|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Layer** | **Layer Name** | **Data** | **Protocol** | **Purpose** | **Description** | **Devices** |
| **7** | **Application** | Upper layer data / Message | HTTP, SMTP, FTP, POP3, DNS, RIP, IMAP, Telnet, SNMP | Interfaces with Applications | Where user interact with application to provide data. |  |
| **6** | **Presentation** | Upper layer data / Message | ASCII, SSL, TLS, MPEG, JPEG, Encryption, Compression | Data translation & prep for network | Concern with the format of data exchange between the end system. |  |
| **5** | **Session** | Upper layer data / Message | NetBIOS, SAP, NFTS, SQL, RPC, NCP, ADSP, | Establish & maintain Communication link | Allow user on different machine to create session between them. |  |
| **4** | **Transport** | Segment | TCP, UDP, NWLink, SPY, NBP, ATP, SPP | Breaks down message to send | Concern with end to end communication of message. |  |
| **3** | **Network** | Packet | IPv4, IPv6, ICMP, IPSec, ARP, MPLS, IPx, RIP, DDP, RTMP, RARP, OSPF | Adds logical address information | Concern with routing of packets to correct destination. | Router, Gateway |
| **2** | **Data Link** | Frame | MPLS, RARP, Ethernet, 802.11x, 802.3, 802.5, PPP, STP, X.25, ATM, FDDI, Frame Relay, Fibre Channel | Adds physical addressing | Concern with transmission of error free data in form of frames. | Switches or Bridge |
| **1** | **Physical** | Bits | DSL, ISDN, T1, Rs232, 10BaseT, 100BaseTx | Converts to signal and sends it | Concern with transmission of row bits over the communication link. | Hub, Repeaters, Cable, Connectors, |

**Porgi Dili Nahi Tar Saral Palaun Aanen.**

**Protocol**

**HTTP** (Hypertext Transfer Protocol) is the set of rules for transferring files (text, graphic images, sound, video, and other multimedia files) on the World Wide Web. As soon as a Web user opens their Web browser, the user is indirectly making use of **HTTP**.

**SMTP**  (**Simple Mail Transfer Protocol**)  is part of the application layer of the TCP/IP protocol. Using a process called "store and forward," **SMTP** moves your email on and across **networks**. It works closely with something called the Mail Transfer Agent (MTA) to send your communication to the right **computer** and email inbox.

The **File Transfer Protocol** (**FTP**) is a standard **network** protocol used to transfer **computer** files between a client and server on a **computer network**. **FTP** is built on a client-server model architecture and uses separate control and data connections between the client and the server.

**POP3** (Post Office Protocol 3) is the most recent version of a standard protocol for receiving e-mail. **POP3** is a client/server protocol in which e-mail is received and held for you by your Internet server.

The Domain Name System (**DNS**) is a hierarchical decentralized naming system for computers, services, or any resource connected to the Internet or a private network. It associates various information with domain names assigned to each of the participating entities.

The **Routing Information Protocol** (**RIP**) is one of the oldest distance-vector routing protocols which employ the hop count as a routing metric. **RIP** prevents routing loops by implementing limit on the number of hops allowed in a path from source to destination.

In computing, the **Internet Message Access Protocol (IMAP)** is an Internet standard protocol used by e-mail clients to retrieve e-mail messages from a mail server over a **TCP/IP connection**. IMAP is defined by RFC 3501.

**Telnet** is a protocol that allows you to connect to remote **computers** (called hosts) over a TCP/IP **network** (such as the Internet). Using **telnet** client software on your **computer**, you can make a connection to a **telnet** server (i.e., the remote host).

**Simple Network Management Protocol** (**SNMP**) is a popular protocol for **network** management. It is used for collecting information from, and configuring, **network** devices, such as servers, printers, hubs, switches, and routers on an Internet Protocol (IP)**network**.

**ASCII** stands for American Standard Code for Information Interchange. Computers can only understand numbers, so an **ASCII** code is the numerical representation of a character such as 'a' or '@' or an action of some sort.

The **Secure Sockets Layer** (**SSL**) and **Transport Layer Security (TLS)** is the most widely deployed security protocol used today. It is essentially a protocol that provides a secure channel between two machines operating over the Internet or an internal **network**.

**Transport Layer Security** (**TLS**) and its predecessor, **Secure Sockets Layer (SSL),** both frequently referred to as "SSL", are cryptographic protocols that provide communications security over a **computer network**. ... The connection is private (or secure) because symmetric cryptography is used to encrypt the data transmitted.

**MPEG** (Moving Picture Experts Group) Part of the Computing fundamentals glossary **MPEG** (pronounced EHM-pehg), the Moving Picture Experts Group, develops standards for digital video and digital audio compression. It operates under the auspices of the International Organization for Standardization (ISO).

**JPEG (Joint Photographic Experts Group)** is an ISO/IEC group of experts that develops and maintains standards for a suite of compression algorithms for computer image files.

The translation of data into a secret code. **Encryption** is the most effective way to achieve data security. To read an **encrypted** file, you must have access to a secret key or password that enables you to decrypt it. Unencrypted data is called plain text; **encrypted** data is referred to as cipher text.

In signal processing, data **compression**, source coding, or bit-rate reduction involves encoding information using fewer bits than the original representation. **Compression** can be either lossy or lossless. Lossless **compression** reduces bits by identifying and eliminating statistical redundancy.

**NetBIOS** (**Network** Basic Input/Output System) is a program that allows applications on different **computers** to communicate within a local area **network** (LAN). It was created by IBM for its early PC **Network**, was adopted by Microsoft, and has since become a de facto industry standard.

**SAP(A** **Service** **Access** **Point)** Community **Network** (SCN) is the official user community of **SAP** SE. **SAP** software users, developers, consultants, mentors and students use the **SAP** Community **Network** to get help, share ideas, learn, innovate and connect with others.

In [distributed computing](https://en.wikipedia.org/wiki/Distributed_computing) **a remote procedure call** (RPC) is when a [computer program](https://en.wikipedia.org/wiki/Computer_program) causes a procedure ([subroutine](https://en.wikipedia.org/wiki/Subroutine)) to execute in another [address space](https://en.wikipedia.org/wiki/Address_space) (commonly on another computer on a shared network), which is coded as if it were a normal (local) procedure call, without the programmer explicitly coding the details for the remote interaction. That is, the programmer writes essentially the same code whether the subroutine is local to the executing program, or remote.[[1]](https://en.wikipedia.org/wiki/Remote_procedure_call#cite_note-ostep-1) This is a form of [client–server](https://en.wikipedia.org/wiki/Client%E2%80%93server_model) interaction (caller is client, executer is server), typically implemented via a [request–response](https://en.wikipedia.org/wiki/Request%E2%80%93response) message-passing system. The [object-oriented programming](https://en.wikipedia.org/wiki/Object-oriented_programming) analog is [remote method invocation](https://en.wikipedia.org/wiki/Remote_method_invocation) (RMI). The RPC model implies a level of [location transparency](https://en.wikipedia.org/wiki/Location_transparency), namely that calling procedures is largely the same whether it is local or remote, but usually they are not identical, so local calls can be distinguished from remote calls. Remote calls are usually orders of magnitude slower and less reliable than local calls, so distinguishing them is important.

The **Network** Control Program (**NCP**) provided the middle layers of the protocol stack running on host **computers** of the ARPANET, the predecessor to the modern Internet. **NCP** preceded the Transmission Control Protocol (TCP) as a transport layer protocol used during the early ARPANET.

**TCP** is one of the main protocols in **TCP**/IP **networks**. Whereas the IP protocol deals only with packets, **TCP** enables two hosts to establish a connection and exchange streams of data. **TCP** guarantees delivery of data and also guarantees that packets will be delivered in the same order in which they were sent.

The **User Datagram Protocol** (**UDP**) is one of the core members of the Internet protocol suite. The protocol was designed by David P. Reed in 1980 and formally defined in RFC 768. With **UDP**, **computer** applications can send messages, in this case referred to as datagrams, to other hosts on an Internet Protocol (IP) **network**.

**NWLink** IPX/SPX/**NetBIOS** Compatible Transport is Microsoft's implementation of the Novell IPX/SPX (Internetwork Packet Exchange/Sequenced Packet Exchange)**protocol** stack. The Windows XP implementation of the IPX/SPX **protocol** stack adds **NetBIOS** support.

**Internet Protocol version 4** (**IPv4**) is the fourth version of the [Internet Protocol](https://en.wikipedia.org/wiki/Internet_Protocol) (IP). It is one of the core protocols of standards-based internetworking methods in the [Internet](https://en.wikipedia.org/wiki/Internet), and was the first version deployed for production in the [ARPANET](https://en.wikipedia.org/wiki/ARPANET) in 1983. It still routes most Internet traffic today,[[1]](https://en.wikipedia.org/wiki/IPv4#cite_note-:0-1) despite the ongoing deployment of a successor protocol, [IPv6](https://en.wikipedia.org/wiki/IPv6). IPv4 is described in [IETF](https://en.wikipedia.org/wiki/IETF) publication [RFC 791](https://tools.ietf.org/html/rfc791) (September 1981), replacing an earlier definition ([RFC 760](https://tools.ietf.org/html/rfc760), January 1980).

**Internet Protocol version 6** (**IPv6**) is the most recent version of the [Internet Protocol](https://en.wikipedia.org/wiki/Internet_Protocol) (IP), the [communications protocol](https://en.wikipedia.org/wiki/Communications_protocol) that provides an identification and location system for computers on networks and routes traffic across the [Internet](https://en.wikipedia.org/wiki/Internet). IPv6 was developed by the [Internet Engineering Task Force](https://en.wikipedia.org/wiki/Internet_Engineering_Task_Force) (IETF) to deal with the long-anticipated problem of [IPv4 address exhaustion](https://en.wikipedia.org/wiki/IPv4_address_exhaustion). IPv6 is intended to replace [IPv4](https://en.wikipedia.org/wiki/IPv4).

The Internet Control Message Protocol (**ICMP**) is a supporting protocol in the Internet protocol suite. It is used by network devices, like routers, to send error messages and operational information indicating, for example, that a requested service is not available or that a host or router could not be reached.

Internet Protocol security (**IPSec**) is a framework of open standards for helping to ensure private, secure communications over Internet Protocol (IP) **networks** through the use of cryptographic security services. ... Administrative control of servers, other **computers**, and the **network** . Mar 28, 2003

The **address resolution protocol** (**arp**) is a protocol used by the Internet Protocol (IP) [RFC826], specifically IPv4, to map IP **network** addresses to the hardware addresses used by a data link protocol. The protocol operates below the **network** layer as a part of the interface between the OSI **network** and OSI link layer.

Multiprotocol Label Switching (**MPLS**) is a type of data-carrying technique for high-performance telecommunications **networks** that directs data from one **network** node to the next based on short path labels rather than long **network** addresses, avoiding complex lookups in a routing table.

**IPX** is a **network** layer protocol (layer 3 of the OSI Model), while SPX is a transport layer protocol (layer 4 of the OSI Model). The SPX layer sits on top of the **IPX** layer and provides connection-oriented services between two nodes on the **network**. SPX is used primarily by client–server applications.

The **Routing Information Protocol** (**RIP**) is one of the oldest distance-vector routing protocols which employ the hop count as a routing metric. **RIP** prevents routing loops by implementing limit on the number of hops allowed in a path from source to destination.

**Distributed Data Protocol** (or **DDP**) is a [client-server](https://en.wikipedia.org/wiki/Client-server) [protocol](https://en.wikipedia.org/wiki/Communications_protocol) for querying and updating a server-side database and for synchronizing such updates among clients. It uses the [publish-subscribe](https://en.wikipedia.org/wiki/Publish-subscribe_pattern) messaging pattern. It was created for use by the [Meteor JavaScript framework](https://en.wikipedia.org/wiki/Meteor_(platform)).[[1]](https://en.wikipedia.org/wiki/Distributed_Data_Protocol#cite_note-1)

**Real-Time Messaging Protocol** (**RTMP**) was initially a proprietary **protocol** developed by Macromedia for streaming audio, video and data over the Internet, between a Flash player and a server. Macromedia is now owned by Adobe, which has released an incomplete version of the specification of the **protocol** for public use.

The **Reverse Address Resolution Protocol** (**RARP**) is an obsolete computer networking **protocol** used by a client computer to request its Internet **Protocol**(IPv4) address from a computer network, when all it has available is its link layer or hardware address, such as a MAC address.

**Open Shortest Path First** (**OSPF**) is a routing **protocol** for Internet **Protocol** (IP) networks. It uses a link state routing (LSR) algorithm and falls into the group of interior routing **protocols**, operating within a single autonomous system (AS). It is defined as **OSPF** Version 2 in RFC 2328 (1998) for IPv4.

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**Ethernet** is the most widely installed local area **network** (LAN) technology. **Ethernet**is a link layer protocol in the TCP/IP stack, describing how networked devices can format data for transmission to other **network** devices on the same **network**segment, and how to put that data out on the **network** connection.May 19, 2015

**IEEE 802.11** is a set of [media access control](https://en.wikipedia.org/wiki/Media_access_control) (MAC) and [physical layer](https://en.wikipedia.org/wiki/Physical_layer) (PHY) specifications for implementing [wireless local area network](https://en.wikipedia.org/wiki/Wireless_LAN) (WLAN) computer communication in the 900 MHz and 2.4, [3.6](https://en.wikipedia.org/wiki/IEEE_802.11y-2008), 5, and [60 GHz](https://en.wikipedia.org/wiki/IEEE_802.11ad) frequency bands. They are created and maintained by the [Institute of Electrical and Electronics Engineers](https://en.wikipedia.org/wiki/Institute_of_Electrical_and_Electronics_Engineers) (IEEE) [LAN](https://en.wikipedia.org/wiki/Local_area_network)/[MAN](https://en.wikipedia.org/wiki/Metropolitan_area_network) Standards Committee ([IEEE 802](https://en.wikipedia.org/wiki/IEEE_802)). The base version of the standard was released in 1997, and has had subsequent amendments. The standard and amendments provide the basis for wireless network products using the [Wi-Fi](https://en.wikipedia.org/wiki/Wi-Fi) brand. While each amendment is officially revoked when it is incorporated in the latest version of the standard, the corporate world tends to market to the revisions because they concisely denote capabilities of their products. As a result, in the marketplace, each revision tends to become its own standard.

**IEEE 802.3** is a [working group](https://en.wikipedia.org/wiki/Working_group) and a collection of [IEEE](https://en.wikipedia.org/wiki/IEEE) standards produced by the working group defining the [physical layer](https://en.wikipedia.org/wiki/Physical_layer) and [data link layer](https://en.wikipedia.org/wiki/Data_link_layer)'s [media access control](https://en.wikipedia.org/wiki/Media_access_control) (MAC) of wired [Ethernet](https://en.wikipedia.org/wiki/Ethernet). This is generally a [local area network](https://en.wikipedia.org/wiki/Local_area_network) technology with some [wide area network](https://en.wikipedia.org/wiki/Wide_area_network) applications. Physical connections are made between nodes and/or infrastructure devices ([hubs](https://en.wikipedia.org/wiki/Network_hub), [switches](https://en.wikipedia.org/wiki/Network_switch), [routers](https://en.wikipedia.org/wiki/Router_(computing))) by various types of copper or [fiber cable](https://en.wikipedia.org/wiki/Optical_fiber" \o "Optical fiber).

In computer networking, **Point-to-Point Protocol**(**PPP**) is a data link (layer 2) **protocol** used to establish a direct connection between two nodes.

Spanning Tree **Protocol** (**STP**) is a Layer 2 **protocol** that runs on bridges and switches. The specification for **STP** is IEEE 802.1D. The main purpose of **STP** is to ensure that you do not create loops when you have redundant paths in your network. Loops are deadly to a network.Aug 17, 2006

**X**.**25** is an ITU-T standard protocol suite for packet switched wide area network (WAN) communication. An **X**.**25** WAN consists of packet-switching exchange (PSE) nodes as the networking hardware, and leased lines, plain old telephone service connections, or ISDN connections as physical links.

**Asynchronous transfer mode** (**ATM**) is a switching technique used by telecommunication **networks** that uses asynchronous time-division multiplexing to encode data into small, fixed-sized cells. This is different from Ethernet or Internet, which use variable packet sizes for data or frames.

**FDDI** (**Fiber Distributed Data Interface**) is a set of ANSI and ISO standards for data transmission on fiber optic lines in a local area **network** (LAN) that can extend in range up to 200 km (124 miles). The **FDDI** protocol is based on the token ring protocol.

**Frame Relay** is a standardized wide area **network** technology that specifies the physical and data link layers of digital telecommunications channels using a packet switching methodology.

Fibre Channel. Fibre Channel, or FC, is a high-speed network technology (commonly running at 1, 2, 4, 8, 16, 32, and 128 gigabit per second rates) primarily used to connect computer data storage to servers. Fibre Channel is mainly used in **storage area networks** (SAN) in commercial data centers.

**DSL** (**Digital Subscriber Line**) is a technology for bringing high- bandwidth information to homes and small businesses over ordinary copper telephone lines. xDSL refers to different variations of **DSL**, such as **ADSL**, HDSL, and RADSL.

**Integrated Services Digital Network** (**ISDN**) is a set of communication standards for simultaneous digital transmission of voice, video, data, and other **network** services over the traditional circuits of the public switched telephone **network**.

**Digital Signal 1** (**DS1**, sometimes **DS-1**) is a [T-carrier](https://en.wikipedia.org/wiki/T-carrier) signalling scheme devised by [Bell Labs](https://en.wikipedia.org/wiki/Bell_Labs).[[1]](https://en.wikipedia.org/wiki/Digital_Signal_1#cite_note-1) DS1 is the primary digital telephone standard used in the [United States](https://en.wikipedia.org/wiki/United_States) and [Japan](https://en.wikipedia.org/wiki/Japan) and is able to transmit up to 24 [multiplexed](https://en.wikipedia.org/wiki/Time-division_multiplexing) voice and data calls over telephone lines. [E-carrier](https://en.wikipedia.org/wiki/E-carrier) is used in place of T-carrier outside the United States, Japan, and South Korea. DS1 is the logical bit pattern used over a physical [T1](https://en.wikipedia.org/wiki/T-carrier) line; in practice, the terms "DS1" and "T1" are often used interchangeably.[[a]](https://en.wikipedia.org/wiki/Digital_Signal_1#cite_note-2)

**RS232** is a asynchronous serial communication **protocol** widely used in computers and digital systems. It is called asynchronous because there is no separate synchronizing clock signal as there are in other serial **protocols** like SPI and I2C. The **protocol** is such that it automatically synchronize itself .Nov 12, 2008

**Devices**

**Network encryption** (sometimes called **network** layer, or **network** level **encryption) is** a **network** security process that applies **crypto** services at the **network** transfer layer - above the data link level, but below the application level.

A **router** [a] is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the **Internet**. A data packet is typically forwarded from one router to another through the networks that constitute the internetwork until it reaches its destination node.

An **Internet** Protocol address (IP address) is a numerical label assigned to each device (e.g., computer, printer) participating in a computer network that uses the **Internet** Protocol for communication. An IP address serves two principal functions: host or network interface identification and location addressing.

A **media access control** **address** (**MAC address**) of a computer is a unique identifier assigned to **network** interfaces for communications at the data link layer of a **network** segment. **MAC addresses** are used as a **network address** for most IEEE 802 **network** technologies, including Ethernet and WiFi.

A **network switch** (also called **switching** hub, bridging hub, officially MAC bridge) is a computer **networking** device that connects devices together on a computer **network**, by using packet **switching** to receive, process and forward data to the destination device.

In telecommunication networks, a bridge is a product that connects a **local area network** (LAN) to another **local area network** that uses the same protocol (for example, Ethernet or token ring).

Different types of **network cables**, such as coaxial **cable**, optical fiber **cable**, and twisted pair **cables**, are used depending on the **network's** physical layer, topology, and size. The devices can be separated by a few meters (e.g. via Ethernet) or nearly unlimited distances (e.g. via the interconnections of the Internet).

The part of a cable that plugs into a port or interface to connect one device to another. Most **connectors** are either male (containing one or more exposed pins) or female (containing holes in which the male **connector** can be inserted).

A hub is a common connection point for devices in a network. Hubs are commonly used to connect segments of a **LAN**. A hub contains multiple ports. When a packet arrives at one port, it is copied to the other ports so that all segments of the **LAN** can see all packets.

A **network** interface card (**NIC**) is a circuit board or card that is installed in a computer so that it can be connected to a **network**. A **network** interface card provides the computer with a dedicated, full-time connection to a **network**

A **network** device used to regenerate or replicate a signal. **Repeaters** are used in transmission systems to regenerate analog or digital signals distorted by transmission loss. Analog **repeaters** frequently can only amplify the signal while digital **repeaters** can reconstruct a signal to near its original quality.