Theodore Kim

CS-GY 6843

Lab 2 – HTTP

Part 1: Basic HTTP GET/response interaction

**Wireshark Traces:**

219 17.334100 192.168.0.100 128.119.245.12 HTTP 421 GET /wireshark-labs/HTTP-wireshark-filel.html HTTP/1.1

Frame 219: 421 bytes on wire (3368 bits), 421 bytes captured (3368 bits) on interface 0

Ethernet II, Src: RivetNet\_el:f0:cf (9c:b6:d0:el:f0:cf), Dst: Tp-LinkT\_97:5f:e8 (60:e3:27:97:5f:e8)

Internet Protocol Version 4, Src: 192.168.0.100, Dst: 128.119.245.12 Computer’s IP Address is 192.168.0.100

Transmission Control Protocol, Src Port: 64817, Dst Port: 80, Seq: 1, Ack: 1, Len: 367 Hypertext Transfer Protocol

GET /wireshark-labs/HTTP-wireshark-filel.html HTTP/1.1\r\n Browser is running HTTP 1.1

Host: gaia.cs.umass.edu\r\n

User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n Accept: text/html,application/xhtml+xml,application/xml;q=0.9,\*/\*;q=0.8\r\n

Accept-Language: en-US,en;q=0.5\r\n The Browser can accept English

Accept-Encoding: gzip, deflate\r\n

Connection: keep-alive\r\n

Upgrade-Insecure-Requests: 1\r\n

\r\n

[Full request URI: [http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-filel.html]](http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-filel.html) [HTTP request 1/3]

[Response in frame: 224] [Next request in frame: 353]

224 17.345729 128.119.245.12 192.168.0.100 HTTP 540 HTTP/1.1 200 OK (text/html)

Frame 224: 540 bytes on wire (4320 bits), 540 bytes captured (4320 bits) on interface 0

Ethernet II, Src: Tp-LinkT\_97:5f:e8 (60:e3:27:97:5f:e8), Dst: RivetNet\_el:f0:cf (9c:b6:d0:el:f0:cf) Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.0.100

Transmission Control Protocol, Src Port: 80, Dst Port: 64817, Seq: 1, Ack: 368, Len: 486 Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n Server running HTTP 1.1 / Server returned status code 200

Date: Thu, 15 Feb 2018 03:12:05 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: Wed, 14 Feb 2018 06:59:01 GMT\r\n File was last updated on Wed, Feb 14 2018

ETag: "80-56526a5620b2e"\r\n

Accept-Ranges: bytes\r\n

Content-Length: 128\r\n The server returned 128 bytes of code

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 1/3]

[Time since request: 0.011629000 seconds] [Request in frame: 219]

[Next request in frame: 353]

[Next response in frame: 355]

File Data: 128 bytes

Line-based text data: text/html

<html>\n

Congratulations. You've downloaded the file \n <http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-filel.html!\n>

</html>\n

**Questions:**

1. Both the browser and server are running HTTP 1.1
2. The browser indicates that it can accept English
3. The IP Address of the computer is 192.168.0.100
4. The server returned a status code of 200.
5. The HTML file was last modified on Wednesday February 14, 2018 at 06:59 GMT
6. 128 bytes of content are being returned by the server
7. The packet listing window does not display the content type of the message.

Part 2: HTTP Conditional GET

**Wireshark Traces:**

75 1.515773 192.168.100 128.119.245.12 HTTP 464 GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1

Frame 75: 464 bytes on wire (3712 bits), 464 bytes captured (3712 bits) on interface 0

Ethernet II, Src: RivetNet\_el:f0:cf (9c:b6:d0:el:f0:cf), Dst: Tp-LinkT\_97:5f:e8 (60:e3:27:97:5f:e8) Internet Protocol Version 4, Src: 192.168.100,Dst: 128.119.245.12

Transmission Control Protocol, Src Port: 50176, Dst Port: 80, Seq: 1, Ack: 1, Len: 410 Hypertext Transfer Protocol

GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1\r\n Host: gaia.cs.umass.edu\r\n

User-Agent: Mozilla/.50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n Accept: text/html,application/xhtml+xml,application/xml;q=0.9,\*/\*;q=0.8\r\n

Accept-Language: en-US,en;q=0.5\r\n Accept-Encoding: gzip, deflate\r\n Connection: keep-alive\r\n

Upgrade-Insecure-Requests: 1\r\n Pragma: no-cache\r\n

Cache-Control: no-cache\r\n

\r\n

[Full request URI: <http://gaia.cs.umass.edu/wireshark->labs/HTTP-wireshark-fi le2.html]

[HTTP request 1/2]

[Response in frame: 77]

[Next request in frame: 95]

77 1.561250 128.119.2.4152 192.168.100 HTTP 784 HTTP/1.1 200 OK (text/html)

Frame 77: 784 bytes on wire (6272 bits), 784 bytes captured (6272 bits) on interface 0

Ethernet II, Src: Tp-LinkT\_97:5f:e8 (60:e3:27:97:5f:e8), Dst: RivetNet\_el:f0:cf (9c:b6:d0:el:f0:cf) Internet Protocol Version 4, Src: 128.119.2.4152, Dst: 192.168.0.100

Transmission Control Protocol, Src Port: 80, Dst Port: 50176, Seq: 1, Ack: 411, Len: 730 Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n

Date: Thu, 15 Feb 2018 03:46:29 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 Last-Modified: Wed, 14 Feb 2018 06:59:01 GMT\r\n

ETag: "173-56526a562035e"\r\n

Explicit content in response to first GET request

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: 0.045477000 seconds]

[Request in frame: 75]

[Next request in frame: 95]

[Next response in frame: 96]

File Data: 371 bytes

Line-based text data: text/html

\n

<html>\n

\n

Congratulations again! Now you've downloaded the file lab2-2.html. <br>\n This file's last modification date will not change. <p>\n

Thus if you download this multiple times on your browser, a complete copy <br>\n

will only be sent once by the server due to the inclusion of the IN-MODIFIED-SINCE<br>\n field in your browser's HTTP GET request to the server.\n

\n

</html>\n

95 3.241306 192.168.100 128.119.245.12 HTTP 533 GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1

Frame 95: 533 bytes on wire (4264 bits), 533 bytes captured (4264 bits) on interface 0

Ethernet II, Src: RivetNet\_el:f0:cf (9c:b6:d0:el:f0:cf), Dst: Tp-LinkT\_97:5f:e8 (60:e3:27:97:5f:e8) Internet Protocol Version 4, Src: 192.168.100,Dst: 128.11.9245.12

Transmission Control Protocol, Src Port: 50176, Dst Port: 80, Seq: 411, Ack: 731, Len: 479 Hypertext Transfer Protocol

GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1\r\n Host: gaia.cs.umass.edu\r\n

User-Agent: Mozilla/.50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n Accept: text/html,application/xhtml+xml,application/xml;q=0.9,\*/\*;q=0.8\r\n

Accept-Language: en-US,en;q=0.5\r\n Accept-Encoding: gzip, deflate\r\n Connection: keep-alive\r\n

Upgrade-Insecure-Requests: 1\r\n

If-Modified-Since header in second GET request

If-Modified-Since: Wed, 14 Feb 2018 06:59:01 GMT\r\n

If-None-Match: "173-56526a562035e"\r\n

Cache-Control: max-age=0\r\n

\r\n

[Full request URI: <http://gaia.cs.umass.edu/wireshark->labs/HTTP-wireshark-fi le2.html]

[HTTP request 2/2]

[Prev request in frame: 75]

[Response in frame: 96]

96 3.290142 128.119.2.4152 192.168.100 HTTP 293 HTTP/1.1 304 Not Modified

Frame 96: 293 bytes on wire (2344 bits), 293 bytes captured (2344 bits) on interface 0

Ethernet II, Src: Tp-LinkT\_97:5f:e8 (60:e3:27:97:5f:e8), Dst: RivetNet\_el:f0:cf (9c:b6:d0:el:f0:cf) Internet Protocol Version 4, Src: 128.119.248.12, Dst: 192.168.0.100

Server responded with 304 Not Modified

HTTP/1.1 304 Not Modified\r\n

Date: Thu, 15 Feb 2018 03:46:31 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: "173-56526a562035e"\r\n

\r\n

[HTTP response 2/2]

[Time since request: 0.048836000 seconds]

[Prev request in frame: 75]

[Prev response in frame: 77]

[Request in frame: 95]

**Questions:**

1. No, there is no “IF-MODIFIED-SINCE” line in the first HTTP GET
2. The server did explicitly return the contents of the file as indicated by the content length header and content type header
3. There is a “IF-MODIFIED-SINCE” line in the second HTTP GET and it has the value of Wednesday, 14 February, 2018 06:59, the value listed as the “Last-Modified” header in the previous response.
4. The status code of the second response was a 304 Not Modified. The server did not explicitly return the contents of the file as there is no Content-Length or Content-Type headers to indicate such.

Part 3: Retrieving Long Documents

**Wireshark Traces:**

82 7.991616 192.168.100 128.119.245.12 HTTP 421 GET /wireshark-labs/HTTP-wireshark-file3.html HTTP/1.1

Frame 82 contained GET request

Frame 82: 421 bytes on wire (3368 bits), 421 bytes captured (3368 bits) on interface 0

Ethernet II, Src: RivetNet\_el:f0:cf (9c:b6:d0:el:f0:cf), Dst: Tp-LinkT\_97:5f:e8 (60:e3:27:97:5f:e8)

Internet Protocol Version 4, Src: 192.168.100, Dst: 128.119.245.12

Transmission Control Protocol, Src Port: 50898, Dst Port: 80, Seq: 1, Ack: 1, Len: 367 Hypertext Transfer Protocol

GET /wireshark-labs/HTTP-wireshark-file3.html HTTP/1.1\r\n

Host: gaia.cs.umass.edu\r\n

User-Agent: Mozilla/.50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n

Accept: text/html,application/xhtml+xml,application/xml;q=0.9,\*/\*;q=0.8\r\n

Accept-Language: en-US,en;q=0.5\r\n

Accept-Encoding: gzip, deflate\r\n

Connection: keep-alive\r\n

Upgrade-Insecure-Requests: 1\r\n

\r\n

[Full request URI: <http://gaia.cs.umass.edu/wireshark->labs/HTTP-wireshark-fi le3.html]

[HTTP request 1/1]

[Response in frame: 88]

88 8.039821 128.119.2.4152 192.168.100 HTTP 535 HTTP/1.1 200 OK (text/html)

Frame 88: 535 bytes on wire (4280 bits), 535 bytes captured (4280 bits) on interface 0

Packet 88 contained response

Ethernet II, Src: Tp-LinkT\_97:5f:e8 (60:e3:27:97:5f:e8), Dst: RivetNet\_el:f0:cf (9c:b6:d0:el:f0:cf)\

Internet Protocol Version 4, Src: 128.119.2.4152, Dst: 192.168.0.100

Transmission Control Protocol, Src Port: 80, Dst Port: 50898, Seq: 4381, Ack: 368, Len: 481

[4 Reassembled TCP Segments (4861 bytes): #84(1460), #85(1460), #87(1460), #88(481)]

4 TCP Segments were used

[Frame: 84, payload: 0-1459 (1460 bytes)]

[Frame: 85, payload: 1460-2919 (1460 bytes)]

[Frame: 87, payload: 2920-4379 (1460 bytes)]

[Frame: 88, payload: 4380-4860 (481 bytes)]

[Segment count: 4] [Reassembled TCP length: 4861]

[Reassembled TCP Data: 485454502f312e3120323030204f4b0d0a446174653a2054...]

Server responds with 200 OK

Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n

Date: Thu, 15 Feb 2018 04:04:03 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: Wed, 14 Feb 2018 06:59:01 GMT\r\n

ETag: "1194-56526a561d095"\r\n

Accept-Ranges: bytes\r\n

Content-Length: 4500\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 1/1]

[Time since request: 0.048205000 seconds]

[Request in frame: 82]

File Data: 4500 bytes

**Questions:**

1. The browser only sent one GET request, packet number 82
2. Packet 88 contains the status code and phrase associated with the initial GET request.
3. The response is 200 OK
4. Four separate TCP segments were needed to carry the single HTTP response and text of the Bill of Rights.

Part 4: HTML Documents with Embedded Objects

**Wireshark Traces:**

78 13.625248 192.168.100 128.119.245.12 HTTP 421 GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1

Frame 78: 421 bytes on wire (3368 bits), 421 bytes captured (3368 bits) on interface 0

Hypertext Transfer Protocol

1st GET request

GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1\r\n

Host: gaia.cs.umass.edu\r\n

User-Agent: Mozilla/.50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n

Accept: text/html,application/xhtml+xml,application/xml;q=0.9,\*/\*;q=0.8\r\n

Accept-Language: en-U5,en;q=0.5\r\n

Accept-Encoding: gzip, deflate\r\n

Connection: keep-alive\r\n

Upgrade-Insecure-Requests: 1\r\n

\r\n

82 13.644101 128.119.2.4152 192.168.100 HTTP 1127 HTTP/1.1 200 OK (text/html)

Frame 82: 1127 bytes on wire (9016 bits), 1127 bytes captured (9016 bits) on interface 0

Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n

Date: Thu, 15 Feb 2018 04:12:06 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: Wed, 14 Feb 2018 06:59:01 GMT\r\n

ETag: "2ca-56526a561fb8e"\r\n

Accept-Ranges: bytes\r\n

Content-Length: 714\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

84 13.856106 192.168.100 128.119.245.12 HTTP 378 GET /pearson.png HTTP/1.1

Frame 84: 378 bytes on wire (3024 bits), 378 bytes captured (3024 bits) on interface 0

2nd GET request

Hypertext Transfer Protocol

GET /pearson.png HTTP/1.1\r\n Host: gaia.cs.umass.edu\r\n

User-Agent: Mozilla/.50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n

Accept: \*/\*\r\n

Accept-Language: en-U5,en;q=0.5\r\n

Accept-Encoding: gzip, deflate\r\n

Referer: <http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file4.html\r\n>

Connection: keep-alive\r\n

\r\n

91 13.894861 128.119.2.4152 192.168.100 HTTP 745 HTTP/1.1 200 OK (PNG)

Frame 91: 745 bytes on wire (5960 bits), 745 bytes captured (5960 bits) on interface 0

[3 Reassembled TCP Segments (3611 bytes): #87(1460), #89(1460), #91(691)]

Hypertext Transfer Protocol HTTP/1.1 200 OK\r\n

Date: Thu, 15 Feb 2018 04:12:06 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 Aug 2016 10:08:14 GMT\r\n

ETag: "cc3-539645c7flee7"\r\n

Accept-Ranges: bytes\r\n

Content-Length: 3267\r\n

Keep-Alive: timeout=5, max=99\r\n

Connection: Keep-Alive\r\n

Content-Type: image/png\r\n

\r\n

Portable Network Graphics

99 13.907007 192.168.100 128.119.240.90 HTTP 392 GET /-kurose/cover\_5th\_ed.jpg HTTP/1.1

Frame 99: 392 bytes on wire (3136 bits), 392 bytes captured (3136 bits) on interface 0

3rd GET request

Hypertext Transfer Protocol

GET /-kurose/cover\_5th\_ed.jpg HTTP/1.1\r\n Host: manic.c s.umass.edu \r\n

User-Agent: Mozilla/.50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n

Accept: \*/\*\r\n

Accept-Language: en-US,en;q=0.5\r\n

Accept-Encoding: gzip, deflate\r\n

Referer: <http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file4.html\r\n>

Connection: keep-alive\r\n

\r\n

102 13.919199 128.119.2.4900 192.168.100 HTTP 510 HTTP/1.1 302 Found (text/html)

Frame 102: 510 bytes on wire (4080 bits), 510 bytes captured (4080 bits) on interface 0

Hypertext Transfer Protocol

HTTP/1.1 302 Found\r\n

Date: Thu, 15 Feb 2018 04:12:06 GMT\r\n Server: Apache\r\n

Location: <http://caite.cs.umass.edu/-kurose/cover_5th_ed.jpg\r\n>

Content-Length: 234\r\n

Connection: close\r\n

Content-Type: text/html; charset=iso-8859-1\r\n

Browser requests second image at 11313 seconds, after already receiving previous image response

\r\n

Line-based text data: text/html

113 13.954683 192.168.100 128.119.240.90 HTTP 392 GET /-kurose/cover\_5th\_ed.jpg HTTP/1.1

Frame 113: 392 bytes on wire (3136 bits), 392 bytes captured (3136 bits) on interface 0

4th GET request

Hypertext Transfer Protocol

GET /-kurose/cover\_5th\_ed.jpg HTTP/1.1\r\n Host: caite.cs.umass.edu \r\n

User-Agent: Mozilla/.50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n

Accept: \*/\*\r\n

Accept-Language: en-US,en;q=0.5\r\n

Accept-Encoding: gzip, deflate\r\n

Referer: <http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file4.html\r\n>

Connection: keep-alive\r\n

\r\n

204 14.126289 128.119.2.4900 192.168.100 HTTP 526 HTTP/1.1 200 OK (JPEG JFIF image)

Frame 204: 526 bytes on wire (4208 bits), 526 bytes captured (4208 bits) on interface 0

70 Reassembled TCP Segments (101212 bytes)

Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n

Date: Thu, 15 Feb 2018 04:12:06 GMT\r\n Server: Apache\r\n

Last-Modified: Tue, 15 Sep 2009 18:23:27 GMT\r\n ETag: "78004-18a68-473ale0e6e5c0"\r\n

Accept-Ranges: bytes\r\n

Content-Length: 100968\r\n Connection: close\r\n

Content-Type: image/jpeg\r\n

\r\n

**Questions:**

1. The browser sent a total of 4 HTTP GET Requests
2. The browser downloaded the imaged serially because the time stamps on the images GET requests are not the same and one occurs after the other received a 200 OK response from the server with the image file contents.

Part 5: HTTP Authentication

**Wireshark Traces:**

86 1.979607 192.168.100 128.119.245.12 HTTP 452 GET /wireshark-labs/protected\_pages/HTTP-wireshark- files.html HTTP/1.1

Frame 86: 452 bytes on wire (3616 bits), 452 bytes captured (3616 bits) on interface 0

Hypertext Transfer Protocol

GET /wireshark-labs/protected\_pages/HTTP-wireshark-file5.html HTTP/1.1\r\n

Accept: text/html, application/xhtml+xml, image/jxr, \*/\*\r\n

Accept-Language: en-US,en;q=0.7,ko;q=0.3\r\n

User-Agent: Mozilla/.50 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/58.0.3029.110Safari/537.36 Edge/ 16.16299\r\n

Accept-Encoding: gzip, deflate\r\n Host: gaia.cs.umass.edu\r\n Connection: Keep-Alive\r\n

\r\n

90 1.992323 128.119.2.4152 192.168.100 HTTP 771 HTTP/1.1 401 Unauthorized (text/html)

Frame 90: 771 bytes on wire (6168 bits), 771 bytes captured (6168 bits) on interface 0

Hypertext Transfer Protocol

Server responds to first GET request with 401 Unauthorized

HTTP/1.1 401 Unauthorized\r\n

Date: Thu, 15 Feb 2018 04:22:05 GMT\r\n

Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod\_perl/2.0.10 Perl/vS.16.3\r\n

WWW-Authenticate: Basic realm="wireshark-students only"\r\n

Content-Length: 381\r\n

Keep-Alive: timeout=S, max=100\r\n

Connection: Keep-Alive\r\n

Content-Type: text/html; charset=iso-8859-1\r\n

\r\n

1223 18.479785 192.168.100 128.119.245.12 HTTP 511 GET /wireshark-labs/protected\_pages/HTTP-wireshark- file5.html HTTP/1.1

Frame 1223: 511 bytes on wire (4088 bits), 511 bytes captured (4088 bits) on interface 0

Hypertext Transfer Protocol

GET /wireshark-labs/protected\_pages/HTTP-wireshark-file5.html HTTP/1.1\r\n Accept: text/html, application/xhtml+xml, image/jxr, \*/\*\r\n

Accept-Language: en-US,en;q=0.7,ko;q=0.3\r\n

User-Agent: Mozilla/.50 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/58.0.3029.110Safari/537.36 Edge/ 16.16299\r\n

Accept-Encoding: gzip, deflate\r\n Host: gaia.cs.umass.edu\r\n Connection: Keep-Alive\r\n

Authorization: Basic d2lyZXNoYXJrLXN0dWRlbnRzOm5ldHdvcms=\r\n

Authorization is the new header added to the next GET request

\r\n

1225 18.525535 128.119.2.4152 192.168.100 HTTP 544 HTTP/1.1 200 OK (text/html)

Frame 1225: 544 bytes on wire (4352 bits), 544 bytes captured (4352 bits) on interface 0

Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n

Date: Thu, 15 Feb 2018 04:22:22 GMT\r\n

Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod\_perl/2.0.10 Perl/vS.16.3\r\n

Last-Modified: Wed, 14 Feb 2018 06:59:01 GMT\r\n

ETag: "84-56526a56212fe"\r\n Accept-Ranges: bytes\r\n

Content-Length: 132\r\n

Keep-Alive: timeout=S, max=100\r\n

Connection: Keep-Alive\r\n

Content-Type: text/html; charset=UTF-8\r\n

**Questions:**

1. The server’s initial response to the first GET message was 401: Unauthorized
2. The next GET requests includes the field “Authorization”