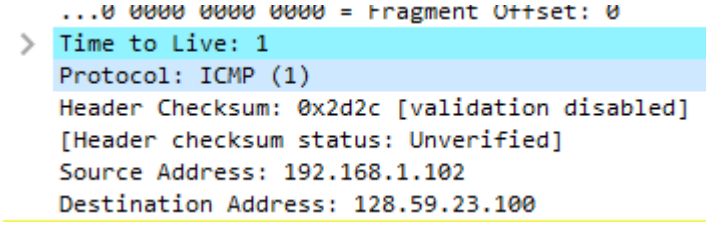
1. Select the first ICMP Echo Request message sent by your computer, and expand the Internet Protocol part of the packet in the packet details window. What is the IP address of your computer?

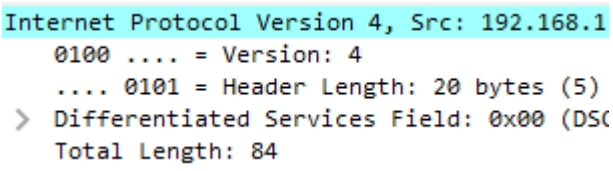


Answer: 192.168.1.102

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

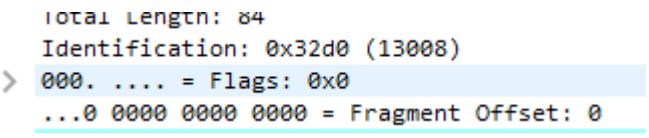
Answer: ICMP

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.



Answer: Payload = Total – Header = 84 – 20 = 64 bytes

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



Answer: The IP datagram has not been fragmented. This was determined by looking at the fragment offset, which is set to 0

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?

Answer: The header checksum and the Identification changes from each datagram to the next

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

Answer:

The following fields remain constant:

• version

• header length

• source IP

• destination IP

• differentiated services

• upper layer protocol

• header checksum

The following fields change:

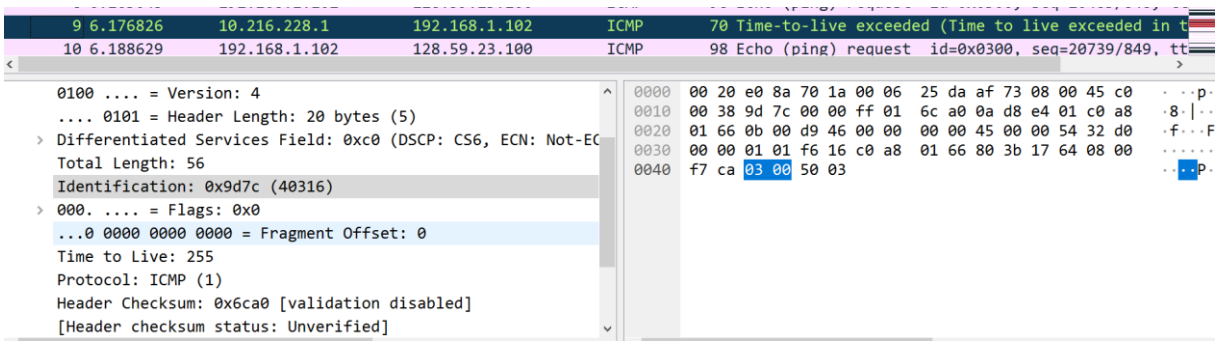
• Identification field is incrementing (each IP datagram has a different ID)

• Time to live is also incrementing (this is how trace route works)

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

Answers: They are incrementing by one with each datagram

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



Answer: Identification: 0x9d7c (40316). TTL: 255

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?

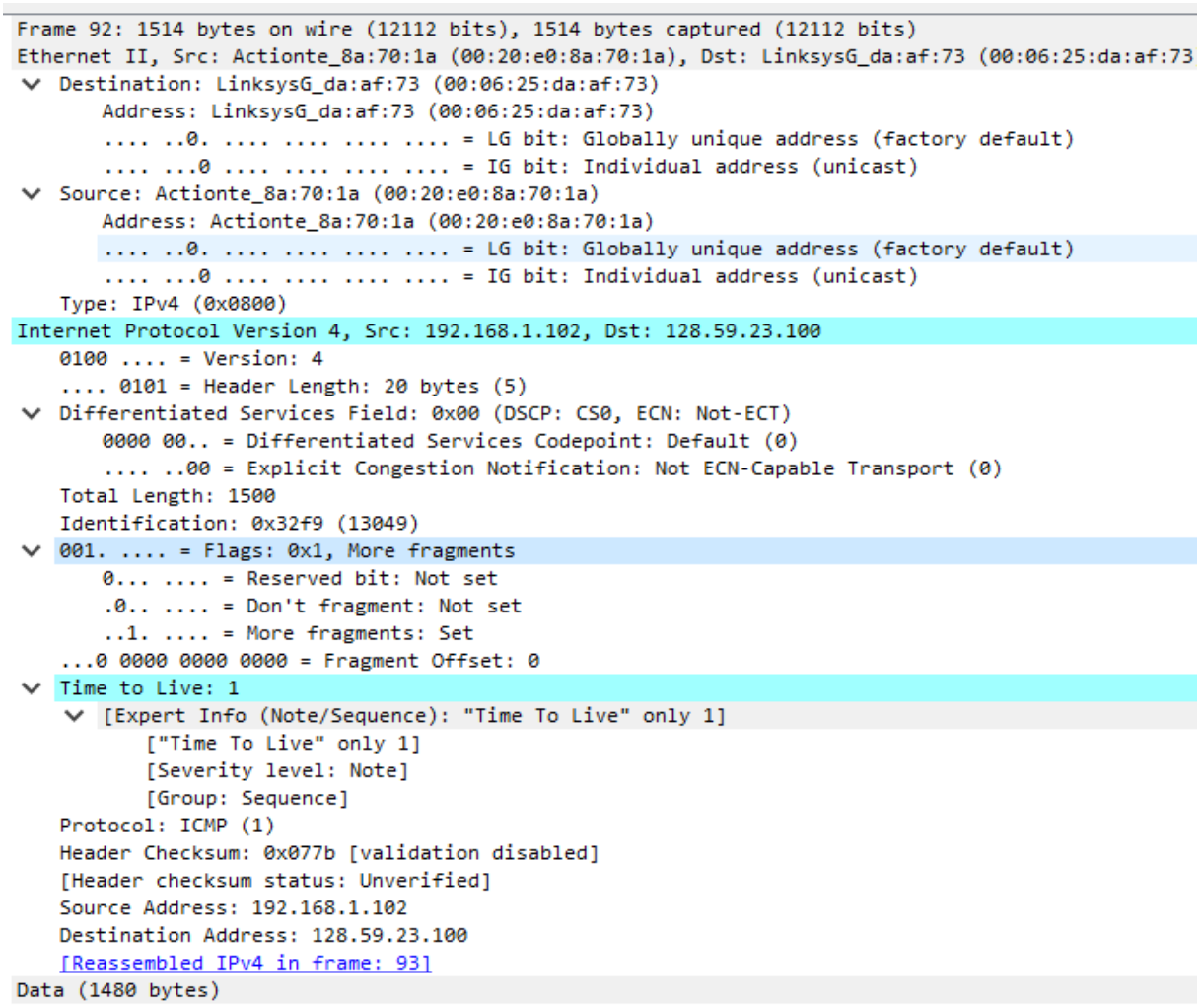
Answer:

- The Identification field changes from all of the replies because this field has to have a unique value. If they have the same value then the replies must be fragments of a bigger packet.
- The TLL field does not change because the time to live to the first hop router is always the same.

10. Find the first ICMP Echo Request message that was sent by your computer after you changed the Packet Size in pingplotter to be 2000. Has that message been fragmented across more than one IP datagram?

Answer: Yes, that message has been fragmented across more than one IP datagram

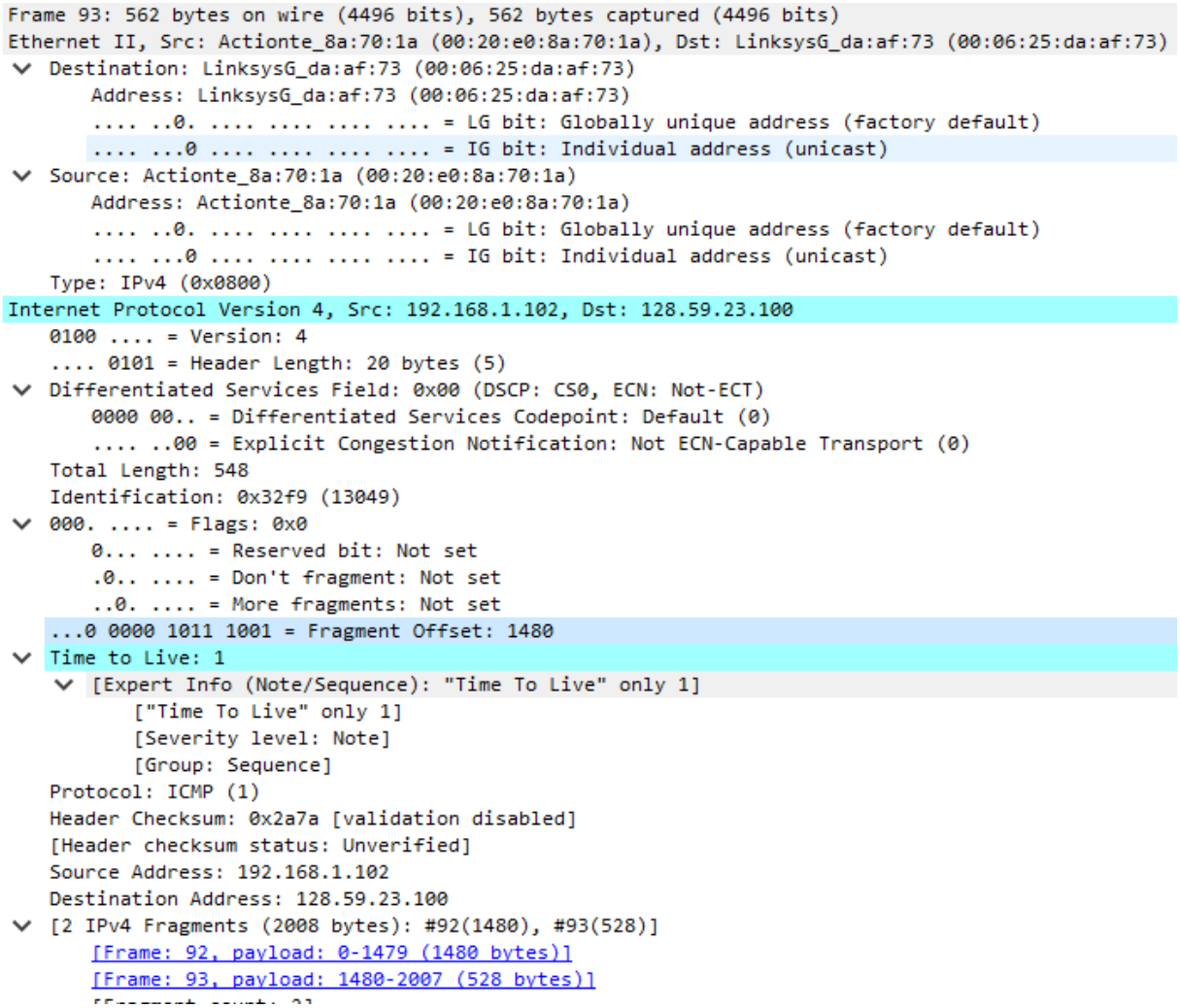
11. Print out the first fragment of the fragmented IP datagram. What information in the IP header indicates that the datagram been fragmented? What information in the IP header indicates whether this is the first fragment versus a latter fragment? How long is this IP datagram?



Answer: The flag is set for more segments shows that the the datagram has been fragmented (see above).The fragment offset is set to 0 indicating that this is the first fragment rather than a latter fragment where that value is is set to (1480). The datagram has a total length of 1500.

12. Print out the second fragment of the fragmented IP datagram. What information in the IP header indicates that this is not the first datagram fragment? Are the more fragments? How can you tell?

Answer: The second fragment is obvious because it now has a a fragment offset of 1480. There are no more fragments because it no longer has a flag set for more fragments



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

Answers: The fields that change are

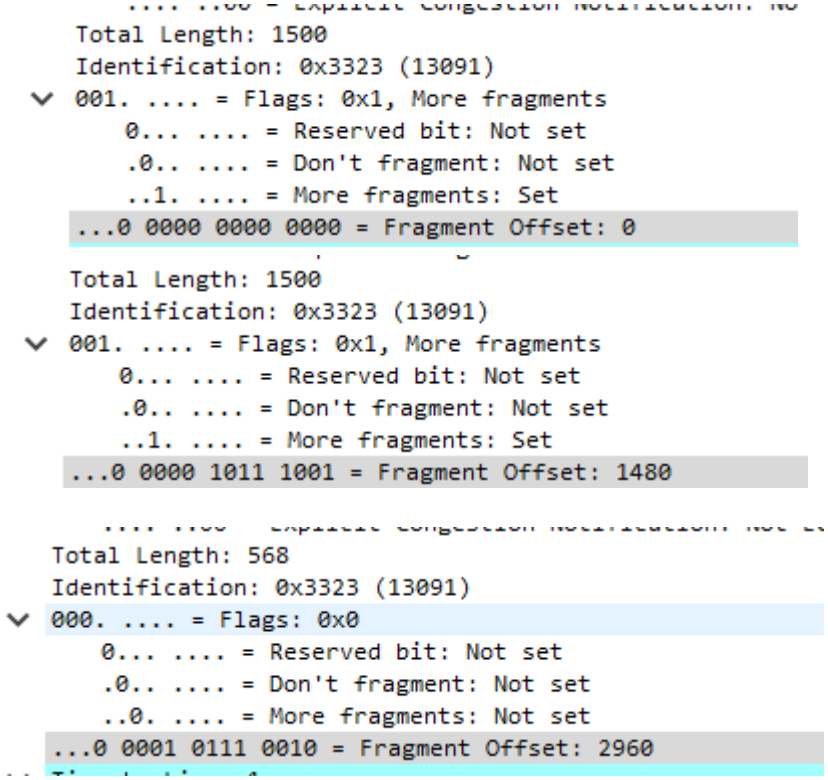
1. Length
2. Flags Set
3. Fragment offset
4. header checksum

14. How many fragments were created from the original datagram?

Answer: After switching to 3500 bytes, 3 fragements are created**.**

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

Answer: The fields that change are the fragment offset (0, 1480, 2960) and checksum. The first 2 packets also have lengths of 1500 and more fragments flags set, while the last fragment is shorter (568) and does not have a flag set.


Total Length: 1500
Identification: 0x3323 (13091)
001. .... = Flags: 0x1, More fragments
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..1. .... = More fragments: Set
...0 0000 0000 0000 = Fragment Offset: 0
Total Length: 1500
Identification: 0x3323 (13091)
001. .... = Flags: 0x1, More fragments
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..1. .... = More fragments: Set
...0 0000 1011 1001 = Fragment Offset: 1480
Total Length: 568
Identification: 0x3323 (13091)
000. .... = Flags: 0x0
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..0. .... = More fragments: Not set
...0 0001 0111 0010 = Fragment Offset: 2960