

Forum:[Hack Forums](#)

Thread: [Introduction to OSI Model for Beginners](#)

Business - November 23, 2018, 8:07 pm

The Open Systems Interconnection (OSI) reference model was developed by the International Organization for Standardization during the early stages of networking's evolution. The OSI model makes troubleshooting and network analysis much easier by segmenting the steps of the data transfer process into layers. The layers, abstraction layers to be precise, are set according to their interfaces and protocols.

An easy way to remember the order of the layers (top to bottom):

(A)ll (P)eople (S)eem (T)o (N)eed (D)ata (P)rocessing

Layer 7: The Application Layer

The Application Layer of the OSI model covers the interface between two applications, both of which are on separate systems. This layer is responsible for displaying received information/data to the user. Many protocols are used at this layer, such as File Transfer Protocol (FTP), Remote Desktop Protocol (RDP), Extensible Messaging and Presence Protocol (XMPP), Simple Mail Transfer Protocol (SMTP), Hypertext Transfer Protocol (HTTP), and more.

Programs that use these protocols are divided into two categories:

Utility programs, which are used to service a system. Examples include Windows Defender, File Explorer, Troubleshooting wizards, and antivirus protection.

Application programs, which are used to accommodate the user. Examples include Internet browsers, Skype, and Microsoft Office.

Data is sent and received by two host systems. Data that passes through utility or application programs and the OS is called the "payload". The Application Layer has no way to determine the availability of network resources.

Layer 6: The Presentation Layer

The Presentation Layer handles reformatting, compressing, converting, and translating data in such

a way that the system on the receiving end can successfully read it. Encryption can also be done at the Presentation level, but it may also be done at the Session, Application, or Network layers. This layer ensures that the application layer has no problems regarding syntax or data formatting and is responsible for presenting data to the application layer, hence the nickname "Syntax Layer". Many protocols are used at this layer, such as Lightweight

There are two sublayers of the Presentation Layer:

CASE (Common Application Service Element)

Supports common application services like Reliable Transfer Service Element (RTSE), Commitment Concurrency and Recovery (CCR), and more.

SASE (Specific Application Service Element)

Supports specific application services and protocols like Manufacturing Messaging Service (MMS), Job Transfer and Manipulation (JTM), and more.

Business - November 23, 2018, 8:08 pm

Layer 5: The Session Layer

Layer 5 of the OSI Model is responsible for managing sessions by establishing, managing, and terminating the connections between local and remote applications. The Session Layer enables two systems to initiate communication with one another in half-duplex, full-duplex, or simplex modes. A full-duplex communication system allows all devices to communicate simultaneously, such as on the telephone. Half-duplex systems on the other hand, only allow one device to communicate at a time. Both users can still communicate, just not at the same time. The most common example of a half-duplex device is the walkie-talkie. Simplex systems are very different from full and half-duplex systems because only one device can transmit data, while the other can only receive it. Examples of devices that use a simplex system are television, keyboards, and radio. Applications at this layer include web conferencing, live television, Apple Talk, and more.

Layer 4: The Transport Layer

The Transport layer transports Application Layer payloads from application to application. There are two primary protocols used at this level:

TCP (Transmission Control Protocol):

A connection is established with the end host, then a check is done to see if the data was received. If the data did not successfully reach the end host, it will be resent. The check done in this process is why TCP is considered a connection-oriented protocol. Connection-oriented protocols take longer than connectionless protocols, so it is usually used when delivery confirmation is needed. Performing flow control, segmenting long messages into chunks with the correct header info, and converting domain names to IP are all examples of TCP tasks.

UDP (User Datagram Protocol):

A lack of flow control and error checks makes UDP much less reliable than TCP. The only thing UDP does is send packets. Since the process is shorter, UDP can send packets much quicker than TCP. UDP is considered a connectionless protocol and is used for things like streaming video and audio.

In a process called encapsulation, these protocols attach control information of their own to the beginning of the payload. This information is called the header. Once the header is added, the message/data is ready to be transmitted to the Network Layer. If datagrams are too big to transport, they are broken into segments.

Business - November 23, 2018, 8:09 pm

Layer 3: The Network Layer

This layer has the job of moving messages from one node to another until they finally reach the destination host. The primary protocol for the Network layer is IP (Internet Protocol). Once the Network layer header is added, the segments are now called packets. The header added in this layer identifies the sending and receiving host IP addresses. Each individual node on a network has its own IP. Internet Protocol relies on protocols such as Internet Control Message Protocol (ICMP) and Address Resolution Protocol (ARP) to identify the best route for packets to take on its way to the destination. The Network layer will use a process called fragmentation to break packets into smaller packets so that their Maximum Transmission Unit (MTU) is smaller than the network's maximum data size.

Layer 2: The Data Link Layer

The primary responsibility of the Data Link layer is to respond to service requests from the network layer and issue requests for the physical layer to receive. The entire Link Layer message is called a frame. This layer also encodes bits into packets before they are transmitted, and also decodes them back into bits before at the destination. Bits are like atoms in scientific fields, they are the most basic unit. Error control, flow control, and synchronization allow the Data Link layer to provide reliable data transfer. Processing done at this layer is much faster than at the network layer because less analysis is done on the packets.

The Data Link Layer is broken up into two sublayers:

Media Access Control (MAC):

Embedded on every network adapter for every device

In charge of framing and reframing, along with collision handling

Examines the frame header

Includes collision resolution protocols like CSMA and CD

Logical Link Control (LLC):Handles Packet Synchronization

In charge of error checking

Manages traffic

Layer 1: The Physical Layer

This is the most basic of all the layers. It's only responsibility is sending bits over wired and wireless transmissions. For transmission, WiFi uses wavelengths in the air, Ethernet uses voltage on a copper wire, and fiber optic uses strands of glass and light beams. The Physical layer and the Link layer are the only layers that deal with the details of wired and wireless transmissions. This layer deals with hardware more than any other layer.

Examples of technology using Physical layer services:
Bluetooth

USB

Ethernet

Optical Transport Networks

archangel.dmitry - November 24, 2018, 11:53 am

It is one of better overviews I have seen so far in this section.

Deathbox - November 25, 2018, 7:42 am

Felt like I was back in college. Looks good.

Disease - November 25, 2018, 9:31 am

I'm with archangel.dmitry on this one. I've seen a lot of subpar introductions to concepts such as the OSI model here. This is a solid introduction. Covers everything concisely.

You repeated the header for session though. Where it should be presentation, it's session.

Business - November 25, 2018, 9:43 am

(Nov 25, 2018 10:31 AM)Disease Wrote: [\[CITE\]](#) I'm with archangel.dmitry on this one. I've seen a lot of subpar introductions to concepts such as the OSI model here. This is a solid introduction. Covers everything concisely.

You repeated the header for session though. Where it should be presentation, it's session.Fixed!
Thanks for the heads up, and thanks for the kind words! I tried my best!

VoIPv2 - November 25, 2018, 2:15 pm

Great guide! Looks good from what I remember on the CCNA.

Business - November 25, 2018, 4:24 pm

(Nov 24, 2018 12:53 PM)archangel.dmitry Wrote: [\[CITE\]](#) It is one of better overviews I have seen so far in this section.

(Nov 25, 2018 10:31 AM)Disease Wrote: [\[CITE\]](#) I'm with archangel.dmitry on this one. I've seen a lot of subpar introductions to concepts such as the OSI model here. This is a solid introduction. Covers everything concisely.

You repeated the header for session though. Where it should be presentation, it's session.

(Nov 25, 2018 03:15 PM)VoIPv2 Wrote: [\[CITE\]](#) Great guide! Looks good from what I remember on the CCNA. This is why I create content for the community... for people like this. Thanks for the kind words! It's nice to know my work doesn't go unappreciated.

Bacardi Cola Lime - November 30, 2018, 4:47 am

As a CS student who chose to take lessons and get expertise on Networking and Telecommunications field, I can say that this introduction is one of the easiest ways to understand the OSI model. Business has done excellent job on presenting what someone needs to know about the subject! It was great to refresh my knowledge in such an enjoyable way.

Business, I can tell you have knowledge on the subject and considering the ability to present it in such an easy to read way, I'd be excited to see more to come from you and learn stuff.

Thank you!

xMannyG - December 1, 2018, 9:07 am

Thank you for this! Always good knowledge to retouch up on before exams like the CCNA Security and OSCP!

RedRogue - December 19, 2018, 11:31 am

Thanks for your work and share this....

datguy.dev - December 19, 2018, 6:29 pm

Please Don't Network This Shit Pisses Ass. It makes no sense, but that is how I managed to remember it for my exams when I was in college. ? I kinda' feel like the OSI model is something like math. I haven't really had to use either very much in the real world.

Business - January 5, 2019, 11:16 pm

Just gonna give this a boost so more people can see it :)