**Application layer**

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An **application layer** is an [abstraction layer](https://en.wikipedia.org/wiki/Abstraction_layer) that specifies the shared [communications protocols](https://en.wikipedia.org/wiki/Communications_protocol) and [interface](https://en.wikipedia.org/wiki/Interface_(computing)) methods used by [hosts](https://en.wikipedia.org/wiki/Host_(network)) in a communications network.[[1]](https://en.wikipedia.org/wiki/Application_layer#cite_note-1) The application layer abstraction is used in both of the standard models of [computer networking](https://en.wikipedia.org/wiki/Computer_networking): the [Internet Protocol Suite](https://en.wikipedia.org/wiki/Internet_Protocol_Suite) (TCP/IP) and the [OSI model](https://en.wikipedia.org/wiki/OSI_model).[[2]](https://en.wikipedia.org/wiki/Application_layer#cite_note-2) Although both models use the same term for their respective highest level layer, the detailed definitions and purposes are different.[[3]](https://en.wikipedia.org/wiki/Application_layer#cite_note-3)



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**TCP/IP**

In TCP/IP, the application layer contains the communications protocols and interface methods used in process-to-process communications across an [Internet Protocol](https://en.wikipedia.org/wiki/Internet_Protocol) (IP) computer network.[[4]](https://en.wikipedia.org/wiki/Application_layer#cite_note-4) The application layer only standardizes communication and depends upon the underlying [transport layer](https://en.wikipedia.org/wiki/Transport_layer) protocols to establish host-to-host data transfer channels and manage the data exchange in a [client-server](https://en.wikipedia.org/wiki/Client-server_model) or [peer-to-peer](https://en.wikipedia.org/wiki/Peer-to-peer) networking model.[[5]](https://en.wikipedia.org/wiki/Application_layer#cite_note-5) Though the TCP/IP application layer does not describe specific rules or data formats that applications must consider when communicating, the original specification (in [RFC](https://en.wikipedia.org/wiki/RFC_(identifier)) [1123](https://tools.ietf.org/html/rfc1123)) does rely on and recommend the [robustness principle](https://en.wikipedia.org/wiki/Robustness_principle) for application design.[[6]](https://en.wikipedia.org/wiki/Application_layer#cite_note-rfc1123-6)[[7]](https://en.wikipedia.org/wiki/Application_layer#cite_note-7)

**OSI model**

In the [OSI model](https://en.wikipedia.org/wiki/OSI_model), the definition of the application layer is narrower in scope.[[8]](https://en.wikipedia.org/wiki/Application_layer#cite_note-8) The OSI model defines the application layer as the user interface responsible for displaying received information to the user.[[9]](https://en.wikipedia.org/wiki/Application_layer#cite_note-:0-9) In contrast, the Internet Protocol Suite does not concern itself with such detail. OSI also explicitly distinguishes additional functionality below the application layer, but above the transport layer at two additional levels: the [session layer](https://en.wikipedia.org/wiki/Session_layer), and the [presentation layer](https://en.wikipedia.org/wiki/Presentation_layer). OSI specifies a strict modular separation of functionality at these layers and provides [protocol implementations](https://en.wikipedia.org/wiki/OSI_protocols) for each layer.[[9]](https://en.wikipedia.org/wiki/Application_layer#cite_note-:0-9)

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| [**Internet protocol suite**](https://en.wikipedia.org/wiki/Internet_protocol_suite) |
| **Application layer** |
| * [BGP](https://en.wikipedia.org/wiki/Border_Gateway_Protocol) * [DHCP](https://en.wikipedia.org/wiki/Dynamic_Host_Configuration_Protocol) * [DNS](https://en.wikipedia.org/wiki/Domain_Name_System) * [FTP](https://en.wikipedia.org/wiki/File_Transfer_Protocol) * [HTTP](https://en.wikipedia.org/wiki/Hypertext_Transfer_Protocol) * [HTTPS](https://en.wikipedia.org/wiki/HTTPS) * [IMAP](https://en.wikipedia.org/wiki/Internet_Message_Access_Protocol) * [LDAP](https://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol) * [MGCP](https://en.wikipedia.org/wiki/Media_Gateway_Control_Protocol) * [MQTT](https://en.wikipedia.org/wiki/MQTT) * [NNTP](https://en.wikipedia.org/wiki/Network_News_Transfer_Protocol) * [NTP](https://en.wikipedia.org/wiki/Network_Time_Protocol) * [POP](https://en.wikipedia.org/wiki/Post_Office_Protocol) * [PTP](https://en.wikipedia.org/wiki/Precision_Time_Protocol) * [ONC/RPC](https://en.wikipedia.org/wiki/Open_Network_Computing_Remote_Procedure_Call) * [RTP](https://en.wikipedia.org/wiki/Real-time_Transport_Protocol) * [RTSP](https://en.wikipedia.org/wiki/Real_Time_Streaming_Protocol) * [RIP](https://en.wikipedia.org/wiki/Routing_Information_Protocol) * [SIP](https://en.wikipedia.org/wiki/Session_Initiation_Protocol) * [SMTP](https://en.wikipedia.org/wiki/Simple_Mail_Transfer_Protocol) * [SNMP](https://en.wikipedia.org/wiki/Simple_Network_Management_Protocol) * [SSH](https://en.wikipedia.org/wiki/Secure_Shell) * [Telnet](https://en.wikipedia.org/wiki/Telnet) * [TLS/SSL](https://en.wikipedia.org/wiki/Transport_Layer_Security) * [XMPP](https://en.wikipedia.org/wiki/XMPP) * [*more...*](https://en.wikipedia.org/wiki/Category:Application_layer_protocols) |
| [**Transport layer**](https://en.wikipedia.org/wiki/Transport_layer) |
| * [TCP](https://en.wikipedia.org/wiki/Transmission_Control_Protocol) * [UDP](https://en.wikipedia.org/wiki/User_Datagram_Protocol) * [DCCP](https://en.wikipedia.org/wiki/Datagram_Congestion_Control_Protocol) * [SCTP](https://en.wikipedia.org/wiki/Stream_Control_Transmission_Protocol) * [RSVP](https://en.wikipedia.org/wiki/Resource_Reservation_Protocol) * [*more...*](https://en.wikipedia.org/wiki/Category:Transport_layer_protocols) |
| [**Internet layer**](https://en.wikipedia.org/wiki/Internet_layer) |
| * [IP](https://en.wikipedia.org/wiki/Internet_Protocol)   + [IPv4](https://en.wikipedia.org/wiki/IPv4)   + [IPv6](https://en.wikipedia.org/wiki/IPv6) * [ICMP](https://en.wikipedia.org/wiki/Internet_Control_Message_Protocol) * [ICMPv6](https://en.wikipedia.org/wiki/Internet_Control_Message_Protocol_for_IPv6) * [ECN](https://en.wikipedia.org/wiki/Explicit_Congestion_Notification) * [IGMP](https://en.wikipedia.org/wiki/Internet_Group_Management_Protocol) * [IPsec](https://en.wikipedia.org/wiki/IPsec) * [*more...*](https://en.wikipedia.org/wiki/Category:Internet_layer_protocols) |
| [**Link layer**](https://en.wikipedia.org/wiki/Link_layer) |
| * [ARP](https://en.wikipedia.org/wiki/Address_Resolution_Protocol) * [NDP](https://en.wikipedia.org/wiki/Neighbor_Discovery_Protocol) * [OSPF](https://en.wikipedia.org/wiki/Open_Shortest_Path_First) * [Tunnels](https://en.wikipedia.org/wiki/Tunneling_protocol)   + [L2TP](https://en.wikipedia.org/wiki/Layer_2_Tunneling_Protocol) * [PPP](https://en.wikipedia.org/wiki/Point-to-Point_Protocol) * [MAC](https://en.wikipedia.org/wiki/Medium_access_control)   + [Ethernet](https://en.wikipedia.org/wiki/Ethernet)   + [Wi-Fi](https://en.wikipedia.org/wiki/Wi-Fi)   + [DSL](https://en.wikipedia.org/wiki/Digital_subscriber_line)   + [ISDN](https://en.wikipedia.org/wiki/Integrated_Services_Digital_Network)   + [FDDI](https://en.wikipedia.org/wiki/Fiber_Distributed_Data_Interface) * [*more...*](https://en.wikipedia.org/wiki/Category:Link_protocols) |
| * [v](https://en.wikipedia.org/wiki/Template:IPstack) * [t](https://en.wikipedia.org/wiki/Template_talk:IPstack) * [e](https://en.wikipedia.org/w/index.php?title=Template:IPstack&action=edit) |

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| [**OSI model**](https://en.wikipedia.org/wiki/OSI_model) **by** [**layer**](https://en.wikipedia.org/wiki/Abstraction_layer) |
| 7.  Application layer[[show]](https://en.wikipedia.org/wiki/Application_layer) |
| 6.  [Presentation layer](https://en.wikipedia.org/wiki/Presentation_layer)[[show]](https://en.wikipedia.org/wiki/Application_layer) |
| 5.  [Session layer](https://en.wikipedia.org/wiki/Session_layer)[[show]](https://en.wikipedia.org/wiki/Application_layer) |
| 4.  [Transport layer](https://en.wikipedia.org/wiki/Transport_layer)[[show]](https://en.wikipedia.org/wiki/Application_layer) |
| 3.  [Network layer](https://en.wikipedia.org/wiki/Network_layer)[[show]](https://en.wikipedia.org/wiki/Application_layer) |
| 2.  [Data link layer](https://en.wikipedia.org/wiki/Data_link_layer)[[show]](https://en.wikipedia.org/wiki/Application_layer) |
| 1.  [Physical layer](https://en.wikipedia.org/wiki/Physical_layer)[[show]](https://en.wikipedia.org/wiki/Application_layer) |
| * [v](https://en.wikipedia.org/wiki/Template:OSI_model) * [t](https://en.wikipedia.org/wiki/Template_talk:OSI_model) * [e](https://en.wikipedia.org/w/index.php?title=Template:OSI_model&action=edit) |

**Protocols**

The IETF definition document for the application layer in the Internet Protocol Suite is [RFC 1123](https://tools.ietf.org/html/rfc1123). It provided an initial set of protocols that covered the major aspects of the functionality of the early [Internet](https://en.wikipedia.org/wiki/Internet):[[6]](https://en.wikipedia.org/wiki/Application_layer#cite_note-rfc1123-6)

* Remote login to hosts: [Telnet](https://en.wikipedia.org/wiki/Telnet)
* File transfer: [File Transfer Protocol](https://en.wikipedia.org/wiki/File_Transfer_Protocol) (FTP), [Trivial File Transfer Protocol](https://en.wikipedia.org/wiki/Trivial_File_Transfer_Protocol) (TFTP)
* Electronic mail transport: [Simple Mail Transfer Protocol](https://en.wikipedia.org/wiki/Simple_Mail_Transfer_Protocol) (SMTP)
* Networking support: [Domain Name System](https://en.wikipedia.org/wiki/Domain_Name_System) (DNS)
* Host initialization: [BOOTP](https://en.wikipedia.org/wiki/BOOTP)
* Remote host management: [Simple Network Management Protocol](https://en.wikipedia.org/wiki/Simple_Network_Management_Protocol) (SNMP), [Common Management Information Protocol](https://en.wikipedia.org/wiki/Common_Management_Information_Protocol) over TCP (CMOT)

**Examples**

* [9P](https://en.wikipedia.org/wiki/9P_(protocol)), [Plan 9 from Bell Labs](https://en.wikipedia.org/wiki/Plan_9_from_Bell_Labs) distributed file system protocol
* AFP, [Apple Filing Protocol](https://en.wikipedia.org/wiki/Apple_Filing_Protocol)
* APPC, [Advanced Program-to-Program Communication](https://en.wikipedia.org/wiki/Advanced_Program-to-Program_Communication)
* AMQP, [Advanced Message Queuing Protocol](https://en.wikipedia.org/wiki/Advanced_Message_Queuing_Protocol)
* [Atom Publishing Protocol](https://en.wikipedia.org/wiki/Atom_(standard))
* [BEEP](https://en.wikipedia.org/wiki/BEEP), Block Extensible Exchange Protocol
* [Bitcoin](https://en.wikipedia.org/wiki/Bitcoin)
* [BitTorrent](https://en.wikipedia.org/wiki/BitTorrent_(protocol))
* CFDP, [Coherent File Distribution Protocol](https://en.wikipedia.org/wiki/Coherent_File_Distribution_Protocol)
* CoAP, [Constrained Application Protocol](https://en.wikipedia.org/wiki/Constrained_Application_Protocol)
* DDS, [Data Distribution Service](https://en.wikipedia.org/wiki/Data_Distribution_Service)
* [DeviceNet](https://en.wikipedia.org/wiki/DeviceNet)
* [eDonkey](https://en.wikipedia.org/wiki/EDonkey_network)
* ENRP, [Endpoint Handlespace Redundancy Protocol](https://en.wikipedia.org/wiki/Endpoint_Handlespace_Redundancy_Protocol)
* [FastTrack](https://en.wikipedia.org/wiki/FastTrack_(protocol)) (KaZaa, Grokster, iMesh)
* [Finger](https://en.wikipedia.org/wiki/Finger_protocol), User Information Protocol
* [Freenet](https://en.wikipedia.org/wiki/Freenet)
* [FTAM](https://en.wikipedia.org/wiki/FTAM), File Transfer Access and Management
* Gopher, [Gopher protocol](https://en.wikipedia.org/wiki/Gopher_(protocol))
* HL7, [Health Level Seven](https://en.wikipedia.org/wiki/HL7)
* HTTP, [Hypertext Transfer Protocol](https://en.wikipedia.org/wiki/Hypertext_Transfer_Protocol)
* [H.323](https://en.wikipedia.org/wiki/H.323), Packet-Based Multimedia Communications System
* [IMAP](https://en.wikipedia.org/wiki/IMAP), Internet Message Access Protocol
* IRC, [Internet Relay Chat](https://en.wikipedia.org/wiki/Internet_Relay_Chat)
* IPFS, [InterPlanetary File System](https://en.wikipedia.org/wiki/InterPlanetary_File_System)
* [Kademlia](https://en.wikipedia.org/wiki/Kademlia)
* LDAP, [Lightweight Directory Access Protocol](https://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol)
* LPD, [Line Printer Daemon](https://en.wikipedia.org/wiki/Line_Printer_Daemon) Protocol
* MIME (S-MIME), [Multipurpose Internet Mail Extensions](https://en.wikipedia.org/wiki/Multipurpose_Internet_Mail_Extensions) and Secure MIME
* [Modbus](https://en.wikipedia.org/wiki/Modbus)
* [MQTT](https://en.wikipedia.org/wiki/MQTT) Protocol
* [Netconf](https://en.wikipedia.org/wiki/Netconf)
* NFS, [Network File System](https://en.wikipedia.org/wiki/Network_File_System_(protocol))
* NIS, [Network Information Service](https://en.wikipedia.org/wiki/Network_Information_Service)
* NNTP, [Network News Transfer Protocol](https://en.wikipedia.org/wiki/Network_News_Transfer_Protocol)
* NTCIP, [National Transportation Communications for Intelligent Transportation System Protocol](https://en.wikipedia.org/wiki/National_Transportation_Communications_for_Intelligent_Transportation_System_Protocol)
* NTP, [Network Time Protocol](https://en.wikipedia.org/wiki/Network_Time_Protocol)
* [OSCAR](https://en.wikipedia.org/wiki/OSCAR_protocol), [AOL Instant Messenger Protocol](https://en.wikipedia.org/wiki/AOL_Instant_Messenger_Protocol)
* POP, [Post Office Protocol](https://en.wikipedia.org/wiki/Post_Office_Protocol)
* PNRP, [Peer Name Resolution Protocol](https://en.wikipedia.org/wiki/Peer_Name_Resolution_Protocol)
* RDP, [Remote Desktop Protocol](https://en.wikipedia.org/wiki/Remote_Desktop_Protocol)
* RELP, [Reliable Event Logging Protocol](https://en.wikipedia.org/wiki/Reliable_Event_Logging_Protocol)
* RFP, [Remote Framebuffer Protocol](https://en.wikipedia.org/wiki/RFB_protocol)
* [Rlogin](https://en.wikipedia.org/wiki/Rlogin), Remote Login in UNIX Systems
* RPC, [Remote Procedure Call](https://en.wikipedia.org/wiki/Remote_Procedure_Call)
* RTMP, [Real Time Messaging Protocol](https://en.wikipedia.org/wiki/Real_Time_Messaging_Protocol)
* RTP, [Real-time Transport Protocol](https://en.wikipedia.org/wiki/Real-time_Transport_Protocol)
* [RTPS](https://en.wikipedia.org/wiki/RTPS_protocol), Real Time Publish Subscribe
* RTSP, [Real Time Streaming Protocol](https://en.wikipedia.org/wiki/RTSP)
* SAP, [Session Announcement Protocol](https://en.wikipedia.org/wiki/Session_Announcement_Protocol)
* SDP, [Session Description Protocol](https://en.wikipedia.org/wiki/Session_Description_Protocol)
* SIP, [Session Initiation Protocol](https://en.wikipedia.org/wiki/Session_Initiation_Protocol)
* SLP, [Service Location Protocol](https://en.wikipedia.org/wiki/Service_Location_Protocol)
* SMB, [Server Message Block](https://en.wikipedia.org/wiki/Server_Message_Block)
* SMTP, [Simple Mail Transfer Protocol](https://en.wikipedia.org/wiki/Simple_Mail_Transfer_Protocol)
* SNTP, [Simple Network Time Protocol](https://en.wikipedia.org/wiki/Simple_Network_Time_Protocol)
* SSH, [Secure Shell](https://en.wikipedia.org/wiki/Secure_Shell)
* SSMS, Secure SMS Messaging Protocol
* TCAP, [Transaction Capabilities Application Part](https://en.wikipedia.org/wiki/Transaction_Capabilities_Application_Part)
* TDS, [Tabular Data Stream](https://en.wikipedia.org/wiki/Tabular_Data_Stream)
* [Tor (anonymity network)](https://en.wikipedia.org/wiki/Tor_(anonymity_network))
* [Tox](https://en.wikipedia.org/wiki/Tox_(protocol))
* TSP, [Time Stamp Protocol](https://en.wikipedia.org/wiki/Time_Stamp_Protocol)
* VTP, Virtual Terminal Protocol
* [Whois](https://en.wikipedia.org/wiki/Whois) (and RWhois), Remote Directory Access Protocol
* [WebDAV](https://en.wikipedia.org/wiki/WebDAV)
* [X.400](https://en.wikipedia.org/wiki/X.400), Message Handling Service Protocol
* [X.500](https://en.wikipedia.org/wiki/X.500), Directory Access Protocol (DAP)
* XMPP, [Extensible Messaging and Presence Protocol](https://en.wikipedia.org/wiki/Extensible_Messaging_and_Presence_Protocol)
* [Z39.50](https://en.wikipedia.org/wiki/Z39.50)
* DNS, Domain Name Services

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