Lab 2 - Internet Protocol
Computer Networks

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1 What is the IP address of your computer?

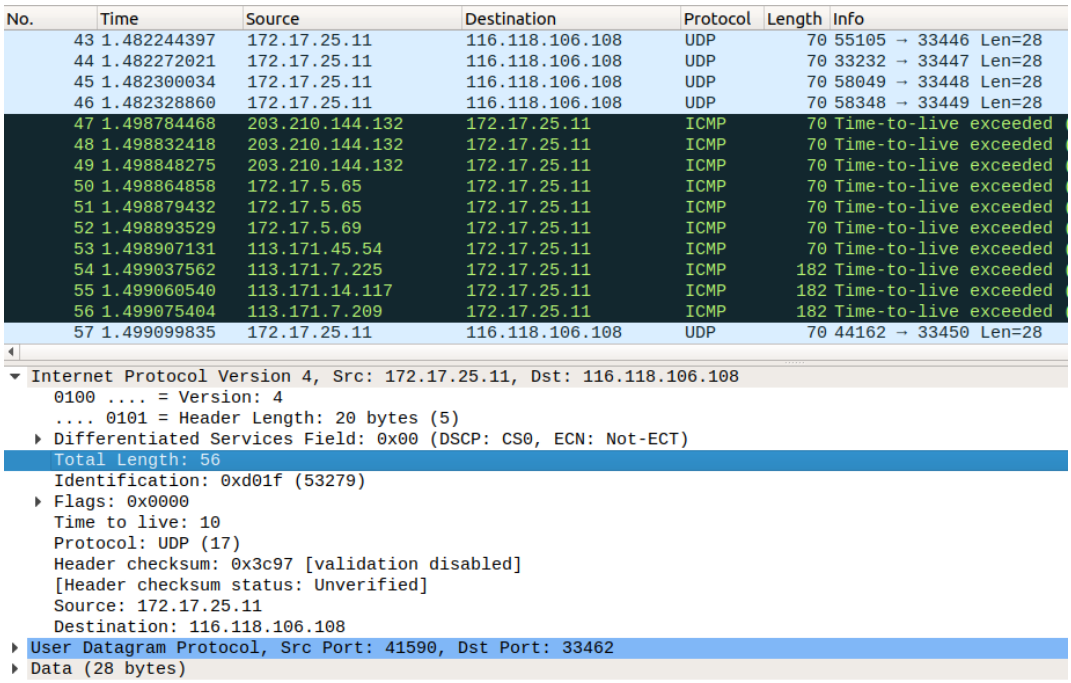

Figure 1: UDP Segment Message IP Information

Answer: The IP address of your computer is 172.17.25.11 and IP address of destination is 116.118.106.108.

2 Within the IP packet header, what is the value in the upper layer protocol field?

Answers: The value in the upper layer protocol field is UDP(0x11)

3 How many bytes are in the IP header? How many bytes are in the payload of the IP datagram? Explain how you determined the number of payload bytes.

Answers: There are 20 bytes in the IP header and 56 bytes total. This gives 56 - 20 = 36 bytes in the payload of the IP datagram.

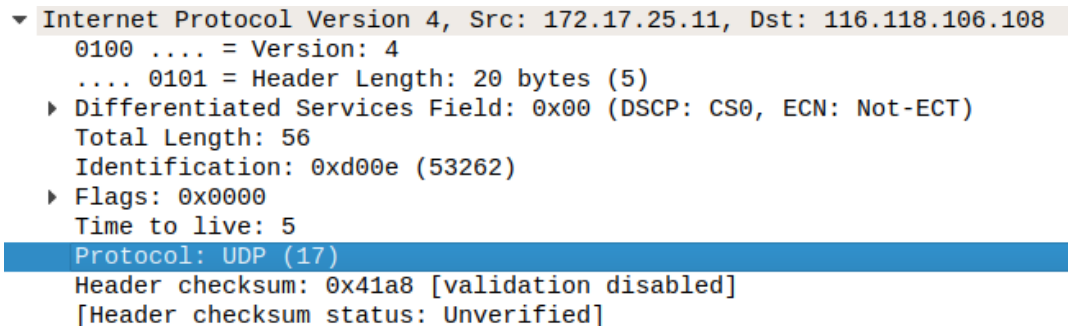

Figure 2: Upper Layer Protocol Field

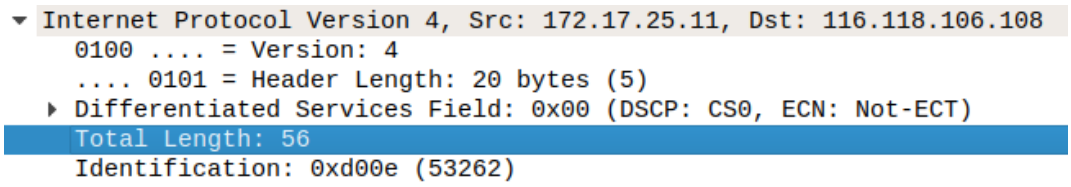

Figure 3: Header length

4 Has this IP datagram been fragmented? Explain how you determined whether or not the datagram has been fragmented.

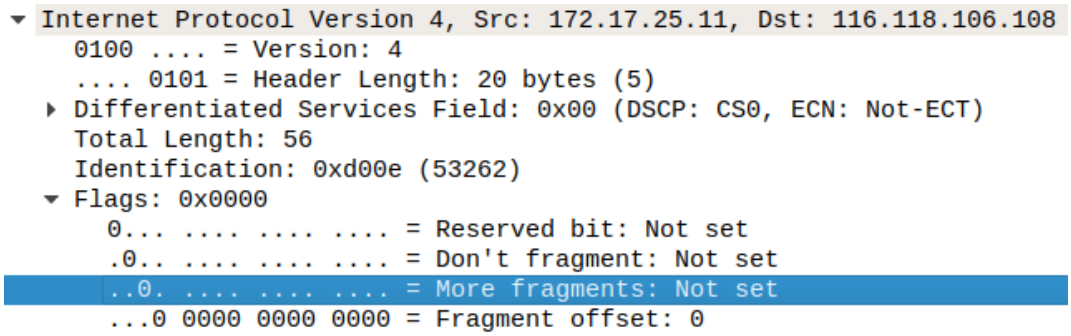

Figure 4: Message Not Fragmented

Answers: This IP datagram hasn't been fragmented. Because the more fragments is not set.

5 Which fields in the IP datagram always change from one datagram to the next within this series of ICMP messages sent by your computer?

Answers: Identification, Time to live, Header checksum always change.

6 Which fields stay constant? Which of the fields must stay constant? Which fields must change? Why?

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

- Version (since we are using IPv4 for all packets)

- Header length (since these are ICMP packets)
- Source IP (since we are sending from the same source)
- Destination IP (since we are sending to the same dest)
- Differentiated Services (since all packets are ICMP they use the same type of Service class)
- Upper Layer Protocol (since these are ICMP packets)

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The fields that must change are:

- Identification(IP packets must have different ids)
- Time to live (traceroute increments each subsequent packet)
- Header checksum (since header changes, so must checksum)

7 Describe the pattern you see in the values in the Identification field of the IP datagram.

Answers: The pattern in the values in the Identification field of IP datagram increment with each UDP segment.

8 What is the value in the Identification field and the TTL field?

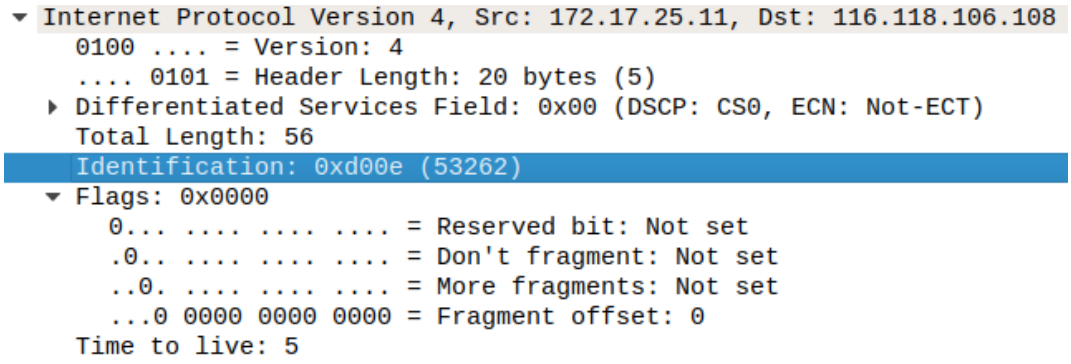

Figure 5: Identification And TTL

Answers:

- Identification: 53262(0xd00e)
- TTL: 5

9 Do these values remain unchanged for all of the ICMP TTL-exceeded replies sent to your computer by the nearest (first hop) router? Why?

Answers:
Identification field always changed because it is a unique value. 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 TTL field remains unchanged because the TTL for the first hop router is always the same.

10 Has that message been fragmented across more than one IP datagram?

Answers: Yes. That message been fragmented across more than one IP datagram.

11 What information in the IP header indicates that the datagram been fragmented? What information in the IP header indicates whether this is the first fragment versus a latter fragment? How long is this IP datagram?

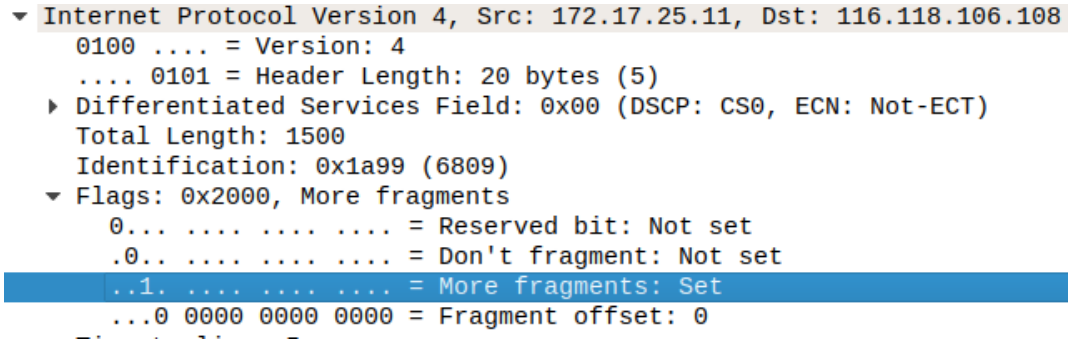

Figure 6: Message Be Fragmented

Answers: The more fragments in Flags field is set indicates that the datagram been fragmented. The Fragment offset in same field is 0 indicates this is the first fragment. This first IP datagram has total length of 1500 bytes.

12 What information in the IP header indicates that this is not the first datagram fragment? Are the more fragments? How can you tell?

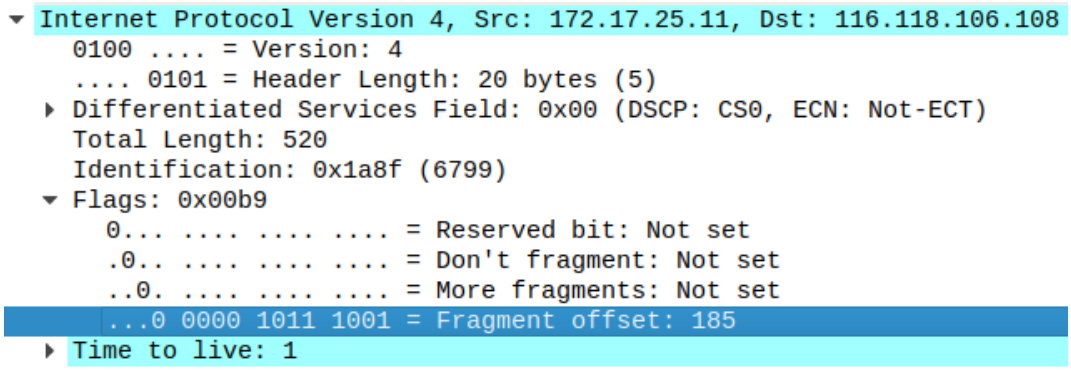

Figure 7: Last fragment

Answers: We can tell that this is not the first fragment, since the fragment offset is 185(not 0). It is also last fragment, since the more fragment is not set.

13 What fields change in the IP header between the first and second fragment?

Answers: The IP header fields that changed between the fragments are: total length, flags, fragment offset, and checksum.

14 How many fragments were created from the original datagram?

Answers: There are 3 fragments were created from the original.

15 What fields change in the IP header among the fragments?

Answers: The IP header fields that changed between all of the packets are: fragment offset, and checksum. Between the first two packets and the last packet, we see a change in total length, and also in the flags. The first two packets have a total length of 1500, with the more fragments bit set to 1, and the last packet has a total length of 540, with the more fragments bit set to 0.