IPv4 and IPv6 difference

IPv4 (Internet Protocol version 4) and IPv6 (Internet Protocol version 6) are two versions of the Internet Protocol used for exchanging data and communication between devices on networks. Here’s a comparison between them:

IPv4:

1. **IP Address:**
    - IPv4 uses 32-bit (4-byte) addresses represented in dotted-decimal format (e.g., 192.168.1.1).
2. **Address Space:**
    - IPv4 provides approximately 4.3 billion unique addresses, which are becoming increasingly scarce due to the growth of internet-connected devices.
3. **Address Configuration:**
    - IPv4 addresses can be configured statically or dynamically (using DHCP), and they typically consist of network and host portions.
4. **Deployment:**
    - IPv4 has been the dominant protocol for decades and is extensively deployed across the internet and corporate networks.

IPv6:

1. **IP Address:**
    - IPv6 uses 128-bit (16-byte) addresses represented in hexadecimal notation (e.g., 2001:0db8:85a3:0000:0000:8a2e:0370:7334).
2. **Address Space:**
    - IPv6 offers an astronomically large address space,

providing approximately 340 undecillion unique addresses (2^128), which ensures availability of addresses for future growth.

3. **Address Configuration:**
    - IPv6 addresses can be configured through stateless autoconfiguration or DHCPv6, and they have additional features like multiple addresses per interface.
4. **Deployment:**
    - IPv6 adoption has been increasing steadily to accommodate the growing number of internet-connected devices and to overcome the limitations of IPv4 address exhaustion.

Key Differences:

- **Address Length:** IPv4 addresses are 32 bits, while IPv6 addresses are 128 bits.
- **Address Representation:** IPv4 addresses are in dotted-decimal format, and IPv6 addresses are in hexadecimal format with colons separating blocks.
- **Address Space:** IPv4 has a limited address space leading to address exhaustion issues, whereas IPv6 offers a vast address space to accommodate the growing number of devices.
- **Deployment:** IPv4 is widely deployed but facing challenges due to address exhaustion, while IPv6 adoption is increasing to support future internet growth.

In summary, IPv4 is the older and more widely used protocol, but IPv6 provides a larger address space and features designed to meet the demands of modern networks and devices.