DHCP – the protocol

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DHCP as a language

● spoken between pairs of programs
  – a dhcp client program, e.g., dhclient or winipcfg
  – an dhcp server program, e.g., dhcpd
  – they’re written specially to speak it
● discussing server giving info it has, or gets, to client
● broadcast-response behavior
DHCP message format

<table>
<thead>
<tr>
<th>op</th>
<th>htype</th>
<th>hlen</th>
<th>hops</th>
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<tbody>
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<tr>
<td>transaction identifier</td>
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<tr>
<td>seconds elapsed</td>
<td>flags</td>
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<tr>
<td>client IP address</td>
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<td>your IP address</td>
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<td>server IP address</td>
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<tr>
<td>router IP address</td>
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<tr>
<td>client hardware address (16 bytes…)</td>
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<tr>
<td>server host name (64 bytes…)</td>
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<tr>
<td>boot file name (128 bytes…)</td>
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<tr>
<td>options (variable…)</td>
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DHCP

- Dynamic Host Configuration Protocol
  - Allows "self-configuration" of computers
  - DHCP server assigns IP address mask etc
- RFC 951 and 1048 (BOOTP)
- RFC 2131 and 2132 DHCP
DHCP Transaction

Client - needs IP config
Server supplies config

BOOTP Packet

- Primary fields of interest
  - Client IP - If the client knows its IP it puts it here
  - Your IP - The IP address the server is offering the client
  - Server IP - The IP address of the server that generated this reply
  - Gateway - IP of gateway for trans-router DHCP
  - Client HW - MAC Address of client
Step 1 DHCP Discover

Client - sends Discover
All IP Fields 0.0.0.0
Client HW = MAC of client

DHCP Discover

All IPs are 0.0.0.0.....
.broadcast destination MAC
Step 2 DHCP Offer

Server - replies with Offer
SAME TRANSACTION #
Client IP 0.0.0.0
Your IP = Offered IP
Server IP = Server IP
Client HW = MAC of client

Client - may get more
than one offer

DHCP Offer

Client IP = 10.100.13.200
Server IP = 10.100.13.101
Step 3 DHCP Request

Client selects an offer and responds with Request
SAME TRANSACTION #
All IPs 0.0.0.0
Parameters in Request List
Step 4 DHCP ACK

Server confirms request

DHCP ACK
DHCPD

- DHCP Server process is dhcpd
- Set configuration in /etc/dhcpd.conf
- Leases list in /var/lib/dhcp/dhcpd.leases
- Set autorun with ntsysv

minimal dhcpd.conf

```
[root@thermador root]# more /etc/dhcpd.conf
subnet 10.100.29.0 netmask 255.255.255.0 {
    range 10.100.29.50 10.100.29.100;
}
```

Many, many, more options

```
option routers <ip address>
```

....would be used to specify a gateway
dhcpd.leases

```
[root@thunderbird var]# more /var/lib/dhcp/dhcpd.leases
# All times in this file are in UTC (GMT), not your local timezone. This is
# not a bug, so please don't ask about it. There is no portable way to
# store leases in the local timezone, so please don't request this as a
# feature. If this is inconvenient or confusing to you, we sincerely
# apologize. Seriously, though - don't ask.
# The format of this file is documented in the dhcpd.leases(5) manual page.

lease 10.100.29.68 {
      starts 4 2002/05/23 18:22:05;
      ends 5 2002/05/24 06:22:05;
      hardware ethernet 00:59:0b:41:56;
      uid 01:0d:d0:59:0b:41:56;
      client-hostname "MCEDIL0-2E";
}

lease 10.100.29.62 {
      starts 4 2002/05/23 18:21:39;
      ends 5 2002/05/24 06:21:39;
      hardware ethernet 00:59:17:35:d1;
      uid 01:0d:d0:59:17:35:d1;
      client-hostname "GDKDGH0-2E";
}
```

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Biblio

- RFC 2131 – “Dynamic Host Configuration Protocol”
- RFC 1534 – “Interoperation Between DHCP and BOOTP”
- RFC 951 – “Bootstrap Protocol (bootp)”

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