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 x 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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