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Types of Internet Protocols

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Internet protocols are a set of rules that allow computers and other devices to communicate over the Internet. These protocols ensure that data is sent, received, and understood correctly between different systems. There are many types of internet protocols, each serving a specific purpose, such as transferring files, sending emails, or securing data. Understanding these protocols is important for making the internet work efficiently and securely. In this article we will see different types of internet protocol in detail.

What is Internet Protocol?

As we discuss **Internet Protocol (IP)** is a set of rules that allows devices to communicate with each other over the Internet. It is like the address system used for sending data. Every device connected to the internet has a unique **IP address** that helps data know where to go and where it is coming from.

What is IP Addressing?

An [IP address](#) represents an Internet Protocol address. A unique address that identifies the device over the network. It is almost like a set of rules governing the structure of data sent over the Internet or through a local network. An IP address helps the Internet to distinguish between different [routers](#), computers, and websites. It serves as a specific machine identifier in a specific network and helps to improve visual communication between source and destination.

Working of Internet Protocol

Step by step working of internet protocol:

- **Dividing Data into Packets:** When you send information over the internet, IP split it into small parts called **packets**. Each packet contains a piece of the data and the address of where it needs to go.
- **Addressing:** Every device connected to the internet has its own **IP address**. This address helps identify where the data is being sent from and where it should be delivered.
- **Routing the Packets:** As the packets travel across the internet, they pass through several devices called **routers**. These routers help direct the packets toward the correct destination, like how mail is sorted at different post offices.
- **Reassemble the Data:** Once all the packets arrive at the destination, they are put back together to recreate the original message or file.
- **Handling Missing Packets:** If some packets don't arrive, the system can request that they be sent again, making sure the complete data is received.

This process helps data move efficiently across the internet, no matter how far it needs to travel or how many networks it passes through.

Need for Internet Protocols

The sender and receiver of data are parts of different networks, located in different parts of the world having different data transfer rates. So, we need protocols to manage the flow control of data and access control of the link being shared in the communication channel. Suppose there is a sender X who has a data transmission rate of 10 Mbps. And, there is a receiver Y who has a data receiving rate of 5Mbps. Since the rate of receiving the data is slow so some data will be lost during transmission. In order to avoid this, receiver Y needs to inform sender X about the speed mismatch so that sender X can adjust its transmission rate. Similarly, the access control decides the node which will access the link shared in the communication channel at a particular instant in time. If not the

transmitted data will collide if many computers send data simultaneously through the same link resulting in the corruption or loss of data.

Types of Internet Protocol

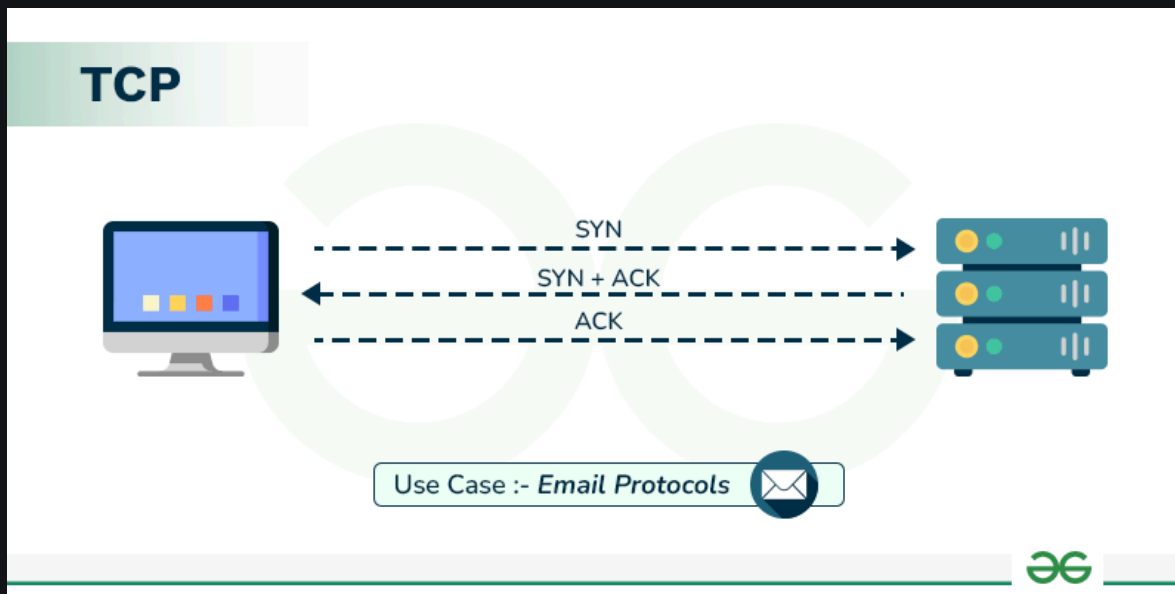
Internet Protocols are of different types having different uses. These are mentioned below:

1. [TCP/IP\(Transmission Control Protocol/ Internet Protocol\)](#)
2. [SMTP\(Simple Mail Transfer Protocol\)](#)
3. [PPP\(Point-to-Point Protocol\)](#)
4. [FTP \(File Transfer Protocol\)](#)
5. [SFTP\(Secure File Transfer Protocol\)](#)
6. [HTTP\(Hyper Text Transfer Protocol\)](#)
7. [HTTPS\(HyperText Transfer Protocol Secure\)](#)
8. [TELNET\(Terminal Network\)](#)
9. [POP3\(Post Office Protocol 3\)](#)
10. [IPv4](#)
11. [IPv6](#)
12. [ICMP](#)
13. [UDP](#)
14. [IMAP](#)
15. [SSH](#)
16. [Gopher](#)

1. TCP/IP(Transmission Control Protocol/ Internet Protocol)

In TCP/IP, the IP protocol ensures that each computer that is connected to the Internet is having a specific serial number called the IP address. TCP specifies how data is exchanged over the internet and how it should be broken into IP packets. It also makes sure that the packets have information about the source of the message data, the destination of the message data, the sequence in which the message data should be re-assembled, and checks if the message has been sent correctly to the

specific destination. The TCP is also known as a connection-oriented protocol.

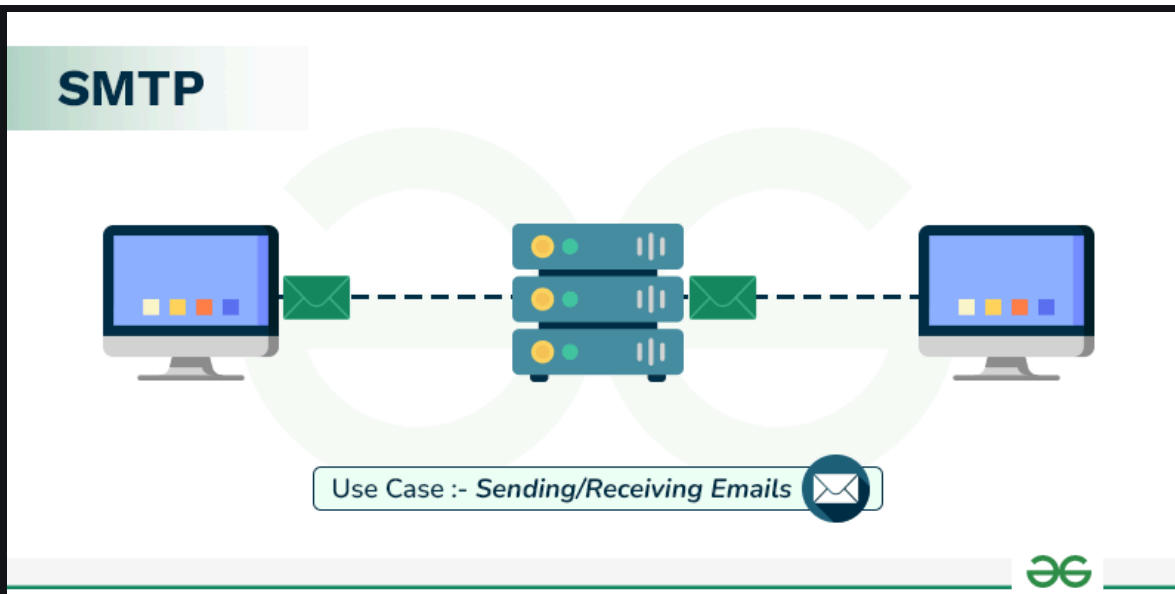


TCP/IP

For more details, please refer [TCP/IP Model](#) article.

2. SMTP(Simple Mail Transfer Protocol)

SMTP protocol is important for sending and distributing outgoing emails. This protocol uses the header of the mail to get the email id of the receiver and enters the mail into the queue of outgoing mail. And as soon as it delivers the mail to the receiving email id, it removes the email from the outgoing list. The message or the electronic mail may consider the text, video, image, etc. It helps in setting up some communication server rules.



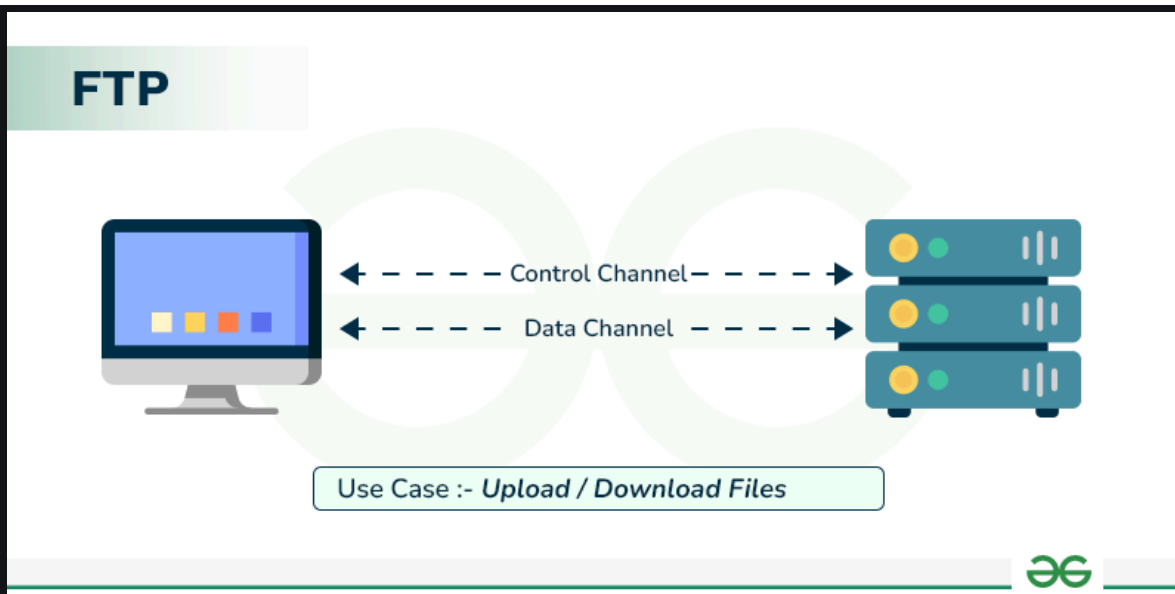
SMTP

3. PPP(Point-to-Point Protocol)

PPP is a communication protocol that is used to create a direct connection between two communicating devices. This protocol defines the rules using which two devices will authenticate with each other and exchange information with each other. For example, A user connects his PC to the server of an Internet Service Provider and also uses PPP. Similarly, for connecting two routers for direct communication it uses PPP.

4. FTP (File Transfer Protocol)

This protocol is used for transferring files from one system to the other. This works on a [client-server model](#). When a machine requests for file transfer from another machine, the FTO sets up a connection between the two and authenticates each other using their ID and Password. And, the desired file transfer takes place between the machines.



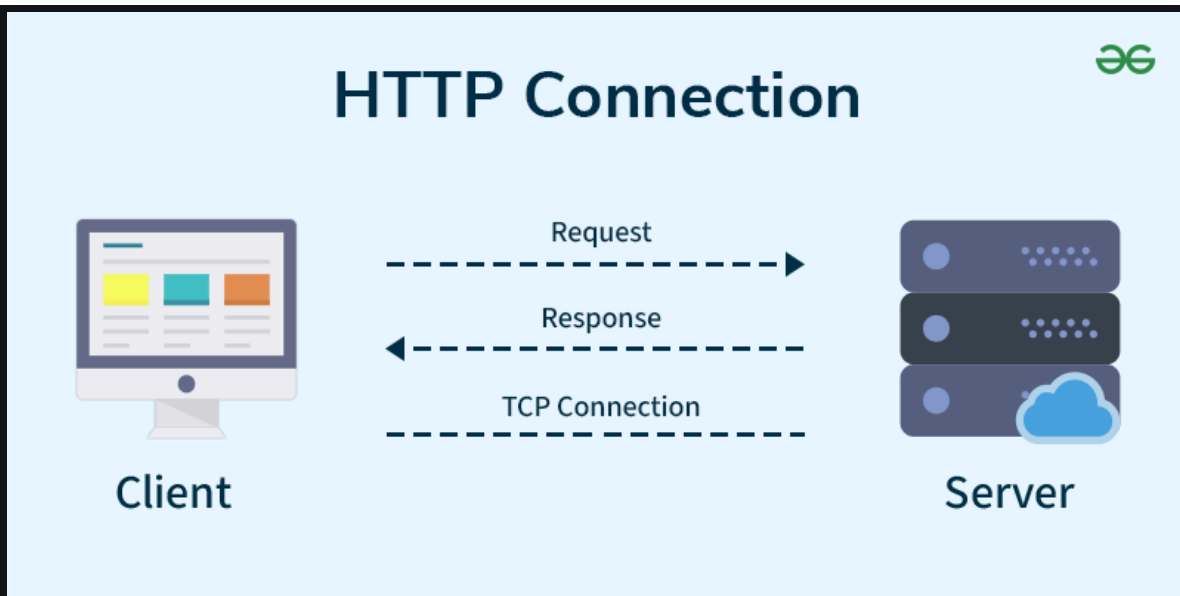
FTP

5. SFTP(Secure File Transfer Protocol)

SFTP which is also known as SSH FTP refers to File Transfer Protocol (FTP) over Secure Shell (SSH) as it encrypts both commands and data while in transmission. SFTP acts as an extension to SSH and encrypts files and data then sends them over a secure shell data stream. This protocol is used to remotely connect to other systems while executing commands from the command line.

6. HTTP(Hyper Text Transfer Protocol)

HTTP protocol is used to transfer hypertexts over the internet and it is defined by the www(world wide web) for information transfer. This protocol defines how the information needs to be formatted and transmitted. And, it also defines the various actions the web browsers should take in response to the calls made to access a particular web page. Whenever a user opens their web browser, the user will indirectly use HTTP as this is the protocol that is being used to share text, images, and other multimedia files on the [World Wide Web](https://www.geeksforgeeks.org/types-of-internet-protocols/).



HTTP

7. HTTPS(HyperText Transfer Protocol Secure)

HTTPS is an extension of the Hypertext Transfer Protocol (HTTP). It is used for secure communication over a computer network with the [SSL/TLS](#) protocol for encryption and authentication. So, generally, a website has an HTTP protocol but if the website is such that it receives some sensitive information such as credit card details, debit card details, OTP, etc then it requires an SSL certificate installed to make the website more secure. So, before entering any sensitive information on a website, we should check if the link is HTTPS or not. If it is not HTTPS then it may not be secure enough to enter sensitive information.

8. TELNET(Terminal Network)

TELNET is a standard TCP/IP protocol used for virtual terminal service given by ISO. This enables one local machine to connect with another. The computer which is being connected is called a remote computer and which is connecting is called the local computer. TELNET operation lets us display anything being performed on the remote computer in the local computer. This operates on the client/server principle. The local computer

uses the telnet client program whereas the remote computer uses the telnet server program.

9. POP3(Post Office Protocol 3)

POP3 stands for Post Office Protocol version 3. It has two Message Access Agents (MAAs) where one is client MAA (Message Access Agent) and another is server MAA(Message Access Agent) for accessing the messages from the mailbox. This protocol helps us to retrieve and manage emails from the mailbox on the receiver mail server to the receiver's computer. This is implied between the receiver and the receiver mail server. It can also be called a one-way [client-server protocol](#). The POP3 works on two ports i.e port 110 and port 995.

10. IPv4

The fourth and initially widely used version of the Internet Protocol is called IPv4 (Internet Protocol version 4). It is the most popular version of the Internet Protocol and is in charge of distributing data packets throughout the network. Maximum unique addresses for IPv4 are 4,294,967,296 (2³²), which are possible due to the use of 32-bit addresses. The network address and the host address are the two components of each address. The host address identifies a particular device within the network, whereas the network address identifies the network to which the host belongs. In the "dotted decimal" notation, which is the standard for IPv4 addresses, each octet (8 bits) of the address is represented by its decimal value and separated by a dot (e.g. 192.168.1.1).

11. IPv6

The most recent version of the Internet Protocol, IPv6, was created to address the IPv4 protocol's drawbacks. A maximum of 4.3 billion unique addresses are possible with IPv4's 32-bit addresses. Contrarily, IPv6 uses 128-bit addresses, which enable a significantly greater number of unique

addresses. This is significant because IPv4 addresses were running out and there are an increasing number of devices that require internet access. Additionally, IPv6 offers enhanced security features like integrated authentication and encryption as well as better support for mobile devices. IPv6 support has spread among websites and internet service providers, and it is anticipated to gradually displace IPv4 as the main internet protocol.

For more details, please refer [Differences between IPv4 and IPv6](#) article.

12. ICMP

ICMP (Internet Control Message Protocol) is a network protocol that is used to send error messages and operational information about network conditions. It is an integral part of the Internet Protocol (IP) suite and is used to help diagnose and troubleshoot issues with network connectivity. ICMP messages are typically generated by network devices, such as routers, in response to errors or exceptional conditions encountered in forwarding a datagram. Some examples of ICMP messages include:

- Echo Request and Echo Reply (ping)
- Destination Unreachable
- Time Exceeded
- Redirect

ICMP can also be used by network management tools to test the reachability of a host and measure the round-trip time for packets to travel from the source to the destination and back. It should be noted that ICMP is not a secure protocol, it can be used in some types of network attacks like [DDoS](#) amplification.

13. UDP

UDP (User Datagram Protocol) is a connectionless, unreliable transport layer protocol. Unlike TCP, it does not establish a reliable connection

between devices before transmitting data, and it does not guarantee that data packets will be received in the order they were sent or that they will be received at all. Instead, UDP simply sends packets of data to a destination without any error checking or flow control. UDP is typically used for real-time applications such as streaming video and audio, online gaming, and [VoIP \(Voice over Internet Protocol\)](#) where a small amount of lost data is acceptable and low latency is important. UDP is faster than TCP because it has less overhead. It doesn't need to establish a connection, so it can send data packets immediately. It also doesn't need to wait for confirmation that the data was received before sending more, so it can transmit data at a higher rate.

14. IMAP

IMAP (Internet Message Access Protocol) is a protocol used for retrieving emails from a mail server. It allows users to access and manage their emails on the server, rather than downloading them to a local device. This means that the user can access their emails from multiple devices and the emails will be synced across all devices. IMAP is more flexible than [POP3 \(Post Office Protocol version 3\)](#) as it allows users to access and organize their emails on the server, and also allows multiple users to access the same mailbox.

15. SSH

SSH (Secure Shell) is a protocol used for secure remote login and other secure network services. It provides a secure and encrypted way to remotely access and manage servers, network devices, and other computer systems. SSH uses public-key cryptography to authenticate the user and encrypt the data being transmitted, making it much more secure than traditional remote login protocols such as Telnet. SSH also allows for secure file transfers using the SCP (Secure Copy) and [SFTP \(Secure File Transfer Protocol\)](#) protocols. It is widely used in Unix-based operating systems and is also available for Windows. It is commonly used by system

administrators, developers, and other technical users to remotely access and manage servers and other network devices.

16. Gopher

Gopher is a type of file retrieval protocol that provides downloadable files with some description for easy management, retrieving, and searching of files. All the files are arranged on a remote computer in a stratified manner. It is an old protocol and it is not much used nowadays.

Conclusion

In conclusion, the various types of [Internet Protocols \(IP\)](#) play a important role in enabling communication across networks, ensuring to transfer of data between devices. Protocols such as **IP** , **TCP**, **UDP**, **HTTP**, **FTP**, and **SMTP** serve distinct purposes, from routing data packets efficiently to providing reliable file transfers and web communication. Each protocol resolved specific requirement with in internet connectivity, and ensuring that the data communication must be reliable, secure, and efficient.

Frequently Asked Questions on Types of Internet Protocols – FAQs

What does FTP do?

***FTP (File Transfer Protocol)** helps move files between computers on a network. It's like using a digital post office to send or receive large files.*

What is the role of SMTP?

***SMTP (Simple Mail Transfer Protocol)** is used to send emails from one server to another. It ensures your email is delivered to the right recipient.*

Why is IP important for the internet?


IP (Internet Protocol) assigns unique addresses to devices, like phones and computers, so they can find each other and send information across the internet.

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