Assignment 3

Using a Packet Sniffer

Part 1: Basics

Answer 1:

1. ARP
2. UDP
3. LLMNR
4. TCP
5. STP
6. SSDP
7. DHCPv6
8. DNS
9. HTTP
10. TLSv1

Answer 2:

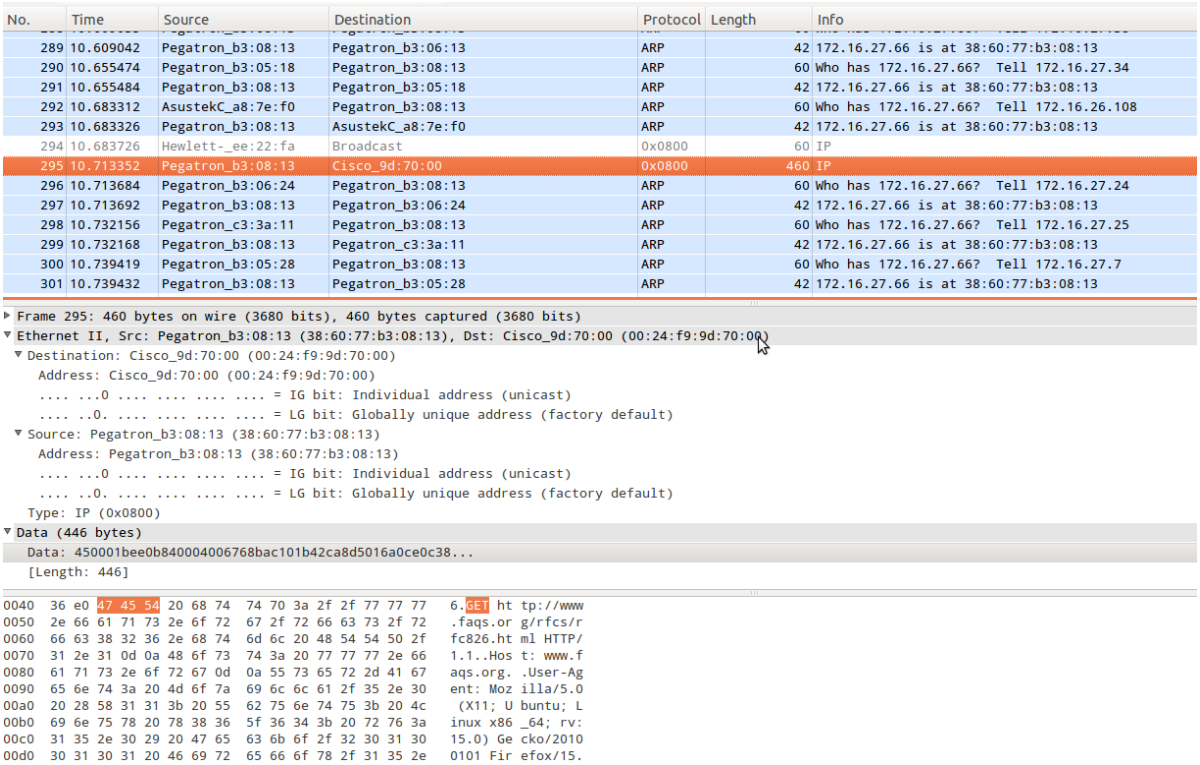
When we look at the frame section of the GET request we see that the time the packet arrived is 08:04:59.937502000.

The same section for the HTTP OK shows an arrival time is 08:05:00.264414000
Therefore, time difference = 0.326912 sec

Answer 3:

- Because, we are behind a proxy address, therefore the ip address of www.google.com cannot be traced using wireshark as the DNS fails and request is sent to the proxy server which is 202.141.80.22
- The ip address of my computer is 172.16.27.66 which can be seen in the IP header field.

Part 2: Ethernet



No.	Time	Source	Destination	Protocol	Length	Info
289	10.609042	Pegatron_b3:08:13	Pegatron_b3:06:13	ARP	42	172.16.27.66 is at 38:60:77:b3:08:13
290	10.655474	Pegatron_b3:05:18	Pegatron_b3:08:13	ARP	60	Who has 172.16.27.66? Tell 172.16.27.34
291	10.655484	Pegatron_b3:08:13	Pegatron_b3:05:18	ARP	42	172.16.27.66 is at 38:60:77:b3:08:13
292	10.683312	AsustekC_a8:7e:f0	Pegatron_b3:08:13	ARP	60	Who has 172.16.27.66? Tell 172.16.26.108
293	10.683326	Pegatron_b3:08:13	AsustekC_a8:7e:f0	ARP	42	172.16.27.66 is at 38:60:77:b3:08:13
294	10.683726	Hewlett-_ee:22:fa	Broadcast	0x0800	60	IP
295	10.713352	Pegatron_b3:08:13	Cisco_9d:70:00	0x0800	460	IP
296	10.713684	Pegatron_b3:06:24	Pegatron_b3:08:13	ARP	60	Who has 172.16.27.66? Tell 172.16.27.24
297	10.713692	Pegatron_b3:08:13	Pegatron_b3:06:24	ARP	42	172.16.27.66 is at 38:60:77:b3:08:13
298	10.732156	Pegatron_c3:3a:11	Pegatron_b3:08:13	ARP	60	Who has 172.16.27.66? Tell 172.16.27.25
299	10.732168	Pegatron_b3:08:13	Pegatron_c3:3a:11	ARP	42	172.16.27.66 is at 38:60:77:b3:08:13
300	10.739419	Pegatron_b3:05:28	Pegatron_b3:08:13	ARP	60	Who has 172.16.27.66? Tell 172.16.27.7
301	10.739432	Pegatron_b3:08:13	Pegatron_b3:05:28	ARP	42	172.16.27.66 is at 38:60:77:b3:08:13

```
▸ Frame 295: 460 bytes on wire (3680 bits), 460 bytes captured (3680 bits)
▾ Ethernet II, Src: Pegatron_b3:08:13 (38:60:77:b3:08:13), Dst: Cisco_9d:70:00 (00:24:f9:9d:70:00)
  ▾ Destination: Cisco_9d:70:00 (00:24:f9:9d:70:00)
      Address: Cisco_9d:70:00 (00:24:f9:9d:70:00)
      .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
      .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
  ▾ Source: Pegatron_b3:08:13 (38:60:77:b3:08:13)
      Address: Pegatron_b3:08:13 (38:60:77:b3:08:13)
      .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
      .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
    Type: IP (0x0800)
▾ Data (446 bytes)
    Data: 450001bee0b840004006768bac101b42ca8d5016a0ce0c38...
    [Length: 446]
```

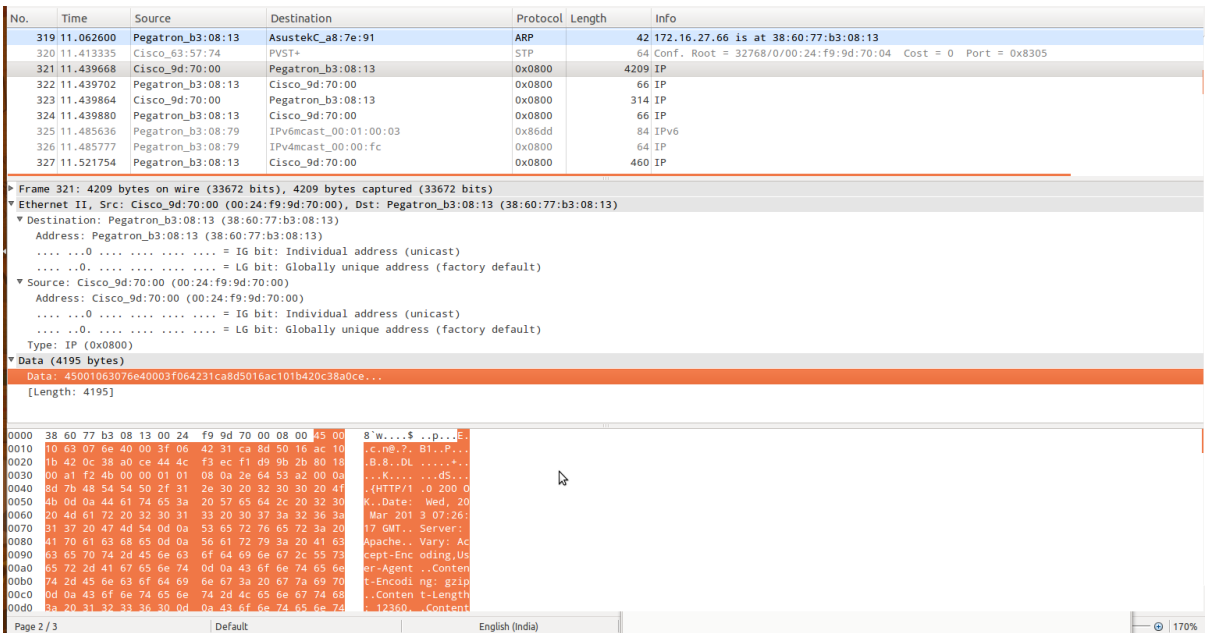
```
0040  36 e0 47 45 54 20 68 74  74 70 3a 2f 2f 77 77 77   6.GET ht tp://www
0050  2e 66 61 71 73 2e 6f 72  67 2f 72 66 63 73 2f 72   .faqs.or g/rfcs/r
0060  66 63 38 32 36 2e 68 74  6d 6c 20 48 54 54 50 2f   fc826.ht ml HTTP/
0070  31 2e 31 0d 0a 48 6f 73  74 3a 20 77 77 77 2e 66   1.1..Hos t: www.f
0080  61 71 73 2e 6f 72 67 0d  0a 55 73 65 72 2d 41 67   aqs.org. .User-Ag
0090  65 6e 74 3a 20 4d 6f 7a  69 6c 6c 61 2f 35 2e 30   ent: Moz illa/5.0
00a0  20 28 58 31 31 3b 20 55  62 75 6e 74 75 3b 20 4c    (X11; U buntu; L
00b0  69 6e 75 78 20 78 38 36  5f 36 34 3b 20 72 76 3a   inux x86 _64; rv:
00c0  31 35 2e 30 29 20 47 65  63 6b 6f 2f 32 30 31 30   15.0) Ge cko/2010
00d0  30 31 30 31 20 46 69 72  65 66 6f 78 2f 31 35 2e   0101 Fir efox/15.
```

Answer 1: 48-bit Ethernet address of your computer is 38:60:77:b3:08:13.

Answer 2: The destination address is 00:24:f9:9d:70:00.It is not the Ethernet address of the website with the RFC. This is not the address of the server, but rather, the address of the router or switch that this computer is connected to.

Answer 3: The hex value for the Frame type field is 0x0800. It identifies an upper layer protocol encapsulating the frame data which in this case is Internet Protocol version 4.

Answer 4: GET is at 67 bytes away from the start of the header frame.

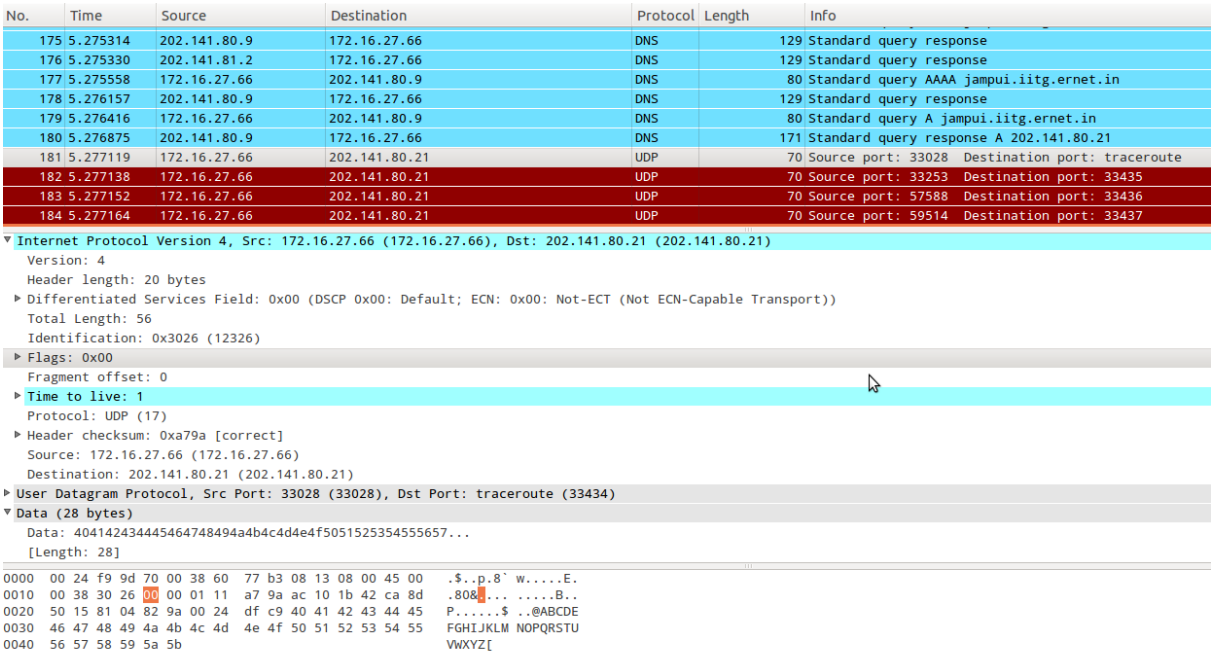


Answer 5: The source address is 00:24:f9:9d:70:00 which is the address of the router or switch that the local computer is connected to. No, it is not the address of my computer nor the address of the website server.

Answer 6: The destination address of the Ethernet frame is 38:60:77:b3:08:13 which is the address of my computer.

Answer 7: The hex value for the Frame type field is 0x0800. It identifies an upper layer protocol encapsulating the frame data which in this case is Internet Protocol version 4.

Part 3: IP



Answer 1: Ip address of computer is 172.16.27.66

Answer 2: Upper Layer Protocol field is UDP(17).

Answer 3:

IPHeader Length = 20 bytes

Total Length = 56 bytes

Thus there are 36 bytes in the payload of the IP datagram.

Answer 4: The more fragments bit = 0, so the data is not fragmented.

Answer 5: Header Checksum and Identification always change and Time to live may remain same in some packets.

Answer 6:

The fields **that stay constant** across the IP datagrams are:

- Version --Using IPv4 for all packets
- Header Length --These are ICMP packet
- Source IP -- Sending from the same source
- Destination IP -- Sending to the same destination
- Differentiated Services --All packets are ICMP they use the same type of Service class
- Upper Layer Protocol -- These are ICMP packets

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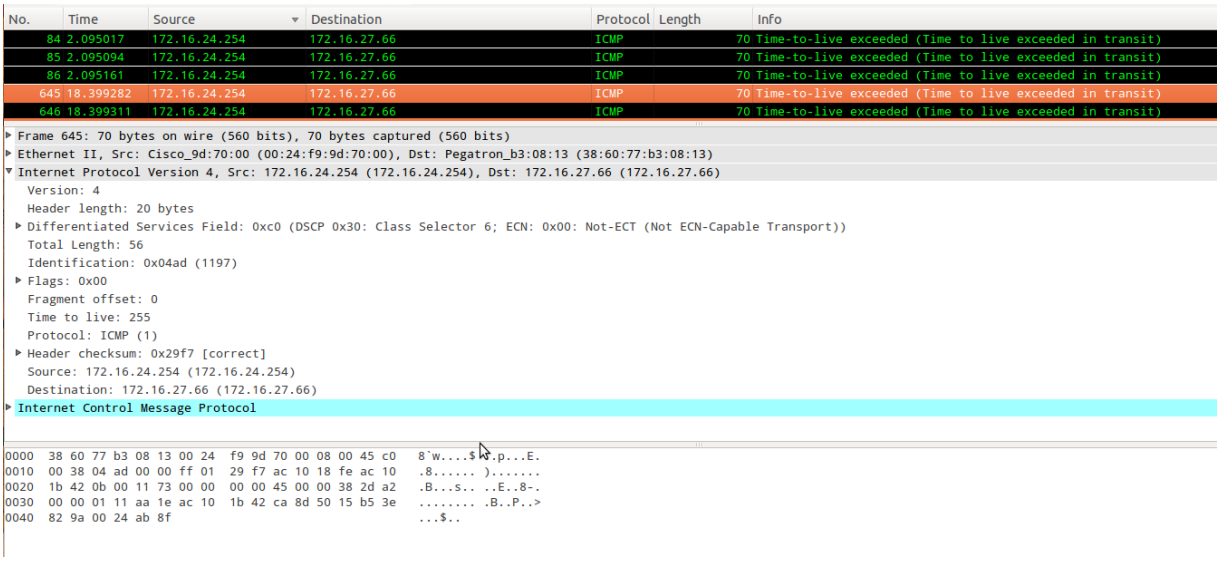
- Differentiated Services --All packets are ICMP they use the same type of Service class
- Upper Layer Protocol -- These are ICMP packets

The fields that **must change** are:

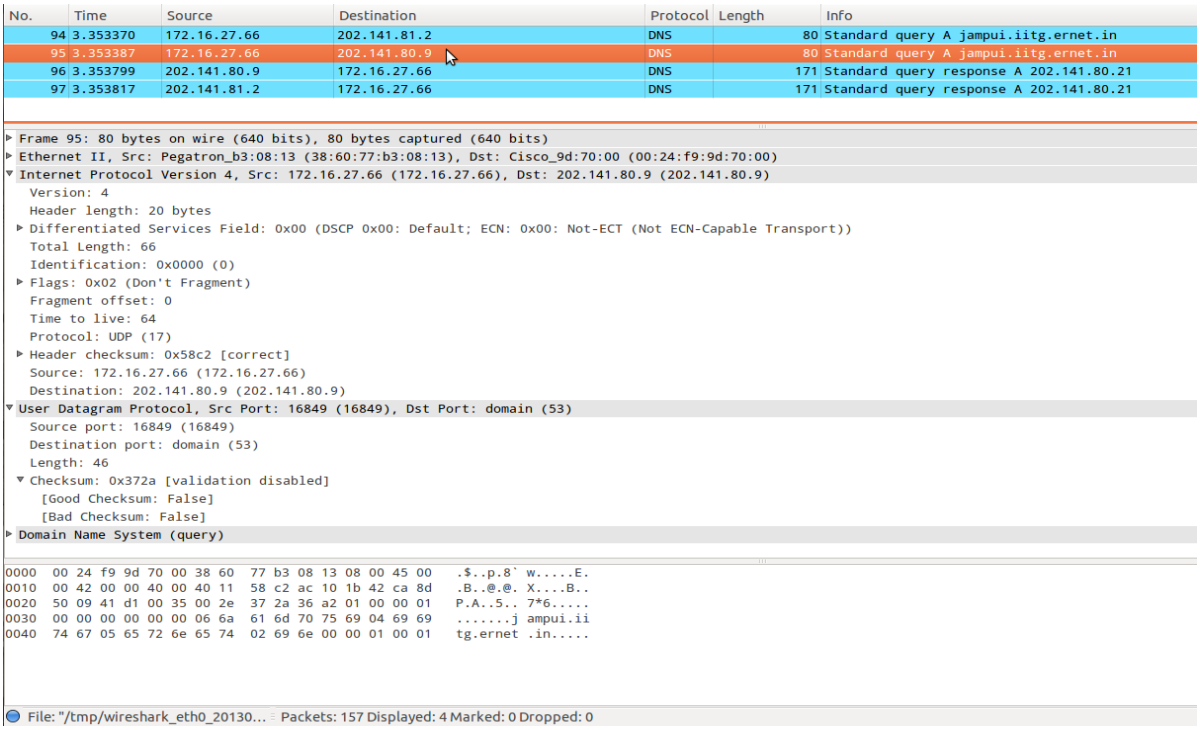
- Identification --IP packets must have different ids
- Time to live --Traceroute increments each subsequent packet
- Header checksum --Header changes, so must checksum



Answer 7:

The identification field is 0x04ad(1197) and TTL is 255.When two or more IP datagrams have the same identification value, then it means that these IP datagrams are fragments of a single large IP datagram. The identification field changes for all the ICMP TTL-exceeded replies because the identification field is a unique value but the TTL field remains unchanged because the TTL for the first hop router is always the same.

Part 4: UDP

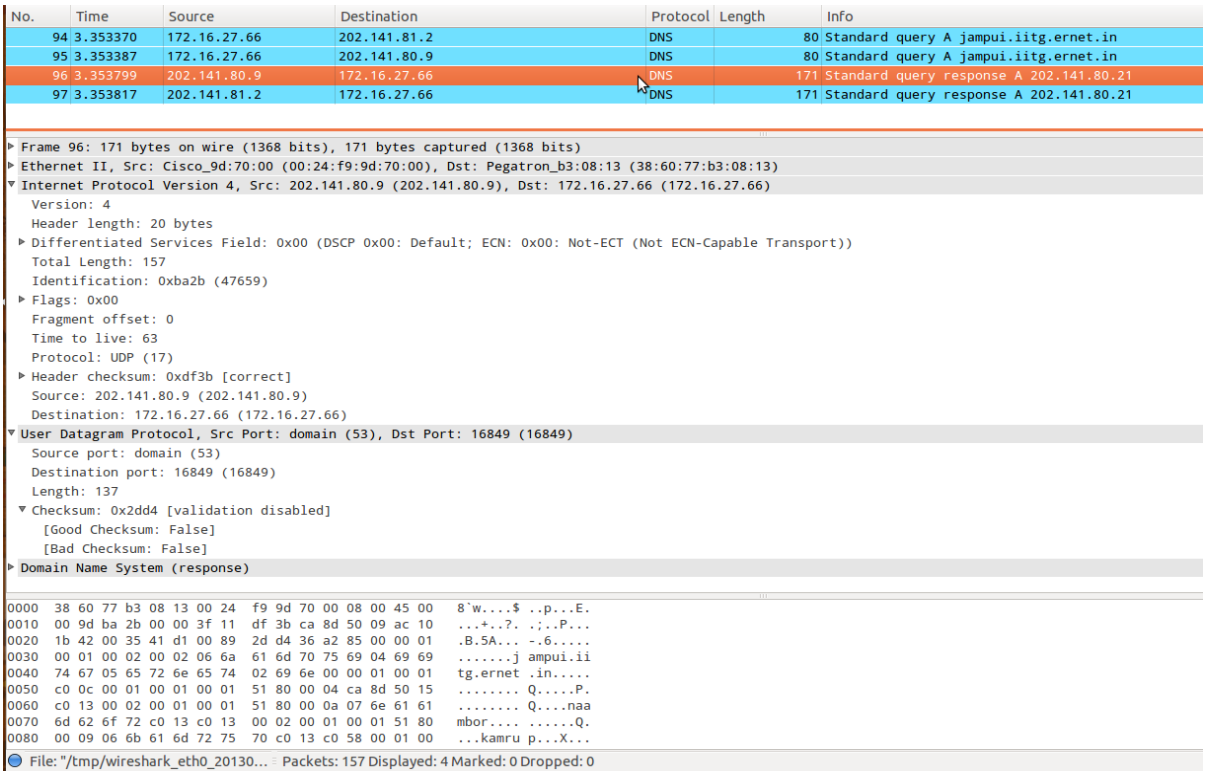


No.	Time	Source	Destination	Protocol	Length	Info
94	3.353370	172.16.27.66	202.141.81.2	DNS	80	Standard query A jampui.iitg.ernet.in
95	3.353387	172.16.27.66	202.141.80.9	DNS	80	Standard query A jampui.iitg.ernet.in
96	3.353799	202.141.80.9	172.16.27.66	DNS	171	Standard query response A 202.141.80.21
97	3.353817	202.141.81.2	172.16.27.66	DNS	171	Standard query response A 202.141.80.21

```
▸ Frame 95: 80 bytes on wire (640 bits), 80 bytes captured (640 bits)
▸ Ethernet II, Src: Pegatron_b3:08:13 (38:60:77:b3:08:13), Dst: Cisco_9d:70:00 (00:24:f9:9d:70:00)
▾ Internet Protocol Version 4, Src: 172.16.27.66 (172.16.27.66), Dst: 202.141.80.9 (202.141.80.9)
    Version: 4
    Header length: 20 bytes
  ▸ Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00: Not-ECT (Not ECN-Capable Transport))
    Total Length: 66
    Identification: 0x0000 (0)
  ▸ Flags: 0x02 (Don't Fragment)
    Fragment offset: 0
    Time to live: 64
    Protocol: UDP (17)
  ▸ Header checksum: 0x58c2 [correct]
    Source: 172.16.27.66 (172.16.27.66)
    Destination: 202.141.80.9 (202.141.80.9)
▾ User Datagram Protocol, Src Port: 16849 (16849), Dst Port: domain (53)
    Source port: 16849 (16849)
    Destination port: domain (53)
    Length: 46
  ▾ Checksum: 0x372a [validation disabled]
      [Good Checksum: False]
      [Bad Checksum: False]
▸ Domain Name System (query)
```

```
0000  00 24 f9 9d 70 00 38 60  77 b3 08 13 08 00 45 00   .$..p.8` w.....E.
0010  00 42 00 00 40 00 40 11  58 c2 ac 10 1b 42 ca 8d   .B..@.@. X....B..
0020  50 09 41 d1 00 35 00 2e  37 2a 36 a2 01 00 00 01   P.A..5.. 7*6.....
0030  00 00 00 00 00 00 06 6a  61 6d 70 75 69 04 69 69   .......j ampui.ii
0040  74 67 05 65 72 6e 65 74  02 69 6e 00 00 01 00 01   tg.ernet .in.....
```

File: "/tmp/wireshark_eth0_20130... Packets: 157 Displayed: 4 Marked: 0 Dropped: 0



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95	3.353387	172.16.27.66	202.141.80.9	DNS	80	Standard query A jampui.iitg.ernet.in
96	3.353799	202.141.80.9	172.16.27.66	DNS	171	Standard query response A 202.141.80.21
97	3.353817	202.141.81.2	172.16.27.66	DNS	171	Standard query response A 202.141.80.21

```
▸ Frame 96: 171 bytes on wire (1368 bits), 171 bytes captured (1368 bits)
▸ Ethernet II, Src: Cisco_9d:70:00 (00:24:f9:9d:70:00), Dst: Pegatron_b3:08:13 (38:60:77:b3:08:13)
▾ Internet Protocol Version 4, Src: 202.141.80.9 (202.141.80.9), Dst: 172.16.27.66 (172.16.27.66)
    Version: 4
    Header length: 20 bytes
  ▸ Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00: Not-ECT (Not ECN-Capable Transport))
    Total Length: 157
    Identification: 0xba2b (47659)
  ▸ Flags: 0x00
    Fragment offset: 0
    Time to live: 63
    Protocol: UDP (17)
  ▸ Header checksum: 0xdf3b [correct]
    Source: 202.141.80.9 (202.141.80.9)
    Destination: 172.16.27.66 (172.16.27.66)
▾ User Datagram Protocol, Src Port: domain (53), Dst Port: 16849 (16849)
    Source port: domain (53)
    Destination port: 16849 (16849)
    Length: 137
  ▾ Checksum: 0x2dd4 [validation disabled]
      [Good Checksum: False]
      [Bad Checksum: False]
▸ Domain Name System (response)
```

```
0000  38 60 77 b3 08 13 00 24  f9 9d 70 00 08 00 45 00   8`w....$ ..p...E.
0010  00 9d ba 2b 00 00 3f 11  df 3b ca 8d 50 09 ac 10   ...+..?. .;..P...
0020  1b 42 00 35 41 d1 00 89  2d d4 36 a2 85 00 00 01   .B.5A... -.6.....
0030  00 01 00 02 00 02 06 6a  61 6d 70 75 69 04 69 69   .......j ampui.ii
0040  74 67 05 65 72 6e 65 74  02 69 6e 00 00 01 00 01   tg.ernet .in.....
0050  c0 0c 00 01 00 01 00 01  51 80 00 04 ca 8d 50 15   ........ Q.....P.
0060  c0 13 00 02 00 01 00 01  51 80 00 0a 07 6e 61 61   ........ Q....naa
0070  6d 62 6f 72 c0 13 c0 13  00 02 00 01 00 01 51 80   mbor.... ......Q.
0080  00 09 06 6b 61 6d 72 75  70 c0 13 c0 58 00 01 00   ...kamru p...X...
```

File: "/tmp/wireshark_eth0_20130... Packets: 157 Displayed: 4 Marked: 0 Dropped: 0

Answer 1: This contains 4 fields: Source Port, destination port, length, and checksum.

Answer 2:

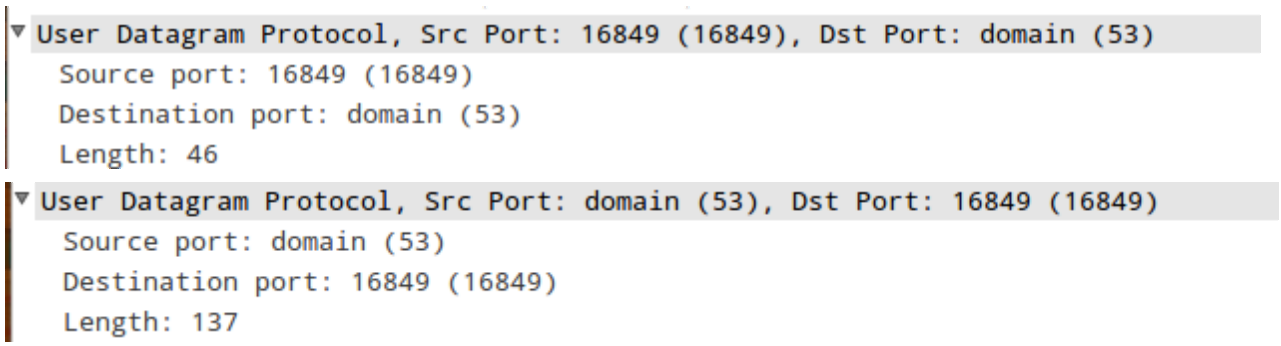
The UDP has four fields of two bytes each so in total it is 8 bytes

Source Port = 2 bytes
Destination port = 2 bytes
Length = 2 bytes
Checksum = 2 bytes

Answer 3: Length of the UDP datagram = UDP header + The data length.

Answer 4: UDP protocol number in hex = 11 and in decimal = 17

Answer 5:



The source port number of the query packet is the destination port number of the response packet and the destination port number of the query packet is the source port number of the response packet.