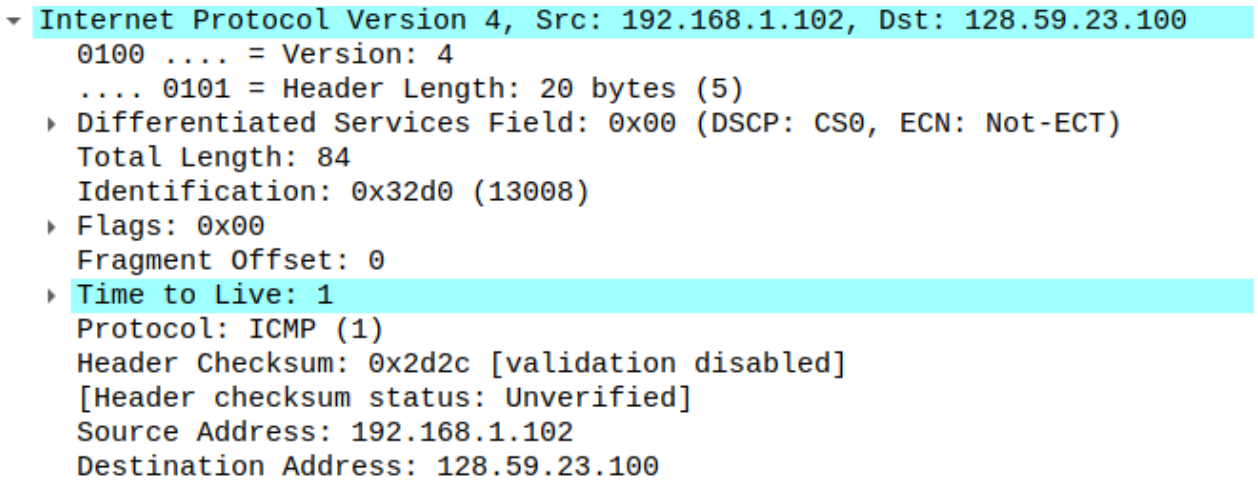
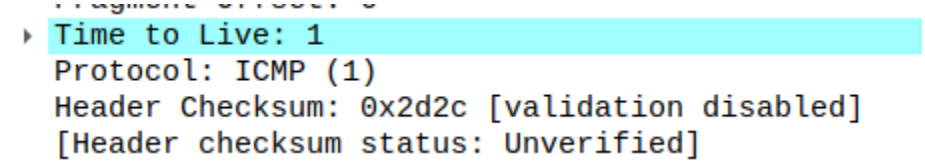
Investigating IP Protocol

Q.1 What is the IP address of your computer?



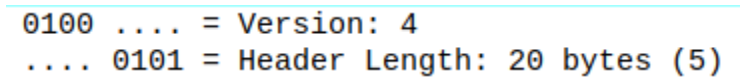
Ans: Its the source address: 192.168.1.102

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



Ans: The upper layer protocol field is ICMP(1)

Q.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



Ans: There are 20 Bytes in the IP header.

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

```
Flags: 0x00
  0... .... = Reserved bit: Not set
  .0.. .... = Don't fragment: Not set
  ..0. .... = More fragments: Not set
```

Ans: The more fragment bit is 0, So, the data is not fragmented.

Q.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?

Ans: Identification, Time to live, and Header checksum will always change.

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

Ans:

The Fields that stay constant and must stay constant across the IP datagrams are:

- ➔ Header length
- ➔ Source IP
- ➔ Destination IP
- ➔ Upper layer protocol (As these are ICMP packets)
- ➔ Version (IPV4 for all packets, we are using)
- ➔ Differentiated services (All the packets will use the same type of service)

The fields that must change are:

- ➔ Identification
- ➔ Time to live
- ➔ Header checksum

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

Ans:

IP header identification fields increment with each other ICMP Echo (ping) request.

Q.8. What are the value in the Identification field and the TTL field?

```
Identification: 0x9d7c (40316)
▾ Flags: 0x00
    0... .... = Reserved bit: Not set
    .0.. .... = Don't fragment: Not set
    ..0. .... = More fragments: Not set
  Fragment Offset: 0
  Time to Live: 255
```

Ans:

Identification: 40316

TTL: 255

Q.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?

Ans: The identification field value will change for all ICMP-TTL-EXCEEDED replies because the identification field is a unique value.

››› If two or more identification values are the same then it means that these IP datagrams are fragments of a single large IP datagram.

››› The TTL field remains unchanged ad the TTL for the first HOP router is always the same.

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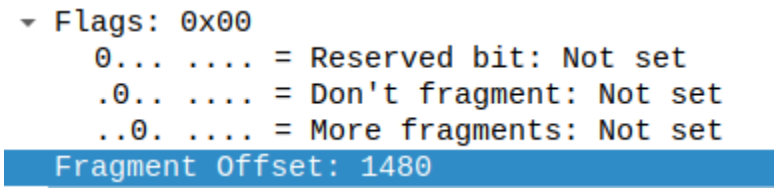
Q.10. Find the first ICMP Echo Request message that was sent by your computer after you changed the Packet Size in ping plotter to be 2000. Has that message been fragmented across more than one IP datagram?

Ans: Yes, This packet is fragmented across more than one IP datagram.

Q.11. Print out the first fragment of the fragmented IP datagram. What information in the IP header indicates that the datagram has 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?

Ans:



More Fragment: Datagram has been fragmented or not

As the fragment is set to 0, we know that this is the first fragment. The first datagram has a total length of 1480.

Q.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?

Ans. We can tell that this is not the first fragment, since the fragment offset is 1480. It is the last fragment since the more fragments flag is not set.

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

Ans:

- Total length
- Flags
- Fragment offset
- Checksum

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

Ans: After switching to 3500, There are 3 packets created from the original datagram.

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

Ans:

The IP header fields that changed are:

- ➔ Checksum
- ➔ Fragment offset
- ➔ Total length
- ➔ Flags