

| Feature | IPv4 | IPv6 |
|-----------------------------------|---|---|
| Full Form | Internet Protocol version 4 | Internet Protocol version 6 |
| Address Length | 32 bits | 128 bits |
| Address Format | Dotted Decimal Notation (e.g., 192.168.0.1) | Eight groups of hexadecimal numbers (e.g., 2001:0db8::1) |
| Address Space | Limited (approximately 4.3 billion addresses) | Vast (approximately 3.4×10^{38} addresses) |
| Address Assignment | Manual (DHCP, static) | Autoconfiguration (stateless or stateful) |
| Network Address Translation (NAT) | Commonly used to share a single public IP address among multiple devices | Less reliance on NAT, as ample addresses are available |
| Header Format | Fixed header length | Simplified and more efficient header format |
| Routing | Requires additional protocols for routing and network discovery (e.g., ARP) | Built-in support for routing and network discovery (e.g., ICMPv6) |
| Quality of Service (QoS) | Limited support | Improved support for QoS and traffic prioritization |
| Security | Relies on additional security mechanisms (e.g., IPsec) | Built-in support for IPsec and improved security features |
| Transition Mechanisms | Several mechanisms developed (e.g., dual-stack, tunneling) | Designed to support smooth transition from IPv4 to IPv6 |

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