

Let Us Communicate

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Abstract: Reading the name of paper, communication must be ringing in mind. This paper basically includes communication between the distributed operating systems. From the very beginning of the times, the communication got its emergence from the OSI(Open System Interconnect) model. This paper includes detailed description of OSI model and its various layers. Various devices and its protocols are also discussed in this paper.

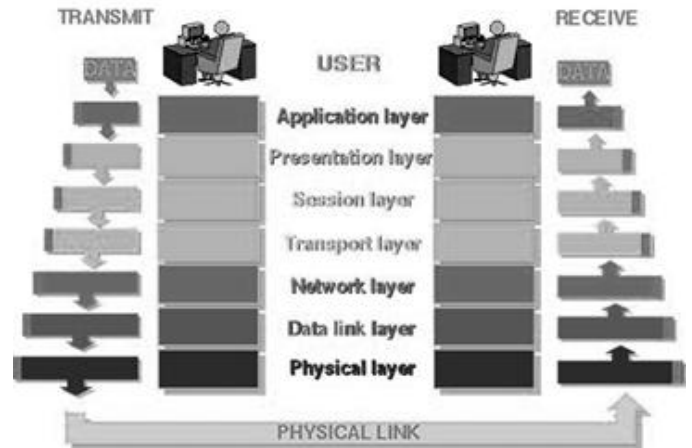
INDEXED TERMS: USB^[2], TFTP, Telnet, SMTP, SSH, FTP, dot1q, ISDN^[3], DSL^[4]

I. INTRODUCTION

This paper provides the discussion about the basic networking fundamental i.e., OSI Model. This model includes 7 different layers that are arranged hierarchically where each layer performs its specific functions. In addition to this, they also include certain devices and standardisation for each layer which are deliberately discussed here. Various diagrams provide the better understanding about the movement of data and information in a distributed operating system (commonly any two devices that communicates) between the two ends.

II. OSI MODEL

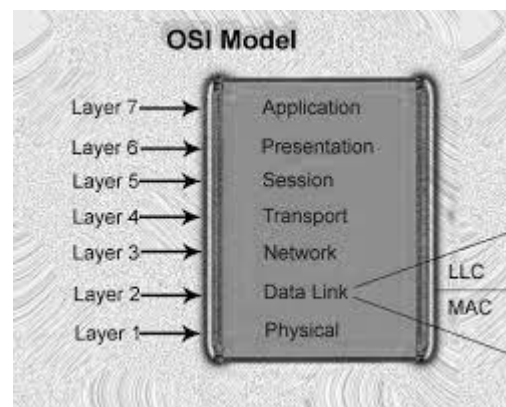
The **Open Systems Interconnection model** is a conceptual model that characterizes and standardizes the internal functions of a communication system by partitioning it into abstraction layers. The model is a product of the Open System Interconnect project at the International Organisation Of Standardisation (ISO)^[1] in 1974 .



There had been some communication standards before OSI Model, but the need and popularisation of OSI came because it provided a medium of communication between different vendors. For example, IBM could not communicate with CISCO and this was made successful by OSI. The working and understanding of this model is quite complex and it is distributed among seven different layers.

III. LAYERS OF OSI MODEL

OSI Model is divided into 7 layers where each layer have its own functionality, protocols and their respective devices.



3.1 Physical layer

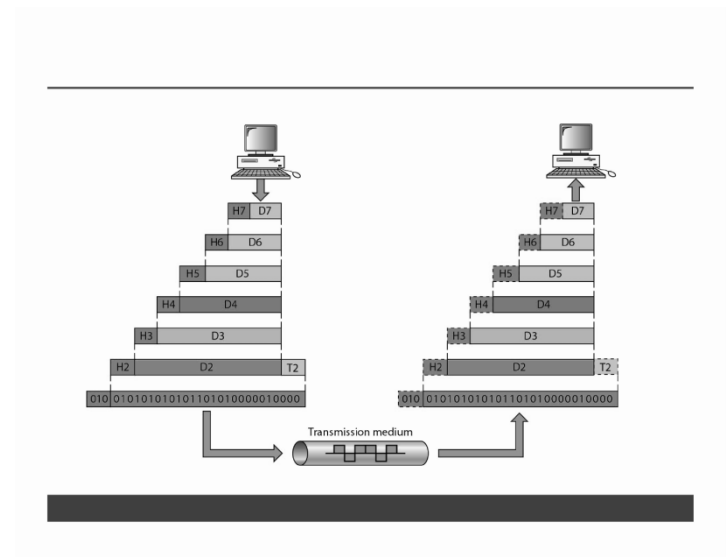
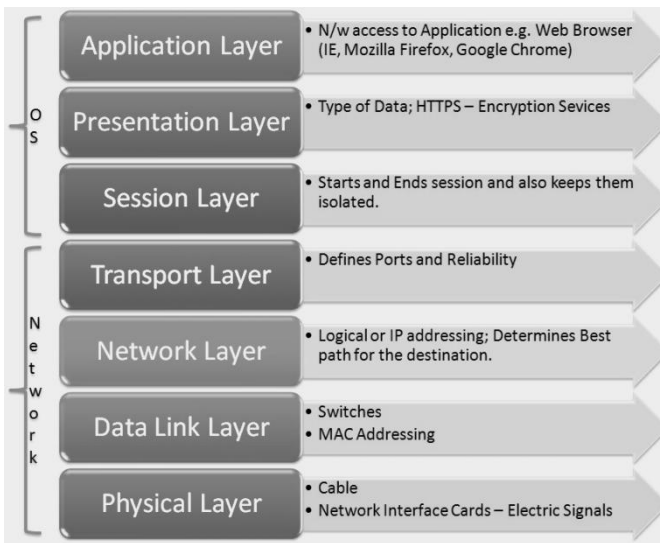
The physical layer coordinates the function required to carry a bitstream over a physical medium. It deals with the mechanical and electrical specification of the interface and the transmission medium. It also defines the procedures and functions that physical devices and interfaces have to perform for the transmission to occur^[6]

Various protocols that work at physical layer are: USB^[2], Optical Transport Network (OTN)^[3], DSL^[5], ISDN^[4]. Devices at this layer include wires like optical wires, crossover wires, rollover or straight through wires and such others.

It accepts data from the upper network layer and adds the header to transform it further to the physical layer. It additionally does the framing, physical addressing, flow control, error control and access control. It is also further divided into two layers namely MAC (Media Access Control) and LLC (Logical Link Control) layer.

Various protocols that work at this layer include HDLC, PPP, ARPA, dot1q and many more. Devices at this layer includes layer2 switches, bridges, NIC and others.

3.4 Network layer



3.2 Data Link Layer

OSI LAYERS	EXAMPLE PROTOCOLS
APPLICATION LAYER	HTTP, FTP, IRC, SSH, DNS
PRESENTATION LAYER	SSL, FTP, IMAP, SSH
SESSION LAYER	VARIOUS API'S, SOCKETS
TRANSPORT LAYER	TCP, UDP, ECN, SCTP, DCCP
NETWORK LAYER	IP, IPSec, ICMP, IGMP
DATA-LINK LAYER	Ethernet, SLIP, PPP, FDDI
PHYSICAL LAYER	Coax, Fiber, Wireless

The network layer is responsible for the source-to-destination delivery of a packet, possibly across multiple networks (links). Whereas the data link layer oversees the delivery of the packet between two systems on the same network (links), the network layer ensures that each packet gets from its point of origin to its final destination^[6].

Routers and Layer 3 switches work at this layer. Various protocols at this layer are RIP, EIGRP, OSPF, BGP, IP, IPx, Apple-talk and many more.

3.5 Transport Layer

This layer is responsible for process to process delivery of the entire message. It actually treats the entire message in form of packets. Its responsibility is to deliver each packet individually checking its error and flow. It also provides acknowledgment after delivery of the packets at the destination end. It also manages with the sequence of the ongoing packets.

There are two protocols that work at this layer which includes TCP (Transmission Control Protocol) and UDP (User datagram Protocol). TCP is a connection oriented protocol whereas UDP is a connectionless protocol.

3.6 Session Layer

This layer is responsible to establish a session between the two devices that are communicating over the network. It not only establishes a session but in fact also maintains it until the two is communicating and finally after the transmission is completed it terminates the session.

There are two type of connections established at this layer namely SVC(Switched virtual connection) and PVC(Permanent Virtual Connection).The SVC connection gets terminated after sending the data whereas the PVC connection remains established ever once it is established like in leased line.

3.8 Application Layer

The application layer enables the user , whether human or software, to access the network. It provides user interface and support for services such as electronic mail, remote file access and transfer, shared database management, and other types of distributed information systems.

It includes services like mail services, directory services, network management services and many more. Various protocols included t this layer includes Telnet ,HTTP, FTP, SSH, TFTP,SMTP and many more.

IV. APPLICATIONS

OSI Model had been introduced in 1974 and it was the most precious jewel in the era of computer technology. It plays the base role for today’s networking technology. But the model is actually conceptual, when it comes to application, it faces little problem in application. Therefore in the later period, TCP/IP model came up. TCP/IP model is implemented today in every network. In fact the internet that we use, actually work using the TCP/IP model.

REFERENCES

[1] Wikipedia-OSI Model
http://en.wikipedia.org/wiki/OSI_model

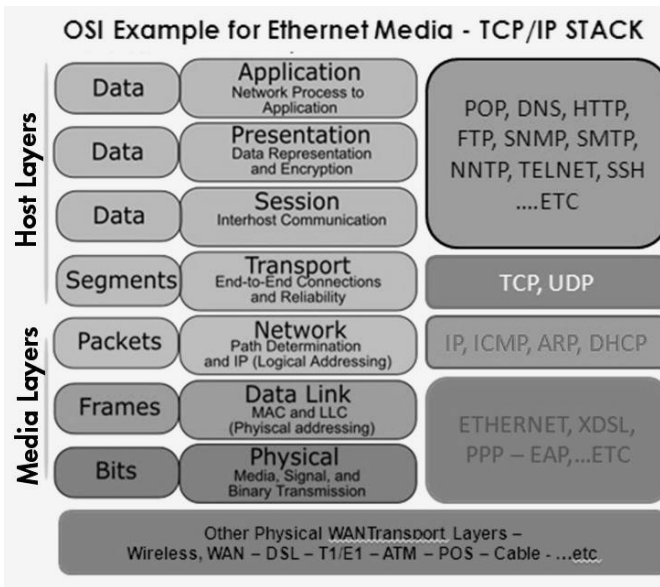
[2] Wikipedia-USB
<http://en.wikipedia.org/wiki/USB>

[3] Wikipedia-OTN
http://en.wikipedia.org/wiki/Optical_Transport_Network

[4] Wikipedia-ISDN
http://en.wikipedia.org/wiki/Integrated_Services_Digital_Network

[5] Wikipedia-DSL
<http://en.wikipedia.org/wiki/DSL>

[6]Data Communications and networking by FOUROZAN
<http://iit.qau.edu.pk/books/Data%20Communications%20and%20Networking%20By%20Behrouz%20A.Forouzan.pdf>



3.7 Presentation layer

The presentation layer is concerned with the syntax and semantics of the information exchanged between two systems. This layer is responsible for formatting a file before and after it gets transferred from one end to the other. It also does the encryption and decryption, compression and decompression, coding and encoding at the two ends communicating with each other.