

7 Layers of OSI Model

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Aspirants,

Let's learn today the OSI model and functions of its layers as it forms an important topic from which basic networking questions are usually asked.

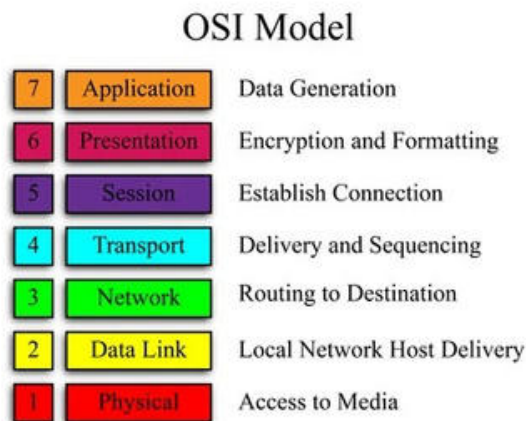
Open System Interconnection (OSI) Model

International Standards Organization (ISO) in 1977 proposed the OSI model. It was done so that national and worldwide communication systems can be designed which are compatible to each other.

With this model, we can understand how software and hardware work with each other and

troubleshooting gets easier with known functions of respective layers.

It consists of a 7 layer architecture as follows:



Layer 1: The Physical Layer

It activates, maintains and deactivates the **physical connection**. Although **transmission** of each bit of data is a responsibility of this layer but its not that reliable as there is **no error detection** mechanism at this layer. Network design is an integral part of this layer. Remember we learned about infrastructure devices and topologies in last article!

Layer 2: Data Link Layer

It provides a **reliable transmission of packets** using the services of physical layer. Major functions are as follows:

- **Framing**- breaks input data into frames, frame size and boundaries are also taken care of by this layer.
- **Acknowledgement**- from receiver to source confirming the frame received without error or with error.
- **Retransmission**- Frame is retransmitted if source fails to receive acknowledgement.
- **Sequence Numbering**- to acknowledge which frame was received.
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- **Error detection**- Frames may be lost, damaged or duplicated leading to errors. Detection is on a link to link basis.
- **Flow Control**- Necessary for a fast transmitter to keep pace with a slower one.

Layer 3: Network Layer

Basic functions of this layer are **routing and congestion control**. It routes the signals through different channels/routes thereby acting like a network controller. It divides the outgoing messages into packets and incoming packets in to messages for higher layers.

Please note that network layer **doesn't** guarantee that packet will reach its intended destination.

Layer 4: Transport Layer

It decides if data transmission should be parallel path or single path. Other major functions are **multiplexing/demultiplexing (using port numbers), Fragmentation/ Re-assembly, sequencing, error control, flow control**.

Layer 5: Session Layer

This layer is responsible for **establishing, managing and terminating sessions** between end user applications. **Authentication and Authorization** (implemented through remote procedure calls) are other services provided by this layer. Sessions are usually implemented on web browsers. Also, it works in tandem with the transport layer.

Layer 6: Presentation Layer

Data is formatted at this layer before passing down to other layers on sender's side. Formatting functions include **compression, encryption, compatible character code set** (ASCII, EBCDIC etc). It serves as data translator for the network, sometimes called syntax layer.

Layer 7: Application Layer

This layer **interacts with the user** and user applications. **Real traffic data is generated** from this layer, that may be a browsing request from HTTP, command from TELNET or a file download request from FTP. It only standardizes communication but depends on transport layer for establishing data transfer channels.