

# Computer Networks

## *LAB 6*

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1. Are DHCP messages sent over UDP or TCP?

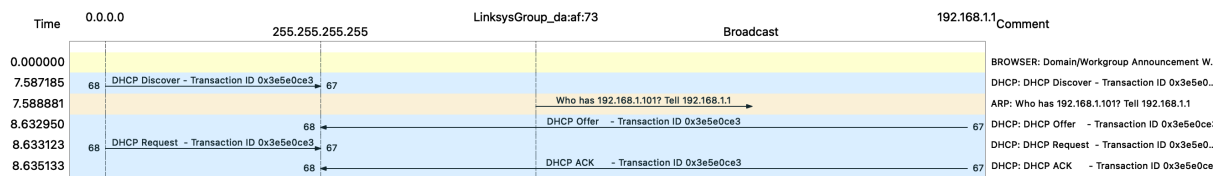
```

3 7 588881 LinksysGroup_da:af:73 Broadcast ARP 68 Who has 192.168.1.101? Tell 192.168.1.1
> Frame 2: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on 0
> Ethernet II, Src: Dell_4f:36:23 (00:08:74:4f:36:23), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
  Source Port: 68
  Destination Port: 67
  Length: 308
  Checksum: 0xe97b [unverified]
  [Checksum Status: Unverified]
  [Stream index: 1]
  [Stream Packet Number: 1]
  > [Timestamps]
    UDP payload (300 bytes)
  > Dynamic Host Configuration Protocol (Discover)

```

DHCP messages are sent over UDP

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?



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

```

> Frame 1: 250 bytes on wire (2000 bits), 250 bytes captured (2000 bits) on 0
> Ethernet II, Src: Intel_52:2b:23 (00:04:23:52:2b:23), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Destination: Broadcast (ff:ff:ff:ff:ff:ff)
> Source: Intel_52:2b:23 (00:04:23:52:2b:23)
  Type: IPv4 (0x0800)
  [Stream index: 0]
> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 192.168.1.255
> User Datagram Protocol, Src Port: 138, Dst Port: 138

```

The Link Layer address of my workstation is: 00:04:23:52:2b:23

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

```

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

```

The values which differentiate the Discover message from the Request message are in “Option 53: DHCP Message Type”

- 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 field?

2	7.587185	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x3e5e0ce3
3	7.588881	LinksysGroup_da:af...	Broadcast	ARP	60	Who has 192.168.1.101? Tell 192.168.1.1
4	8.632950	192.168.1.1	255.255.255.255	DHCP	590	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	590	DHCP ACK - Transaction ID 0x3e5e0ce3

The value of the Transaction ID is 0x3e5e0ce3. The second Transaction ID is 0x3e5e0ce3. A Transaction ID is used so that the DHCP server can differentiate between client requests during the request process.

- 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.
- What is the IP address of your DHCP server?
  - The IP address of the DHCP server is 192.168.1.1
- 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.



11. In the DHCP trace file noted in footnote 2, the DHCP server offers a specific IP address to the client (see also question 8. above). In the client's response to the first server OFFER message, does the client accept this IP address? Where in the client's RESPONSE is the client's requested address?

```
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: 000000000000
```

In my experiment, the host requests the offered IP address in the DHCP Request message.

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

```
Dynamic Host Configuration Protocol (ACK)
  Message type: Boot Reply (2)
  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: 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 (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)
  > Option: (54) DHCP Server Identifier (192.168.1.1)
  > Option: (255) End
```

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 days.

13. 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.

14. Clear the bootp filter from your Wireshark window. Were any ARP packets sent or received during the DHCP packet-exchange period? If so, explain the purpose of those ARP packets.

- Yes, there are ARP requests made by the DHCP server. Before offering an IP address to a client, the DHCP server issues an ARP request for the offered IP to make sure the IP address is not already in use by another workstation.