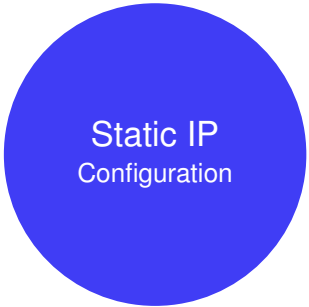
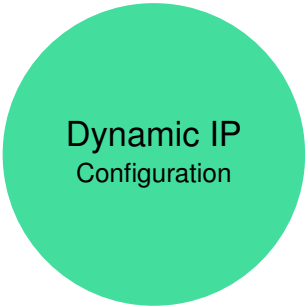
DHCP

Dynamic Host Configuration Protocol

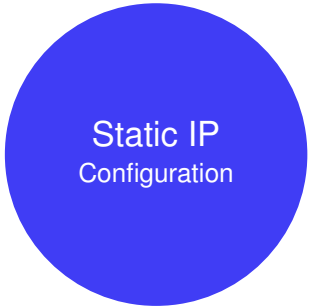
Richard Berger, 2021

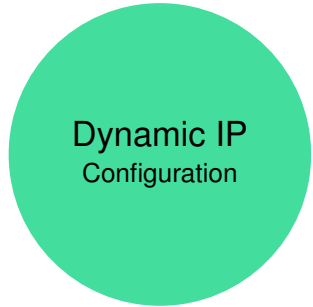
IP Network Configuration





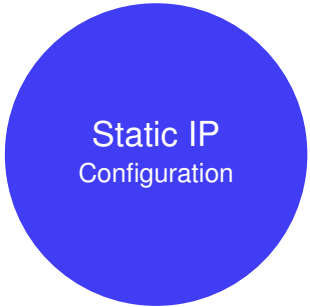
IP Network Configuration



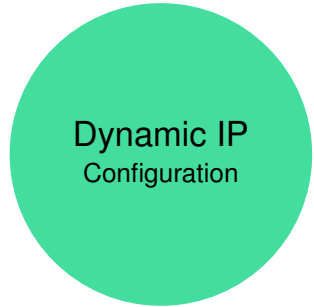


- Each configuration parameter is manually set
- IP address, Subnet Mask / Prefix, Default Gateway, and DNS Server(s)

IP Network Configuration

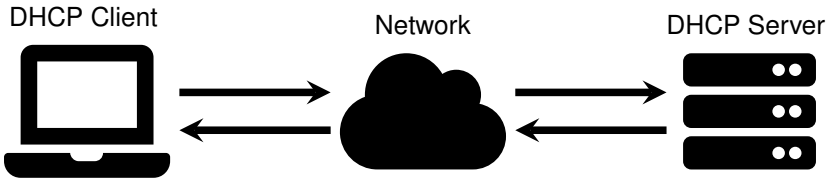


- Each configuration parameter is manually set
- IP address, Subnet Mask / Prefix, Default Gateway, and DNS Server(s)



- IP Configuration is assigned by a different system
- Can change over time
- managed centrally

Dynamic Host Configuration Protocol (DHCP)



- hosts connected to a network can be assigned an IP address dynamically using DHCP
- a *DHCP server* hands out these IP addresses to hosts, which are called *DHCP clients*
- these addresses are *leased* for a fixed amount of time. After expiration the DHCP client will have to request a new IP.
- UDP port 67 for server (bootps)
- UDP port 68 for client (bootpc)

Initial IP Configuration

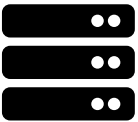
DHCP Client

0.0.0.0

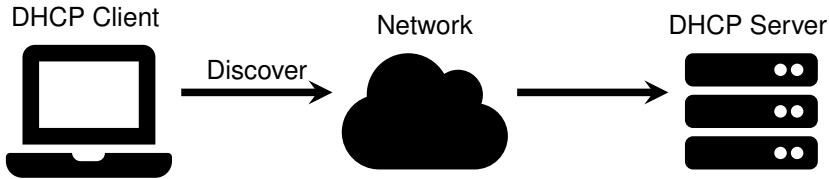
24:8a:07:51:a7:82

Network

DHCP Server



DHCP Discover



DHCP Discover

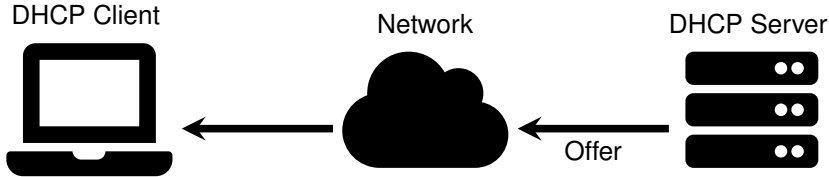
From: 24:8a:07:51:a7:82

To: ff:ff:ff:ff:ff:ff

Src IP: 0.0.0.0

Dst IP: 255.255.255.255

DHCP Offer



DHCP Offer

From: 24:8a:07:8f:f2:a4

To: ff:ff:ff:ff:ff:ff

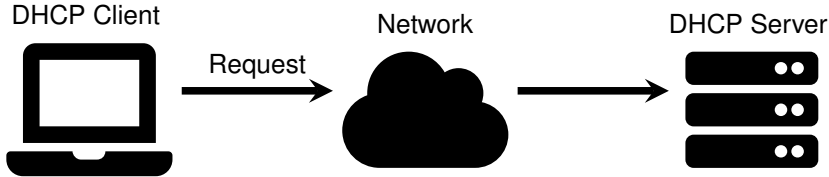
Src IP: 192.168.0.1

Dst IP: 255.255.255.255

Your IP: 192.168.0.10

Client MAC: 24:8a:07:51:a7:82

DHCP Request



DHCP Request

From: 24:8a:07:51:a7:82

To: ff:ff:ff:ff:ff:ff

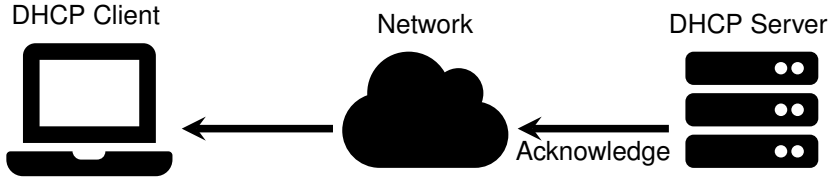
Src IP: 0.0.0.0

Dst IP: 255.255.255.255

Request IP: 192.168.0.10

DHCP Server: 192.168.0.1

DHCP Acknowledge



DHCP Acknowledge

From: 24:8a:07:8f:f2:a4

To: ff:ff:ff:ff:ff:ff

Src IP: 192.168.0.1

Dst IP: 255.255.255.255

Your IP: 192.168.0.10

Client MAC: 24:8a:07:51:a7:82

IP Configuration after DHCP

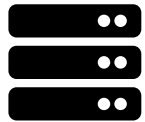
DHCP Client

192.168.0.10

24:8a:07:51:a7:82

Network

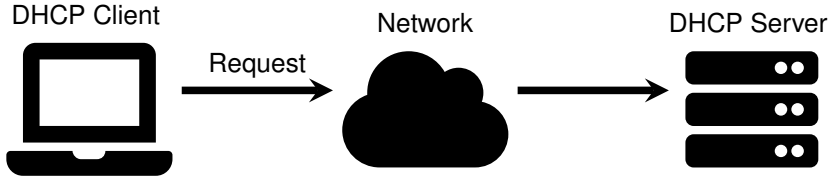
DHCP Server



192.168.0.1

24:8a:07:8f:f2:a4

DHCP lease renewal (unicast)



DHCP Request

From: 24:8a:07:51:a7:82

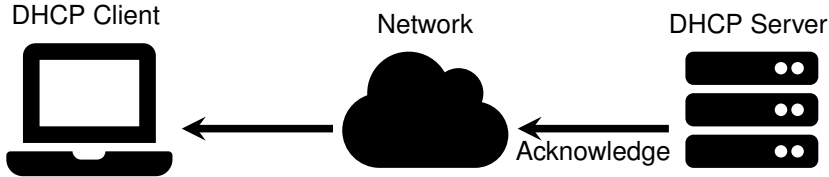
To: 24:8a:07:8f:f2:a4

Src IP: 192.168.0.10

Dst IP: 192.168.0.1

Request IP: 192.168.0.10

DHCP lease renewal (unicast)



DHCP Acknowledge

From: 24:8a:07:8f:f2:a4

To: 24:8a:07:51:a7:82

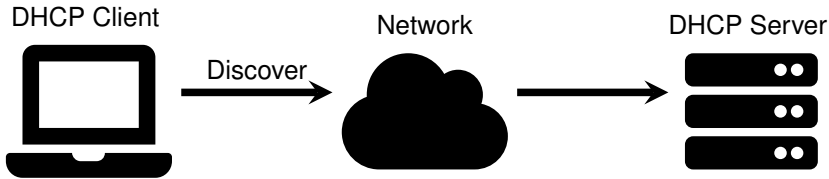
Src IP: 192.168.0.1

Dst IP: 168.168.0.10

Your IP: 192.168.0.10

Client MAC: 24:8a:07:51:a7:82

DHCP lease renewal (broadcast)



DHCP Discover

From: 24:8a:07:51:a7:82

To: ff:ff:ff:ff:ff:ff

Src IP: 192.168.0.10

Dst IP: 255.255.255.255

DHCP lease expired

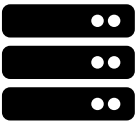
DHCP Client

0.0.0.0

24:8a:07:51:a7:82

Network

DHCP Server



Summary

DHCP allows us to centrally manage the IP configuration of multiple systems on a network based on their MAC addresses.

DHCP request/response

1. Client sends discover (I'm a client at MAC address 24:8a:07:51:a7:82, I need an IP address)
2. Server sends an offer (OK, 24:8a:07:51:a7:82, I'm offering IP 192.168.0.10)
3. Client sends a request (Server 192.168.0.1, I would like to have IP 192.168.0.10)
4. Server sends acknowledgement (OK 24:8a:07:51:a7:82, IP 192.168.0.10 is yours)