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# Open System Interconnection (OSI): A Seven Layered Model

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***Abstract:***
*Open System Interconnection model is a seven layer architecture model which describes how data communication process takes place from one computer to another computer through network. This model divides the communication process into seven steps called layers. The basic purpose of this model is to show how to communication is possible between different systems without requiring any changes to the logic of underlying hardware and software. Basically this model is the way of subdividing the communication system into smaller parts called layers. These layers are Physical layer, Data link layer, Network layer, Transport layer, Session layer, Presentation layer and Application layer. Each layer of this model performs well defined function and provides services to upper layer and depend upon the services provide by layer below it. The main purpose of this paper is to explain about Open System Interconnection Model and all layers of this model.*

***Key words:*** *Open System Interconnection model, Layers of Open System Interconnection Model*

**1. Introduction**

Open System Interconnection model was developed by International Standard Organisation (ISO) in late 1970's. An ISO standard that covers all aspects of network communication is the Open System Interconnection model. It is also known as standard reference model which is used for communication between two end users through network. It is a seven layer architecture model which describes how data communication takes place between two end users. This model divides this process of communication into seven steps called layers. These layers are:

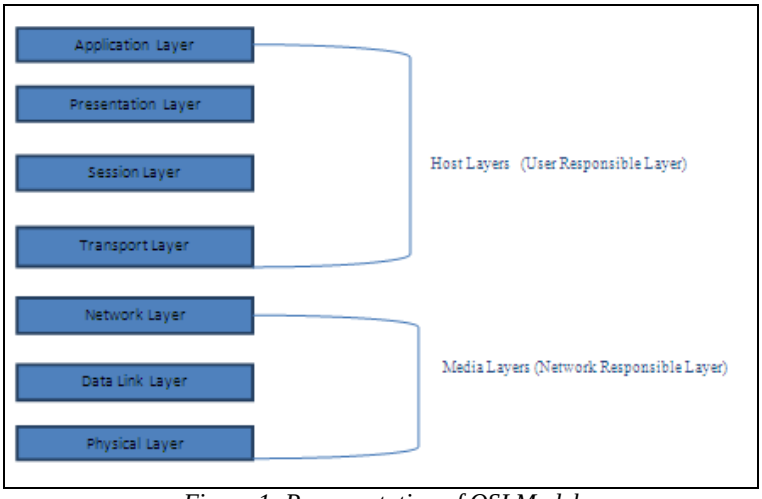


*Figure 1: Representation of OSI Model*

Each layer of this model performs different function and provides function to upper layer which are transparent to the upper layer and relies on function of layer below to it. Physical layer, Data Link layer and Network layer these layers are also known as media layer. Media layer is used when any of the messages passes through the host device. These layers also known as network responsible layers. Transport Layer, Session Layer, Presentation Layer and Application Layer these four layers are known as Host

Layer. Host layer is used when any of the messages passes from or to a user. These layers also known as user responsible layer. Some Principle used for defining the OSI layer that principles are:
Do not create unnecessary layers.
Creation of a boundary at a point where description of services can be small.
Collect similar function into same layer.
Creation of a layer where there is a need for different layer of abstraction.
Allow changes of functions or protocols to be made within a layer without affecting other layers.

**2. Layers Of Open System Interconnection (OSI) Model**

The explanation of all the layers is as below starting from the lowest in the hierarchy (Physical Layer) and proceeding to the highest (Application Layer).

*2.1. Physical Layer*

This layer, is the lowest layer in the hierarchy level. This layer concerned with the transmission of bit streams over the physical medium. It also deals with mechanical, electrical and procedural characteristics to access the physical medium. This layer is the interface between the devices and the transmission medium, transmission of bit stream, transmission rate and mode of transmission. This layer confirms that when one side send something to other side the same thing is received on the other side, not anything else. For ex: when one side sends 1 bit, another side also receive it as 1 bit not as a 0 bit. Protocols in this layer are IEEE 802.3, IEEE 802.11, PON, OTN, DSL etc. The below figure shows a physical layer of the Open System Interconnection model.

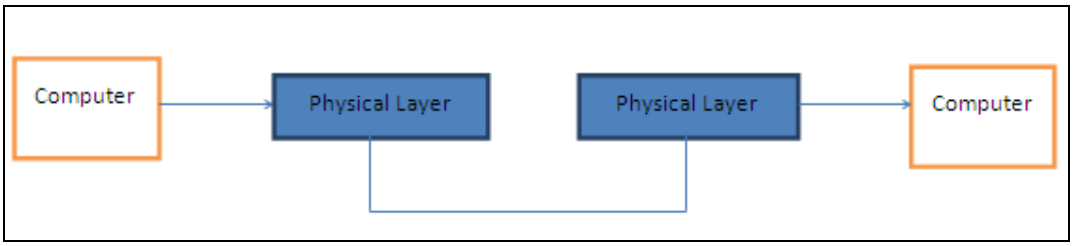


*Figure 2: Representation of Physical Layer*

*2.2. Data Link Layer*

This is the second layer of the Open System Interconnection model. This layer takes raw bit stream from the physical layer and provide error free communication lines between computers (hosts) that are directly connected or in this layer there is hope to hop or machine to machine delivery. This layer turns packets into raw bits and bits into packets. This layer provides physical address that is MAC address. This layer adds two things i.e. Header and Trailor. The main function of this layer is framing and error detection. This layer is subdivided into two parts that are medium access control and logical link control. The data link layer provide network layer. Protocols in this layer are ARP, HDLC, SDLC, CSLIP, SLIP etc. The below figure represents the data link layer.

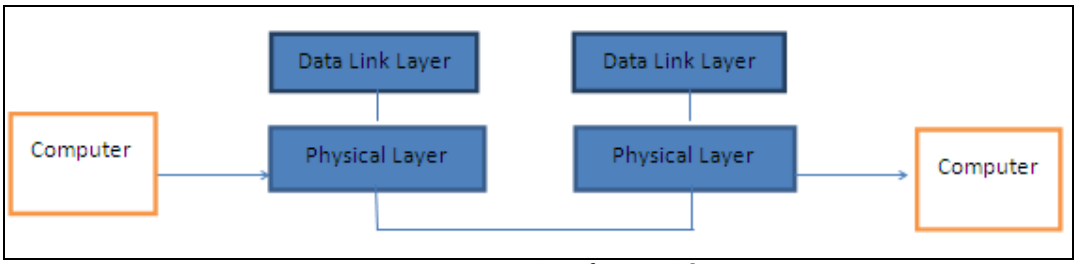


*Figure 3: Representation of Data Link Layer*

*2.3. Network Layer*

This is the third layer of Open System Interconnection model. The network layer is responsible for routing of data. Routing means sending data or information in the right direction and to the right destination on outgoing transmission and receiving incoming transmission at packets. In this layer there is also forwarding of data. This layer deals with how information should be transmit from one machine to another. In this layer there is store and forward switching. Protocols in this layer are ICMP, IPsec, IGMP, IPX, Apple Talk etc. the below figure shows the representation of network layer.

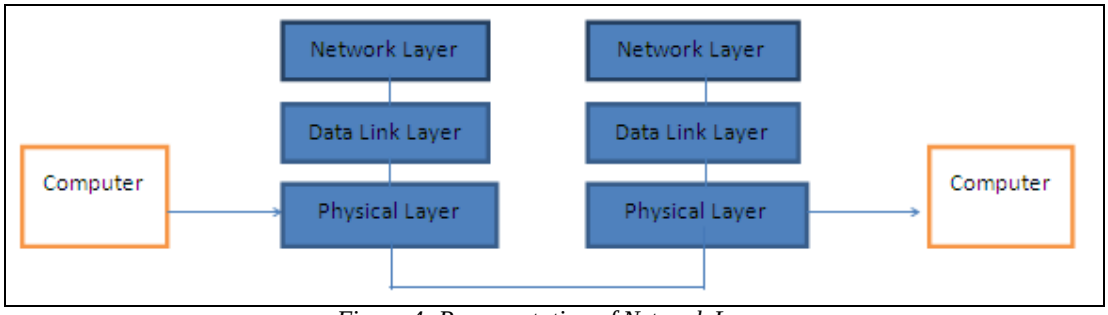


*Figure 4: Representation of Network Layer*

*2.4 Transport Layer*

This is the fourth layer of Open System Interconnection model. This layer ensures that message sent is error free, in a sequence. This is the first layer which provide source to destination connection. This deals with process to process or n to n delivery. This layer is the interface between bottom and top three layers. This layer use User Datagram protocol, Transmission control Protocol, SCTP, DCCP. The below figure is the representation of Transport layer.

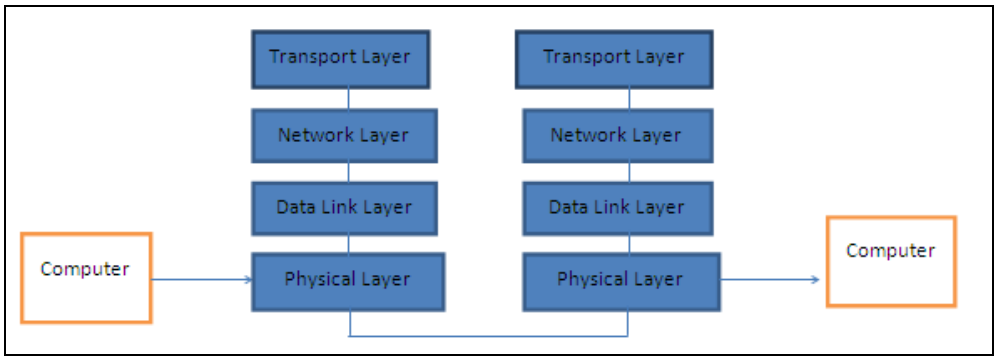


*Figure 5: Representation of Transport Layer*

This layer also deals with three way handshaking which means connection establishment, data transfer, and connection termination.

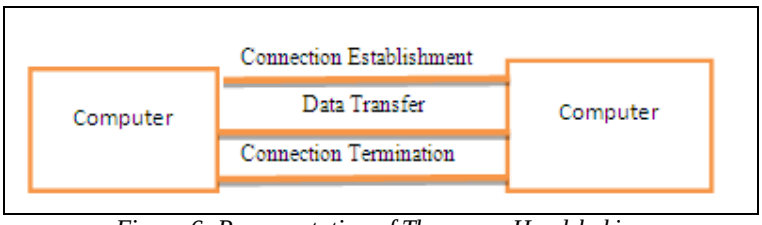


*Figure 6: Representation of Three way Handshaking*

*2.5 Session Layer*

This is the fifth layer of Open System Interconnection model. The main function of this layer is session control. Session here means time. In this layer there is proper coordination means this layer decides when to turn communication on and off between two Computers. This layer set and clear communication channel between two communicating components. It also deals with dialogue between two parties. This layer uses Post Office Protocol, Transmission control/ Internet protocol.

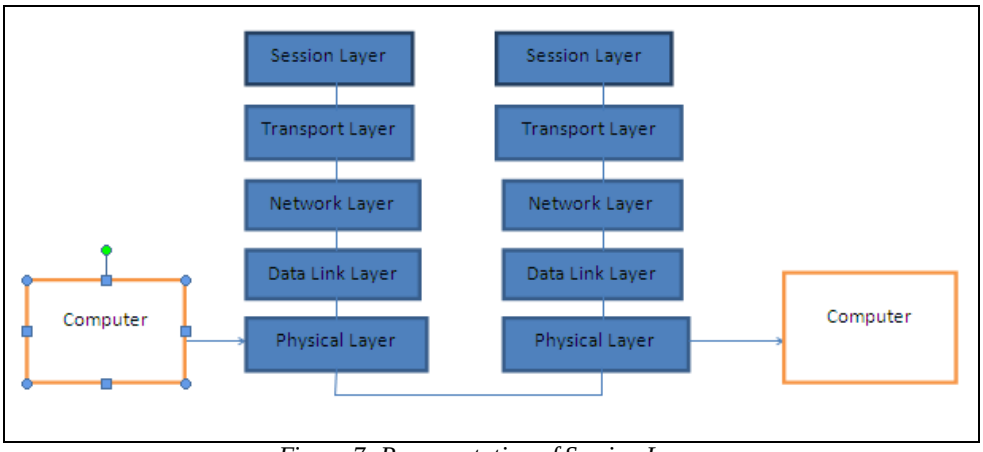


*Figure 7: Representation of Session Layer*

*2.6. Presentation Layer*

This is the Sixth layer or second last layer of Open System Interconnection model. This layer manages the way in which data is presented and encoded when data is transmitted between different types of computers. In this layer Post Office Protocol, File Transfer Protocol, Simple Network Management Protocol are used. This layer deals with compression, translation, encryption, and authentication.

- Compression: This means to send data after compressing.
- Translation: To transfer data into another form.
- Encryption and Authentication: Both related to the security of data.

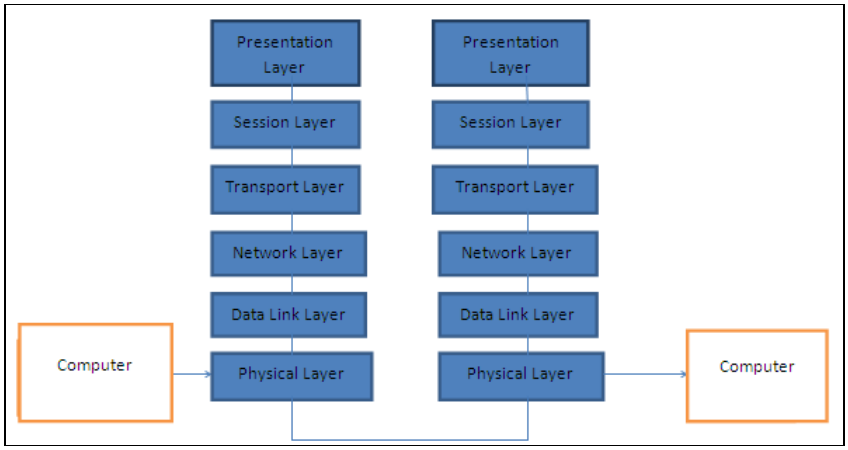


*Figure 8: Representation of Presentation Layer*

*2.7 Application Layer*

This is the Seventh and highest layer of Open System Interconnection model in hierarchy. This is also the last layer of Open System Interconnection model. This layer define the languages that program used to communicate with other program. The function of this layer is file transfer access management or file transfer, reading or writing files, email message etc.. This also deals with directory services, bearer services, mail services, telephone services.

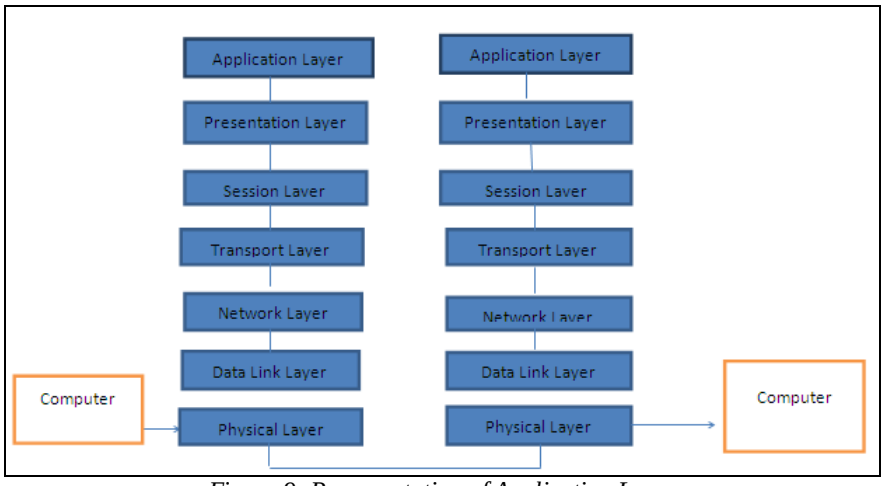


*Figure 9: Representation of Application Layer*

**3. Conclusion**

The main purpose of this paper is to explain about Open System Interconnection model and its seven layers. After giving all explanation this can be concluded that Open System Interconnection is a seven layered architecture model in which communication of data is done between two end users through network. Each layer performs different function which is transparent to upper layer. The main purpose of this model is data transmission between the layers or how data is transmitted from one layer to another layer in a proper and step by step process.

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