

Internet Protocol

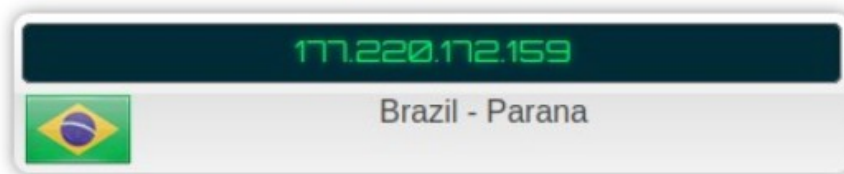
“Internet Protocol” is the name of the method for transmitting data around the internet. There are currently two popular versions – Version 4 and Version 6. They are known as “IPv4” and “IPv6”.

What is IPv4?

Internet Protocol Version 4 (IPv4) is the most common protocol for transmitting data around the “world wide web”. It provides the identification addresses (IP addresses) for every device on the internet and also describes the rules that determine how data packets are transmitted between devices. For a packet of data to be sent from computer A to computer B, computer A must know the unique IP address of computer B. The Internet Protocol will then carry the data packet around the internet and deliver it to the correct destination.

An IP address has 32 “bits” (a “bit” is 0 or 1) and is usually represented by four decimal numbers, each between 0 and 255. For example:

32 bits:	10110001	11011100	10101100	10011111
Decimal:	177	220	172	159
Written as:	177.220.172.159			

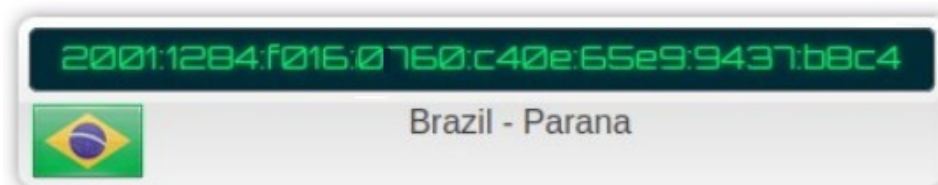


There are about **4.3 billion** (256^4) possible IPv4 addresses. There are about **40 billion** devices connected to the internet (2024), including smartphones, computers, tablets, wearables, smart home gadgets and IoT (Internet of Things) devices. The number increased tenfold between 2015 and 2020. The growth is primarily driven by the rapid expansion of IoT, which includes smart appliances, sensors and vehicles,. The number of devices connected to the internet is expected to continue increasing rapidly. So, as you can see, there aren't enough IP addresses for all connected devices.

What is IPv6?

Due to the massive increase in devices connected to the Internet in the last decade, the “Internet Engineering Tracking Taskforce” (IETF) has been forced to create a new Internet protocol – “Internet Protocol Version 6” (IPv6). IPv5 was developed but was never used, due to its limitations. IPv6 addresses are written as 8 groups of 4 hexadecimal numbers (0-9,a-f), for example:

Hexadecimal: 2001 1284 f016 0760 c40e 65e9 9437 b8c4



There are about 340 trillion trillion trillion possible IPv6 addresses! That is nearly the same as the number of atoms in the planet Earth!

How do I find my IP address?

There are many websites which allow you to discover your IP address. For example

IP Leak (<https://ipleak.net/>)

If you want to “hide” your IP address in order to use the internet anonymously, then you need to use a “Virtual Private Network” (VPN).

Accessing your Router

If you wish to configure your wireless router, you need to know its IP address. Here is a quick way to discover its address using Windows:

1. Open a CMD window.
2. Type “ipconfig”
3. The “Default Gateway” is the IP address of your router.

If you type this address into your browser, you will have access to your router. You will, of course, also need to know the username and password to configure it.

The Pros of IPv4

1. **Existing infrastructure** – Most websites currently use IPv4. If you switch to IPv6, then you will only be able to visit sites that also use IPv6.
2. **Simplicity** – IPv4’s decimal representation is much simpler than IPv6’s representation, making it easier for us to read and remember.
3. **Support** – Because most traffic is still using IPv4, all network operators still support it. When IPv6 traffic becomes more common, they will have to make a decision about their own infrastructure. Change costs money!

The Pros of IPv6

1. **Speed** – Web and cloud service providers have found that websites load around 10% faster using IPv6 compared to IPv4.
2. **Network Address Translation (NAT)** – Since there aren’t enough IPv4 addresses for all devices, NAT software allows a group of IPv4 devices to share one IP address. This requires complex configuration. Since IPv6 has many more addresses, IPv6 devices don’t need this extra configuration.

When a company needs more IP addresses, it has three options:

1. **Buy IPv4 addresses** – A company can buy addresses from IPv4 brokers, or from a company which is planning to move to IPv6, because they can sell their IPv4 addresses.
2. **Use NAT** – As mentioned above, NAT allows one address to be used by many devices. This has disadvantages – it costs money and access speed is reduced.
3. **Convert to IPv6** – A business can change to IPv6, but most of the internet uses IPv4. So, even if a business converts to IPv6, it will still need some IPv4 addresses to communicate with other IPv4 devices.

In Conclusion

There’s much debate about which is better – IPv4 or IPv6. It’s all about your specific needs. But one thing is certain – the days of IPv4 are numbered....