

# OSI Model

## OSI

Open System Interconnection Model breaks the TCP/IP protocol down into more specific layers with more specific responsibilities.

The layers of the OSI model appear in this order when information is being sent out from the host machine. If information is being received, the layers would be traversed in reverse order from 1-7

7. Application
6. Presentation
5. Session
4. Transport
3. Network
2. Data Link
1. Physical

## Application

The Application layer is the interface or software that the user interacts with in order to send communications over the network. This could be a web browsers, chat services, or email clients. This layer is where the application's protocol lives.

This layer is generally the same as the Application layer of the TCP/IP model.

Protocols in this layer are HTTP, HTTPS, DNS, SMTP, ICMP, FTP, and Telnet

## Presentation

The Presentation layer is responsible for converting data into a standardized format which can optionally be encrypted or compressed before being sent across the wire. Thus, the Presentation layer is responsible for converting data into a format which can either be used by the Application layer, or passed down to the Session layer to later be sent over the wire to another device on the network.

If the application wanted to encrypt the data, this layer would do so. Similarly, if the data this layer receives is encrypted, this layer decrypts the data so the receiving Application can use it.

## Session

The Session layer is responsible for establishing and maintaining a reliable connection between *applications and/or devices* on the network. This layer is not always used, but services such as

streaming video and audio would use this layer heavily, or in the case of monitoring remote system resources or logs.

If you are familiar with sockets in programming, think of this layer as the creation of a socket between a local or remote application that may either be on the machine locally or on a remote server.

This layer is also responsible for creating checkpoints during large data transfers, which enables the download to pick up where it left off in the case of an interruption. If it were not for this layer, the download would need to be restarted from the beginning in order to ensure that all the information was sent over the wire.

## Transport

The Transport layer is responsible for establishing and maintaining a reliable end-to-end connection between *two devices on different networks*. If the devices are on the same network, this layer is not used.

When data is being sent, this layer breaks the data down into smaller segments before sending it across the wire. When data is being received, this layer reconstructs the data into its original format.

By the sender, multiplexing is used to package local application data and send it over to the destination where demultiplexing is used in order to determine which application the message is intended for.

This layer is also responsible for error and flow control. Flow control describes the process of ensuring that the data was received using ACK signals and responses. Error control refers to the process of ensuring that the data is in the same format as it was when it was initially sent, and it has not been malformed during transmission.

Protocols for this layer are TCP and UDP, or Transmission Control Protocol and User Datagram Protocol.

## Network

The Network layer is where the IP protocol lives, which as we know is responsible for routing packets to the correct destination. This layer ensures the most efficient path to the destination is used based on transmission speed and the current load. This is where packets are created.

The IP protocol is used in this layer, along with ARP and ICMP

## Data Link

The Data Link layer manages how the host device interface with the network adapter. Thus, the Data Link layer manages the communication between two devices *on the same network*.

When data is being sent, this layer takes packets and breaks them down into frames. These frames are then sent to the physical layer for transmission.

Protocols for this layer are DSL, LAN, SATNET, SONET, WiFi (802.11)

## Physical

The Physical layer is made up of the physical equipment and infrastructure which facilitates the connection between two devices. This layer transmits data only as 1's and 0's, called signals, which is then interpreted on the receiving end to reconstruct the data by following the OSI model in reverse.

The Ethernet (802.3) protocol would live on this layer, since it is a physical connection between machines

# Resources and Links

[Pearson - OSI Model](#)

[Cloudflare - OSI Model](#)

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