PRACTICAL 8

AIM: - To study OSI Model, TCP/IP protocol & HTTP.

Theory: -

The Open Systems Interconnection model (OSI model) is a conceptual model that characterizes and standardizes the communication functions of a telecommunication or computing system without regard to their underlying internal structure and technology. Its goal is the interoperability of diverse communication systems with standard protocols. The model partitions a communication system into abstraction layers. The original version of the model defined seven layers.

Layer 1: - Physical Layer

The physical layer has the following major functions:

- It defines the electrical and physical specifications of the data connection. It defines the relationship between a device and a physical transmission medium (e.g., a copper or fiber optical cable, radio frequency). This includes the layout of pins, voltages, line impedance, cable specifications, signal timing and similar characteristics for connected devices and frequency (5 GHz or 2.4 GHz etc.) for wireless devices.
- It defines transmission mode i.e. simplex, half duplex, full duplex.
- It defines the network topology as bus, mesh, or ring being some of the most common.

Layer 2: - Data Link Layer

The data link layer provides node-to-node data transfer a link between two directly detects and possibly corrects errors that may occur in the physical layer. It, among other things, defines the protocol to establish and terminate a connection between two physically connected devices. It also defines the protocol for flow control between them. IEEE 802 divides the data link layer into two sublayers:

- Media Access Control (MAC) layer responsible for controlling how devices in a network gain access to data and permission to transmit it.
- Logical Link Control (LLC) layer responsible for identifying Network layer protocols and then encapsulating them and controls error checking and packet synchronization.

The MAC and LLC layers of IEEE 802 networks such as 802.3 Ethernet, 802.11 Wi-Fi, and802.15.4 ZigBee, operate at the data link layer.

Layer 3: - Network Layer

The network layer provides the functional and procedural means of transferring variable length data sequences (called datagrams) from one node to another connected to the same network. It translates logical network address into physical machine address. A network is medium to which many nodes can be connected, on which every node has an address and which permits nodes connected to it to transfer messages to other nodes connected to it by merely providing the content of a message and the address of the destination node and letting the network find the way to deliver ("route") the message to the destination node. In addition to message routing, the network may implement message delivery by splitting the message into several fragments, delivering each fragment by a separate route and reassembling the fragments, report delivery errors, etc.

Datagram delivery at the network layer is not guaranteed to be reliable.

Layer 4: - Transport Layer

The transport layer provides the functional and procedural means of transferring variable length data sequences from a source to a destination host via one or more networks, while maintaining the quality of service functions.

An example of a transport-layer protocol in the standard Internet stack is Transmission Control Protocol (TCP), usually built on top of the Internet Protocol (IP).

The transport layer controls the reliability of a given link through flow control, segmentation/desegmentation, and error control. Some protocols are state and connection oriented. This means that the transport layer can keep track of the segments and retransmit those that fail. The transport layer also provides the acknowledgement of the successful data transmission and sends the next data if no errors occurred. The transport layer creates packets out of the message received from the application layer. Packetizing is a process of dividing the long message into smaller messages.

Layer 5: - Session Layer

The session layer controls the dialogues (connections) between computers. It establishes. Manages and terminates the connections between the local and remote application. It provides for full-duplex, half-duplex, or simplex operation, and establishes checkpointing. Adjournment, termination, and restart procedures. The OSI model made this layer responsible for graceful close of sessions, which is a property of the Transmission Control Protocol, and also for session checkpointing and recovery, which is not usually used in the Internet Protocol Suite. The session layer is commonly implemented explicitly in application environments that use remote procedure calls.

Layer 6: Presentation Layer

The presentation layer establishes context between application-layer entities, in which the application-layer entities may use different syntax and semantics if the presentation service provides a big mapping between them. If a mapping is available, presentation service data units are encapsulated into session protocol data units, and passed down the protocol stack. This layer provides independence from data representation (e.g., encryption) by translating between application and network formats. The presentation layer transforms data into the form that the application accepts. This layer formats and encrypts data to be sent across network. It is sometimes called the syntax layer.

The original presentation structure used the Basic Encoding Rules of Abstract Syntax Notation One (ASN.1), with capabilities such as converting an EBCDIC-coded text file to an ASCII-coded file, or serialization of objects and other data structures from and to XML.

Layer 7: Application Layer

The application layer is the OSI layer closest to the end user, which means both the OSI application layer and the user interact directly with the software application. This layer interacts with software applications that implement a communicating component. Such application programs fall outside the scope of the OSI model. Application-layer functions typically include identifying communication partners, determining resource availability, and synchronizing communication. When identifying communication partners, the application layer determines the identity and availability of communication partners for an application with data to transmit. When determining resource availability, the application layer must decide whether sufficient network or the requested communication exists. In synchronizing communication, all communication between applications requires cooperation that is managed by the application layer. This layer supports application and end-user processes. Communication partners are identified, quality of service is identified, user authentication and privacy are considered, and any constraints on data syntax are identified. Everything at this layer is application-specific.

TCP- Transmission Control Protocol

The Transmission Control Protocol (TCP) is a core protocol of the Internet protocol suite. It originated in the initial network implementation in which it complemented the Internet Protocol (IP). Therefore, the entire suite is commonly referred to as TCP/IP, TCP provides reliable. Ordered, and error-checked delivery of a stream of octets between applications running on such as the World Wide Web, email, remote administration and file transfer rely on. Hosts communicating over an IP network. TCP is the protocol that major Internet applications. Applications that do not require reliable data stream service may use the User Datagram Protocol (UDP), which provides a connectionless datagram service that emphasizes reduced latency over reliability.

IP- Internet Protocol

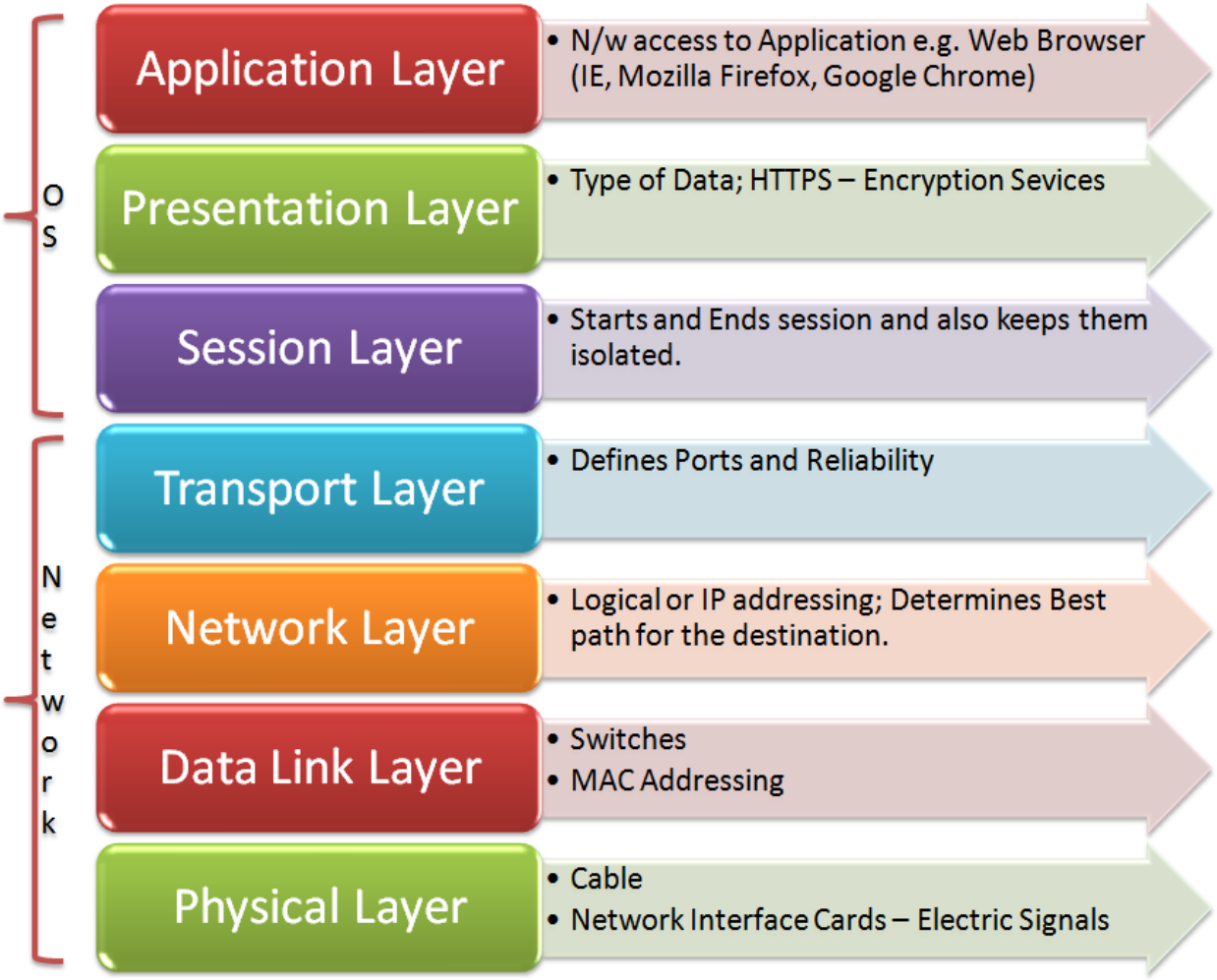
The Internet Protocol (IP) is the principal communications protocol in the Internet protocol internetworking, and essentially establishes the Internet. Suite for relaying datagrams across network boundaries. Its routing function enables

IP has the task of delivering packets from the source host to the destination host solely based on the IP addresses in the packet headers. For this purpose, IP defines packet structures that encapsulate the data to be delivered. It also defines addressing methods that are used to label the datagram with source and destination information.

HTTP - Hypertext Transfer Protocol

The Hypertext Transfer Protocol (HTTP) is an application protocol for distributed, collaborative, hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web.

Hypertext is structured text that uses logical links (hyperlinks) between nodes containing text. HTTP is the protocol to exchange or transfer hypertext.



Conclusion: -

By performing this practical, we learnt about OSI Model, TCP/IP protocol & HTTP.