

Computer Networks - Lab 4

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DHCP Document

1. Are DHCP messages sent over UDP or TCP?

DHCP messages are sent over UDP (User Datagram Protocol).

2	7.587185	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x3e5e0ce3
4	8.632958	192.168.1.1	255.255.255.255	DHCP	598	DHCP Offer - Transaction ID 0x3e5e0ce3
5	8.633123	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0x3e5e0ce3
6	8.635133	192.168.1.1	255.255.255.255	DHCP	598	DHCP ACK - Transaction ID 0x3e5e0ce3
36	28.134178	192.168.1.101	192.168.1.1	DHCP	342	DHCP Request - Transaction ID 0x257e55a3
37	28.135938	192.168.1.1	255.255.255.255	DHCP	598	DHCP ACK - Transaction ID 0x257e55a3
41	25.073867	192.168.1.101	192.168.1.1	DHCP	342	DHCP Release - Transaction ID 0xb7a32733
42	38.869153	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x3a5d7f09
44	31.988133	192.168.1.1	255.255.255.255	DHCP	598	DHCP Offer - Transaction ID 0x3a5d7f09
45	31.988384	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0x3a5d7f09
46	31.918313	192.168.1.1	255.255.255.255	DHCP	598	DHCP ACK - Transaction ID 0x3a5d7f09

> Frame 2: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits)	0000	ff	ff	ff	ff	ff	ff	00	88	74	4f	36	23	88	00	45	00
> Ethernet II, Src: Dell_4f:36:23 (08:00:74:4f:36:23), Dst: Broadcast (ff:ff:ff:ff:ff:ff)	0010	01	42	52	10	00	00	11	06	95	00	00	00	00	00	ff	ff
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255	0020	ff	ff	00	44	00	43	01	34	e9	7b	01	01	06	00	3c	5a
> User Datagram Protocol, Src Port: 68, Dst Port: 67	0030	00	c3	00	00	00	00	00	00	00	00	00	00	00	00	00	00
> Length: 388	0040	00	00	00	00	00	00	00	00	88	74	4f	36	23	88	00	00
> Checksum: 0xe97b (unverified)	0050	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
> [Checksum Status: Unverified]	0060	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
> [Stream Index: 1]	0070	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
> [Timestamps]	0080	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
> UDP payload (388 bytes)	0090	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
> Dynamic Host Configuration Protocol (Discover)	00a0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00b0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00c0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00d0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00e0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	00f0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	0100	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	0110	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
	0120	3d	97	81	00	00	74	4f	36	23	32	84	c9	a6	01	05	0c
	0130	04	4e	5f	68	6f	3c	00	4d	53	46	54	20	35	2e	3b	37
	0140	00	01	0f	03	06	2c	2e	2f	1f	21	19	2b	ff	00	00	00

2. Draw a timing datagram illustrating the sequence of the first four-packet Discover/Offer-/Request/ACK DHCP exchange between the client and server. For each packet, indicated the source and destination port numbers. Are the port numbers the same as in the example given in this lab assignment?

Time	0.0.0.0	255.255.255.255	LinksysGroup_dkaf73	Broadcast	Comment
20.985227					BROWSER Host Announcement NNDG, Workstn...
20.439684					BROWSER Local Master Announcement C&U...
25.073867					DHCP DHCP Release - Transaction ID 0x3e5e0ce3
30.869153	68				DHCP DHCP Discover - Transaction ID 0x3e5e0ce3
30.870874					Who has 192.168.1.101? 192.168.1.1
31.808133					DHCP DHCP Offer - Transaction ID 0x3e5e0ce3
31.808384	68				DHCP DHCP Request - Transaction ID 0x3e5e0ce3
31.918313					DHCP DHCP ACK - Transaction ID 0x3e5e0ce3
31.812478					ARP As ARP Announcement for 192.168.1.101
32.286682					ARP As ARP Announcement for 192.168.1.101
33.286615					ARP As ARP Announcement for 192.168.1.101
34.308482					IGMPv2 Membership Report 1 join group 228...
34.310998					ARP Who has 192.168.1.101? 192.168.1.1

3. What is the link-layer (e.g., Ethernet, MAC) address of your host?

```
> Frame 2: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits)
> Ethernet II, Src: Dell_4f:36:23 (08:00:74:4f:36:23), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Destination: Broadcast (ff:ff:ff:ff:ff:ff)
> Source: Dell_4f:36:23 (08:00:74:4f:36:23)
  Type: IPv4 (0x0800)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
> Dynamic Host Configuration Protocol (Discover)
```

4. What values in the DHCP discover message differentiate this message from the DHCP request message?

The discover and request are different in the options part.

5. What is the value of the Transaction-ID in each of the first four (Discover/Offer-/Request/ACK) DHCP messages? What are the values of the Transaction-ID in the second set (Request/ACK) set of DHCP messages? What is the purpose of the Transaction-ID

```

Dynamic Host Configuration Protocol (Discover)
Message type: Boot Request (1)
Hardware type: Ethernet (0x01)
Hardware address length: 6
Hops: 0
Transaction ID: 0x3e5e0ce3
Seconds elapsed: 0
> Bootp flags: 0x0000 (Unicast)
Client IP address: 0.0.0.0
Your (client) IP address: 0.0.0.0
Next server IP address: 0.0.0.0
Relay agent IP address: 0.0.0.0
Client MAC address: Dell_4f:36:23 (00:08:74:4f:36:23)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP
> Option: (53) DHCP Message Type (Discover)
> Option: (116) DHCP Auto-Configuration
> Option: (61) Client identifier
> Option: (50) Requested IP Address (192.168.1.101)
> Option: (12) Host Name
> Option: (60) Vendor class identifier
> Option: (55) Parameter Request List
> Option: (255) End
Padding: 00000000000000000000

```

```

Dynamic Host Configuration Protocol (Request)
Message type: Boot Request (1)
Hardware type: Ethernet (0x01)
Hardware address length: 6
Hops: 0
Transaction ID: 0x3e5e0ce3
Seconds elapsed: 0
> Bootp flags: 0x0000 (Unicast)
Client IP address: 0.0.0.0
Your (client) IP address: 0.0.0.0
Next server IP address: 0.0.0.0
Relay agent IP address: 0.0.0.0
Client MAC address: Dell_4f:36:23 (00:08:74:4f:36:23)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP
> Option: (53) DHCP Message Type (Request)
> Option: (61) Client identifier
> Option: (50) Requested IP Address (192.168.1.101)
> Option: (54) DHCP Server Identifier (192.168.1.1)
> Option: (12) Host Name
> Option: (60) Vendor class identifier
> Option: (55) Parameter Request List
> Option: (255) End
Padding: 00000000000000000000

```

field?

The transaction ID's are same for Discover, Offer, Request, ACK.

Discover Transaction ID: 0x3e5e0ce3

Offer Transaction ID: 0x3e5e0ce3

ACK Transaction ID: 0x3e5e0ce3

Request Transaction ID: 0x3e5e0ce3

DHCP Discover	– Transaction ID 0x3e5e0ce3
DHCP Offer	– Transaction ID 0x3e5e0ce3
DHCP Request	– Transaction ID 0x3e5e0ce3
DHCP ACK	– Transaction ID 0x3e5e0ce3

6. A host uses DHCP to obtain an IP address, among other things. But a host's IP address is not confirmed until the end of the four-message exchange! If the IP address is not set until the end of the four-message exchange, then what values are used in the IP datagrams in the four-message exchange? For each of the four DHCP messages (Discover/Offer/Request/ACK DHCP), indicate the source and destination IP addresses that are carried in the encapsulating IP datagram.

The DHCP client and server both use 255.255.255.255 as the destination address. The client uses source IP address 0.0.0.0, while the server uses its actual IP address as the source.

Source	Destination	Protocol	Length	Info
0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover
192.168.1.1	255.255.255.255	DHCP	590	DHCP Offer
0.0.0.0	255.255.255.255	DHCP	342	DHCP Request
192.168.1.1	255.255.255.255	DHCP	590	DHCP ACK

7. What is the IP address of your DHCP server?

Your (client) IP address: 192.168.1.101

8. What IP address is the DHCP server offering to your host in the DHCP Offer message? Indicate which DHCP message contains the offered DHCP address.

The DHCP server offered the IP address 192.168.1.101 to my client machine. The DHCP message with "DHCP Message Type = DHCP Offer" contained the offered IP.

9. In the example screenshot in this assignment, there is no relay agent between the host and the DHCP server. What values in the trace indicate the absence of a relay agent? Is there a relay agent in your experiment? If so what is the IP address of the agent?

```

> Bootp flags: 0x0000 (Unicast)
Client IP address: 0.0.0.0
Your (client) IP address: 192.168.1.101
Next server IP address: 0.0.0.0
Relay agent IP address: 0.0.0.0
Client MAC address: Dell_4f:36:23 (00:08:74:4f:36:23)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP
> Option: (53) DHCP Message Type (Offer)

```

The IP address 0.0.0.0 indicates the absence of the relay agent. No, there is no relay agent in my experiment.

10. Explain the purpose of the router and subnet mask lines in the DHCP offer message.

The router line indicates to the client what its default gateway should be. The subnet mask line tells the client which subnet mask it should use.

```

Option: (53) DHCP Message Type (ACK)
Option: (1) Subnet Mask (255.255.255.0)
Length: 4
Subnet Mask: 255.255.255.0
Option: (3) Router
Length: 4
Router: 192.168.1.1

```

11. Explain the purpose of the lease time. How long is the lease time in your experiment?

The lease time is the amount of time the DHCP server assigns an IP address to a client. During the lease time, the DHCP server will not assign the IP given to the client to another client, unless it is released by the client. Once the lease time has expired, the IP address can be reused by the DHCP server to give to another client. In my experiment, the lease time is 1 day.

```

Option: (53) DHCP Message Type (ACK)
Option: (1) Subnet Mask (255.255.255.0)
Option: (3) Router
Option: (6) Domain Name Server
Option: (15) Domain Name
Option: (51) IP Address Lease Time
Length: 4
IP Address Lease Time: 1 day (86400)

```

12. What is the purpose of the DHCP release message? Does the DHCP server issue an acknowledgment of receipt of the client's DHCP request? What would happen if the client's DHCP release message is lost?

The client sends a DHCP Release message to cancel its lease on the IP address given to it by the DHCP server. The DHCP server does not send a message back to the client acknowledging the DHCP Release message. If the DHCP Release message from the client is lost, the DHCP server would have to wait until the lease period is over for that IP address until it could reuse it for another client.