CS 372 Lab 4

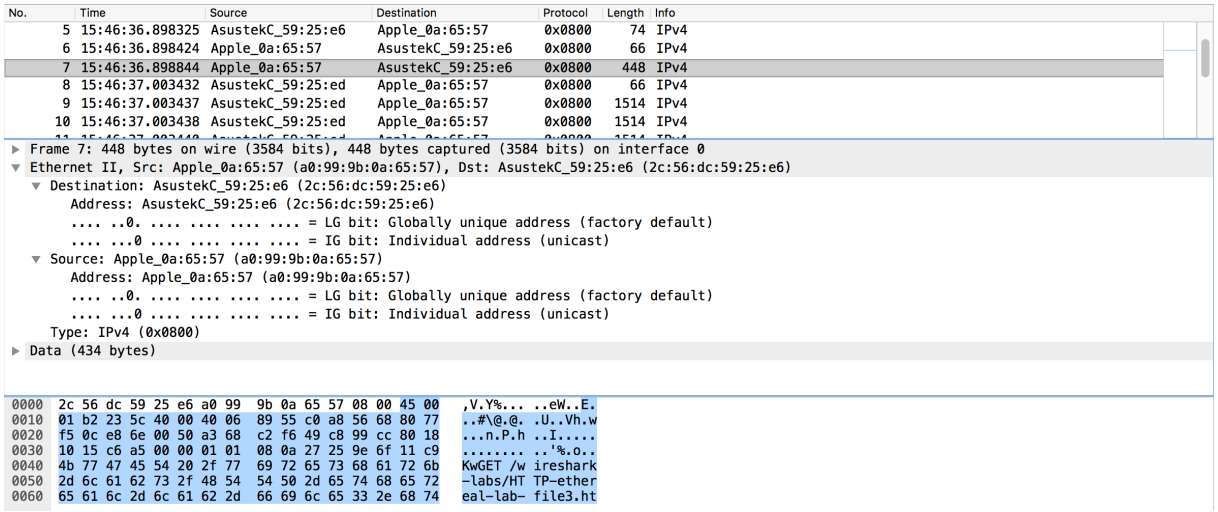
Joanna Lew

Summer 2017

Question 1

Q: What is the 48-bit Ethernet address of your computer?

A: The 48-bit Ethernet address of my computer is a0:99:9b:0a:65:57.



Question 2

Q: What is the 48-bit destination address in the Ethernet frame? Is this the Ethernet address of gaia.cs.umass.edu? What device has this as its Ethernet address?

A: The 48-bit destination address is 2c:56:dc:59:25:e6. No, it is not the Ethernet address of gaia.cs.umass.edu. It is the Ethernet address of the router to which my computer is connected.

Question 3

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

A: The hex value for the Frame type field is 0x800. This indicates it is an IPv4 type frame.

Question 4

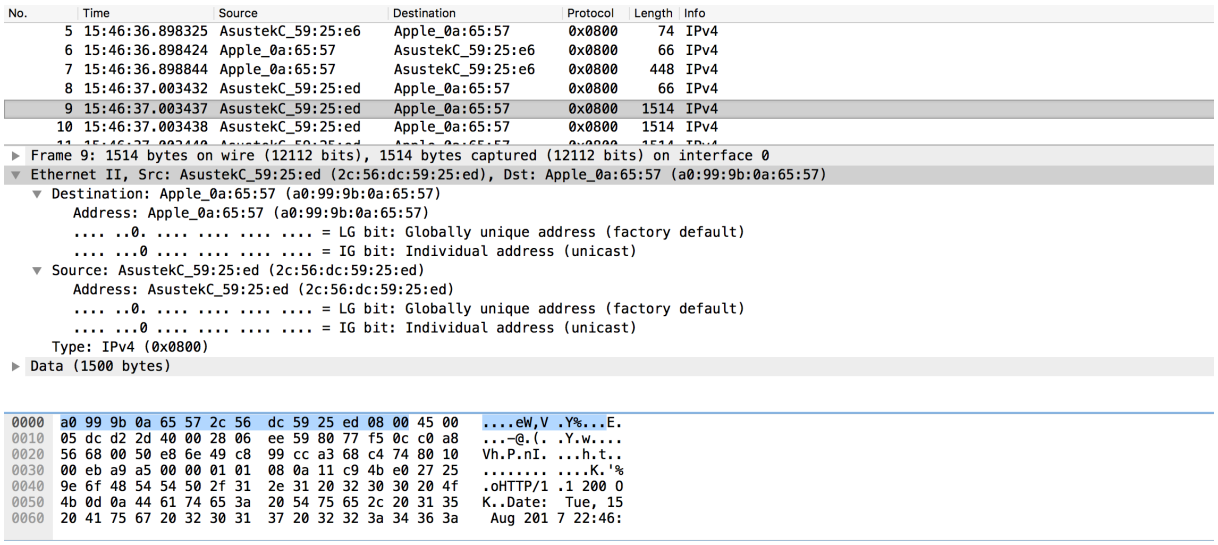
Q: How many bytes from the very start of the Ethernet frame does the ASCII "G" in "GET" appear in the Ethernet frame?

A: The "G" appears 54 bytes from the start of the frame. The Ethernet frame is 14 bytes, which can be obtained with Total size − Data size = 448 − 434 = 14 bytes. The IP and TCP headers are each 20 bytes. Therefore 20 + 20 + 14 = 54 bytes.

Question 5

Q: What is the value of the Ethernet source address? Is this the address of your computer, or of gaia.cs.umass.edu? What device has this as its Ethernet address?

A: The Ethernet source address is 2c:56:dc:59:25:e6. This is the address of the router to which my computer is connected to.



Question 6

Q: What is the destination address in the Ethernet frame? Is this the Ethernet address of your computer?

A: The destination address is a0:99:9b:0a:65:57. Yes, it is the Ethernet address of my computer.

Question 7

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

A: The hex value for the Frame type field is 0x800, which corresponds to IPv4.

Question 8

Q: How many bytes from the very start of the Ethernet frame does the ASCII "O" in "OK" (i.e., the HTTP response code) appear in the Ethernet frame?

A: The Ethernet frame is 14 bytes, and the IP and TCP are each 20 bytes. There is an additional 13 bytes since the "O" is preceded by HTTP/1.1 200 . $14 + 20 + 20 + 13 = 67$ bytes. Therefore, "O" is the 68th byte.

Question 9

Q: Write down the contents of your computers ARP cache. What is the meaning of each column value?

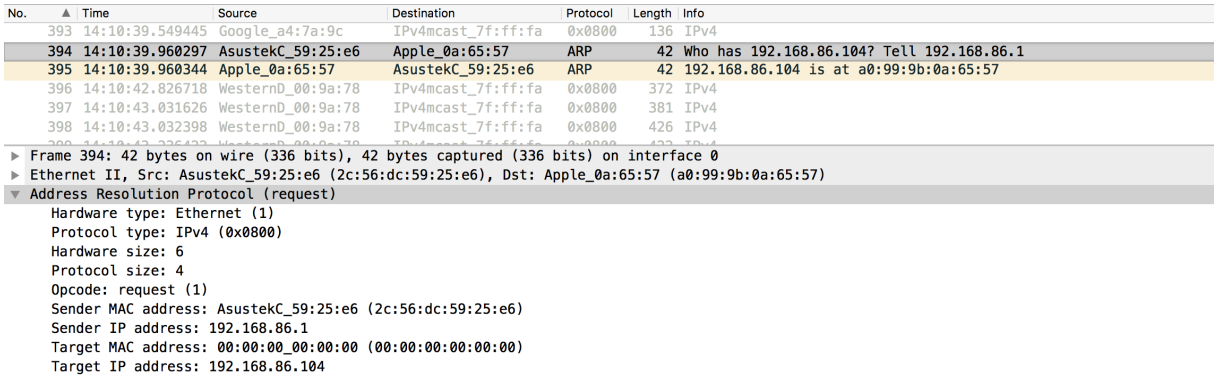
```
joannas-mbp:~ Eggo$ arp -n -l -a
Neighbor                Linklayer Address Expire(O) Expire(I)    Netif Refs Prbs
192.168.86.1            2c:56:dc:59:25:e6 1m5s      1m1s           en0    1
192.168.86.101          f4:f5:d8:a4:7a:9c 1m12s     1m12s          en0    1
192.168.86.113          0:71:cc:45:4b:ab  1m58s     1m58s          en0    1
224.0.0.251             1:0:5e:0:0:fb     (none)    (none)         en0
239.255.255.250         1:0:5e:7f:ff:fa   (none)    (none)         en0
```

A: The "Neighbor" column shows the IPv4 addresses of the devices connected to the network, while the "Linklayer Address" column shows the corresponding MAC address. A value in the Expire columns shows that the entries are dynamic, meaning they will be removed after a period of time. Having (none) in the Expire column means they are static/permanent ARP cache entries.

Question 10

Q: What are the hexadecimal values for the source and destination addresses in the Ethernet frame containing the ARP request message?

A: The source address is 2c:56:dc:59:25:e6. The destination address is a0:99:9b:0a:65:57.



Question 11

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

A: The hex value for the Frame type field is 0x0806. This corresponds to ARP.

Question 12

Q: Find the first of two frames that contain ARP messages.

(a) How many bytes from the very beginning of the Ethernet frame does the ARP opcode field begin?

The ARP opcode field begins 20 bytes from the beginning of the Ethernet frame. There are 6 bytes each for the source and destination MAC addresses, 2 bytes for the Frame type, and 6 bytes for the header fields that precede Operation (HTYPE, PTYPE, HLEN, PLEN). $6 + 6 + 6 + 2 = 20$ bytes.

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

The Opcode value is 1. This indicates it is an ARP request.

(c) Does the ARP message contain the IP address of the sender?

Yes, it contains the Sender's IP address, which is 192.168.86.1.

(d) Where in the ARP request does the question appear the Ethernet address of the machine whose corresponding IP address is being queried?

The field "Target MAC address" is set to 00:00:00:00:00:00 to question the machine whose corresponding IP address is being queried.

Question 13

Q: Now find the ARP reply that was sent in response to the ARP request.

(a) How many bytes from the very beginning of the Ethernet frame does the ARP opcode field begin?

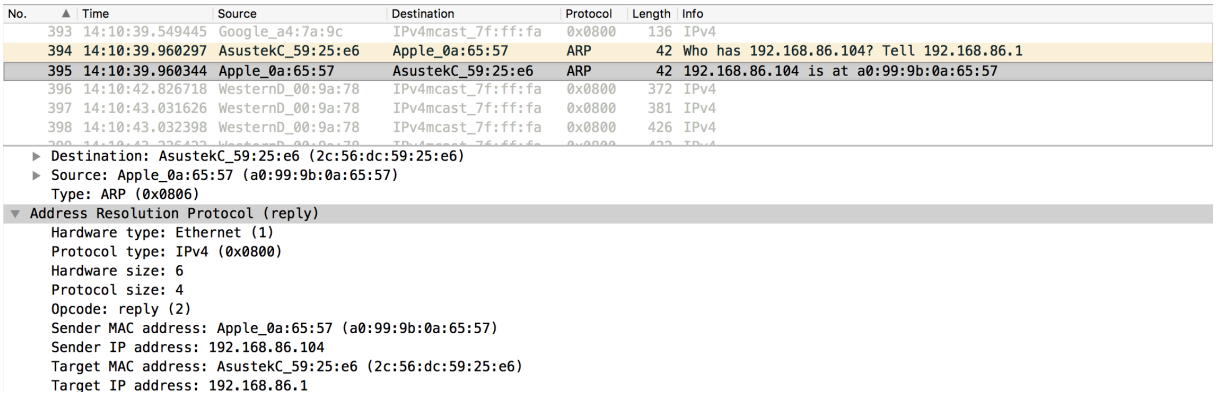
The ARP opcode field begins 20 bytes from the beginning of the Ethernet frame.

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

The value of the opcode field is 2. This indicates it is a reply.

(c) 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 ARP request is in the "Sender MAC address" field. It has the Ethernet address a0:99:9b:0a:65:57 for the sender with corresponding IP address 192.168.86.104.



Question 14

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

A: The source address is a0:99:9b:0a:65:57. The destination address is 2c:56:dc:59:25:e6.

Question 15

Q: Open the ethernet-ethereal-trace-1 trace file. The first and second ARP packets in this trace correspond to an ARP request sent by the computer running Wireshark, and the ARP reply sent to the computer running Wireshark by the computer with the ARP-requested Ethernet address. But there is yet another computer on this network, as indicated by packet 6 another ARP request. Why is there no ARP reply (sent in response to the ARP request in packet 6) in the packet trace?

A: There is no ARP reply because the reply is sent by the computer with the requested IP address (192.168.1.117) directly to the sender (192.168.1.104). Since we are not the sender or destination, we do not see the reply.