



Global Internet (Areas, BGP, IPv6)

IPv6:

IP address is your digital identity. It's a network address for your computer so the Internet knows where to send you emails, data, etc.

IP address determines who and where you are in the network of billions of digital devices that are connected to the Internet.

IPv6 or Internet Protocol Version 6 is a network layer protocol that allows communication to take place over the network. IPv6 was designed by Internet Engineering Task Force (IETF) in December 1998 with the purpose of superseding the IPv4 due to the global exponentially growing internet users.

IPv4 vs IPv6

The common type of IP address (is known as IPv4, for “version 4”). Here's an example of what an IP address might look like:

25.59.209.224

- An IPv4 address consists of four numbers, each of which contains one to three digits, with a single dot (.) separating each number or set of digits. Each of the four numbers can range from 0 to 255.
- This group of separated numbers creates the addresses that let you and everyone around the globe to send and retrieve data over our Internet connections.
- The IPv4 uses a 32-bit address scheme allowing to store 2^{32} addresses which is more than 4 billion addresses.
- To date, it is considered the primary Internet Protocol and carries 94% of Internet traffic.
- Initially, it was assumed it would never run out of addresses but the present situation paves a new way to IPv6, let's see why? An IPv6 address consists of eight groups of four hexadecimal digits. Here's an example IPv6 address:

3001:0da8:75a3:0000:0000:8a2e:0370:7334

- This new IP address version is being deployed to fulfil the need for more Internet addresses.
- It was aimed to resolve issues which are associated with IPv4.
- With 128-bit address space, it allows 340 undecillion unique address space.
- IPv6 also called IPng (Internet Protocol next generation).

IPv6 support a theoretical maximum of 340, 282, 366, 920, 938, 463, 463, 374, 607, 431, 768, 211, 456. To keep it straightforward, we will never run out of IP addresses again.

Types of IPv6 Address

Now that we know about what is IPv6 address let's take a look at its different types.



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- **Unicast addresses** It identifies a unique node on a network and usually refers to a single sender or a single receiver.
- **Multicast addresses** It represents a group of IP devices and can only be used as the destination of a datagram.
- **Anycast addresses** It is assigned to a set of interfaces that typically belong to different nodes.

Advantages of IPv6

- Reliability
- **Faster Speeds:** IPv6 supports multicast rather than broadcast in IPv4. This feature allows bandwidth-intensive packet flows (like multimedia streams) to be sent to multiple destinations all at once.
- **Stronger Security:** IP Security, which provides confidentiality, and data integrity, is embedded into IPv6.
- Routing efficiency
- Most importantly it's the final solution for growing nodes in Global-network.

Disadvantages of IPv6

- **Conversion:** Due to widespread present usage of IPv4 it will take a long period to completely shift to IPv6.
- **Communication:** IPv4 and IPv6 machines cannot communicate directly with each other. They need an intermediate technology to make that possible.

The use of IP addresses typically happens behind the scenes. The process works like this:

1. Your device indirectly connects to the internet by connecting at first to a network connected to the internet, which then grants your device access to the internet.
2. When you are at home, that network will probably be your Internet Service Provider (ISP). At work, it will be your company network.
3. Your IP address is assigned to your device by your ISP.
4. Your internet activity goes through the ISP, and they route it back to you, using your IP address. Since they are giving you access to the internet, it is their role to assign an IP address to your device.
5. However, your IP address can change. For example, turning your modem or router on or off can change it. Or you can contact your ISP, and they can change it for you.
6. When you are out and about – for example, traveling – and you take your device with you, your home IP address does not come with you. This is because you will be using another network (Wi-Fi at a hotel, airport, or coffee shop, etc.) to access the internet and will be using a different (and temporary) IP address, assigned to you by the ISP of the hotel, airport or coffee shop.



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