The Internet Protocol (IP) is a set of rules that allows computers and other devices to communicate over the Internet. It ensures that information sent from one device reaches the correct destination by using a unique set of numbers known as IP addresses.

Cisco:

IP is a network layer (Layer 3) protocol that contains addressing information and some control information that enables packets to be routed. IP is documented in RFC 791 and is the primary network layer protocol in the Internet protocol suite.

**IP** is connectionless because it treats each packet of information independently.

It is unreliable because it does not guarantee delivery, meaning, it does not require acknowledgments from the sending host, the receiving host, or intermediate hosts.

**What is the Internet Protocol?**

The Internet Protocol (IP) is a protocol, or set of rules, for routing and addressing packets of data so that they can travel across networks and arrive at the correct destination. Data traversing the Internet is divided into smaller pieces, called [packets](https://www.cloudflare.com/learning/network-layer/what-is-a-packet/). IP information is attached to each packet, and this information helps [routers](https://www.cloudflare.com/learning/network-layer/what-is-a-router/) to send packets to the right place. Every device or [domain](https://www.cloudflare.com/learning/dns/glossary/what-is-a-domain-name/) that connects to the Internet is assigned an [IP address](https://www.cloudflare.com/learning/dns/glossary/what-is-my-ip-address/), and as packets are directed to the IP address attached to them, data arrives where it is needed.

Once the packets arrive at their destination, they are handled differently depending on which transport protocol is used in combination with IP. The most common transport protocols are TCP and UDP.

**What is an IP address? How does IP addressing work?**

An IP address is a unique identifier assigned to a device or domain that connects to the Internet. Each IP address is a series of characters, such as '192.168.1.1'. Via [DNS](https://www.cloudflare.com/learning/dns/what-is-dns/) resolvers, which translate human-readable domain names into IP addresses, users are able to access websites without memorizing this complex series of characters. Each IP packet will contain both the IP address of the device or domain sending the packet and the IP address of the intended recipient, much like how both the destination address and the return address are included on a piece of mail.

A black and white rectangular object with a black line

AI-generated content may be incorrect.

**What is DNS?**

<https://www.cloudflare.com/learning/dns/what-is-dns/>

**DHCP**

**DHCP (Dynamic Host Configuration Protocol)** is:

* An **application-layer protocol** used to **automatically assign IP addresses and network configuration parameters (subnet mask, gateway, DNS) to devices on a network**.
* Removes the need to manually configure IP addresses on each device.

In local networks:

* Each device needs a **unique IP address** in the subnet to communicate.
* Manual configuration is error-prone and impractical for large networks.
* DHCP **automates assignment, ensures uniqueness, and allows re-use of IPs**.

IP packet

IPv4

DHCP

Masks

Subnets

Reserved addresses

Flow of a request or what would be if I type url in a browser

Ports

IPv6

DNS

How name resolving is happening

ping, trace, etc..

ipconfig /all

tracert google.com

ping google.com

1. A user types ‘example.com’ into a web browser and the query travels into the Internet and is received by a DNS recursive resolver.
2. The resolver then queries a DNS root nameserver (.).
3. The root server then responds to the resolver with the address of a Top Level Domain (TLD) DNS server (such as .com or .net), which stores the information for its domains. When searching for example.com, our request is pointed toward the .com TLD.
4. The resolver then makes a request to the .com TLD.
5. The TLD server then responds with the IP address of the domain’s nameserver, example.com.
6. Lastly, the recursive resolver sends a query to the domain’s nameserver.
7. The IP address for example.com is then returned to the resolver from the nameserver.
8. The DNS resolver then responds to the web browser with the IP address of the domain requested initially.