

# Studying the Open System Interconnection Model and Proposing the Concept of Layer Zero

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## Abstract

**Background/Objectives:** The background objective of this research paper is to break a predefined networking model so that it is studied in greater depth and open new portals of improvements for the coming generations. **Methods/Statistical Analysis:** Since this research work is more of a theoretical approach therefore there is no sample testing involved but it proposes to add something in the predefined technique which is being used to make networking structure. The mainly used devices are available ordinarily in the combination with other amount of hardware; actually the devices mentioned here are embedded within the circuitry of other devices. **Findings:** It has been found that after implantation of the addition proposed there would be more ease in understanding the hierarchical structures of networking. A separate division of the networking branch is made for the digital electronics by doing so. Also a layer is bifurcated leading to ease the way things were approached. **Application/Improvements:** There is a greater chance of improvement in what has been accomplished, like by changing a device with more efficient device could be lead to great innovations.

**Keywords:** Bit Streams, Client Server Model, Flips Flops, Networking, Open System Interconnection

## 1. Introduction

The open system interconnection architecture, commonly named as the OSI architecture is an interconnection guide that was initially created as a worldwide set of standard for constructing networks. The International Organization for Standardization felt the special and immediate need to introduce standards for heterogeneous informatics networks and decided to build a reference model to make things work for then and future<sup>1</sup>. But rather of its acting as a model with acknowledged-upon rules which were meant to be used universally, the OSI model is now seen as a schooling instrument which tells how various duties inside an interconnection should be done in way to advocate correct message transfer. These jobs are spitted into 7 major layers or bifurcations, each of which depends on the functioning taken from other stratum. As a consequence, the OSI insinuation architecture also gives us a way for overhauling grid complications by drawing

an inference to each specific stratum. Let us take a look at the layers of the OSI model. Figure 1 shows some features of the OSI reference architecture.

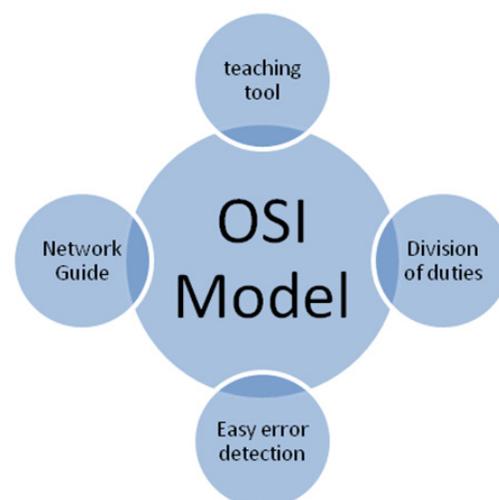


Figure 1. Features of OSI.

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## 2. History

There is very less knowledge about the history of OSI reference model. Most of the effort on the delineation of OSI was contributed by cluster of people at Honeywell Information Systems. The in charges of this team were Mike Canepa, with Charlie Bachman also as the main technical member. In the starting and mid of 70s, the concerns of Canepa's team was majorly on directory creation and then on apportioned database design. In the mid of 70s, it became clearer that to backing database system, apportioned access, and then like, a structured apportioned database communications constructions would be needed. The group evaluated a group of solutions that existed during that time, which included System Network Architecture (SNA) of IBM and few of the ideas of demonstration services hat were being made for regulated database systems. The aftermath of all this practice was the creation of 1977 seven-stratum construction also called as the Distributed Systems Architecture (DSA) which was the base for the OSI insinuation model. It was introduced as easy Model to be implemented for the Client-Server Mode<sup>2</sup>

## 3. Different Layers of OSI

The OSI insinuation model has got seven layer physical layer, data link layer, network layer, transport layer, session layer, presentation layer and application layer. Here is Figure 2 giving us a description of each of the 7 layers:

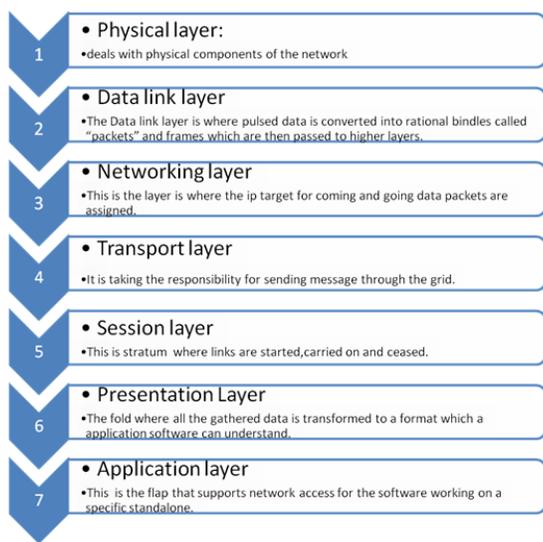


Figure 2. Description of 7 layers.

### 3.1 Physical Layer

This layer is including the real cable, fibers, billet, switches, and all the other physical as well as rousing equipment that is needed to build up a network. It is responsible for the transformation of digital data into pulses which are ready to be sent through a cable to transfer data. Such signals are chosen to be mostly electrical but, in the categories like fiber optics, they are chosen to be non-rousing pulses like optical signal or any other category of pulse which could be digitalized. From the interconnection point of view, the objective of this layer is to give the construction for raw information to be transferred as well as received. It may also include the LAN wire which makes two or more standalone systems corporeally and sensibly connected to each another<sup>3</sup>. It is very easy in this layer to overhaul but it is the most hard to darn or reconstruct, because this includes appropriating the hardware framework enamored with as well as bunged in.

### 3.2 Data Link Layer

At this layer the pulsed data is changed into rational bindles called bundles and frames which are then given away to higher layers. The sole purpose of this layer is to give the functional and action for means to build, sustains, and release data links among network<sup>4</sup>. Importantly, this layer unloads unprocessed data it is getting in from the stratum below as well as interprets raw message that it gets from the layers above into coarse message which is ready to get broadcasted to the fold below. It also has the responsibility of catching and correcting for any misconceptions that may or may not occur in the layer below.

### 3.3 Network Layer

This is the place where the IP target for entering and approachable data bundles is created. If this flapacts as the avenue for the vehicles to move on, then the network stratum will be the GPS guiding chauffeurs how to reach the place. Addressing of data is done by tacking it with information in the style of an address venture. It also has the responsibility of determining the fastest route to the targets and also it deals with coping with any complications regarding bundle swapping or grid traffic jam. It is the place where the device called routers will serve in order to safeguard that data is given address again properly and is ready before it is given to the next fold of OSI. This Network Layer of network architecture

is a ported protocol that provides delivery of packets among numerous hops<sup>5</sup>.

### 3.4 Transport Layer

The Transport lamina is taking the answerability of sending data through the network. At this layer, the raw information is not considered in terms of lone bundles rather also in form of a communication. In order to acquire this, protocols or set of rules of networking are appointed. These rules see the full transfer of a all the packets, seeking the communication for mistakes, acknowledging prosperate transfers and asking the host for retransmission if any errors are encountered. The DTLS (Datagram Transport Layer Security) protocols work on this layer<sup>6</sup>. Both of the networking layer as well as this layer work hand in hand like a letter posting system. This flap gives address ports to the raw information just as a man gives addresses to a package. Then, it will be acting as the sender at a local postal building, which will be serializing and gathering all identical addressed units of data into bigger freights restricted to all other native buildings, where they all can be distributed. Moreover there are algorithms like TCP are working over here which is a stream regulating mechanism that is based on the negative response and connection breaking<sup>9</sup>.

### 3.5 Session Layer

The Session layer <https://www.techopedia.com/definition/9322/session-layer> is where links are started, carried on and ceased. It usually gives insinuation to application queries for raw information across our grid. It is different from transport layer as because that layer is handling the real streaming of information, this layer behaves like a broadcaster, ensuring that the programs and software querying and broadcasting information have knowledge of their queries get fulfilled. In technical terms, this layer harmonizes data transfers.

### 3.6 Presentation Layer

This is the layer where gathered data is transformed to a syntax which the user interactive software is able to apprehend. The job done here can be regarded as a job of translation. For example, most of the data is encoded here before it is passed away to the various folds for transfer. When the raw information is retrieved, it would be decoded as well as then given to a GUI environment for which it was meant.

### 3.7 Application Layer

This layer will support network access of the software working on stand alone. The protocols or standards at this layer will manage the queries which various services are giving to our network. For example, if the Web browser is willing to download a document or an email client has to avail the server, then the standards of this layer will catalogue as well as fulfill these queries.

## 4. Proposing the Concept of Fundamental Layer or Layer Zero

This layer can be thought of as a subdivision of Physical layer but at a more prior level. Figure 3 shows us how the work of physical layer can be divided. Like in different there are various devices like in physical layer it is hubs, in data link layer it is switches and routers in network layer the devices that will be working on this layer will be flip-flops, DACs (Digital to Analog Converters).



Figure 3. Sub layering the physical layer.

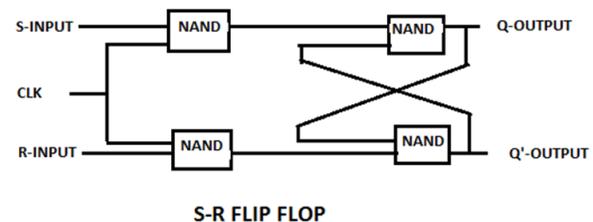


Figure 4. Figure showing S-R flip flop.

This layer will be more involved at the bit level of the data communication across the network. The flip-flops will decide when the bits are to be kept high and low so in a way controlling the pulse voltage whether high or low. Figure 4 showing diagram of S-R flip flop. The DACs will help in the making of data bit into pulses. Moreover we are limiting the functioning of physical layer to only hardware parts. So by proposing this new OSI model version ease of understanding OSI model concept has increased. Figure 5 showing some features and properties of layer zero.

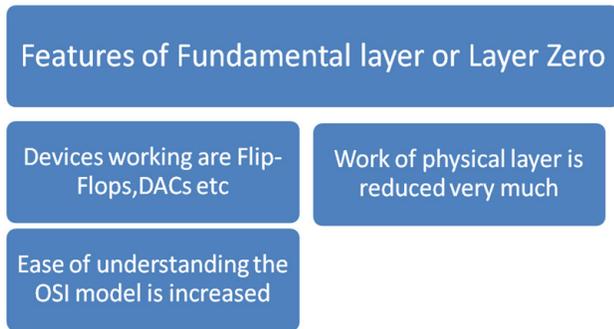


Figure 5. Features of layer zero.

## 5. Conclusions

The OSI model is a reference model which is acting as a tool to implement network related technologies in a more enhanced way. It is forging our lives with comforts and ease of accessing our smart devices. With the introduction of this new layer the clarity of the OSI model has increased. Moreover we have divided the load of the physical layer by giving it a bifurcation of layer zero. This would be a great approach in saving the crucial sources such as bandwidth for the other important tasks<sup>10</sup>.

## 6. Future Scope

The future scope of the OSI reference model knows no bounds. There is always chance of improvements in the protocols or standard being used in this model. It is an internationally approved model for networking. It

provides us with a means to evaluate the existing reference model of its kind<sup>7</sup>. Moreover this kind of referential model can be used in neural networking and may lead to a great amount of deal in artificial intelligence<sup>8</sup>.

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