

## Fundamentals of Networks

### Assignment 2

**Q1: What are the functionalities of each layers of the ISO/OSI model?**

**Ans:**

**1. Physical Layer**

The lowest layer of the OSI Model is concerned with electrically or optically transmitting raw unstructured data bits across the network from the physical layer of the sending device to the physical layer of the receiving device. It can include specifications such as voltages, pin layout, cabling, and radio frequencies. At the physical layer.

**2. Data Link Layer**

Data link layer corrects errors which can occur at the physical layer. The layer allows you to define the protocol to establish and terminates a connection between two connected network devices.

It is IP address understandable layer, which helps you to define logical addressing so that any endpoint should be identified.

The layer also helps you implement routing of packets through a network. It helps you to define the best path, which allows you to take data from the source to the destination.

**3. Network Layer**

The network layer provides the functional and procedural means of transferring variable length data sequences from one node to another connected in different networks.

Message delivery at the network layer does not give any guaranteed to be reliable network layer protocol.

**4. Transport Layer**

The transport layer builds on the network layer to provide data transport from a process on a source machine to a process on a destination machine. It is hosted using single or multiple networks, and also maintains the quality of service functions.

It determines how much data should be sent where and at what rate. This layer builds on the message which are received from the application layer. It helps ensure that data units are delivered error-free and in sequence.

**5. Session Layer**

Session Layer controls the dialogues between computers. It helps you to establish starting and terminating the connections between the local and remote application.

This layer request for a logical connection which should be established on end user's requirement. This layer handles all the important log-on or password validation.

## **6. Presentation Layer**

Presentation layer allows you to define the form in which the data is to exchange between the two communicating entities. It also helps you to handles data compression and data encryption.

This layer transforms data into the form which is accepted by the application. It also formats and encrypts data which should be sent across all the networks. This layer is also known as a syntax layer.

## **7. Application Layer**

Application layer interacts with an application program, which is the highest level of OSI model. The application layer is the OSI layer, which is closest to the end-user. It means OSI application layer allows users to interact with other software application.

### **Q2: What are the functionalities of each layers of the TCP/IP protocol suite?**

#### **Physical Layer:**

The Physical Layer is the lowest layer of the TCP/IP model. It deals with data in the form of bits. This layer mainly handles the host to host communication in the network. It defines the transmission medium and mode of communication between two devices. The medium can be wired or wireless, and the mode can be simplex, half-duplex, or full-duplex.

It also specifies the line configuration(point-to-point or multiport), data rate(number of bits sent each second), and topology in the network. There are no specific protocols that are used in this layer. The functionality of the physical layer varies from network-to-network.

#### **Data Link Layer:**

The Data-Link Layer is the second layer of the TCP/IP layer. It deals with data in the form of data frames. It mainly performs the data framing in which, it adds some header information to the data packets for the successful delivery of data packets to correct destinations. For this, it performs physical addressing of the data packets by adding the source and the destination address to it.

### **Network Layer :**

The Internet layer also performs routing of data packets using the IP addresses. The data packets can be sent from one network to another using the routers in this layer. This layer also performs the sequencing of the data packets at the receiver's end. In other words, it defines the various protocols for logical transmission of data within the same or different network. The protocols that are used in the Internet layer are IP(Internet Protocol), ICMP(Internet Control Message Protocol), IGMP(Internet Group Management Protocol), ARP(Address Resolution Protocol), RARP(Reverse Address Resolution Protocol), etc.

### **Transport Layer:**

It deals with data in the form of data segments. It mainly performs segmentation of the data received from the upper layers. It is responsible for transporting data and setting up communication between the application layer and the lower layers. This layer facilitates the end-to-end communication and error-free delivery of the data. It also facilitates flow control by specifying data rates. The transport layer is used for process-to-process communication with the help of the port number of the source and the destination.

### **Application Layer:**

The Application layer in the TCP/IP model is equivalent to the upper three layers(Application, Physical, and Session Layer) of the OSI model. It deals with the communication of the whole data message. The Application layer provides an interface between the network services and the application programs. It mainly provides services to the end-users to work over the network. For Example, file transfer, web browsing, etc. This layer uses all the higher-level protocols like HTTP, HTTPS, FTP, NFS, DHCP, FFTP, SNMP, SMTP, Telnet, etc.

### **Q3: Define the following terms:**

1. **Physical address: (MAC addresses) It is basically the address of any particular node that has been described by the LAN or WAN**
2. **Logical Address: (IP addresses) is a virtual address and can be viewed by the user.**
3. **Port Address:**  
**Port address is a 16- bit address represented by one decimal number.**  
**Destination port number is needed for delivery.**
4. **Specific address: that allows users and applications to identify a specific network or host with which to communicate.**

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