EE981 Network Switching & Routing

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Host Configuration

- For any new computer joining a network following information is necessary
  - IP address
  - Subnet Mask
  - IP address of router / gateway
  - IP of name server

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Host Configuration

- Static Allocation
  - Configured physically on the machine
  - Remains same until changed manually

- Dynamic Allocation
  - Automatically assigned on joining a network
  - Can be changed every time

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DHCP: Dynamic Host Configuration Protocol

- Client Server Model
  - New machine is the client
  - DHCP server provides IP address and other information

- Goal: Allow host to dynamically obtain its IP address from network server when it joins network
  - Can renew its lease on address in use
  - Allows reuse of addresses (only hold address while connected/"on")
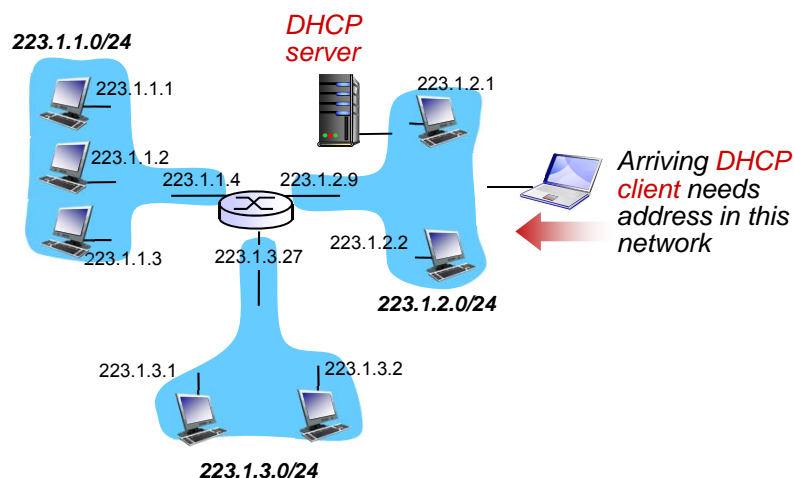 - Support for mobile users who want to join network

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DHCP: Dynamic Host Configuration Protocol

- Host broadcasts "DHCP discover" message
- DHCP server responds with "DHCP offer" message
- Host requests IP address: "DHCP request" message
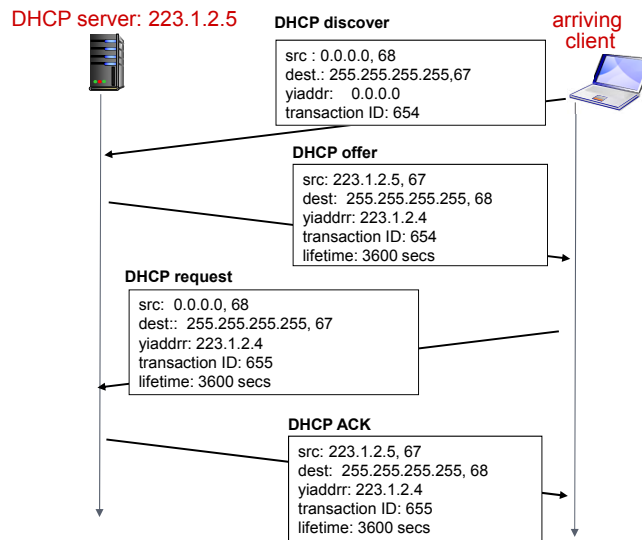- DHCP server sends address: "DHCP ack" message

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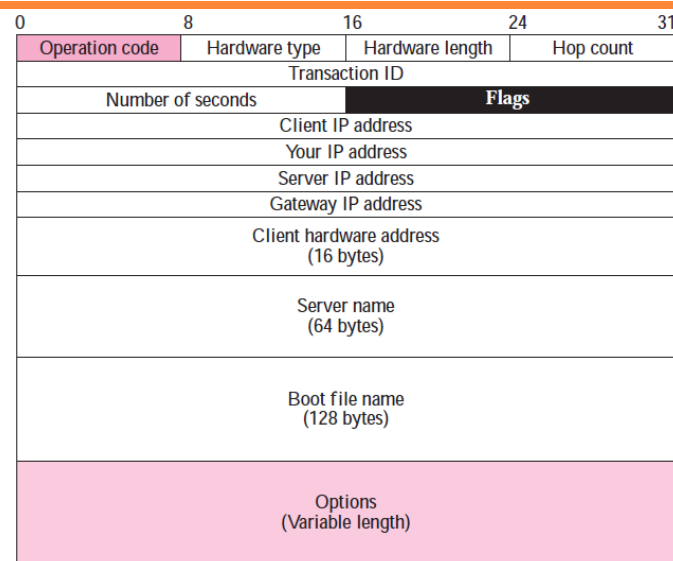# DHCP: Dynamic Host Configuration Protocol
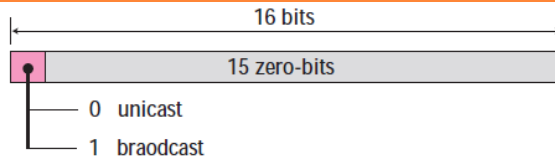

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DHCP: Dynamic Host Configuration Protocol

DHCP server: 223.1.2.5

DHCP discover

arriving client

src : 0.0.0.0, 68
dest.: 255.255.255.255,67
yiaddr: 0.0.0.0
transaction ID: 654

DHCP offer

src: 223.1.2.5, 67
dest: 255.255.255.255, 68
yiaddrr: 223.1.2.4
transaction ID: 654
lifetime: 3600 secs

DHCP request

src: 0.0.0.0, 68
dest:: 255.255.255.255, 67
yiaddrr: 223.1.2.4
transaction ID: 655
lifetime: 3600 secs

DHCP ACK

src: 223.1.2.5, 67
dest: 255.255.255.255, 68
yiaddrr: 223.1.2.4
transaction ID: 655
lifetime: 3600 secs

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DHCP Packet Format

Operation code	Hardware type	Hardware length	Hop count

| 0 | 8 | 16 | 24 | 31 |

Transaction ID

| Number of seconds | Flags |

Client IP address

Your IP address

Server IP address

Gateway IP address

Client hardware address
(16 bytes)

Server name
(64 bytes)

Boot file name
(128 bytes)

Options
(Variable length)

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DHCP Packet Format

- Flag

16 bits

15 zero-bits

- 0 unicast
- 1 braodcast

- Options

Padding — Tag (0)

End of list — Tag (255)

Other options — Tag | Length | Value (Variable length)

Length in byted defined in the length field.

- Magic Cookie
  - 99.130.83.99

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DHCP options

Tag	Length	Value	Description
0			Padding
1	4	Subnet mask	Subnet mask
2	4	Time of the day	Time offset
3	Variable	IP addresses	Default router
4	Variable	IP addresses	Time server
5	Variable	IP addresses	IEN 16 server
6	Variable	IP addresses	DNS server
7	Variable	IP addresses	Log server
8	Variable	IP addresses	Quote server
9	Variable	IP addresses	Print server
10	Variable	IP addresses	Impress
11	Variable	IP addresses	RLP server
12	Variable	DNS name	Host name
13	2	Integer	Boot file size
53	1	Discussed later	Used for dynamic configuration
128–254	Variable	Specific information	Vendor specific
255			End of list

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DHCP Option 53

Tag	Length	Value
53	1	•

1 DHCPDISCOVER
2 DHCPOFFER
3 DHCPREQUEST
4 DHCPDECLINE
5 DHCPACK
6 DHCPNACK
7 DHCPRELEASE
8 DHCPINFORM
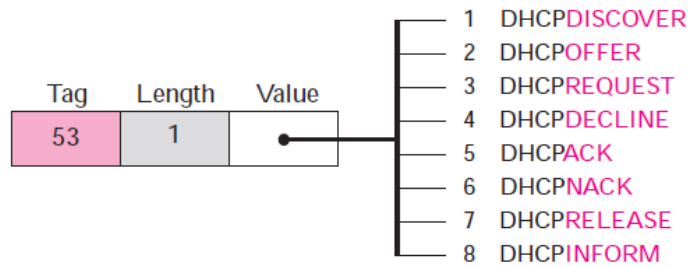
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DHCP Client Transition Diagram

Boot

INIT

– / DHCPDISCOVER

SELECTING

DHCPOFFER

Select Offer / DHCPREQUEST

REQUESTING

Lease time expired
or
DHCPNACK

DHCPACK

Lease cancelled/
DHCPRELEASE

Lease time 50% expired /
DHCPREQUEST

BOUND

RENEWING   DHCPACK   DHCPACK   REBINDING

Lease time 87.5% expired /
DHCPREQUEST
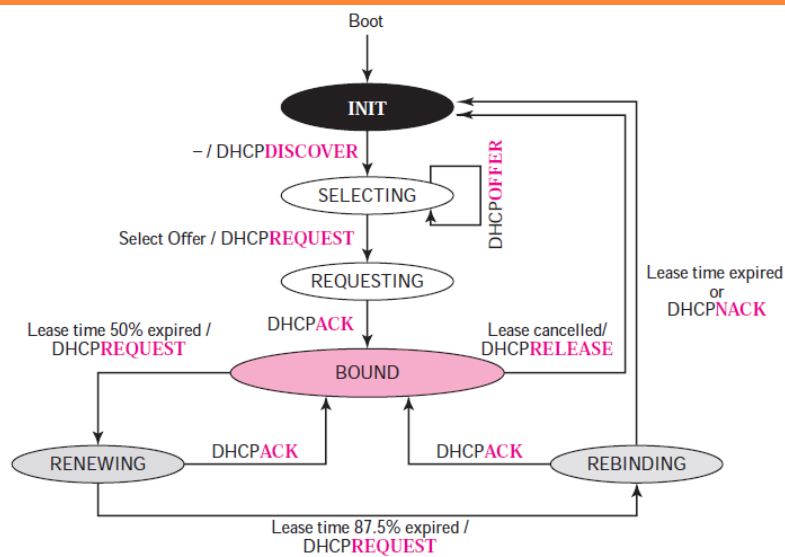
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Other actions in DHCP

- Early Release
  - DHCPRELEASE can be sent by client to indicate that IP is not needed any more
  - Server may assign that IP to some one else
- Timers

Renewal timer:	→	50% of lease time
Rebinding timer:	→	87.5% of lease time
Expiration timer:	→	100% of lease time

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