

*In the Name of God*



University of Tehran

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# **Computer Networks**

## **Wireshark Lab**

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# Abstract

Goal of the computer assignment is to get familiar with different internet protocols and packet transition inside network. More specifically we will dig in to ARP and DHCP protocols.

## Part 1. Capturing and analyzing Ethernet and IP headers

### 1. What is IP address of the source and destination?

As show in figure one IP address of source is : 192.168.1.4 and IP address of destination is 80.66.177.54 .

477	16.105769	192.168.1.4	80.66.177.54	HTTP	670 GET / HTTP/1.1
486	16.149698	80.66.177.54	192.168.1.4	HTTP	437 HTTP/1.1 301 Moved Permanently (text/html)

Type: IPv4 (0x0800)
Internet Protocol Version 4, Src: 192.168.1.4, Dst: 80.66.177.54
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 656
Identification: 0xb6b (7019)
> Flags: 0x40, Don't fragment
Fragment Offset: 0
Time to Live: 128
Protocol: TCP (6)
Header Checksum: 0x0000 [validation disabled]
[Header checksum status: Unverified]
Source Address: 192.168.1.4
Destination Address: 80.66.177.54
Transmission Control Protocol, Src Port: 51802, Dst Port: 80, Seq: 1, Ack: 1, Len: 616
Source Port: 51802
Destination Port: 80
[Stream index: 12]
[TCP Segment Len: 616]
Sequence Number: 1 (relative sequence number)
Sequence Number (raw): 1617414805
[Next Sequence Number: 617 (relative sequence number)]

Figure 1, Internet Protocol V4 and TCP

### 2. What is Time to Live?

Time to live is 128.

### 3. What is the 48-bit Ethernet address of your computer?

As shown in figure 2, MAC address of source is:

MAC address : 50:76:af:7e:e6:45

No.	Time	Source	Destination	Protocol	Length	Info
477	16.105769	192.168.1.4	80.66.177.54	HTTP	670	GET / HTTP/1.1
486	16.149698	80.66.177.54	192.168.1.4	HTTP	437	HTTP/1.1 301 Moved Permanently (text/html)

> Frame 477: 670 bytes on wire (5360 bits), 670 bytes captured (5360 bits) on interface \Device\NPF_{3D7AB8CE-05E4-4BE8-AD}
Ethernet II, Src: IntelCor_7e:e6:45 (50:76:af:7e:e6:45), Dst: Tp-LinkT_84:e8:2b (f8:d1:11:84:e8:2b)
> Destination: Tp-LinkT_84:e8:2b (f8:d1:11:84:e8:2b)
Address: Tp-LinkT_84:e8:2b (f8:d1:11:84:e8:2b)
.... .. = LG bit: Globally unique address (factory default)
.... .. = IG bit: Individual address (unicast)
> Source: IntelCor_7e:e6:45 (50:76:af:7e:e6:45)
Address: IntelCor_7e:e6:45 (50:76:af:7e:e6:45)
.... .. = LG bit: Globally unique address (factory default)
.... .. = IG bit: Individual address (unicast)
Type: IPv4 (0x0800)

Figure 2, Ethernet II

4. What is the 48-bit destination address in the Ethernet frame? What device has this as its Ethernet address?

The address and device are:

Address: f8:d1:11:84:e8:2b

Device: Tp-LinkT\_84:e8:2b

5. What is the header size?

As shown in figure 1 header length is 20 bytes.

6. How many bytes are from the start of the Ethernet frame until the ASCII “O” in “OK” (i.e., the HTTP response code)? This shows the total header of the frame.

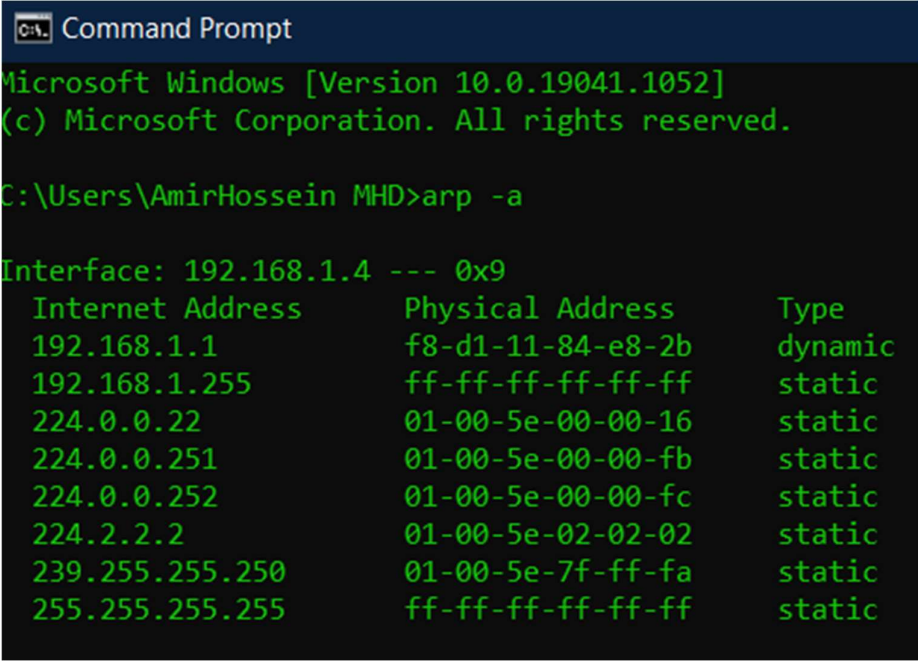
In this packages GET request has been cached but, the O in OK appear 52 bytes in the Ethernet frame.

## Part 2. The Address Resolution Protocol

1. Write down the contents of your computer's ARP cache. What is the meaning of column value?

As shown figure 3 we can see ARP cache of computer,

Internet address is IP, Physical Address is MAC address, Type is protocol type.



```
Microsoft Windows [Version 10.0.19041.1052]
(c) Microsoft Corporation. All rights reserved.

C:\Users\AmirHossein MHD>arp -a

Interface: 192.168.1.4 --- 0x9
    Internet Address      Physical Address      Type
    192.168.1.1           f8-d1-11-84-e8-2b    dynamic
    192.168.1.255         ff-ff-ff-ff-ff-ff    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
    224.2.2.2             01-00-5e-02-02-02    static
    239.255.255.250       01-00-5e-7f-ff-fa    static
    255.255.255.255       ff-ff-ff-ff-ff-ff    static
```

Internet Address	Physical Address	Type
192.168.1.1	f8-d1-11-84-e8-2b	dynamic
192.168.1.255	ff-ff-ff-ff-ff-ff	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
224.2.2.2	01-00-5e-02-02-02	static
239.255.255.250	01-00-5e-7f-ff-fa	static
255.255.255.255	ff-ff-ff-ff-ff-ff	static

Figure 3, ARP Cache Table

2. Find the ARP request and answer the following questions:

- a) What are the hexadecimal values for the source and destination addresses in the Ethernet frame containing the ARP request message?

As shown in figure 4, destination address is ff:ff:ff:ff:ff:ff, since client is broadcasting request to all nodes in network in order to get an IP address.

- b) Give the hexadecimal value for the two-byte Ethernet Frame type field. What upper layer protocol does this correspond to?

Protocol type is ARP as we expected:

Type: ARP(0x0806)

It is clear at figure 4.

29	21.031085	IntelCor_7e:e6:45	Broadcast	ARP	42	Who has 169.254.169.254? Tell 192.168.1.4
30	21.759605	IntelCor_7e:e6:45	Broadcast	ARP	42	Who has 169.254.169.254? Tell 192.168.1.4
31	21.994921	IntelCor_7e:e6:45	IPv4mcast_02:02:02	0x0800	72	IPv4
32	22.774291	IntelCor_7e:e6:45	Broadcast	ARP	42	Who has 169.254.169.254? Tell 192.168.1.4
33	22.990959	IntelCor_7e:e6:45	IPv4mcast_02:02:02	0x0800	72	IPv4
34	24.002959	IntelCor_7e:e6:45	IPv4mcast_02:02:02	0x0800	72	IPv4
35	25.003237	IntelCor_7e:e6:45	IPv4mcast_02:02:02	0x0800	72	IPv4
36	25.992006	IntelCor_7e:e6:45	IPv4mcast_02:02:02	0x0800	72	IPv4
37	26.993679	IntelCor_7e:e6:45	IPv4mcast_02:02:02	0x0800	72	IPv4
38	27.993406	IntelCor_7e:e6:45	IPv4mcast_02:02:02	0x0800	72	IPv4

[Coloring Rule String: arp]

- Ethernet II, Src: IntelCor\_7e:e6:45 (50:76:af:7e:e6:45), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
  - Destination: Broadcast (ff:ff:ff:ff:ff:ff)
    - Address: Broadcast (ff:ff:ff:ff:ff:ff)
      - ...1. .... = LG bit: Locally administered address (this is NOT the factory default)
      - ...1. .... = IG bit: Group address (multicast/broadcast)
    - Source: IntelCor\_7e:e6:45 (50:76:af:7e:e6:45)
      - Address: IntelCor\_7e:e6:45 (50:76:af:7e:e6:45)
        - ...0. .... = LG bit: Globally unique address (factory default)
        - ...0. .... = IG bit: Individual address (unicast)
      - Type: ARP (0x0806)

> Address Resolution Protocol (request)

0000	ff ff ff ff ff ff 50 76	af 7e e6 45 08 06 00 01	.....Pv ..-E-...
0010	08 00 06 04 00 01 50 76	af 7e e6 45 c0 a8 01 04	.....Pv ..-E-...
0020	00 00 00 00 00 00 a9 fe	a9 fe	.....

Figure 4

- c) What is the value of the opcode field within the ARP-payload part of the Ethernet frame in which an ARP request is made?  
value for opcode field withing the ARP-payload of the request is 1.

No.	Time	Source	Destination	Protocol	Length	Info
1079	47.464681	IntelCor_7e:e6:45	Broadcast	ARP	42	Who has 169.254.169.254? Tell 192.168.1.4
1081	48.048793	IntelCor_7e:e6:45	Broadcast	ARP	42	Who has 169.254.169.254? Tell 192.168.1.4
1084	49.049128	IntelCor_7e:e6:45	Broadcast	ARP	42	Who has 169.254.169.254? Tell 192.168.1.4
1120	78.549086	IntelCor_7e:e6:45	Tp-LinkT_84:e8:2b	ARP	42	Who has 192.168.1.1? Tell 192.168.1.4
1121	78.587768	Tp-LinkT_84:e8:2b	IntelCor_7e:e6:45	ARP	60	192.168.1.1 is at f8:d1:11:84:e8:2b
1194	123.052506	IntelCor_7e:e6:45	Tp-LinkT_84:e8:2b	ARP	42	Who has 192.168.1.1? Tell 192.168.1.4
1195	123.056070	Tp-LinkT_84:e8:2b	IntelCor_7e:e6:45	ARP	60	192.168.1.1 is at f8:d1:11:84:e8:2b

> Frame 1081: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface \Device\NPF\_{3D7AB8CE-05E4-4BE8-ADD
> Ethernet II, Src: IntelCor\_7e:e6:45 (50:76:af:7e:e6:45), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Address Resolution Protocol (request)

Hardware type: Ethernet (1)
Protocol type: IPv4 (0x0800)
Hardware size: 6
Protocol size: 4
Opcode: request (1)
Sender MAC address: IntelCor\_7e:e6:45 (50:76:af:7e:e6:45)
Sender IP address: 192.168.1.4
Target MAC address: 00:00:00:00:00:00 (00:00:00:00:00:00)
Target IP address: 169.254.169.254

Figure 5

- d) Does the ARP message contain the IP address of the sender?  
Yes, Sender IP address is 192.168.1.4

- e) Where in the ARP request does the “question” appear – the Ethernet address of the machine whose corresponding IP address is being queried?  
The field of Target MAC address 00:00:00:00:00:00, this broadcast will queries the machine which IP address is 169.254.169.254.

### 3. Now find the ARP reply that was sent in response to the ARP request.

a) What is the value of the opcode field within the ARP-payload part of the Ethernet frame in which an ARP response is made?

Opcode for reply is 2.

No.	Time	Source	Destination	Protocol	Length	Info
1079	47.464681	IntelCor_7e:e6:45	Broadcast	ARP	42	Who has 169.254.169.254? Tell 192.168.1.4
1081	48.048793	IntelCor_7e:e6:45	Broadcast	ARP	42	Who has 169.254.169.254? Tell 192.168.1.4
1084	49.049128	IntelCor_7e:e6:45	Broadcast	ARP	42	Who has 169.254.169.254? Tell 192.168.1.4
1120	78.549086	IntelCor_7e:e6:45	Tp-LinkT_84:e8:2b	ARP	42	Who has 192.168.1.1? Tell 192.168.1.4
1121	78.587768	Tp-LinkT_84:e8:2b	IntelCor_7e:e6:45	ARP	60	192.168.1.1 is at f8:d1:11:84:e8:2b
1194	123.052506	IntelCor_7e:e6:45	Tp-LinkT_84:e8:2b	ARP	42	Who has 192.168.1.1? Tell 192.168.1.4
1195	123.056070	Tp-LinkT_84:e8:2b	IntelCor_7e:e6:45	ARP	60	192.168.1.1 is at f8:d1:11:84:e8:2b

>	Frame 1195: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface \Device\NPF_{3D7AB8CE-05E4-4BE8-ADD3-3894A0D97555}, id 0
>	Ethernet II, Src: Tp-LinkT_84:e8:2b (f8:d1:11:84:e8:2b), Dst: IntelCor_7e:e6:45 (50:76:af:7e:e6:45)
>	Destination: IntelCor_7e:e6:45 (50:76:af:7e:e6:45)
>	Address: IntelCor_7e:e6:45 (50:76:af:7e:e6:45)
>	.....0..... = LG bit: Globally unique address (factory default)
>	.....0..... = IG bit: Individual address (unicast)
>	Source: Tp-LinkT_84:e8:2b (f8:d1:11:84:e8:2b)
>	Address: Tp-LinkT_84:e8:2b (f8:d1:11:84:e8:2b)
>	.....0..... = LG bit: Globally unique address (factory default)
>	.....0..... = IG bit: Individual address (unicast)
>	Type: ARP (0x0806)
>	Trailer: a86e65742d6469736300002681c60703001e
>	[Expert Info (Note/Protocol): Didn't find padding of zeros, and an undecoded trailer exists. There may be padding of non-zeros.]
>	Address Resolution Protocol (reply)
>	Hardware type: Ethernet (1)
>	Protocol type: IPv4 (0x0800)
>	Hardware size: 6
>	Protocol size: 4
>	Opcode: reply (2)
>	Sender MAC address: Tp-LinkT_84:e8:2b (f8:d1:11:84:e8:2b)
>	Sender IP address: 192.168.1.1
>	Target MAC address: IntelCor_7e:e6:45 (50:76:af:7e:e6:45)
>	Target IP address: 192.168.1.4

Figure 6, ARP Reply

b) Where in the ARP message does the “answer” to the earlier ARP request appear – the IP address of the machine having the Ethernet address whose corresponding IP address is being queried?

The answer to the earlier ARP request appears in the “Sender MAC address” field, which contains the Ethernet address f8:d1:11:84:e8:2b for the sender with IP address 192.168.1.1.

c) What are the hexadecimal values for the source and destination addresses in the Ethernet frame containing the ARP reply message?

MAC address of source: f8:d1:11:84:e8:2b

MAC address of destination: 50:76:af:e6:45



## Part 3. DHCP

### 1. Draw a timing datagram illustrating the sequence of the DHCP packets.

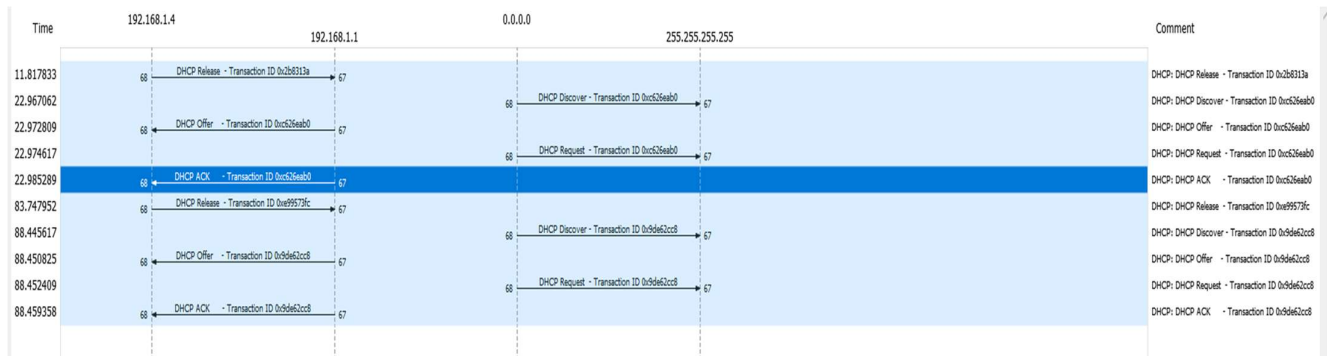


Figure 7, Timing Diagram

From above it we can obtain that, we have four stages:

- I. **Discover:** client sending request to find out if there is any DHCP server to allocate an IP to client or not.
- II. **Offer:** DHCP server is telling to the client that there is an available IP.
- III. **Request:** Client accepts DHCP server's offer.
- IV. **ACK:** Server accepts client's request, and from now client has the given IP.

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

Message type differentiates discover message from request. Message for DHCP Discover is 1 and for request is 3.

### 3. 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?

Transaction IDs are clear in Figure 7. As we can see each set of transactions has a unique ID in order to distinguish requests from another.

We had two sets of transactions:

First set: 0xc626eab0

Second set: 0x9de62cc8

4. For each of the four DHCP messages (Discover/ Offer/ Request/ ACKDHCP), indicate the source and destination IP addresses that are carried in the encapsulating IP datagram.

543	83.747952	192.168.1.4	192.168.1.1	DHCP	342 DHCP Release	- Transaction ID 0xe99573fc
565	88.445617	0.0.0.0	255.255.255.255	DHCP	342 DHCP Discover	- Transaction ID 0x9de62cc8
566	88.450825	192.168.1.1	192.168.1.4	DHCP	342 DHCP Offer	- Transaction ID 0x9de62cc8
567	88.452409	0.0.0.0	255.255.255.255	DHCP	362 DHCP Request	- Transaction ID 0x9de62cc8
568	88.459358	192.168.1.1	192.168.1.4	DHCP	590 DHCP ACK	- Transaction ID 0x9de62cc8

```

> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
v Dynamic Host Configuration Protocol (Discover)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x9de62cc8
  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: IntelCor_7e:e6:45 (50:76:af:7e:e6:45)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
v Option: (53) DHCP Message Type (Discover)
  Length: 1
  DHCP: Discover (1)
v Option: (61) Client identifier
  Length: 7
  Hardware type: Ethernet (0x01)
  Client MAC address: IntelCor_7e:e6:45 (50:76:af:7e:e6:45)
v Option: (50) Requested IP Address (192.168.1.4)
  Length: 4

```

Figure 8, DHCP DISCOVER

543	83.747952	192.168.1.4	192.168.1.1	DHCP	342 DHCP Release	- Transaction ID 0xe99573fc
565	88.445617	0.0.0.0	255.255.255.255	DHCP	342 DHCP Discover	- Transaction ID 0x9de62cc8
566	88.450825	192.168.1.1	192.168.1.4	DHCP	342 DHCP Offer	- Transaction ID 0x9de62cc8
567	88.452409	0.0.0.0	255.255.255.255	DHCP	362 DHCP Request	- Transaction ID 0x9de62cc8
568	88.459358	192.168.1.1	192.168.1.4	DHCP	590 DHCP ACK	- Transaction ID 0x9de62cc8

```

v Dynamic Host Configuration Protocol (Offer)
  Message type: Boot Reply (2)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x9de62cc8
  Seconds elapsed: 0
  > Bootp flags: 0x0000 (Unicast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 192.168.1.4
  Next server IP address: 192.168.1.1
  Relay agent IP address: 0.0.0.0
  Client MAC address: IntelCor_7e:e6:45 (50:76:af:7e:e6:45)
  Client hardware address padding: 00000000000000000000
  Server host name: TP-LINK
  Boot file name not given
  Magic cookie: DHCP
v Option: (53) DHCP Message Type (Offer)
  Length: 1
  DHCP: Offer (2)
v Option: (1) Subnet Mask (255.255.255.0)
  Length: 4
  Subnet Mask: 255.255.255.0
v Option: (3) Router
  Length: 4
  Router: 192.168.1.1
v Option: (6) Domain Name Server
  Length: 8
  Domain Name Server: 192.168.1.1

```

Figure9 , Offer

No.	Time	Source	Destination	Protocol	Length	Info
543	83.747952	192.168.1.4	192.168.1.1	DHCP	342	DHCP Release - Transaction ID 0xe99573fc
565	88.445617	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x9de62cc8
566	88.450825	192.168.1.1	192.168.1.4	DHCP	342	DHCP Offer - Transaction ID 0x9de62cc8
567	88.452409	0.0.0.0	255.255.255.255	DHCP	362	DHCP Request - Transaction ID 0x9de62cc8
568	88.459358	192.168.1.1	192.168.1.4	DHCP	590	DHCP ACK - Transaction ID 0x9de62cc8

> User Datagram Protocol, Src Port: 68, Dst Port: 67
 

> Dynamic Host Configuration Protocol (Request)
 

Message type: Boot Request (1)
 Hardware type: Ethernet (0x01)
 Hardware address length: 6
 Hops: 0
 Transaction ID: 0x9de62cc8
 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: IntelCor\_7e:e6:45 (50:76:af:7e:e6:45)
 Client hardware address padding: 00000000000000000000
 Server host name not given
 Boot file name not given
 Magic cookie: DHCP
 > Option: (53) DHCP Message Type (Request)
 Length: 1
 DHCP: Request (3)
 > Option: (61) Client identifier
 Length: 7
 Hardware type: Ethernet (0x01)
 Client MAC address: IntelCor\_7e:e6:45 (50:76:af:7e:e6:45)
 > Option: (50) Requested IP Address (192.168.1.4)
 Length: 4
 Requested IP Address: 192.168.1.4
 > Option: (54) DHCP Server Identification (192.168.1.1)

Figure 10, Request

No.	Time	Source	Destination	Protocol	Length	Info
543	83.747952	192.168.1.4	192.168.1.1	DHCP	342	DHCP Release - Transaction ID 0xe99573fc
565	88.445617	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x9de62cc8
566	88.450825	192.168.1.1	192.168.1.4	DHCP	342	DHCP Offer - Transaction ID 0x9de62cc8
567	88.452409	0.0.0.0	255.255.255.255	DHCP	362	DHCP Request - Transaction ID 0x9de62cc8
568	88.459358	192.168.1.1	192.168.1.4	DHCP	590	DHCP ACK - Transaction ID 0x9de62cc8

> Frame 568: 590 bytes on wire (4720 bits), 590 bytes captured (4720 bits) on interface \Device\NPF\_{3D7AB8CE-05E4-4BE8-ADD3-3894}
 > Ethernet II, Src: Tp-Link\_84:e8:2b (f8:d1:11:84:e8:2b), Dst: IntelCor\_7e:e6:45 (50:76:af:7e:e6:45)
 > Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.4
 > User Datagram Protocol, Src Port: 67, Dst Port: 68
 > Dynamic Host Configuration Protocol (ACK)
 

Message type: Boot Reply (2)
 Hardware type: Ethernet (0x01)
 Hardware address length: 6
 Hops: 0
 Transaction ID: 0x9de62cc8
 Seconds elapsed: 0
 > Bootp flags: 0x0000 (Unicast)
 Client IP address: 0.0.0.0
 Your (client) IP address: 192.168.1.4
 Next server IP address: 192.168.1.1
 Relay agent IP address: 0.0.0.0
 Client MAC address: IntelCor\_7e:e6:45 (50:76:af:7e:e6:45)
 Client hardware address padding: 00000000000000000000
 Server host name: TP-LINK
 Boot file name not given
 Magic cookie: DHCP
 > Option: (53) DHCP Message Type (ACK)
 Length: 1
 DHCP: ACK (5)
 > Option: (1) Subnet Mask (255.255.255.0)
 Length: 4
 Subnet Mask: 255.255.255.0
 > Option: (3) Router

Figure 11, DHCP ACK

As we can see in figures above:

IP \ Transaction	Discover	Offer	Request	Acknolegment
Source IP	0.0.0.0	192.168.1.1	0.0.0.0	192.168.1.1
Destination IP	192.168.1.1	255.255.255.255	255.255.255.255	192.168.1.4

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

DHCP Server IP Adress is 192.168.1.1.

6. 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.

Offering IP Address: 192.168.1.4.

Offer message contains IP address.

7. 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?

Client answer to offer message in request packet (figure 9) .

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

Since users may leave network and we have limited number of IPs, DHCP server allocate each client an IP for a limited time. This time indicates that how much time users have been given an specific IP address. After this lease time, if user requests, process will be repeated.

## Supplementary HTTP

### 1. How many HTTP GET request messages did your browser send?

My browser Sent 5 GET request messages.

no.	time	source	destination	protocol	length	info
51	3.911348	192.168.1.4	128.119.245.12	HTTP	535	GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1
65	4.199481	128.119.245.12	192.168.1.4	HTTP	1355	HTTP/1.1 200 OK (text/html)
79	4.270521	192.168.1.4	128.119.245.12	HTTP	481	GET /pearson.png HTTP/1.1
91	4.435485	192.168.1.4	178.79.137.164	HTTP	448	GET /8E_cover_small.jpg HTTP/1.1
95	*REF*	128.119.245.12	192.168.1.4	HTTP	865	HTTP/1.1 200 OK (PNG)
102	0.073299	178.79.137.164	192.168.1.4	HTTP	225	HTTP/1.1 301 Moved Permanently
993	4.589184	192.168.1.4	128.119.245.12	HTTP	481	GET /favicon.ico HTTP/1.1
1030	5.390927	192.168.1.4	128.119.245.12	HTTP	481	GET /favicon.ico HTTP/1.1
1046	5.730771	128.119.245.12	192.168.1.4	HTTP	539	HTTP/1.1 404 Not Found (text/html)

> [Timestamps]
TCP payload (427 bytes)
> Hypertext Transfer Protocol
> GET /pearson.png HTTP/1.1\r\n
> [Expert Info (Chat/Sequence): GET /pearson.png HTTP/1.1\r\n]
Request Method: GET
Request URI: /pearson.png
Request Version: HTTP/1.1
Host: gaia.cs.umass.edu\r\n
Connection: keep-alive\r\n
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36 Edg/91.0.864.59\r\n
Accept: image/webp,image/apng,image/svg+xml,image/*,*/*;q=0.8\r\n
Referer: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file4.html\r\n
Accept-Encoding: gzip, deflate\r\n
Accept-Language: en-US,en;q=0.9\r\n
\r\n
[Full request URI: http://gaia.cs.umass.edu/pearson.png]

Figure 12

### 2. Explain the purposes of all GET messages.

GET is used to retrieve and request data from a specified resource in a server.

Packet 51: getting html file.

Packet 79: Pearson book image.

Packet 91: cover\_small.jpg

Packet 993,1030: favicon.ico

### 3. Explain the GET responses. What is the content of these messages?

All of GET response is with code 1xx and are INFORMATIONAL, it means request was received and the process is continuing.