**Introduction to IP address - Classes of IP address -Need for sub netting -Basics of IPV6-**

IP address stands for Internet Protocol address, and it is a numerical label assigned to each device connected to a computer network. IP addresses serve as unique identifiers for devices and facilitate communication across the internet or any IP-based network. Here's an introduction to IP addresses, the classes of IP addresses, the need for subnetting, and basics of IPv6:

1. IP Address:
* An IP address is a 32-bit or 128-bit numeric identifier that consists of a series of numbers separated by periods (IPv4) or colons (IPv6).
* IPv4 addresses are divided into four octets, represented in decimal format (e.g., 192.168.0.1).
* IPv6 addresses are 128 bits long and are represented in hexadecimal format (e.g., 2001:0db8:85a3:0000:0000:8a2e:0370:7334).
* IP addresses are used to uniquely identify devices on a network and enable data routing between them.
1. Classes of IP Addresses (IPv4):
* IPv4 originally defined three classes of IP addresses: A, B, and C.
* Each class has a different range of network and host bits, providing varying numbers of network and host addresses.
* Class A addresses are used for large networks, Class B for medium-sized networks, and Class C for small networks.
* Classes D and E are reserved for multicasting and experimental purposes, respectively.
1. Need for Subnetting:
* Subnetting is the process of dividing a network into smaller subnetworks, allowing for more efficient utilization of IP addresses and network resources.
* Subnetting helps reduce network congestion, improve network performance, and enhance security by isolating different segments of a network.
* It enables organizations to have separate network segments for different departments, locations, or purposes while conserving IP address space.
1. Basics of IPv6:
* IPv6 was developed as the successor to IPv4 to address the growing need for IP addresses due to the proliferation of devices and the depletion of available IPv4 addresses.
* IPv6 uses a 128-bit address space, allowing for a significantly larger number of unique addresses compared to IPv4.
* IPv6 addresses are expressed in hexadecimal format and use colons to separate groups of digits.
* IPv6 also introduces other improvements, such as enhanced security features and support for auto-configuration of addresses.

The adoption of IPv6 is gradually increasing to accommodate the growing number of connected devices and to overcome the limitations of IPv4. While IPv4 continues to be widely used, the industry is moving towards a transition to IPv6 to support the expanding requirements of the internet and enable future network growth.

It's important to note that subnetting and IPv6 are separate concepts, with subnetting being applicable to both IPv4 and IPv6 networks. IPv6 introduces a new addressing scheme and other improvements to address the limitations of IPv4.