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04/12/2017
CS4793
Homework 06

*For this particular homework, I used the file provided by the lab, because NYU WiFi prevents me from accessing additional information.

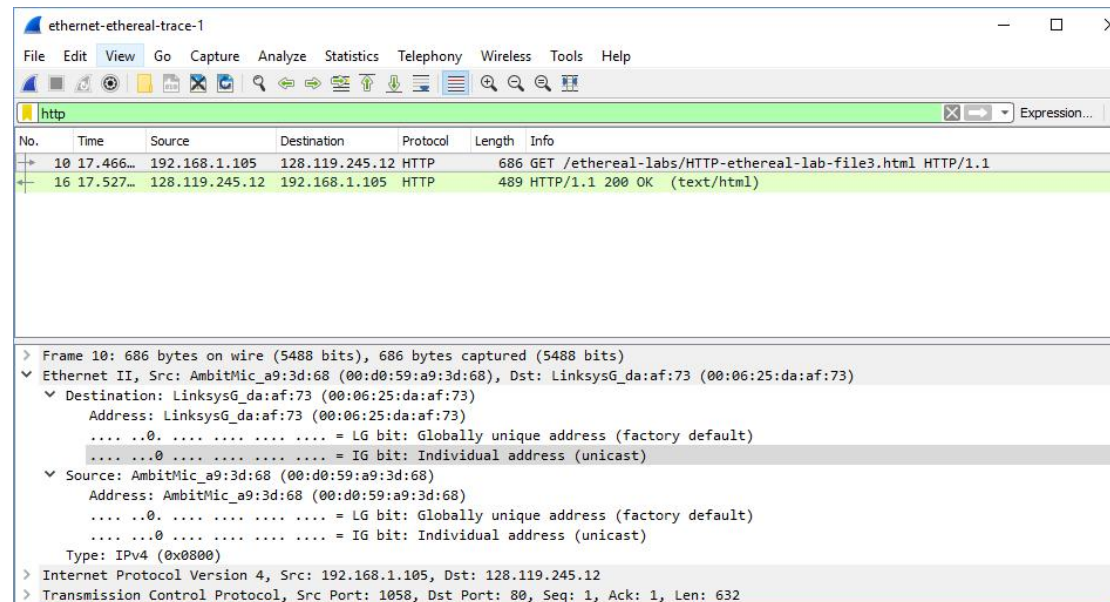


Figure 1. GET response Ethernet information

1. The Ethernet address of my computer is 00:d0:59:a9:3d:68
2. The destination address is 00:06:25:da:af:73. This address is not the Ethernet address of the actual website. It is the address of my router used to get off the subnet, or in case, NYU WiFi.
3. The hex value for the frame type field is 0x0800, it corresponds to the IP protocol.
4. The ASCII "G" appears 52 bytes from the start of the Ethernet frame. There are 14B Ethernet frame, and then 20 bytes of IP header followed by 20 bytes of TCP header before the HTTP data is encountered.

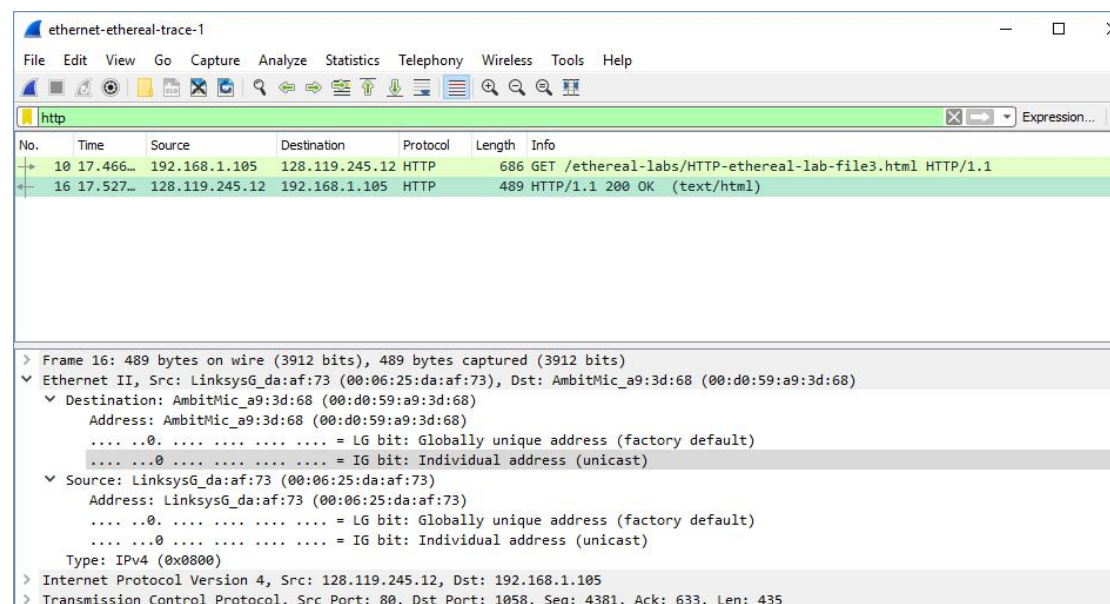


Figure 2. OK response Ethernet information

5. The source address `00:06:25:da:af:73` is neither the Ethernet address of the website nor the address of my computer. It is the address of NYU WiFi.
6. The destination address is `00:d0:59:a9:3d:68` is the address of computer
7. The hex value for the Frame type field is `0x0800`, which corresponds to the IP protocol
8. The ASCII "O" appears `52 bytes` from the start of the ethernet frame. Again, there are 14 bytes of Ethernet frame, and then 20 bytes of IP header followed by 20 bytes of TCP header before the HTTP data is encountered.

*My actual computer data

```
C:\Users\wxy52>arp -a

Interface: 192.168.145.1 --- 0x3
    Internet Address      Physical Address      Type
    192.168.145.255       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
    239.255.255.250       01-00-5e-7f-ff-fa    static

Interface: 172.16.44.210 --- 0xa
    Internet Address      Physical Address      Type
    172.16.40.1           00-00-5e-00-01-53    dynamic
    172.16.47.255         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
    239.255.255.250       01-00-5e-7f-ff-fa    static
    255.255.255.255       ff-ff-ff-ff-ff-ff    static

Interface: 192.168.137.1 --- 0xc
    Internet Address      Physical Address      Type
    192.168.137.255       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
    239.255.255.250       01-00-5e-7f-ff-fa    static
```

Figure 3. Command prompt ARP

9. The Internet Address column contains the `IP address`, the Physical Address column contains the `MAC address`, and the type indicates the `protocol type`.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	AmbitMic_a9:3d:68	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	0.001018	LinksysG_da:a9:3d:68	AmbitMic_a9:3d:68	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
6	13.542...	Telebit_73:8d:68	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104

Frame 1: 42 bytes on wire (336 bits), 42 bytes captured (336 bits)

Ethernet II, Src: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68), 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: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
 - Address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
 -0. = LG bit: Globally unique address (factory default)
 -0. = IG bit: Individual address (unicast)
- Type: ARP (0x0806)
- Address Resolution Protocol (request)
 - Hardware type: Ethernet (1)
 - Protocol type: IPv4 (0x0800)
 - Hardware size: 6
 - Protocol size: 4
 - Opcode: request (1)
 - Sender MAC address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
 - Sender IP address: 192.168.1.105
 - Target MAC address: 00:00:00:00:00:00 (00:00:00:00:00:00)
 - Target IP address: 192.168.1.1

Figure 4. ARP request message

10. The source address is **00:d059:a9:3d:68**. The destination address is **ff:ff:ff:ff:ff:ff**, the broadcast address.
11. The Ethernet frame type field is **0x0806**, which corresponds to ARP.
12.
 - A) The field beings **20 bytes** from the very beginning.
 - B) The hex value of opcode is **0x0001 (request)**.
 - C) Yes, the ARP message containing the P address **192.168.1.105** for the sender.
 - D) The field **"Target MAC address"** is set to **00:00:00:00:00:00** to question the machine whose corresponding IP address (**192.168.1.1**) is being queried.

ethernet-ethereal-trace-1

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arp

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	AmbitMic_a9:3d:68	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	0.001018	LinksysG_da:af:73	AmbitMic_a9:3d:68	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
6	13.542...	Telebit_73:8d:68	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104

> Frame 2: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)

▼ Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)

▼ Destination: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)

Address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)

...0... = LG bit: Globally unique address (factory default)

...0... = IG bit: Individual address (unicast)

▼ Source: LinksysG_da:af:73 (00:06:25:da:af:73)

Address: LinksysG_da:af:73 (00:06:25:da:af:73)

...0... = LG bit: Globally unique address (factory default)

...0... = IG bit: Individual address (unicast)

Type: ARP (0x0806)

Padding: 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: LinksysG_da:af:73 (00:06:25:da:af:73)

Sender IP address: 192.168.1.1

Target MAC address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)

Target IP address: 192.168.1.105

Figure 5. ARP reply message

13.

A) The field beings **20 bytes** from the very beginning.

B) The hex value of opcode is **0x0002 (reply)**.

C) The answer that contains the Ethernet address **00:06:25:da:af:73** appears in the **"Sender MAC address"**.

14. The source address is **00:06:25:da:af:73** and for the destination is **00:d0:59:a9:3d:68**.

15. There is **no reply** in this trace, because we are not the machine that sent the original request. The ARP reply is sent back **directly to the sender's Ethernet address**.

Extra Credit:

EX-1. If the router/adaptor received the destination IP address, the router/adaptor would still remove the **IP address** from the Ethernet frame and then using ARP would get the **correct MAC address of the destination**.

Ex-2. The default time is **20mins**. For every 20mins, the ARP table will be refreshed, because the neighboring device can be out of the network so the ARP table should be updated according to the network states. When the table gets refreshed, the content will **get erased** and when the chance comes to resolve the **MAC address to the known UP address**, the **ARP request** will be sent in **broadcast mode** where the reply will be in **Unicast mode**.