IPv6

**Internet Protocol version 6 (IPv6)** is the most recent version of the Internet Protocol (IP), the communications protocol that provides an identification and location system for computers on networks and routes traffic across the Internet.

## Main features

Devices on the Internet are assigned a unique IP address for identification and location definition. With the rapid growth of the Internet after commercialization in the 1990s, it became evident that far more addresses would be needed to connect devices than the IPv4 address space had available

IPv6 addresses are represented as eight groups, separated by colons, of four hexadecimal digits. The full representation may be shortened; for example, 2001:0db8:0000:0000:0000:8a2e:0370:7334 becomes 2001:db8::8a2e:370:7334.

## Addressing

IPv6 uses a 128-bit address, theoretically allowing 2128, or approximately 3.4×1038 addresses. The actual number is slightly smaller, as multiple ranges are reserved for special use or completely excluded from use. The design of the IPv6 address space implements a different design philosophy than in IPv4, in which subnetting was used to improve the efficiency of utilization of the small address space. In IPv6, the address space is deemed large enough for the foreseeable future, and a local area subnet always uses 64 bits for the host portion of the address, designated as the interface identifier, while the most-significant 64 bits are used as the routing prefix. While the myth has existed regarding IPv6 subnets being impossible to scan, **RFC 7707** notes that patterns resulting from some IPv6 address configuration techniques and algorithms allow address scanning in many real-world scenarios.

## IPv6 vs IPv4

The two protocols (IPv4 and IPv6) are not designed to be interoperable, and thus direct communication between them is impossible, complicating the move to IPv6. However, several transition mechanisms have been devised to rectify this.

IPv6 provides other technical benefits in addition to a larger addressing space. In particular, it permits hierarchical address allocation methods that facilitate route aggregation across the Internet, and thus limit the expansion of routing tables.

IPv6 also simplifies aspects of address configuration, network renumbering, and router announcements when changing network connectivity providers. It simplifies processing of packets in routers by placing the responsibility for packet fragmentation into the end points. The IPv6 [subnet](https://en.wikipedia.org/wiki/Subnetwork) size is standardized by fixing the size of the host identifier portion of an address to 64 bits.