

IPv4 vs IPv6 Made Easy

Old address vs new address

IPv4

- Four numbers
- Separated by dots
- 32 bits
- Old and everywhere

IPv6

- Letters and numbers
- Separated by colons
- 128 bits
- New and future-ready

Understand the difference in simple words.

What is an IP address?

An IP address is the label that tells the internet where to deliver something. It works exactly like a house address in a city.

Key Points:

- Every device on a network needs one
- It must be unique on that network
- Without one, a device is connected but unreachable
- IPv4 and IPv6 are two ways of writing it
- Both do the identical job

No address on the gate means no delivery.

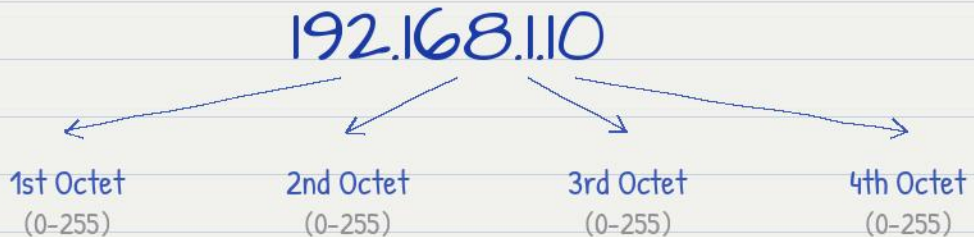
What is IPv4?

IPv4 means Internet Protocol version 4. It is the most common type of IP address used on networks and the internet today.

Key Points:

- IPv4 uses 32 bits
- Written in four parts
- Parts are separated by dots
- Each part is called an octet
- Each octet can be from 0 to 255

Example:



IPv4 is four numbers separated by dots.

What is IPv6?

IPv6 means Internet Protocol version 6. It is the newer version, created to provide far more addresses than IPv4 could.

Key Points:

- IPv6 uses 128 bits
- Written in hexadecimal format
- Parts are separated by colons
- Supports a huge number of devices
- Solves the IPv4 address shortage

Example:

2001:0db8:85a3:0000:

0000:8a2e:0370:7334

IPv6 gives the internet a much bigger address space.

The Double Colon

Why IPv6 addresses look shorter than they are

Three rules:

1. Characters are 0-9 and a-f. That is all hexadecimal means.
2. Leading zeros in a group can be dropped: 0db8 becomes db8.
3. ONE run of all-zero groups collapses to a double colon.

2001:db8:85a3::8a2e:370:7334

Nothing is removed. The zeros are still there, just not typed.



IPv4 and IPv6 Format

IPv4 Format

- Uses numbers only
- Uses dots (.)
- Has 4 parts
- Each part: 0 to 255
- Short and simple

IPv6 Format

- Uses numbers and letters
- Uses colons (:)
- Has 8 hex groups
- Much longer
- Compressed with ::

IPv4 uses dots. IPv6 uses colons.

IPv4 vs IPv6

Feature	IPv4	IPv6
Full form	IP version 4	IP version 6
Size	32-bit	128-bit
Format	Decimal	Hexadecimal
Separator	Dot (.)	Colon (:)
Example	192.168.1.1	2001:db8::1
Address space	Smaller	Very large
Status	Common	Future-ready

IPv4 is common. IPv6 is modern and scalable.



Why was IPv6 needed?

IPv4 has limited address space. As the number of devices grew, more addresses were needed than it could ever produce.

Reasons:

1. More phones, laptops and smart devices
2. Growth of internet users worldwide
3. Only about 4.3 billion IPv4 addresses exist
4. Those addresses ran out years ago
5. Room needed for future expansion

32 bits - IPv4  4.3 billion

128 bits - IPv6  340 undecillion

IPv6 was created because the internet needed more addresses.

A Simple Analogy

Think of IP addresses like house numbers

IPv4

- Like a small town
- Limited house numbers
- Every plot taken
- Neighbours must share one number



Small Town (Limited)

IPv6

- Like a vast city
- Almost unlimited numbers
- Room for everyone
- Every device gets its own



Big City (Unlimited)

IPv6 gives enough addresses for the growing internet.



Three Honest Corrections

What IPv6 does NOT do

1. It will not make your internet faster

Speed comes from your line, your provider and your WiFi. Not from address notation.

2. It is not automatically more secure

Every device gets a real address, so a correctly configured firewall matters MORE, not less.

3. IPv4 is not switching off

There is no deadline. Both run together, which is called dual-stack.

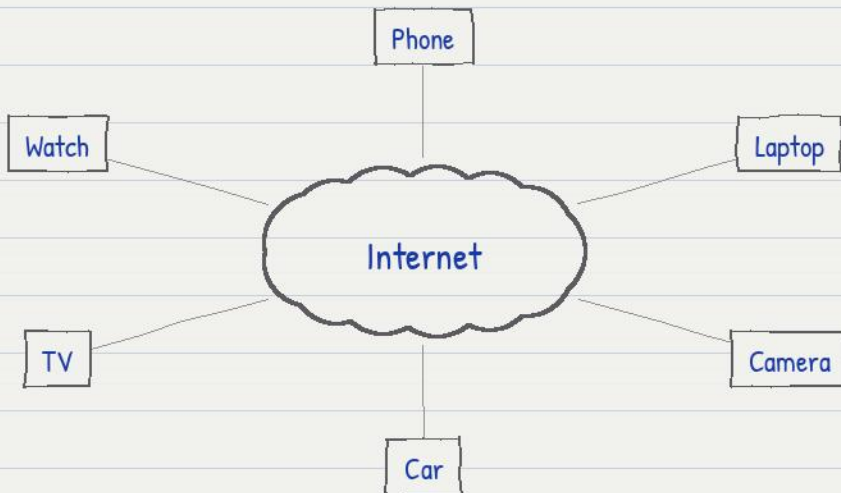


Where are they used?

IPv4 is used:

- In most websites
- In home networks
- In older systems
- In almost all routers today

IPv6 is used:



IPv4 is used now. IPv6 is used more every year.



The Real Problem

Cameras work at home but not from outside?

Because IPv4 addresses ran out, many providers now share one public address between many customers. There is no unique door pointing at your building.

The fixes:

- A dedicated public address from your provider
- IPv6, where your provider supports it
- A VPN back into the site - often the best answer

It is an addressing problem, not a camera fault.

Quick Revision

IPv4 means Internet Protocol version 4

IPv6 means Internet Protocol version 6

IPv4 uses 32 bits, IPv6 uses 128 bits

IPv4 format: 192.168.1.1

IPv6 format: 2001:db8::1

IPv4 uses dots, IPv6 uses colons

IPv4 address space is smaller

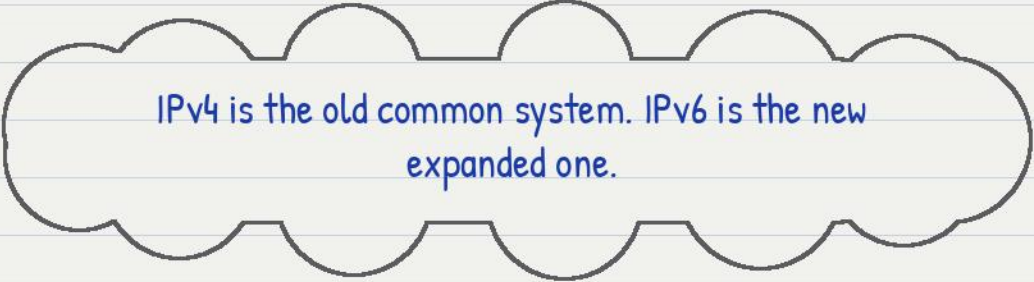
IPv6 address space is very large

IPv6 is NOT faster than IPv4

IPv6 is NOT automatically more secure

IPv4 is not being switched off

Most networks run both at once



IPv4 is the old common system. IPv6 is the new expanded one.

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