# Networking

DHCP

# DHCP

- **DHCP (dynamic host configuration protocol)**
  - Service that assigns IP addresses to devices that connect to a network
- DHCP servers can be found in many different devices
  - Routers, gateways, servers, etc…
- The DHCP service runs on port 67

- Step 1 - When a device connects to a home network, the DHCP server inside the router will assign that device an IP for that network
  - If that device is to go to a friend's home and wants to connect to their network, they will be assigned a new IP address by their friend's DHCP service in their router

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- Step 2 - When a device connects to a network, it sends out a message (using UDP) that is broadcasted to the entire network, this is called the DHCPDISCOVER message, and it contains some information about the device (usually the MAC address)
    - If the DHCP server will accept the device, it will respond with a DHCPOFFER that will contain all the necessary configuration information as well as an available IP address for the device
    - The device will send back a DHCPREQUEST that accepts the offer and selects different settings that it would like
    - The server sends a DHCPACK message that leases the IP address as well as any other configuration information, the device is on the network.

- Step 3 - When a device wants to disconnect from a network, it can send a DHCPRELEASE message that will return the IP address back to the available pool on the DHCP server

- Step 4 - The configuration settings that are sent back and forth include the IP address, default gateways, the DNS server, subnet masks, and other settings.

# DHCP Terms

- **Scope and Scope Options**
  - This is the IP configuration options for the network including the DNS and TTL server
- **Exclusion ranges**
  - In the pool of IP addresses that can be assigned by the DHCP, the network administrator can block off some of these IP addresses that cannot be assigned to any device that connects to the network
- **Reservation**
  - The IP addresses that are assigned to a specific device and can't be handed out to other devices that connect to the network
- **Dynamic assignment**
  - How a DHCP device assigns IP addresses, it is temporary and can change depending on when the device connects to the network

# DHCP Terms

- **Static assignment**
  - Devices that keep the same, permanent IP address on a network

- **Lease time**
  - The amount of time the DHCP leases/gives a device an IP address on the network

- **Available leases**
  - Available IP Addresses on the network that are auto-assigned when a device connects to the network

- **DHCP relay**
  - If a device not directly connected to the network need an IP address on that network, the devices in the middle can send a relay DHCP message to assign an IP to that device

- **IP helper/UDP forwarding**
  - These help set-up the DHCP relay that helps pass along/relay the DHCP requests between the DHCP server and another device