

DHCP

ITL

Dynamic Host Configuration

- RFC 2131 – DHCP
- RFC 2132 – DHCP Options
- RFC 951 - BOOTP

Overview

- How to Configure Hosts that
 - Should not store this information (for manageability)
 - Cannot store configuration info locally
- RARP – limited usefulness
- BOOTP – designed for diskless workstations
- DHCP – update of BOOTP (more options)

DHCP Process Flow

- Client
 - broadcast dhcpdiscover
 - send dhcprequest
 - send dhcprelease
- Server(s)
 - send dhcponoffer
 - send dhcpack

DHCP Process Flow, cont.

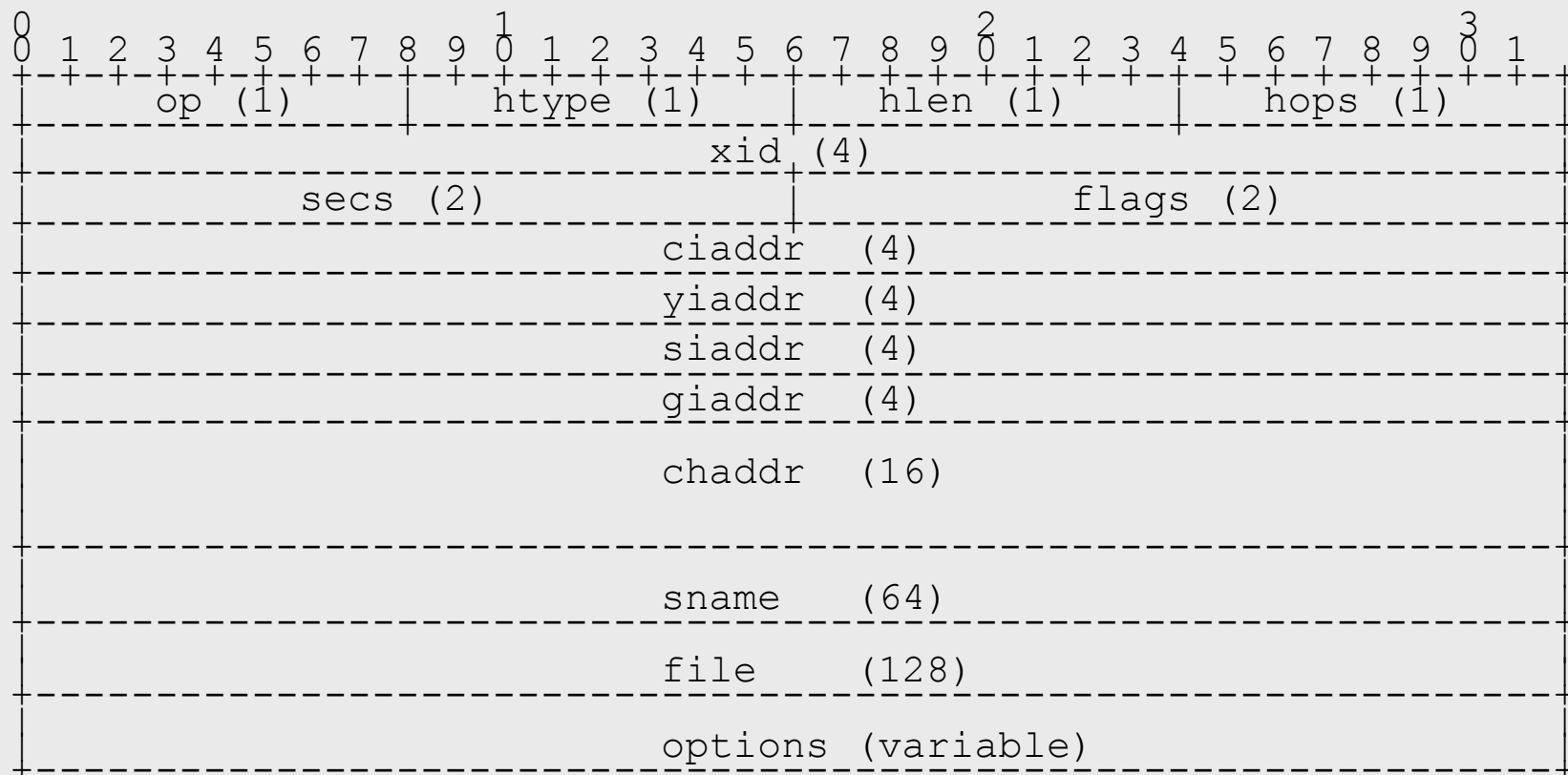
- Client renews
 - broadcast dhcprequest
- Server(s)
 - send dhcpack
- send dhcprelease

DHCP Process Flow, cont.

- Client moved
 - send dhcprequest
 - broadcast dhcpdiscover
 - send dhcprequest
 - send dhcprelease
- Server(s)
 - send dhcpnack
 - send dhcpoffer
 - send dhcpack

DHCP Message Structure

in UDP:



Protocol Fields from RFC2131

- op: Message op code / message type
1 = BOOTREQUEST, 2 = BOOTREPLY
- htype: Hardware address type
'1' = 10mb ethernet.
- hlen: Hardware address length
'6' for 10mb ethernet
- hops: Client sets to zero, optionally used by relay agents when booting via a relay agent.
- xid Transaction ID, a random number chosen by the client

Fields cont.

- secs: Filled in by client, seconds elapsed since client began address acquisition or renewal process.
- flags: Used to request broadcast reply
- ciaddr: Client IP address; only filled in if client is in BOUND, RENEW or REBINDING state and can respond to ARP requests.
- yiaddr: 'your' (client) IP address.
- siaddr: IP address of next server to use in bootstrap; returned by server.

Fields cont.

- giaddr: Relay agent IP address
- chaddr: Client hardware address.
- sname: Optional server host name
- file: Boot file name
- Options: Optional parameters field

DHCP Options

- Message Format comes from BOOTP
 - Boot-request and Boot-reply op codes
- DHCP commands sent as options
- Many other pieces of information can be sent in optional fields

Option Field Structure

- Tag (1 octet)
 - 0 – pad, 255 – end of options
- Option Length (1 octet), except for 0 & 255
- Option Data
- Tags 128-254 are reserved for “site specific” options, all others are registered

Option Examples

- Tag 1 (Length 4)
 - Subnet Mask
- Tag 3 (Length 4n)
 - n Router Addresses
- Tag 53 (Length 1)
 - DHCP Message Type

Clients and Servers

	Client	Server
Windows	built-in (all versions) ipconfig	Windows 2003 Server Server management snap-in
Mac OS X	built-in ipconfig (!!!)	bootpd Integrated with LDAP
Linux	dhclient	dhcpd

Ipconfig - Windows

USAGE:

```
ipconfig [/? | /all | /release [adapter] | /renew [adapter]
         | /flushdns | /registerdns
         | /showclassid adapter
         | /setclassid adapter [classidtoreset] ]
```

adapter Full name or pattern with '*' and '?' to 'match',
* matches any character, ? matches one character.

Options

```
/?          Display this help message.
/all        Display full configuration information.
/release    Release the IP address for the specified adapter.
/renew      Renew the IP address for the specified adapter.
/flushdns   Purges the DNS Resolver cache.
/registerdns Refreshes all DHCP leases and re-registers DNS names
/displaydns Display the contents of the DNS Resolver Cache.
/showclassid Displays all the dhcp class IDs allowed for adapter.
/setclassid Modifies the dhcp class id.
```

ipconfig output (Windows)

Windows 2000 IP Configuration

```
Host Name . . . . . : hans-laptop1
Primary DNS Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
```

Ethernet adapter Local Area Connection:

```
Connection-specific DNS Suffix . . . . . :
Description . . . . . : Intel(R) PRO/100+ MiniPCI
Physical Address. . . . . : 00-10-A4-8C-18-7F
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes
IP Address. . . . . : 132.235.74.219
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 132.235.74.254
DHCP Server . . . . . : 132.235.250.15
DNS Servers . . . . . : 132.235.64.1
                        132.235.64.2
Primary WINS Server . . . . . : 132.235.234.235
Secondary WINS Server . . . . . : 123.235.197.38
Lease Obtained. . . . . : Friday, April 20, 2001 08:50:49
Lease Expires . . . . . : Friday, April 20, 2001 20:50:49
```

Linux

- /sbin/dhclient (see *man dhclient*)
 - dhclient -r
 - Release address and exit
 - dhclient normally starts at boot and uses dhclient.conf to determine which interfaces to request addresses on.

Mac OS X

- GUI
 - Turn interface off and back on
 - Reinitializes loadable kernel module and renews DHCP
- `/usr/sbin/ipconfig` (???....)
 - `ipconfig set interface mode`
switches interface settings (e.g. from DHCP to MANUAL and back)
 - used for diagnostics only (e.g. can display the content of the last DHCP packet received)

DHCP Server on Unix/Linux

NAME

dhcpcd - Dynamic Host Configuration Protocol Server

SYNOPSIS

```
dhcpcd [ -p port ] [ -f ] [ -d ] [ -q ] [ -cf  
config-file ]  
[ -lf lease-file ] [ if0 [ ...ifN ] ]
```

See “man dhcpcd3” and “man dhcpcd.conf”

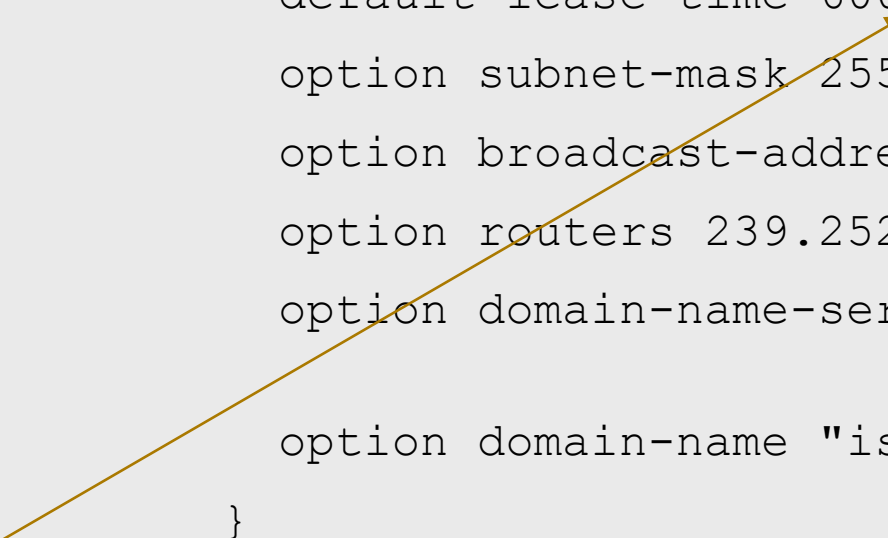
simple dhcpd.conf file

```
subnet 239.252.197.0 netmask 255.255.255.0 {  
    range 239.252.197.10 239.252.197.250;  
}
```

See “man dhcpd.conf”

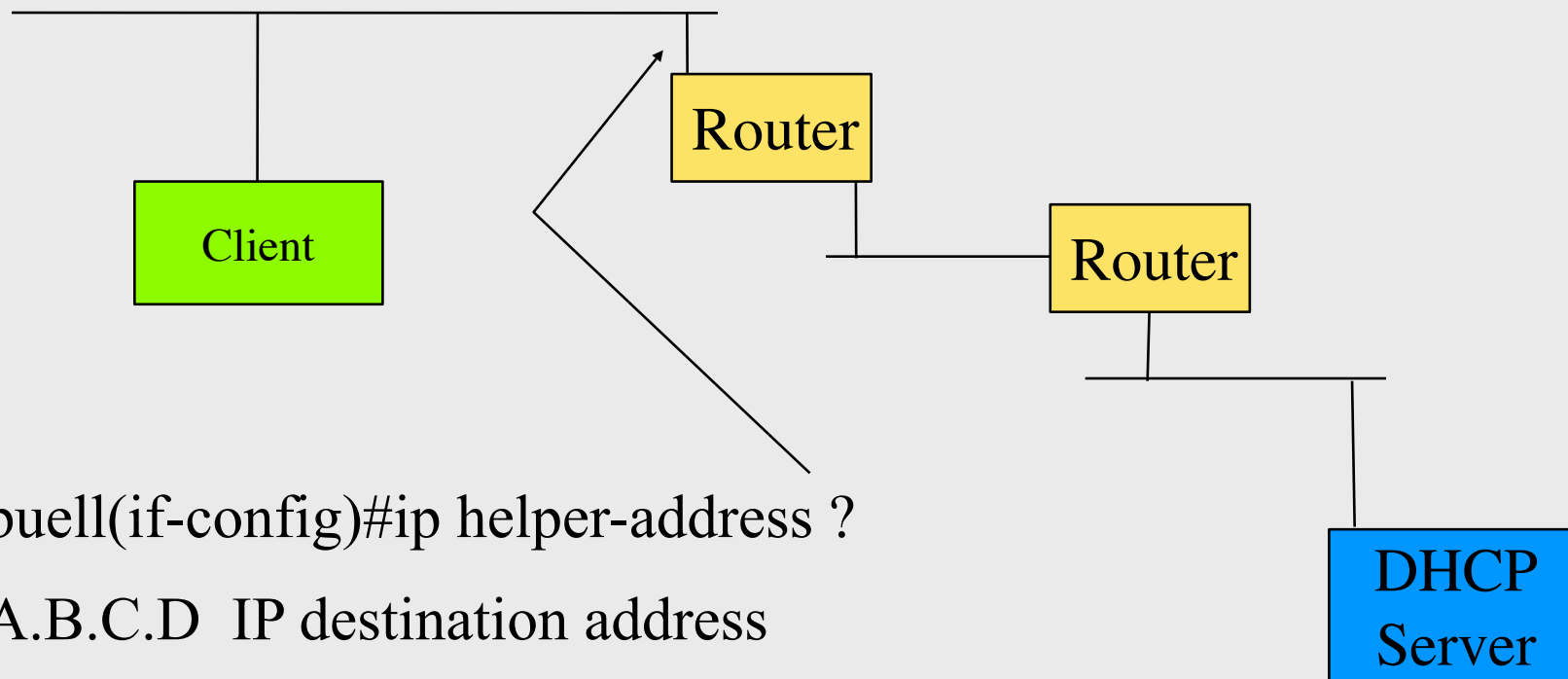
More Complete

```
subnet 239.252.197.0 netmask 255.255.255.0 {
    range 239.252.197.10 239.252.197.250;
    default-lease-time 600; max-lease-time 7200;
    option subnet-mask 255.255.255.0;
    option broadcast-address 239.252.197.255;
    option routers 239.252.197.1;
    option domain-name-servers 239.252.197.2,
                                239.252.197.3;
    option domain-name "isc.org";
}
```



Note: there is a typo in the man page

The Relay



`buell(if-config)#ip helper-address ?`

A.B.C.D IP destination address