Dynamic Host Configuration Protocol(DHCP)

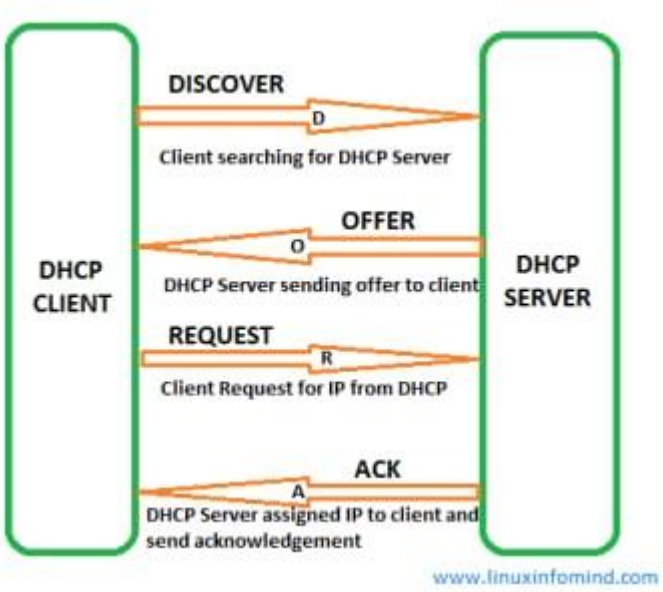
A network protocol used to automatically assign IP addresses and other network configuration parameters to devices(clients) allowing them to communicate on a network without manual setup.

When a device joins a network (like plugging into ethernet or connecting to Wi-Fi) it needs

- IP address
- Subnet mask
- Default gateway(router)
- DNS server

These all will be provided by DHCP

WORKING:



DHCP DISCOVER:

- First message generated in the communication process between the server and the client.
- This message is generated by the client in order to discover if there is any DHCP server present in a network or not.
- This message is broadcasted to all devices present in a network to find the DHCP server
- Broadcasted to 255.255.255.255 (IP address used for broadcasting)

DHCP OFFER:

- The server will respond to the host in this message specifying the
  - Unleased IP address
  - Subnet mask
  - Lease time

- If there is more than one DHCP server present in the network then the client host will accept the first DHCP OFFER message it receives

DHCP REQUEST:

- When a client receives an offer message, it responds by broadcasting a DHCP request message
- This message is broadcasted to find out whether any other host is not using that offered IP
- If there is no reply, then the client broadcast the DHCP request message for the server showing the acceptance of the IP address

DHCP ACK:

- In response to the request message received, the server will make an entry with a specified client ID and bind the IP address offered with lease time
- Now, the client will have the IP address provided by the server

FEATURES:

- Dynamic allocation – assigns IP addresses only when needed and reclaims them when devices leave the network
- Configuration options – offers additional details like subnet mask, default gateway, DNS server addresses
- IP address management – it keeps track of all the IP addresses in a network ensuring no two devices have the same IP
- Saves time - need not to manually configure every device. The DHCP server handles it automatically.
- Prevents errors - Manual IP configuration can lead to conflicts or mistakes. A DHCP server eliminates that risk
- Scalable - Whether a network has 10 or 1000 devices a DHCP server can handle the load effortlessly