**Sub net masking - Static and dynamic IP numbers-**

Subnet masking is a technique used in IP networking to divide an IP address into two parts: the network address and the host address. It allows for efficient utilization of IP address space and enables logical grouping of devices within a network. Static and dynamic IP addresses are two different types of IP addresses assigned to devices within a network. Let's explore each concept:

1. Subnet Masking:

* Subnet masking involves using a subnet mask to determine the network and host portions of an IP address.
* A subnet mask is a 32-bit value that accompanies an IP address. It uses a series of contiguous binary 1s followed by binary 0s to divide the IP address.
* The 1s in the subnet mask represent the network portion, while the 0s represent the host portion.
* By applying the subnet mask to an IP address, you can determine the network address and the host address.

For example, consider the IP address 192.168.0.10 with a subnet mask of 255.255.255.0. The subnet mask has 24 binary 1s followed by 8 binary 0s. Applying the subnet mask to the IP address reveals that the network portion is 192.168.0, and the host portion is 10.

1. Static IP Address:

* A static IP address is manually assigned to a device and remains fixed unless changed manually.
* It provides a consistent and predictable address for the device, allowing for easier management and connectivity.
* Static IP addresses are often used for devices that require permanent connectivity, such as servers, network printers, or routers.
* To assign a static IP address, the network administrator configures the IP address, subnet mask, default gateway, and DNS server addresses directly on the device.

1. Dynamic IP Address:

* A dynamic IP address is automatically assigned to a device by a DHCP (Dynamic Host Configuration Protocol) server.
* DHCP is a network protocol that dynamically distributes IP addresses and other network configuration parameters to devices.
* When a device connects to the network, it sends a DHCP request, and the DHCP server responds by assigning an available IP address from a predefined pool.
* Dynamic IP addresses are commonly used for client devices, such as computers, laptops, smartphones, and IoT devices, which may connect and disconnect from the network frequently.
* DHCP also assigns other network configuration parameters, such as subnet mask, default gateway, and DNS server addresses, along with the dynamic IP address.

Dynamic IP addressing simplifies IP management, promotes efficient use of IP address space, and reduces configuration overhead, especially in large networks.

Both static and dynamic IP addressing have their advantages and use cases. The choice depends on factors such as the specific network requirements, device types, scalability needs, and network management preferences.