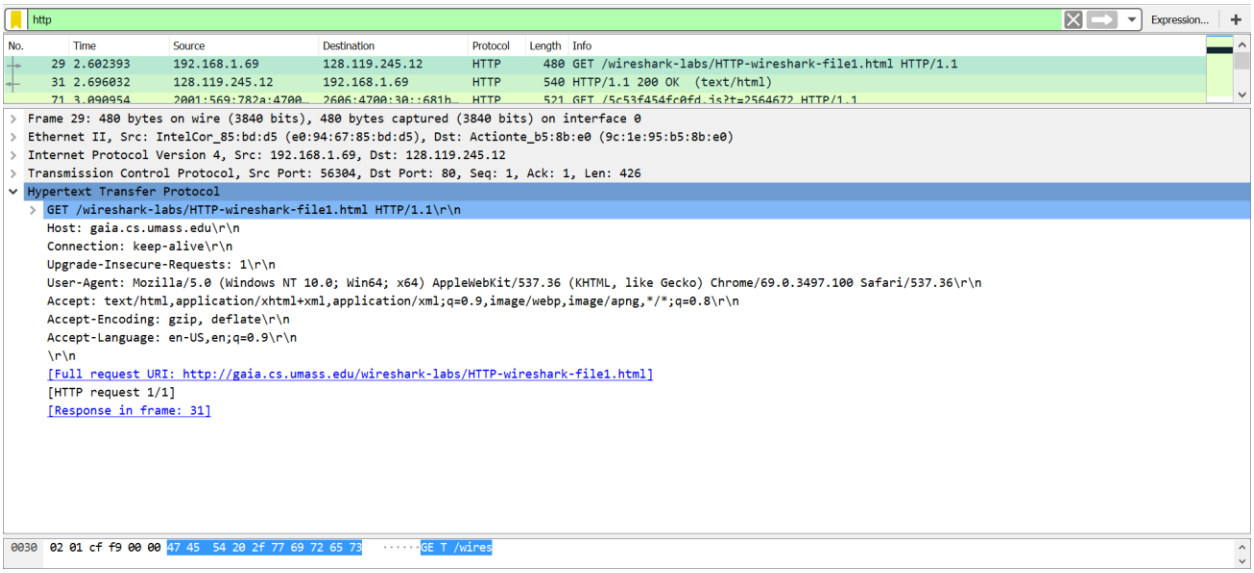
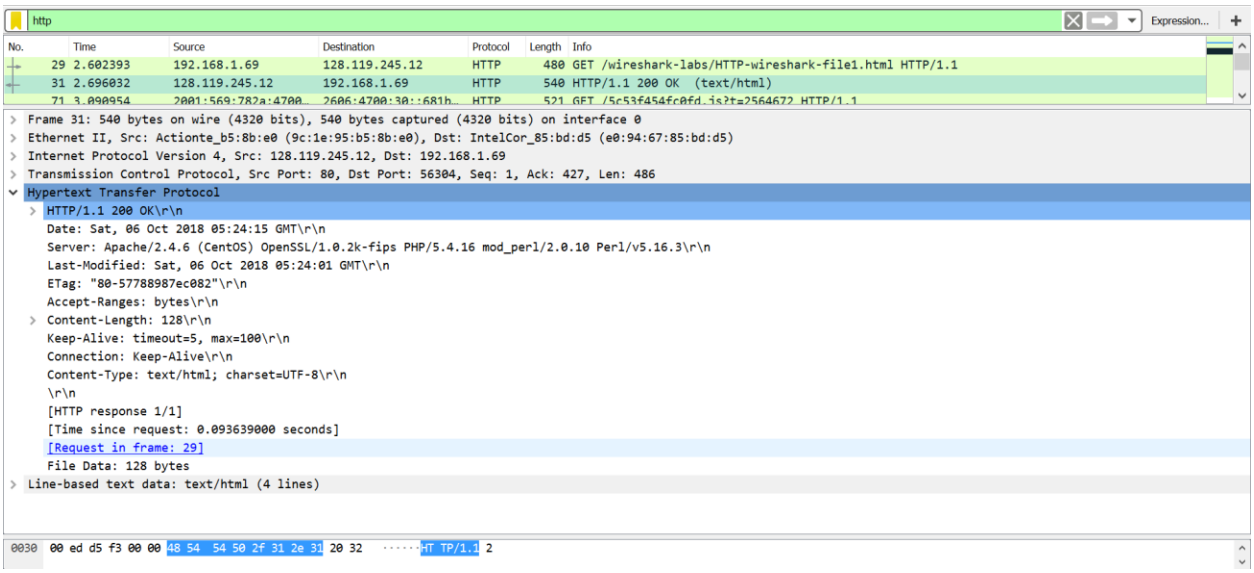
ELEC 331 Assignment 1

Basic HTTP GET/response interaction

GET Request



GET Response



1. My browser is running HTTP 1.1 as indicated by the GET request. The server is also running HTTP 1.1 as indicated by the GET response.
2. My browser indicates that it can accept two languages, en-US and en, as indicated by the Accepted-Language header in the GET request.
3. The IP of my computer is 192.168.1.69. The IP of the server is 128.119.245.12.
4. The server returned status code 200 OK, indicating a successful GET request, to my browser.
5. The HTML file was last modified on Sat, 06 Oct 2018 05:24:01 GMT
6. My browser received exactly 128 bytes of content.
7. There are no headers that were not displayed in the packet-listing window.

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ELEC 331 Assignment 1

HTTP CONDITIONAL GET/response interaction

First GET Request

http

No.	Time	Source	Destination	Protocol	Length	Info
33	4.512938	192.168.1.69	128.119.245.12	HTTP	480	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
37	4.606559	128.119.245.12	192.168.1.69	HTTP	784	HTTP/1.1 200 OK (text/html)
46	4.985729	2001:569:782a:4700…	2606:4700:30::681b…	HTTP	521	GET /5c53f454fc0fd.js?t=2564674 HTTP/1.1
57	5.012522	2606:4700:30::681b…	2001:569:782a:4700…	HTTP	764	HTTP/1.1 200 OK (application/javascript)
104	8.389578	192.168.1.69	128.119.245.12	HTTP	592	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
108	8.482687	128.119.245.12	192.168.1.69	HTTP	293	HTTP/1.1 304 Not Modified

```
> Frame 33: 480 bytes on wire (3840 bits), 480 bytes captured (3840 bits) on interface 0
> Ethernet II, Src: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5), Dst: Actionte_b5:8b:e0 (9c:1e:95:b5:8b:e0)
> Internet Protocol Version 4, Src: 192.168.1.69, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 58001, Dst Port: 80, Seq: 1, Ack: 1, Len: 426
v Hypertext Transfer Protocol
  > GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    Connection: keep-alive\r\n
    Upgrade-Insecure-Requests: 1\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/69.0.3497.100 Safari/537.36\r\n
    Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8\r\n
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: en-US,en;q=0.9\r\n
    \r\n
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file2.html]
    [HTTP request 1/2]
    [Response in frame: 37]
    [Next request in frame: 104]

0000  9c 1e 95 b5 8b e0 e0 94  67 85 bd d5 08 00 45 00   ........ g.....E.
```

First GET Response

http

No.	Time	Source	Destination	Protocol	Length	Info
33	4.512938	192.168.1.69	128.119.245.12	HTTP	480	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
37	4.606559	128.119.245.12	192.168.1.69	HTTP	784	HTTP/1.1 200 OK (text/html)
46	4.985729	2001:569:782a:4700…	2606:4700:30::681b…	HTTP	521	GET /5c53f454fc0fd.js?t=2564674 HTTP/1.1
57	5.012522	2606:4700:30::681b…	2001:569:782a:4700…	HTTP	764	HTTP/1.1 200 OK (application/javascript)
104	8.389578	192.168.1.69	128.119.245.12	HTTP	592	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
108	8.482687	128.119.245.12	192.168.1.69	HTTP	293	HTTP/1.1 304 Not Modified

```
> Frame 37: 784 bytes on wire (6272 bits), 784 bytes captured (6272 bits) on interface 0
> Ethernet II, Src: Actionte_b5:8b:e0 (9c:1e:95:b5:8b:e0), Dst: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5)
> Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.69
> Transmission Control Protocol, Src Port: 80, Dst Port: 58001, Seq: 1, Ack: 427, Len: 730
v Hypertext Transfer Protocol
  > HTTP/1.1 200 OK\r\n
    Date: Sat, 06 Oct 2018 05:49:21 GMT\r\n
    Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/v5.16.3\r\n
    Last-Modified: Sat, 06 Oct 2018 05:49:01 GMT\r\n
    ETag: "173-57788f1ee4abc"\r\n
    Accept-Ranges: bytes\r\n
  > Content-Length: 371\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
    [HTTP response 1/2]
    [Time since request: 0.093621000 seconds]
    [Request in frame: 33]

0030  00 ed da 85 00 00 48 54  54 50 2f 31 2e 31 20 32   ......HT TP/1.1 2
```

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ELEC 331 Assignment 1

Second GET Request

http

No.	Time	Source	Destination	Protocol	Length	Info
33	4.512938	192.168.1.69	128.119.245.12	HTTP	480	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
37	4.606559	128.119.245.12	192.168.1.69	HTTP	784	HTTP/1.1 200 OK (text/html)
46	4.985729	2001:569:782a:4700…	2606:4700:30::681b…	HTTP	521	GET /5c53f454fc0fd.js?t=2564674 HTTP/1.1
57	5.012522	2606:4700:30::681b…	2001:569:782a:4700…	HTTP	764	HTTP/1.1 200 OK (application/javascript)
104	8.389578	192.168.1.69	128.119.245.12	HTTP	592	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
108	8.482687	128.119.245.12	192.168.1.69	HTTP	293	HTTP/1.1 304 Not Modified

```
> Frame 104: 592 bytes on wire (4736 bits), 592 bytes captured (4736 bits) on interface 0
> Ethernet II, Src: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5), Dst: Actionte_b5:8b:e0 (9c:1e:95:b5:8b:e0)
> Internet Protocol Version 4, Src: 192.168.1.69, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 58001, Dst Port: 80, Seq: 427, Ack: 731, Len: 538
v Hypertext Transfer Protocol
  > GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    Connection: keep-alive\r\n
    Cache-Control: max-age=0\r\n
    Upgrade-Insecure-Requests: 1\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/69.0.3497.100 Safari/537.36\r\n
    Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8\r\n
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: en-US,en;q=0.9\r\n
    If-None-Match: "173-57788f1ee4abc"\r\n
    If-Modified-Since: Sat, 06 Oct 2018 05:49:01 GMT\r\n
    \r\n
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file2.html]
    [HTTP request 2/2]

0030  01 fe 1e 39 00 00 47 45  54 20 2f 77 69 72 65 73   ···9··GE T /wires
```

Second GET Response

http

No.	Time	Source	Destination	Protocol	Length	Info
33	4.512938	192.168.1.69	128.119.245.12	HTTP	480	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
37	4.606559	128.119.245.12	192.168.1.69	HTTP	784	HTTP/1.1 200 OK (text/html)
46	4.985729	2001:569:782a:4700…	2606:4700:30::681b…	HTTP	521	GET /5c53f454fc0fd.js?t=2564674 HTTP/1.1
57	5.012522	2606:4700:30::681b…	2001:569:782a:4700…	HTTP	764	HTTP/1.1 200 OK (application/javascript)
104	8.389578	192.168.1.69	128.119.245.12	HTTP	592	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
108	8.482687	128.119.245.12	192.168.1.69	HTTP	293	HTTP/1.1 304 Not Modified

```
> Frame 108: 293 bytes on wire (2344 bits), 293 bytes captured (2344 bits) on interface 0
> Ethernet II, Src: Actionte_b5:8b:e0 (9c:1e:95:b5:8b:e0), Dst: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5)
> Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.69
> Transmission Control Protocol, Src Port: 80, Dst Port: 58001, Seq: 731, Ack: 965, Len: 239
v Hypertext Transfer Protocol
  > HTTP/1.1 304 Not Modified\r\n
    Date: Sat, 06 Oct 2018 05:49:25 GMT\r\n
    Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/v5.16.3\r\n
    Connection: Keep-Alive\r\n
    Keep-Alive: timeout=5, max=99\r\n
    ETag: "173-57788f1ee4abc"\r\n
    \r\n
    [HTTP response 2/2]
    [Time since request: 0.093109000 seconds]
    [Prev request in frame: 33]
    [Prev response in frame: 37]
    [Request in frame: 104]

0030  00 f5 90 cb 00 00 48 54  54 50 2f 31 2e 31 20 33   ····· HT TP/1.1 3
```

8. No, I don't see an "IF-MODIFIED-SINCE" line in the first HTTP GET.
9. Yes. The server explicitly returned the contents of the file. We can tell because after the HTTP Headers, the payload / body of the response indicated by "Line-based text data: text/html" contains the contents of the file.
10. Yes, the second HTTP GET request contains an "IF-MODIFIED-SINCE" line, specifically: If-Modified-Since: Sat, 06 Oct 2018 05:49:01 GMT. This time corresponds to the Last Modified time from the First HTTP GET response.
11. For the second HTTP GET request, the server returned a 304 Not Modified. As such, the server did not explicitly return the contents of the file as I already have the latest version in the cache.

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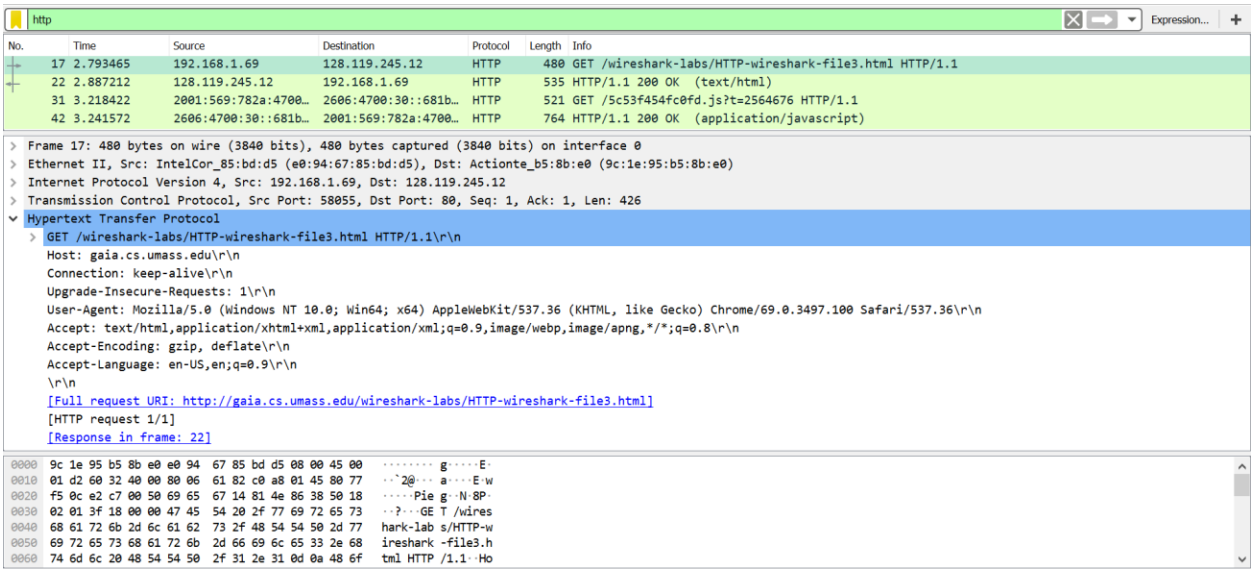
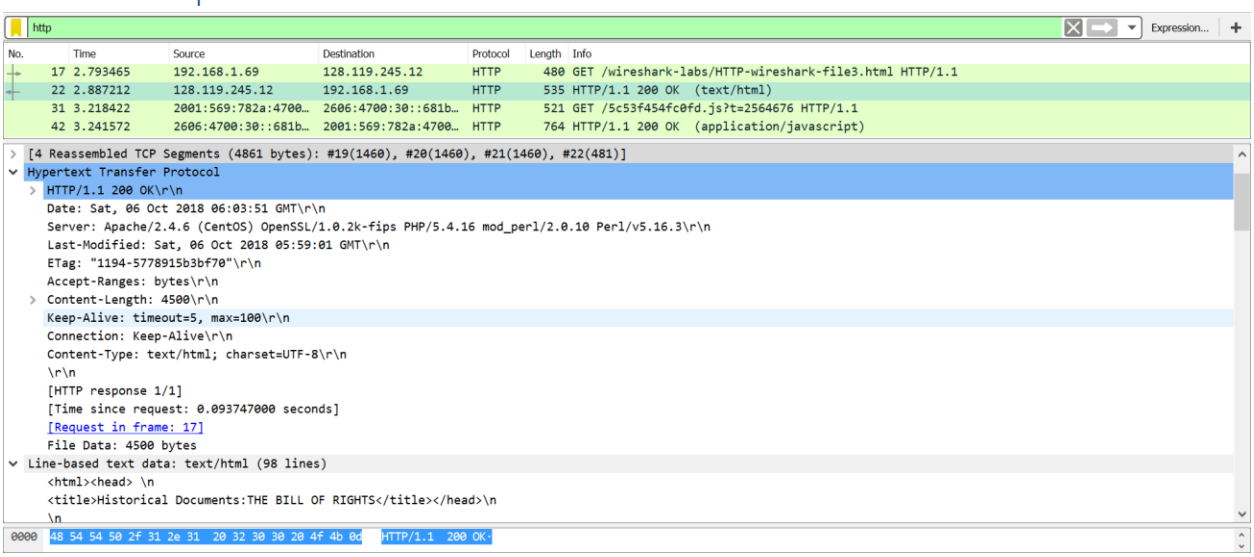
ELEC 331 Assignment 1

Retrieving Long Documents

HTTP GET Request



HTTP GET Response



12. Only one HTTP GET request was sent by my browser. For me, the packet number that contained the GET request message for the Bill of Rights is 17.
13. The packet number that corresponds to the GET response is 19 as indicated by the first Frame under “4 Assembled TCP segments”.
14. The status code and phase of the response was 200 OK.
15. 4 TCP segments was required to carry the single HTTP response and text for the Bill of Rights.

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ELEC 331 Assignment 1

HTML Documents with Embedded Objects

First HTTP GET Request

http

No.	Time	Source	Destination	Protocol	Length	Info
21	2.461368	192.168.1.69	128.119.245.12	HTTP	480	GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1
23	2.554542	128.119.245.12	192.168.1.69	HTTP	1127	HTTP/1.1 200 OK (text/html)
24	2.580235	192.168.1.69	128.119.245.12	HTTP	451	GET /pearson.png HTTP/1.1
31	2.674344	128.119.245.12	192.168.1.69	HTTP	745	HTTP/1.1 200 OK (PNG)
50	2.848353	192.168.1.69	128.119.245.12	HTTP	465	GET /~kurose/cover_5th_ed.jpg HTTP/1.1
72	3.040102	2001:569:782a:4700…	2606:4700:30::681b…	HTTP	521	GET /5c53f454fc0fd.js?t=2564677 HTTP/1.1
104	3.062846	2606:4700:30::681b…	2001:569:782a:4700…	HTTP	764	HTTP/1.1 200 OK (application/javascript)
147	3.140518	128.119.245.12	192.168.1.69	HTTP	632	HTTP/1.1 200 OK (JPEG JFIF image)

```
> Frame 21: 480 bytes on wire (3840 bits), 480 bytes captured (3840 bits) on interface 0
> Ethernet II, Src: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5), Dst: Actionte_b5:8b:e0 (9c:1e:95:b5:8b:e0)
> Internet Protocol Version 4, Src: 192.168.1.69, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 58087, Dst Port: 80, Seq: 1, Ack: 1, Len: 426
v Hypertext Transfer Protocol
  > GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    Connection: keep-alive\r\n
    Upgrade-Insecure-Requests: 1\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/69.0.3497.100 Safari/537.36\r\n
    Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8\r\n
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: en-US,en;q=0.9\r\n
    \r\n
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file4.html]
    [HTTP request 1/2]
    [Response in frame: 23]

0000  9c 1e 95 b5 8b e0 e0 94  67 85 bd d5 08 00 45 00   ........ g.....E.
0010  01 d2 60 38 40 00 80 06  61 7c c0 a8 01 45 80 77   ..`8@... a|...E.w
0020  f5 0c e2 e7 00 50 f7 16  10 ad 94 a7 7d 34 50 18   .....P.. ....}4P.
```

Second HTTP GET Request

http

No.	Time	Source	Destination	Protocol	Length	Info
21	2.461368	192.168.1.69	128.119.245.12	HTTP	480	GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1
23	2.554542	128.119.245.12	192.168.1.69	HTTP	1127	HTTP/1.1 200 OK (text/html)
24	2.580235	192.168.1.69	128.119.245.12	HTTP	451	GET /pearson.png HTTP/1.1
31	2.674344	128.119.245.12	192.168.1.69	HTTP	745	HTTP/1.1 200 OK (PNG)
50	2.848353	192.168.1.69	128.119.245.12	HTTP	465	GET /~kurose/cover_5th_ed.jpg HTTP/1.1
72	3.040102	2001:569:782a:4700…	2606:4700:30::681b…	HTTP	521	GET /5c53f454fc0fd.js?t=2564677 HTTP/1.1
104	3.062846	2606:4700:30::681b…	2001:569:782a:4700…	HTTP	764	HTTP/1.1 200 OK (application/javascript)
147	3.140518	128.119.245.12	192.168.1.69	HTTP	632	HTTP/1.1 200 OK (JPEG JFIF image)

```
> Frame 24: 451 bytes on wire (3608 bits), 451 bytes captured (3608 bits) on interface 0
> Ethernet II, Src: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5), Dst: Actionte_b5:8b:e0 (9c:1e:95:b5:8b:e0)
> Internet Protocol Version 4, Src: 192.168.1.69, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 58087, Dst Port: 80, Seq: 427, Ack: 1074, Len: 397
v Hypertext Transfer Protocol
  > GET /pearson.png HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    Connection: keep-alive\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/69.0.3497.100 Safari/537.36\r\n
    Accept: image/webp,image/apng,image/*,*/*;q=0.8\r\n
    Referer: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file4.html\r\n
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: en-US,en;q=0.9\r\n
    \r\n
    [Full request URI: http://gaia.cs.umass.edu/pearson.png]
    [HTTP request 2/2]
    [Prev request in frame: 21]

0000  9c 1e 95 b5 8b e0 e0 94  67 85 bd d5 08 00 45 00   ........ g.....E.
0010  01 b5 60 39 40 00 80 06  61 98 c0 a8 01 45 80 77   ..`9@... a....E.w
0020  f5 0c e2 e7 00 50 f7 16  12 57 94 a7 81 65 50 18   .....P.. .W...eP.
```

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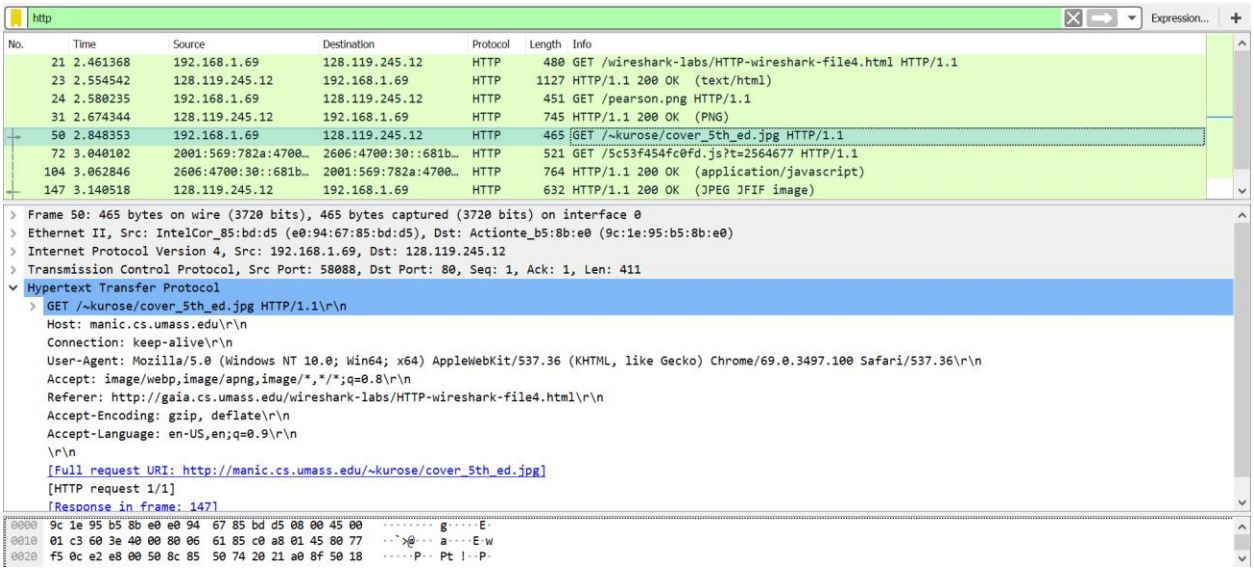
ELEC 331 Assignment 1

Third HTTP GET Request



http

No.	Time	Source	Destination	Protocol	Length	Info
21	2.461368	192.168.1.69	128.119.245.12	HTTP	480	GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1
23	2.554542	128.119.245.12	192.168.1.69	HTTP	1127	HTTP/1.1 200 OK (text/html)
24	2.580235	192.168.1.69	128.119.245.12	HTTP	451	GET /pearson.png HTTP/1.1
31	2.674344	128.119.245.12	192.168.1.69	HTTP	745	HTTP/1.1 200 OK (PNG)
50	2.848353	192.168.1.69	128.119.245.12	HTTP	465	GET /~kurose/cover_5th_ed.jpg HTTP/1.1
72	3.040102	2001:569:782a:4700…	2606:4700:30::681b…	HTTP	521	GET /5c53f454fc0fd.js?t=2564677 HTTP/1.1
104	3.062846	2606:4700:30::681b…	2001:569:782a:4700…	HTTP	764	HTTP/1.1 200 OK (application/javascript)
147	3.140518	128.119.245.12	192.168.1.69	HTTP	632	HTTP/1.1 200 OK (JPEG JFIF image)

```
Frame 50: 465 bytes on wire (3720 bits), 465 bytes captured (3720 bits) on interface 0
Ethernet II, Src: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5), Dst: Actionte_b5:8b:e0 (9c:1e:95:b5:8b:e0)
Internet Protocol Version 4, Src: 192.168.1.69, Dst: 128.119.245.12
Transmission Control Protocol, Src Port: 58088, Dst Port: 80, Seq: 1, Ack: 1, Len: 411
Hypertext Transfer Protocol
  GET /~kurose/cover_5th_ed.jpg HTTP/1.1\r\n
  Host: manic.cs.umass.edu\r\n
  Connection: keep-alive\r\n
  User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/69.0.3497.100 Safari/537.36\r\n
  Accept: image/webp,image/apng,image/*,*/*;q=0.8\r\n
  Referer: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file4.html\r\n
  Accept-Encoding: gzip, deflate\r\n
  Accept-Language: en-US,en;q=0.9\r\n
  \r\n
  [Full request URI: http://manic.cs.umass.edu/~kurose/cover_5th_ed.jpg]
  [HTTP request 1/1]
  [Response in frame: 147]
0000  9c 1e 95 b5 8b e0 e0 94  67 85 bd d5 08 00 45 00   ........ g.....E.
0010  01 c3 60 3e 40 00 80 06  61 85 c0 a8 01 45 80 77   ..`>@... a....E.w
0020  f5 0c e2 e8 00 50 8c 85  50 74 20 21 a0 8f 50 18   .....P.. Pt !..P.
```

16. A total of 3 GET requests were send by my browser. Specifically:
    a. The first GET request was for the HTML, sent to gaia.cs.umass.edu.
    b. The second GET request was for pearson.png, sent to gaia.cs.umass.edu.
    c. The third GET request was for the 5th Edition cover, sent to manic.cs.umass.edu.
    d. Both servers are under the same IP address, just different port numbers.
17. I believe that the two images were downloaded in parallel. If we were to look at the HTTP GET requests for both images, their source ports are different, indicating that these requests were sent in parallel over two different ports. If the source ports were the same, then it would be sequential.

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ELEC 331 Assignment 1

HTTP Authentication

First HTTP GET Response

http

No.	Time	Source	Destination	Protocol	Length	Info
155	4.757101	192.168.1.69	128.119.245.12	HTTP	496	GET /wireshark-labs/protected_pages/HTTP-wireshark-file5.html HTTP/1.1
161	4.848876	128.119.245.12	192.168.1.69	HTTP	771	HTTP/1.1 401 Unauthorized (text/html)
1342	13.879841	192.168.1.69	128.119.245.12	HTTP	555	GET /wireshark-labs/protected_pages/HTTP-wireshark-file5.html HTTP/1.1
1348	13.990208	128.119.245.12	192.168.1.69	HTTP	544	HTTP/1.1 200 OK (text/html)
1407	14.395065	192.168.1.69	128.119.245.12	HTTP	467	GET /favicon.ico HTTP/1.1
1412	14.411497	2001:569:782a:4700…	2606:4700:30::681b…	HTTP	537	GET /5c53f454fc0fd.js?t=2564678 HTTP/1.1
1424	14.433734	2606:4700:30::681b…	2001:569:782a:4700…	HTTP	764	HTTP/1.1 200 OK (application/javascript)
1443	14.488053	128.119.245.12	192.168.1.69	HTTP	538	HTTP/1.1 404 Not Found (text/html)

```
> Frame 161: 771 bytes on wire (6168 bits), 771 bytes captured (6168 bits) on interface 0
> Ethernet II, Src: Actionte_b5:8b:e0 (9c:1e:95:b5:8b:e0), Dst: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5)
> Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.69
> Transmission Control Protocol, Src Port: 80, Dst Port: 58129, Seq: 1, Ack: 443, Len: 717
v Hypertext Transfer Protocol
  > HTTP/1.1 401 Unauthorized\r\n
    Date: Sat, 06 Oct 2018 06:25:29 GMT\r\n
    Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/v5.16.3\r\n
    WWW-Authenticate: Basic realm="wireshark-students only"\r\n
  > Content-Length: 381\r\n
    Keep-Alive: timeout=5, max=100\r\n
    Connection: Keep-Alive\r\n
    Content-Type: text/html; charset=iso-8859-1\r\n
    \r\n
    [HTTP response 1/1]
    [Time since request: 0.091775000 seconds]
    [Request in frame: 155]

0000  e0 94 67 85 bd d5 9c 1e  95 b5 8b e0 08 00 45 00   ··g····· ····· E·
0010  02 f5 52 f1 40 00 2f 06  be a0 80 77 f5 0c c0 a8   ··R·@·/· ···w····
0020  01 45 00 50 e3 11 05 f1  0b 5f 65 e1 20 3e 50 18   ·E·P···· ·_e· >P·
```

Second HTTP GET Request

http

No.	Time	Source	Destination	Protocol	Length	Info
155	4.757101	192.168.1.69	128.119.245.12	HTTP	496	GET /wireshark-labs/protected_pages/HTTP-wireshark-file5.html HTTP/1.1
161	4.848876	128.119.245.12	192.168.1.69	HTTP	771	HTTP/1.1 401 Unauthorized (text/html)
1342	13.879841	192.168.1.69	128.119.245.12	HTTP	555	GET /wireshark-labs/protected_pages/HTTP-wireshark-file5.html HTTP/1.1
1348	13.990208	128.119.245.12	192.168.1.69	HTTP	544	HTTP/1.1 200 OK (text/html)
1407	14.395065	192.168.1.69	128.119.245.12	HTTP	467	GET /favicon.ico HTTP/1.1
1412	14.411497	2001:569:782a:4700…	2606:4700:30::681b…	HTTP	537	GET /5c53f454fc0fd.js?t=2564678 HTTP/1.1
1424	14.433734	2606:4700:30::681b…	2001:569:782a:4700…	HTTP	764	HTTP/1.1 200 OK (application/javascript)
1443	14.488053	128.119.245.12	192.168.1.69	HTTP	538	HTTP/1.1 404 Not Found (text/html)

```
> Frame 1342: 555 bytes on wire (4440 bits), 555 bytes captured (4440 bits) on interface 0
> Ethernet II, Src: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5), Dst: Actionte_b5:8b:e0 (9c:1e:95:b5:8b:e0)
> Internet Protocol Version 4, Src: 192.168.1.69, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 58147, Dst Port: 80, Seq: 1, Ack: 1, Len: 501
v Hypertext Transfer Protocol
  > GET /wireshark-labs/protected_pages/HTTP-wireshark-file5.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    Connection: keep-alive\r\n
  > Authorization: Basic d2lyZXNoYXJrLXN0dWRlbnRzOm5ldHdvcms=\r\n
    Upgrade-Insecure-Requests: 1\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/69.0.3497.100 Safari/537.36\r\n
    Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8\r\n
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: en-US,en;q=0.9\r\n
    \r\n
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/protected_pages/HTTP-wireshark-file5.html]
    [HTTP request 1/2]

0000  9c 1e 95 b5 8b e0 e0 94  67 85 bd d5 08 00 45 00   ····· g····E·
0010  02 1d 60 59 40 00 80 06  61 10 c0 a8 01 45 80 77   ··`Y@··· a····E·w
0020  f5 0c e3 23 00 50 74 c9  4b 60 f6 05 5e 52 50 18   ···#·Pt· K`··^RP·
```

18. For the initial HTTP GET request, the server responded with 401 Unauthorized.
19. For the second HTTP GET request, the field “Authorization: Basic” was added.

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ELEC 331 Assignment 1

nslookup

1. Using nslookup, I looked up baidu.com, which had an IP of 220.181.37.10.

```
$ nslookup baidu.com
Non-authoritative answer:
Server:  cns06.eastlink.ca
Address:  64.178.142.10

Name:    baidu.com
Addresses:  123.125.115.110
          220.181.57.216
```

s

2. Using nslookup-type=soa, I looked up Oxford University (http://www.ox.ac.uk/), which has an authoritative server of ns2.ja.net with IP of 193.63.105.17.

```
$ nslookup -type=NS ox.ac.uk
Non-authoritative answer:
Server:  cns06.eastlink.ca
Address:  64.178.142.10

ox.ac.uk        nameserver = dns2.ox.ac.uk
ox.ac.uk        nameserver = dns1.ox.ac.uk
ox.ac.uk        nameserver = ns2.ja.net
ox.ac.uk        nameserver = dns0.ox.ac.uk

ns2.ja.net      internet address = 193.63.105.17
ns2.ja.net      AAAA IPv6 address = 2001:630:0:45::11
```

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ELEC 331 Assignment 1

Tracing DNS with Wireshark

ipconfig /all (My IP and local DNS servers)

```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) Dual Band Wireless-AC 3165
   Physical Address. . . . . . . . . : E0-94-67-85-BD-D5
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::552b:fe50:93b6:e089%7(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.0.10(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : October 6, 2018 5:34:46 PM
   Lease Expires . . . . . . . . . . : October 13, 2018 5:34:46 PM
   Default Gateway . . . . . . . . . : 192.168.0.1
   DHCP Server . . . . . . . . . . . : 192.168.0.1
   DHCPv6 IAID . . . . . . . . . . . : 65049703
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-20-2E-81-F9-E0-94-67-85-BD-D5
   DNS Servers . . . . . . . . . . . : 64.178.142.10
                                       24.207.0.167
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

DNS Query message

ip.addr == 192.168.0.10

No.	Time	Source	Destination	Protocol	Length	Info
42	3.318515	IntelCor_85:bd:d5	ArrisGro_29:a6:c8	ARP	42	192.168.0.10 is at e0:94:67:85:bd:d5
43	3.334131	192.168.0.10	192.168.0.255	UDP	305	54915 → 54915 Len=263
44	3.397101	192.168.0.10	224.0.0.22	IGMPv3	54	Membership Report / Join group 239.255.255.250 for any sources
45	3.581987	192.168.0.3	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.250
46	3.581987	192.168.0.1	239.255.255.250	IGMPv3	56	Membership Query, specific for group 239.255.255.250
47	3.602387	192.168.0.10	64.178.142.10	DNS	72	Standard query 0x1556 A www.ietf.org

```
> Frame 47: 72 bytes on wire (576 bits), 72 bytes captured (576 bits) on interface 0
> Ethernet II, Src: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5), Dst: ArrisGro_29:a6:c8 (2c:99:24:29:a6:c8)
> Internet Protocol Version 4, Src: 192.168.0.10, Dst: 64.178.142.10
> User Datagram Protocol, Src Port: 58557, Dst Port: 53
v Domain Name System (query)
    Transaction ID: 0x1556
  > Flags: 0x0100 Standard query
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
  v Queries
    v www.ietf.org: type A, class IN
        Name: www.ietf.org
        [Name Length: 12]
        [Label Count: 3]
        Type: A (Host Address) (1)
        Class: IN (0x0001)
    [Response In: 50]

0030  00 00 00 00 00 00 03 77 77 77 04 69 65 74 66 03   ·····w ww·ietf·
```

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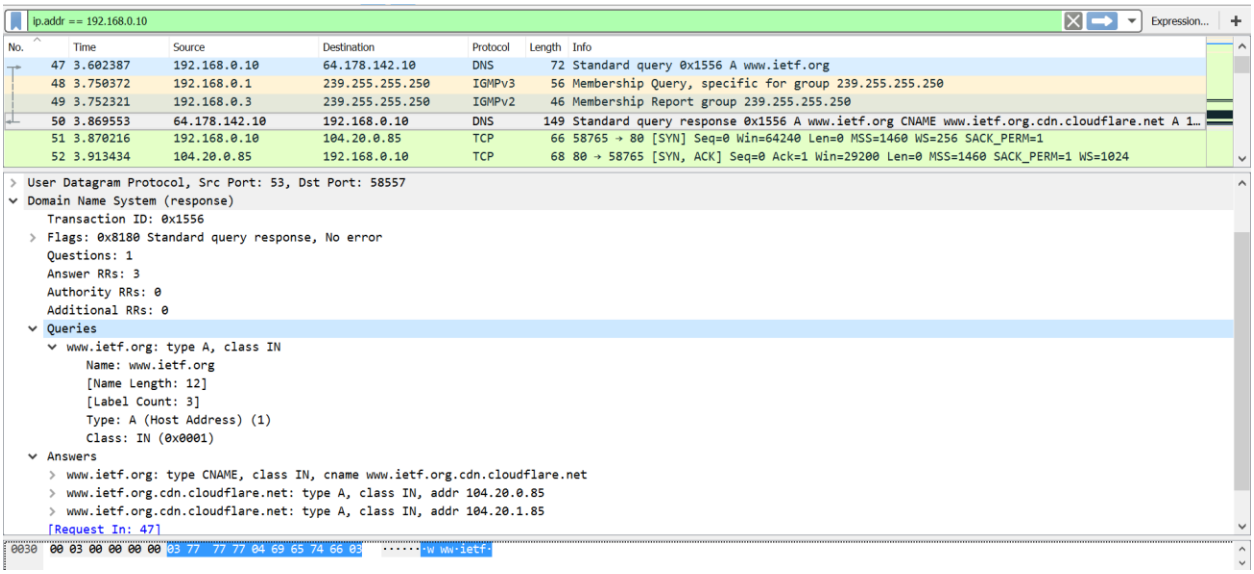
ELEC 331 Assignment 1

DNS Response message



3. The DNS query and response messages are all sent over UDP.
4. The destination port for the DNS query message is port 53. The source port of the DNS response message is port 53.
5. The DNS query message is being sent to an IP address of 64.178.142.10. My local DNS server for WiFi is also 64.178.142.10.
6. Inspecting the DNS query, it has a type of "A" and does not contain any answers.
7. Inspecting the DNS response, it provides 3 answers, respectively:
   a. The canonical name of www.ietf.org with type CNAME.
   b. Two type A DNS servers.
8. The subsequent TCP SYN packet sent has a destination IP address of 104.20.0.85, which corresponds to the first of the two type A DNS servers provided by the DNS response message.
9. No DNS queries were sent before retrieving the images.

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ELEC 331 Assignment 1

DNS Query for nslookup www.mit.edu

ip.addr == 192.168.0.10

No.	Time	Source	Destination	Protocol	Length	Info
167	12.859419	192.168.0.1	239.255.255.250	IGMPv3	56	Membership Query, specific for group 239.255.255.250
168	12.861862	192.168.0.3	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.250
169	12.931380	192.168.0.10	64.178.142.10	DNS	86	Standard query 0x0001 PTR 10.142.178.64.in-addr.arpa
170	12.941961	192.168.0.10	224.0.0.22	IGMPv3	54	Membership Report / Join group 239.255.255.250 for any sources
171	12.974399	64.178.142.10	192.168.0.10	DNS	117	Standard query response 0x0001 PTR 10.142.178.64.in-addr.arpa PTR cns06.eastlink.ca
172	12.976791	192.168.0.10	64.178.142.10	DNS	71	Standard query 0x0002 A www.mit.edu
173	13.084275	192.168.0.3	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.250
174	13.203127	192.168.0.1	239.255.255.250	IGMPv3	56	Membership Query, specific for group 239.255.255.250
175	13.204949	64.178.142.10	192.168.0.10	DNS	160	Standard query response 0x0002 A www.mit.edu CNAME www.mit.edu.edgekey.net CNAME e9566.…
176	13.215192	192.168.0.10	64.178.142.10	DNS	71	Standard query 0x0003 AAAA www.mit.edu
177	13.298925	192.168.0.1	239.255.255.250	IGMPv3	56	Membership Query, specific for group 239.255.255.250
178	13.301497	192.168.0.3	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.250
179	13.304381	64.178.142.10	192.168.0.10	DNS	200	Standard query response 0x0003 AAAA www.mit.edu CNAME www.mit.edu.edgekey.net CNAME e95…

```
> Internet Protocol Version 4, Src: 192.168.0.10, Dst: 64.178.142.10
> User Datagram Protocol, Src Port: 51056, Dst Port: 53
v Domain Name System (query)
    Transaction ID: 0x0003
  > Flags: 0x0100 Standard query
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
  v Queries
    v www.mit.edu: type AAAA, class IN
        Name: www.mit.edu
        [Name Length: 11]
0000  2c 99 24 29 a6 c8 e0 94  67 85 bd d5 08 00 45 00   ,·$)···· g·····E·
```

DNS Response for nslookup www.mit.edu

ip.addr == 192.168.0.10

No.	Time	Source	Destination	Protocol	Length	Info
167	12.859419	192.168.0.1	239.255.255.250	IGMPv3	56	Membership Query, specific for group 239.255.255.250
168	12.861862	192.168.0.3	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.250
169	12.931380	192.168.0.10	64.178.142.10	DNS	86	Standard query 0x0001 PTR 10.142.178.64.in-addr.arpa
170	12.941961	192.168.0.10	224.0.0.22	IGMPv3	54	Membership Report / Join group 239.255.255.250 for any sources
171	12.974399	64.178.142.10	192.168.0.10	DNS	117	Standard query response 0x0001 PTR 10.142.178.64.in-addr.arpa PTR cns06.eastlink.ca
172	12.976791	192.168.0.10	64.178.142.10	DNS	71	Standard query 0x0002 A www.mit.edu
173	13.084275	192.168.0.3	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.250
174	13.203127	192.168.0.1	239.255.255.250	IGMPv3	56	Membership Query, specific for group 239.255.255.250
175	13.204949	64.178.142.10	192.168.0.10	DNS	160	Standard query response 0x0002 A www.mit.edu CNAME www.mit.edu.edgekey.net CNAME e9566.…
176	13.215192	192.168.0.10	64.178.142.10	DNS	71	Standard query 0x0003 AAAA www.mit.edu
177	13.298925	192.168.0.1	239.255.255.250	IGMPv3	56	Membership Query, specific for group 239.255.255.250
178	13.301497	192.168.0.3	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.250
179	13.304381	64.178.142.10	192.168.0.10	DNS	200	Standard query response 0x0003 AAAA www.mit.edu CNAME www.mit.edu.edgekey.net CNAME e95…

```
> Internet Protocol Version 4, Src: 64.178.142.10, Dst: 192.168.0.10
> User Datagram Protocol, Src Port: 53, Dst Port: 51056
v Domain Name System (response)
    Transaction ID: 0x0003
  > Flags: 0x8180 Standard query response, No error
    Questions: 1
    Answer RRs: 4
    Authority RRs: 0
    Additional RRs: 0
  v Queries
    v www.mit.edu: type AAAA, class IN
        Name: www.mit.edu
        [Name Length: 11]
0000  e0 94 67 85 bd d5 2c 99  24 29 a6 c8 08 00 45 00   ··g···,· $)····E·
```

10. For the last DNS query, the destination port is port 53. For the last DNS response, the source port is port 53.
11. For the last DNS query, the destination address is 64.178.142.10, which is my local DNS server.
12. For the last DNS query, the type is AAAA (IPv6) and does not contain any answers.
13. For the last DNS response, it provided 4 answers, respectively:
    a. The canonical name of www.mit.edu of type CNAME
    b. The canonical name of Akami's CDN for www.mit.edu.edgekey.net of type CNAME
    c. Two DNS servers of type AAAA hosted by akamiedge

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ELEC 331 Assignment 1

DNS Query for nslookup -type=NS mit.edu

dns

No.	Time	Source	Destination	Protocol	Length	Info
8	0.488004	192.168.0.10	64.178.142.10	DNS	86	Standard query 0x0001 PTR 10.142.178.64.in-addr.arpa
9	0.541632	64.178.142.10	192.168.0.10	DNS	117	Standard query response 0x0001 PTR 10.142.178.64.in-addr.arpa PTR cns06.eastlink.ca
10	0.543580	192.168.0.10	64.178.142.10	DNS	67	Standard query 0x0002 NS mit.edu
11	0.627126	64.178.142.10	192.168.0.10	DNS	358	Standard query response 0x0002 NS mit.edu NS ns1-37.akam.net NS asia2.akam.net NS asia1.akam.…

```
> Frame 10: 67 bytes on wire (536 bits), 67 bytes captured (536 bits) on interface 0
> Ethernet II, Src: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5), Dst: ArrisGro_29:a6:c8 (2c:99:24:29:a6:c8)
> Internet Protocol Version 4, Src: 192.168.0.10, Dst: 64.178.142.10
> User Datagram Protocol, Src Port: 60056, Dst Port: 53
v Domain Name System (query)
    Transaction ID: 0x0002
  > Flags: 0x0100 Standard query
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
  v Queries
    v mit.edu: type NS, class IN
        Name: mit.edu
        [Name Length: 7]
        [Label Count: 2]
        Type: NS (authoritative Name Server) (2)
        Class: IN (0x0001)
    [Response In: 11]

0000  2c 99 24 29 a6 c8 e0 94  67 85 bd d5 08 00 45 00   ,·$)····  g·····E·
0010  00 35 6f a1 00 00 80 11  3b a8 c0 a8 00 0a 40 b2   ·5o·····  ;·····@·
0020  8e 0a ea 98 00 35 00 21  ac b0 00 02 01 00 00 01   ·····5·!  ........
```

DNS Response for nslookup-type=NS mit.edu

dns

No.	Time	Source	Destination	Protocol	Length	Info
8	0.488004	192.168.0.10	64.178.142.10	DNS	86	Standard query 0x0001 PTR 10.142.178.64.in-addr.arpa
9	0.541632	64.178.142.10	192.168.0.10	DNS	117	Standard query response 0x0001 PTR 10.142.178.64.in-addr.arpa PTR cns06.eastlink.ca
10	0.543580	192.168.0.10	64.178.142.10	DNS	67	Standard query 0x0002 NS mit.edu
11	0.627126	64.178.142.10	192.168.0.10	DNS	358	Standard query response 0x0002 NS mit.edu NS ns1-37.akam.net NS asia2.akam.net NS asia1.akam.…

```
  v Queries
    v mit.edu: type NS, class IN
        Name: mit.edu
        [Name Length: 7]
        [Label Count: 2]
        Type: NS (authoritative Name Server) (2)
        Class: IN (0x0001)
  v Answers
    > mit.edu: type NS, class IN, ns ns1-37.akam.net
    > mit.edu: type NS, class IN, ns asia2.akam.net
    > mit.edu: type NS, class IN, ns asia1.akam.net
    > mit.edu: type NS, class IN, ns use5.akam.net
    > mit.edu: type NS, class IN, ns use2.akam.net
    > mit.edu: type NS, class IN, ns eur5.akam.net
    > mit.edu: type NS, class IN, ns ns1-173.akam.net
    > mit.edu: type NS, class IN, ns usw2.akam.net
  > Additional records
    [Request In: 10]
    [Time: 0.083546000 seconds]

0000  e0 94 67 85 bd d5 2c 99  24 29 a6 c8 08 00 45 00   ··g···,·  $)····E·
0010  01 58 00 00 40 00 3a 11  b0 26 40 b2 8e 0a c0 a8   ·X··@·:·  ·&@·····
0020  00 0a 00 35 ea 98 01 44  a5 fd 00 02 81 80 00 01   ···5···D  ........
```

14. For the last DNS query, the destination address is 64.178.142.10, which is my local DNS server.
15. For the last DNS query, the type is NS and does not contain any answers.
16. For the last DNS response, the MIT nameservers it provides are:
    a. ns1-37.akam.net
    b. asia2.akam.net
    c. asia1.akam.net
    d. use5.akam.net
    e. use2.akam.net
    f. eur5.akam.net
    g. ns1-173.akam.net
    h. usw2.akam.net

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ELEC 331 Assignment 1

DNS Results for nslookup www.aiit.or.kr hub.ubc.ca

dns

No.	Time	Source	Destination	Protocol	Length	Info
21	1.482590	192.168.0.10	64.178.142.10	DNS	70	Standard query 0xcae0 A hub.ubc.ca
24	1.536977	64.178.142.10	192.168.0.10	DNS	86	Standard query response 0xcae0 A hub.ubc.ca A 137.82.1.1
25	1.539824	192.168.0.10	137.82.1.1	DNS	83	Standard query 0x0001 PTR 1.1.82.137.in-addr.arpa
26	1.573742	137.82.1.1	192.168.0.10	DNS	172	Standard query response 0x0001 PTR 1.1.82.137.in-addr.arpa PTR hub.ubc.ca NS hub.ubc.ca NS dn…
27	1.575510	192.168.0.10	137.82.1.1	DNS	74	Standard query 0x0002 A www.aiit.or.kr
28	1.603609	137.82.1.1	192.168.0.10	DNS	193	Standard query response 0x0002 A www.aiit.or.kr A 58.229.6.225 NS ns25.dnszi.com NS ns9.dnszi…
29	1.614969	192.168.0.10	137.82.1.1	DNS	74	Standard query 0x0003 AAAA www.aiit.or.kr
30	1.643596	137.82.1.1	192.168.0.10	DNS	128	Standard query response 0x0003 AAAA www.aiit.or.kr SOA ns9.dnszi.com

```
> Frame 21: 70 bytes on wire (560 bits), 70 bytes captured (560 bits) on interface 0
> Ethernet II, Src: IntelCor_85:bd:d5 (e0:94:67:85:bd:d5), Dst: ArrisGro_29:a6:c8 (2c:99:24:29:a6:c8)
> Internet Protocol Version 4, Src: 192.168.0.10, Dst: 64.178.142.10
> User Datagram Protocol, Src Port: 55552, Dst Port: 53
v Domain Name System (query)
    Transaction ID: 0xcae0
  > Flags: 0x0100 Standard query
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
  > Queries
    [Response In: 24]
```

```
0000  2c 99 24 29 a6 c8 e0 94  67 85 bd d5 08 00 45 00   ,·$)···· g·····E·
0010  00 38 6f ad 00 00 80 11  3b 99 c0 a8 00 0a 40 b2   ·8o····· ;·····@·
```

17. For the first DNS query, the destination address is 64.178.142.10, which is my local DNS server.
18. For the first DNS query, the type is A and does not contain any answers.
19. For the first DNS response, there is one answer. As we used hub.ubc.ca as the default DNS server, we must make a lookup there to find out more about www.aiit.or.kr. Once we find out that our "default" DNS server does not contain what we want, we make further calls to attempt to reach our target. Thus, the answer contained in our first DNS response is a response signifying that it does not have information about www.aiit.or.kr.

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