

E-Commerce

**Enabling technologies of the World Wide
Web**

Module 3

World Wide Web

- The **World Wide Web (WWW)**, commonly known as **the Web**, is an information system where documents and other web resources are identified by Uniform Resource Locators (URLs) which may be interlinked by hypertext, and are accessible over the Internet.
- The resources of the Web are transferred via the Hypertext Transfer Protocol (HTTP), may be accessed by users by a software application called a web browser, and are published by a software application called a web server.

HyperText Markup Language (HTML)

- The hypertext pages on the web are all written using the hypertext markup language (HTML), a simple language consisting of a small number of tags to describe logical constructs within the text.
- HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects such as interactive forms may be embedded into the rendered page.

HyperText Transfer Protocol (HTTP)

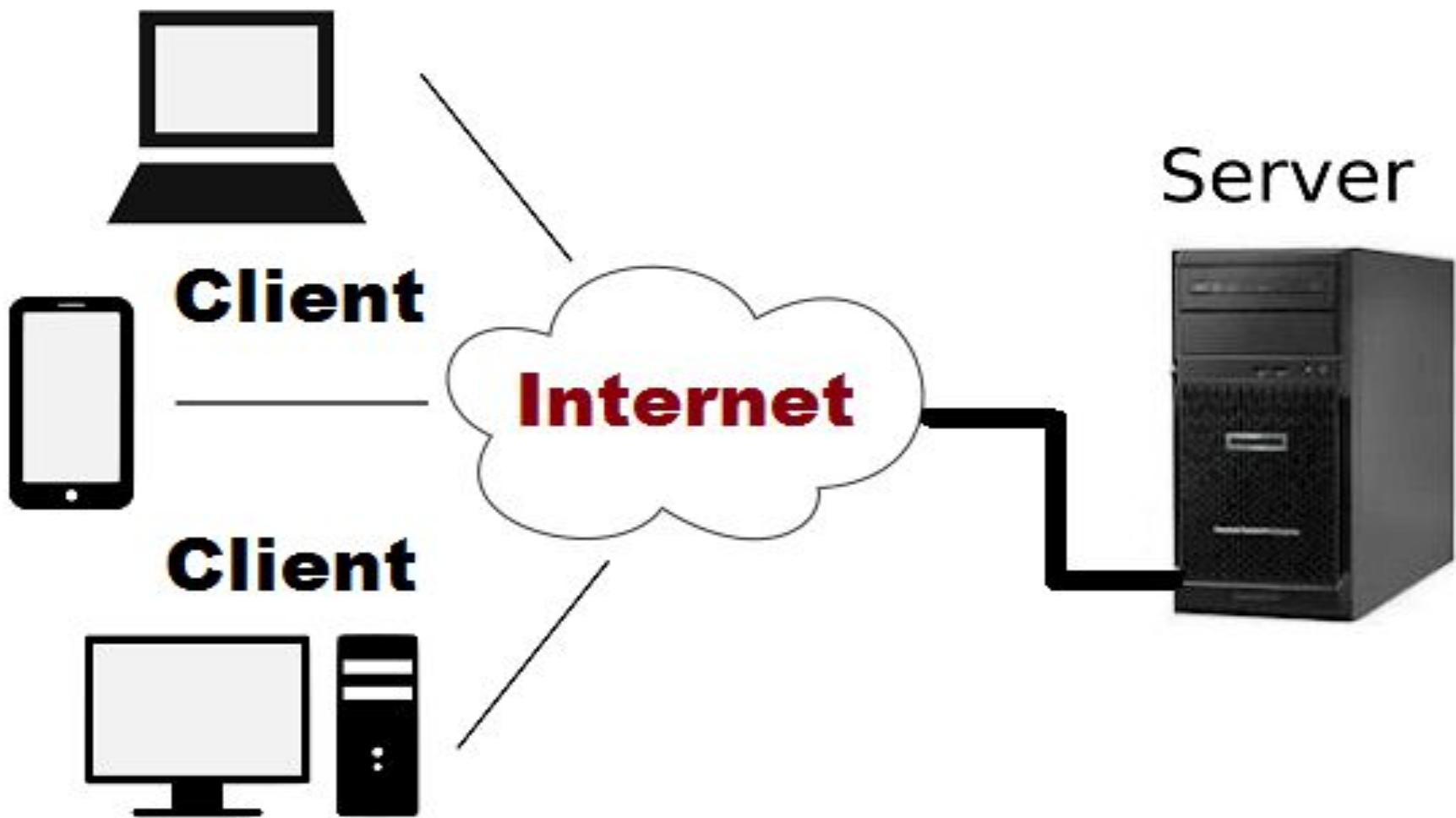
- HTTP is the foundation of data communication for the World Wide Web
- In the first phase of a HTTP transfer, the browser sends a request for a document to the server.
- In response to a query, the server returns the document to the browser using one of the formats acceptable to the browser.

Uniform Resource Locators (URL)

- **URL**, colloquially termed a **web address** is a reference to a web resource that specifies its location on a computer network and a mechanism for retrieving it.
- A URL consist of 3 major components:
 - First component specifies the protocol to be used to access the document. for example, HTTP,FTP etc
 - Second component specifies the node on the network from which the document is to be obtained.
 - Third component specifies the location of the document on the remote machine.

Internet Client Server Architecture

- Client server is a network architecture that divides functions into client and server subsystems.
- A client is defined as a requester of services and the server is defined as the provider of services.
- A user who wants to access information runs a www client on his local computer. The client fetches documents from remote network nodes by connecting to the server.



Client Server Applications

- **World Wide Web**

- It is a collection of documents distributed across the internet and linked together by hyperlink links.
- Users access the web facilities via a client called browser.

- **E-mail**

- The application that allows users to send, receive and read email.
- Attachments that can be added along with email make it as a general file delivery mechanism.

Protocols used in email are:

1) POP (Post Office Protocol)

- Used to send email from a mail server to email clients inbox. POP mail is downloaded to email client directly and does not stay on the server by default.

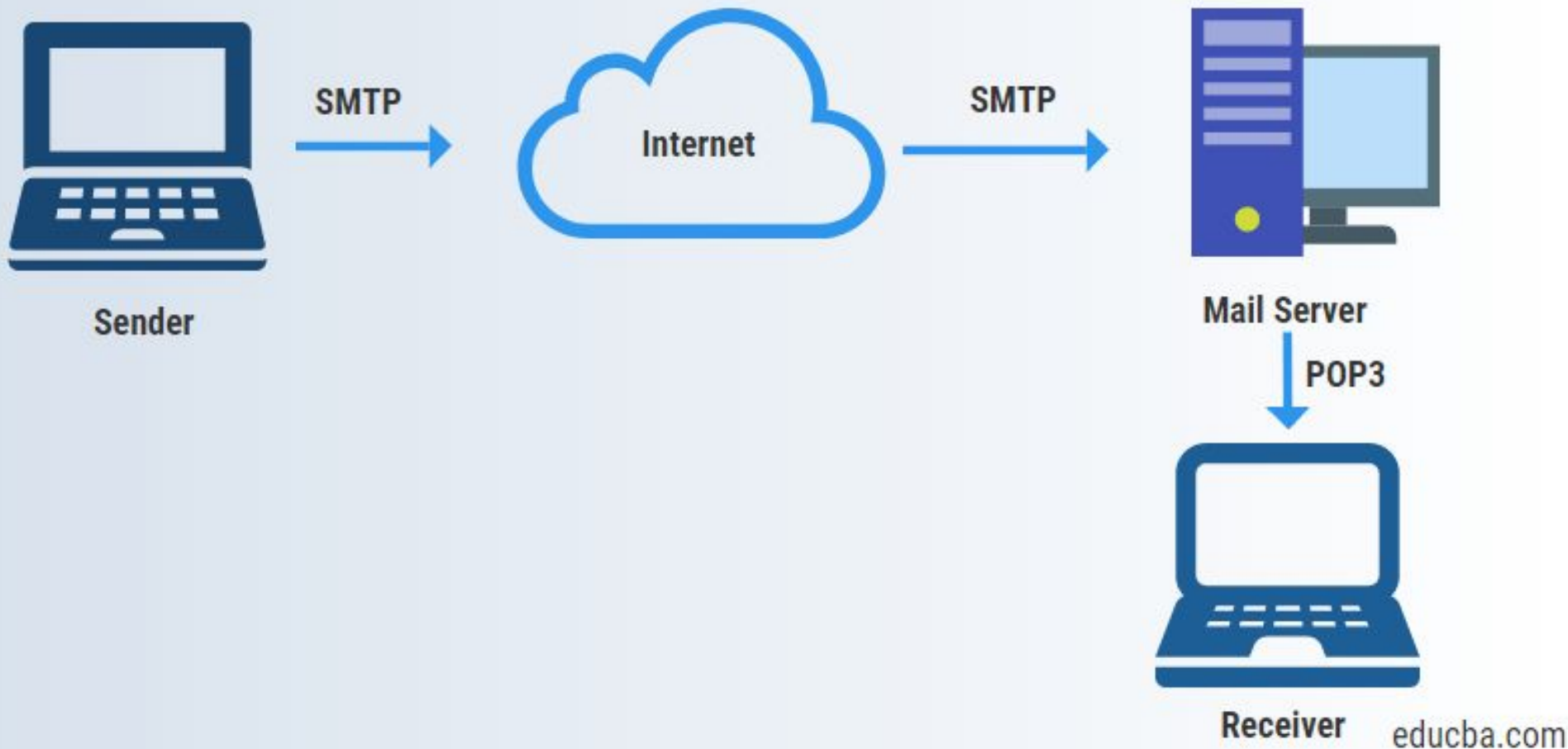
2) IMAP (Internet Message Access protocol)

- Used for retrieving email messages from email server. Email from IMAP servers are stored on the server and not downloaded to the mail client.

3) SMTP (Simple Mail Transfer Protocol)

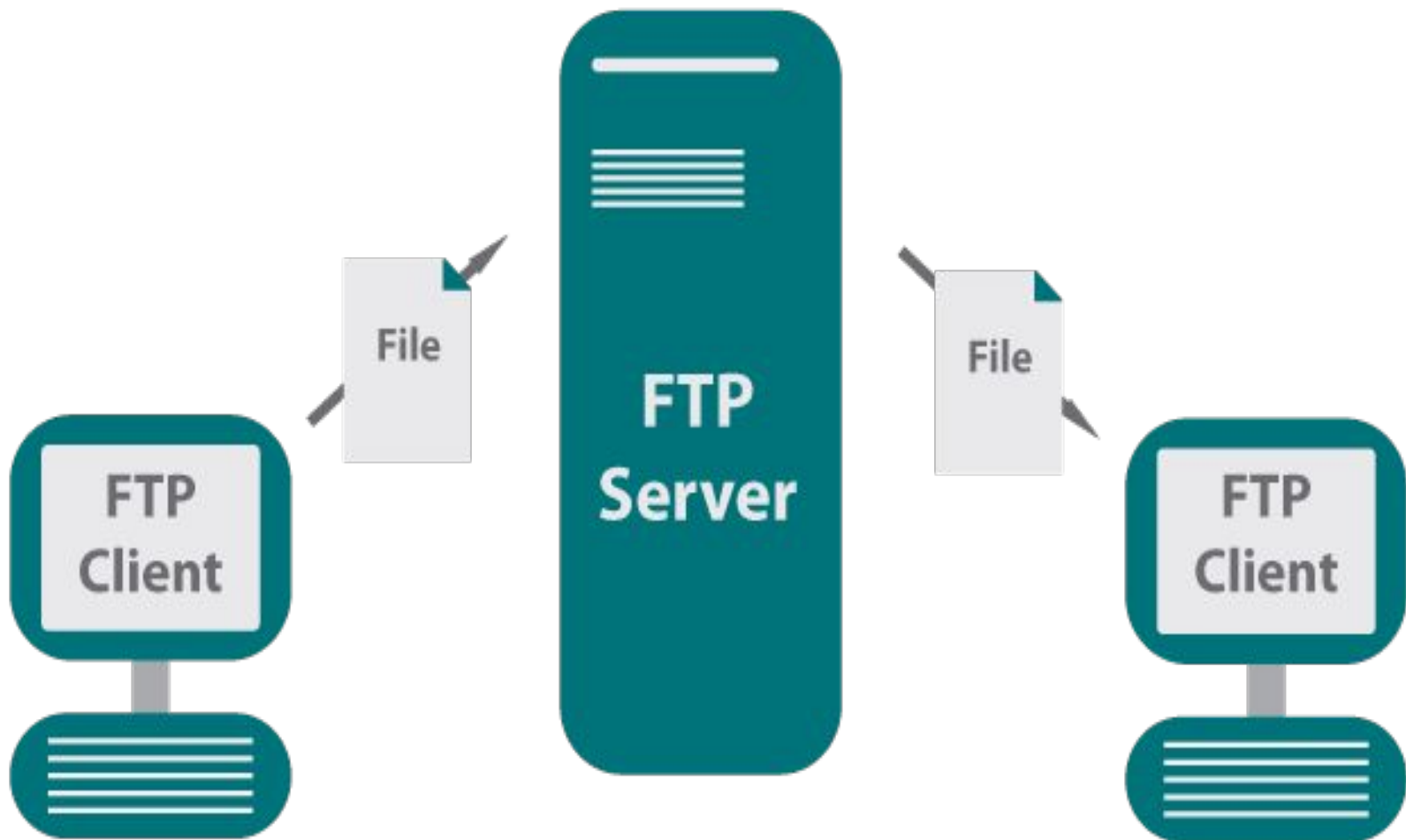
- Used for sending email messages between mail servers. Also used to send messages from a mail client to a mail server.

SMTP Protocol



● **File Transfer Protocol**

- It is a standard network protocol used for the transfer of computer files between a client and server on a computer network.
- FTP allows upload and download files from computer via internet.
- FTP is composed of two parts : FTP client and FTP server.
- FTP client is the software that execute on local computer to send and receive files.
- FTP server is software which executes on a server machine on which the files are to be saved or retrieved.



- **Chat**
 - Online chat may refer to any kind of communication over the Internet that offers a real-time transmission of text messages from sender to receiver.
 - Main protocol used in chat is Internet Relay Chat (IRC).

- **Interactive text oriented communications (TELNET)**
 - Telnet is an application protocol used on the Internet or local area network to provide a bidirectional interactive text-oriented communication facility using a virtual terminal connection.

- **Usenet NewsGroups**

- It is a discussion group where people can share views on topic of their interest.
- Newsreader software is used to read the content of newsgroups.
- NNTP (Network News Transfer protocol) is used for transporting usenet news.

Advantages of Client server technology

- **Improves network performance**

Most of the data is processed on the server and only the result is returned to the client. This reduces the amount of network traffic between the server and the client machine, which improves the network performance.

- **Scalability**

Thousands of users can access the same database at the same time, and the database can store billions of records.

- **Easy maintenance**

Easier to maintain and repair or even relocate a server without affecting the clients.

- **Greater security**

Data is stored on servers which generally have greater security than clients.

- **Easy development**

A programmer can develop presentation components without knowing the business application logic.

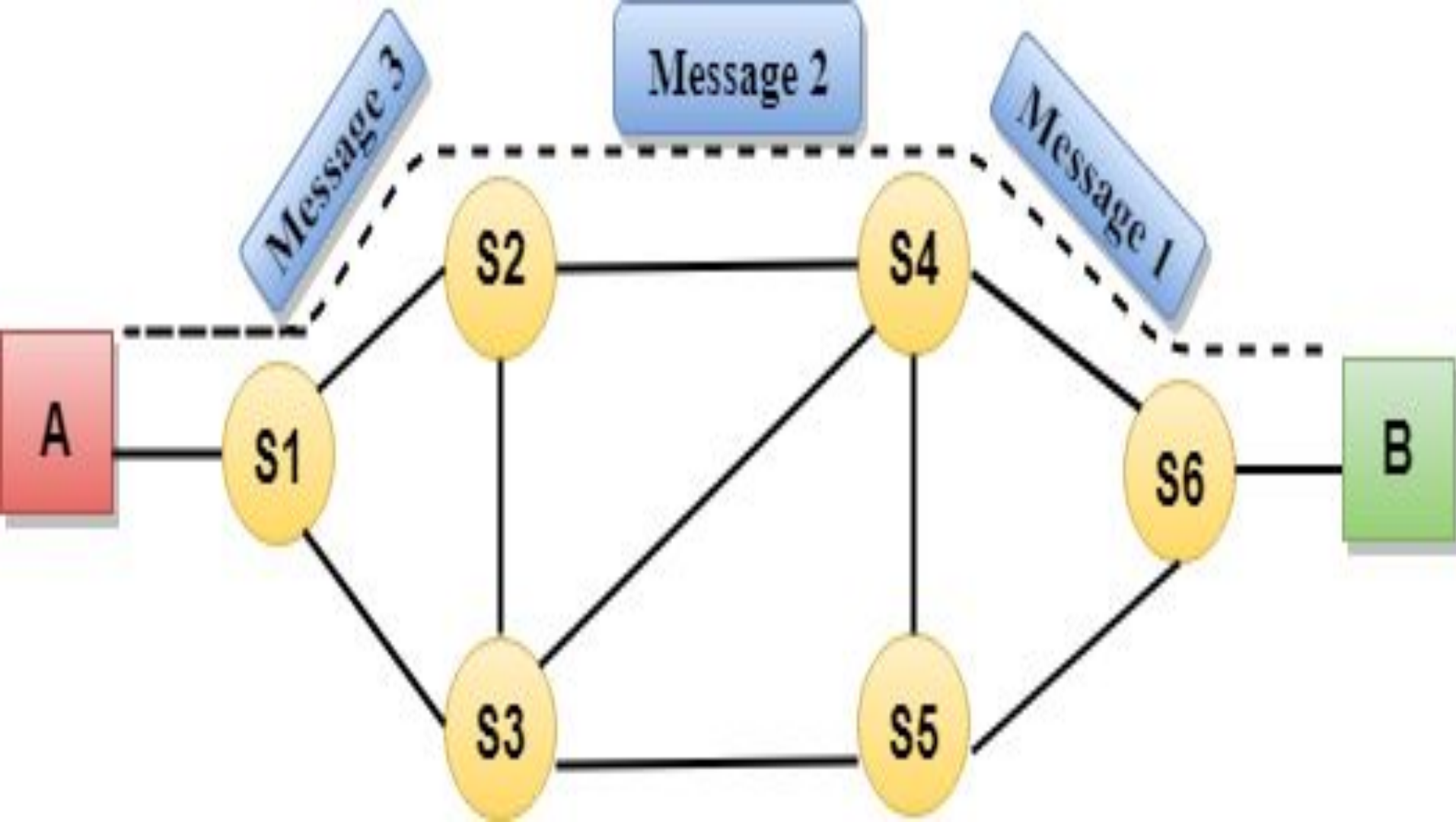
Communication switching

- In large networks, there may be more than one paths for transmitting data from sender to receiver.
- Selecting a path that data must take out of the available options is called switching.
- There are two popular switching techniques
 - circuit switching
 - packet switching

Circuit Switching

- Circuit switching is a switching technique that establishes a dedicated path between sender and receiver.
- A complete end-to-end path must exist before the communication takes place.
- When any network node wants to send data, a call request signal is sent to the receiver and acknowledged back to ensure availability of dedicated path. This dedicated path is then used to send data.

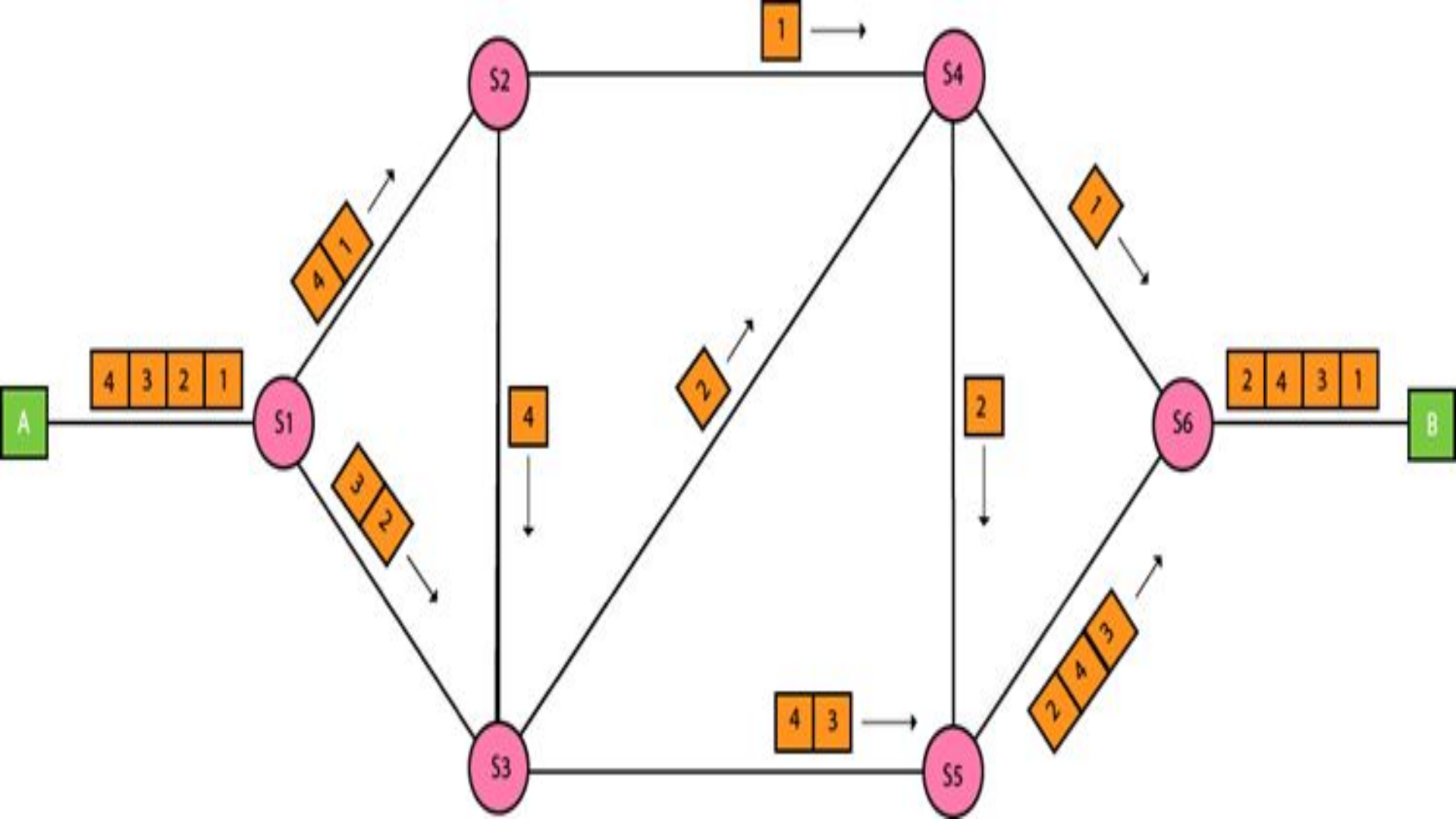
- ARPANET used circuit switching for communication over the network.
- Circuit switching is used in public telephone network. It is used for voice transmission.
- Fixed data can be transferred at a time in circuit switching technology.



Packet Switching

- The packet switching is a switching technique in which the message is divided into smaller pieces, and they are sent individually.
- The message splits into smaller pieces known as packets and packets are given a unique number to identify their order at the receiving end.
- Every packet contains some information in its headers such as source address, destination address and sequence number.

- Packets will travel across the network, taking the shortest path as possible.
- All the packets are reassembled at the receiving end in correct order.
- If any packet is missing or corrupted, then the message will be sent to resend the message.
- If the correct order of the packets is reached, then the acknowledgment message will be sent.

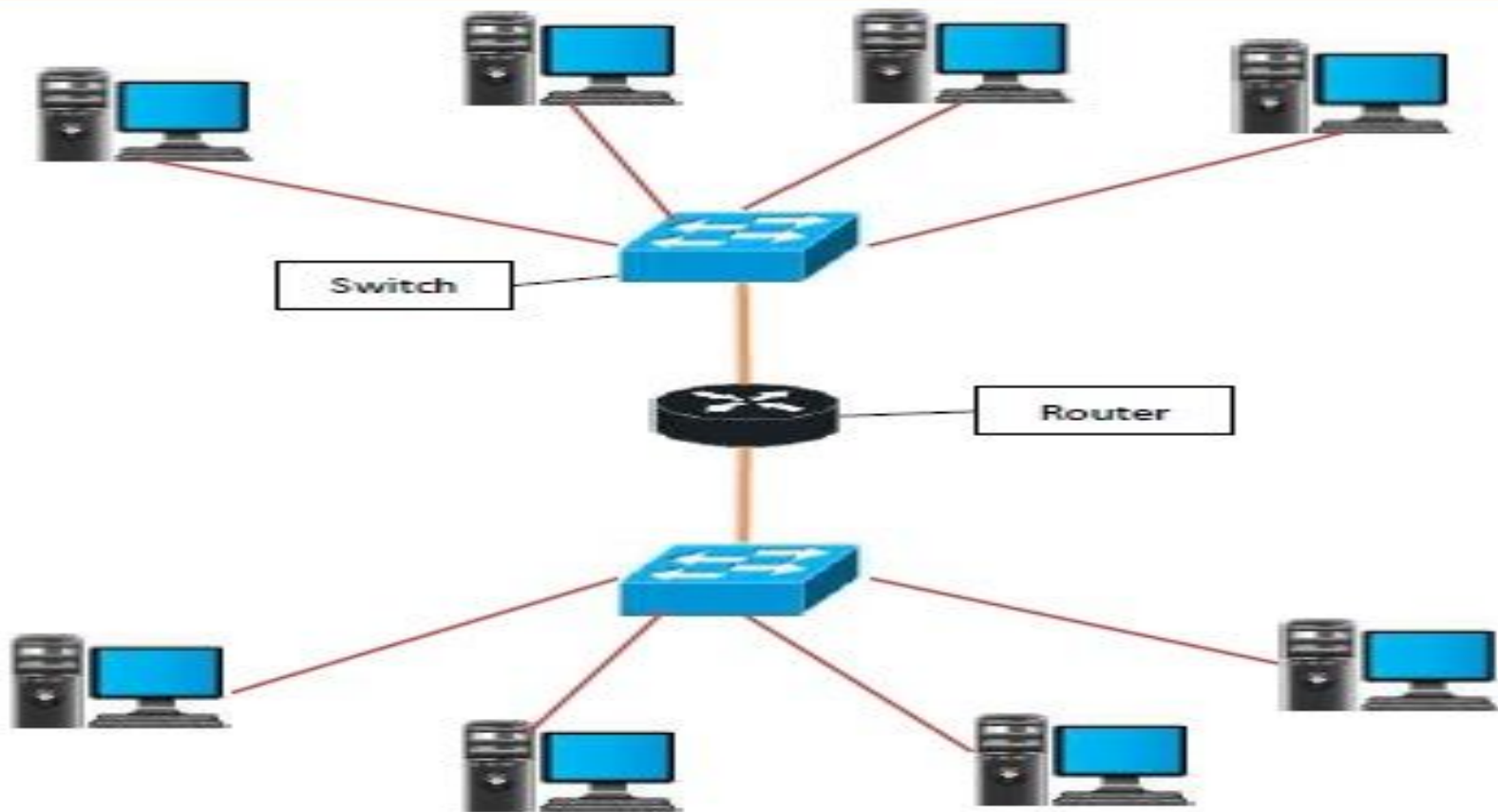


Network Routers

- The router is a physical or virtual internetworking device that is designed to receive, analyze, and forward data packets between computer networks.
- A router examines a destination IP address of a given data packet, and it uses the headers and forwarding tables to decide the best way to transfer the packets.



- Router is also known as an intelligent device as it can calculate the best route to pass the network packets from source to the destination automatically.
- Routers have a routing table in it that is refreshed periodically according to the changes in the network. In order to transmit data packets, it consults the table and uses a routing protocol.



Router Connecting Two Networks

Network Switches

- It is a hardware device that filters and forwards network packets.
- Most business networks today use switches to connect computers, printers, phones and servers in a building or campus.
- When a switch receives a data packet, it examines the data address, the sender and the receiver and stores the memory, after which it then sends the data to the device that the data is meant for.



Connection oriented versus Connectionless protocol

- There are two ways to establish a connection before sending data from one device to another, that are **Connection-Oriented** and **Connectionless Service**.

connection oriented protocol

- In connection oriented protocol, a connection is to be established before starting the communication.
- When connection is established, information is sent and then releases the connection.

- Connection oriented service is more reliable.
- Example TCP (Transmission Control Protocol)

connectionless protocol

- In connectionless protocol, the data is transferred in one direction from source to destination without checking that destination is still there or not or if it prepared to accept the message and hence connectionless service protocol does not guarantees a message delivery.
- Each message is routed independently from source to destination.
- The order of message sent can be different from the order received.
- Example UDP (User Datagram Protocol)

The internet protocol suite

- A protocol stack or suite is a complete set of protocol layers that work together to provide networking capabilities.
- Most network protocol suites are structured as a series of layers, sometimes referred to collectively as a protocol stack.
- Each layer is designed for a specific purpose and exists on both the sending and receiving hosts.

- Each is designed so that a specific layer on one machine sends or receives exactly the same object sent or received by its peer process on another machine.
- Each layer on a host acts independently of other layers on the same machine, and in concert with the same layer on other hosts.
- The two Reference Models are :
 - OSI reference model
 - TCP/IP reference model

OSI reference model

- The international organization for standardisation (ISO) designed the open systems interconnection (OSI) reference model that uses structured layers.
- The OSI model describes a structure with seven layers for network activities.
- One or more protocols are associated with each layer.
- A system that implements protocol behavior consisting of a series of these layers is known as a protocol stack.

Seven layers are :

- **Physical layer**

It is responsible for the actual physical connection between the devices. The physical layer contains information in the form of bits. It is responsible for transmitting individual bits from one node to the next.

- **Data Link layer**

The data link layer is responsible for the node to node delivery of the message. The main function of this layer is to make sure data transfer is error-free from one node to another, over the physical layer.

- **Network layer**

Network layer works for the transmission of data from one host to the other located in different networks. It also takes care of packet routing i.e. selection of the shortest path to transmit the packet, from the number of routes available.

- **Transport layer**

The data in the transport layer is referred to as *Segments*. It is responsible for the End to End Delivery of the complete message. The transport layer also provides the acknowledgement of the successful data transmission and re-transmits the data if an error is found.

- **Session layer**

This layer is responsible for establishment of connection, maintenance of sessions, authentication and also ensures security.

- **Presentation layer**

The data from the application layer is extracted here and manipulated as per the required format to transmit over the network. The functions of the presentation layer are Translation, Encryption/ Decryption, Compression.

- **Application layer**

This layer also serves as a window for the application services to access the network and for displaying the received information to the user.

TCP/IP protocol model

- It is also referred to as the internet protocol suite.
- It is the set of communications protocol that implements the protocol stack on which the internet and most commercial network run.

It contains four layers :

- **Process/Application Layer**

This layer performs the functions of top three layers of the OSI model: Application, Presentation and Session Layer.

It is responsible for node-to-node communication and controls user-interface specifications.

- **Host-to-Host/Transport Layer**

This layer is analogous to the transport layer of the OSI model. It is responsible for end-to-end communication and error-free delivery of data.

- **Internet Layer**

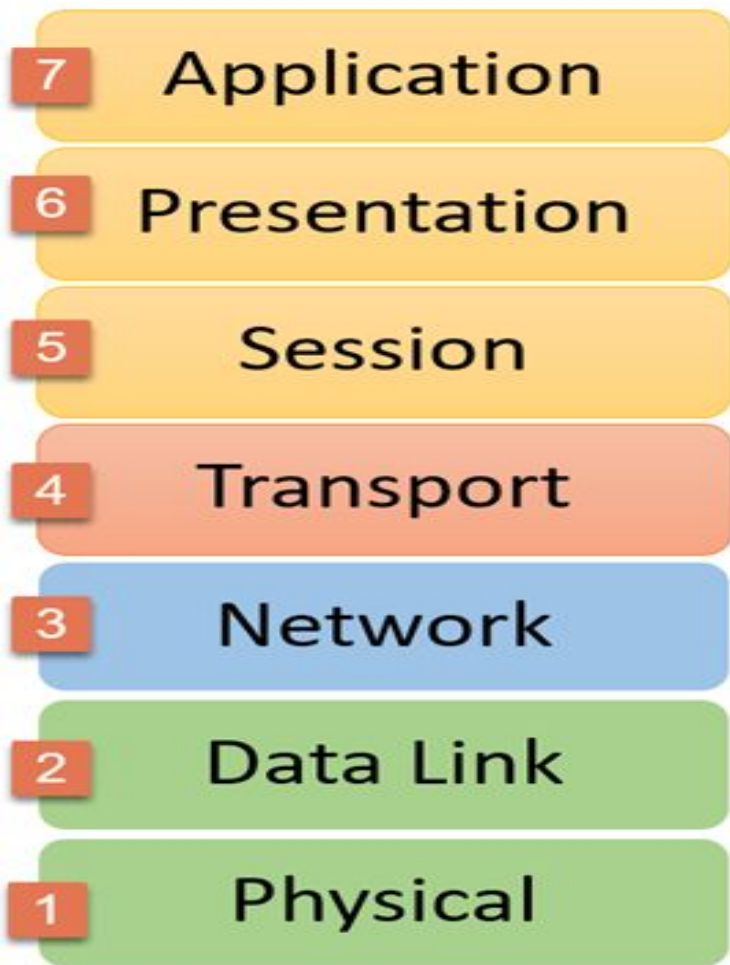
This layer parallels the functions of OSI's Network layer. It defines the protocols which are responsible for logical transmission of data over the entire network.

- **Network Access/Link Layer**

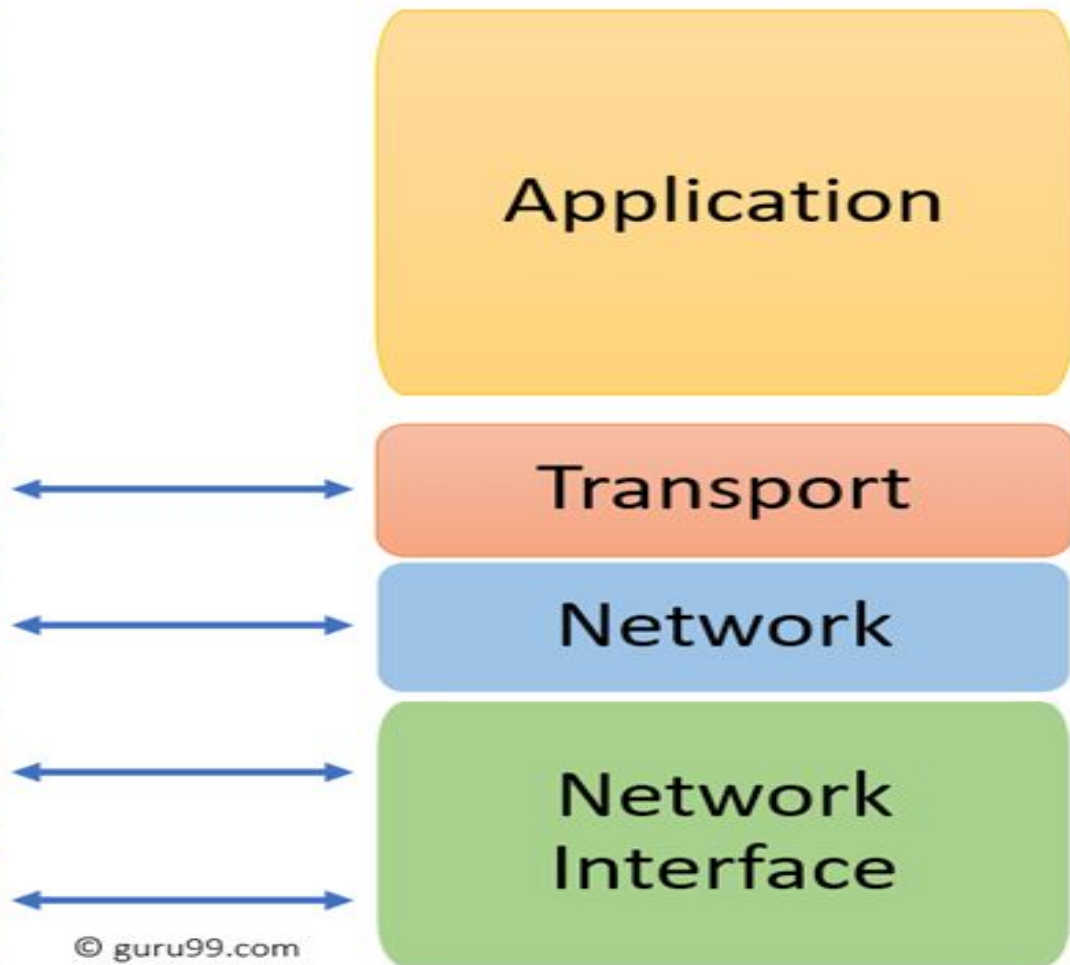
This layer corresponds to the combination of Data Link Layer and Physical Layer of the OSI model.

It looks out for hardware addressing and the protocols present in this layer allows for the physical transmission of data.

OSI Reference Model



TCP/IP Conceptual Layers



IP Address

- An Internet Protocol address (IP address) is a numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication.
- There are two IP versions: IPv4 and IPv6.
 - IPv4 defines an IP address as a 32-bit number
 - IPv6 defines an IP address as a 128-bit number
- It helps to connect one computer to other devices on the network and all over the world.

- IP address example : 192.6.132.0
- An IP address is in the format of 4 sets of decimal numbers separated by dots.
- The decimal set is in the range 0 to 255. Each and every set is called octet.

Domain Name System (DNS)

- The Domain Name System (DNS) is a hierarchical naming system for computers, services, or other resources connected to the Internet.
- It is the Internet's system for mapping alphabetic names to numeric Internet Protocol (IP) addresses like a phone book maps a person's name to a phone number.
- No two organizations can have the same domain name.
- Eg : microsoft.com , www.tutorialspoint.com

Every domain name ends in a top level domain (TLD) name.

- Generic Top-Level Domain names :
 - Com - Commercial business
 - Edu - Education
 - Gov - Government agency
 - Net - Networking organization
 - Org - Non profit organization
- Country top-level domain names :
 - Au - Australia
 - In - India
 - Fr - France
 - Us - United States

Software agents

- Software agents are autonomous pieces of software that conduct several tasks delegated to them.
- An agent represents a person or organization and interact with others to accomplish a predefined task.
- A software agent is the computer analogue of an autonomous robot.

Characteristics of software agents

- **Autonomy**

A software agent can initiate communication, monitor events, and perform tasks without the direct intervention of humans or others.

- **Reactivity**

A software agent responds in a timely fashion to changes in its environment.

- **Proactivity**

The ability to take the initiative and not only react to external signals. In some cases, an agent can modify the goals or establish goals of their own.

- **Temporal continuity**

Unlike regular computer programs that terminate when processing is complete, an agent continues to run monitoring system events that trigger its action.

- **Cooperation or interactivity**

An agent should be able to interact with other agents.

Types of software agents

- Collaborative agents
- Interface agents
- Mobile agents
- information/ internet agents
- Reactive agents
- Hybrid agents
- Smart agents
- Heterogeneous agents

- **Collaborative agents**

Collaborative agents emphasis autonomy and cooperation with other agents in order to perform tasks for their owners.

- **Interface agents**

Interface agents emphasis autonomy and learning in order to perform tasks for their owners.the agent observes and monitors the actions taken by the user in the interface,learns new short cuts, and suggests better ways of doing task.

Interface agents learn to better assist its users in four ways :

1. By observing and imitating the user.
2. Through receiving positive and negative feedback from the user.
3. By receiving explicit instructions from the user
4. By asking other agents for advice.

- **Mobile agents**

Mobile agents are software processes capable of roaming wide area networks such as the WWW, interacting with foreign hosts, gathering information on behalf of its owner and coming back home having performed the duties set by its user.

- **Information/Internet agents**

The intelligent part of software which can automatically search for information on the website is termed as information agents. Information system can be considered as knowledge base system.

- **Reactive agents**

Reactive agents act/respond in a stimulus-response manner to the present state of the environment in which they are embedded.

- **Hybrid agents**

Hybrid agents refer to those agents whose constitution is a combination of two or more previous mentioned agents. They may be mobile, interface, information, collaborative or reactive.

- **Heterogeneous agents**

It refers to an integrated set up of at least two or more agents which belong to two or more different agent classes. A heterogeneous agent system may also contain one or more hybrid agents.

- **Smart agents**

Smart agents are the new form of software agents that interface with other agents forming an artificial intelligence. **SMART stands for System for Managing Agents for Real Time.** These agents can learn, co-operative and autonomous. When all these three qualities are combined in an agent, the agent will become smart.

Internet standards and specification

- In data communication, a standard specifies a set of procedures.
- Standard helps to promote a consistent and universal use of internet worldwide.
- The following organizations are principal players in internet standard development.
 - The Internet Engineering Task Force(IETF)
 - IEEE-SA
 - ISOC
 - ANSI
 - ISO
 - IESG
 - IAB , W3C

- **The Internet Engineering Task Force(IETF) :**

It is a loosely self organized group of people who make technical and other contributions to the engineering and evolution of the internet and its technologies.

- **The Institute of Electrical and Electronics Engineers Standards Association(IEEE-SA)**

It is an organization within IEEE that develops global standards in a broad range of industries including computers and networking.

- **The Internet Society (ISOC)**

They are multinational, non profit organization. Their major goal is to ensure the open development, evolution and use of the internet for the benefit of people throughout the world.

- **The internet Engineering Steering Group (IESG)**

This is a part of ISOC and manages the internet standards process and technical activities for the IETF.

- **The internet architecture board (IAB)**

It is a technical advisory group of ISOC and oversees internet architecture and protocols.

- **The world wide web consortium (W3C)**

W3C's mission is to lead the world wide web to its full potential by developing protocols and guidelines that ensure long term growth for the web.

- **The American National Standards Institute(ANSI)**

ANSI coordinates the standards system and approves American national data processing and communications standards. ANSI does not develop standards.

- **The international Organization for Standardisation (ISO)**

It accepts and certifies international standards for telecommunications. ANSI is a member of ISO.

Internet Service Provider (ISP)

- It is a company that provides customers with internet access.
- An Internet service provider (ISP) is an organization that provides a set of services for accessing, using, or participating in the Internet.
- Internet service providers can be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.
- An ISP typically serves as the access point or the gateway that provides a user, access to everything available on the Internet.

Traditional Marketing

- Essentially, marketing is the process of creating or directing an organization to be successful in selling a product or service that people not only desire, but also are willing to buy.
- Methods of traditional marketing can include direct sales, print advertising like magazine, newspapers etc.

Limitations of traditional marketing

- Expensive

Printing hard copy brochures, business cards, advertising for magazine is expensive.

- Time consuming

Traditional marketing uses static text or advertising commercials to promote a product. If an ad is placed in the newspaper, it can't change until another ad is placed.

- Customization

With traditional ads, it is difficult to target a specific customer. Specific market segments can be targeted, but not an individual.

E-Marketing

- E-marketing redefining the way businesses interact with their customers.
- Companies use social media tools and online ad campaigns to expand their audience.
- Companies can develop web pages or blogs that provide up to date information on their products or services.
- Customers can then subscribe to news feeds and receive alerts to sales or company events.

Differences between E-marketing and Traditional Marketing :

- **Interactivity**

Companies can collect the responses of their consumers online, making them more dynamic and adaptive.

- **Immediacy**

Traditional marketing takes more time to go from a concept to finished products.

- **Cost**

Every business strategy involves cost. Traditional marketing promotes the products of a brand through ads on paper, magazine TV radio and more. Online marketing can carry a cost, but there are numerous online marketing strategies that are virtually free.

- **Coverage**

In traditional marketing , coverage of our products will be printed on paper media or aired on television and radio. unfortunately , the exposure to products will be for short duration.

- **Audience**

Traditional marketing is more effective for target customers which out of reach of internet.

- **Tracking**

It is difficult to keep track of traditional marketing strategy. We need to put a lot of effort and time consuming research to get information how our customer behaviour against our products. On the other hand, online marketing is easy to track.

Identifying Web presence goals

- An effective website is one that creates an attractive presence that meets the objectives of the business or other organizations. These objectives include :
 - Attracting visitors to the website.
 - Making the site interesting enough
 - Convincing visitors to follow the sites links
 - Building a trusting relationship with visitors.
 - Reinforcing positive images of the organization
 - Encouraging visitors to return to the site.

Online Marketing

- It is a type of marketing that utilizes techniques for the sale of products and services, aimed at a target audience that uses the internet and other social media tools.
- The methods and techniques used for online marketing include email, social media, search engine optimization and more.

Advantages of online marketing

- Reduced cost

The initial cost of starting an online marketing is very low comparing traditional marketing.

- Measurability

With online marketing, everything can be tracked and illustrated in detailed graphs.

- **Brand engagement**

It is essential to establish and maintain positive brand awareness. A regularly updated website with well written content that maintains people's interest brings great value to business.

- **Real time result**

It is not necessary to wait weeks to see a significant increase in business.

- **Meet competition**

It allows small business firms to compete with big corporations spending their marketing budgets.

E- Advertising

- It is an attempt to release information on the internet in order to establish a relationship among vendors and buyers.
- Even if the audience does not go to the advertised site immediately, the audience will remember having seen advertisement and hopefully visit another time.

Various means of E-advertising

- Banner Advertisements

It appears as rectangular graphics near the top of the page. The important payment model of internet advertising is Cost per click.

Cost per click

It is a form of internet marketing where in advertisers pay the search engine or the publisher of the ads whenever their ads are clicked.

- Floating advertisements

These advertisements may float or stay on the window for a specified time of 10-30 seconds.

They have escape options such as close or exit buttons.

While they are on the screen, it is difficult to view the matter on the page we are trying to read.

They take the viewers attention and can not be ignored.

- Interstitials

They are a form of advertisement that is shown between pages on the web site. As you click from one page to another, you are shown this advertisement before the next page is shown.

- Unicast advertisements

They have the advantage of sound, picture, color, and movement and are mostly animated. These run like television commercials in a separate window. However, it has the ability to click on the ad for more information.

- Popup advertisements

When a person visits a website containing a pop up add, a separate window pops up and the advertisement will be displayed in the window.

- Contextual advertisements

Commonly used for content based websites. With Contextual advertisements, targeted advertisements appear based on the pages actual content.

- E-Zines

This stands for electronic magazine. In terms of features, an ezine is similar to a magazine in the sense that one has to subscribe to ezines to read them.

- Auctions

Auction allows products to be sold via bids.

Benefits of E-Advertising

- Global accessibility
- Rich content
- Affordability
- Speed
- Quick updating
- Provides brand relevant information
- Easy collection of data
- Greater flexibility
- Better customer relation
- Facilitates purchase decisions

E-Branding

- Internet branding (also referred to as Online branding) is a brand management technique that uses the World Wide Web & Social Media Channels as a medium for positioning a brand in the marketplace.
- Branding is increasingly important with the advancements of the internet.
- Most businesses are exploring various online channels, which include search engine, social media, online marketplace, to establish strong relationships with consumers and to build their brands awareness.

Elements of branding

- Product differentiation

The product should stand out in the market and must be distinguishable from all others in the market.

- Relevance

It is the degree to which the product offers utility to a potential customer.

- Perceived value

A brand is established if the brand is different from other brands and also proves its value of worth to potential customers.

Benefits of E-branding

- Easy to survive among competitors.
- Helps to find familiarity and loyalty from customers.
- Easy to expand customer relationship.
- Result in higher sales of not only for one product, but other products associated with the brand.
- Successful marketing strategy

The End

Thank You

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