

A Evaluation of OSI Reference model and Comparison with TCP/IP Model

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Abstract:

OSI (Open Systems Interconnection) layered model was created by the International Organization for Standardization (ISO). OSI model is designed to be a reference model for describing the functions of a communication system. It has seven layers, with each layer describing a different function of data traveling through a network. A reference model is a conceptual blueprint of how communication should take place. It addresses every process which is required for effective communication and divides it's into logical grouping called layers. When a communication system is designed in this manner, it is known as layered architecture.

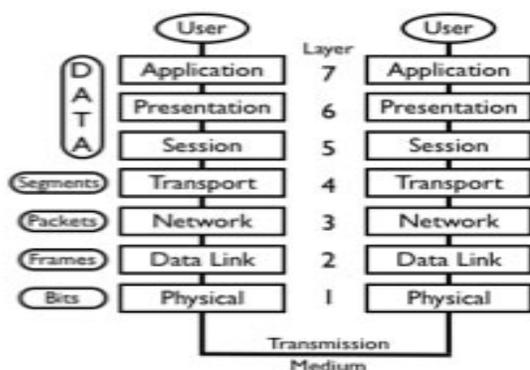
Keywords — Open System Interconnection (OSI), TCP/IP protocol, Benefits, Comparisons.

Introduction:

The OSI Model is a process for understanding the data communication between two different networks. The plan suggested by ISO named OSI includes all the aspects of network communication. The OSI model is not the set of procedure; it is a model for understanding and creating a network to exchange the information. The OSI model contains seven layers for the communication between the networks. Each layer performs particular functions to communicate above layer to bottom layer in there architecture. Bottom three layers are targets on sending information through the network to the destination i.e. user. The upper four layers perform their action in the end to complete the process.

Synopsis of the OSI model:

The OSI Reference Model



The OSI model provides the layered architecture networking functions into several layers. A set of rules, which perform their function in both hardware and software as well as with most protocol suites, make the two combinations. The lowest layer known as physical layer is concern only with the hardware whereas other layers work with the software of the system. The ISO (International Organization for Standardization) standard gives the idea of the model. The OSI model is a seven-layer model is done the communications between two computers. In this model all network components work together to give the desirable output to the user.

Description of the seven layers:

Physical Layer:

The physical layer, main function is to convert signals into bits, which can be used by other layer and managing the signal to allow for more users to use the same connection. The physical layer responsible for bit streams electrical impulse, radio signal through the network. It provides the hardware means of sending and receiving data on a carrier such as including defining cables, cards and physical aspects.

Data Link Layer: The date link layer, the main function is to provide a set of

procedure by which information broken down into numbers of frames and transmitted over the physical layer. This layer is also responsible for different type Error detection and correction. It is responsible for node to node validity and integrity of the transmission. The transmitted bits are divided into frames; such as: an Ethernet, Token, etc.

Network Layer: The network layer deals with organizing that data for transfer and reassembly. The main addresses to find the packets received which is helping them to find their path. The network layer provides the functional and procedural type of variable length data sequence known as datagram from one node to another connected over the network.

Transport Layer: The transport layer is mainly concerned with Reliability such as encryption or decryption, firewall etc. The managing the flow of packets by reduces congestion and performs error checking ensuring error free service by resending data when data has been lost. This layer provides transparent transfer of data between end systems and is responsible for send and recovers' end error recovery and flow control. It ensures complete data transfer.

Session Layer: The session layer creates a session between the two parties such as sender and receiver programs to create and control conversation. The session layer is responsible for establishing, adjusting, and terminating connections between applications at each end of the communication.

Presentation Layer: The presentation layer works by deciding the directions given by the user at the application layer. It is where the human readable programming languages are converted into machine code instructions used by the lower layers. In general the main function of Presentation is Data representation, security encryption, and converts computer code to network formatted code etc.

Application Layer: This is the level that the user often interacts with environments. The application layer supports application and end-user processes. Here the communication partners are identified, and also 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. This layer provides application services for e-mail, file transfers, and other network software services.

Benefits of the OSI model:

Data Segmentation: - In this process a large data file is divided into smaller segments sufficient enough to transmit over the network.

Packet acknowledgment: - Every transferred segment is acknowledged with a return message from recipient which insures that segment is delivered successfully.

Flow control: - This mechanism instructs sender computer to match its transmissions speed with receiver computer.

Error detection and correction: - In this process receiving computer verify the content of data. If any segment is corrupted, it will inform the sender that specific piece of data was damaged and must be retransmitted

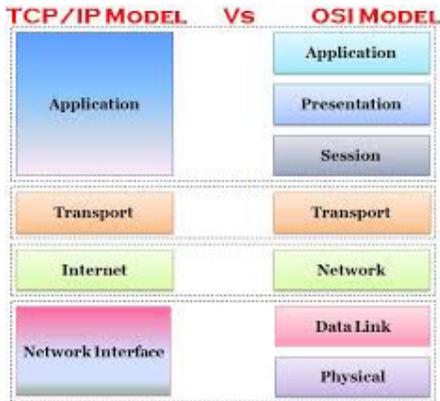
Data compression: - To eliminate redundant, segments are compressed before transmission.

Data encryption: - To increase the data safety, segments are encrypted with a key already known by receiving system.

Comparison between OSI and TCP/IP Models:

Transmission Control Protocol is used by Internet applications such as email, World Wide Web, FTP, etc. TCP/IP was developed by the Department of Defence (DoD) to connect various devices to a common network. The purpose of developing the protocol was to build a robust and automatically recovering phone

line failure while on the battlefield. On the other hand, Open Systems Interconnection was developed by the International Organization for Standardization (ISO). This model was made up of two components, namely, seven-layer model and the subset of protocols.



Following are some major differences between OSI Reference Model and TCP/IP Reference Model, with diagrammatic comparison below.

OSI(Open System Interconnection)	TCP/IP(Transmission Control Protocol / Internet Protocol)
1. OSI provides layer functioning and also defines functions of all the layers.	1. TCP/IP model is more based on protocols and protocols are not flexible with other layers.
2. In OSI model the transport layer guarantees the delivery of packets	2. In TCP/IP model the transport layer does not guarantees delivery of packets.
3. Follows horizontal approach	3. Follows vertical approach
4. OSI model has a separate presentation layer	4. TCP/IP does not have a separate presentation layer
5. OSI is a general model.	5. TCP/IP model cannot be used in any other application.
6. Network layer of OSI model provide both connection oriented and connectionless service.	6. The Network layer in TCP/IP model provides connectionless service.
7. OSI model has a problem of fitting the protocols in the model	7. TCP/IP model does not fit any protocol
8. Protocols are hidden in OSI model and are easily replaced as the technology changes.	8. In TCP/IP replacing protocol is not easy.
9. OSI model defines services, interfaces and protocols very clearly and makes clear distinction between them.	9. In TCP/IP it is not clearly separated its services, interfaces and protocols.
10. It has 7 layers	10. It has 4 layers

Conclusion:

In this new era there has been a vast development in the different layer of OSI model which affect the communication of computer system. The OSI model is too

complex and expensive as it is bound in seven rigid layers. In the OSI model users face many challenges as it is not adapted to the tele-communication applications. Peoples has a natural tendency to use TCP\IP model rather than OSI MODEL.

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