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## LAB3 REPORT

### PART1 DHCP

#### Ipconfig release, ipconfig renew:

```
Last login: Wed Jun 19 15:35:56 on ttys000
[amaris-MacBook-Pro:~ jun$ sudo ipconfig set en0 BOOTP
Password:
[amaris-MacBook-Pro:~ jun$ sudo ipconfig set en0 DHCP
[amaris-MacBook-Pro:~ jun$ sudo ipconfig set en0 DHCP
[amaris-MacBook-Pro:~ jun$ sudo ipconfig set en0 BOOTP
[amaris-MacBook-Pro:~ jun$ sudo ipconfig set en0 DHCP
[amaris-MacBook-Pro:~ jun$ ifconfig
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
    options=1203<RXCSUM,TXCSUM,TXSTATUS,SW_TIMESTAMP>
    inet 127.0.0.1 netmask 0xff000000
    inet6 ::1 prefixlen 128
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x1
    nd6 options=201<PERFORMNUD,DAD>
gif0: flags=8010<POINTOPOINT,MULTICAST> mtu 1280
stf0: flags=0<> mtu 1280
XHC1: flags=0<> mtu 0
XHC20: flags=0<> mtu 0
VHC128: flags=0<> mtu 0
XHC0: flags=0<> mtu 0
ap1: flags=8802<BROADCAST,SIMPLEX,MULTICAST> mtu 1500
    ether f2:18:98:b5:23:6f
    media: autoselect
    status: inactive
en0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    ether f0:18:98:b5:23:6f
    inet6 fe80::108c:92fa:b909:952c%en0 prefixlen 64 secured scopeid 0xa
    inet 10.0.89.15 netmask 0xffff8000 broadcast 10.0.127.255
    nd6 options=201<PERFORMNUD,DAD>
    media: autoselect
    status: active
p2p0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 2304
    ether 02:18:98:b5:23:6f
    media: autoselect
    status: inactive
awdl0: flags=8943<UP,BROADCAST,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1484
    ether 9a:25:34:28:33:ee
    inet6 fe80::9825:34ff:fe28:33ee%awdl0 prefixlen 64 scopeid 0xc
    nd6 options=201<PERFORMNUD,DAD>
    media: autoselect
    status: active
```

#### 1. DHCP messages are send over UDP.

- ▶ Frame 1193: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
- ▶ Ethernet II, Src: Apple\_b5:23:6f (f0:18:98:b5:23:6f), 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
- ▶ Dynamic Host Configuration Protocol (Discover)

```

▶ Frame 1211: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
▶ Ethernet II, Src: Cisco-Li_41:96:40 (c8:d7:19:41:96:40), Dst: Apple_b5:23:6f (f0:18:98:b5:23:6f)
▶ Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.120
▶ User Datagram Protocol, Src Port: 67, Dst Port: 68
▶ Dynamic Host Configuration Protocol (Offer)

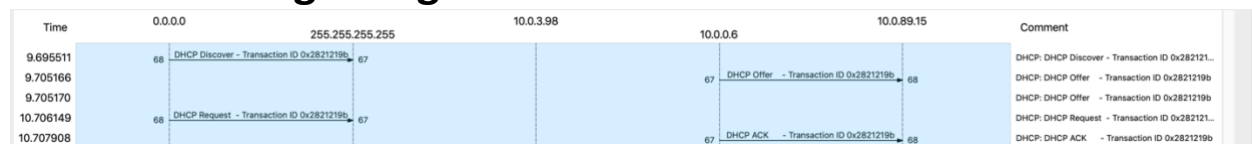
▶ Frame 1220: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
▶ Ethernet II, Src: Apple_c2:94:53 (f4:5c:89:c2:94:53), Dst: Apple_b5:23:6f (f0:18:98:b5:23:6f)
▶ Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
▶ User Datagram Protocol, Src Port: 68, Dst Port: 67
▶ Dynamic Host Configuration Protocol (Request)

▶ Frame 527: 590 bytes on wire (4720 bits), 590 bytes captured (4720 bits) on interface 0
▶ Ethernet II, Src: Nomadix_03:35:c5 (00:50:e8:03:35:c5), Dst: Apple_b5:23:6f (f0:18:98:b5:23:6f)
▶ Internet Protocol Version 4, Src: 10.0.0.6, Dst: 10.0.89.15
▶ User Datagram Protocol, Src Port: 67, Dst Port: 68
▶ Dynamic Host Configuration Protocol (ACK)

```

## 2. DHCP use client-server architecture

## 3. DHCP Timing datagram



## 4.

```

▶ Frame 1039: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
▶ Ethernet II, Src: Apple_b5:23:6f (f0:18:98:b5:23:6f), 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
▶ Dynamic Host Configuration Protocol (Discover)

```

## 5.

```

Frame 1039: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
Ethernet II, Src: Apple_b5:23:6f (f0:18:98:b5:23:6f), 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
Dynamic Host Configuration Protocol (Discover)

```

```

Message type: Boot Request (1)
Hardware type: Ethernet (0x01)
Hardware address length: 6
Hops: 0
Transaction ID: 0x2821219b
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: Apple_b5:23:6f (f0:18:98:b5:23:6f)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP

```

```

▼ Option: (53) DHCP Message Type (Discover)
Length: 1
DHCP: Discover (1)

```

```

Frame 1106: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
Ethernet II, Src: Apple_b5:23:6f (f0:18:98:b5:23:6f), 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
Dynamic Host Configuration Protocol (Request)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x2821219b
  Seconds elapsed: 1
  ▶ 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: Apple_b5:23:6f (f0:18:98:b5:23:6f)
  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)

```

## 6. Transaction ID of the first four messages

1039	9.695511	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover	- Transaction ID 0x2821219b
1040	9.705166	10.0.0.6	10.0.89.15	DHCP	590	DHCP Offer	- Transaction ID 0x2821219b
1041	9.705170	192.168.1.1	192.168.1.131	DHCP	342	DHCP Offer	- Transaction ID 0x2821219b
1106	10.706149	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request	- Transaction ID 0x2821219b
1107	10.707908	10.0.0.6	10.0.89.15	DHCP	590	DHCP ACK	- Transaction ID 0x2821219b

## Transaction ID of second set of DHCP messages

2258	19.506496	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request	- Transaction ID 0xd299baa3
2259	19.509837	10.0.0.6	10.0.89.15	DHCP	590	DHCP ACK	- Transaction ID 0xd299baa3

We need transaction id to help the client to recognize which DHCP is responding to the request.

## 7. Source IP address for host is 0.0.0.0.

Destination address for both client and server is

255.255.255.255.

Source IP address for server is its actual IP address.

2161	18.495021	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover	- Transaction ID 0xd299baa3
2163	18.504709	10.0.0.6	10.0.89.15	DHCP	590	DHCP Offer	- Transaction ID 0xd299baa3
2164	18.504714	192.168.1.1	192.168.1.131	DHCP	342	DHCP Offer	- Transaction ID 0xd299baa3
2258	19.506496	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request	- Transaction ID 0xd299baa3
2259	19.509837	10.0.0.6	10.0.89.15	DHCP	590	DHCP ACK	- Transaction ID 0xd299baa3

## 8. The IP address of my DHCP server is 192.168.1.1

2161	18.495021	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover	- Transaction ID 0xd299baa3
2163	18.504709	10.0.0.6	10.0.89.15	DHCP	590	DHCP Offer	- Transaction ID 0xd299baa3
2164	18.504714	192.168.1.1	192.168.1.131	DHCP	342	DHCP Offer	- Transaction ID 0xd299baa3
2258	19.506496	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request	- Transaction ID 0xd299baa3
2259	19.509837	10.0.0.6	10.0.89.15	DHCP	590	DHCP ACK	- Transaction ID 0xd299baa3

**9. The DHCP server offer 192.168.1.131 to my host,  
the lease time is 1 day,  
the offered IP is contained in the “DHCP message type(offer)”**

```
Frame 1041: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
Ethernet II, Src: Cisco-Li_41:96:40 (c8:d7:19:41:96:40), Dst: Apple_b5:23:6f (f0:18:98:b5:23:6f)
Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.131
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: 0x2821219b
  Seconds elapsed: 0
  ▶ Bootp flags: 0x0000 (Unicast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 192.168.1.131
  Next server IP address: 192.168.1.1
  Relay agent IP address: 0.0.0.0
  Client MAC address: Apple_b5:23:6f (f0:18:98:b5:23:6f)
  Client hardware address padding: 00000000000000000000
  Server host name: ecosystem.home.cisco.com
  Boot file name not given
  Magic cookie: DHCP
  ▼ Option: (53) DHCP Message Type (Offer)
    Length: 1
    DHCP: Offer (2)
  ▼ Option: (54) DHCP Server Identifier (192.168.1.1)
    Length: 4
    DHCP Server Identifier: 192.168.1.1
  ▼ Option: (51) IP Address Lease Time
    Length: 4
    IP Address Lease Time: (86400s) 1 day
  ▼ Option: (58) Renewal Time Value
    Length: 4
    Renewal Time Value: (43200s) 12 hours
  ▼ Option: (59) Rebinding Time Value
    Length: 4
    Rebinding Time Value: (75600s) 21 hours
  ▼ Option: (1) Subnet Mask (255.255.255.0)
    Length: 4
    Subnet Mask: 255.255.255.0
  ▼ Option: (28) Broadcast Address (192.168.1.255)
    Length: 4
    Broadcast Address: 192.168.1.255
  ▼ Option: (6) Domain Name Server
    Length: 4
    Domain Name Server: 192.168.1.1
```

**10. DHCP server also provides network configuration  
information for the client**

**11. The relay agent IP address is 0.0.0.0 in the given example,  
this indicates that there is no relay agent. In my experiment,**



there is no relay agent, since the relay agent IP address in my experiment is also 0.0.0.0.

```
Frame 1041: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
Ethernet II, Src: Cisco-Li_41:96:40 (c8:d7:19:41:96:40), Dst: Apple_b5:23:6f (f0:18:98:b5:23:6f)
Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.131
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: 0x2821219b
  Seconds elapsed: 0
  ▶ Bootp flags: 0x0000 (Unicast)
    Client IP address: 0.0.0.0
    Your (client) IP address: 192.168.1.131
    Next server IP address: 192.168.1.1
    Relay agent IP address: 0.0.0.0
    Client MAC address: Apple_b5:23:6f (f0:18:98:b5:23:6f)
    Client hardware address padding: 00000000000000000000
    Server host name: ecosystem.home.cisco.com
    Boot file name not given
    Magic cookie: DHCP
```

**12. The purpose of the router line is to default gateway for the client. The purpose of the subnet mask line is to tell the client to use which subnet mask.**

```
Frame 1041: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
Ethernet II, Src: Cisco-Li_41:96:40 (c8:d7:19:41:96:40), Dst: Apple_b5:23:6f (f0:18:98:b5:23:6f)
Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.131
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: 0x2821219b
  Seconds elapsed: 0
  ▶ Bootp flags: 0x0000 (Unicast)
    Client IP address: 0.0.0.0
    Your (client) IP address: 192.168.1.131
    Next server IP address: 192.168.1.1
    Relay agent IP address: 0.0.0.0
    Client MAC address: Apple_b5:23:6f (f0:18:98:b5:23:6f)
    Client hardware address padding: 00000000000000000000
    Server host name: ecosystem.home.cisco.com
    Boot file name not given
    Magic cookie: DHCP
  ▶ Option: (53) DHCP Message Type (Offer)
  ▶ Option: (54) DHCP Server Identifier (192.168.1.1)
  ▶ Option: (51) IP Address Lease Time
  ▶ Option: (58) Renewal Time Value
  ▶ Option: (59) Rebinding Time Value
  ▶ Option: (1) Subnet Mask (255.255.255.0)
  ▶ Option: (28) Broadcast Address (192.168.1.255)
  ▶ Option: (6) Domain Name Server
  ▼ Option: (3) Router
    Length: 4
    Router: 192.168.1.1
```

### 13. The client accept this IP address.

```
Frame 1106: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
Ethernet II, Src: Apple_b5:23:6f (f0:18:98:b5:23:6f), 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
Dynamic Host Configuration Protocol (Request)
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0x2821219b
  Seconds elapsed: 1
  ▶ 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: Apple_b5:23:6f (f0:18:98:b5:23:6f)
  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: (55) Parameter Request List
  ▶ Option: (57) Maximum DHCP Message Size
  ▶ Option: (61) Client identifier
  ▼ Option: (50) Requested IP Address (10.0.89.15)
    Length: 4
    Requested IP Address: 10.0.89.15
```

**14. The purpose of a DHCP release message is to delete the current lease of the IP address given by the DHCP server. The DHCP server does not give a message to acknowledge the DHCP release message. If the client's DHCP Release message is lost, the server will keep waiting until the IP address for lease is over and reused to serve for another client.**

**15. Yes, there is a ARP packet during the DHCP packet-exchange period. The purpose of ARP packet is to map the MAC address with new IP address.**

2161	18.495021	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xd299baa3
2162	18.495112	Apple_19:49:8b	Apple_b5:23:6f	ARP	56	Who has 169.254.255.255? Tell 10.0.93.195
2163	18.504709	10.0.0.6	10.0.89.15	DHCP	590	DHCP Offer - Transaction ID 0xd299baa3
2164	18.504714	192.168.1.1	192.168.1.131	DHCP	342	DHCP Offer - Transaction ID 0xd299baa3

## PART2 ARP

**16. The first column is Internet Address, which indicates IPv4 address. The second column is physical address, which indicates the MAC address**

```
amaris-MacBook-Pro:~ jun$ arp -a
? (10.0.0.6) at 0:50:e8:3:35:c5 on en0 ifscope [ethernet]
? (10.0.0.12) at 4c:56:9d:6f:21:b8 on en0 ifscope [ethernet]
? (10.0.0.21) at 28:a0:2b:79:ec:1c on en0 ifscope [ethernet]
? (10.0.0.30) at f8:e9:4e:87:a:68 on en0 ifscope [ethernet]
? (10.0.0.31) at 10:94:bb:d9:27:9c on en0 ifscope [ethernet]
? (10.0.0.38) at f0:18:98:4:5:0 on en0 ifscope [ethernet]
? (10.0.0.39) at d8:1c:79:83:4e:e4 on en0 ifscope [ethernet]
? (10.0.0.42) at 14:c2:13:9:e1:44 on en0 ifscope [ethernet]
? (10.0.0.65) at 48:bf:6b:f0:a7:c8 on en0 ifscope [ethernet]
? (10.0.0.77) at 68:ef:43:3b:15:80 on en0 ifscope [ethernet]
? (10.0.0.79) at c8:d0:83:8b:8a:b4 on en0 ifscope [ethernet]
? (10.0.0.81) at dc:56:e7:75:e9:1c on en0 ifscope [ethernet]
? (10.0.0.111) at b8:c1:11:d5:7b:88 on en0 ifscope [ethernet]
? (10.0.0.113) at 8c:8e:f2:8f:bf:e8 on en0 ifscope [ethernet]
? (10.0.0.114) at d0:a6:37:e4:d6:40 on en0 ifscope [ethernet]
? (10.0.0.134) at d0:c5:f3:2c:6d:84 on en0 ifscope [ethernet]
? (10.0.0.140) at 98:fe:94:4c:7d:50 on en0 ifscope [ethernet]
? (10.0.0.152) at cc:8:8d:4:7:0 on en0 ifscope [ethernet]
? (10.0.0.169) at 68:ec:c5:ce:25:20 on en0 ifscope [ethernet]
? (10.0.0.170) at f0:18:98:42:fe:70 on en0 ifscope [ethernet]
? (10.0.0.191) at 2c:33:7a:24:7a:24 on en0 ifscope [ethernet]
? (10.0.0.195) at 90:dd:5d:14:a5:4 on en0 ifscope [ethernet]
? (10.0.0.206) at c4:b3:1:96:46:28 on en0 ifscope [ethernet]
```

**17. The hexadecimal values for the source addresses is 5c:5f:67:63:31:c0, and the hexadecimal values for the destination addresses is f0:18:98:b5:23:6f in the ARP request message.**

41	0.247948	IntelCor_63:31:c0	Apple_b5:23:6f	ARP	56	Who has 10.0.0.1? Tell 10.0.4.81
42	0.261221	Apple_99:e4:d6	Apple_b5:23:6f	ARP	56	0.0.0.0 is at 6c:94:f8:99:e4:d6
43	0.273240	Apple_1e:fa:f0	Apple_b5:23:6f	ARP	56	0.0.0.0 is at 18:34:51:1e:fa:f0
44	0.279193	Apple_1e:fa:f0	Apple_b5:23:6f	ARP	56	0.0.0.0 is at 18:34:51:1e:fa:f0

- ▶ Frame 41: 56 bytes on wire (448 bits), 56 bytes captured (448 bits) on interface 0
- ▼ Ethernet II, Src: IntelCor\_63:31:c0 (5c:5f:67:63:31:c0), Dst: Apple\_b5:23:6f (f0:18:98:b5:23:6f)
  - ▶ Destination: Apple\_b5:23:6f (f0:18:98:b5:23:6f)
  - ▶ Source: IntelCor\_63:31:c0 (5c:5f:67:63:31:c0)
    - Type: ARP (0x0806)
    - Trailer: 00000000000000000000000000000000
  - ▶ Address Resolution Protocol (request)

## 18. The hexadecimal value for the two-byte Ethernet Frame type field is 0X0806.

```
► Frame 41: 56 bytes on wire (448 bits), 56 bytes captured (448 bits) on interface 0
▼ Ethernet II, Src: IntelCor_63:31:c0 (5c:5f:67:63:31:c0), Dst: Apple_b5:23:6f (f0:18:98:b5:23:6f)
  ► Destination: Apple_b5:23:6f (f0:18:98:b5:23:6f)
  ► Source: IntelCor_63:31:c0 (5c:5f:67:63:31:c0)
  Type: ARP (0x0806)
  Trailer: 00000000000000000000000000000000
► Address Resolution Protocol (request)
```

## 19. a) 20 bytes

b) 1, for request

c) Yes

d) In “Target MAC address”, 00:00:00:00:00:00

```
► Frame 25: 56 bytes on wire (448 bits), 56 bytes captured (448 bits) on interface 0
▼ Ethernet II, Src: Apple_e4:6f:47 (a4:5e:60:e4:6f:47), Dst: Apple_b5:23:6f (f0:18:98:b5:23:6f)
  ► Destination: Apple_b5:23:6f (f0:18:98:b5:23:6f)
  ► Source: Apple_e4:6f:47 (a4:5e:60:e4:6f:47)
  Type: ARP (0x0806)
  Trailer: 00000000000000000000000000000000
▼ Address Resolution Protocol (request)
  Hardware type: Ethernet (1)
  Protocol type: IPv4 (0x0800)
  Hardware size: 6
  Protocol size: 4
  Opcode: request (1)
  Sender MAC address: Apple_e4:6f:47 (a4:5e:60:e4:6f:47)
  Sender IP address: 10.0.94.231
  Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)
  Target IP address: 10.0.1.198
```

## 20.a) 20 bytes

b) 2, for reply



### c) In “Sender MAC address”, 6c:94:f8:99:e4:d6

- ▶ Frame 57: 56 bytes on wire (448 bits), 56 bytes captured (448 bits) on interface 0
- ▼ Ethernet II, Src: Apple\_99:e4:d6 (6c:94:f8:99:e4:d6), Dst: Apple\_b5:23:6f (f0:18:98:b5:23:6f)
  - ▶ Destination: Apple\_b5:23:6f (f0:18:98:b5:23:6f)
  - ▶ Source: Apple\_99:e4:d6 (6c:94:f8:99:e4:d6)
  - Type: ARP (0x0806)
  - Trailer: 00000000000000000000000000000000
- ▼ Address Resolution Protocol (reply)
  - Hardware type: Ethernet (1)
  - Protocol type: IPv4 (0x0800)
  - Hardware size: 6
  - Protocol size: 4
  - Opcode: reply (2)
  - Sender MAC address: Apple\_99:e4:d6 (6c:94:f8:99:e4:d6)
  - Sender IP address: 0.0.0.0
  - Target MAC address: SamsungE\_3e:6d:03 (5c:a3:9d:3e:6d:03)
  - Target IP address: 169.254.78.27

**21. The hexadecimal values for the source addresses is 6c:94:f8:99:e4:d6, and the hexadecimal values for the destination addresses is f0:18:98:b5:23:6f in the ARP reply message.**

56	0.376207	Apple_2f:c7:de	Apple_b5:23:6f	ARP	56	0.0.0.0	is at 20:7d:74:2f:c7:de
57	0.385615	Apple_99:e4:d6	Apple_b5:23:6f	ARP	56	0.0.0.0	is at 6c:94:f8:99:e4:d6

- ▶ Frame 57: 56 bytes on wire (448 bits), 56 bytes captured (448 bits) on interface 0
- ▶ Ethernet II, Src: Apple\_99:e4:d6 (6c:94:f8:99:e4:d6), Dst: Apple\_b5:23:6f (f0:18:98:b5:23:6f)
- ▶ Address Resolution Protocol (reply)

**22. Because the ARP reply is sent directly to the client, but my machine is not the one sent the request.**