**INTRODUCTION**

Network architectures define the standards and techniques for designing and building communication systems for computers and other devices. In the past, vendors developed their own architectures and required that other vendors conform to this architecture if they wanted to develop compatible hardware and software. There are proprietary network architectures such as IBM's SNA (Systems Network Architecture) and there are open architectures like the OSI (Open Systems Interconnection) model defined by the International Organization for Standardization. The previous strategy, where the computer network is designed with the hardware as the main concern and software is afterthought, no longer works. Network software is now highly *structured.*

To reduce the design complexity, most of the networks are organized as a series of **layers** or **levels**, each one build upon one below it. The basic idea of a layered architecture is *to divide the design into small pieces*. Each layer adds to the services provided by the lower layers in such a manner that the highest layer is provided a full set of services to manage communications and run the applications. The benefits of the layered models are modularity and clear interfaces, i.e. open architecture and comparability between the different providers' components

A basic principle is to ensure independence of layers by defining services provided by each layer to the next higher layer without defining how the services are to be performed. This permits changes in a layer without affecting other layers. Prior to the use of layered protocol architectures, simple changes such as adding one terminal type to the list of those supported by an architecture often required changes to essentially all communications software at a site. The number of layers, functions and contents of each layer differ from network to network. However in all networks, the purpose of each layer is to offer certain services to higher layers, shielding those layers from the details of how the services are actually implemented

The basic elements of a layered model are services, protocols and interfaces. A *service* is a set of actions that a layer offers to another (higher) layer. *Protocol* is a set of rules that a layer uses to exchange information with a peer entity. These rules concern both the contents and the order of the messages used. Between the layers service interfaces are defined. The messages from one layer to another are sent through those interfaces.

**NEED FOR LAYERED APPROACH IN NETWORK DESIGN**

We use the concept of layers in our daily life. As an example, let us consider two friends who communicate through postal mail. The process of sending a letter to a friend would be complex if there were no services available from the post office.

Figure below shows tasks involved in sending a letter:



Fig: Layered Tasks

Thus from above figure it is clearly understood that layer architecture simplifies the network design. It is easy to debug network applications in a layered architecture network. There are two layered Models namely OSI Model and TCP/IP Model.

In summary the need for layered approach in network design

1. To make the design process easy by breaking unmanageable tasks into several smaller and manageable tasks (by divide-and-conquer approach).

2. Modularity and clear interfaces, so as to provide comparability between the different providers' components.

3. Ensure independence of layers, so that implementation of each layer can be changed or modified without affecting other layers.

4. Each layer can be analyzed and tested independently of all other layers.

**DIFFERENCES BETWEEN ISO AND OSI**

Yes there are differences between ISO and OSI. The differences are

ISO stands for International StandardsOrganization. It is an organization for agreement on international standards of network communication worldwide. While OSI stands for International Organization for Standardization is a model for understanding and designing network architecture.

And also

The International Organization for Standardization (ISO) is an international standard-setting body composed of representatives from various national standards organizations.While 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 of 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.

**OBJECTIVE AND FUNCTION OF DIFFERENT LAYERS IN OSI REFERENCE MODULE**

The OSI Reference Model includes seven layers:

**7. *Application Layer*:** Provides Applications with access to network services.

**6. *Presentation Layer*:** Determines the format used to exchange data among networked computers.

**5. *Session Layer*:** Allows two applications to establish, use and disconnect a connection between them called a session. Provides for name recognition and additional functions like security, which are needed to allow applications to communicate over the network.

**4. *Transport Layer*:** Ensures that data is delivered error free, in sequence and with no loss, duplications or corruption. This layer also repackages data by assembling long messages into lots of smaller messages for sending, and repackaging the smaller messages into the original larger message at the receiving end.

**3. *Network Layer*:** This is responsible for addressing messages and data so they are sent to the correct destination, and for translating logical addresses and names (like a machine name FLAME) into physical addresses. This layer is also responsible for finding a path through the network to the destination computer.

**2. *Data-Link Layer*:** This layer takes the data frames or messages from the Network Layer and provides for their actual transmission. At the receiving computer, this layer receives the incoming data and sends it to the network layer for handling. The Data-Link Layer also provides error-free delivery of data between the two computers by using the physical layer. It does this by packaging the data from the Network Layer into a frame, which includes error detection information. At the receiving computer, the Data-Link Layer reads the incoming frame, and generates its own error detection information based on the received frames data. After receiving the entire frame, it then compares its error detection value with that of the incoming frames, and if they match, the frame has been received correctly.

**1. *Physical Layer*:** Controls the transmission of the actual data onto the network cable. It defines the electrical signals, line states and encoding of the data and the connector types used.

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***Two sets of layers make up the OSI layers***

Figure below shows interaction between layers in the OSI model

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Figure below shows each objective and function of each layer in summary:

