Q10. What is IP version 4 & IP version 6 address.

Ans.

* **IPv4**

IPv4 is a version 4 of IP. It is a current version and the most commonly used IP address. It is a 32-bit address written in four numbers separated by 'dot', i.e., periods. This address is unique for each device.

For example, **66.94.29.13**

The above example represents the IP address in which each group of numbers separated by periods is called an Octet. Each number in an octet is in the range from 0-255. This address can produce 4,294,967,296 possible unique addresses.

In today's computer network world, computers do not understand the IP addresses in the standard numeric format as the computers understand the numbers in binary form only. The binary number can be either 1 or 0. The IPv4 consists of four sets, and these sets represent the octet. The bits in each octet represent a number.

Each bit in an octet can be either 1 or 0. If the bit the 1, then the number it represents will count, and if the bit is 0, then the number it represents does not count.

* **IPv6**

IPv4 produces 4 billion addresses, and the developers think that these addresses are enough, but they were wrong. IPv6 is the next generation of IP addresses. The main difference between IPv4 and IPv6 is the address size of IP addresses. The IPv4 is a 32-bit address, whereas IPv6 is a 128-bit hexadecimal address. IPv6 provides a large address space, and it contains a simple header as compared to IPv4.

It provides transition strategies that convert IPv4 into IPv6, and these strategies are as follows:

* **Dual stacking:** It allows us to have both the versions, i.e., IPv4 and IPv6, on the same device.
* **Tunneling:** In this approach, all the users have IPv6 communicates with an IPv4 network to reach IPv6.
* **Network Address Translation:** The translation allows the communication between the hosts having a different version of IP.

This hexadecimal address contains both numbers and alphabets. Due to the usage of both the numbers and alphabets, IPv6 is capable of producing over 340 undecillion (3.4\*1038) addresses.

IPv6 is a 128-bit hexadecimal address made up of 8 sets of 16 bits each, and these 8 sets are separated by a colon. In IPv6, each hexadecimal character represents 4 bits. So, we need to convert 4 bits to a hexadecimal number at a time

* **Differences between IPv4 and IPv6**

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|  | **Ipv4** | **Ipv6** |
| **Address length** | IPv4 is a 32-bit address. | IPv6 is a 128-bit address. |
| **Fields** | IPv4 is a numeric address that consists of 4 fields which are separated by dot (.). | IPv6 is an alphanumeric address that consists of 8 fields, which are separated by colon. |
| **Classes** | IPv4 has 5 different classes of IP address that includes Class A, Class B, Class C, Class D, and Class E. | IPv6 does not contain classes of IP addresses. |
| **Number of IP address** | IPv4 has a limited number of IP addresses. | IPv6 has a large number of IP addresses. |
| **VLSM** | It supports VLSM (Virtual Length Subnet Mask). Here, VLSM means that Ipv4 converts IP addresses into a subnet of different sizes. | It does not support VLSM. |
| **Address configuration** | It supports manual and DHCP configuration. | It supports manual, DHCP, auto-configuration, and renumbering. |
| **Address space** | It generates 4 billion unique addresses | It generates 340 undecillion unique addresses. |
| **End-to-end connection integrity** | In IPv4, end-to-end connection integrity is unachievable. | In the case of IPv6, end-to-end connection integrity is achievable. |
| **Security features** | In IPv4, security depends on the application. This IP address is not developed in keeping the security feature in mind. | In IPv6, IPSEC is developed for security purposes. |
| **Address representation** | In IPv4, the IP address is represented in decimal. | In IPv6, the representation of the IP address in hexadecimal. |
| **Checksum field** | The checksum field is available in IPv4. | The checksum field is not available in IPv6. |
| **Encryption and Authentication** | It does not provide encryption and authentication. | It provides encryption and authentication. |
| **Number of octets** | It consists of 4 octets. | It consists of 8 fields, and each field contains 2 octets. Therefore, the total number of octets in IPv6 is 16. |