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QUESITON#2
HTTP

PART I

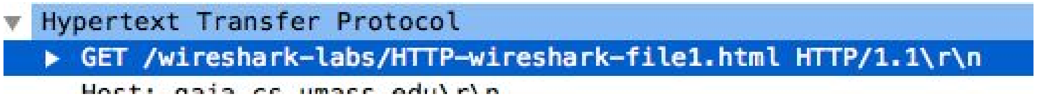
1. Is your browser running HTTP version 1.0 or 1.1? What version of HTTP is the server running?

answer:

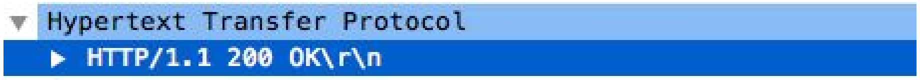
Browser: HTTP 1.1

Server: HTTP 1.1

screen shot:



```
▼ Hypertext Transfer Protocol
  ▶ GET /wireshark-labs/HTTP-wireshark-file1.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
```



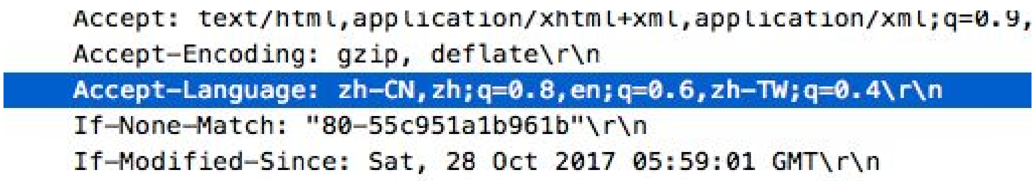
```
▼ Hypertext Transfer Protocol
  ▶ HTTP/1.1 200 OK\r\n
```

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

answer:

Accept Language: Chinese(PRC), Chinese, English, Chinese(Taiwan)

screen shot:



```
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,
Accept-Encoding: gzip, deflate\r\n
Accept-Language: zh-CN,zh;q=0.8,en;q=0.6,zh-TW;q=0.4\r\n
If-None-Match: "80-55c951a1b961b"\r\n
If-Modified-Since: Sat, 28 Oct 2017 05:59:01 GMT\r\n
```

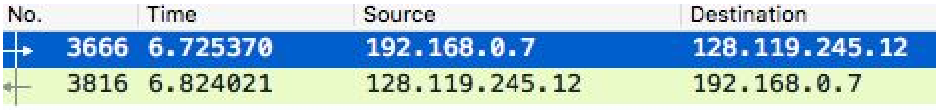
3. What is the IP address of your computer? Of the gaia.cs.umass.edu server?

answer:

My computer: 192.168.0.7

Server: 128.119.245.12

screen shot:



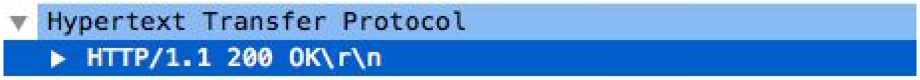
No.	Time	Source	Destination
3666	6.725370	192.168.0.7	128.119.245.12
3816	6.824021	128.119.245.12	192.168.0.7

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

answer:

Status code: 200 ok

screen shot:



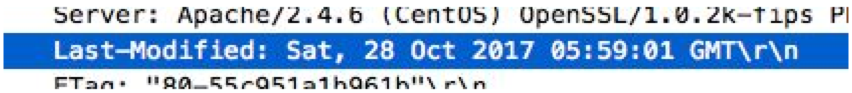
```
▼ Hypertext Transfer Protocol
  ▶ HTTP/1.1 200 OK\r\n
```

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

answer:

Last modified: October 28th, 2017 5:59:01 GMT

screen shot:



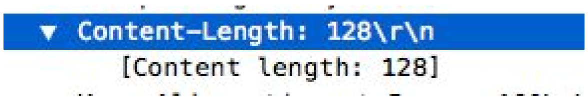
```
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips Pl
Last-Modified: Sat, 28 Oct 2017 05:59:01 GMT\r\n
ETag: "80-55c951a1b961b"\r\n
```

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

answer:

Bytes: 128

screen shot:



```
▼ Content-Length: 128\r\n
     [Content length: 128]
```

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.

answer:

There isn’t any headers within data but not displayed in packet-listing window

PART II

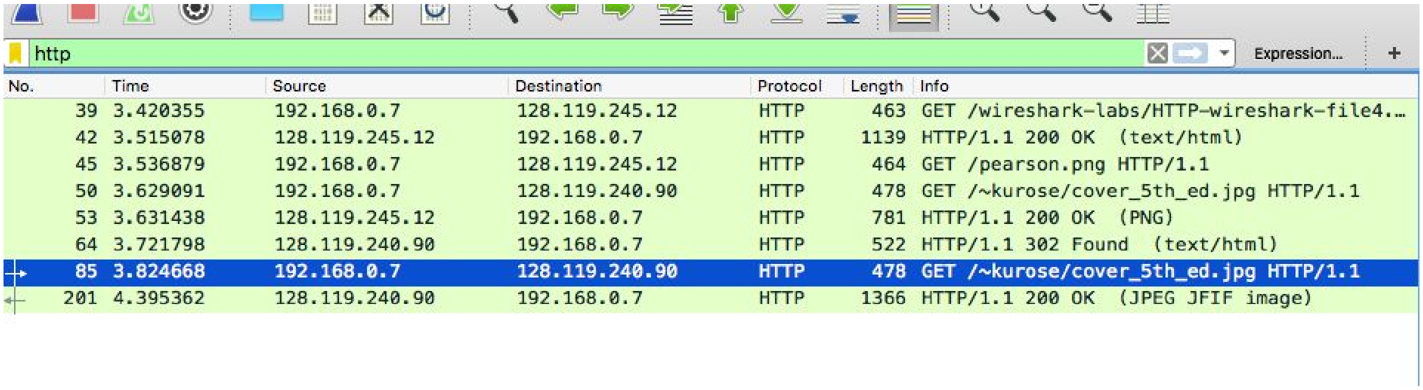
16. How many HTTP GET request messages did your browser send? To which Internet addresses were these GET requests sent?

answer:

a) Totally 4 GET requests are sent out. Three of them were sent directly through my browser and one was redirected by the http protocol with status code 302. Packets number 39, 45, 50, 85 are the GET requests sent out. 39 ask for the base file, 45 ask for the pearson.png, and 50 and 85 ask for cover_5th_ed.jpg

b) #39 : From 192.168.0.7 To 128.119.245.12
#45 : From 192.168.0.7 To 128.119.245.12
#50 : From 192.168.0.7 To 128.119.240.90
#85 : From 192.168.0.7 To 128.119.240.90

screen shot:



No.	Time	Source	Destination	Protocol	Length	Info
39	3.420355	192.168.0.7	128.119.245.12	HTTP	463	GET /wireshark-labs/HTTP-wireshark-file4.…
42	3.515078	128.119.245.12	192.168.0.7	HTTP	1139	HTTP/1.1 200 OK (text/html)
45	3.536879	192.168.0.7	128.119.245.12	HTTP	464	GET /pearson.png HTTP/1.1
50	3.629091	192.168.0.7	128.119.240.90	HTTP	478	GET /~kurose/cover_5th_ed.jpg HTTP/1.1
53	3.631438	128.119.245.12	192.168.0.7	HTTP	781	HTTP/1.1 200 OK (PNG)
64	3.721798	128.119.240.90	192.168.0.7	HTTP	522	HTTP/1.1 302 Found (text/html)
85	3.824668	192.168.0.7	128.119.240.90	HTTP	478	GET /~kurose/cover_5th_ed.jpg HTTP/1.1
201	4.395362	128.119.240.90	192.168.0.7	HTTP	1366	HTTP/1.1 200 OK (JPEG JFIF image)

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.

answer:

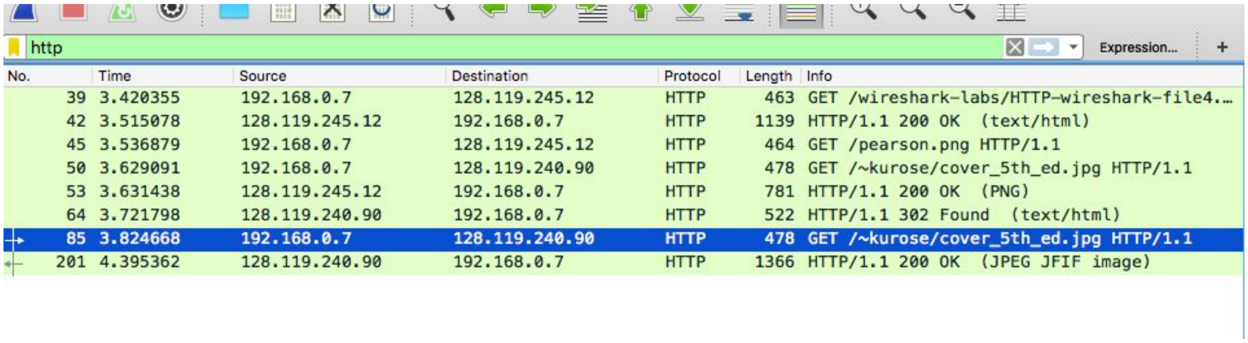
That must happen parallely. The reason is the GET request for the second image was sent out before the receiving of the response from the server containing the first image.

Packet number of the GET request for the second image is 50

Packet number of the response containing the first image is 53

50 < 53 Thus, sending of the GET request for the second image happens first.

screen shot:



```
http
No.  Time      Source          Destination     Protocol Length Info
  39 3.420355  192.168.0.7     128.119.245.12  HTTP      463  GET /wireshark-labs/HTTP-wireshark-file4.…
  42 3.515078  128.119.245.12  192.168.0.7     HTTP     1139  HTTP/1.1 200 OK  (text/html)
  45 3.536879  192.168.0.7     128.119.245.12  HTTP      464  GET /pearson.png HTTP/1.1
  50 3.629091  192.168.0.7     128.119.240.90  HTTP      478  GET /~kurose/cover_5th_ed.jpg HTTP/1.1
  53 3.631438  128.119.245.12  192.168.0.7     HTTP      781  HTTP/1.1 200 OK  (PNG)
  64 3.721798  128.119.240.90  192.168.0.7     HTTP      522  HTTP/1.1 302 Found  (text/html)
  85 3.824668  192.168.0.7     128.119.240.90  HTTP      478  GET /~kurose/cover_5th_ed.jpg HTTP/1.1
 201 4.395362  128.119.240.90  192.168.0.7     HTTP     1366  HTTP/1.1 200 OK  (JPEG JFIF image)
```

DNS

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

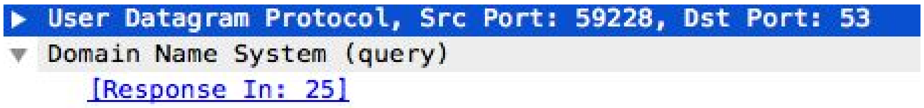
answer:

Source port: 53

Destination port: 53

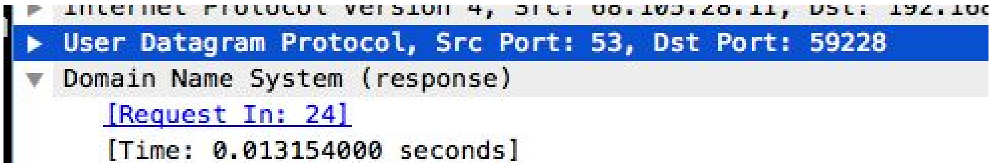
screen shot:

1.



```
▶ User Datagram Protocol, Src Port: 59228, Dst Port: 53
▼ Domain Name System (query)
    [Response In: 25]
```

2.



```
▶ Internet Protocol Version 4, Src: 68.105.28.11, Dst: 192.168
▶ User Datagram Protocol, Src Port: 53, Dst Port: 59228
▼ Domain Name System (response)
    [Request In: 24]
    [Time: 0.013154000 seconds]
```

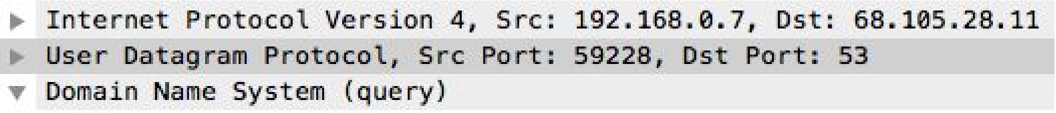
12. To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server?

answer:

68.105.28.11
It is the default local DNS server

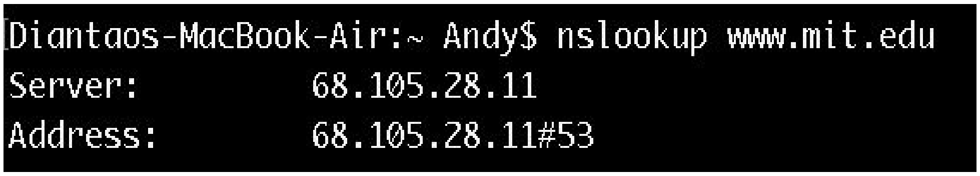
screen shot:

1.



```
▶ Internet Protocol Version 4, Src: 192.168.0.7, Dst: 68.105.28.11
▶ User Datagram Protocol, Src Port: 59228, Dst Port: 53
▼ Domain Name System (query)
```

2.



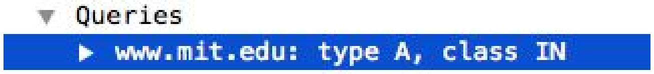
```
Diantaos-MacBook-Air:~ Andy$ nslookup www.mit.edu
Server:         68.105.28.11
Address:        68.105.28.11#53
```

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

answer:

It’s type ‘A’, It doesn’t contain any answer

screen shot:



```
▼ Queries
    ▶ www.mit.edu: type A, class IN
```

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

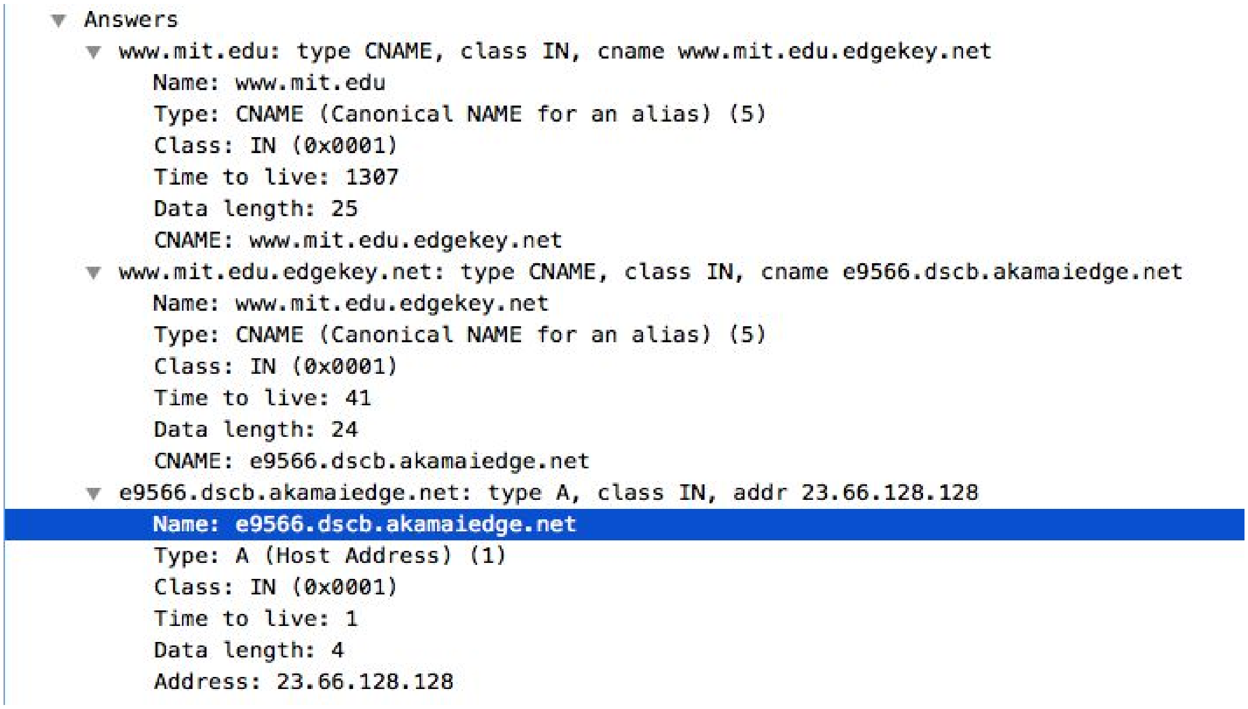
answer:

Three answers are provided. The first answer is a CNAME of the second answer, where the second answer is a CNAME for the third answer, the actual “name” for “www.mit.edu”

Answers with type “CNAME” contains the type of the name, value of the CNAME, and the class.

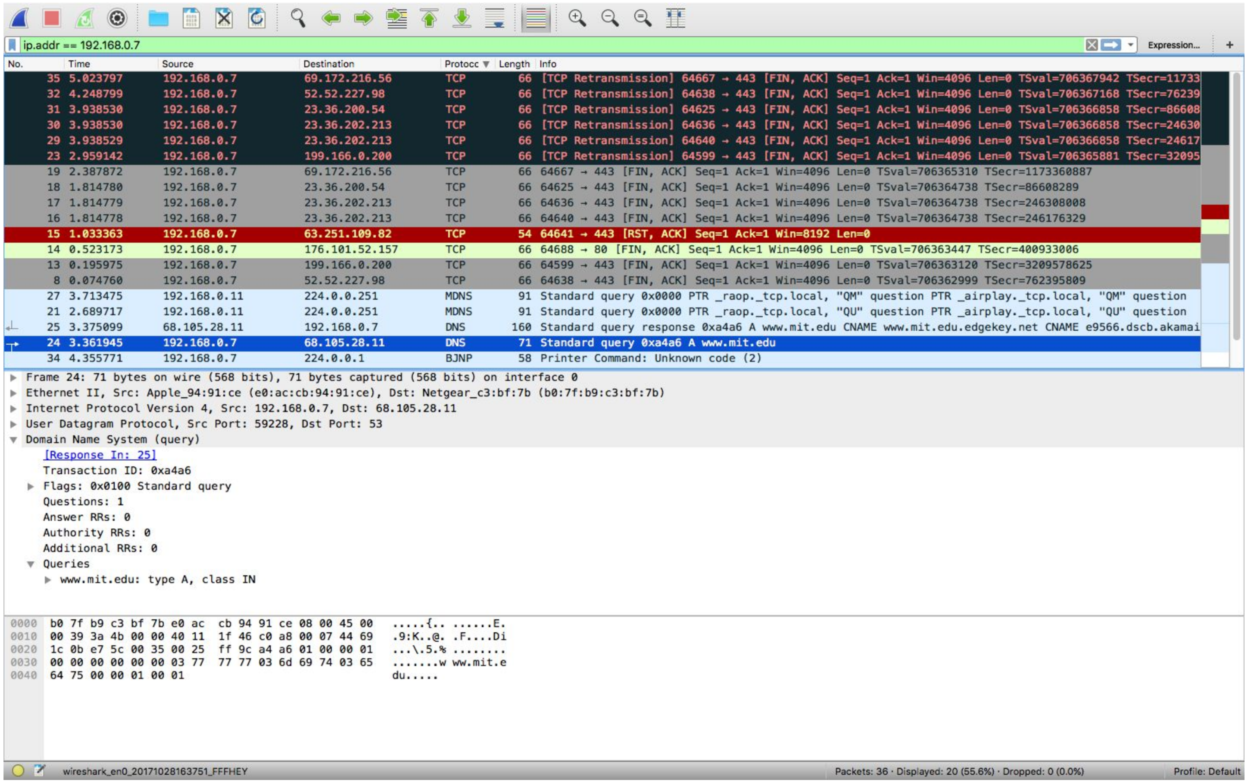
Answer with type “A” contains name of the host, type of the address, class and IP address.

screen shot:



```
▼ Answers
  ▼ 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: 1307
      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 (Canonical NAME for an alias) (5)
      Class: IN (0x0001)
      Time to live: 41
      Data length: 24
      CNAME: e9566.dscb.akamaiedge.net
  ▼ e9566.dscb.akamaiedge.net: type A, class IN, addr 23.66.128.128
      Name: e9566.dscb.akamaiedge.net
      Type: A (Host Address) (1)
      Class: IN (0x0001)
      Time to live: 1
      Data length: 4
      Address: 23.66.128.128
```

15.



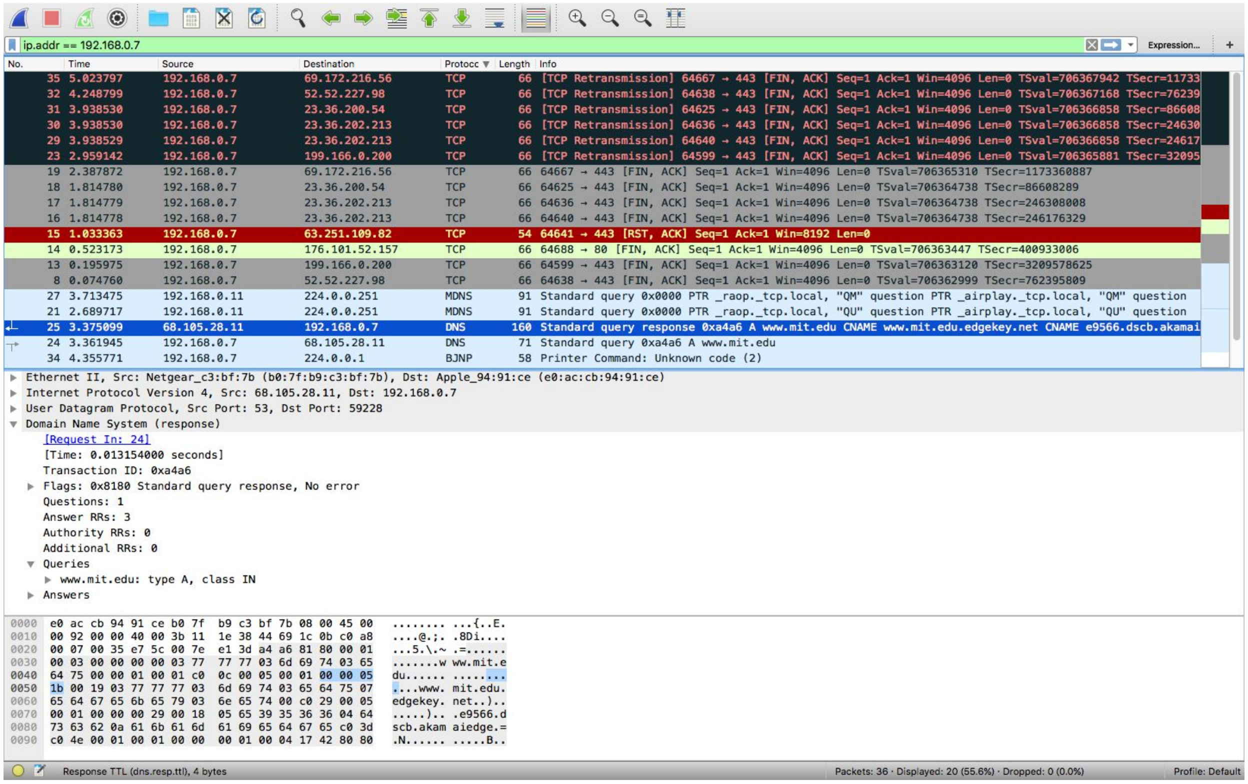
```
ip.addr == 192.168.0.7
```

```
No.  Time      Source        Destination     Protocol Length Info
 35 5.023797  192.168.0.7   69.172.216.56   TCP      66 [TCP Retransmission] 64667 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706367942 TSecr=11733
 32 4.248799  192.168.0.7   52.52.227.98    TCP      66 [TCP Retransmission] 64638 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706367168 TSecr=76239
 31 3.938530  192.168.0.7   23.36.200.54    TCP      66 [TCP Retransmission] 64625 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706366858 TSecr=86608
 30 3.938530  192.168.0.7   23.36.202.213   TCP      66 [TCP Retransmission] 64636 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706366858 TSecr=24630
 29 3.938529  192.168.0.7   23.36.202.213   TCP      66 [TCP Retransmission] 64640 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706366858 TSecr=24617
 23 2.959142  192.168.0.7   199.166.0.200   TCP      66 [TCP Retransmission] 64599 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706365881 TSecr=32095
 19 2.387872  192.168.0.7   69.172.216.56   TCP      66 64667 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706365310 TSecr=1173360887
 18 1.814780  192.168.0.7   23.36.200.54    TCP      66 64625 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706364738 TSecr=86608289
 17 1.814779  192.168.0.7   23.36.202.213   TCP      66 64636 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706364738 TSecr=246308008
 16 1.814778  192.168.0.7   23.36.202.213   TCP      66 64640 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706364738 TSecr=246176329
 15 1.033363  192.168.0.7   63.251.109.82   TCP      54 64641 → 443 [RST, ACK] Seq=1 Ack=1 Win=8192 Len=0
 14 0.523173  192.168.0.7   176.101.52.157  TCP      66 64688 → 80 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706363447 TSecr=400933006
 13 0.195975  192.168.0.7   199.166.0.200   TCP      66 64599 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706363120 TSecr=3209578625
  8 0.074760  192.168.0.7   52.52.227.98    TCP      66 64638 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706362999 TSecr=762395809
 27 3.713475  192.168.0.11  224.0.0.251     MDNS     91 Standard query 0x0000 PTR _raop._tcp.local, "QM" question PTR _airplay._tcp.local, "QM" question
 21 2.689717  192.168.0.11  224.0.0.251     MDNS     91 Standard query 0x0000 PTR _raop._tcp.local, "QU" question PTR _airplay._tcp.local, "QU" question
 25 3.375099  68.105.28.11  192.168.0.7     DNS     160 Standard query response 0xa4a6 A www.mit.edu CNAME www.mit.edu.edgekey.net CNAME e9566.dscb.akamai
 24 3.361945  192.168.0.7   68.105.28.11    DNS      71 Standard query 0xa4a6 A www.mit.edu
 34 4.355771  192.168.0.7   224.0.0.1       BJNP     58 Printer Command: Unknown code (2)
```

```
▶ Frame 24: 71 bytes on wire (568 bits), 71 bytes captured (568 bits) on interface 0
▶ Ethernet II, Src: Apple_94:91:ce (e0:ac:cb:94:91:ce), Dst: Netgear_c3:bf:7b (b0:7f:b9:c3:bf:7b)
▶ Internet Protocol Version 4, Src: 192.168.0.7, Dst: 68.105.28.11
▶ User Datagram Protocol, Src Port: 59228, Dst Port: 53
▼ Domain Name System (query)
    [Response In: 25]
    Transaction ID: 0xa4a6
  ▶ Flags: 0x0100 Standard query
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
  ▼ Queries
    ▶ www.mit.edu: type A, class IN
```

```
0000  b0 7f b9 c3 bf 7b e0 ac  cb 94 91 ce 08 00 45 00   .....{.. ......E.
0010  00 39 3a 4b 00 00 40 11  1f 46 c0 a8 00 07 44 69   .9:K..@. .F....Di
0020  1c 0b e7 5c 00 35 00 25  ff 9c a4 a6 01 00 00 01   ...\.5.% ........
0030  00 00 00 00 00 00 03 77  77 77 03 6d 69 74 03 65   .......w ww.mit.e
0040  64 75 00 00 01 00 01                               du.....
```

```
wireshark_en0_20171028163751_FFFHEY     Packets: 36 · Displayed: 20 (55.6%) · Dropped: 0 (0.0%)     Profile: Default
```



```
ip.addr == 192.168.0.7

No.  Time      Source        Destination     Protocol Length Info
 35  5.023797  192.168.0.7   69.172.216.56   TCP      66  [TCP Retransmission] 64667 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706367942 TSecr=11733
 32  4.248799  192.168.0.7   52.52.227.98    TCP      66  [TCP Retransmission] 64638 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706367168 TSecr=76239
 31  3.938530  192.168.0.7   23.36.200.54    TCP      66  [TCP Retransmission] 64625 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706366858 TSecr=86608
 30  3.938530  192.168.0.7   23.36.202.213   TCP      66  [TCP Retransmission] 64636 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706366858 TSecr=24630
 29  3.938529  192.168.0.7   23.36.202.213   TCP      66  [TCP Retransmission] 64640 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706366858 TSecr=24617
 23  2.959142  192.168.0.7   199.166.0.200   TCP      66  [TCP Retransmission] 64599 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706365881 TSecr=32095
 19  2.387872  192.168.0.7   69.172.216.56   TCP      66  64667 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706365310 TSecr=1173360887
 18  1.814780  192.168.0.7   23.36.200.54    TCP      66  64625 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706364738 TSecr=86608289
 17  1.814779  192.168.0.7   23.36.202.213   TCP      66  64636 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706364738 TSecr=246308008
 16  1.814778  192.168.0.7   23.36.202.213   TCP      66  64640 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706364738 TSecr=246176329
 15  1.033363  192.168.0.7   63.251.109.82   TCP      54  64641 → 443 [RST, ACK] Seq=1 Ack=1 Win=8192 Len=0
 14  0.523173  192.168.0.7   176.101.52.157  TCP      66  64688 → 80 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706363447 TSecr=400933006
 13  0.195975  192.168.0.7   199.166.0.200   TCP      66  64599 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706363120 TSecr=3209578625
  8  0.074760  192.168.0.7   52.52.227.98    TCP      66  64638 → 443 [FIN, ACK] Seq=1 Ack=1 Win=4096 Len=0 TSval=706362999 TSecr=762395809
 27  3.713475  192.168.0.11  224.0.0.251     MDNS     91  Standard query 0x0000 PTR _raop._tcp.local, "QM" question PTR _airplay._tcp.local, "QM" question
 21  2.689717  192.168.0.11  224.0.0.251     MDNS     91  Standard query 0x0000 PTR _raop._tcp.local, "QU" question PTR _airplay._tcp.local, "QU" question
 25  3.375099  68.105.28.11  192.168.0.7     DNS     160  Standard query response 0xa4a6 A www.mit.edu CNAME www.mit.edu.edgekey.net CNAME e9566.dscb.akamai
 24  3.361945  192.168.0.7   68.105.28.11    DNS      71  Standard query 0xa4a6 A www.mit.edu
 34  4.355771  192.168.0.7   224.0.0.1       BJNP     58  Printer Command: Unknown code (2)

▶ Ethernet II, Src: Netgear_c3:bf:7b (b0:7f:b9:c3:bf:7b), Dst: Apple_94:91:ce (e0:ac:cb:94:91:ce)
▶ Internet Protocol Version 4, Src: 68.105.28.11, Dst: 192.168.0.7
▶ User Datagram Protocol, Src Port: 53, Dst Port: 59228
▼ Domain Name System (response)
    [Request In: 24]
    [Time: 0.013154000 seconds]
    Transaction ID: 0xa4a6
  ▶ Flags: 0x8180 Standard query response, No error
    Questions: 1
    Answer RRs: 3
    Authority RRs: 0
    Additional RRs: 0
  ▼ Queries
    ▶ www.mit.edu: type A, class IN
  ▶ Answers

0000  e0 ac cb 94 91 ce b0 7f  b9 c3 bf 7b 08 00 45 00   ........ ...{..E.
0010  00 92 00 00 40 00 3b 11  1e 38 44 69 1c 0b c0 a8   ....@.;. .8Di....
0020  00 07 00 35 e7 5c 00 7e  e1 3d a4 a6 81 80 00 01   ...5.\.~ .=......
0030  00 03 00 00 00 00 03 77  77 77 03 6d 69 74 03 65   .......w ww.mit.e
0040  64 75 00 00 01 00 01 c0  0c 00 05 00 01 00 00 05   du...... ........
0050  1b 00 19 03 77 77 77 03  6d 69 74 03 65 64 75 07   ....www. mit.edu.
0060  65 64 67 65 6b 65 79 03  6e 65 74 00 c0 29 00 05   edgekey. net..)..
0070  00 01 00 00 00 29 00 18  05 65 39 35 36 36 04 64   .....).. .e9566.d
0080  73 63 62 0a 61 6b 61 6d  61 69 65 64 67 65 c0 3d   scb.akam aiedge.=
0090  c0 4e 00 01 00 01 00 00  00 01 00 04 17 42 80 80   .N...... .....B..

Response TTL (dns.resp.ttl), 4 bytes        Packets: 36 · Displayed: 20 (55.6%) · Dropped: 0 (0.0%)        Profile: Default
```

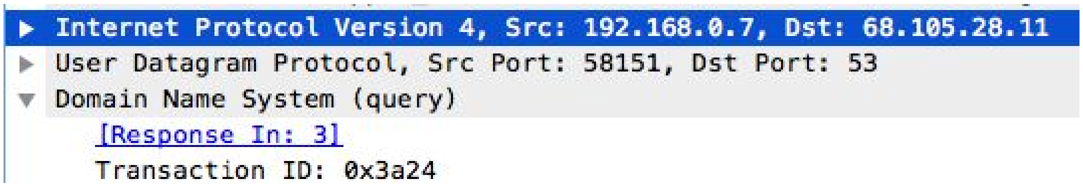
16. To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server?

answer:

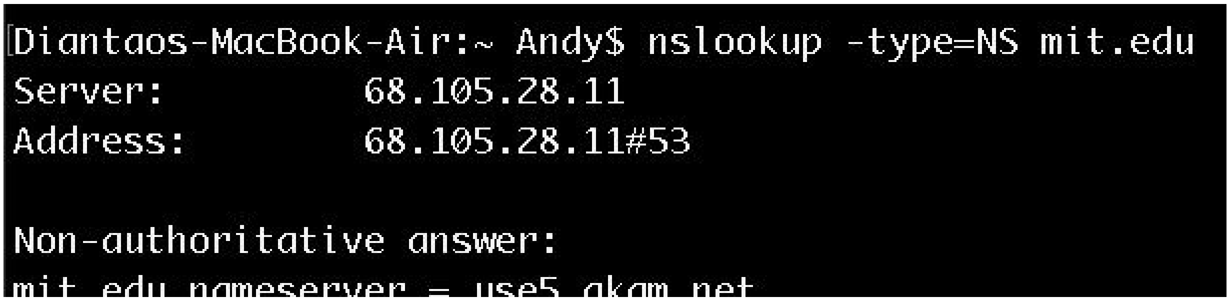
68.105.28.11

It is the default local DNS server

screen shot:

1. 

```
▶ Internet Protocol Version 4, Src: 192.168.0.7, Dst: 68.105.28.11
▶ User Datagram Protocol, Src Port: 58151, Dst Port: 53
▼ Domain Name System (query)
    [Response In: 3]
    Transaction ID: 0x3a24
```

2. 

```
Diantaos-MacBook-Air:~ Andy$ nslookup -type=NS mit.edu
Server:         68.105.28.11
Address:        68.105.28.11#53

Non-authoritative answer:
mit.edu nameserver = use5.akam.net
```

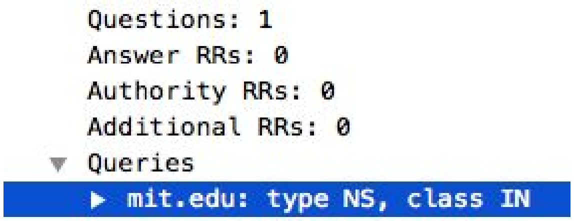
17. Examine the DNS query message. What “Type” of DNS query is it? Does the query message contain any “answers”?

answer:

Type = NS

answers = NONE

screen shot:



```
      Questions: 1
      Answer RRs: 0
      Authority RRs: 0
      Additional RRs: 0
    ▼ Queries
      ▶ mit.edu: type NS, class IN
```

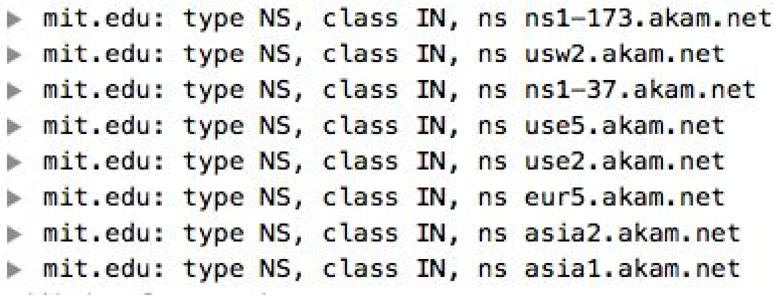
18.Examine the DNS response message. What MIT nameservers does the response message provide? Does this response message also provide the IP addresses of the MIT namesers?

answer:

See screen shots

Yes, it does provide the IP address in the additional record

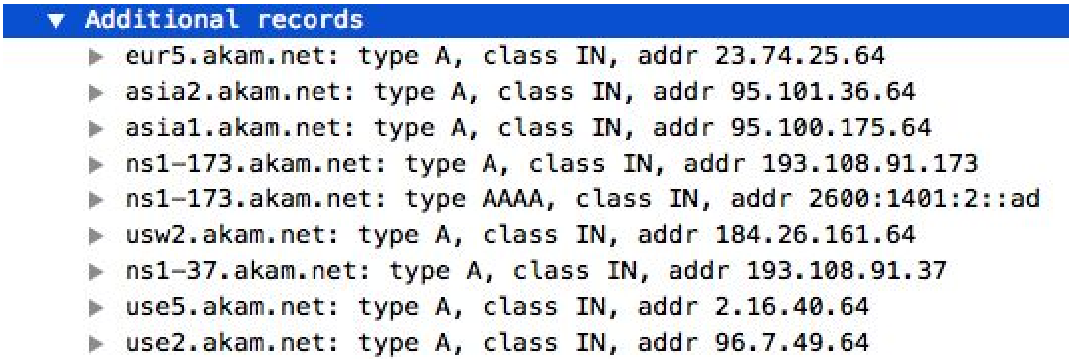
screen shot:



```
▶ mit.edu: type NS, class IN, ns ns1-173.akam.net
▶ mit.edu: type NS, class IN, ns usw2.akam.net
▶ mit.edu: type NS, class IN, ns ns1-37.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 asia2.akam.net
▶ mit.edu: type NS, class IN, ns asia1.akam.net
```

1.

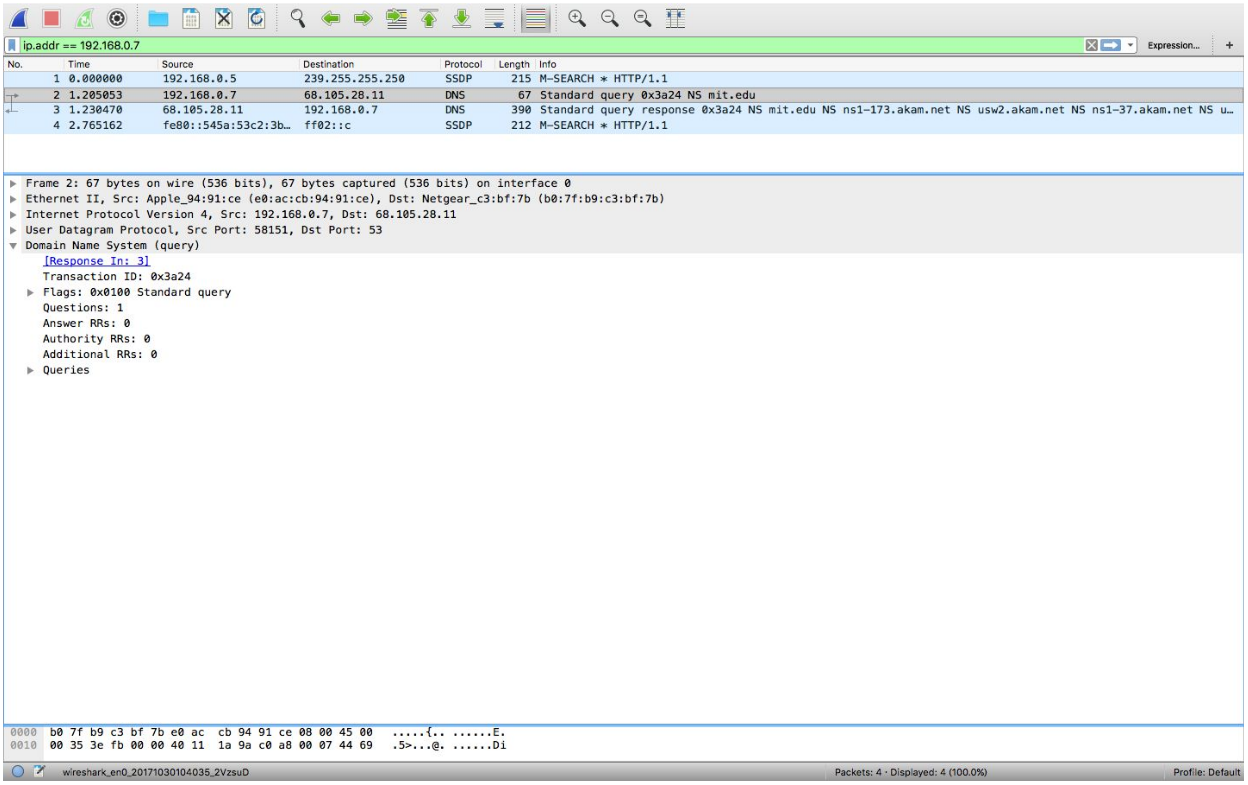
2.



```
▼ Additional records
    ▶ eur5.akam.net: type A, class IN, addr 23.74.25.64
    ▶ asia2.akam.net: type A, class IN, addr 95.101.36.64
    ▶ asia1.akam.net: type A, class IN, addr 95.100.175.64
    ▶ ns1-173.akam.net: type A, class IN, addr 193.108.91.173
    ▶ ns1-173.akam.net: type AAAA, class IN, addr 2600:1401:2::ad
    ▶ usw2.akam.net: type A, class IN, addr 184.26.161.64
    ▶ ns1-37.akam.net: type A, class IN, addr 193.108.91.37
    ▶ use5.akam.net: type A, class IN, addr 2.16.40.64
    ▶ use2.akam.net: type A, class IN, addr 96.7.49.64
```

19. Provide a screenshot.

1.



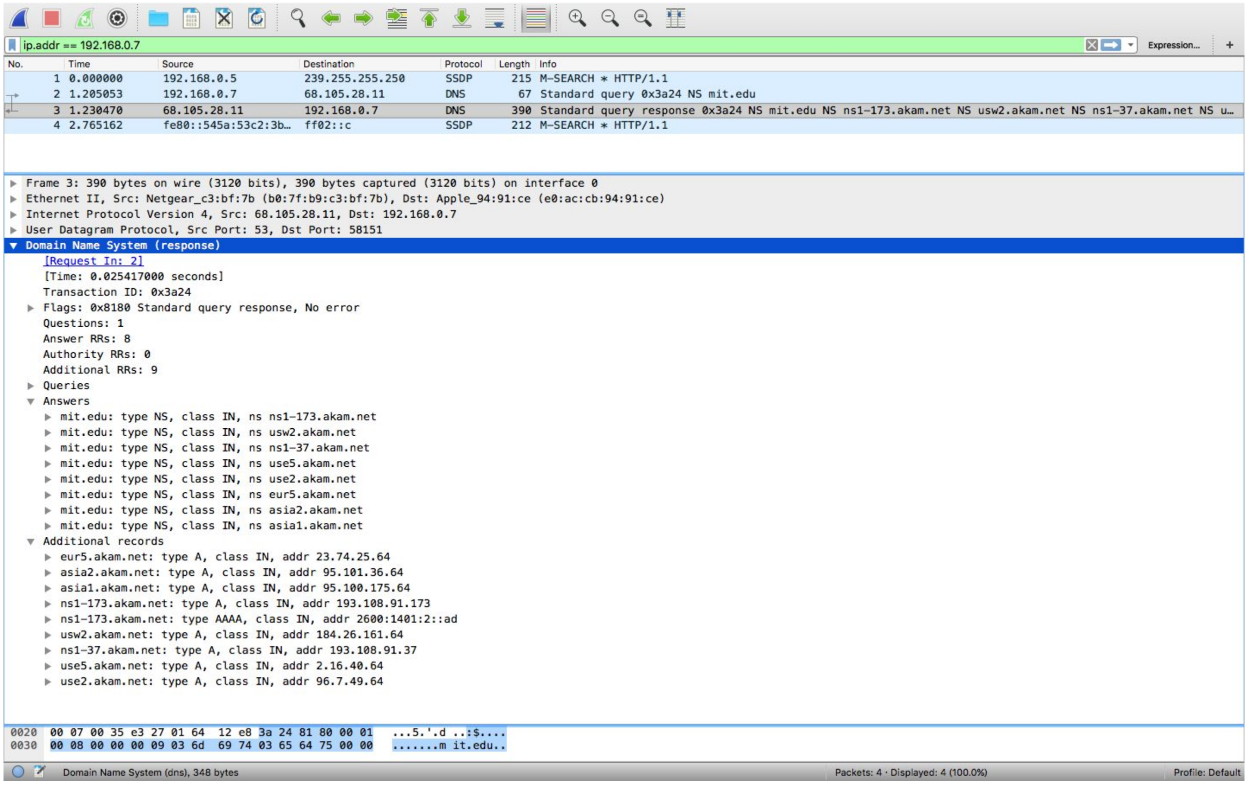
```
No.   Time        Source               Destination        Protocol  Length  Info
   1  0.000000    192.168.0.5          239.255.255.250    SSDP         215  M-SEARCH * HTTP/1.1
   2  1.205053    192.168.0.7          68.105.28.11       DNS           67  Standard query 0x3a24 NS mit.edu
   3  1.230470    68.105.28.11         192.168.0.7        DNS          390  Standard query response 0x3a24 NS mit.edu NS ns1-173.akam.net NS usw2.akam.net NS ns1-37.akam.net NS u…
   4  2.765162    fe80::545a:53c2:3b…  ff02::c            SSDP         212  M-SEARCH * HTTP/1.1
```

```
▶ Frame 2: 67 bytes on wire (536 bits), 67 bytes captured (536 bits) on interface 0
▶ Ethernet II, Src: Apple_94:91:ce (e0:ac:cb:94:91:ce), Dst: Netgear_c3:bf:7b (b0:7f:b9:c3:bf:7b)
▶ Internet Protocol Version 4, Src: 192.168.0.7, Dst: 68.105.28.11
▶ User Datagram Protocol, Src Port: 58151, Dst Port: 53
▼ Domain Name System (query)
    [Response In: 3]
    Transaction ID: 0x3a24
  ▶ Flags: 0x0100 Standard query
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
  ▶ Queries
```

```
0000  b0 7f b9 c3 bf 7b e0 ac  cb 94 91 ce 08 00 45 00   .....{.. ......E.
0010  00 35 3e fb 00 00 40 11  1a 9a c0 a8 00 07 44 69   .5>...@. ......Di
```

wireshark_en0_20171030104035_2VzsuD   Packets: 4 · Displayed: 4 (100.0%)   Profile: Default

2.



```
No.   Time        Source               Destination        Protocol  Length  Info
   1  0.000000    192.168.0.5          239.255.255.250    SSDP         215  M-SEARCH * HTTP/1.1
   2  1.205053    192.168.0.7          68.105.28.11       DNS           67  Standard query 0x3a24 NS mit.edu
   3  1.230470    68.105.28.11         192.168.0.7        DNS          390  Standard query response 0x3a24 NS mit.edu NS ns1-173.akam.net NS usw2.akam.net NS ns1-37.akam.net NS u…
   4  2.765162    fe80::545a:53c2:3b…  ff02::c            SSDP         212  M-SEARCH * HTTP/1.1
```

```
▶ Frame 3: 390 bytes on wire (3120 bits), 390 bytes captured (3120 bits) on interface 0
▶ Ethernet II, Src: Netgear_c3:bf:7b (b0:7f:b9:c3:bf:7b), Dst: Apple_94:91:ce (e0:ac:cb:94:91:ce)
▶ Internet Protocol Version 4, Src: 68.105.28.11, Dst: 192.168.0.7
▶ User Datagram Protocol, Src Port: 53, Dst Port: 58151
▼ Domain Name System (response)
    [Request In: 2]
    [Time: 0.025417000 seconds]
    Transaction ID: 0x3a24
  ▶ Flags: 0x8180 Standard query response, No error
    Questions: 1
    Answer RRs: 8
    Authority RRs: 0
    Additional RRs: 9
  ▶ Queries
  ▼ Answers
    ▶ mit.edu: type NS, class IN, ns ns1-173.akam.net
    ▶ mit.edu: type NS, class IN, ns usw2.akam.net
    ▶ mit.edu: type NS, class IN, ns ns1-37.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 asia2.akam.net
    ▶ mit.edu: type NS, class IN, ns asia1.akam.net
  ▼ Additional records
    ▶ eur5.akam.net: type A, class IN, addr 23.74.25.64
    ▶ asia2.akam.net: type A, class IN, addr 95.101.36.64
    ▶ asia1.akam.net: type A, class IN, addr 95.100.175.64
    ▶ ns1-173.akam.net: type A, class IN, addr 193.108.91.173
    ▶ ns1-173.akam.net: type AAAA, class IN, addr 2600:1401:2::ad
    ▶ usw2.akam.net: type A, class IN, addr 184.26.161.64
    ▶ ns1-37.akam.net: type A, class IN, addr 193.108.91.37
    ▶ use5.akam.net: type A, class IN, addr 2.16.40.64
    ▶ use2.akam.net: type A, class IN, addr 96.7.49.64
```

```
0020  00 07 00 35 e3 27 01 64  12 e8 3a 24 81 80 00 01   ...5.'.d ..:$....
0030  00 08 00 00 00 09 03 6d  69 74 03 65 64 75 00 00   .......m it.edu..
```

Domain Name System (dns), 348 bytes   Packets: 4 · Displayed: 4 (100.0%)   Profile: Default

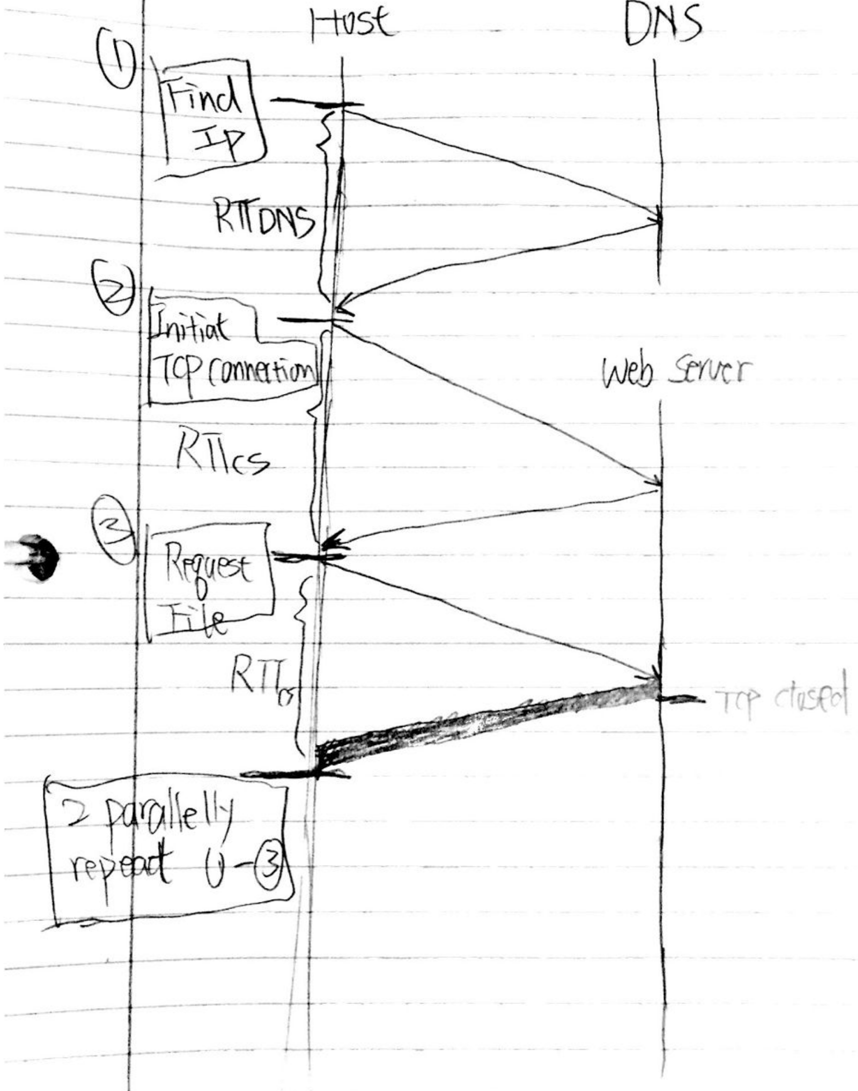
QUESITON #3

Non-Persistence:

When the address of the server will be cached after first query:
RTT_DNS + 4 x RTT_CS + TransmissionDelay_basefile +
max(TransmissionDelay_image1, TransmissionDelay_image2)

When the address of the server will NOT be cached after first query:
2 x RTT_DNS + 4 x RTT_CS + TransmissionDelay_basefile +
max(TransmissionDelay_image1, TransmissionDelay_image2)

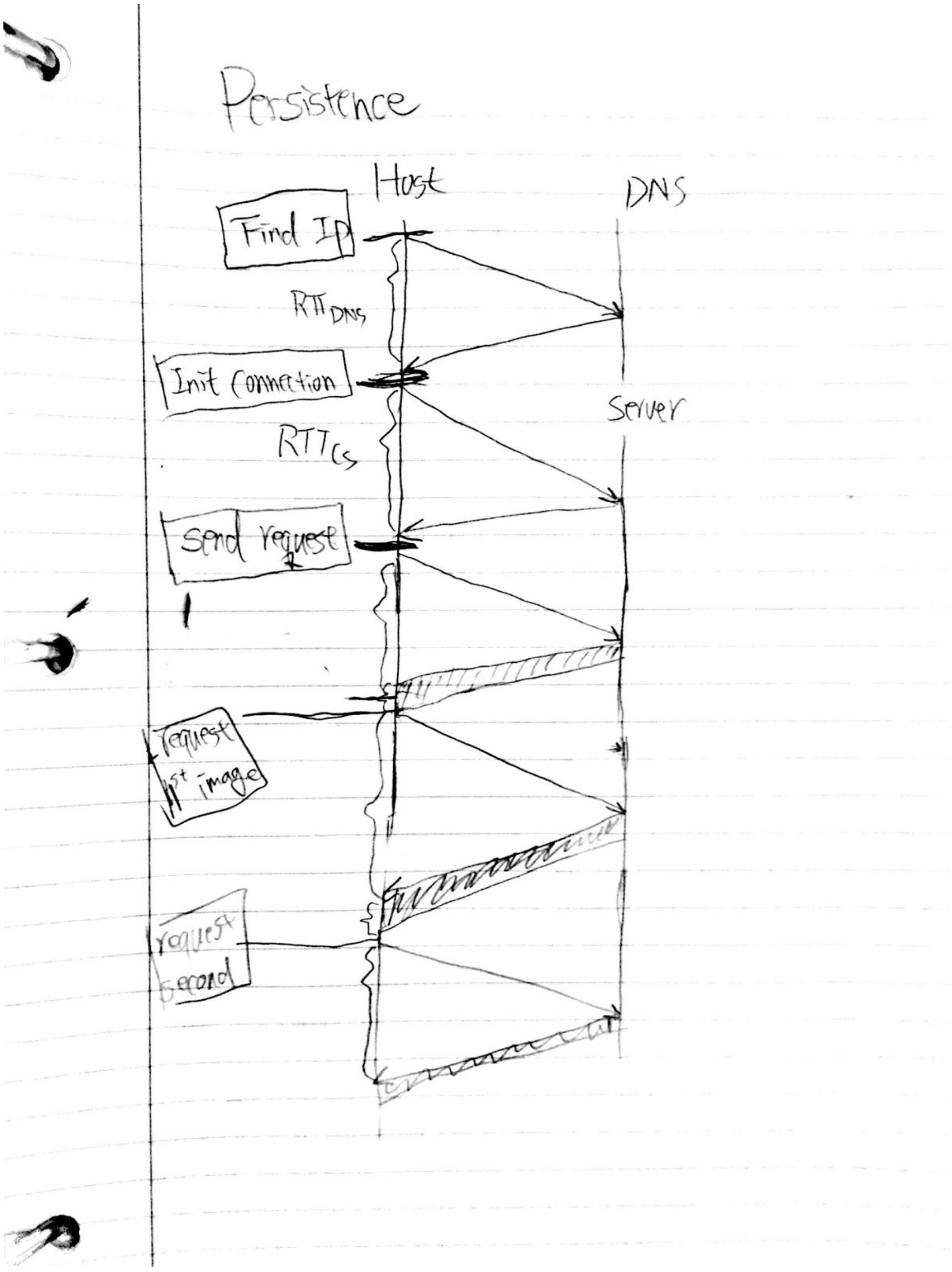
Non-Preistence



$2 \times DNS + 4 \times RTT_{cs}$

Persistence（without pipe):

RTT_DNS + 4 x RTT_CS + TransmissionDelay_basefile +
TransmissionDelay_image1 + Transmission_Delay_image2


Persistence
Host
DNS
Find Ip
RTT_DNS
Init Connection
Server
RTT_CS
Send request
request 1st image
request second