

Part 1.

Packet numbers of Get Request and Response: 221, 279

1.

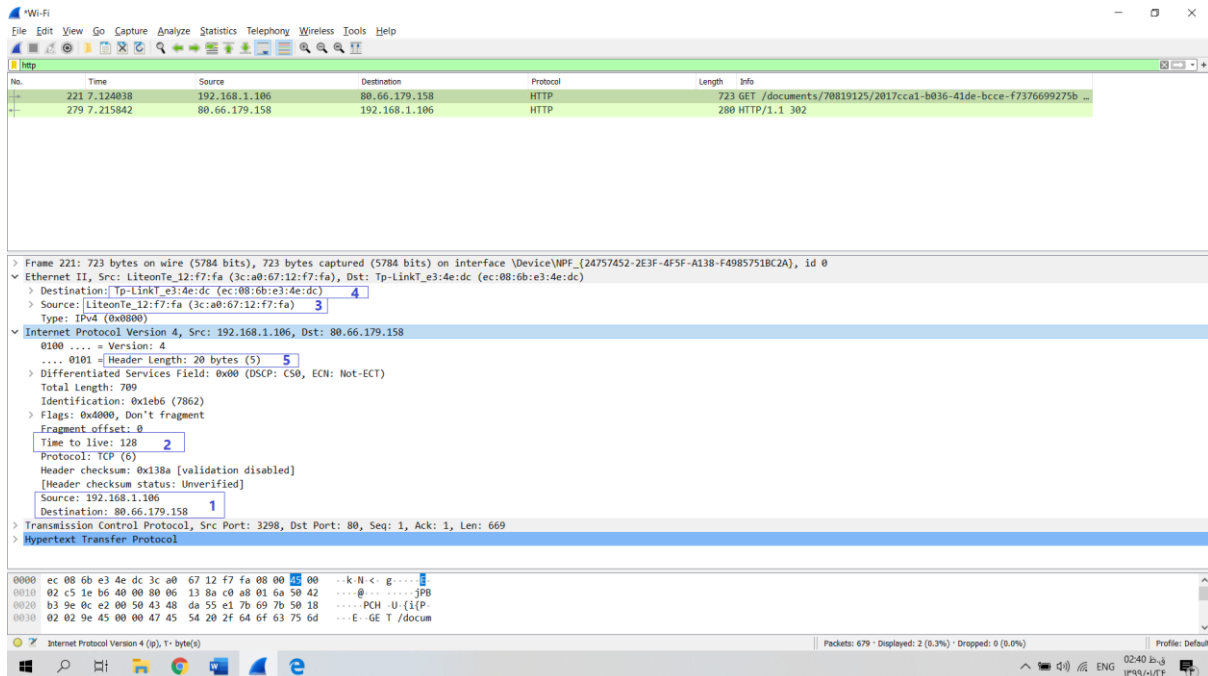


Figure 1

Source IP: 192.168.1.106

Destination IP: 80.66.179.158

2. 128

3. 3c:a0:67:12:f7:fa

4. ec:08:6b:e3:4e:dc . It is the address of my TP-Link router.

5. 20 Bytes

6. 52 Bytes

Part 2.

1. The Internet Address column contains the IP address, the Physical Address column contains the MAC address, and the type indicates the protocol type. Figure 2 shows the contents of my computer's ARP cache.

Interface: 192.168.1.106 --- 0x8		
Internet Address	Physical Address	Type
192.168.1.1	ec-08-6b-e3-4e-dc	dynamic
192.168.1.255	ff-ff-ff-ff-ff-ff	static
224.0.0.2	01-00-5e-00-00-02	static
224.0.0.22	01-00-5e-00-00-16	static
224.0.0.251	01-00-5e-00-00-fb	static
224.0.0.252	01-00-5e-00-00-fc	static
239.255.102.18	01-00-5e-7f-66-12	static
239.255.255.250	01-00-5e-7f-ff-fa	static
255.255.255.255	ff-ff-ff-ff-ff-ff	static

Figure 2

2.

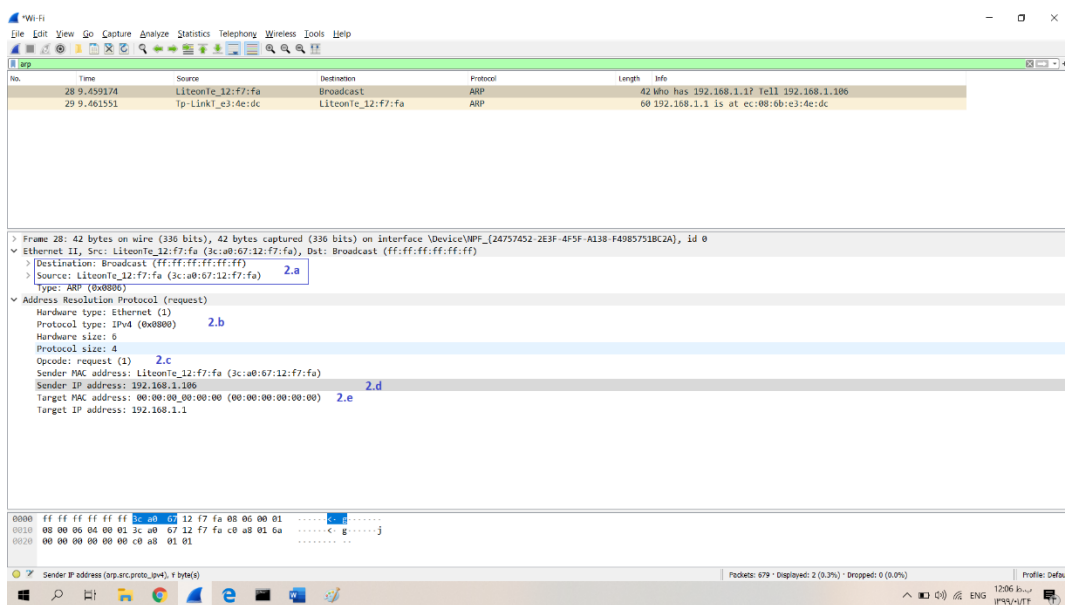


Figure 3

- hex value of destination address: ff:ff:ff:ff:ff:ff
source address: 3c:a0:67:12:f7:fa
- The hex value for the frame type field is 0x0800. This corresponds to IP protocol.
- Its value is 1.
- Yes, ARP message contain the IP address of the sender and it is 192.168.1.106
- The field "Target MAC address" is set to 00:00:00:00:00:00 to question the machine whose corresponding IP address (192.168.1.106) is being queried.

3.

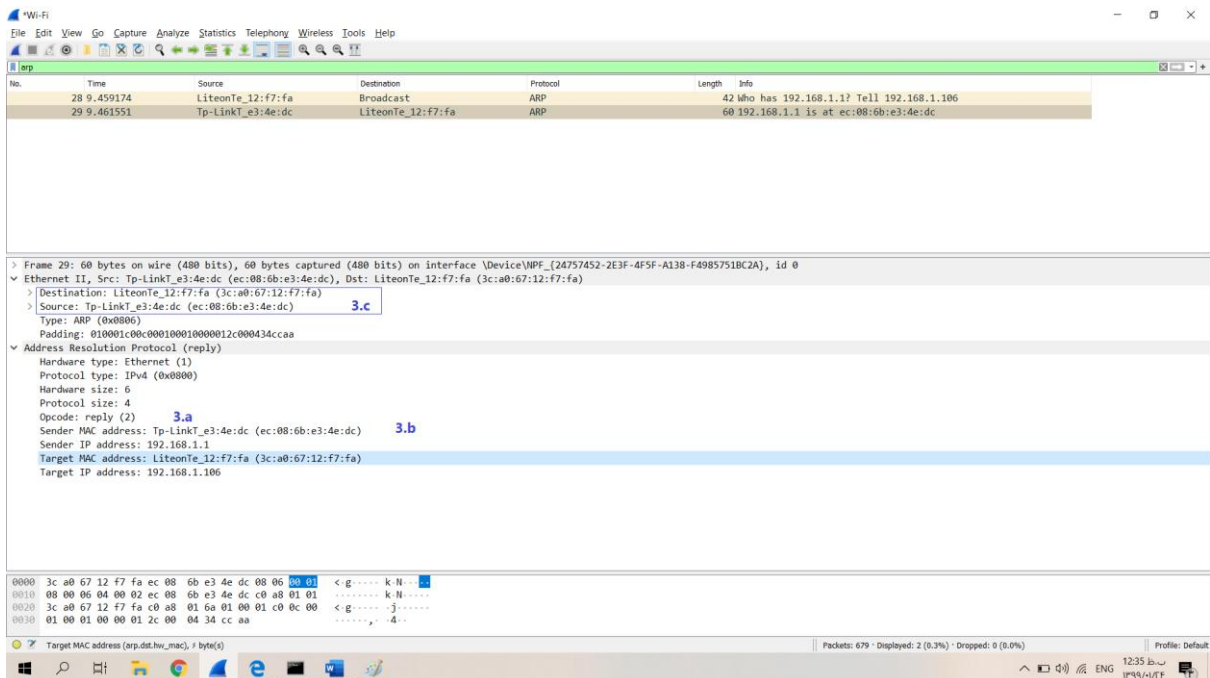


Figure 4

a) Its value is 2.

b) The answer to the earlier ARP request appears in the "Sender MAC address" field, which contains the Ethernet address ec:08:6b:e3:4e:dc for the sender with IP address 192.168.1.106.

c) Destination Address: 3c:a0:67:12:f7:fa

Source Address: ec:08:6b:e3:4e:dc

Part 3.

1.

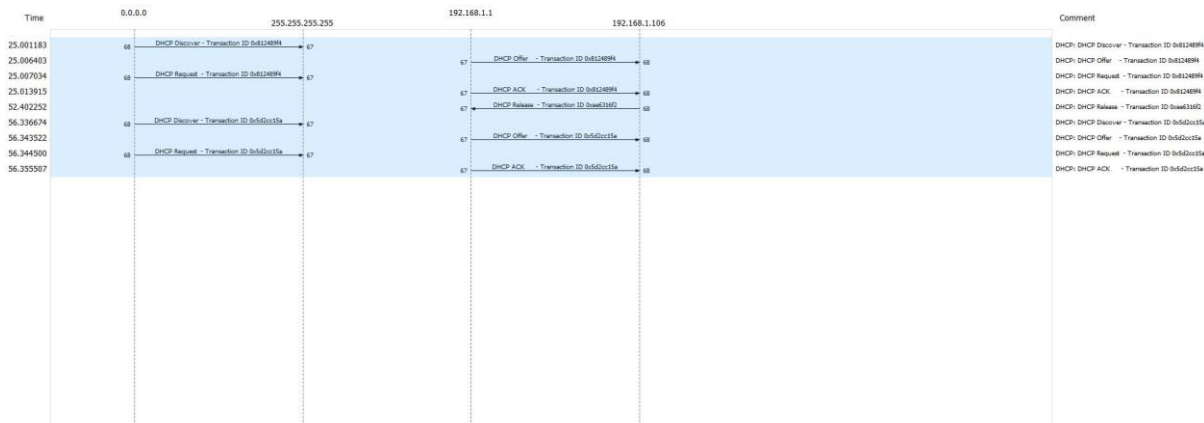


Figure 5

2. The values which differentiate the Discover message from the Request message are in “Option 53: DHCP Message Type” that for Discover is 1 according to Figure 6 and 3 for Request according to Figure 7.

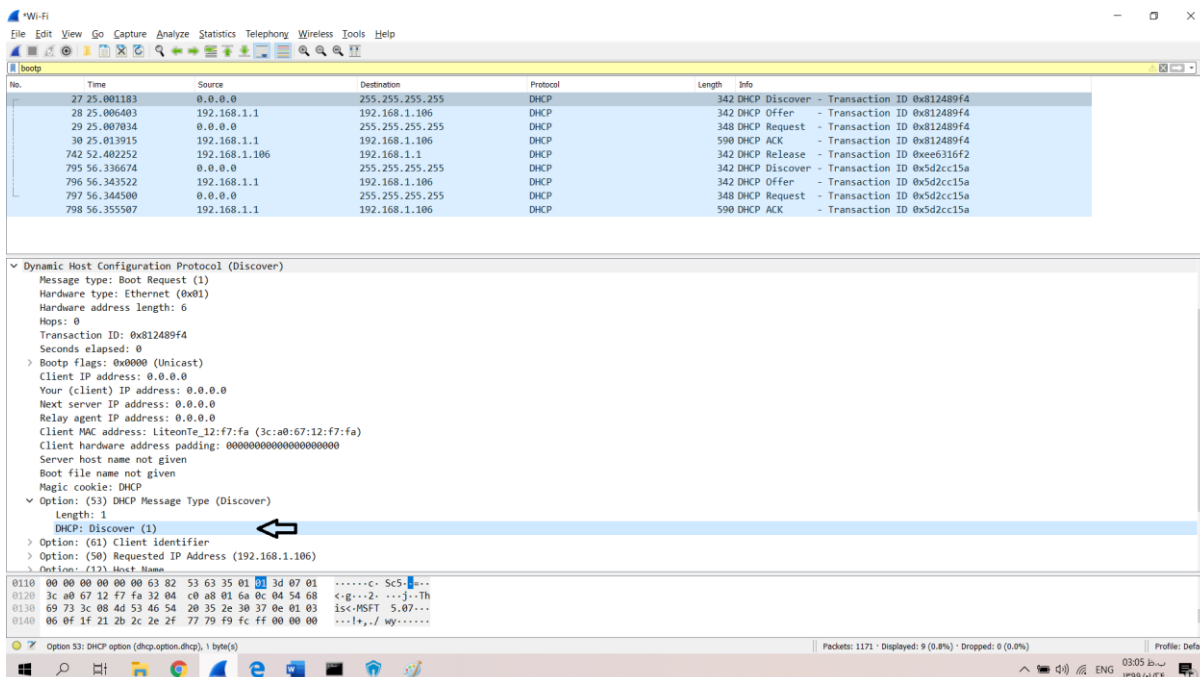


Figure 6

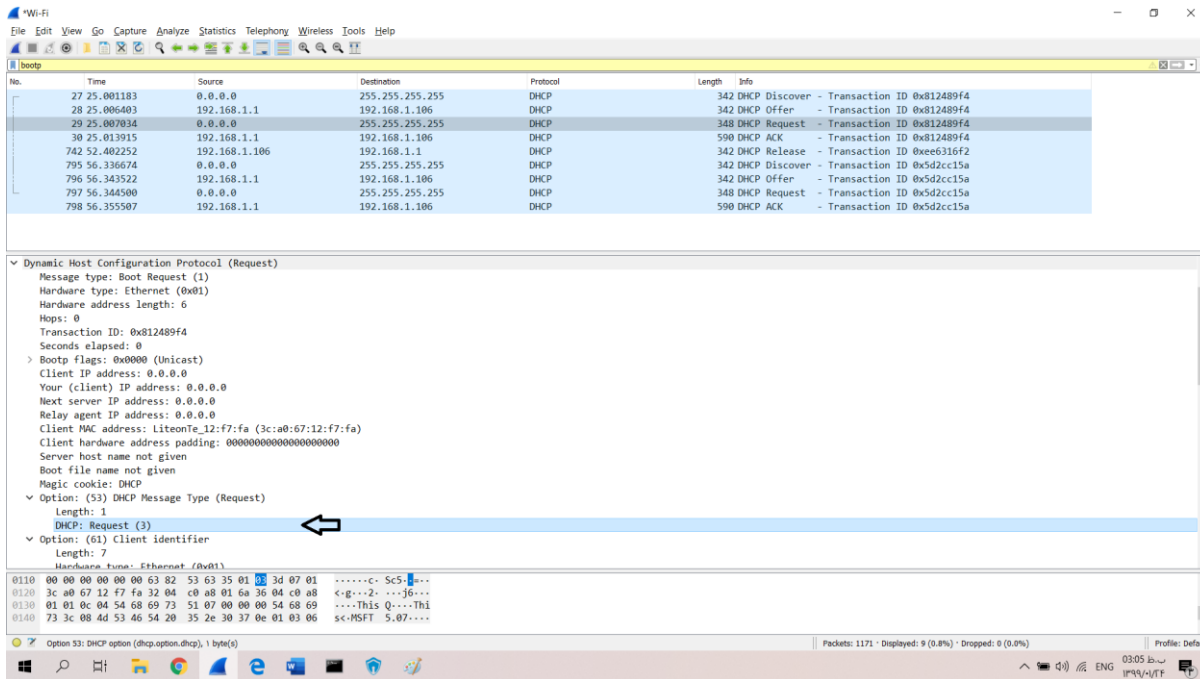


Figure 7

3. According to Figure 8, all the first four DHCP messages have the same transaction-ID (0x812489f4). The second two have the same transaction-ID (0x5d2cc15a). A Transaction ID is used so that the DHCP server can differentiate between client requests during the request process.

No.	Time	Source	Destination	Protocol	Length	Info
27	25.001183	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x812489f4
28	25.006403	192.168.1.1	192.168.1.106	DHCP	342	DHCP Offer - Transaction ID 0x812489f4
29	25.007034	0.0.0.0	255.255.255.255	DHCP	348	DHCP Request - Transaction ID 0x812489f4
30	25.013915	192.168.1.1	192.168.1.106	DHCP	590	DHCP ACK - Transaction ID 0x812489f4
742	52.402252	192.168.1.106	192.168.1.1	DHCP	342	DHCP Release - Transaction ID 0xee6316f2
795	56.336674	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x5d2cc15a
796	56.343522	192.168.1.1	192.168.1.106	DHCP	342	DHCP Offer - Transaction ID 0x5d2cc15a
797	56.344500	0.0.0.0	255.255.255.255	DHCP	348	DHCP Request - Transaction ID 0x5d2cc15a
798	56.355507	192.168.1.1	192.168.1.106	DHCP	590	DHCP ACK - Transaction ID 0x5d2cc15a

Figure 8

4. According to Figure 8:

Table 1

DHCP message	Source IP	Destination IP
Discover	0.0.0.0	255.255.255.255
Offer	192.168.1.1	192.168.1.106
Request	0.0.0.0	255.255.255.255
ACK	192.168.1.1	192.168.1.106

5. According to Figure 8, DHCP server IP is 192.168.1.1.

6. The DHCP server offered the IP address (192.168.1.106) and (0.0.0.0) to my client machine. The DHCP message with “DHCP Message Type = DHCP Offer” contained the offered IP.

```
> User Datagram Protocol, Src Port: 67, Dst Port: 68
√ Dynamic Host Configuration Protocol (Offer)
  Message type: Boot Reply (2)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x812489f4
  Seconds elapsed: 0
  > Bootp flags: 0x0000 (Unicast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 192.168.1.106
  Next server IP address: 192.168.1.1
  Relay agent IP address: 0.0.0.0
  Client MAC address: LiteonTe_12:f7:fa (3c:a0:67:12:f7:fa)
  Client hardware address padding: 00000000000000000000
  Server host name: TP-LINK
  Boot file name not given
  Magic cookie: DHCP
  √ Option: (53) DHCP Message Type (Offer)
    Length: 1
    DHCP: Offer (2)
  > Option: (1) Subnet Mask (255.255.255.0)
  \ Option: (3) Router
```

Figure 9

7. The client does not accept this IP address. It requests the offered IP address.

```

v Dynamic Host Configuration Protocol (Request)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x812489f4
  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: LiteonTe_12:f7:fa (3c:a0:67:12:f7:fa)
  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
  v Option: (50) Requested IP Address (192.168.1.106)
    Length: 4
    Requested IP Address: 192.168.1.106
  > Option: (54) DHCP Server Identifier (192.168.1.1)

```

Figure 10

8. The lease time is the amount of time the DHCP server assigns an IP address to a client once the client ACK it. 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 it is 3 days.

```

v Option: (51) IP Address Lease Time
  Length: 4
  IP Address Lease Time: (259200s) 3 days
v Option: (54) DHCP Server Identifier (192.168.1.1)

```

Figure 11