EXPERIMENT10

ANALYZINGDOMAIN NAME SYSTEM (DNS) PROTOCOL IN WIRE-SHARK

OBJECTIVE:

- Understand the Domain Name System Protocol

THEORY:

Domain Name System (DNS) translates hostnames to IP addresses, fulfilling a critical role in the Internet infrastructure. In this lab, we'll take a closer look at the client side of DNS. Recall that the client's role in the DNS is relatively simple – a client sends a *query* to its local DNS server, and receives a *response* back. Much can go on "under the covers," invisible to the DNS clients, as the hierarchical DNS servers communicate with each other to either recursively or iteratively resolve the client's DNS query. From the DNS client's standpoint, however, the protocol is quite simple – a query is formulated to the local DNS server and a response is received from that server. Before beginning this lab, you'll probably want to review DNS by reading Section 2.5 of the text. In particular, you may want to review the material on **local DNS servers**, **DNS caching**, **DNS records and messages**, and the **TYPE field** in the DNS record.

1. nslookup

In this lab, we'll make extensive use of the *nslookup*tool, which is available in most Linux/Unix and Microsoft platforms today. To run *nslookup*in Linux/Unix, you just type the *nslookup*command on the command line. To run it in Windows, open the Command Prompt and run *nslookup*on the command line.

In it is most basic operation, *nslookup*tool allows the host running the tool to query any specified DNS server for a DNS record. The queried DNS server can be a root DNS server, a toplevel-domain DNS server, an authoritative DNS server, or an intermediate DNS server (see the textbook for definitions of these terms). To accomplish this task, *nslookup*sends a DNS query to the specified DNS server, receives a DNS reply from that same DNS server, and displays the result.

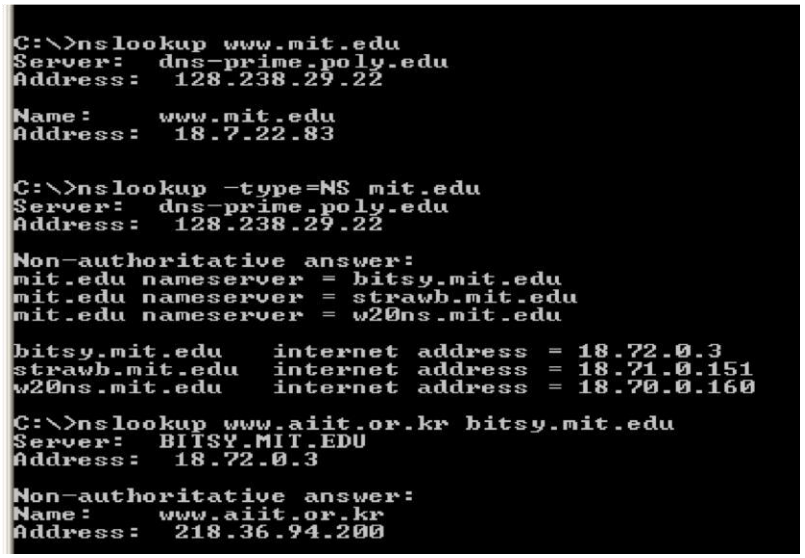


Figure 10.1

Figure 10.1 shows the results of three independent *nslookup*commands (displayed in the Windows Command Prompt). In this example, the client host is located on the campus of Polytechnic University in Brooklyn, where the default local DNS server is dns-prime.poly.edu. When running *nslookup*, if no DNS server is specified, then *nslookup*sends the query to the default DNS server, which in this case is dns-prime. poly.edu.

Details of each command:

- **nslookupwww.mit.edu**

In words, this command is saying "*Please send me the IP address for the host www.mit.edu.*" As shown in the screenshot, the response from this command provides two pieces of information: (1) the name and IP address of the DNS server that provides the answer; and (2) the answer itself, which is the host name and IP address of www.mit.edu. Although the response came from the local DNS server at Polytechnic University, it is quite possible that this local DNS server iteratively contacted several other DNS servers to get the answer, as described in Section 2.5 of the textbook.

- **nslookup –type=NS mit.edu**

In this example, we have provided the option "-type=NS" and the domain "mit.edu". This causes *nslookup*to send a query for a type-NS record to the default local DNS server. In words, the query is saying, *"Please send me the host names of the authoritative DNS for mit.edu."* (When the –type option is not used, *nslookup*uses the default, which is to query for type A records; see Section 2.5.3 in the text.) The answer, displayed in the above screenshot, first indicates the DNS server that is providing the answer (which is the default local DNS server) along with three MIT name servers. Each of these servers is indeed an authoritative DNS server for the hosts on the MIT campus.

However, *nslookup*also indicates that the answer is "non-authoritative," meaning that this answer came from the cache of some server rather than from an authoritative MIT DNS server. Finally, the answer also includes the IP addresses of the authoritative DNS servers at MIT. (Even though the type-NS query generated by *nslookup*did not explicitly ask for the IP addresses, the local DNS server returned these "for free" and *nslookup*displays the result.)

- **nslookup www.aiit.or.kr bitsy.mit.edu**

In this example, we indicate that we want to the query sent to the DNS server bitsy.mit.edu rather than to the default DNS server (dns-prime.poly.edu). Thus, the query and reply transaction takes place directly between our querying host and bitsy.mit.edu. In this example, the DNS server bitsy.mit.edu provides the IP address of the host www.aiit.or.kr, which is a web server at the Advanced Institute of Information Technology (in Korea).

Do the following (and write down the results)

1. **Run *nslookup* to obtain the IP address of a Web server in Asia, e.g. www.lums.edu.pk. Paste screenshot of your result here:**

```
C:\Users\l236006>nslookup www.lums.edu.pk
Server:  MAINDC.fastlhr.nu.edu.pk
Address:  172.16.99.2

Non-authoritative answer:
Name:    lums.edu.pk
Addresses:  111.68.103.174
          110.93.234.24
          203.135.62.24
Aliases:  www.lums.edu.pk


C:\Users\l236006>
```

2. **Run *nslookup*to determine the authoritative DNS servers for a university in Europe (e.g., cam.ac.uk)**

```
C:\Users\l236006>nslookup -type=NS cam.ac.uk
Server:  MAINDC.fastlhr.nu.edu.pk
Address:  172.16.99.2

Non-authoritative answer:
cam.ac.uk       nameserver = ns1.mythic-beasts.com
cam.ac.uk       nameserver = auth0.dns.cam.ac.uk
cam.ac.uk       nameserver = dns0.cl.cam.ac.uk
cam.ac.uk       nameserver = ns2.ic.ac.uk
cam.ac.uk       nameserver = ns3.mythic-beasts.com
cam.ac.uk       nameserver = dns0.eng.cam.ac.uk

ns1.mythic-beasts.com   internet address = 45.33.127.156
ns1.mythic-beasts.com   AAAA IPv6 address = 2600:3c00:e000:19::1
auth0.dns.cam.ac.uk     internet address = 131.111.8.37
auth0.dns.cam.ac.uk     AAAA IPv6 address = 2001:630:212:8::d:a0
dns0.cl.cam.ac.uk       internet address = 128.232.0.19
dns0.cl.cam.ac.uk       AAAA IPv6 address = 2a05:b400:110::d:a0
ns2.ic.ac.uk    internet address = 155.198.142.82
ns2.ic.ac.uk    AAAA IPv6 address = 2a0c:5bc0:4:1::82
ns3.mythic-beasts.com   internet address = 185.24.221.32
ns3.mythic-beasts.com   AAAA IPv6 address = 2a02:2770:11:0:21a:4aff:febe:759b
dns0.eng.cam.ac.uk      internet address = 129.169.8.8

C:\Users\l236006>
```

3. **Run *nslookup*so that one of the DNS servers obtained in Question 2 is queried for the mail servers for Yahoo! mail. If server does not respond, just type the command you used.**

```
C:\Users\l236006>nslookup -type=MX yahoo.com 8.8.8.8
Server:  dns.google
Address:  8.8.8.8

Non-authoritative answer:
yahoo.com       MX preference = 1, mail exchanger = mta7.am0.yahoodns.net
yahoo.com       MX preference = 1, mail exchanger = mta6.am0.yahoodns.net
yahoo.com       MX preference = 1, mail exchanger = mta5.am0.yahoodns.net

C:\Users\l236006>nslookup -type=MX yahoo.com dns0.cl.cam.ac.uk
Server:  dns0.cl.cam.ac.uk
Address:  128.232.0.19

*** dns0.cl.cam.ac.uk can't find yahoo.com: Query refused

C:\Users\l236006>
```

Query refused

2. ipconfig

ipconfig (for Windows) and *ifconfig* (for Linux/Unix) are among the most useful little utilities in your host, especially for debugging network issues. Here we'll only describe *ipconfig*, although the Linux/Unix *ifconfig* is very similar. *ipconfig* can be used to show your current TCP/IP information, including your address, DNS server addresses, adapter type and so on. For example, if you want to see all this information about your host, simply enter: `ipconfig/all` into the Command Prompt, as shown in figure 10.2.

type

ipconfig/all

```
C:\>ipconfig /all

Windows IP Configuration

        Host Name . . . . . . . . . . . . : USG11631-ZMWQA6
        Primary Dns Suffix  . . . . . . . :
        Node Type . . . . . . . . . . . . : Hybrid
        IP Routing Enabled. . . . . . . . : No
        WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . : poly.edu
        Description . . . . . . . . . . . : Intel(R) PRO/100 VE Network Connecti
on
        Physical Address. . . . . . . . . : 00-09-6B-10-60-99
        Dhcp Enabled. . . . . . . . . . . : Yes
        Autoconfiguration Enabled . . . . : Yes
        IP Address. . . . . . . . . . . . : 128.238.38.160
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 128.238.38.1
        DHCP Server . . . . . . . . . . . : 128.238.29.25
        DNS Servers . . . . . . . . . . . : 128.238.29.22
                                            128.238.29.23
                                            128.238.2.38
                                            128.238.32.22
        Primary WINS Server . . . . . . . : 128.238.29.23
        Secondary WINS Server . . . . . . : 128.238.29.22
        Lease Obtained. . . . . . . . . . : Monday, August 30, 2004 1:30:50 PM
        Lease Expires . . . . . . . . . . : Monday, August 30, 2004 7:30:50 PM
```

Figure 10.2

ipconfig is also very useful for managing the DNS information stored in your host. We learned that a host can cache DNS records it recently obtained.

To see these cached records, after the prompt C:\> provide the following command:

`ipconfig /displaydns`

Each entry shows the remaining Time to Live (TTL) in seconds.

To clear the cache, enter `ipconfig /flushdns`

Flushing the DNS cache clears all entries and reloads the entries from the host's file.

3. Tracing DNS with Wireshark

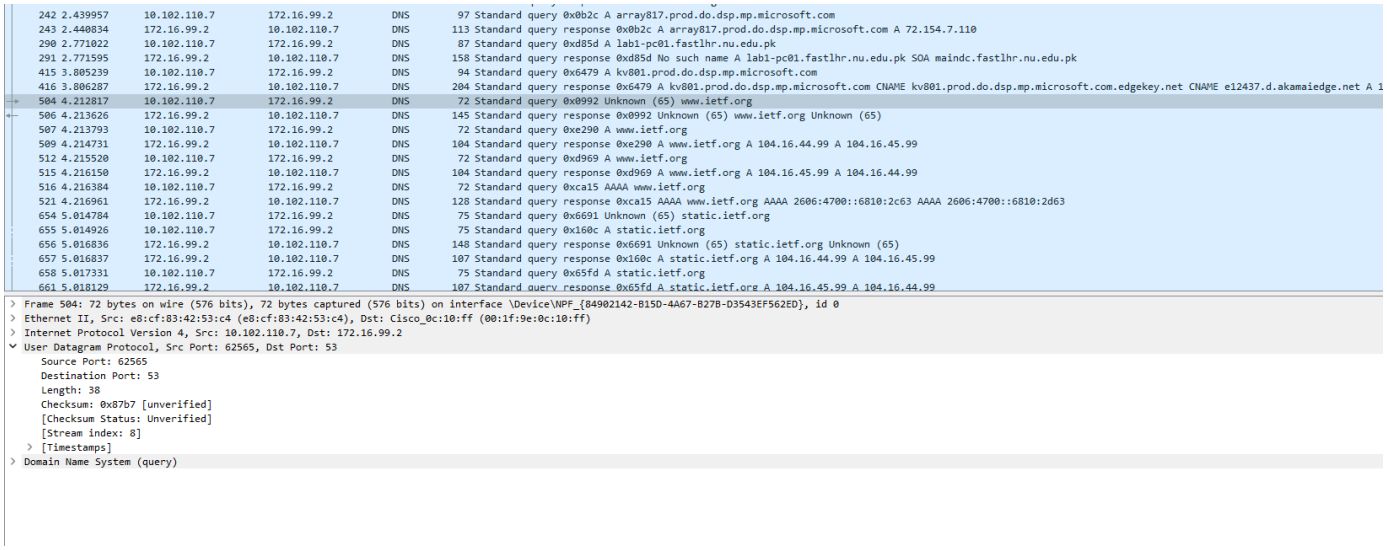
Let's first capture the DNS packets that are generated by ordinary Web surfing activity.

- Use *ipconfig* to empty the DNS cache in your host.
- Open your browser and empty your browser cache. (With Internet Explorer, go to Tools menu and select Internet Options; then in the General tab select Delete Files.)
- Start packet capture in Wireshark.
- With your browser, visit the Web page: **http://www.ietf.org**
- Stop packet capture.

Answer the following questions:

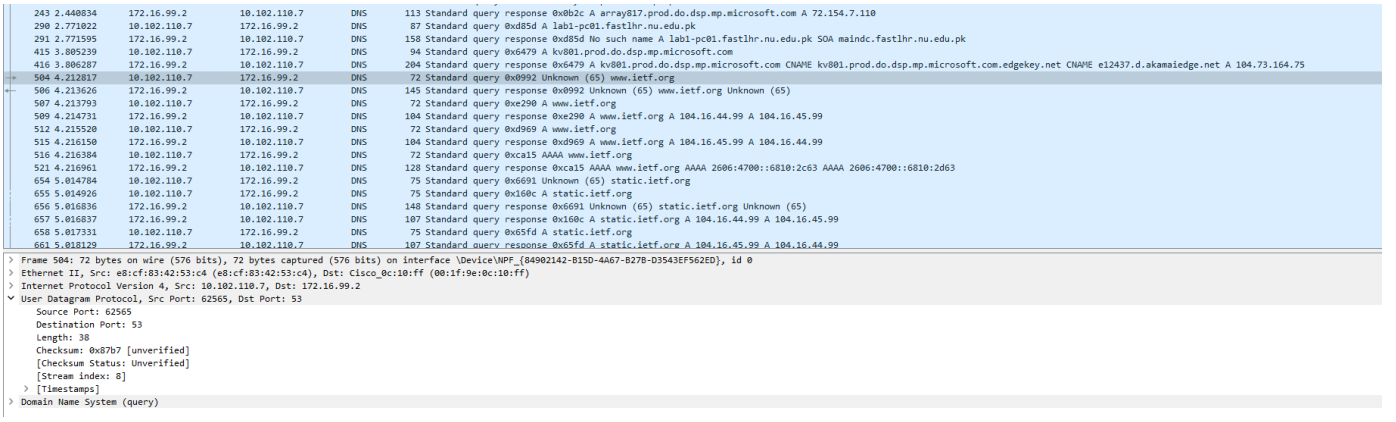
4. **Locate the DNS query and response messages. Are they sent over UDP or TCP?**

   They are sent over UDP

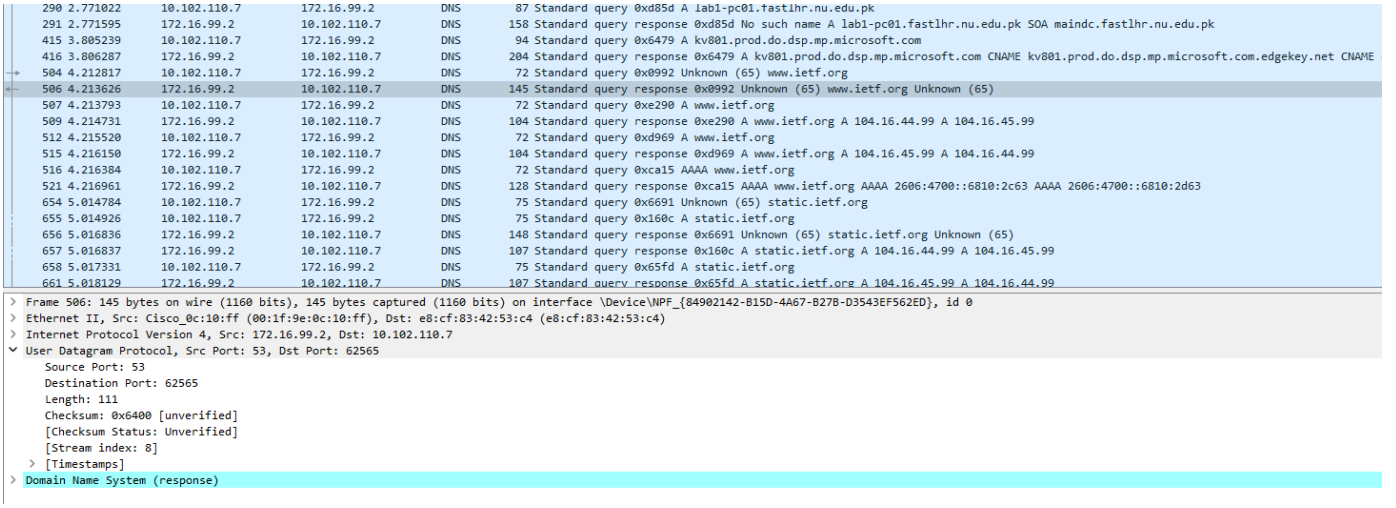


5. **What is the destination port for the DNS query message? What is the source port of DNS response message?**

Query message Source port =53 see destination port



Message port = 53 (response)



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?**

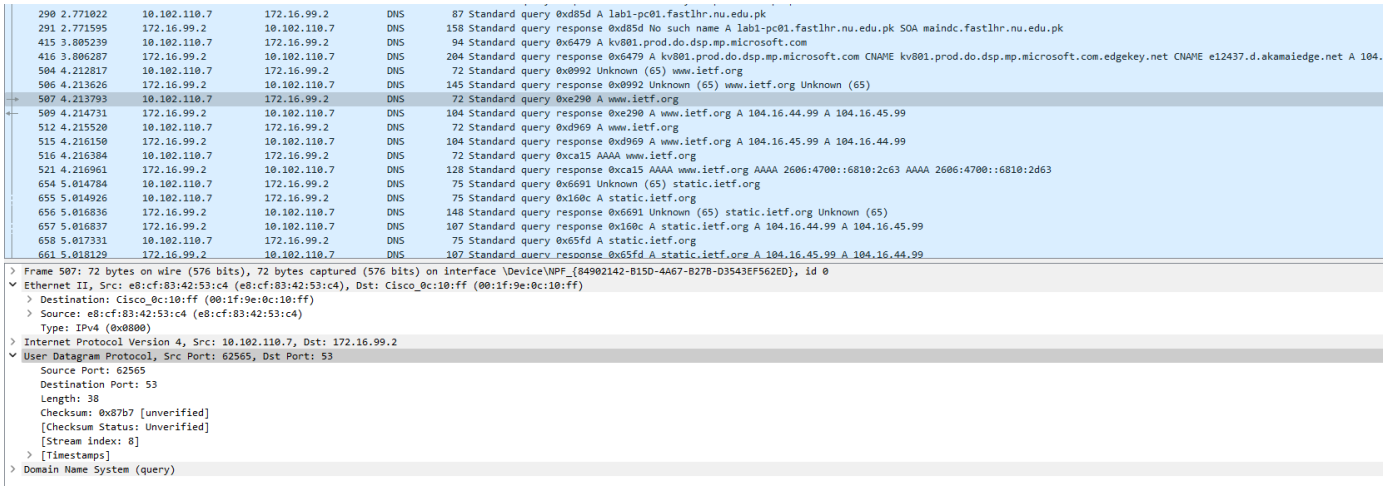
```
Ethernet adapter Ethernet 4:

   Connection-specific DNS Suffix  . : fastlhr.nu.edu.pk
   Description . . . . . . . . . . . : Intel(R) Ethernet Connection (17) I219-LM #3
   Physical Address. . . . . . . . . : E8-CF-83-42-53-C4
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::64c3:a16c:fd12:2beb%11(Preferred)
   IPv4 Address. . . . . . . . . . . : 10.102.110.7(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : Monday, November 10, 2025 11:20:38 AM
   Lease Expires . . . . . . . . . . : Tuesday, November 11, 2025 11:20:37 AM
   Default Gateway . . . . . . . . . : 10.102.110.1
   DHCP Server . . . . . . . . . . . : 172.16.99.6
   DHCPv6 IAID . . . . . . . . . . . : 468242307
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2C-9D-42-F2-6C-3C-8C-50-5A-3C
   DNS Servers . . . . . . . . . . . : 172.16.99.2
                                       172.16.99.10
                                       172.16.99.5
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

Both ip address are same

172.16.99.2

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

Type A , IPv4 . answers Zero



```
> Frame 507: 72 bytes on wire (576 bits), 72 bytes captured (576 bits) on interface \Device\NPF_{84902142-B15D-4A67-B27B-D3543EF562ED}, id 0
v Ethernet II, Src: e8:cf:83:42:53:c4 (e8:cf:83:42:53:c4), Dst: Cisco_0c:10:ff (00:1f:9e:0c:10:ff)
    > Destination: Cisco_0c:10:ff (00:1f:9e:0c:10:ff)
    > Source: e8:cf:83:42:53:c4 (e8:cf:83:42:53:c4)
      Type: IPv4 (0x0800)
> Internet Protocol Version 4, Src: 10.102.110.7, Dst: 172.16.99.2
v User Datagram Protocol, Src Port: 62565, Dst Port: 53
      Source Port: 62565
      Destination Port: 53
      Length: 38
      Checksum: 0x87b7 [unverified]
      [Checksum Status: Unverified]
      [Stream index: 8]
    > [Timestamps]
v Domain Name System (query)
      Transaction ID: 0xe290
    > Flags: 0x0100 Standard query
      Questions: 1
      Answer RRs: 0
      Authority RRs: 0
      Additional RRs: 0
    > Queries
      [Response In: 509]
```

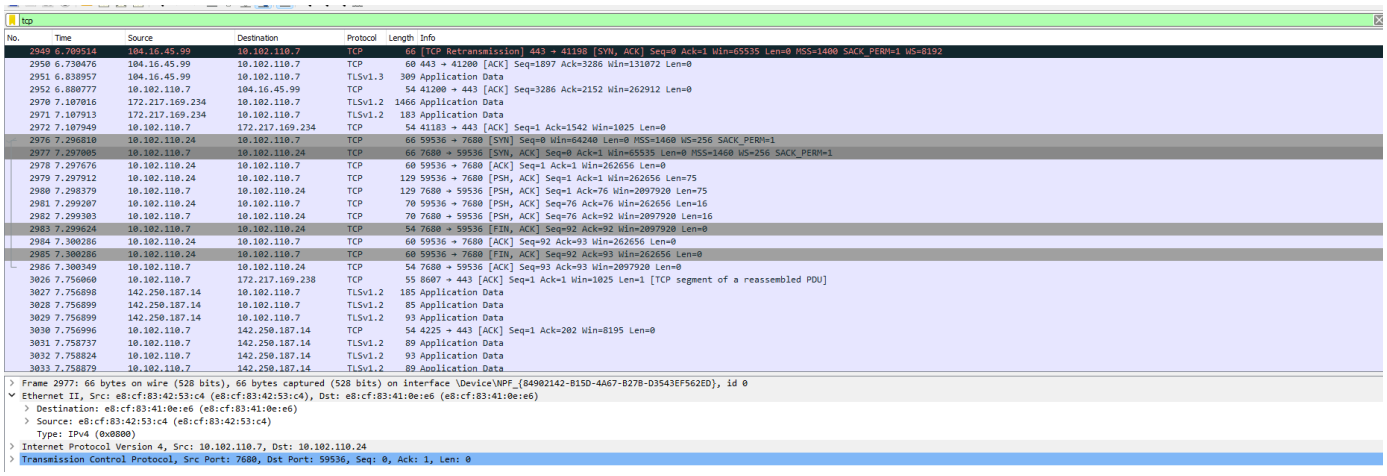
8. **Examine the DNS response message. How many "answers" are provided? What does each of these answers contain?**

```
   415 3.805239    10.102.110.7    172.16.99.2     DNS      94 Standard query 0x6479 A kv801.prod.do.dsp.mp.microsoft.com
   416 3.806287    172.16.99.2     10.102.110.7    DNS     204 Standard query response 0x6479 A kv801.prod.do.dsp.mp.microsoft.com CNAME kv801.prod.do.dsp.mp.microsoft.com.edgekey.net CNAME e12437.d.akama
   504 4.212817    10.102.110.7    172.16.99.2     DNS      72 Standard query 0x0992 Unknown (65) www.ietf.org
   506 4.213626    172.16.99.2     10.102.110.7    DNS     145 Standard query response 0x0992 Unknown (65) www.ietf.org Unknown (65)
   507 4.213793    10.102.110.7    172.16.99.2     DNS      72 Standard query 0xe290 A www.ietf.org
   509 4.214731    172.16.99.2     10.102.110.7    DNS     104 Standard query response 0xe290 A www.ietf.org A 104.16.44.99 A 104.16.45.99
   512 4.215520    10.102.110.7    172.16.99.2     DNS      72 Standard query 0xd969 A www.ietf.org
   515 4.216150    172.16.99.2     10.102.110.7    DNS     104 Standard query response 0xd969 A www.ietf.org A 104.16.45.99 A 104.16.44.99
   516 4.216384    10.102.110.7    172.16.99.2     DNS      72 Standard query 0xca15 AAAA www.ietf.org
   521 4.216961    172.16.99.2     10.102.110.7    DNS     128 Standard query response 0xca15 AAAA www.ietf.org AAAA 2606:4700::6810:2c63 AAAA 2606:4700::6810:2d63
   654 5.014784    10.102.110.7    172.16.99.2     DNS      75 Standard query 0x6691 Unknown (65) static.ietf.org
   655 5.014926    10.102.110.7    172.16.99.2     DNS      75 Standard query 0x160c A static.ietf.org
   656 5.016836    172.16.99.2     10.102.110.7    DNS     148 Standard query response 0x6691 Unknown (65) static.ietf.org Unknown (65)
   657 5.016837    172.16.99.2     10.102.110.7    DNS     107 Standard query response 0x160c A static.ietf.org A 104.16.44.99 A 104.16.45.99
   658 5.017331    10.102.110.7    172.16.99.2     DNS      75 Standard query 0x65fd A static.ietf.org
   661 5.018129    172.16.99.2     10.102.110.7    DNS     107 Standard query response 0x65fd A static.ietf.org A 104.16.45.99 A 104.16.44.99
> Frame 509: 104 bytes on wire (832 bits), 104 bytes captured (832 bits) on interface \Device\NPF_{84902142-B15D-4A67-B27B-D3543EF562ED}, id 0
v Ethernet II, Src: Cisco_0c:10:ff (00:1f:9e:0c:10:ff), Dst: e8:cf:83:42:53:c4 (e8:cf:83:42:53:c4)
    > Destination: e8:cf:83:42:53:c4 (e8:cf:83:42:53:c4)
    > Source: Cisco_0c:10:ff (00:1f:9e:0c:10:ff)
      Type: IPv4 (0x0800)
> Internet Protocol Version 4, Src: 172.16.99.2, Dst: 10.102.110.7
v User Datagram Protocol, Src Port: 53, Dst Port: 62565
      Source Port: 53
      Destination Port: 62565
      Length: 70
      Checksum: 0x51da [unverified]
      [Checksum Status: Unverified]
      [Stream index: 8]
    > [Timestamps]
v Domain Name System (response)
      Transaction ID: 0xe290
    > Flags: 0x8180 Standard query response, No error
      Questions: 1
      Answer RRs: 2
      Authority RRs: 0
      Additional RRs: 0
    > Queries
    > Answers
      [Request In: 507]
      [Time: 0.000938000 seconds]
```

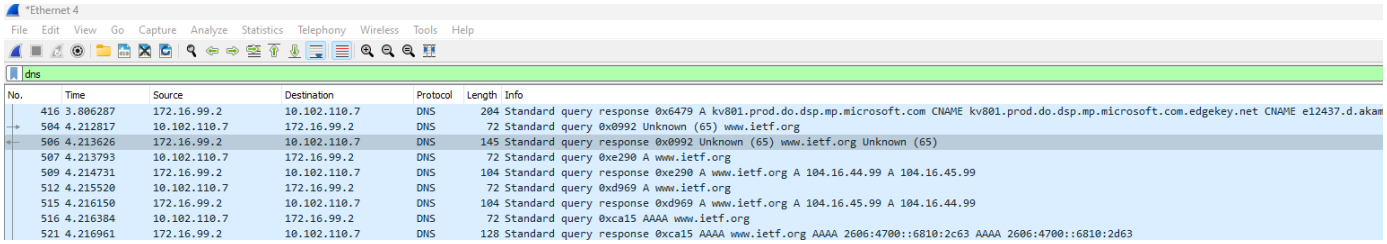
Answer 2

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?**

Filter tcp, go at last, see first tcp seq = 0



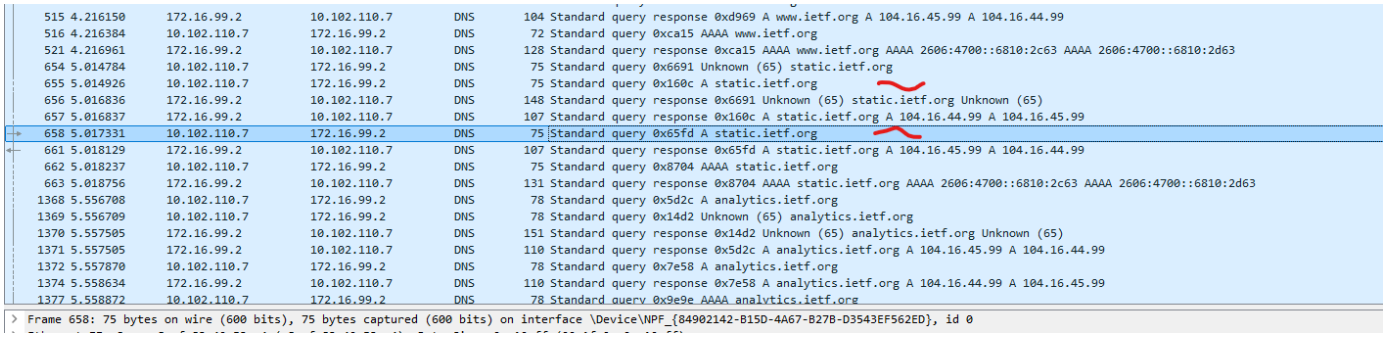
Type dns



Both **addresses are same** 10.102.110.7

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

Yes as two static requests are seen for the two images.



Important Note

For questions 11 and onwards, if you are unable get results from nslookup commands, you may use the trace files given in a zipped folder at the following link. http://gaia.cs.umass.edu/wiresharklabs/wireshark-traces.zip

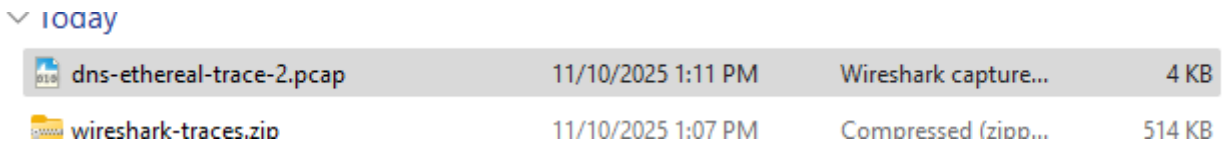
- **Using a trace file**

Download the zip file http://gaia.cs.umass.edu/wireshark-labs/wireshark-traces.zipand extract files. The traces in this zip file were collected by Wireshark running on one of the author's computers, while performing the steps indicated in the Wireshark lab. Once you have downloaded the trace, you can load it into Wireshark and view the trace using the *File* pull down menu, choosing *Open*, and then selecting any trace file.

Now let's use *nslookup*and capture its packets.

- Start packet capture.
- Do an *nslookup*on www.mit.edu
- Stop packet capture.

(For Questions 11-15, dns-ethereal-trace-2 can be used only if you are unable get results from nslooku

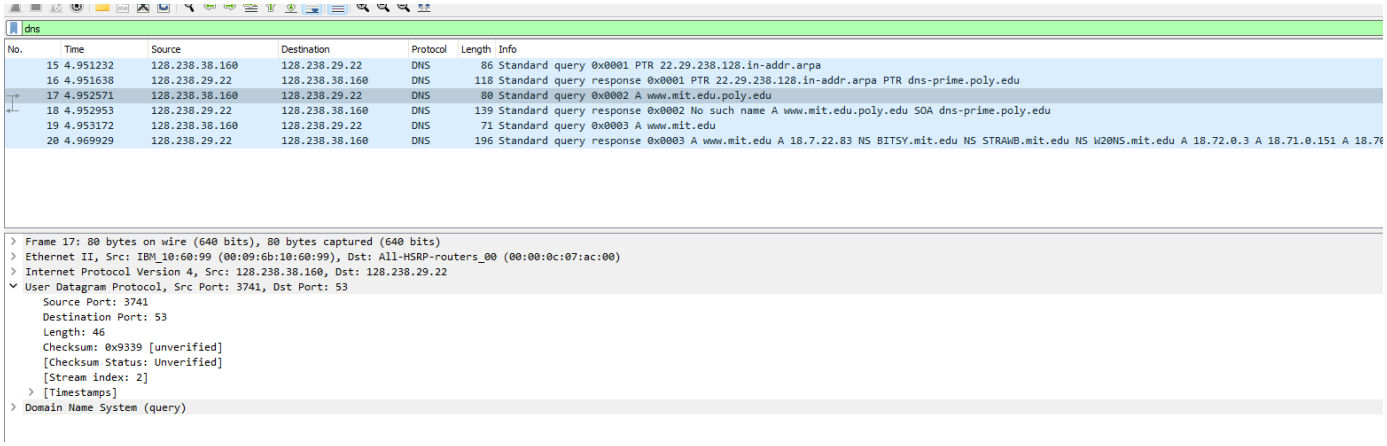


Open the first file

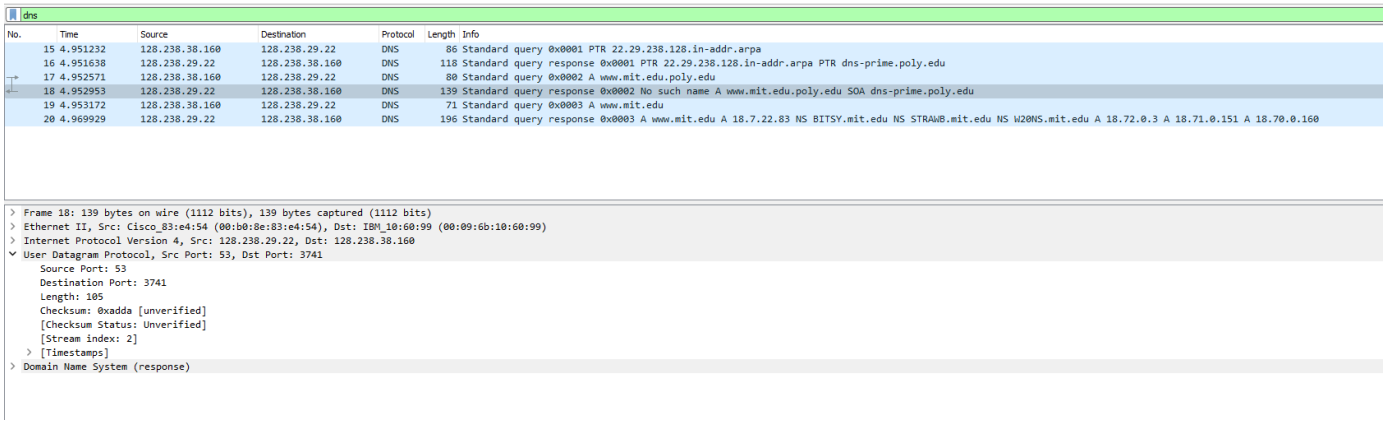
11. **What is the destination port for the DNS query message? What is the source port of DNS response message?**

Destination port:53

Source port: 3741

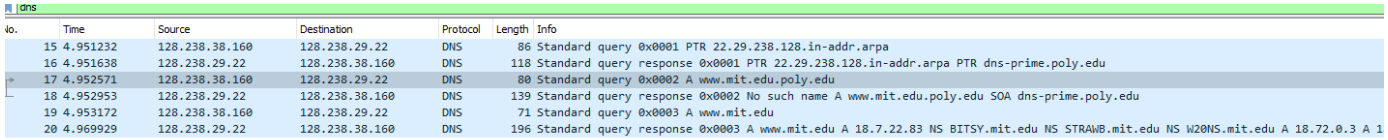


Response



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

Destination IP Address 128.238.29.22



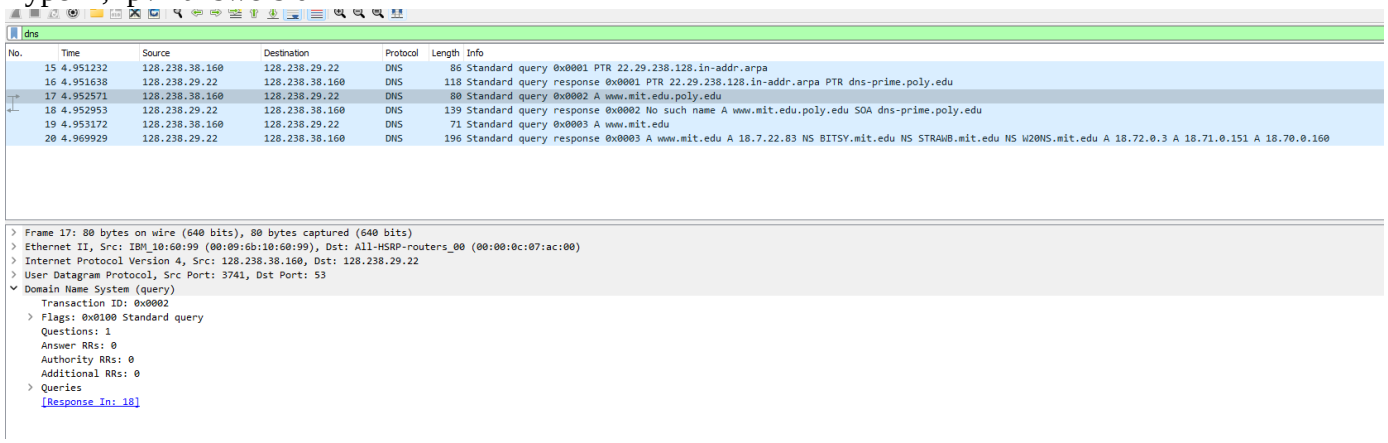
dns

No.	Time	Source	Destination	Protocol	Length	Info
15	4.951232	128.238.38.160	128.238.29.22	DNS	86	Standard query 0x0001 PTR 22.29.238.128.in-addr.arpa
16	4.951638	128.238.29.22	128.238.38.160	DNS	118	Standard query response 0x0001 PTR 22.29.238.128.in-addr.arpa PTR dns-prime.poly.edu
17	4.952571	128.238.38.160	128.238.29.22	DNS	80	Standard query 0x0002 A www.mit.edu.poly.edu
18	4.952953	128.238.29.22	128.238.38.160	DNS	139	Standard query response 0x0002 No such name A www.mit.edu.poly.edu SOA dns-prime.poly.edu
19	4.953172	128.238.38.160	128.238.29.22	DNS	71	Standard query 0x0003 A www.mit.edu
20	4.969929	128.238.29.22	128.238.38.160	DNS	196	Standard query response 0x0003 A www.mit.edu A 18.7.22.83 NS BITSY.mit.edu NS STRAWB.mit.edu NS W20NS.mit.edu A 18.72.0.3 A 1

```
> Frame 17: 80 bytes on wire (640 bits), 80 bytes captured (640 bits)
> Ethernet II, Src: IBM_10:60:99 (00:09:6b:10:60:99), Dst: All-HSRP-routers_00 (00:00:0c:07:ac:00)
v Internet Protocol Version 4, Src: 128.238.38.160, Dst: 128.238.29.22
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 66
    Identification: 0x27a2 (10146)
  > Flags: 0x0000
    Fragment offset: 0
    Time to live: 128
    Protocol: UDP (17)
    Header checksum: 0xcd76 [validation disabled]
    [Header checksum status: Unverified]
    Source: 128.238.38.160
    Destination: 128.238.29.22
v User Datagram Protocol, Src Port: 3741, Dst Port: 53
```

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

Type A, ipv4 answers 0



dns

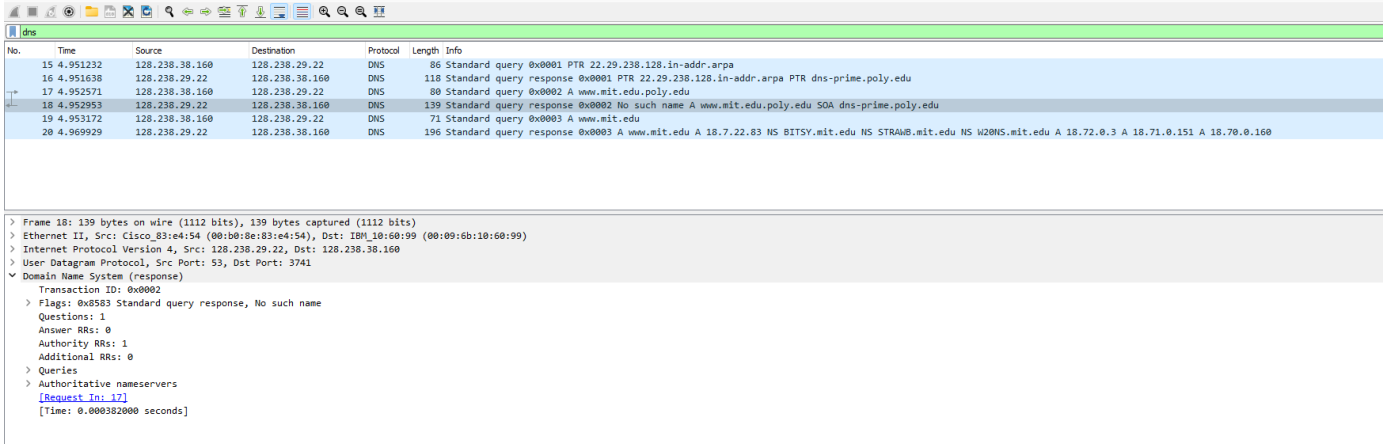
No.	Time	Source	Destination	Protocol	Length	Info
15	4.951232	128.238.38.160	128.238.29.22	DNS	86	Standard query 0x0001 PTR 22.29.238.128.in-addr.arpa
16	4.951638	128.238.29.22	128.238.38.160	DNS	118	Standard query response 0x0001 PTR 22.29.238.128.in-addr.arpa PTR dns-prime.poly.edu
17	4.952571	128.238.38.160	128.238.29.22	DNS	80	Standard query 0x0002 A www.mit.edu.poly.edu
18	4.952953	128.238.29.22	128.238.38.160	DNS	139	Standard query response 0x0002 No such name A www.mit.edu.poly.edu SOA dns-prime.poly.edu
19	4.953172	128.238.38.160	128.238.29.22	DNS	71	Standard query 0x0003 A www.mit.edu
20	4.969929	128.238.29.22	128.238.38.160	DNS	196	Standard query response 0x0003 A www.mit.edu A 18.7.22.83 NS BITSY.mit.edu NS STRAWB.mit.edu NS W20NS.mit.edu A 18.72.0.3 A 18.71.0.151 A 18.70.0.160


```
> Frame 17: 80 bytes on wire (640 bits), 80 bytes captured (640 bits)
> Ethernet II, Src: IBM_10:60:99 (00:09:6b:10:60:99), Dst: All-HSRP-routers_00 (00:00:0c:07:ac:00)
> Internet Protocol Version 4, Src: 128.238.38.160, Dst: 128.238.29.22
> User Datagram Protocol, Src Port: 3741, 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
  > Queries
    [Response In: 18]
```

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

The DNS query is of type-A. The query message does not contain any answers.

15.Provide a screenshot



No.	Time	Source	Destination	Protocol	Length	Info
15	4.951232	128.238.38.160	128.238.29.22	DNS	86	Standard query 0x0001 PTR 22.29.238.128.in-addr.arpa
16	4.951638	128.238.29.22	128.238.38.160	DNS	118	Standard query response 0x0001 PTR 22.29.238.128.in-addr.arpa PTR dns-prime.poly.edu
17	4.952571	128.238.38.160	128.238.29.22	DNS	80	Standard query 0x0002 A www.mit.edu.poly.edu
18	4.952953	128.238.29.22	128.238.38.160	DNS	139	Standard query response 0x0002 No such name A www.mit.edu.poly.edu SOA dns-prime.poly.edu
19	4.953172	128.238.38.160	128.238.29.22	DNS	71	Standard query 0x0003 A www.mit.edu
20	4.969929	128.238.29.22	128.238.38.160	DNS	196	Standard query response 0x0003 A www.mit.edu A 18.7.22.83 NS BITSY.mit.edu NS STRAWB.mit.edu NS W20NS.mit.edu A 18.72.0.3 A 18.71.0.151 A 18.70.0.160

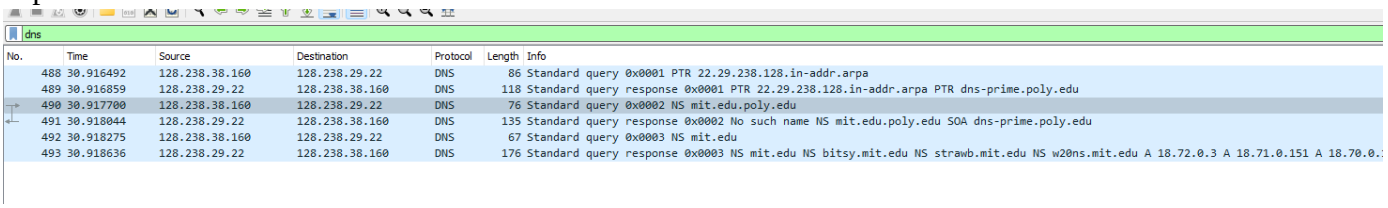
```
> Frame 18: 139 bytes on wire (1112 bits), 139 bytes captured (1112 bits)
> Ethernet II, Src: Cisco_83:e4:54 (00:b0:8e:83:e4:54), Dst: IBM_10:60:99 (00:09:6b:10:60:99)
> Internet Protocol Version 4, Src: 128.238.29.22, Dst: 128.238.38.160
> User Datagram Protocol, Src Port: 53, Dst Port: 3741
v Domain Name System (response)
    Transaction ID: 0x0002
  > Flags: 0x8583 Standard query response, No such name
    Questions: 1
    Answer RRs: 0
    Authority RRs: 1
    Additional RRs: 0
  > Queries
  > Authoritative nameservers
    [Request In: 17]
    [Time: 0.000382000 seconds]
```

Now repeat the previous experiment, but instead issue the command:
nslookup –type=NS mit.edu

(For Questions 16-19, dns-ethereal-trace-3 can be used only if you are unable get results from nslookup)

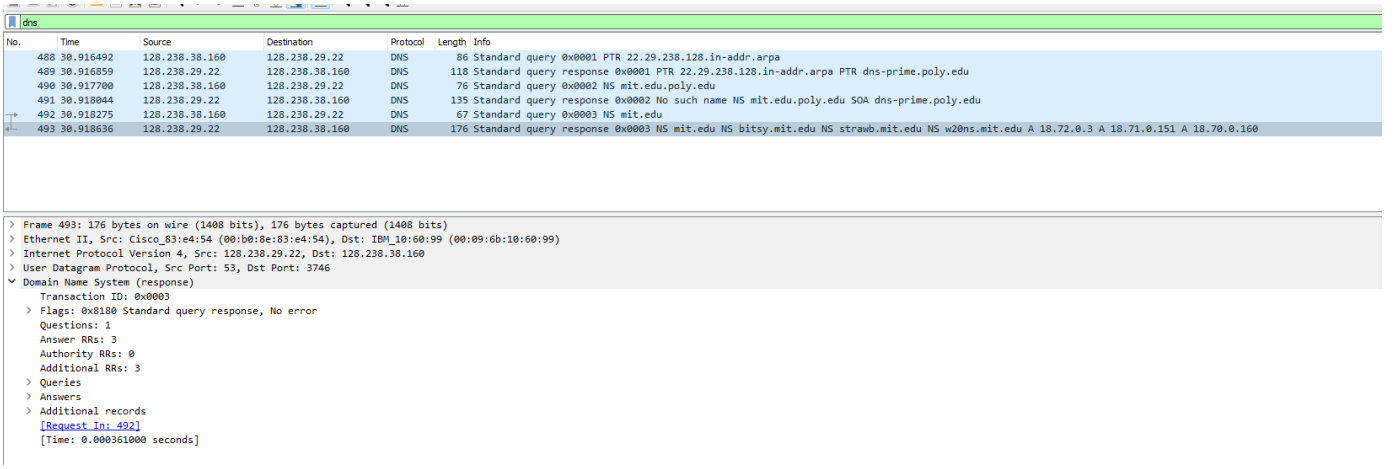
16. To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server?

    Ip address 128.238.29.22



No.	Time	Source	Destination	Protocol	Length	Info
488	30.916492	128.238.38.160	128.238.29.22	DNS	86	Standard query 0x0001 PTR 22.29.238.128.in-addr.arpa
489	30.916859	128.238.29.22	128.238.38.160	DNS	118	Standard query response 0x0001 PTR 22.29.238.128.in-addr.arpa PTR dns-prime.poly.edu
490	30.917700	128.238.38.160	128.238.29.22	DNS	76	Standard query 0x0002 NS mit.edu.poly.edu
491	30.918044	128.238.29.22	128.238.38.160	DNS	135	Standard query response 0x0002 No such name NS mit.edu.poly.edu SOA dns-prime.poly.edu
492	30.918275	128.238.38.160	128.238.29.22	DNS	67	Standard query 0x0003 NS mit.edu
493	30.918636	128.238.29.22	128.238.38.160	DNS	176	Standard query response 0x0003 NS mit.edu NS bitsy.mit.edu NS strawb.mit.edu NS w20ns.mit.edu A 18.72.0.3 A 18.71.0.151 A 18.70.0.

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

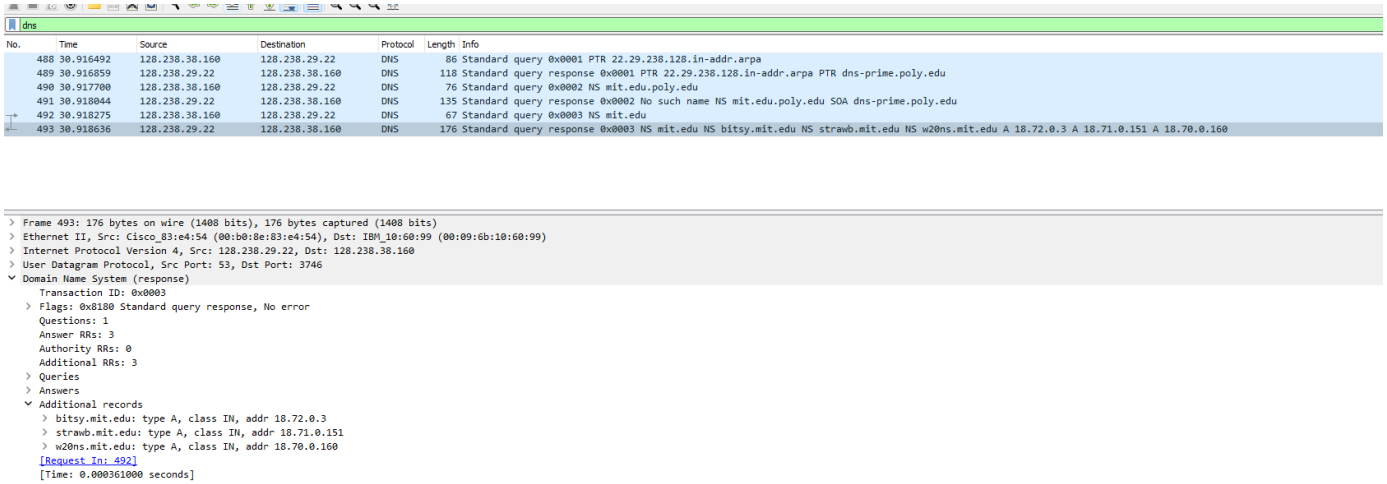


Type ipv4

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

Yes, the response message contains the IP addresses of the MIT name servers.

19. **Provide a screenshot.**



Now repeat the previous experiment, but instead issue the command:
nslookup www.aiit.or.kr bitsy.mit.edu

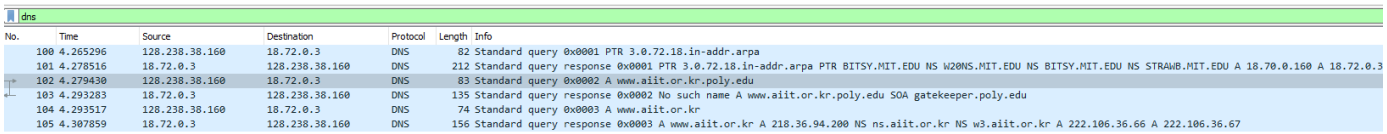
(For Questions 20-23, dns-ethereal-trace-4 can be used only if you are unable get results from nslookup)

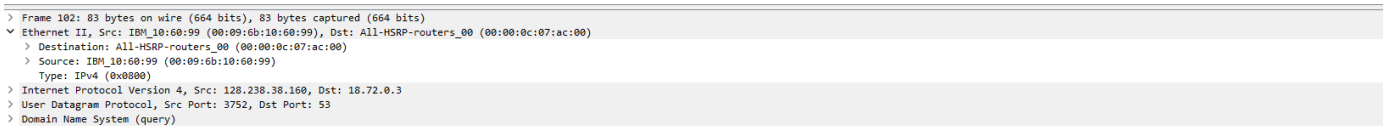
20. **To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server? If not, what does the IP address correspond to?**

Ip address 18.70.0.3, it change from default DNS server.

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

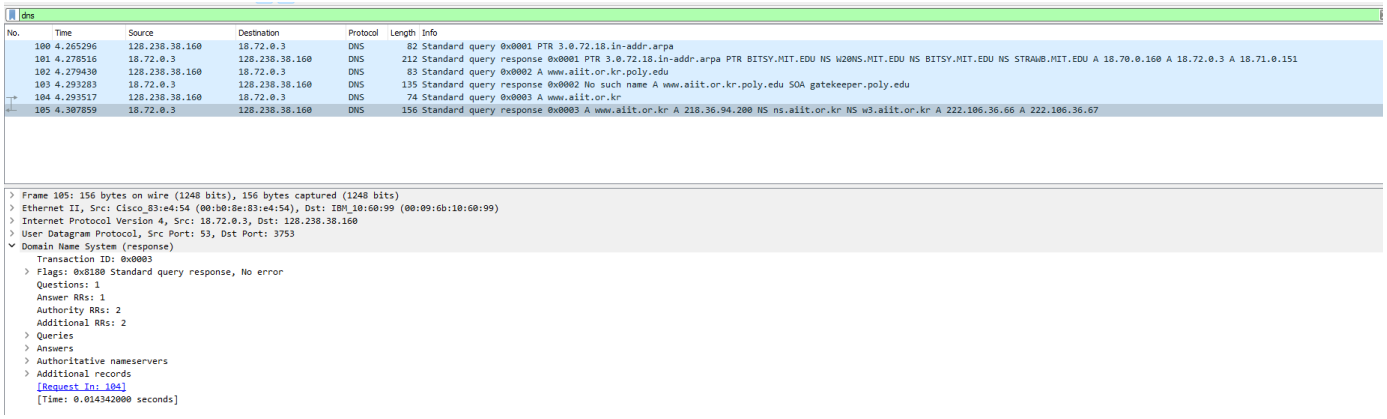
Type: A(IPv4)





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

Answer 1



Answer the following QUESTIONS:

Q: Why does HTTP and DNS use TCP and UDP respectively?

HTTP and DNS are application layer protocols, and in order to utilize the transport layer services of for example reliable or unreliable (but fast) data transfer we only have two choices in internet: ● TCP (Transmission Control Protocol) ● UDP (User Datagram Protocol) The application layer encapsulates its data into the segment at the transport layer. DNS usually uses UDP as it does rely much on reliability because of its small segment size.

- **If the webpage having 10 reference objects and base html located at different location, then how may HTTP and DNS request will be generated?**

A DNS request from the host is sent to the local default gateway DNS server for getting the IP address of the webpage. Now because the webpage has distributed files at different locations in different servers, the DNS will query all the servers (via hierarchical DNS servers) to gather the IP addresses of all the servers at which the webpage data is distributed. Finally, the DNS response will contain the IP addresses of all the servers which contain the required webpage files. The HTTP request now contains the destination IP addresses and therefore forms the segment and then the HTTP request is sent to all those servers (either through TCP or UDP). The DNS query and response usually utilizes UDP.