protocol called HyperText Transfer Protocol (HTTP). Web pages are written using a simple language called HyperText Markup Language (HTML).

The text and images on a Web page can contain [hyperlinks](#) to other Web pages at the same or different Web site. Web browsers allow a user to quickly and easily access information provided on many Web pages at many Web sites by

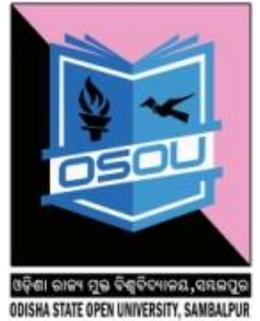
traversing these links. Web browsers format [HTML](#) information for display, so the appearance of a Web page may differ between browsers.

The Examples of Web Browser as follows:

- ✓ Internet Explorer or IE (from Microsoft)
- ✓ Firefox (from Mozilla)
- ✓ Safari (from Apple)
- ✓ Chrome (from Google)
- ✓ UC.
- ✓ Iron.
- ✓ Opera.
- ✓ Android.
- ✓ Maxthon
- ✓ YouTube Browser.
- ✓ Netscape Browser

Web browsers are the commonly-used type of [HTTP user agent](#). Although browsers are typically used to access the World Wide Web, they can also be used to access information provided by [Web servers](#) in [private networks](#) or content in [file systems](#).

- Web Browsers are of two types one is graphical browser and secondly text-based browser.
 - Graphical browsers provide a graphical user interface where the user can shift from one web page to the other by clicking on the hyperlink on a web page. The examples are as follows: Internet explorer, Chrome and Mosaic etc.
 - The text browsers are used on computers that do not support graphics. The examples i.e. Lynx is a text browser.
- Further, the process of by using browser to view information on the Internet is known as Browsing or Surfing.
- During Browsing, the user can navigate from one web page to another using URLs, hyperlinks, browser navigation tools like forward and back button, bookmarks etc.



2.3 DEFINITION OF A BROWSER

Merriam-Webster's dictionary defines a web browser as a computer program used for accessing sites or information on a network (as the World Wide Web).

The primary function of a Web browser is to display HTML documents. Web browsers come in many different styles, each with their own nuances. However, the main reason a person utilizes a web browser is to view web pages on the Internet, similar to the way you are viewing this article right now.

List of web browsers

- Google Chrome
- Mozilla Firefox
- Opera Web Browser
- Safari Web Browser
- Internet Explorer
- Netscape Browser
- UC Browser

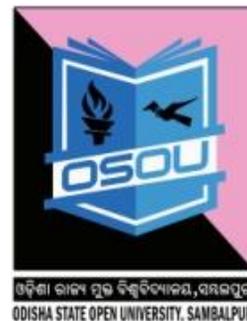
2.4 HOW A BROWSER RETRIVES A WEBPAGE

The browser application retrieves or fetches code, usually written in HTML (Hyper Text Markup Language) and/or another language, from a web server, interprets this code, and renders (displays) it as a web page for you to view. In the majority of cases, user interaction is needed to tell the browser what web site or specific web page he or she would like to view. One way this is done is via the browser's address bar.

The web address, or URL (Uniform Resource Locator), that you type into the browser's address bar tells the browser where to obtain a page or pages from.

For example, when you typed the following URL into the browser's address bar: <http://flipkart.com/compute>.

In this case, you are attempting to reach the Computing & Technology section of flipkart.com. The browser looks at this particular URL in two main sections.



The first is the protocol, which in the address shown is "http://". HTTP, which stands for Hypertext Transfer Protocol, is the standard protocol used to request and transmit files on the Internet, mostly web pages and their respective components. Since the browser knows that the protocol is HTTP, it knows how to interpret everything located to the right of the forward slashes. It now looks at "flipkart.com", which tells the browser the location of the web server it needs to retrieve the page or pages..

Next, once it reaches this web server, it retrieves the index page of the "/compute" directory. Once this page is retrieved by the browser, it is interpreted and rendered in the browser's main window for you to view.

2.5 ARCHITECTURE OF WEB BROWSER

Domain Name System (DNS)

Domain name is a text name corresponding to the numeric IP address of a computer on the internet. Domain names are used for the convenience of the user. A domain name combines a group of hosts on the internet and a top level domain.

Some examples of different level of domain name are as follows:

- Com- for commercial organizations,
- Edu- for educational institutions,
- Net- for gateways and administrative hosts,
- Org- for non-profit organizations,
- Co- for companies, and
- Ac- for academics.

In order to translate numeric IP address that identifies a computer on the internet to a domain name that is convenient for the user to remember, a mapping is needed between the IP addresses and domain names.

Domain Name System (DNS) server is a computer having a database that stores the IP addresses and their domain name. Whenever a user uses the domain name, DNS translates it into its corresponding IP address, to access the computer on internet.



Example: DNS translates google.com to the IP address of the computer that houses google.

The Domain Name System also defines the technical underpinnings of the functionality of this database service. For this purpose it defines the DNS protocol, a detailed specification of the data structures and communication exchanges used in DNS, as part of the Internet Protocol Suite (TCP/IP). The DNS protocol was developed and defined in the early 1980s and published by the Internet Engineering Task Force

The Domain Name System makes it possible to assign domain names to groups of Internet users in a meaningful way, independent of each user's physical location. Because of this, World-Wide Web (WWW) hyperlinks and Internet contact information can remain consistent and constant even if the current Internet routing arrangements change or the participant uses a mobile device. Internet domain names are easier to remember than IP addresses such as 208.77.188.166 (IPv4) or 2001:db8:1f70:999:de8:7648:6e8 (IPv6). People take advantage of this when they recite meaningful URLs and e-mail addresses without having to know how the machine will actually locate them.

URL (Uniform Resource Locator)

URL stands for Uniform Resource Locator, which means it is a uniform (same throughout the world) way to locate a resource (file or document) on the Internet. The URL specifies the address of a file and every file on the Internet has a unique address. Web software, such as browser, uses the URL to retrieve a file from the computer on which it resides.

The actual URL is a set of four numbers separated by periods. An example of this would be 202.147.23.8 but as these are difficult for humans to use, addresses are represented in alphanumeric form that is more descriptive and easy to remember. Thus, the URL of my site which is URL 209.164.80.192 can also be written as www.simplygraphix.com. The Internet Domain Name System translates the alphanumeric address to numeric.

The general form of URL is Protocol://address/path where,

- Protocol defines the method used to access the web page, e.g. http, ftp, news etc.

- Address is the internet address of the server where the web page resides. It contains the service (e.g. www) and the domain name (e.g. google.com)
- Path is the location of web page on the server.

The above URL consists of:

- i. **Protocol: http**
- ii. **Host computer name: www**
- iii. **Domain name: snapdeal**
- iv. **Domain type: com**
- v. **Path: /portfolio**
- vi. **File name 5.html**
- vii. **Protocols;** In addition to the http protocol (mentioned above), there are a few other protocols on the Internet.
 - i. **File:** The file enables a hyperlink to access a file on a local system.
 - ii. **FTP:** It is used to download files from remote machines.
 - iii. **Gopher:** It helps in accessing a gopher server.
 - iv. **Mailto:** It calls SMTP (the Simple Mail Transport Protocol) and enables a hyperlink to send an addressed email message.
 - v. **News:** It helps in accessing a USENET newsgroup.
 - vi. **Telnet:** It provides the means for a hyperlink to open a telnet session on a remote computer.
 - vii. **Site Address:** The site address consists of the host computer name, the domain name and the domain type.
 - viii. **Path Name:** The path name specifies the hierarchic location of the said file on the computer. For instance, in <http://www.snapdeal.com/portfolio/5.html> the file 5.html is located in portfolio subdirectory under the server root directory.
 - ix. **Port:** The browsers communicate with the server using entry points called ports.
 - x. **E-mail:** It is one of the protocols included with the Transport Control Protocol/Internet Protocol (TCP/IP) suite of protocols. A popular protocol for sending e-mail is Simple Mail Transfer Protocol and a popular protocol for receiving it is POP3. Both Netscape and Microsoft include an e-mail utility with their Web browsers.



- xi. **HTML(Hyper Text Markup Language)**. HTML is an internet standard or set of rules that which allows the exchange of information and data on the World Wide Web. Hyper text is a method of preparing and publishing text, ideally suited to the computer, in which the users can select their own text. It is a type of computer language that is primarily used for files that are posted on the internet and viewed by web browsers. HTML files can also be sent through email.

2.6 STEPS OF WORKING OF WEB BROWSER

STEP-01. Firstly, the user enters the URL (Uniform Resource Locator) of the webpage in the address bar of the web browser.

STEP-02. Next, web browser requests the Domain Name Server for the IP address corresponding to www.yahoo.com

STEP-03. Then, after receiving the IP address, the browser sends the request for the webpage to the Internet by using HTTP protocol which specific the way the browser and Web Server communicates. The Internet Routers send the request to the intended web server.

STEP-04. Then, the web server receives the request using HTTP protocol. It then examines the hard disk or memory and if the requested file is found it returns it back to the web browser and closes the Http connection.

STEP-05. Finally, The Web browser then interprets the file and displays the contents of the webpage in the browser window.

2.7 MEANING OF WEB SERVER

A web server is a computer with special software to host web pages and web applications. The computer which provides Web services and pages to intranet and Internet users. A web server serves web pages to clients across the Internet or an Intranet.

The web server hosts the pages, scripts, programs, and multimedia files and serves them using HTTP, a protocol designed to send files to web browsers and other protocols. A number of server-side technologies can be used to increase the power of the server beyond its ability to deliver standard HTML pages. A

Web server is a specific type of server that knows how to communicate with clients using the HyperText Transfer Protocol (HTTP).



2.8 HISTORY OF WEBSERVER

The European Laboratory for Particle Physics (CERN) produced one of the first Web servers. The World Wide Web Consortium (W3C) took over development of the CERN HTTPD (also known as the W3C HTTPD), but no longer it has supports it. The W3C currently supports a Java-based server known as Jigsaw. Both the CERN HTTPD and Jigsaw are reference implementations, meaning that they illustrate features of HTTP but are not meant for large-scale production use. The source code is available for both servers and they are excellent points of reference for developers wishing to write their own HTTP daemons.

Mosaic had first browser even today. At a next level the major platforms are as : UNIX, Macintosh, and Microsoft Windows.. Before Mosaic, only text-based clients such as gopher, WAIS, telnet, and FTP were widely available for retrieving information on the Internet. An easy-to-use GUI interface and easy-to-create content launched the Web in the form of NCSA Mosaic clients and HTTPD servers.

DIFFERENT TYPES OF WEB SERVER

These are the following web server as follows :

- ✓ **Apache:** The first version of Apache, Web server, was developed in 1995. Apache was the first viable alternative to the Netscape Communications Corporation web server (currently known as Sun Java System Web Server), and has since evolved to rival other Unix- based



web servers in terms of functionality and performance. Apache is a freely available Web server. It can be downloaded from <http://httpd.apache.org/download.cgi> for free.

- ✓ **IIS:** This is a Microsoft product. This web server works with all the Windows operating system platforms.
- ✓ **Nginx:** It is a free open source web server which includes IMAP/POP3 proxy server.
- ✓ **LiteSpeed:** It is a high-performance web server on the internet and it is a commercial web server.

PORTAL'S AND ITS TYPES

A portal is a single Web interface that provides personalized access to information, applications, business processes, and much more. With portal technology, an organization can lower development and deployment costs and significantly increase productivity. Using a portal, information can be aggregated and integrated within a particular working environment, application, or service, or a single interface can be used to target an individual user's needs and interests.

Portals help to harmonize content, commerce, and collaboration with business goals. A list of different types of portals and their capabilities follows:

- ✓ **Line-of-business portals:** Which provide easy access to applications that serve a specific area, such as procurement or human resources.
- ✓ **Corporate intranet portal:** It acts as a gateway to other portals and Web sites operated by an organization.
- ✓ **Extranet portals :** It act as an interface between companies, customers, and suppliers, revealing subsets of information to specific audiences.
- ✓ **Customer service and self-service portals:** These are often seen as subsets of a corporate extranet.
- ✓ **Team or divisional portals :** These are used by groups or communities that want to share specific content or business functions.
- ✓ **Personal portal:** It is geared to assist individuals who access information and resources.
- ✓ **Enterprise portal:** It is the central portal for an entire organization. It comprises all other portals deployed.

2.9 LET US SUM UP

The web is a series of pages. Each webpage has a unique address which when entered in to a web browser will take you directly to that page. Most web addresses begin with the letters www (which stands for World Wide Web). For example, www.google.com An Internet browser is a window to the web, where it finds almost anything. The most widely known Internet Browsers are Internet Explorer, Firefox or Safari. The web browser is a tool on WWW. A web browser act as an interface among the user and web servers. The web browser is a software application that allows users to view and interact with content on a web page, such as text, graphics, video, music, games, or other material. A web browser is client side application program that contacts remote servers and retrieves documents from it and displays them on display, either within the browser window itself or by passing the document to an external helper application.

2.10 KEY TERMS

- **Internet:** It is network of all networks throughout the world.
- **WWW:** World Wide web, it is a collection of all web server.
- **Web Browser:** This is an application to use to view websites. There are many web browsers for example, Internet Explorer, Firefox and Safari.
- **ISP:** Internet service provider, these are companies, who provide internet and value added services to the users.
- **Hyperlink:** Pages on the web are linked together via clickable links. These are called hyperlinks.
- **Web Server:** Web servers are host computers that can store thousands of web pages.
- **search Engine Software:** that helps you find what a person is looking for on the web. Google uses a search engine to find relevant results.
- **Web Browser:** The web pages stored on web server on the internet, can be viewed from the user's computer using a tool called web browser.
- **URL:** Every web page is identified on internet by its address, also called Uniform Resource Locator (URL).
- **Web Portal:** A web portal is a web site that presents information from different sources and makes them available in a unified way.
- **Domain Name:** It is a text name corresponding to the numeric IP address of a computer on the internet.

- **Browsing:** The process of using browser to view information on the internet is known as Browsing.
- **DNS: Domain Name System**, a method for naming websites, It is also the worldwide system of distributed databases of names and addresses on internet.

2.11 SELF ASSESSMENT QUESTIONS

- i. What is the function of web server?
- ii. What is the use of web browser?
- iii. What is the purpose of URL?

2.12 FURTHER READINGS

- i. Westland, Christopher J. & Clark, Theodore H K.(2001) Global Economic Commerce: Theory and case studies, Orient Longman.
- ii. Jaiswal, S.(2006) E-commerce, Galgotia Publishers, New Delhi.
- iii. Laudon, C. Kenneth and Traver, Guercio Carol.(2003) E-commerce, Pearson Education, First Indian Reprint.
- iv. Chabra, T.N. , Suri, R.K and etal. (2004) E-Commerce: New Vistas for Business, Dhanpat Rai and Co.
- v. Murty, C.s.V.(2011) E-commerce: concepts, Models and strategic, Himalaya Publishing company, New Delhi.
- vi. Chan, Henry, Lee, Raymond., Dillon, Tharam, Chang, Elizabeth.(2004) E-commerce: fundamentals and applications, John Wiley sons Edition.
- vii. Laudon, Kenneth C. & Laudon, Jane P., International Edition, Management Information Systems, Organization and Technology in the Networked Enterprise, Prentice Hall, 2000, ISBN: 0-13-015682-5, page 25.

2.13. MODEL QUESTIONS

- a) What is the purpose of DNS server?
- b) Explain the parts of the following [URL:http://www.snapdeal.com/mainpage](http://www.snapdeal.com/mainpage)
- c) What is the difference between graphical web browser and text-based web browser?
- d) Explain the syntax of URL?
- e) Define browsing.
- f) Name two web browsers.

2.14 SELF ASSESSMENT QUESTIONS AND ANSWERS



1. What is the function of Web Server?

Ans: Web servers are host computers that can store thousands of web pages. A web server is a computer with special software to host web pages and web applications. The computer which provides Web services and pages to intranet and Internet users. A web server serves web pages to clients across the Internet or an Intranet. The European Laboratory for Particle Physics (CERN) produced one of the first Web servers. The Functions of web server are as follows:

1. It hosts the pages, scripts, programs, and multimedia files and serves them using HTTP, a protocol designed to send files to web browsers and other protocols.
2. A number of server-side technologies can be used to increase the power of the server beyond its ability to deliver standard HTML pages.
3. A Web server is a specific type of server that knows how to communicate with clients using the Hyper-Text Transfer Protocol (HTTP).

2. What is the use of web browser?

Ans: A Web browser is a software application which enables a user to display and interact with text, images, videos, music, games and other information typically located on a Web page at a Web site on the World Wide Web or a local area network. Web browsers are the software applications that are used to access information from the World Wide Web. The World Wide Web (WWW) is a shared information system operating on top of the Internet. Web browsers retrieve content and display from remote web servers using a stateless and anonymous protocol called Hyper-Text Transfer Protocol (HTTP). Web pages are written using a simple language called Hyper-Text Markup Language (HTML). The text and images on a Web page can contain [hyperlinks](#) to other Web pages at the same or different Web site. Web browsers allow a user to quickly and easily access information provided on many Web pages at many Web sites by traversing these links. Web browsers format [HTML](#) information for display, so the appearance of a Web page may differ between browsers.

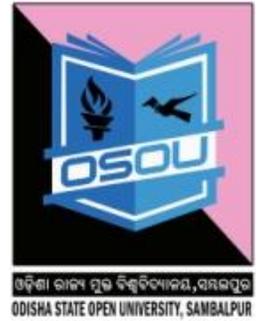
The Examples of Web Browser as follows:

- ✓ Internet Explorer or IE (from Microsoft)
- ✓ Firefox (from Mozilla)
- ✓ Safari (from Apple)
- ✓ Chrome (from Google)
- ✓ UC.
- ✓ Iron.
- ✓ Opera.
- ✓ Android.
- ✓ Maxthon
- ✓ YouTube Browser.
- ✓ Netscape Browser

3. What is the purpose of URL?

Ans: URL stands for Uniform Resource Locator, which means it is a uniform (same throughout the world) way to locate a resource (file or document) on the Internet. The URL specifies the address of a file and every file on the Internet has a unique address. Web software, such as browser, uses the URL to retrieve a file from the computer on which it resides. The actual URL is a set of four numbers separated by periods. An example of this would be 202.147.23.8 but as these are difficult for humans to use, addresses are represented in alphanumeric form that is more descriptive and easy to remember. Thus, the URL of my site which is URL 209.164.80.192 can also be written as www.simplygraphix.com. The Internet Domain Name System translates the alphanumeric address to numeric. The general form of URL is Protocol://address/path where,

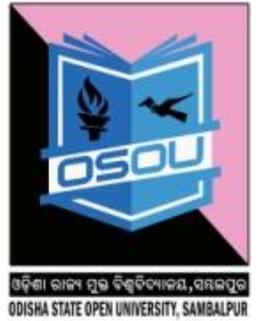
- Protocol defines the method used to access the web page, e.g. http, ftp, news etc.
- Address is the internet address of the server where the web page resides. It contains the service (e.g. www) and the domain name (e.g. google.com)
- Path is the location of web page on the server.



The above URL consists of:

- i. **Protocol: http**
- ii. **Host computer name: www**
- iii. **Domain name: snapdeal**
- iv. **Domain type: com**
- v. **Path: /portfolio**
- vi. **File name 5.html**
- vii. **Protocols;** In addition to the http protocol (mentioned above), there are a few other protocols on the Internet.

Unit-3: Network Infrastructure for E-commerce



Learning objectives

After reading this unit you will

1. Understand the Internet Super highway and its components.
2. Know the Infrastructure Network Access Equipment.
3. Know what are the characteristics Wireless Communication System.

Structure

3.0 Meaning of Network Infrastructure and I-Way

3.1 Characteristics of I-Way

3.2 Components of I-Way

3.3 Internet Architecture

3.4 Connecting to Internet

3.5 Infrastructure Network Access Equipment

3.6 Wireless Communication System

3.7 Wireless Media

3.8 Infrared Transmission Data for Short Distances

3.9 Let us sum up

3.10 Key Terms

3.11 Self – Assessment Questions

3.12 Further Readings

3.13 Model Questions

3.14 Self – Assessment Questions and Answers



3.0 MEANING OF NETWORK INFRASTRUCTURE

Network Infrastructure is the software and hardware resources of an total network that enable network connectivity, communication, operations and management of an organization/company/enterprise network. E-Commerce are used to a network infrastructure to transport the content/data used for business purpose. Information superhighway is also known as interactive/ multimedia superhighway etc. are useful for the business.

Network infrastructures such as telecom, wireless, cable TV, Internet and Intranet are used to implement e-commerce transactions. The focus is currently on Internet-based e-commerce. An e-commerce activity, which typically involves the following steps, invokes a wide variety of services:

1. The customer sits down at a computer terminal or other access device (computer service);
2. Goes to a website with promotional information (advertising service);
3. Logs onto the Internet (communication service);
4. Orders a product (distribution service) and pays for it (financial service);
5. Downloads the product, if digitized, or has it mailed to an address (delivery service).

3.1 MEANING OF I-WAY(INFORMATION SUPER HIGH WAY)

I – Way is defined as universal affordable access to high performance network capable of carrying billions of bits per second in the context of e-commerce.

Components of I-Way: The major components of I-way are

1. Consumer access equipments.
2. Ramps
3. Global Information Distribution Network.

E-commerce is associated with the buying and selling of information, products, and services via computer networks today and in the future via. any one of the myriad of networks that make up the information superhighway (I-way).

I-way is a network of a network that is fully scalable, with no central controlling entity and does not determine the user profile. It can be define as high capacity (broadband) interactive (two-way) electronic pipelines to the home or office which is capable of simultaneously providing access to large number of E-commerce applications and providing interactive phone like connectivity users and other users. It is envisioned to provide very high speed access to information in all forms via a telephone or wireless connection. E-commerce to

become a reality, a network infrastructure is required to transport the content. This network infrastructure is called an interactive.



3.2 CHARACTERISTICS OF I-WAY

- ❖ It has no controlling entity.
- ❖ It is fully capable of handling an increase in the number of users and an increase in the volume of traffic. This is often referred to as scalability of the technology.
- ❖ It does not determine the profile of the user. The user can be machine, an individual or any business entity.

3.3 COMPONENTS OF I-WAY

- a) **Consumer Access Equipments-** These are those instruments or hardware devices that are affordable by customers as well as can be provided by the providers at distribution level. It includes various hardware and software vendors, who provide devices like routers, switches, hubs as hardware devices and operating system and browsers as software's that helps in accessing any information.
- b) **Local on Ramps-** It is considered as communicational backbone that links business schools, homes, communities etc through communication network. Also called the "Last Mile" in telecom industry. Access ramps can be categorized into four types:
 - ✓ T.V. based local on-ramps
 - ✓ Wireless based on-ramps
 - ✓ Computer based on-ramps
 - ✓ Telecom based on-ramps

To each category, benefits and limitations are associated. These communicational backbone access providers link users and E-commerce applications providers.

- c) **Global Information Distribution Network-** This component deals with the infrastructure issues in different countries and continents. Today, it is a much larger ecosystem of networked information with advances in communication and software. Most of the infrastructure for these I-way elements over the decades is provided by cable companies and telephone departments. It is provided in the form of long distance telephone lines and satellite network that need heavy interaction of hardware devices and protocols and their regulations to be placed on the infrastructure globally.

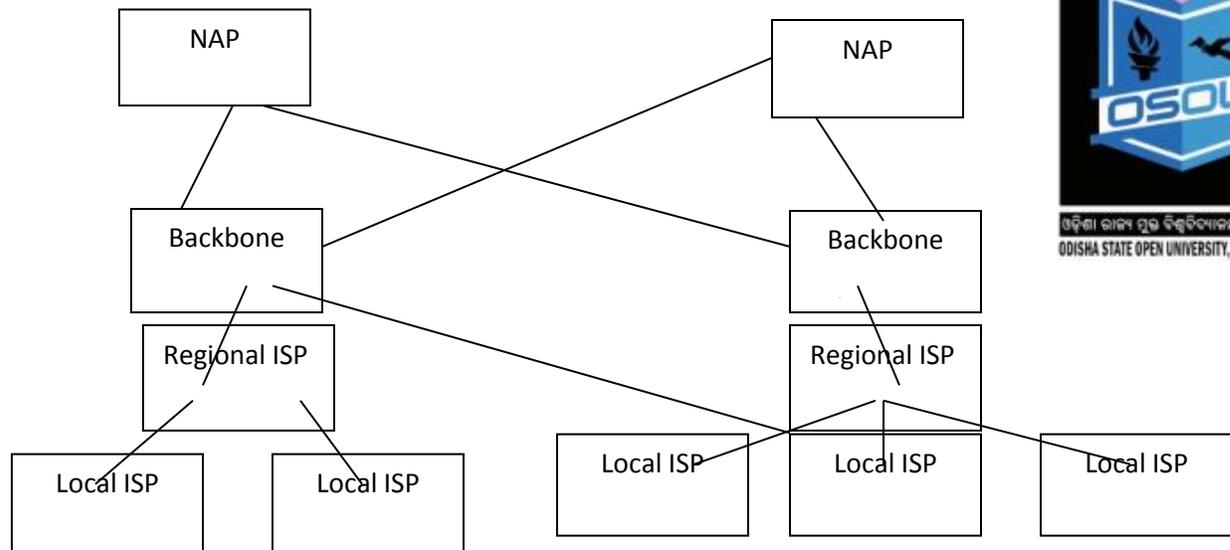


- d) **Long Distance Network-** This connectivity is made available via cable (coaxial or fiber) owned by long distance carriers.
- e) **Satellite Networks-** Countless communication satellites have been placed into earth's orbit and the technology being applied to them is forever growing. Fibre optics has changed the role of satellites in global communication industry by providing higher bandwidth and is immune to electromagnetic interference.

3.4 INTERNET ARCHITECTURE

Internet is a network of interconnected networks and is designed to operate without a central control. If a portion of the network fails, connection is made through alternative paths available. The architecture of internet is hierarchical in nature. A brief description of the architecture of internet is as follows:

- **Client** at home or in a LAN network is at the lowest level in hierarchy.
- **Local Internet Service Provider (ISP)** is at the next higher level.
 - An ISP is an organization that has its own computers connected to the internet and provides facility to individual users to connect to internet through their computers.
 - Local ISP is the local telephone company located in the telephone switching office.
 - The client calls local ISP using a modem.
- **Regional ISP** is next in the hierarchy. The local ISP is connected to regional ISP.
 - A router is a special hardware system consisting of a processor, memory and an I/O interface used for the purpose of interconnecting networks.
 - The regional ISP connects the local ISPs located in various cities via routers.
- **Backbone** is at top of the hierarchy.
 - Backbone operators are large corporation's like AT &T which have their own server farms connected to backbone.
 - The backbone networks are connected to regional ISPs with a large number of routers through high-speed fiber optics.
 - Network Access Points (NAP) connects different backbones.



(Internet hierarchy)

3.5 CONNECTING TO INTERNET

The speed of internet access increases with the increase in bandwidth. ISPs offer low speed internet connection like Dial-up connection, and high speed internet connection called broad-band connection. Broadband are the services with more bandwidth than standard telephone service, DSL, Cable modem, and integrated services digital network are some of the existing broadband connections.

- **Dial-up Access:**
 - ❖ It is a method of connecting to the internet using an existing telephone line.
 - ❖ In dial-up access, you are assigned an account on the server of ISP along with some storage space on the disk of server.
 - ❖ You connect to internet by dialing up one of the computers of ISP.
 - ❖ The client enters the user-id and password, and gets connected to the internet via the ISP.
- **Leased Line:**
 - ❖ It is a dedicated phone line that connects a computer to internet, using special kind of modems. Then the gateway is connected to a large numbers of computers.
 - ❖ The gateway forms a domain on internet which is used to provide connection to the other computers.
 - ❖ Leased lines provide reliable and high speed internet access.

- ❖ The entire bandwidth of leased line is reserved for the traffic between gateway and the internet.
- ❖ These are used by large organizations and universities that have their own internal network.
- ❖ These are online, twenty four hours a day and seven days a week.
- **Integrated Services Digital Network (ISDN)**
 - ❖ ISDN is a digital telephone service that can transmit voice, data and control information over an existing single telephone line.
 - ❖ Internet access is faster using ISDN.
 - ❖ It is commonly used for business purposes.
 - ❖ It is costlier than dial-up connection.
- **Digital Subscriber Line (DSL)**
 - ❖ It is a broadband connection that allows connecting to internet over the existing telephone lines.
 - ❖ It uses the modem provided by ISP.
 - ❖ It uses frequency beyond 3.4 kHz for internet access.
 - ❖ It provides high speed delivery of download data.
- **Cable Modem**
 - ❖ The user can connect to internet via a cable modem through cable television.
 - ❖ It provides two connections-one for television and other for computer.
 - ❖ It sends and receives data through the coaxial cable.
 - ❖ It provides high speed internet connection.

3.6 INFRASTRUCTURE NETWORK ACCESS EQUIPMENT

To achieve high processing of data, higher bandwidth of channels and higher data speed in the field of E-commerce, equipments are required that can handle customer needs. Customer Premises Equipment (CPE) industry is one of the important component of I-way. CPE is defined as any terminal equipment which resides at the customer site and is connected to the Public Switched Telephone Network (PSTN). Modems, telephones, PBXs and answering machine are all considered as CPE. These equipments could be categorized into three parts. These are explained below:

- Cable TV set-top Boxes.
- Computer based telephony.
- Digital switches, routers and hubs.

Cable TV Set Top Box- It is a hardware device used for commercial transactions. Selected from a number of highly integrated chips to build standard digital cable TV set-top boxes for digital video broadcasting. Set top boxes have intelligence characteristics like CPU, a text menu and by selecting a number of options by remote; a user can enable particular option. Broadcom's silicon can also power high-end interactive set-top boxes that merge high speed internet access functionality with text and video etc.

Computer Based Telephony- It means using computer with telephone lines so that high shipment cost can be avoided. There is a need of devices that can combine voice, data, and video and able users to send, store and receive information. In this system, a user of personal computer can transfer data, video, images and voice messages through the telephone switches more efficiently.

Digital Switches, Routers and Hubs

Routers- It transfers or routes the data between networks. They are particularly used in controlling traffic flow by making intelligent routing decisions. It is used in the network layer of ISO model. It is used to connect networks that use different architectures and protocols; they can transfer information packets across multiple networks. It is used by the network as an intermediate destination. Routers Can:

- Direct signal traffic efficiently.
- Route messages between any two protocols.
- Route messages between linear bus, star and star-wired ring topologies.
- Route messages across fibre optic, coaxial, and twisted-pair cabling.

Switches- It is a device that selects a circuit for sending data through a network. A concentrator is a device that provides a central connection point for cables from workstations, servers and peripherals. A switch tends to be simpler, faster and less expensive than a router, lacks information about the network that a router may use in determining the best circuit or path to use to move data from one part of a network to another.

Hubs- It is used in the network but these are such type of network devices that transmits a data to all its connected devices. It does not control the traffic so they are less used in comparison to switches.

3.7 WIRELESS COMMUNICATION SYSTEM

Wireless communication is the transfer of information over a distance without the use of wires. It does not use the electrical or optical conductor. Various types of wireless communication are fixed, mobile and portable two-way radios, cellular telephones, personal digital assistants (PDAs) and wireless networking. Generally wireless system is categorized into 2 categories:

- ✓ **Fixed Wireless System-** It supports little or no mobility of the equipments related to the network.
- ✓ **Mobile Wireless System-** It supports the mobility of the equipment to the network and mobility of the users and allow them to access information from anywhere and at anytime communication is done through radio waves. Wireless network is always connected to a wired network infrastructure with stationary trans-receivers.

3.8 WIRELESS MEDIA

Two types of wireless media:

- ✓ **Radio Waves-** Radio wave has a frequency between 10KHZ and 300GHZ. This electromagnetic range is called radio frequency (RF). Typical radio frequency applications include AM broadcasting, navigational beacons, wireless networks and shortwave radio.
- **Microwaves-** It is the most popular long distance transmission method. It uses line-of-sight communication. Microwaves range from approximately between 300MHZ and 300GHZ and are typically used for broadcast television, FM broadcasting, aviation communications, and radar and satellite links. Microwave system consists of two radio transceivers: (I) One to transmit; (II) One to receive

These antennas are often installed on towers to give them more range and raise them above anything that may block their signal. Such types of communication are of two types: terrestrial microwave (ground based communications stations that are designed to communicate with each other or with satellite) and satellite microwave uses communication that operate in orbit.



3.9 INFRARED TRANSMISSION DATA FOR SHORT DISTANCES

Transmission using infrared light rays has been implemented by short companies for short distance communication. They are inexpensive, easy to install systems as long as they are used within a single building or business operations site. It uses infrared light to transmit signals. The other last miles are as follows:

- a. Cable TV network
- b. VSAT (Very Small Aperture Terminal)
- c. Cellular Infrastructure
- d. Radio Based Wireless
- e. Specialised Mobile Radio System

CABLE TV NETWORK

This is vigorously pushing high speed data to the home by running over cable networks, not on telephone analog but more recent ISDN connections. This last mile is capital intensive and is constructed with copper phone lines, a high capacity wiring in the form of coaxial cable for broadcasting analog video.

VSAT (SMALL APERTURE TERMINAL)

VSAT is Very Small Aperture Terminal. Using satellite communication is expensive. VSATs share satellite transmission capacity for transmitting data to hub station. VSAT handles data, voice and video signals.

CELLULAR COMMUNICATION

This communication is done through cells instead of packets. This technology divides the geographic area into cells. Communication takes place through a grid of transmitter and receiver. Cellular is now the dominant two-way mobile communications technology. Cellular systems have followed the traditional circuit switched channel model of telephony.

RADIO BASED WIRELESS

Radio based system consists of radio, cellular, satellite and paging services. It can be grouped into two main categories- land based cellular communication and satellite based communication. Radio technology is used in radio broadcasting and warfare.

SPECIALISED MOBILE RADIO SYSTEM

Specialized Mobile Radio (SMR) is any two-way radio system in which two or more mobile wireless transceivers are linked by a single repeater. It is like a cellular telephone network. In SMR, the range of each individual mobile transceiver is greater than the range of a cell phone set. SMR systems use

differing protocols, frequency ranges, and modulation schemes: An SMR system uses half-duplex communication and a PTT (push-to-talk) mode. SMR is used by taxi dispatchers, parcel delivery companies, fire departments, paramedic squads, police departments and amateur radio operators. These systems generally consist of one or more repeaters used to maintain communications between a dispatch fleet of mobile or hand-held walkie talkie radios.

MODEM:

A device that converts the digital signals produced by terminals and computers into the analog signals that telephone circuits are designed to carry. It is a device is required to convert from one to the other in order to transmit data over telephone circuits. The term modem is a contraction of the two main functions of such a unit, modulation and demodulation. The device is also called a data set.

Narrowband/phone-line dialup modems





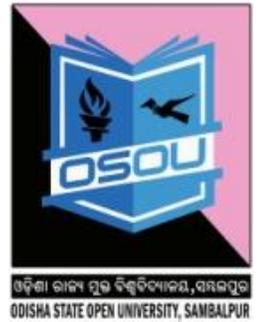
BROADBAND



3.10 LET US SUM UP

Networks are built with a mix of computer hardware and computer software. The communication infrastructure such as the examples are as fiber optic, coaxial cables, radio waves, satellites, and copper wires. Thus Information superhighway is the global information and communications network that includes the Internet and other networks and switching systems such as

telephone networks, cable television networks, and satellite communication networks used for e-commerce and many more other purposes.



3.11 KEY TERMS

- ✓ **Modem** is a device that has both a modulator and a demodulator.
- ✓ **Hub** is like a repeater with multiple ports.
- ✓ **Router** connects networks that use different technologies, media and physical addressing schemes.

3.12 SELF ASSESSMENT QUESTIONS

1. Give a brief description of the architecture of the internet.
2. Define a router.
3. How does a dial-up access method for the inter connection work?
4. What kind of users should preferably use the leased line internet connection?

3.13 FURTHER READINGS

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3.14. MODEL QUESTIONS

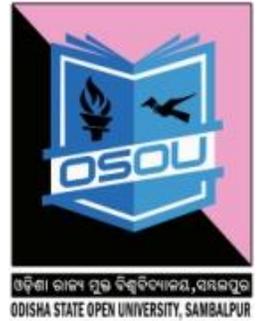
- How does a leased line internet connection work?
- List the features of ISDN internet connection.
- List the features of cable modem internet connection.
- Define wireless communication system.
- Explain in details components of I-way.

3.15 SELF ASSESSMENT QUESTIONS AND ANSWERS

1. Give a brief description of the architecture of the internet?

Ans: Internet is a network of interconnected networks and is designed to operate without a central control. If a portion of the network fails, connection is made through alternative paths available. The architecture of internet is hierarchical in nature. A brief description of the architecture of internet is as follows:

- **Client** at home or in a LAN network is at the lowest level in hierarchy.
- Local **Internet Service Provider (ISP)** is at the next higher level.
 - An ISP is an organization that has its own computers connected to the internet and provides facility to individual users to connect to internet through their computers.
 - Local ISP is the local telephone company located in the telephone switching office.
 - The client calls local ISP using a modem.
- **Regional ISP** is next in the hierarchy. The local ISP is connected to regional ISP.
 - A router is a special hardware system consisting of a processor, memory and an I/O interface used for the purpose of interconnecting networks.
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 - Network Access Points (NAP) connects different backbones.



2. Define a Router.

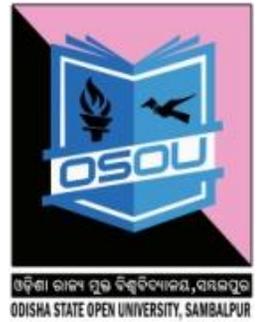
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3. How does a dial-up access method for the inter connection work?

Ans: The speed of internet access increases with the increase in bandwidth. ISPs offer low speed internet connection like Dial-up connection, and high speed internet connection called broad-band connection. Broadband are the services with more bandwidth than standard telephone service, DSL, Cable modem, and integrated services digital network are some of the existing broadband connections.

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 - ❖ You connect to internet by dialing up one of the computers of ISP.
 - ❖ The client enters the user-id and password, and gets connected to the internet via the ISP.



4. What kind of users should preferably use the leased line internet connection?

Ans: The Leased Line internet connection as follows:

- ❖ It is a dedicated phone line that connects a computer to internet, using special kind of modems. Then the gateway is connected to a large numbers of computers.
- ❖ The gateway forms a domain on internet which is used to provide connection to the other computers.
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ODISHA STATE OPEN UNIVERSITY, SAMBALPUR

