Bilkent University

CS421 Wireshark Assignment

Emre Uncu

22003884

What to hand in

1. **List up to 10 different protocols that appear in the protocol column in the unfiltered packet-listing window in step 7 above.**

   - ARP
   - TLSv1.2
   - TCP
   - MDNS
   - UDP
   - SSDP
   - IGMPv2
   - TLSv1.3
   - DNS
   - ICMP

2. **How long did it take from when the HTTP GET message was sent until the HTTP OK reply was received? (By default, the value of the Time column in the packetlisting window is the amount of time, in seconds, since Wireshark tracing began. To display the Time field in time-of-day format, select the Wireshark View pull down menu, then select Time Display Format, then select Time-of-day.)**

   14:37:20,795252 GET
   14:37:20,926717 OK
   0,131465 seconds

```
89 14:37:20,795252 139.179.243.93 128.119.245.12 HTTP 463 GET /wireshark-labs/INTRO-wireshar
91 14:37:20,926717 128.119.245.12 139.179.243.93 HTTP 492 HTTP/1.1 200 OK  (text/html)
```

3. **What is the Internet address of the gaia.cs.umass.edu (also known as wwwnet.cs.umass.edu)? What is the Internet address of your computer?**

   128.119.245.12 gaia.cs.umass.edu
   139.179.243.93 my computer


```
89 14:37:20,795252 139.179.243.93 128.119.245.12 HTTP 463 GET /wireshark-labs/INTRO-wireshar
91 14:37:20,926717 128.119.245.12 139.179.243.93 HTTP 492 HTTP/1.1 200 OK  (text/html)
```

4. **Print the two HTTP messages displayed in step 9 above. To do so, select Print from the Wireshark File command menu, and select "Selected Packet Only" and "Print as displayed" and then click OK.**

```
C:\Users\Emre\AppData\Local\Temp\wireshark_Wi-Fi 2V0O812.pcapng 383 total packets, 1 shown

No.     Time              Source                Destination           Protocol Length Info
     89 14:37:20,795252   139.179.243.93        128.119.245.12        HTTP     463    GET /wireshark-labs/INTRO-wireshark-file1.html
HTTP/1.1
Frame 89: 463 bytes on wire (3704 bits), 463 bytes captured (3704 bits) on interface \Device\NPF_{F30844EB-6737-49E2-8E0B-6D0F904D8E2E},
id 0
Ethernet II, Src: Intel_58:10:4c (64:6e:e0:58:10:4c), Dst: SuperMicroCo_8e:b3:84 (0c:c4:7a:8e:b3:84)
Internet Protocol Version 4, Src: 139.179.243.93, Dst: 128.119.245.12
Transmission Control Protocol, Src Port: 65434, Dst Port: 80, Seq: 1, Ack: 1, Len: 409
Hypertext Transfer Protocol
    GET /wireshark-labs/INTRO-wireshark-file1.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:135.0) Gecko/20100101 Firefox/135.0\r\n
    Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8\r\n
    Accept-Language: tr-TR,tr;q=0.8,en-US;q=0.5,en;q=0.3\r\n
    Accept-Encoding: gzip, deflate\r\n
    Connection: keep-alive\r\n
    Upgrade-Insecure-Requests: 1\r\n
    Priority: u=0, i\r\n
    \r\n
    [Response in frame: 91]
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/INTRO-wireshark-file1.html]
```

```
C:\Users\Emre\AppData\Local\Temp\wireshark_Wi-Fi 2V0O812.pcapng 383 total packets, 1 shown

No.     Time              Source                Destination           Protocol Length Info
     91 14:37:20,926717   128.119.245.12        139.179.243.93        HTTP     492    HTTP/1.1 200 OK  (text/html)
Frame 91: 492 bytes on wire (3936 bits), 492 bytes captured (3936 bits) on interface \Device\NPF_{F30844EB-6737-49E2-8E0B-6D0F904D8E2E},
id 0
Ethernet II, Src: SuperMicroCo_8e:b3:84 (0c:c4:7a:8e:b3:84), Dst: Intel_58:10:4c (64:6e:e0:58:10:4c)
Internet Protocol Version 4, Src: 128.119.245.12, Dst: 139.179.243.93
Transmission Control Protocol, Src Port: 80, Dst Port: 65434, Seq: 1, Ack: 410, Len: 438
Hypertext Transfer Protocol
    HTTP/1.1 200 OK\r\n
    Date: Mon, 24 Feb 2025 11:37:17 GMT\r\n
    Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.33 mod_perl/2.0.11 Perl/v5.16.3\r\n
    Last-Modified: Mon, 24 Feb 2025 06:59:01 GMT\r\n
    ETag: "51-62edde007f376"\r\n
    Accept-Ranges: bytes\r\n
    Content-Length: 81\r\n
    Keep-Alive: timeout=5, max=100\r\n
    Connection: Keep-Alive\r\n
    Content-Type: text/html; charset=UTF-8\r\n
    \r\n
    [Request in frame: 89]
    [Time since request: 0.131465000 seconds]
    [Request URI: /wireshark-labs/INTRO-wireshark-file1.html]
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/INTRO-wireshark-file1.html]
    File Data: 81 bytes
Line-based text data: text/html (3 lines)
```

HTTP

1. The Basic HTTP GET/response interaction

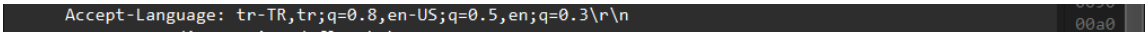
1. **Is your browser running HTTP version 1.0 or 1.1? What version of HTTP is the server running?**

HTTP/1.1 My browser
HTTP/1.1 the server

```
2247 139.179.243.93 128.119.245.12 HTTP            462 GET /wireshark-labs/HTTP-wireshark-file1.html HTTP/1.1
7004 128.119.245.12 139.179.243.93 HTTP            540 HTTP/1.1 200 OK  (text/html)
```

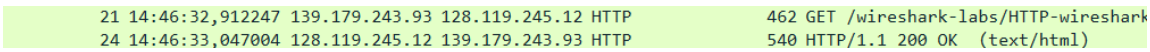
2. **What languages (if any) does your browser indicate that it can accept to the server?**

   `Accept-Language: tr-TR,tr;q=0.8,en-US;q=0.5,en;q=0.3`
   Turkish and English



3. **What is the IP address of your computer? Of the gaia.cs.umass.edu server?**

   `139.179.243.93` my computer
   `128.119.245.12` gaia.cs.umass.edu



4. **What is the status code returned from the server to your browser?**

   `Status Code: 200`
   `[Status Code Description: OK]`

5. **When was the HTML file that you are retrieving last modified at the server?**

   `Last-Modified: Mon, 24 Feb 2025 06:59:01 GMT`

6. **How many bytes of content are being returned to your browser?**

   `Content-Length: 128`
   128 bytes

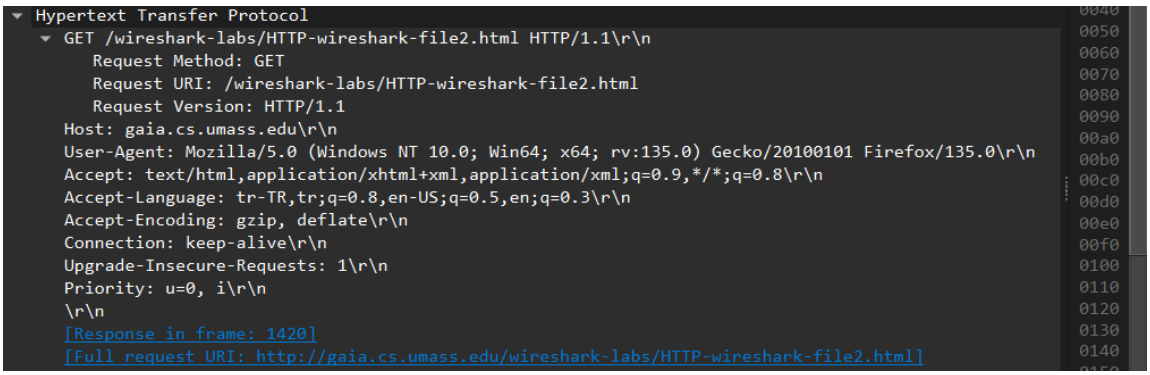
7. **By inspecting the raw data in the packet content window, do you see any headers within the data that are not displayed in the packet-listing window? If so, name one.**

   No, I don't see any headers.

2. The HTTP CONDITIONAL GET/response interaction

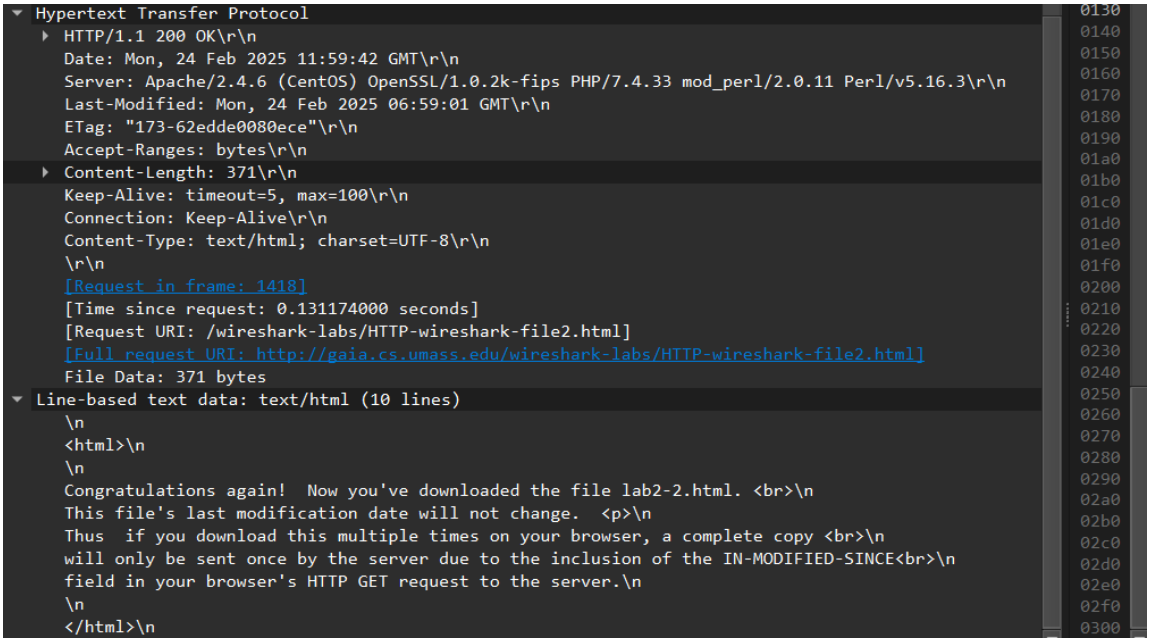
8. **Inspect the contents of the first HTTP GET request from your browser to the server. Do you see an "IF-MODIFIED-SINCE" line in the HTTP GET?**

   No, I don't see an "IF-MODIFIED-SINCE" line in the HTTP GET.



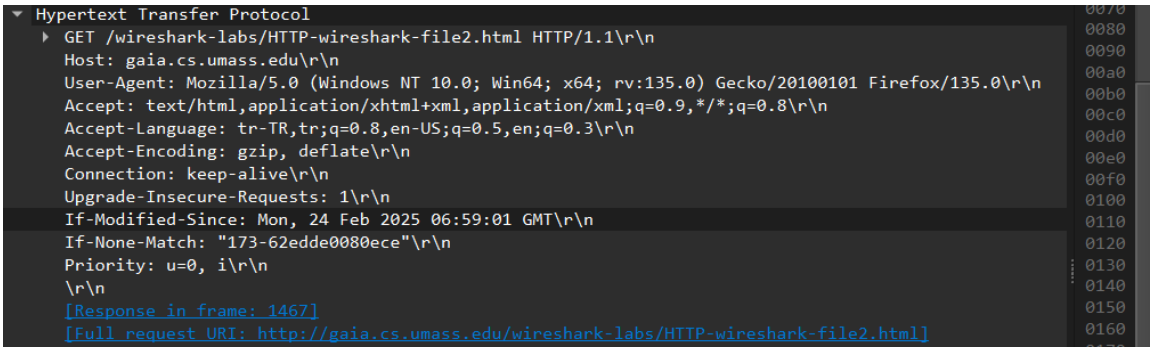
9. **Inspect the contents of the server response. Did the server explicitly return the contents of the file? How can you tell?**

   Yes. It includes a Line-based test data section and 10-line content.



10. **Now inspect the contents of the second HTTP GET request from your browser to the server. Do you see an "IF-MODIFIED-SINCE:" line in the HTTP GET? If so, what information follows the "IF-MODIFIED-SINCE:" header?**

    `If-Modified-Since: Mon, 24 Feb 2025 06:59:01 GMT`



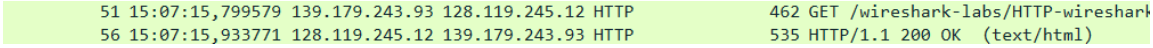
11. **What is the HTTP status code and phrase returned from the server in response to this second HTTP GET? Did the server explicitly return the contents of the file? Explain.**

    `Status Code: 304`
    `Response Phrase: Not Modified`
    The server didn't return the file's contents because it was not modified and exists in the cache.

3. Retrieving Long Documents

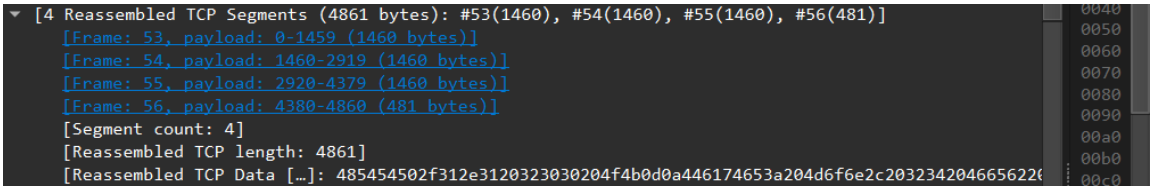
12. **How many HTTP GET request messages were sent by your browser?**

    One HTTP GET request was sent by my browser.



13. **How many data-containing TCP segments were needed to carry the single HTTP response?**

    `[Segment count: 4]`
    4 TCP segments were needed.



14. **What is the status code and phrase associated with the response to the HTTP GET request?**

    Status Code: 200
    Response Phrase: OK

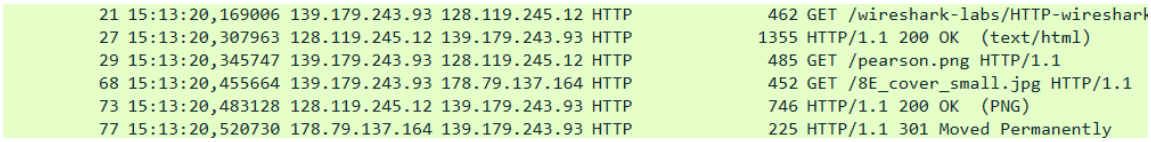
15. **Are there any HTTP status lines in the transmitted data associated with a TCPinduced "Continuation"?**

    No, there were no "Continuation" lines.

4. HTML Documents with Embedded Objects

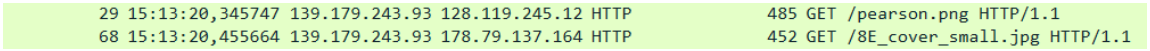
16. **How many HTTP GET request messages were sent by your browser? To which Internet addresses were these GET requests sent?**

    Three HTTP GET requests were sent, two to gaia.cs.umass.edu and one to kurose.cslash.net
    128.119.245.12 gaia.cs.umass.edu
    178.79.137.164 kurose.cslash.net



17. **Can you tell whether your browser downloaded the two images serially, or whether they were downloaded from the two web sites in parallel? Explain.**

    Two separate GET requests were sent at different times; therefore, the images were downloaded serially.



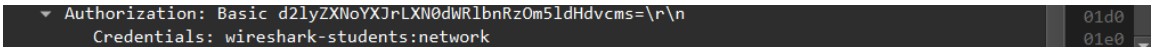
5. HTTP Authentication

18. **What is the server's response (status code and phrase) in response to the initial HTTP GET message from your browser?**

    Status Code: 401
    Response Phrase: Unauthorized

19. **When your browser's sends the HTTP GET message for the second time, what new field is included in the HTTP GET message?**

```
Authorization: Basic d2lyZXNoYXJrLXN0dWRlbnRzOm5ldHdvcms=
   Credentials: wireshark-students:network
```



DNS

1. nslookup

1. **Run nslookup to obtain the IP address of a Web server in Asia.**

```
C:\Users\Emre>nslookup www.emba.cuhk.edu.hk
Server:  manyas.bcc.bilkent.edu.tr
Address:  139.179.30.24

Non-authoritative answer:
Name:    www.emba.cuhk.edu.hk
Address:  172.104.167.152
```

2. **Run nslookup to determine the authoritative DNS servers for a university in Europe.**

```
C:\Users\Emre>nslookup -type=NS tum.de
Server:  manyas.bcc.bilkent.edu.tr
Address:  139.179.30.24

Non-authoritative answer:
tum.de  nameserver = dns2.lrz.bayern
tum.de  nameserver = dns3.lrz.eu
tum.de  nameserver = dns1.lrz.de
```

3. **Run nslookup so that one of the DNS servers obtained in Question 2 is queried for the mail servers for Yahoo! mail.**

```
C:\Users\Emre>nslookup -type=mx yahoo.com dns2.lrz.bayern
Server:  dns2.lrz.de
Address:  141.40.9.211

*** dns2.lrz.de can't find yahoo.com: Query refused

C:\Users\Emre>nslookup -type=mx yahoo.com dns3.lrz.eu
Server:  UnKnown
Address:  78.128.211.180

*** UnKnown can't find yahoo.com: Query refused

C:\Users\Emre>nslookup -type=mx yahoo.com dns1.lrz.de
Server:  dns1.lrz.de
Address:  129.187.19.183

*** dns1.lrz.de can't find yahoo.com: Query refused
```

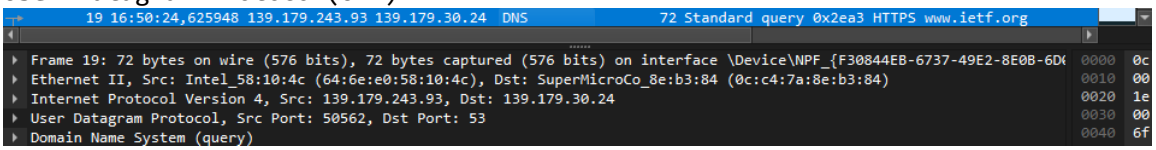
```
C:\Users\Emre>nslookup mail.yahoo.com dns1.lrz.de
Server:  dns1.lrz.de
Address:  129.187.19.183

*** dns1.lrz.de can't find mail.yahoo.com: Query refused

C:\Users\Emre>nslookup mail.yahoo.com dns3.lrz.eu
Server:  UnKnown
Address:  78.128.211.180

*** UnKnown can't find mail.yahoo.com: Query refused

C:\Users\Emre>nslookup mail.yahoo.com dns2.lrz.bayern
Server:  dns2.lrz.bayern
Address:  141.40.9.211

*** dns2.lrz.bayern can't find mail.yahoo.com: Query refused
```

2. ipconfig

3. Tracing DNS with Wireshark

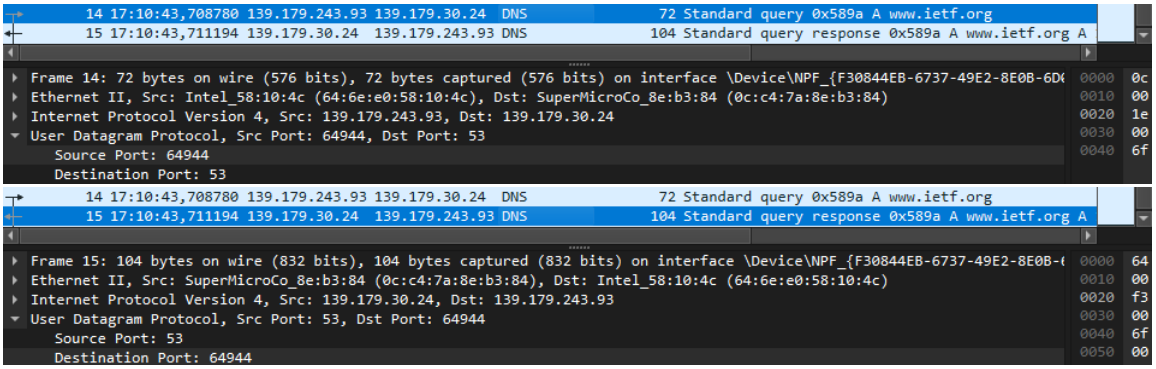
4. **Locate the DNS query and response messages. Are they sent over UDP or TCP?**

User Datagram Protocol(UDP)



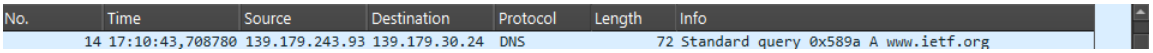
5. **What is the destination port for the DNS query message? What is the source port of DNS response message?**

Destination port for the DNS query: 53
Source port of DNS response: 53



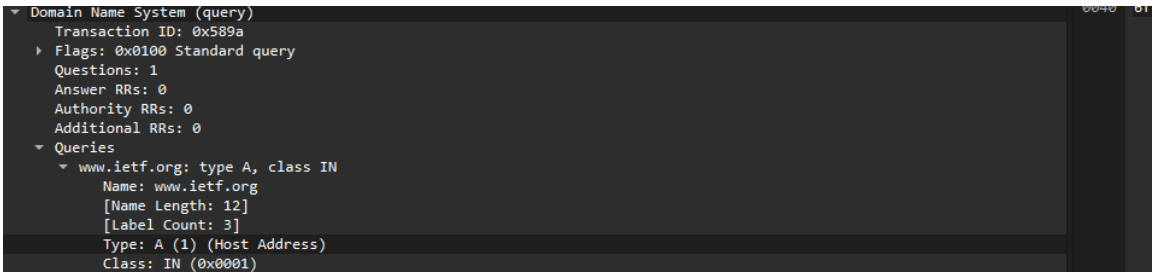
6. **To what IP address is the DNS query message sent? Use ipconfig to determine the IP address of your local DNS server. Are these two IP addresses the same?**

The destination IP: `139.179.30.34`
One of my local DNS servers: `139.179.30.34`
These IP addresses are the same.



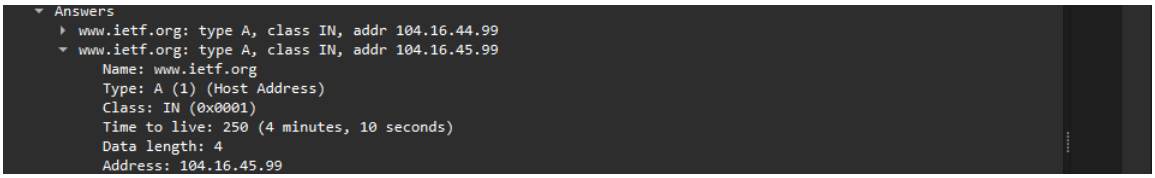
7. **Examine the DNS query message. What "Type" of DNS query is it? Does the query message contain any "answers"?**

   Type A
   It doesn't contain any "answers".



8. **Examine the DNS response message. How many "answers" are provided? What does each of these answers contain?**

   It provides two answers that contain Name, Type, Class, TTL, Data length, and Adress.



9. **Consider the subsequent TCP SYN packet sent by your host. Does the destination IP address of the SYN packet correspond to any of the IP addresses provided in the DNS response message?**

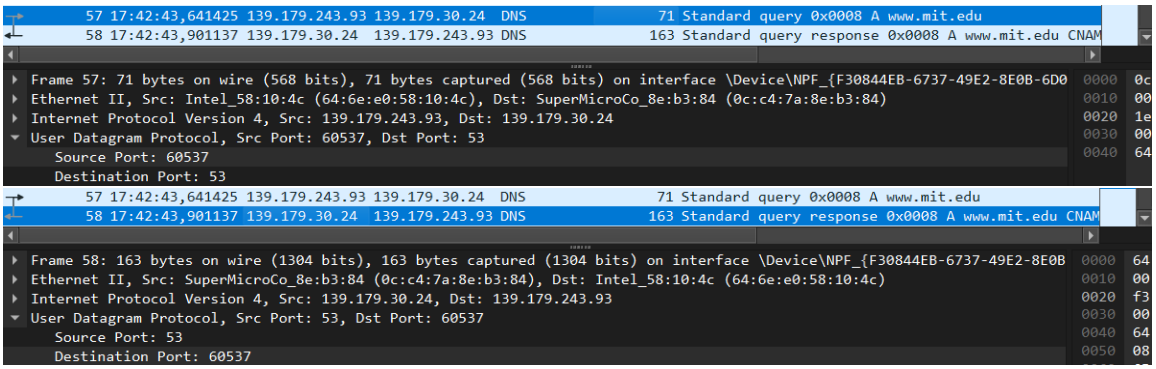
   The destination IP address of the SYN packet: `104.16.44.99`
   One of the IP addresses provided in the DNS response: `104.16.44.99`

10. **This web page contains images. Before retrieving each image, does your host issue new DNS queries?**

    No, the host doesn't issue new DNS queries.

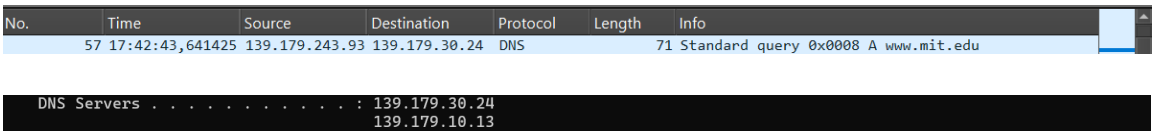
11. **What is the destination port for the DNS query message? What is the source port of DNS response message?**

Destination port for the DNS query: 53
Source port of DNS response: 53



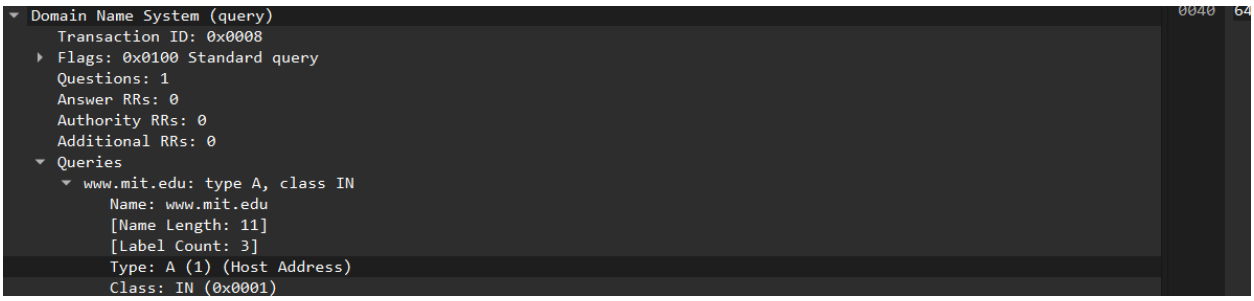
12. To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server?

The destination IP: `139.179.30.34`
One of my local DNS servers: `139.179.30.34` (I used public DNS)



13. Examine the DNS query message. What "Type" of DNS query is it? Does the query message contain any "answers"?

Type A
It doesn't contain any "answers".



14. Examine the DNS response message. How many "answers" are provided? What does each of these answers contain?

It provides three answers that contain Name, Type, Class, TTL, Data length, and CNAME or Adress.

```
Answers
  www.mit.edu: type CNAME, class IN, cname www.mit.edu.edgekey.net
  www.mit.edu.edgekey.net: type CNAME, class IN, cname e9566.dscb.akamaiedge.net
      Name: www.mit.edu.edgekey.net
      Type: CNAME (5) (Canonical NAME for an alias)
      Class: IN (0x0001)
      Time to live: 60 (1 minute)
      Data length: 27
      CNAME: e9566.dscb.akamaiedge.net
  e9566.dscb.akamaiedge.net: type A, class IN, addr 184.29.225.160
      Name: e9566.dscb.akamaiedge.net
      Type: A (1) (Host Address)
      Class: IN (0x0001)
      Time to live: 20 (20 seconds)
      Data length: 4
      Address: 184.29.225.160
```

15. Provide a screenshot

```
No.  Time                  Source          Destination     Protocol  Length  Info
  57 17:42:43,641425       139.179.243.93  139.179.30.24   DNS         71    Standard query 0x0008 A www.mit.edu
  58 17:42:43,901137       139.179.30.24   139.179.243.93  DNS        163    Standard query response 0x0008 A www.mit.edu CNAM

Frame 58: 163 bytes on wire (1304 bits), 163 bytes captured (1304 bits) on interface \Device\NPF_{F30844EB-6737-49E2-8E0B
Ethernet II, Src: SuperMicroCo_8e:b3:84 (0c:c4:7a:8e:b3:84), Dst: Intel_58:10:4c (64:6e:e0:58:10:4c)
Internet Protocol Version 4, Src: 139.179.30.24, Dst: 139.179.243.93
User Datagram Protocol, Src Port: 53, Dst Port: 60537
Domain Name System (response)
    Transaction ID: 0x0008
  Flags: 0x8180 Standard query response, No error
    Questions: 1
    Answer RRs: 3
    Authority RRs: 0
    Additional RRs: 0
  Queries
  Answers
    www.mit.edu: type CNAME, class IN, cname www.mit.edu.edgekey.net
        Name: www.mit.edu
        Type: CNAME (5) (Canonical NAME for an alias)
        Class: IN (0x0001)
        Time to live: 1800 (30 minutes)
        Data length: 25
        CNAME: www.mit.edu.edgekey.net
    www.mit.edu.edgekey.net: type CNAME, class IN, cname e9566.dscb.akamaiedge.net
        Name: www.mit.edu.edgekey.net
        Type: CNAME (5) (Canonical NAME for an alias)
        Class: IN (0x0001)
        Time to live: 60 (1 minute)
        Data length: 27
        CNAME: e9566.dscb.akamaiedge.net
    e9566.dscb.akamaiedge.net: type A, class IN, addr 184.29.225.160
        Name: e9566.dscb.akamaiedge.net
        Type: A (1) (Host Address)
        Class: IN (0x0001)
        Time to live: 20 (20 seconds)
        Data length: 4
        Address: 184.29.225.160
    [Request In: 57]
    [Time: 0.259712000 seconds]

0000  64
0010  00
0020  f3
0030  00
0040  64
0050  08
0060  65
0070  00
0080  73
0090  65
00a0  1d
```

16. To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server?

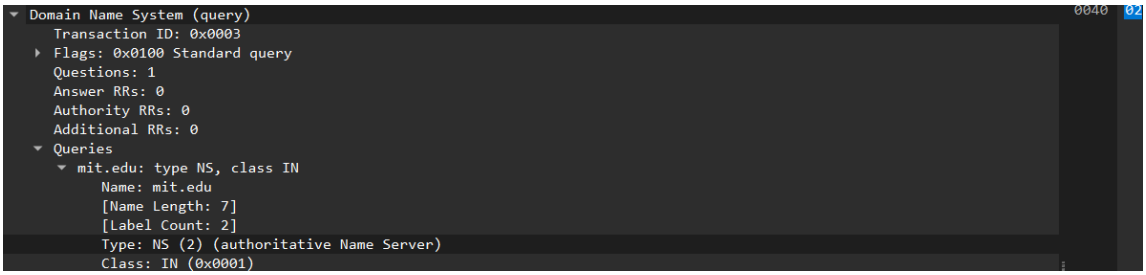
The destination IP: `76.76.19.19`
One of my local DNS servers: `76.76.19.19` (I used public DNS)

```
No.  Time                  Source          Destination     Protocol  Length  Info
  13 20:56:30,077483       192.168.1.71    76.76.19.19     DNS         67    Standard query 0x0003 NS mit.edu
```

```
   DNS Servers . . . . . . . . . . . . : 76.76.19.19
                                         76.223.122.150
```

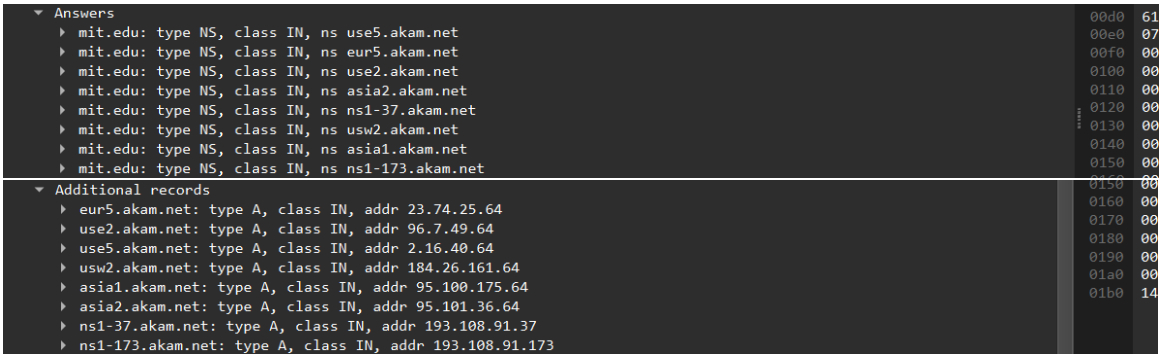
17. **Examine the DNS query message. What "Type" of DNS query is it? Does the query message contain any "answers"?**

    Type NS
    It doesn't contain any "answers".

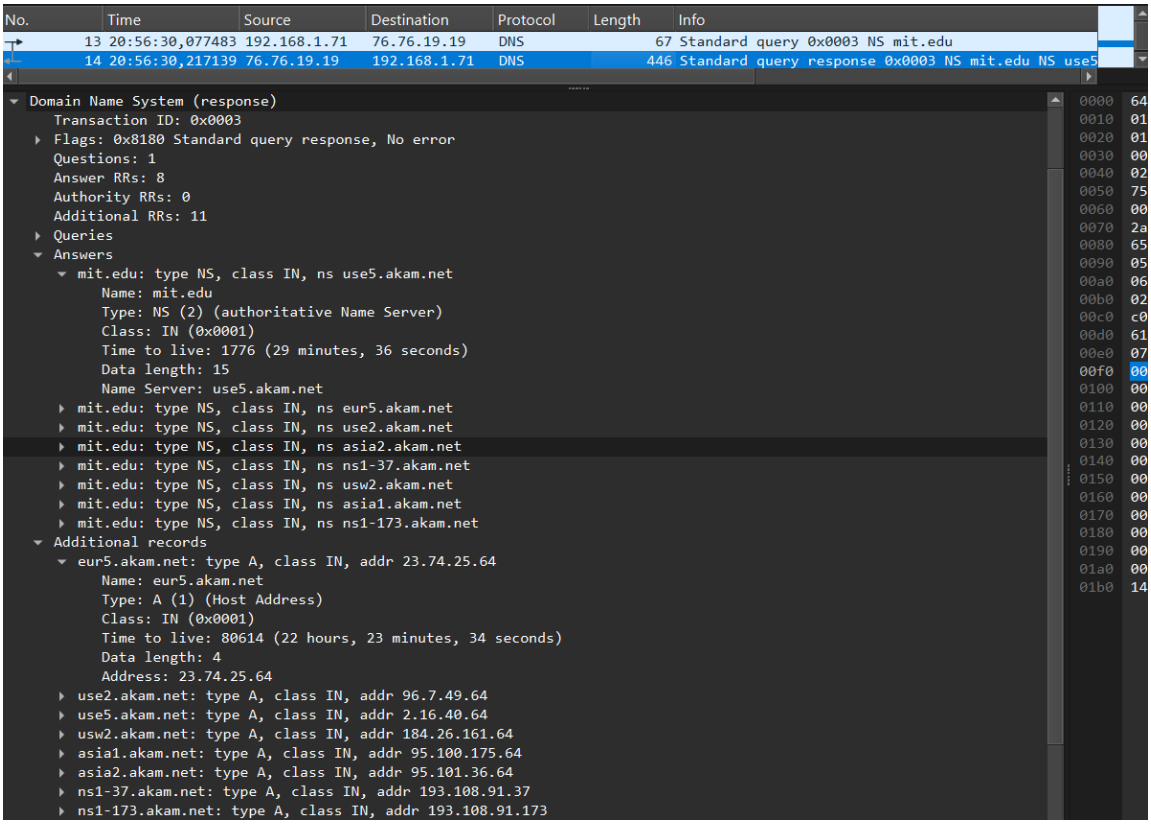


18. **Examine the DNS response message. What MIT name servers does the response message provide? Does this response message also provide the IP addresses of the MIT name servers?**

    The answers provide 8 MIT name servers. The Additional records provide the IP addresses of the MIT name servers.

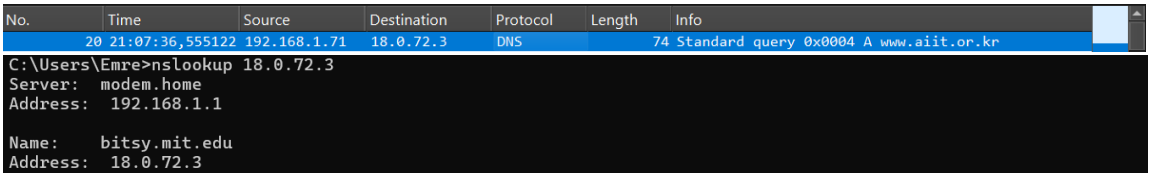


19. **Provide a screenshot.**



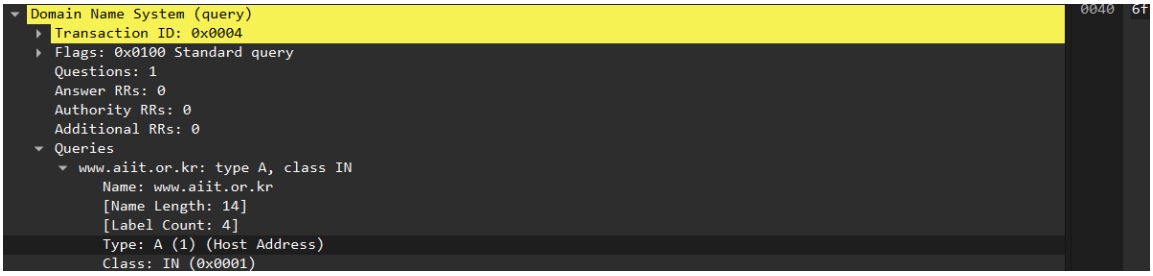
20. To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server? If not, what does the IP address correspond to?

The destination IP: `18.0.72.3`
This IP address corresponds to: `bitsy.mit.edu`



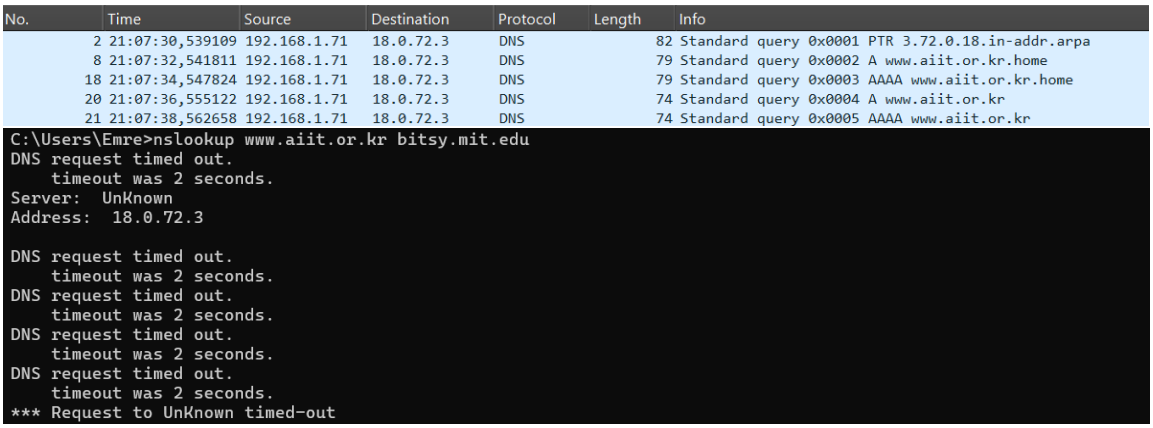
21. Examine the DNS query message. What "Type" of DNS query is it? Does the query message contain any "answers"?

Type A
It doesn't contain any "answers".



22. Examine the DNS response message. How many "answers" are provided? What does each of these answers contain?

Even though I manually tried the public DNSs I found on the internet from my computer's network settings, like the previous question, I could not get a response to this query.



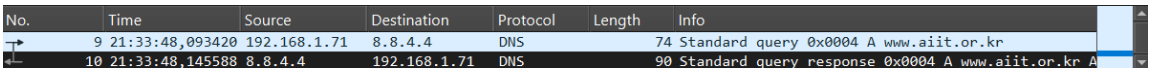
No.	Time	Source	Destination	Protocol	Length	Info
2	21:07:30,539109	192.168.1.71	18.0.72.3	DNS	82	Standard query 0x0001 PTR 3.72.0.18.in-addr.arpa
8	21:07:32,541811	192.168.1.71	18.0.72.3	DNS	79	Standard query 0x0002 A www.aiit.or.kr.home
18	21:07:34,547824	192.168.1.71	18.0.72.3	DNS	79	Standard query 0x0003 AAAA www.aiit.or.kr.home
20	21:07:36,555122	192.168.1.71	18.0.72.3	DNS	74	Standard query 0x0004 A www.aiit.or.kr
21	21:07:38,562658	192.168.1.71	18.0.72.3	DNS	74	Standard query 0x0005 AAAA www.aiit.or.kr

```
C:\Users\Emre>nslookup www.aiit.or.kr bitsy.mit.edu
DNS request timed out.
    timeout was 2 seconds.
Server:  UnKnown
Address:  18.0.72.3

DNS request timed out.
    timeout was 2 seconds.
DNS request timed out.
    timeout was 2 seconds.
DNS request timed out.
    timeout was 2 seconds.
DNS request timed out.
    timeout was 2 seconds.
*** Request to UnKnown timed-out
```

But later, in the command I ran, I replaced the expression `bitsy.mit.edu` with Google's public DNS (`8.8.4.4`) and obtained the following prompt.

```
C:\Users\Emre>nslookup www.aiit.or.kr 8.8.4.4
Server:  dns.google
Address:  8.8.4.4

Non-authoritative answer:
Name:    www.aiit.or.kr
Address:  58.229.6.225
```

So, I was able to view the response message via Wireshark.



No.	Time	Source	Destination	Protocol	Length	Info
9	21:33:48,093420	192.168.1.71	8.8.4.4	DNS	74	Standard query 0x0004 A www.aiit.or.kr
10	21:33:48,145588	8.8.4.4	192.168.1.71	DNS	90	Standard query response 0x0004 A www.aiit.or.kr A

The response message provides one answer that contains the Name, Type, Class, TTL, Data length, and Adress of `www.aiit.or.kr`.

```
▾ Answers
  ▾ www.aiit.or.kr: type A, class IN, addr 58.229.6.225
      Name: www.aiit.or.kr
      Type: A (1) (Host Address)
      Class: IN (0x0001)
      Time to live: 2726 (45 minutes, 26 seconds)
      Data length: 4
      Address: 58.229.6.225
```

23. Provide a screenshot.