컴퓨터 네트워크

ASS1

수업 명 : 컴퓨터 네트워크
과제 이름 : ASS1
담당 교수님 : 이혁준 교수님
소 속 : 컴퓨터정보공학부
학 번 : 2019202005
이 름 : 남종식
제출 일자 : 2023/04/08
강의 시간 : 화 목 5,6교시

서론

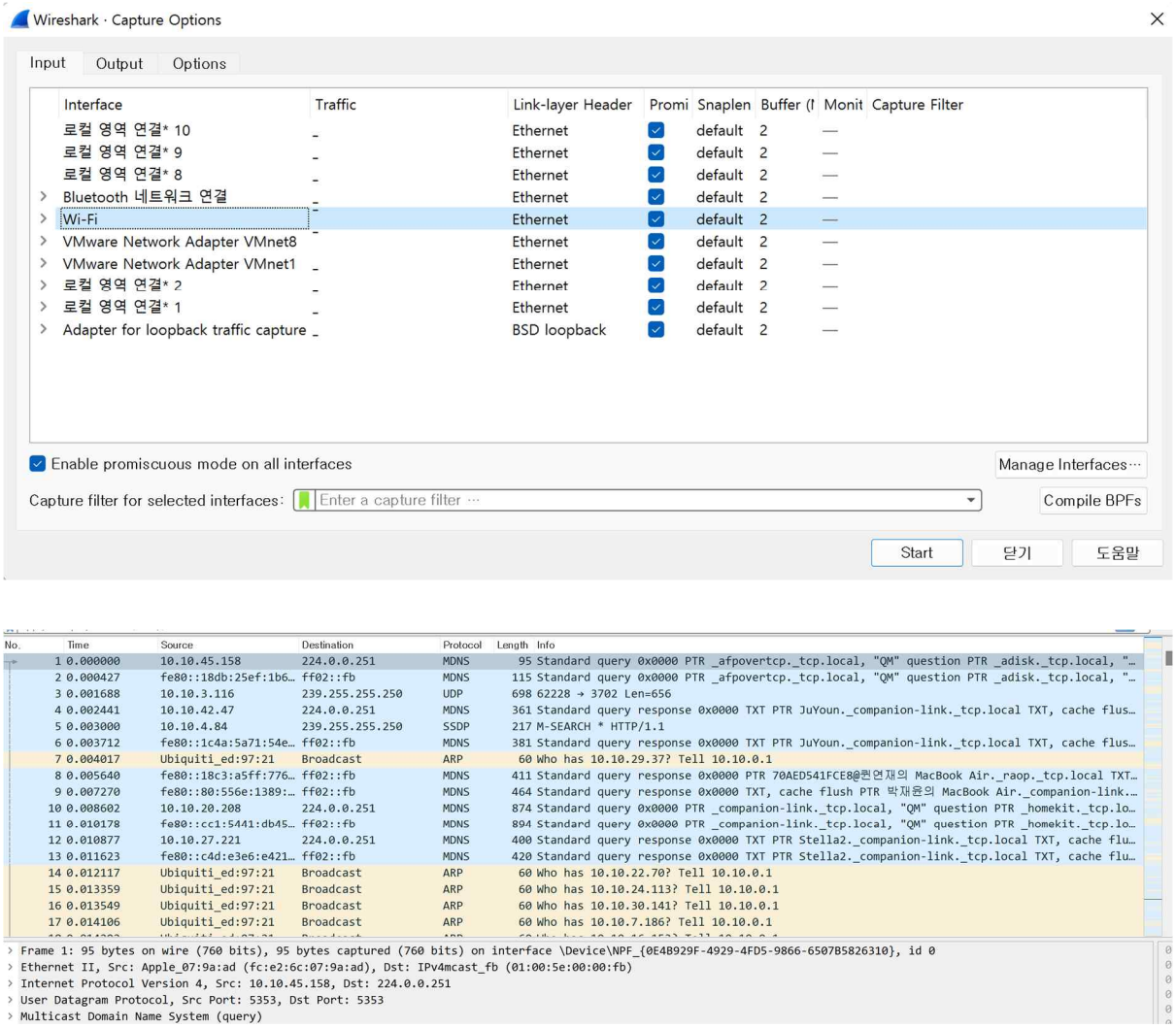
이번 컴퓨터 네트워크 첫번째 과제를 통하여 강의 시간에 배운 패킷에 대해서 wireshark를 이용해 실제로 살펴보고 분석하는 과정을 진행할 것입니다.
강의시간에 컴퓨터 네트워크, 데이터 통신 등에 대해 배우고 있지만 실제로 눈으로 확인하며 배울 수 있는 시간이 없어 아쉬웠지만, wireshark를 통해 TCP/IP 프로토콜을 통하여 주고받는 내용을 실제로 확인하면서 이론적으로만 배웠던 프로토콜을 보다 더 쉽게 이해할 수 있을 것입니다.
HTTP와 DNS의 문제풀이를 통해 wireshark의 이용법을 익히고 네트워크를 분석하는 능력을 기를 것입니다.

본문

Question#1

```
C:WUsersWjongs>ipconfig

Windows IP 구성


무선 LAN 어댑터 로컬 영역 연결* 1:

   미디어 상태 . . . . . : 미디어 연결 끊김
   연결별 DNS 접미사. . . . :

무선 LAN 어댑터 로컬 영역 연결* 2:

   미디어 상태 . . . . . : 미디어 연결 끊김
   연결별 DNS 접미사. . . . :

이더넷 어댑터 VMware Network Adapter VMnet1:

   연결별 DNS 접미사. . . . :
   링크-로컬 IPv6 주소 . . . . : fe80::a35e:9f85:6afc:4458%5
   IPv4 주소 . . . . . : 192.168.83.1
   서브넷 마스크 . . . . . : 255.255.255.0
   기본 게이트웨이 . . . . . :

이더넷 어댑터 VMware Network Adapter VMnet8:

   연결별 DNS 접미사. . . . :
   링크-로컬 IPv6 주소 . . . . : fe80::5870:f64c:84e9:e636%19
   IPv4 주소 . . . . . : 192.168.65.1
   서브넷 마스크 . . . . . : 255.255.255.0
   기본 게이트웨이 . . . . . :

무선 LAN 어댑터 Wi-Fi:

   연결별 DNS 접미사. . . . :
   링크-로컬 IPv6 주소 . . . . : fe80::88bf:3ec9:b7ff:9f7a%4
   IPv4 주소 . . . . . : 10.10.3.220
   서브넷 마스크 . . . . . : 255.255.0.0
   기본 게이트웨이 . . . . . : 10.10.0.1

이더넷 어댑터 Bluetooth 네트워크 연결:

   미디어 상태 . . . . . : 미디어 연결 끊김
   연결별 DNS 접미사. . . . :
```

Ipconfig는 DNS 서버 주소, 주소, 어댑터 타입을 포함하는 현재 TCP/IP 정보를 보여주기 위해 사용됨

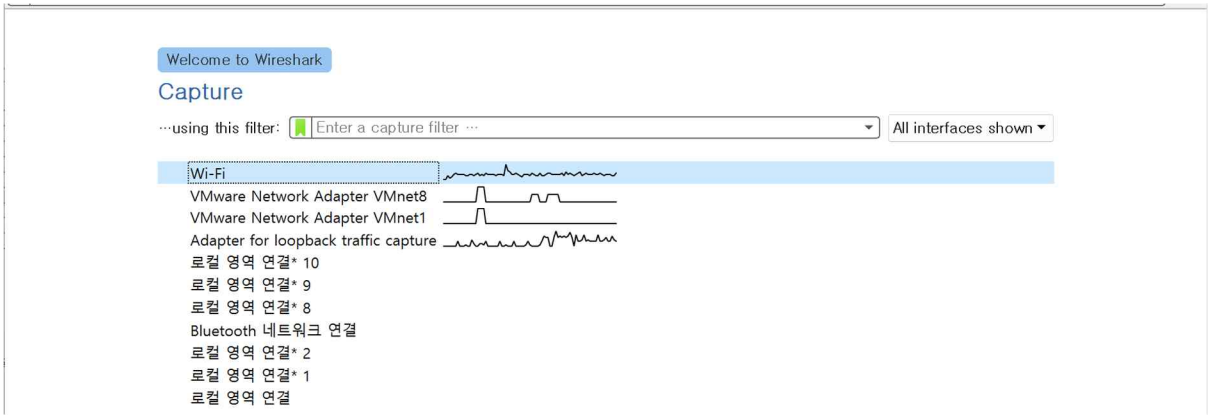


PC에서 동작중인 wifi의 Wireshark 화면 캡쳐

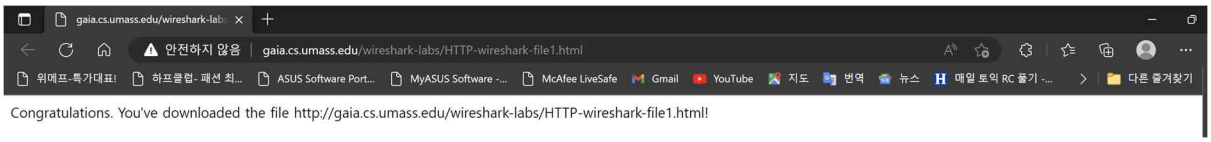
Qustion#2

Wireshark_HTTP_v7.0.pdf의 19개 문제 풀이

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



Wireshark 실행 후 wifi를 선택하여 패킷 캡처를 진행했습니다.

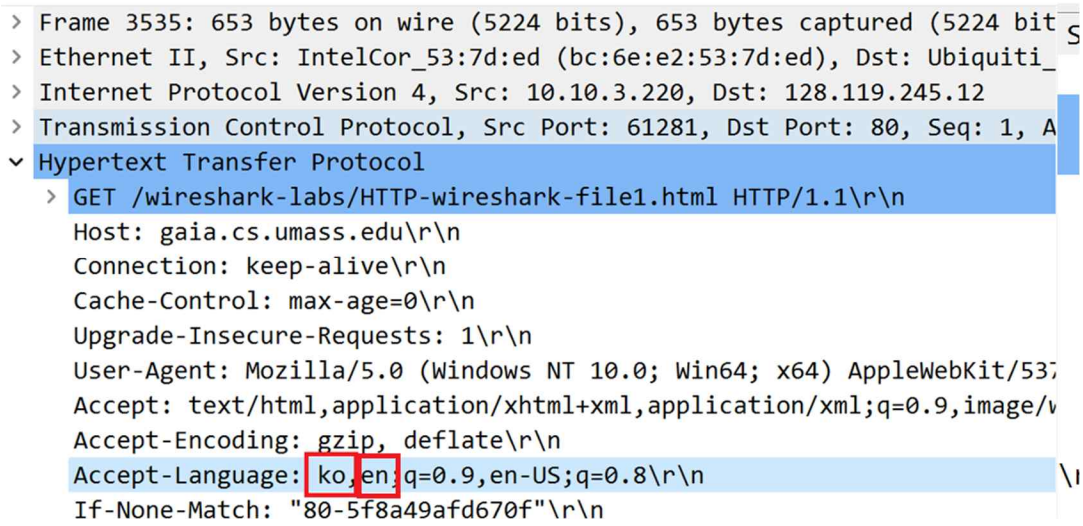


주어진 문제에서 알려준 웹 브라우져 http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file1.html 를 실행 후 캡처한 http의 패킷입니다.

```
> Frame 10: 315 bytes on wire (2520 bits), 315 bytes captured (2520 bits) on interface \Device\NPF_{0E4B929F-4929-4FD5-9866-6507B5826310}, id 0
> Ethernet II, Src: IntelCor_53:7d:ed (bc:6e:e2:53:7d:ed), Dst: HuaweiTe_33:36:a4 (28:de:e5:33:36:a4)
> Internet Protocol Version 4, Src: 192.168.100.138, Dst: 110.45.217.33
> Transmission Control Protocol, Src Port: 64272, Dst Port: 80, Seq: 1, Ack: 1, Len: 261
v Hypertext Transfer Protocol
  > GET /free2/app2/alyac/stats/ActiveUserStats.dat HTTP/1.1\r\n
    Cache-Control: no-cache\r\n
    Connection: Keep-Alive\r\n
    Pragma: no-cache\r\n
    Content-Type: text/plain\r\n
    Accept: */*\r\n
    User-Agent: AYClient-53AED430489A3E323C9EBCE7A82DDF820008\r\n
    Host: update2-statistics.alyac.com\r\n
    \r\n
    [Full request URI: http://update2-statistics.alyac.com/free2/app2/alyac/stats/ActiveUserStats.dat]
    [HTTP request 1/1]
    [Response in frame: 13]
> Transmission Control Protocol, Src Port: 80, Dst Port: 64272, Seq: 451, Ack: 262, Len: 1
> [2 Reassembled TCP Segments (451 bytes): #12(450), #13(1)]
v Hypertext Transfer Protocol
  > HTTP/1.1 200 OK\r\n
    Date: Fri, 07 Apr 2023 14:51:53 GMT\r\n
    Content-Type: application/octet-stream\r\n
  > Content-Length: 1\r\n
    Connection: keep-alive\r\n
    Last-Modified: Mon, 30 Jan 2023 08:30:51 GMT\r\n
    ETag: "11745e7c2e48660b92af5bbf53d27b90186f01b7"\r\n
    X-Cache: HIT\r\n
    X-Proxy-Node-Id: ZmhzMjI2NC5nbi02MQ==, ZmhzMjI2OC5nbi02MQ==\r\n
    X-Request-Id: 6168c0c82838d232b01d1b383ceaf0e4\r\n
    Server: LGUCDN3.0-DS\r\n
    X-Request-Id: b1af4c00889b60007f9aa20290a9a053\r\n
    Accept-Ranges: bytes\r\n
```

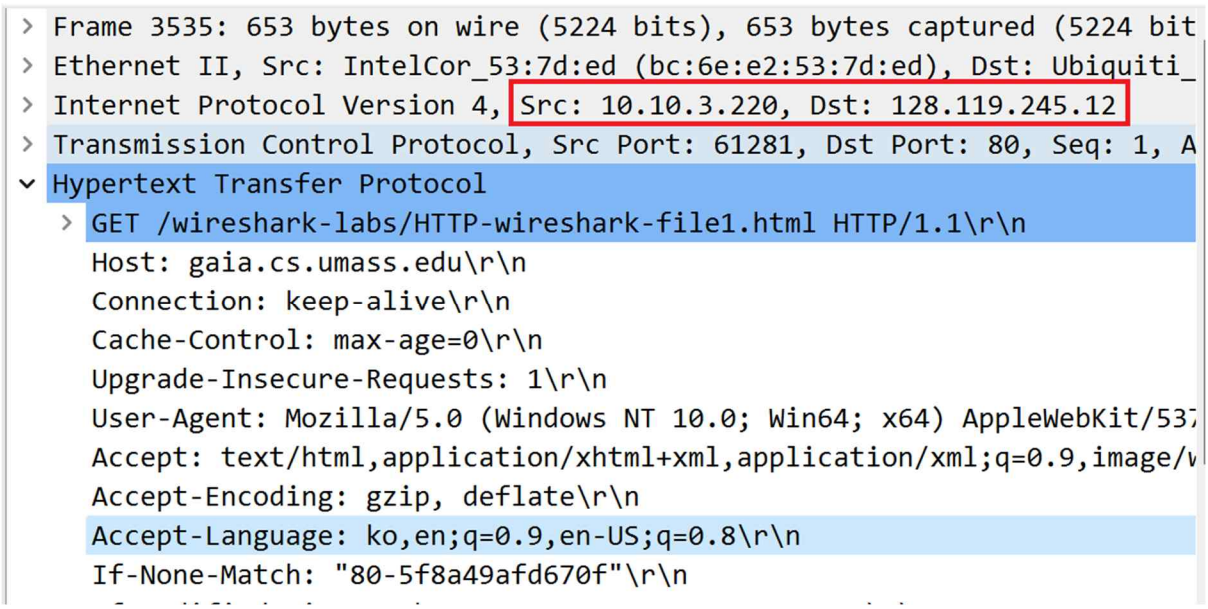
->브라우저와 서버 모두 HTTP version 1.1을 사용합니다.

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



->language : ko, en을 사용하는 것을 알 수 있습니다.

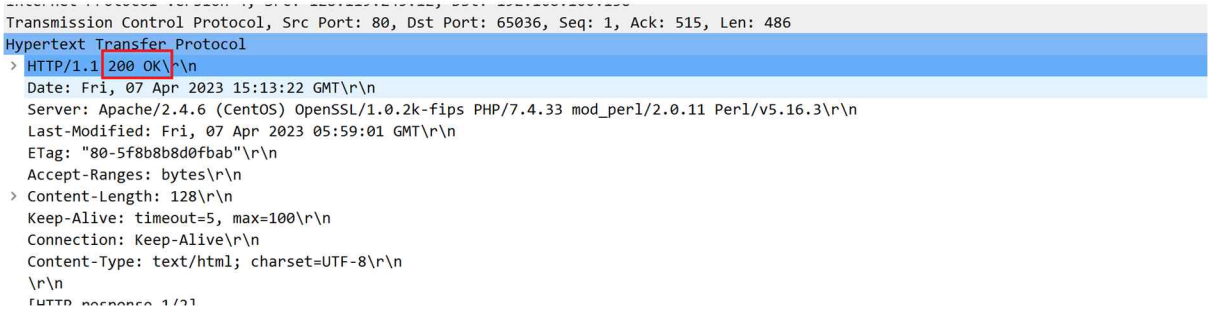
3. What is the IP address of your computer? Of the gaia.cs.umass.edu server?



->내 pc : 10.10.3.220

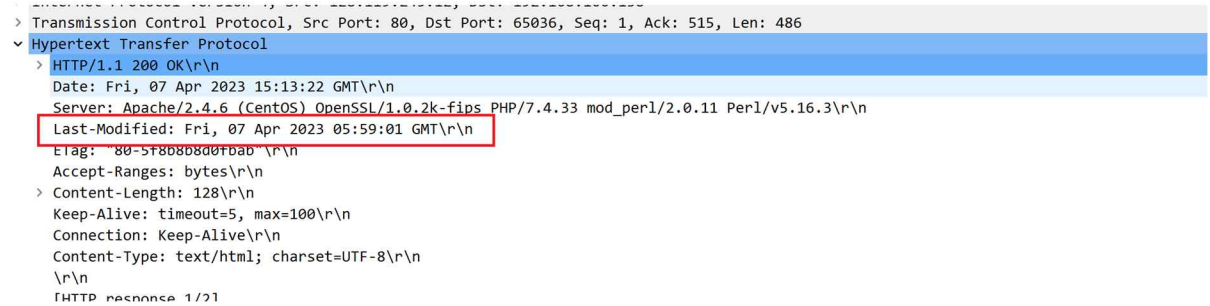
gaia.cs.umass.edu :128.119.245.12

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



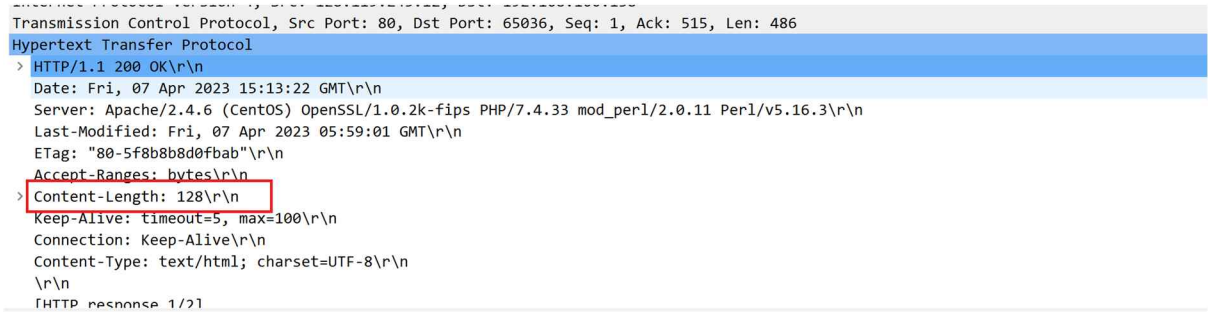
->200 OK

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



->FRI, 07, Apr 2023 05:59:01 GMT

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

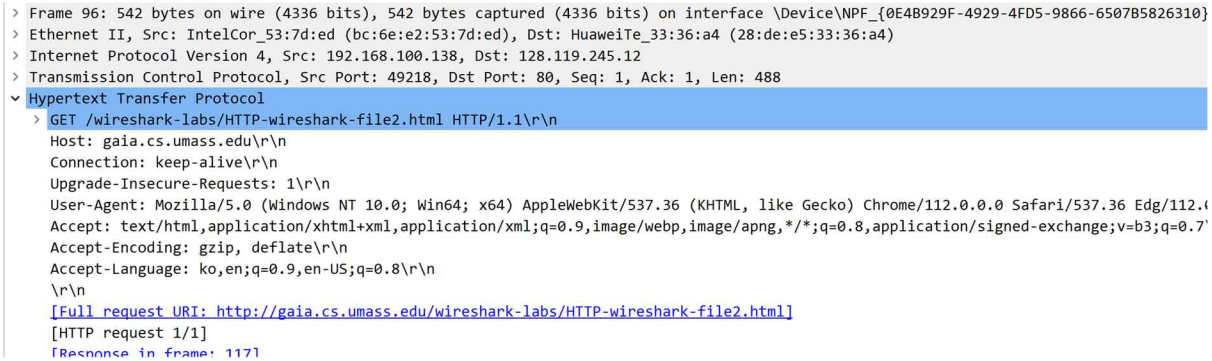


->크기는 128 bytes며 제 브라우져에 반환되고 있습니다.

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

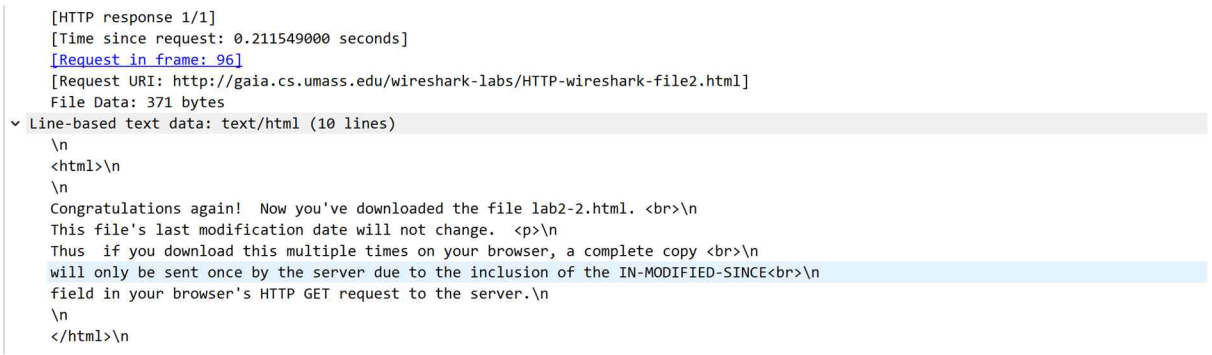
->없습니다. 패킷 창에 나오지 않는 헤더는 보이지 않습니다.

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?



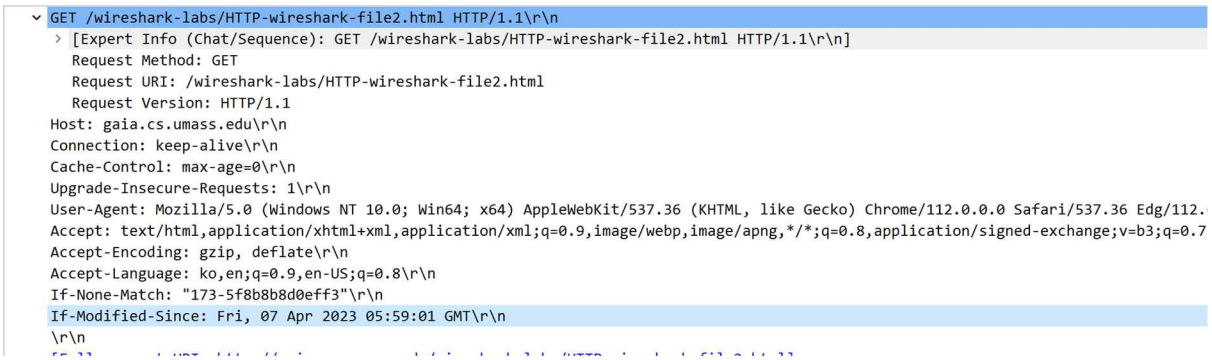
->first HTTP GET request에서는 “IF-MODIFIED-SINCE”를 찾을 수 없습니다.

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



->네 서버는 파일의 내용을 반환하고 있습니다. 이는 lined-based text data에서 볼 수 있습니다.

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?

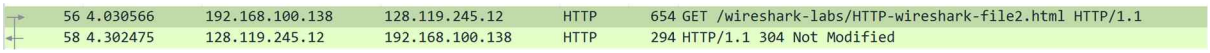


->IF-MODIFIED-SINCE를 확인할 수 있습니다.

->Information으로써는 FRI, 07 APR 2023 05:59:01 GMT를 확인할 수 있습니다.

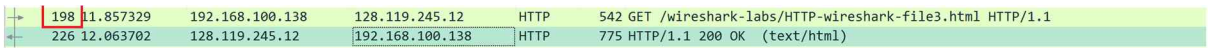
이는 이전 요청에서 이 파일을 마지막으로 수정한 날짜를 나타냅니다.

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.



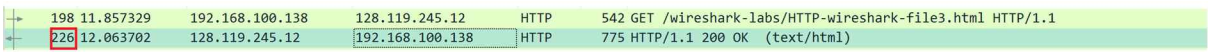
->처음에 파일의 정보를 가져올 때는 캐시에 저장된 내용이 없어 서버에서 정보를 가져왔고 이 과정 사이에 캐시에 정보가 저장되게 됩니다. 그 후 호스트가 request하면 캐시에 있는 정보가 반환되어 서버는 반환하지 않습니다. 브라우저가 파일 내용을 캐시에서 가져왔기 때문에 서버는 파일의 내용을 반환하지 않습니다. 따라서 304 not Modified를 반환합니다.

12. How many HTTP GET request messages did your browser send? Which packet number in the trace contains the GET message for the Bill or Rights?



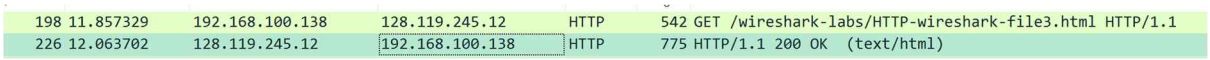
-> HTTP GET request messages는 한번 보냈으며 packet number는 198입니다.

13. Which packet number in the trace contains the status code and phraseassociated with the response to the HTTP GET request?



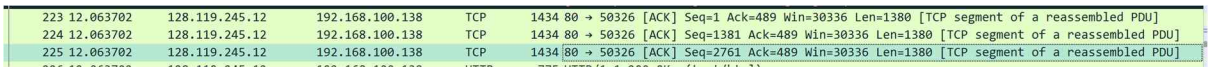
-> packet number는 226입니다.

14. What is the status code and phrase in the response?



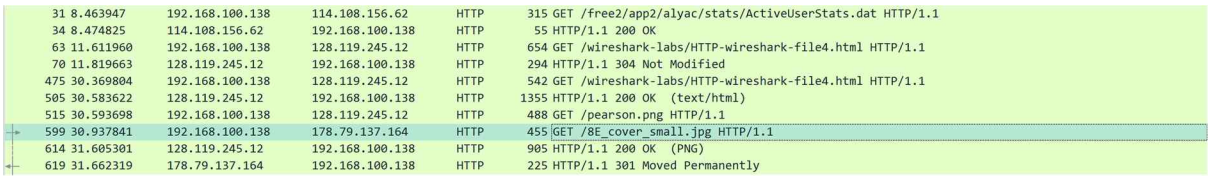
-> status code는 200이며 phrase in the response는 OK입니다.

15. How many data-containing TCP segments were needed to carry the single HTTP response and the text of the Bill of Rights?



-> the single HTTP response and the text of the Bill of Rights를 전달하기 위해서 총 3개의 data-containing TCP segments가 필요합니다.

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

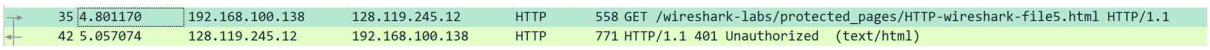


31	8.463947	192.168.100.138	114.108.156.62	HTTP	315	GET /free2/app2/alyac/stats/ActiveUserStats.dat HTTP/1.1
34	8.474825	114.108.156.62	192.168.100.138	HTTP	55	HTTP/1.1 200 OK
63	11.611960	192.168.100.138	128.119.245.12	HTTP	654	GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1
70	11.819663	128.119.245.12	192.168.100.138	HTTP	294	HTTP/1.1 304 Not Modified
475	30.369804	192.168.100.138	128.119.245.12	HTTP	542	GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1
505	30.583622	128.119.245.12	192.168.100.138	HTTP	1355	HTTP/1.1 200 OK (text/html)
515	30.593698	192.168.100.138	128.119.245.12	HTTP	488	GET /pearson.png HTTP/1.1
599	30.937841	192.168.100.138	178.79.137.164	HTTP	455	GET /8E_cover_small.jpg HTTP/1.1
614	31.605301	128.119.245.12	192.168.100.138	HTTP	905	HTTP/1.1 200 OK (PNG)
619	31.662319	178.79.137.164	192.168.100.138	HTTP	225	HTTP/1.1 301 Moved Permanently

->총 3개의 HTTP Get request message를 보내는 것을 확인할 수 있다.
요청한 주소: 128.119.245.12, 128.119.245.12, 178.79.137.164

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.
->이미지 두개를 순차적으로 다운로드 받게 됩니다. pearson.png, 8E_cover_small.png순서로 다운로드 받습니다.

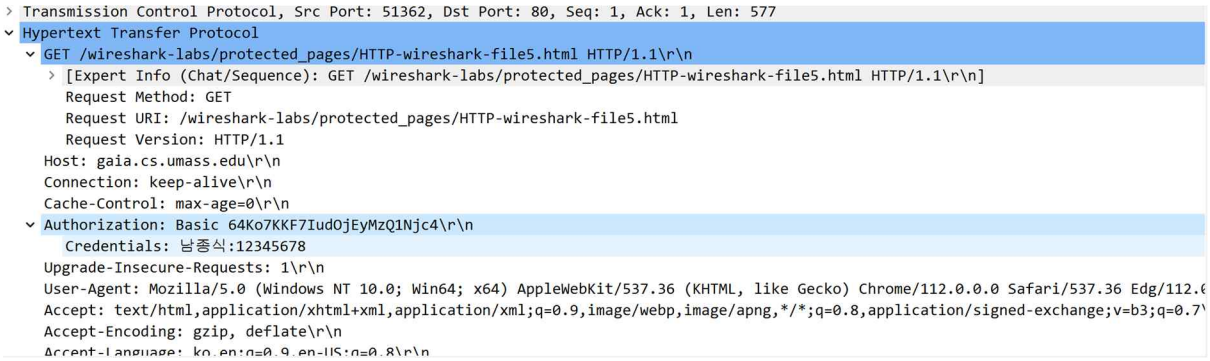
18. What is the server's response (status code and phrase) in response to the initial HTTP GET message from your browser?



35	4.801170	192.168.100.138	128.119.245.12	HTTP	558	GET /wireshark-labs/protected_pages/HTTP-wireshark-file5.html HTTP/1.1
42	5.057074	128.119.245.12	192.168.100.138	HTTP	771	HTTP/1.1 401 Unauthorized (text/html)

->HTTP/1.1 401 Unauthorized
->status code:401
->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?



```
> Transmission Control Protocol, Src Port: 51362, Dst Port: 80, Seq: 1, Ack: 1, Len: 577
v Hypertext Transfer Protocol
  v GET /wireshark-labs/protected_pages/HTTP-wireshark-file5.html HTTP/1.1\r\n
    > [Expert Info (Chat/Sequence): GET /wireshark-labs/protected_pages/HTTP-wireshark-file5.html HTTP/1.1\r\n]
      Request Method: GET
      Request URI: /wireshark-labs/protected_pages/HTTP-wireshark-file5.html
      Request Version: HTTP/1.1
    Host: gaia.cs.umass.edu\r\n
    Connection: keep-alive\r\n
    Cache-Control: max-age=0\r\n
  v Authorization: Basic 64Ko7KKF7IudOjEyMzQ1Njc4\r\n
      Credentials: 남종식:12345678
    Upgrade-Insecure-Requests: 1\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/112.0.0.0 Safari/537.36 Edg/112.0
    Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7\
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: ko,en;q=0.9,en-US;q=0.8\r\n
```

->Authorization을 새로운 필드라고 할 수 있으며 제가 처음에 직접 입력했던 사용자와 암호가 encoding되어 있습니다.

Wireshark_DNS_v7.0.pdf의 23개 문제 풀이

1. Run nslookup to obtain the IP address of a Web server in Asia. What is the IP address of that server?

```
C:₩Users₩jongs>nslookup www.naver.com
서버:    ns.dacom.co.kr
Address:  164.124.101.2

권한 없는 응답:
이름:    www.naver.com.nheos.com
Addresses:  223.130.195.200
          223.130.195.95
Aliases:  www.naver.com
```

->서버의 주소는 223.130.195.200/223.130.195.95입니다. 네이버의 ip주소 조회를 통해 불러왔습니다.

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

```
C:₩Users₩jongs>nslookup -type=NS www.ox.ac.uk
DNS request timed out.
    timeout was 2 seconds.
서버:    UnKnown
Address:  164.124.101.2

ox.ac.uk
        primary name server = raptor.dns.ox.ac.uk
        responsible mail addr = hostmaster.ox.ac.uk
        serial  = 2023040664
        refresh = 3600 (1 hour)
        retry   = 1800 (30 mins)
        expire  = 1209600 (14 days)
        default TTL = 900 (15 mins)
```

->유럽의 옥스퍼드 대학의 authoritative DNS server는 raptor.dns.ox.ac.uk입니다.

3. Run nslookup so that one of the DNS servers obtained in Question 2 is queried for the mail servers for Yahoo! mail. What is its IP address?

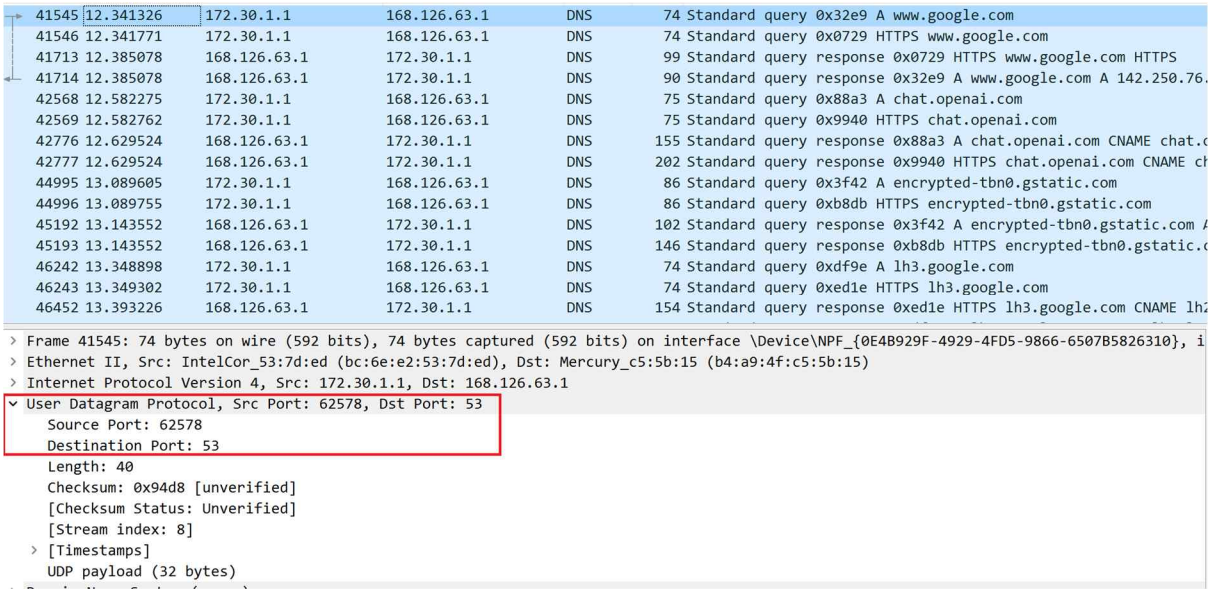
```
C:WUsersWjongs>nslookup raptor.dns.ox.ac.uk mail.yahoo.com
DNS request timed out.
    timeout was 2 seconds.
서버:    UnKnown
Address:  119.161.5.248

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.
*** UnKnown에 대한 요청이 제한 시간을 초과했습니다.
```

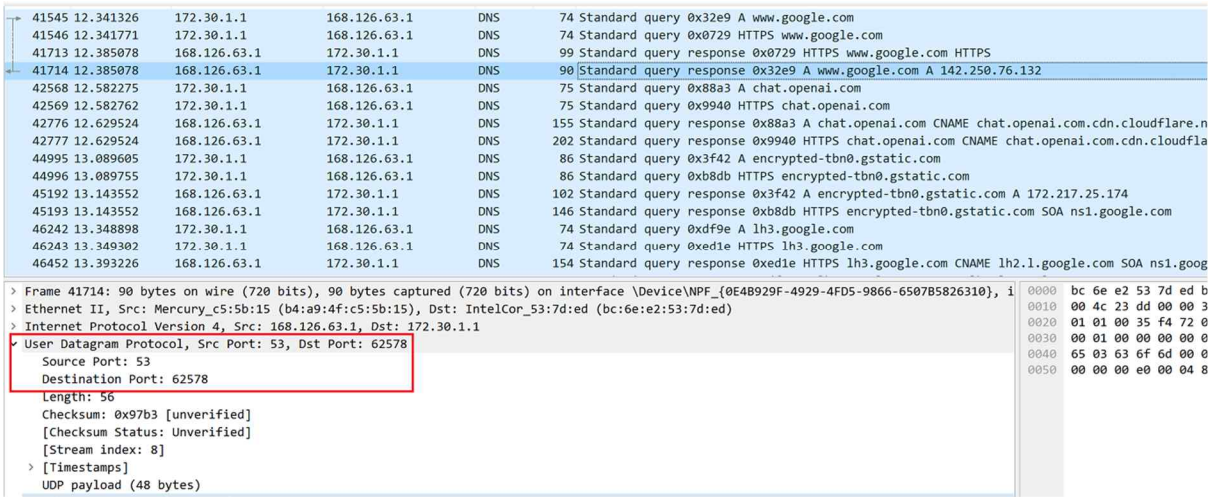
->ip address는 119.161.5.248임을 확인했습니다.

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

->query와 response는 UDP를 통해 전달됩니다.

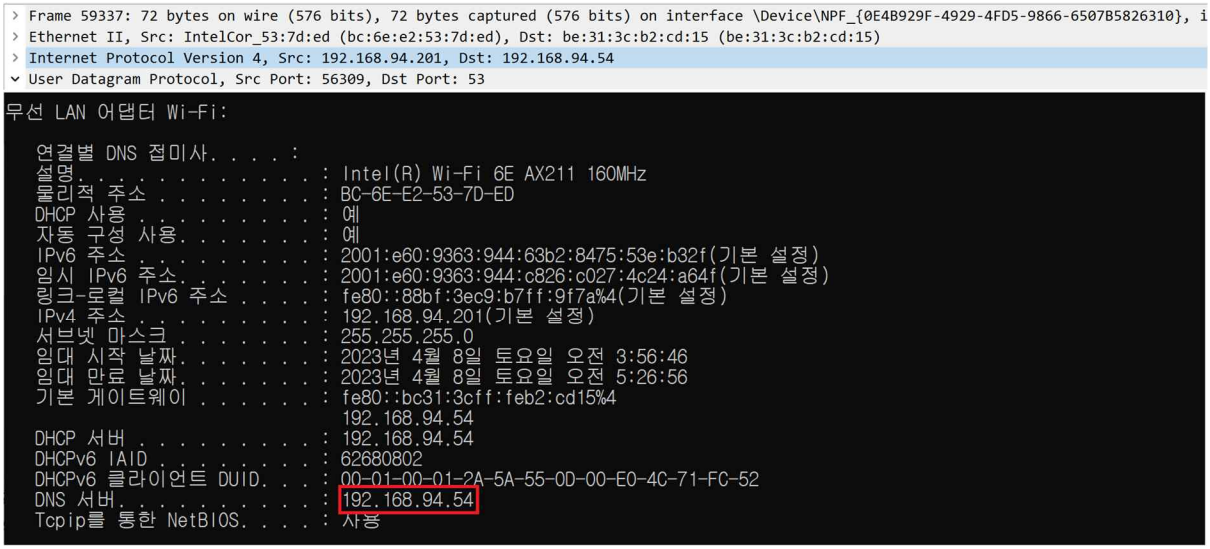
5. What is the destination port for the DNS query message? What is the source port of DNS response message?





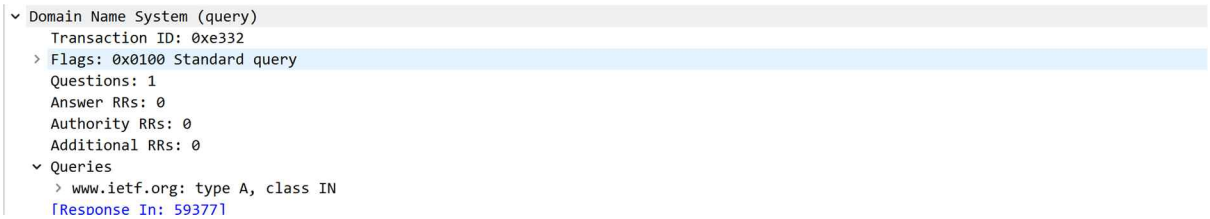
->DNS query message의 destination port와 DNS response message의 source port가 서로 53으로 똑같다는 것을 확인할 수 있습니다.

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?



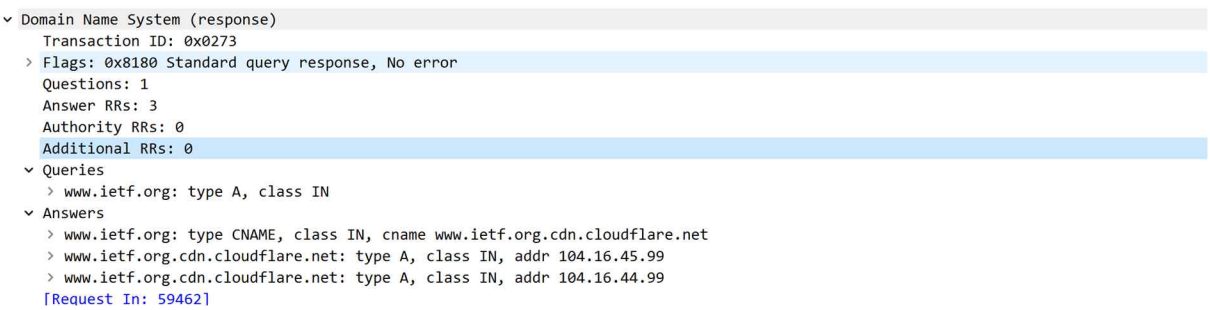
->192.168.94.54.로 서로 동일하다는 점을 알 수 있습니다.

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



->query message는 어떠한 answer를 포함하지 않으며 이는 type A query입니다.

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

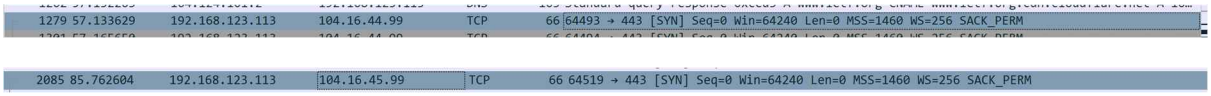


-> DNS response message는 3개의 answers를 제공합니다. 여기에는 조회된 웹사이트 주소와 타입 그리고 class, TTL, data length와 주소를 포함하고 있습니다.

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?

```
> www.ietf.org.cdn.cloudflare.net: type A, class IN, addr 104.16.45.99
> www.ietf.org.cdn.cloudflare.net: type A, class IN, addr 104.16.44.99
```

```
v www.ietf.org.cdn.cloudflare.net: type A, class IN, addr 104.16.44.99
    Name: www.ietf.org.cdn.cloudflare.net
    Type: A (Host Address) (1)
    Class: IN (0x0001)
    Time to live: 300 (5 minutes)
    Data length: 4
    Address: 104.16.44.99
v www.ietf.org.cdn.cloudflare.net: type A, class IN, addr 104.16.45.99
    Name: www.ietf.org.cdn.cloudflare.net
    Type: A (Host Address) (1)
    Class: IN (0x0001)
    Time to live: 300 (5 minutes)
    Data length: 4
    Address: 104.16.45.99
```

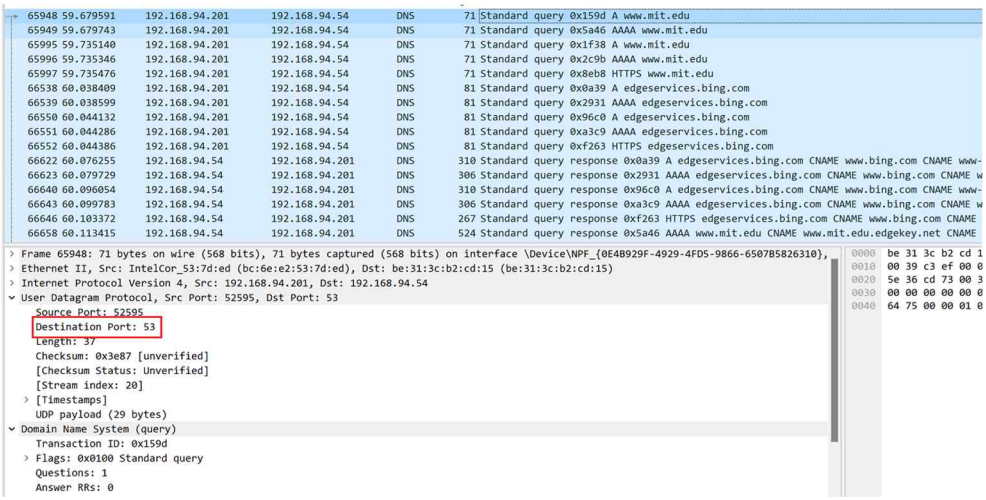


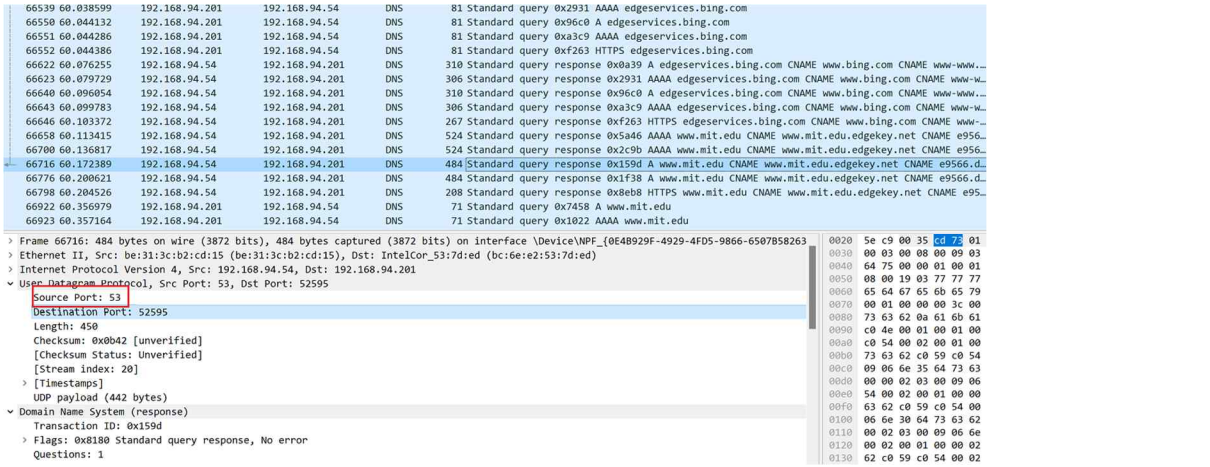
->SYN packet의 대상 IP Address는 DNS response인 104.16.45.99와 104.16.44.99에 의해 제공된 주소에 해당됩니다.

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

->host는 image file에 대한 DNS query를 발행하지 않습니다.

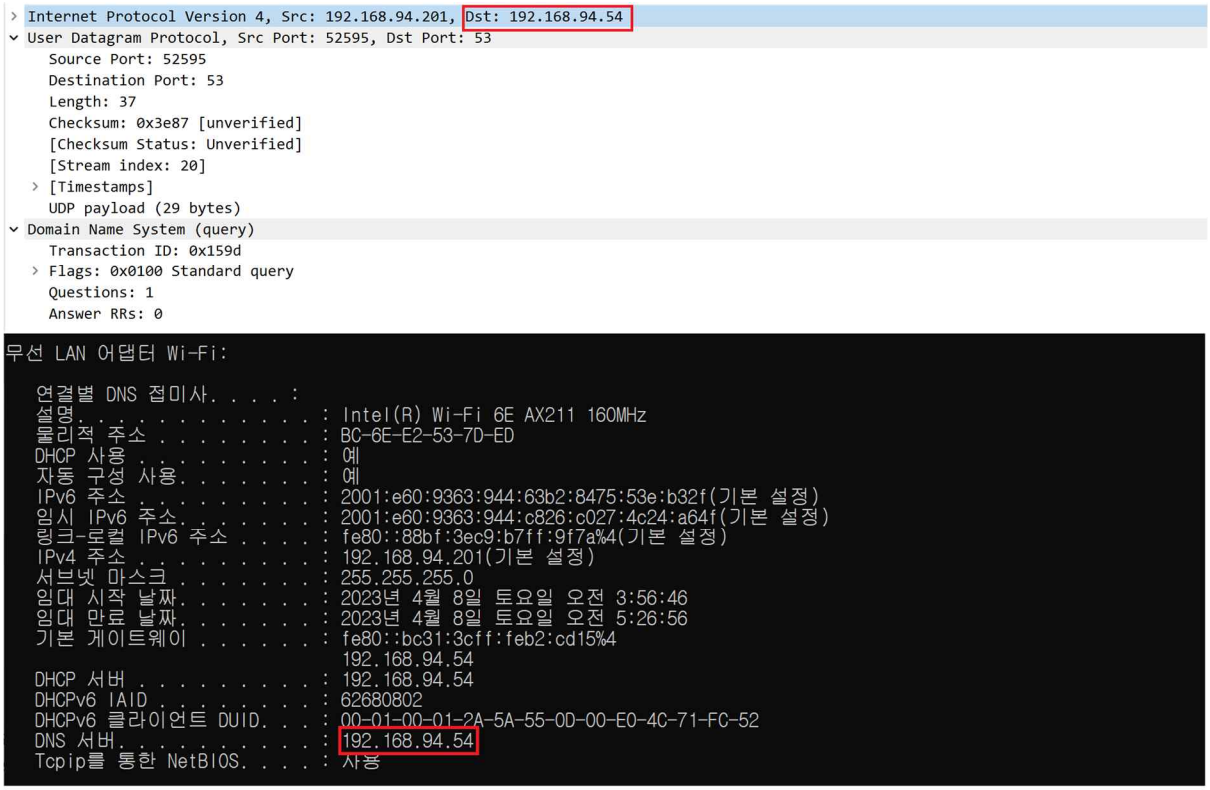
11. What is the destination port for the DNS query message? What is the source port of DNS response message?





->DNS query message의 destination port는 53이며 DNA response message의 source port는 53입니다.

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



->DNS query message는 192.168.94.54로 전송됩니다. 저의 local DNS server의 ip주소와 일치하는 것을 확인할 수 있습니다.

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

```
> [Timestamps]
  UDP payload (29 bytes)
v Domain Name System (query)
  Transaction ID: 0x159d
> Flags: 0x0100 Standard query
  Questions: 1
  Answer RRs: 0
  Authority RRs: 0
  Additional RRs: 0
v Queries
  v www.mit.edu: type A, class IN
      Name: www.mit.edu
      [Name Length: 11]
      [Label Count: 3]
      Type: A (Host Address) (1)
      Class: IN (0x0001)
  [Response In: 66716]
```

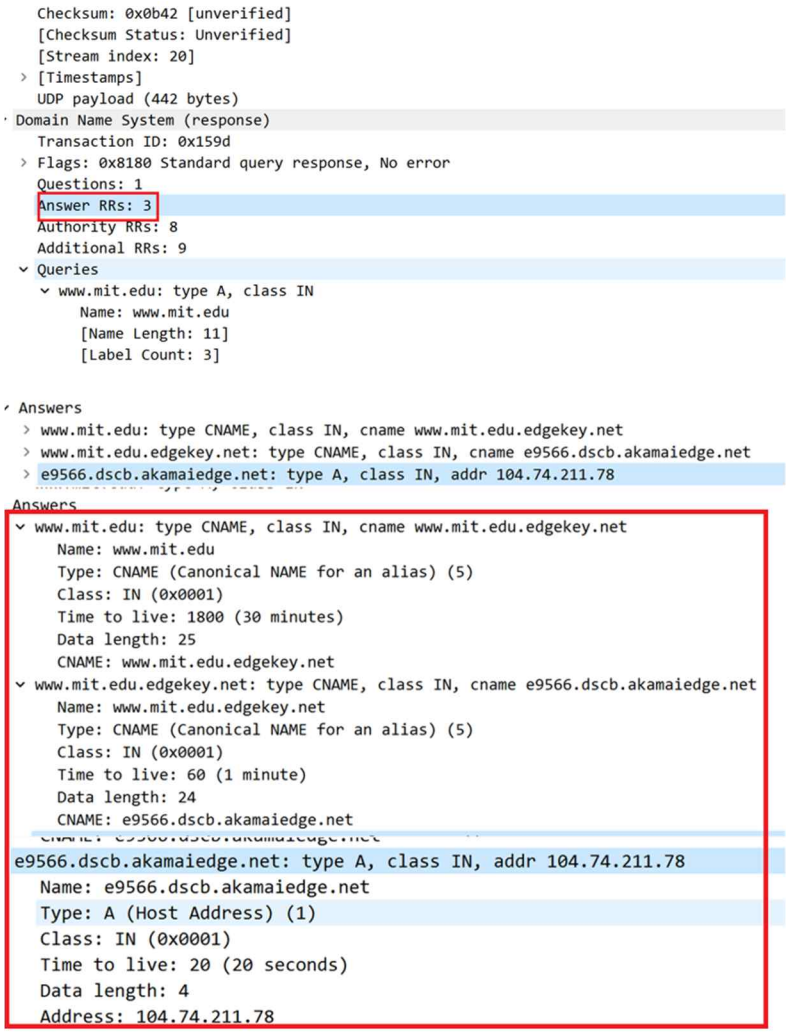
->query는 A type이며 answers를 포함하고 있지 않습니다.

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

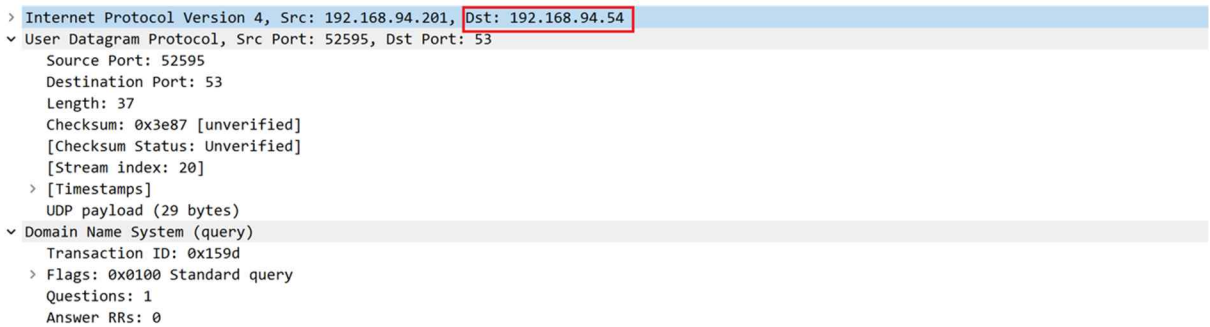
```
  Checksum: 0x0b42 [unverified]
  [Checksum Status: Unverified]
  [Stream index: 20]
> [Timestamps]
  UDP payload (442 bytes)
v Domain Name System (response)
  Transaction ID: 0x159d
> Flags: 0x8180 Standard query response, No error
  Questions: 1
  Answer RRs: 3
  Authority RRs: 8
  Additional RRs: 9
v Queries
  v www.mit.edu: type A, class IN
      Name: www.mit.edu
      [Name Length: 11]
      [Label Count: 3]

v 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
> e9566.dscb.akamaiedge.net: type A, class IN, addr 104.74.211.78
v Answers
v www.mit.edu: type CNAME, class IN, cname www.mit.edu.edgekey.net
    Name: www.mit.edu
    Type: CNAME (Canonical NAME for an alias) (5)
    Class: IN (0x0001)
    Time to live: 1800 (30 minutes)
    Data length: 25
    CNAME: www.mit.edu.edgekey.net
v www.mit.edu.edgekey.net: type CNAME, class IN, cname e9566.dscb.akamaiedge.net
    Name: www.mit.edu.edgekey.net
    Type: CNAME (Canonical NAME for an alias) (5)
    Class: IN (0x0001)
    Time to live: 60 (1 minute)
    Data length: 24
    CNAME: e9566.dscb.akamaiedge.net
v e9566.dscb.akamaiedge.net: type A, class IN, addr 104.74.211.78
    Name: e9566.dscb.akamaiedge.net
    Type: A (Host Address) (1)
    Class: IN (0x0001)
    Time to live: 20 (20 seconds)
    Data length: 4
    Address: 104.74.211.78
```

-> DNS response message는 총 3개의 answers를 포함하고 있습니다. 이는 주소의 타입과 CName, class, host name, ip 주소를 포함합니다. Screenshot를 포함하였습니다.

15. Provide a screenshot.



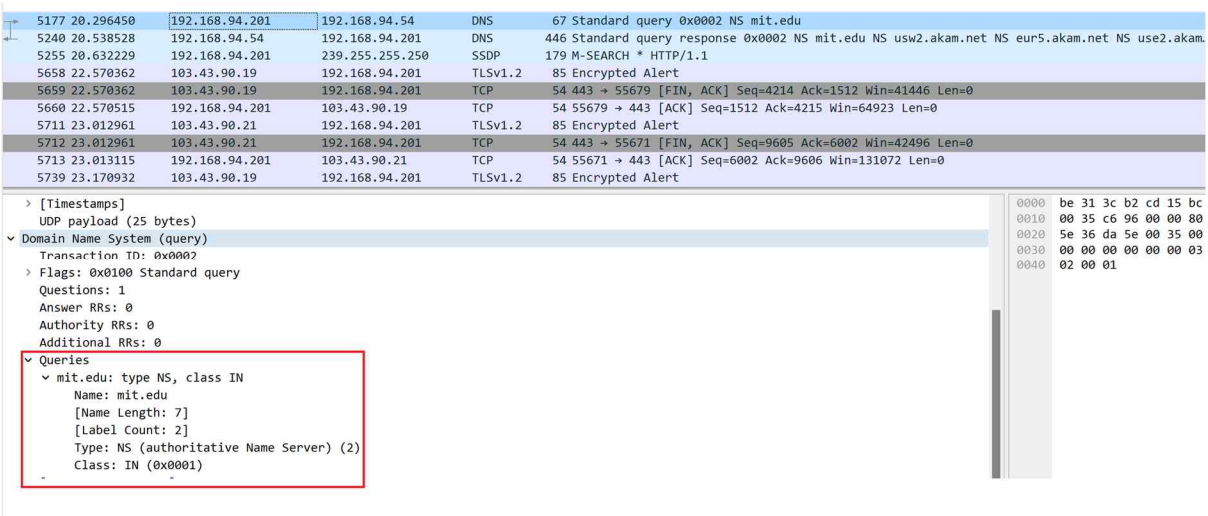
16. To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server?



```
무선 LAN 어댑터 Wi-Fi:

   연결별 DNS 접미사. . . . :
   설명. . . . . . . . . . . : Intel(R) Wi-Fi 6E AX211 160MHz
   물리적 주소 . . . . . . . : BC-6E-E2-53-7D-ED
   DHCP 사용 . . . . . . . . : 예
   자동 구성 사용. . . . . . : 예
   IPv6 주소 . . . . . . . . : 2001:e60:9363:944:63b2:8475:53e:b32f(기본 설정)
   임시 IPv6 주소. . . . . . : 2001:e60:9363:944:c826:c027:4c24:a64f(기본 설정)
   링크-로컬 IPv6 주소 . . . . : fe80::88bf:3ec9:b7ff:9f7a%4(기본 설정)
   IPv4 주소 . . . . . . . . : 192.168.94.201(기본 설정)
   서브넷 마스크 . . . . . . : 255.255.255.0
   임대 시작 날짜. . . . . . : 2023년 4월 8일 토요일 오전 3:56:46
   임대 만료 날짜. . . . . . : 2023년 4월 8일 토요일 오전 5:26:56
   기본 게이트웨이 . . . . . : fe80::bc31:3cff:feb2:cd15%4
                               192.168.94.54
   DHCP 서버 . . . . . . . . : 192.168.94.54
   DHCPv6 IAID . . . . . . . : 62680802
   DHCPv6 클라이언트 DUID. . . : 00-01-00-01-2A-5A-55-0D-00-E0-4C-71-FC-52
   DNS 서버. . . . . . . . . : 192.168.94.54
   Tcpip를 통한 NetBIOS. . . . : 사용
```

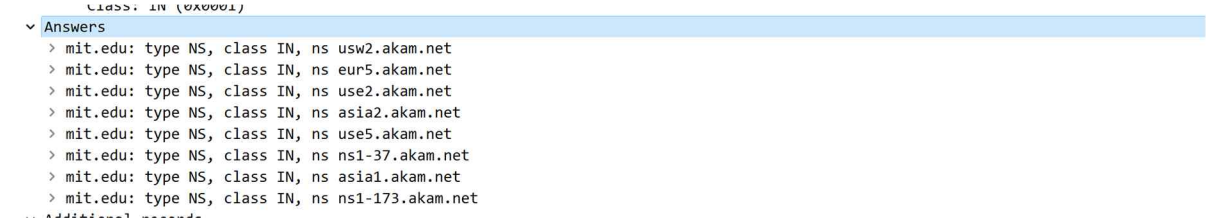
->DNS query message와 저의 local DNS server는 192.168.94.54로 동일합니다.

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

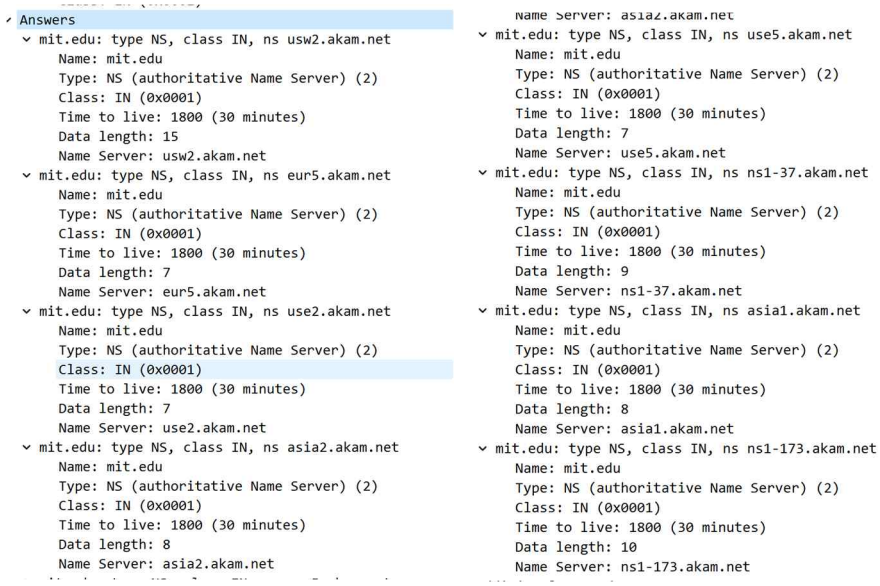


->Type은 NS인 것을 확인할 수 있고 answers는 포함하지 않다는 것을 알 수 있습니다.

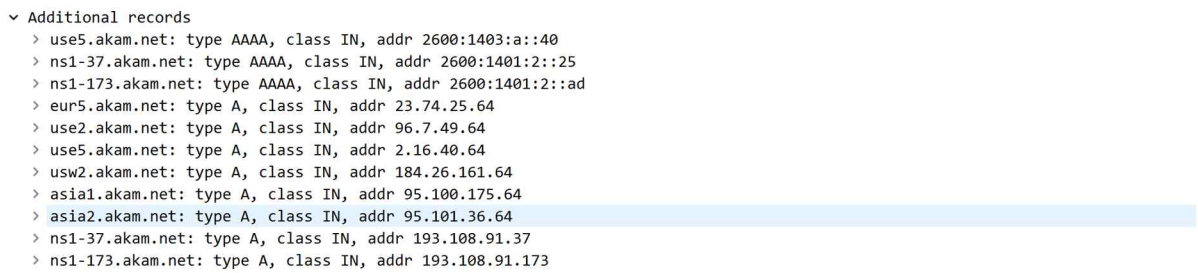
18. Examine the DNS response message. What MIT nameservers does the response message provide? Does this response message also provide the IP addresses of the MIT namesers?



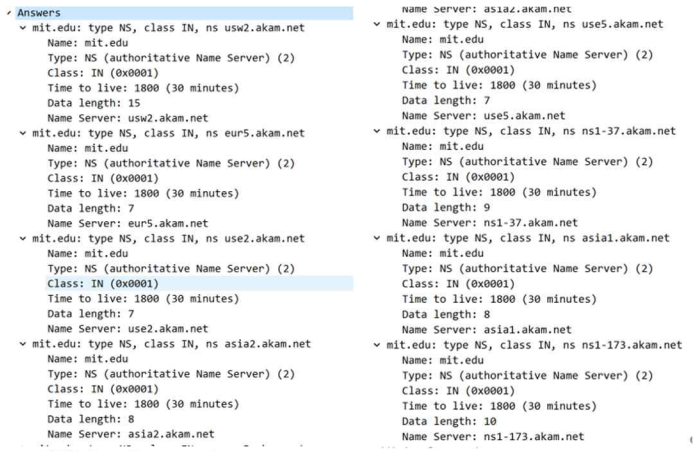
->Nameservers: ns1-37, sus5, usw2, ns1-137, use2, eur5, asia1, asis2

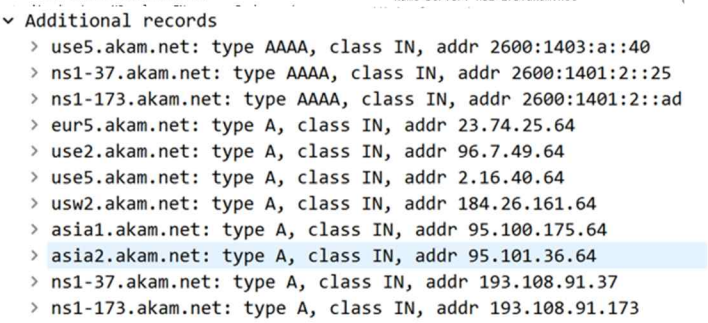


additional records를 맨 아래에서 확인할 수 있다

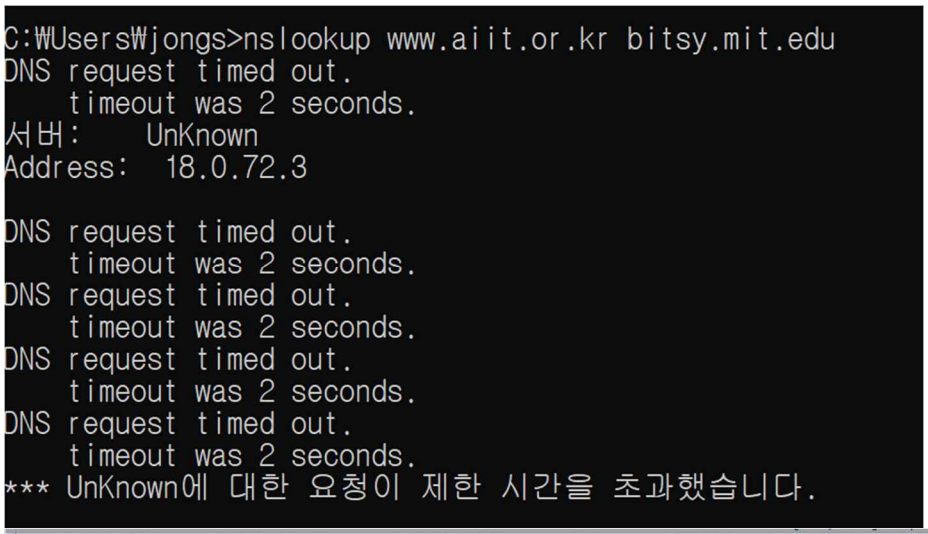


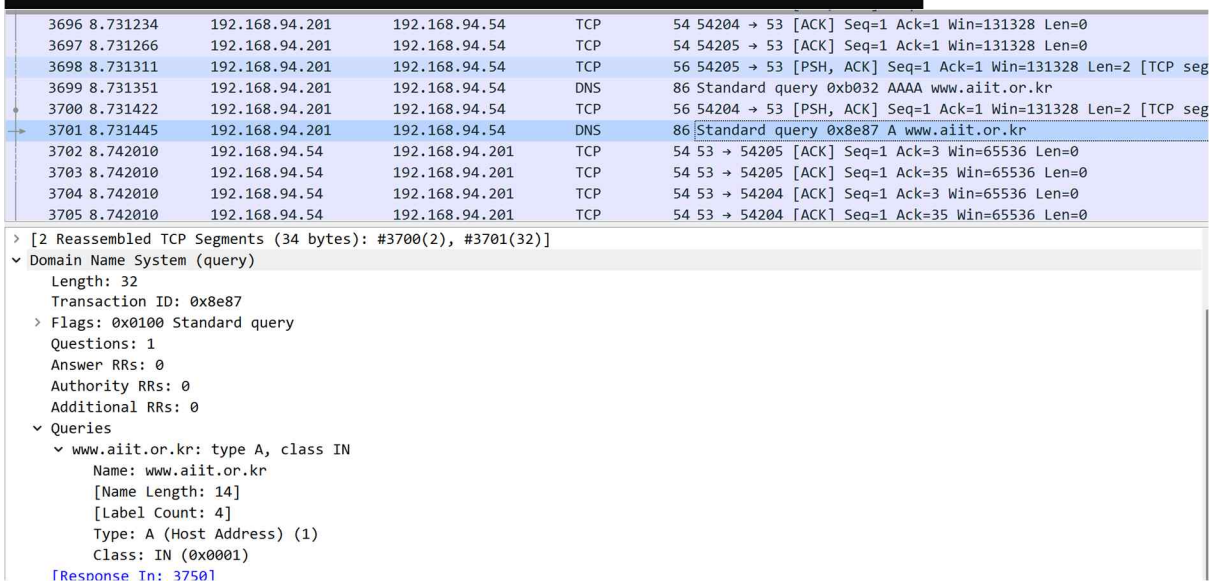
19. Provide a screenshot





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?





->DNS query message는 192.168.94.54로 전송되며 저의 local DNS server ip address와 일치하는 것을 알 수 있습니다.

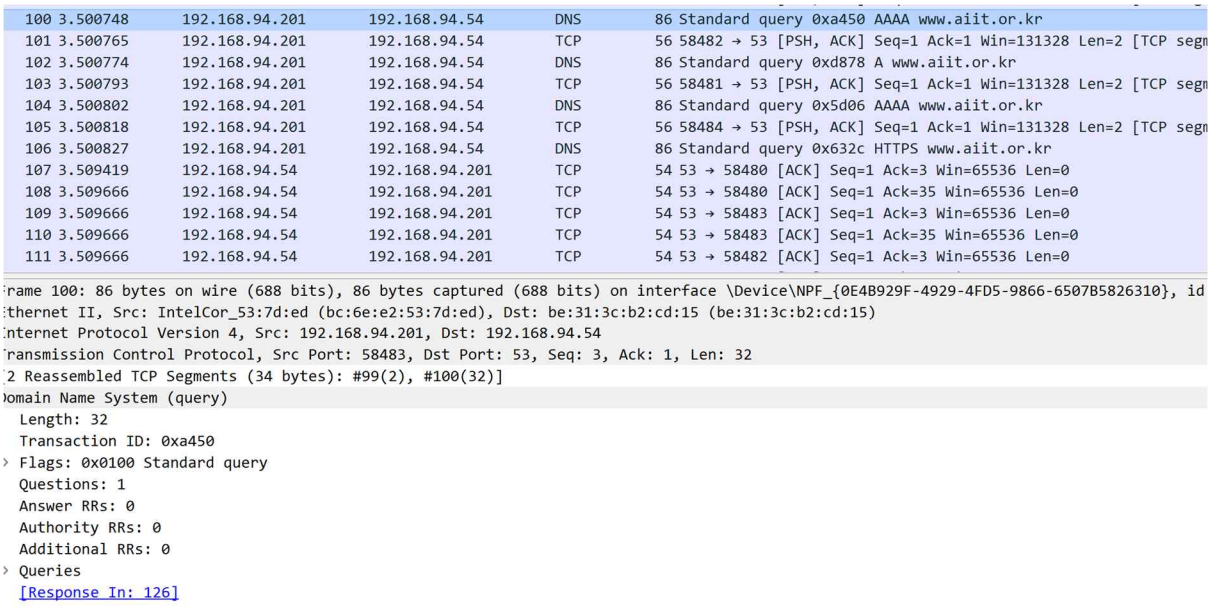
```
무선 LAN 어댑터 Wi-Fi:

   연결별 DNS 접미사. . . . :
   설명. . . . . . . . . . . : Intel(R) Wi-Fi 6E AX211 160MHz
   물리적 주소 . . . . . . . : BC-6E-E2-53-7D-ED
   DHCP 사용 . . . . . . . . : 예
   자동 구성 사용. . . . . . : 예
   IPv6 주소 . . . . . . . . : 2001:e60:9363:944:63b2:8475:53e:b32f(기본 설정)
   임시 IPv6 주소. . . . . . : 2001:e60:9363:944:c826:c027:4c24:a64f(기본 설정)
   링크-로컬 IPv6 주소 . . . : fe80::88bf:3ec9:b7ff:9f7a%4(기본 설정)
   IPv4 주소 . . . . . . . . : 192.168.94.201(기본 설정)
   서브넷 마스크 . . . . . . : 255.255.255.0
   임대 시작 날짜. . . . . . : 2023년 4월 8일 토요일 오전 3:56:46
   임대 만료 날짜. . . . . . : 2023년 4월 8일 토요일 오전 6:27:14
   기본 게이트웨이 . . . . . : fe80::bc31:3cff:feb2:cd15%4
                               192.168.94.54
   DHCP 서버 . . . . . . . . : 192.168.94.54
   DHCPv6 IAID . . . . . . . : 62680802
   DHCPv6 클라이언트 DUID. . : 00-01-00-01-2A-5A-55-0D-00-E0-4C-71-FC-52
   DNS 서버. . . . . . . . . : 192.168.94.54
   Tcpip를 통한 NetBIOS. . . : 사용
```

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

```
100 3.500748  192.168.94.201  192.168.94.54  DNS  86 Standard query 0xa450 AAAA www.aiit.or.kr
101 3.500765  192.168.94.201  192.168.94.54  TCP  56 58482 → 53 [PSH, ACK] Seq=1 Ack=1 Win=131328 Len=2 [TCP segment of a reassembled PDU]
102 3.500774  192.168.94.201  192.168.94.54  DNS  86 Standard query 0xd878 A www.aiit.or.kr
103 3.500793  192.168.94.201  192.168.94.54  TCP  56 58481 → 53 [PSH, ACK] Seq=1 Ack=1 Win=131328 Len=2 [TCP segment of a reassembled PDU]
104 3.500802  192.168.94.201  192.168.94.54  DNS  86 Standard query 0x5d06 AAAA www.aiit.or.kr
105 3.500818  192.168.94.201  192.168.94.54  TCP  56 58484 → 53 [PSH, ACK] Seq=1 Ack=1 Win=131328 Len=2 [TCP segment of a reassembled PDU]
106 3.500827  192.168.94.201  192.168.94.54  DNS  86 Standard query 0x632c HTTPS www.aiit.or.kr
107 3.509419  192.168.94.54   192.168.94.201 TCP  54 53 → 58480 [ACK] Seq=1 Ack=3 Win=65536 Len=0
108 3.509666  192.168.94.54   192.168.94.201 TCP  54 53 → 58480 [ACK] Seq=1 Ack=35 Win=65536 Len=0
109 3.509666  192.168.94.54   192.168.94.201 TCP  54 53 → 58483 [ACK] Seq=1 Ack=3 Win=65536 Len=0
110 3.509666  192.168.94.54   192.168.94.201 TCP  54 53 → 58483 [ACK] Seq=1 Ack=35 Win=65536 Len=0
111 3.509666  192.168.94.54   192.168.94.201 TCP  54 53 → 58482 [ACK] Seq=1 Ack=3 Win=65536 Len=0

Frame 100: 86 bytes on wire (688 bits), 86 bytes captured (688 bits) on interface \Device\NPF_{0E4B929F-4929-4FD5-9866-6507B5826310}, id
Ethernet II, Src: IntelCor_53:7d:ed (bc:6e:e2:53:7d:ed), Dst: be:31:3c:b2:cd:15 (be:31:3c:b2:cd:15)
Internet Protocol Version 4, Src: 192.168.94.201, Dst: 192.168.94.54
Transmission Control Protocol, Src Port: 58483, Dst Port: 53, Seq: 3, Ack: 1, Len: 32
[2 Reassembled TCP Segments (34 bytes): #99(2), #100(32)]
Domain Name System (query)
  Length: 32
  Transaction ID: 0xa450
> Flags: 0x0100 Standard query
  Questions: 1
  Answer RRs: 0
  Authority RRs: 0
  Additional RRs: 0
> Queries
  [Response In: 126]

0000  be 31 3c b2 cd 15 bc
0010  00 48 f3 28 40 00 80
0020  5e 36 e4 73 00 35 f6
0030  02 01 3e 8b 00 00 a4
0040  00 00 03 77 77 77 04
0050  72 00 00 1c 00 01
```

->type은 AAAA type이며 answers는 포함하지 않는 것을 알 수 있습니다.

22. Examine the DNS response message. How many "answers" are provided? What does each of these answers contain? 23. Provide a screenshot.



100	3.500748	192.168.94.201	192.168.94.54	DNS	86 Standard query 0xa450 AAAA www.aiit.or.kr
101	3.500765	192.168.94.201	192.168.94.54	TCP	56 58482 → 53 [PSH, ACK] Seq=1 Ack=1 Win=131328 Len=2 [TCP segm
102	3.500774	192.168.94.201	192.168.94.54	DNS	86 Standard query 0xd878 A www.aiit.or.kr
103	3.500793	192.168.94.201	192.168.94.54	TCP	56 58481 → 53 [PSH, ACK] Seq=1 Ack=1 Win=131328 Len=2 [TCP segm
104	3.500802	192.168.94.201	192.168.94.54	DNS	86 Standard query 0x5d06 AAAA www.aiit.or.kr
105	3.500818	192.168.94.201	192.168.94.54	TCP	56 58484 → 53 [PSH, ACK] Seq=1 Ack=1 Win=131328 Len=2 [TCP segm
106	3.500827	192.168.94.201	192.168.94.54	DNS	86 Standard query 0x632c HTTPS www.aiit.or.kr
107	3.509419	192.168.94.54	192.168.94.201	TCP	54 53 → 58480 [ACK] Seq=1 Ack=3 Win=65536 Len=0
108	3.509666	192.168.94.54	192.168.94.201	TCP	54 53 → 58480 [ACK] Seq=1 Ack=35 Win=65536 Len=0
109	3.509666	192.168.94.54	192.168.94.201	TCP	54 53 → 58483 [ACK] Seq=1 Ack=3 Win=65536 Len=0
110	3.509666	192.168.94.54	192.168.94.201	TCP	54 53 → 58483 [ACK] Seq=1 Ack=35 Win=65536 Len=0
111	3.509666	192.168.94.54	192.168.94.201	TCP	54 53 → 58482 [ACK] Seq=1 Ack=3 Win=65536 Len=0

```
rame 100: 86 bytes on wire (688 bits), 86 bytes captured (688 bits) on interface \Device\NPF_{0E4B929F-4929-4FD5-9866-6507B5826310}, id
thernet II, Src: IntelCor_53:7d:ed (bc:6e:e2:53:7d:ed), Dst: be:31:3c:b2:cd:15 (be:31:3c:b2:cd:15)
nternet Protocol Version 4, Src: 192.168.94.201, Dst: 192.168.94.54
ransmission Control Protocol, Src Port: 58483, Dst Port: 53, Seq: 3, Ack: 1, Len: 32
2 Reassembled TCP Segments (34 bytes): #99(2), #100(32)]
omain Name System (query)
  Length: 32
  Transaction ID: 0xa450
> Flags: 0x0100 Standard query
  Questions: 1
  Answer RRs: 0
  Authority RRs: 0
  Additional RRs: 0
> Queries
  [Response In: 126]
```

-> DNS response message는 없으며 answers는 포함하지 않습니다.

결론 및 고찰

이번 HW1과제에서는 컴퓨터 네트워크 시간에 배운 패킷에 대해서 자세히 알아보기 위해 wireshark를 이용하여 패킷에 대해 분석을 진행하였습니다. 이번 과제를 마무리하였다고 하여 패킷 분석을 완벽하게 할 수 있는 것은 아니지만 조금은 wireshark tool에 대해 익숙해질 수 있었습니다. host가 request를 server에 보내고 server가 host에게 respond를 보내는 과정을 익히고 이 과정에서 캐시에 정보가 저장되어 다음에 host가 데이터를 request할 때 캐시에 이러한 정보가 있다면 굳이 server까지 않고 캐시에서 정보를 가져온다는 점을 알게 되었습니다. 이러한 이유 때문에 과제를 진행하면서 캐시를 계속 삭제해주어 과제의 HTTP부분에서 원하는 값을 얻을 수 있었습니다. 그리고, cmd창에서 ipconfig명령어를 통해 host의 다양한 정보 또한 알 수 있게 되어 신기하기도 했습니다. 처음에는 wireshark tool이 익숙하지 않아서 과제를 진행하는데 어려움이 많았지만 사용법을 익힌 후에는 수월하게 진행할 수 있었습니다.

Reference

Wireshark 강의자료 pdf