

## **Q) How a Network is Created and IP Addresses are Assigned to a Network?**

### **Network creation step:**

#### **1.Planning the Network:**

- Define the network requirements: Consider the number of devices, the required bandwidth, security needs, and future expansion.
- Design the network topology: Decide whether you need a star, mesh, bus, ring, or hybrid topology.
- Select networking equipment: Choose routers, switches, access points, and cables based on your network design.

#### **2.Setting Up the Physical Network:**

- Install the hardware: Place routers, switches, and access points in strategic locations.
- Connect devices: Use Ethernet cables or Wi-Fi to connect computers, printers, and other devices to the network hardware.
- Power on the devices: Ensure all devices are powered and functioning.

#### **3.Configuring Network Devices:**

- Configure the router: Set up the router with an appropriate IP address, subnet mask, and default gateway.
- Configure switches: Assign IP addresses if necessary and set up VLANs if used.
- Set up access points: Configure SSIDs, security settings, and IP addresses.

## **Assigning IP Addresses**

### **Static IP Addressing:**

Manually assign IP addresses: For devices requiring fixed IPs, such as servers and printers, manually configure the IP address, subnet mask, gateway, and DNS servers in the device's network settings.

### **Dynamic IP Addressing (DHCP):**

- Set up a DHCP server: This can be a dedicated server or a service running on a router.

- Configure the DHCP server: Define the IP address range (scope) to be assigned, lease time, and other options such as the default gateway and DNS servers.
- Devices request IP addresses: When a device joins the network, it sends a DHCP discover message. The DHCP server responds with an offer, the device requests the IP, and the server acknowledges, assigning the IP address.

## **Q) UDP Header Overview**

### **Introduction**

In computer networking, the User Datagram Protocol (UDP) is one of the core communication protocols of the Internet protocol suite used to send messages (transported as datagrams in packets) to other hosts on an Internet Protocol (IP) network. Within an IP network, UDP does not require prior communication to set up communication channels or data paths. UDP is suitable for purposes where error checking and correction are either not necessary or are performed in the application.

### **UDP Header Fields**

The UDP header is 8 bytes (64 bits) long and consists of four fields:

- Source Port (16 bits): It specifies the port number of the sender's device. If not used, it should be zero.
- Destination Port (16 bits): It specifies the port number of the recipient's application.
- Length (16 bits): This field specifies the total length of the UDP datagram, including both the header and the data. The minimum length is 8 bytes, which is the size of the header without any data..
- Checksum (16 bits): This field is used for error detection in the header and data. It is optional in IPv4, but mandatory in IPv6. If not used, the field is set to zeros.

## Setting Field Values

- Source Port: It is assigned dynamically by the operating system from a range of ephemeral ports, or specified by the application.
- Destination Port: It is determined by the application protocol being used (e.g., 53 for DNS, 67/68 for DHCP).
- Length: This value is calculated as the sum of the length of the UDP header (8 bytes) and the length of the encapsulated data.
- Checksum: It's value is calculated using a pseudo-header, the UDP header, and the data. The pseudo-header includes:
  - Source IP address
  - Destination IP address
  - Protocol (set to 17 for UDP)
  - UDP length

