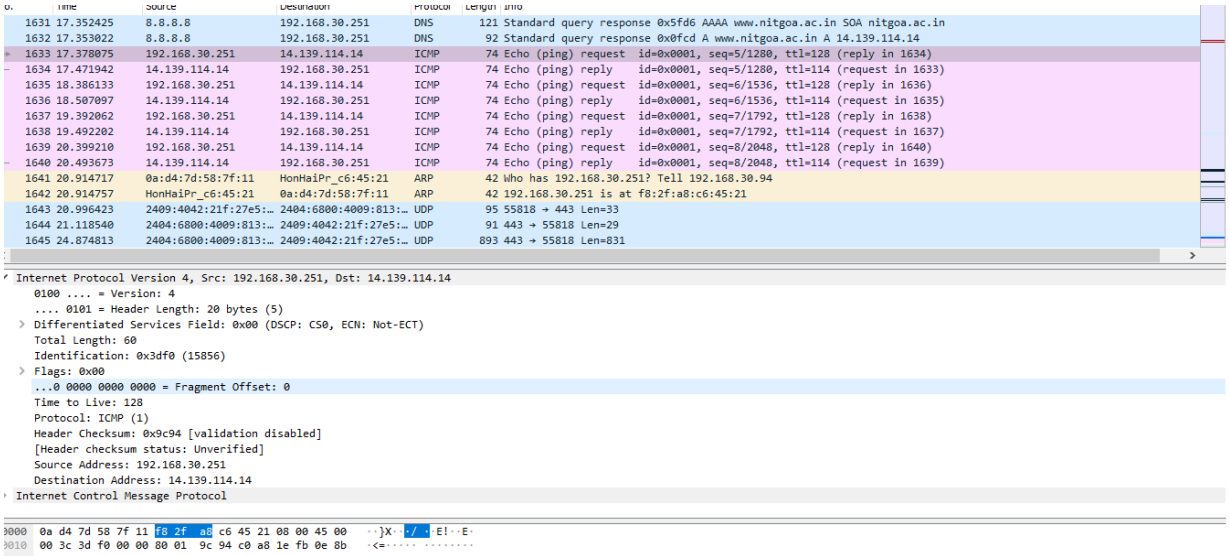
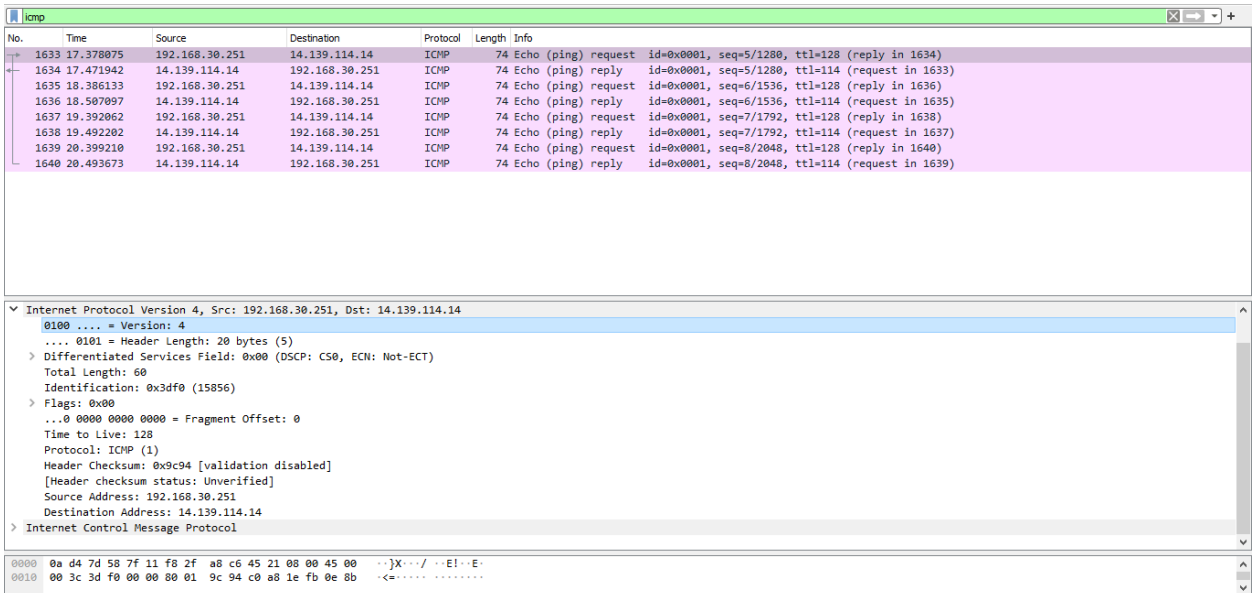
**CN LAB (ICMP):**

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.




My IP address is 192.168.30.251

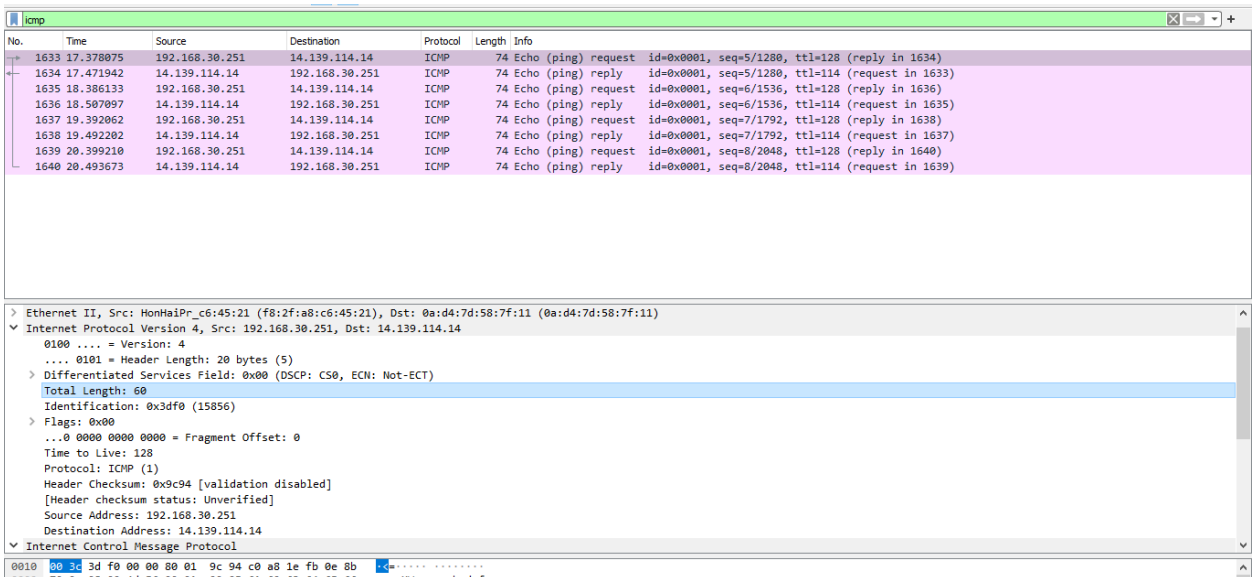
2. Within the IP packet header, what is the value in the upper layer protocol field?




0100 is the value in the upper layer protocol field.

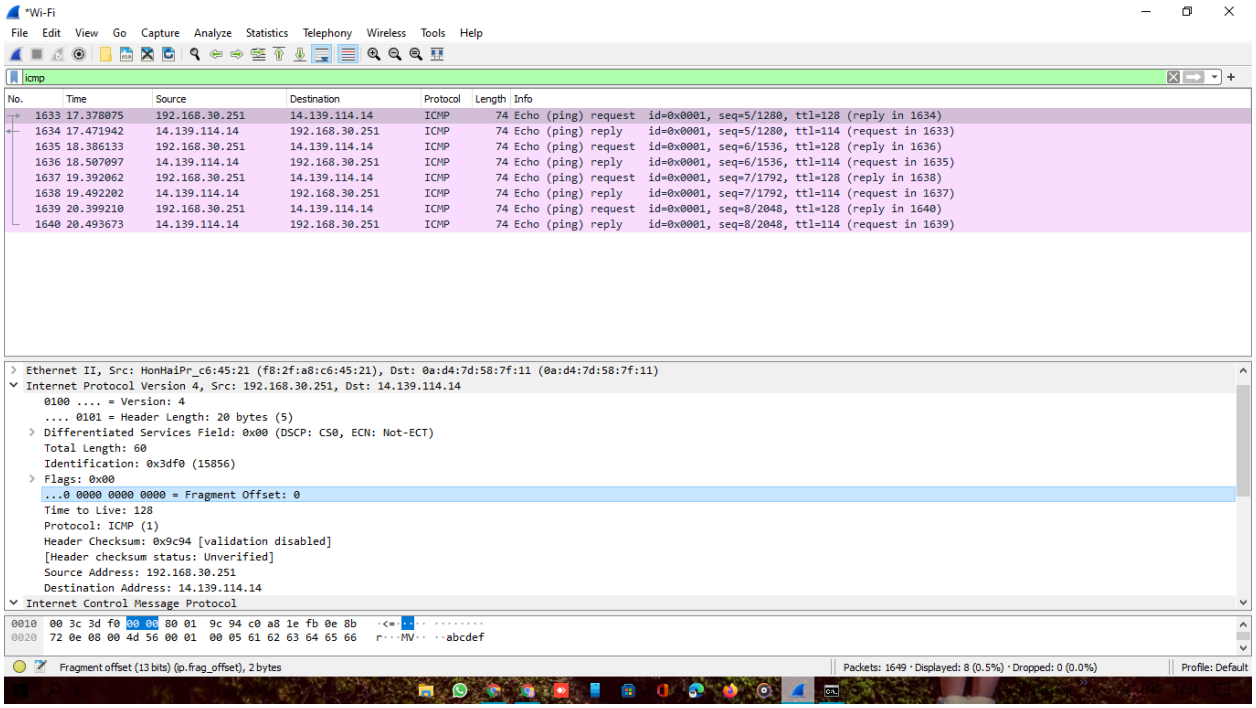
3. How many bytes are in the IP header? How many bytes are in the payload of the IP datagram? Explain how you determined the number of payload bytes.

20 bytes are in the IP header.
Payload = total length - IP header length
payload = 60-20=40



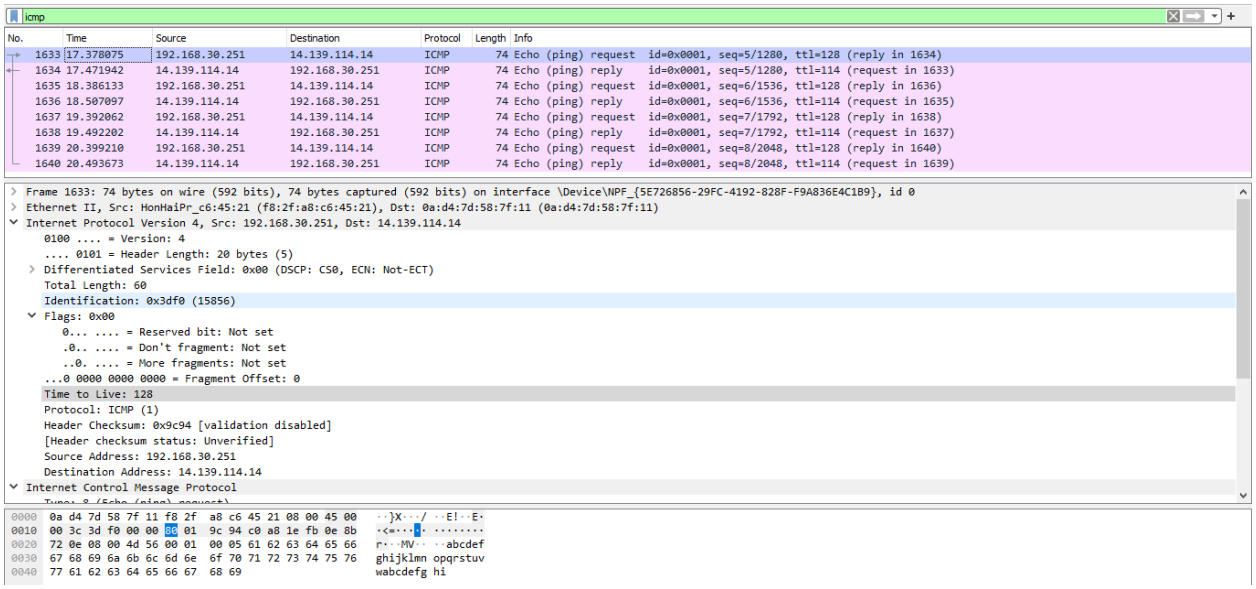

4. Has this IP datagram been fragmented? Explain how you determined whether or not the datagram has been fragmented.

The more fragments bit = 0, so the data is not fragmented




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?

Identification and Header checksum always change.




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

Fields that stay constant across the IP datagrams :

IPv4
Header length
Source IP
Destination IP
Upper layer protocol (since these are ICMP packets )

fields must stay constant

Version
Header length
Source IP
Destination IP
Upper layer protocol

Fields must change

Header check sum
Identification bit
Time to live

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

The pattern is that the IP header Identification fields increment with each ICMP Echo (ping) request.

In my situation 0x3df0(15856)
" " 1
" " 2
" " 3

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

Identification field 0x3df0(15856)
TTL field 128

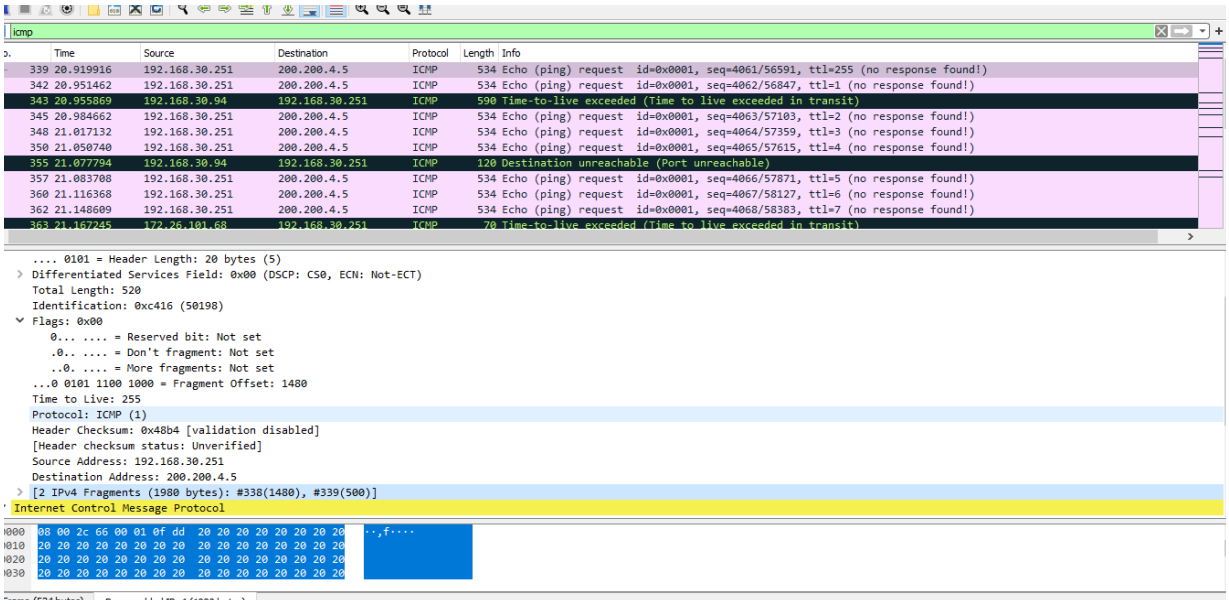
9. Do these values remain unchanged for all of the ICMP TTL-exceeded replies sent to your computer by the nearest (first hop) router? Why?

The identification field changes for all the ICMP TTL-exceeded replies because the identification field 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.

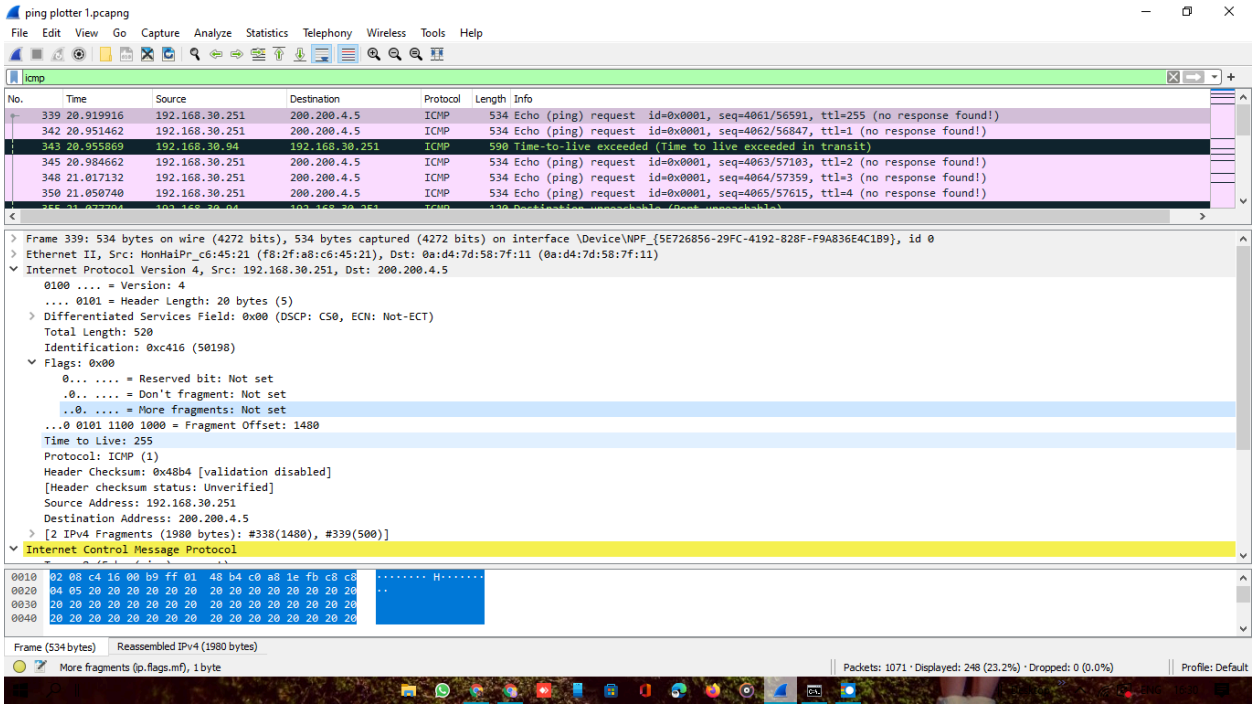
10. Find the first ICMP Echo Request message that was sent by your computer after you changed the Packet Size in pingplotter to be 2000. Has that message been fragmented across more than one IP datagram? [Note: if you find your packet has not been fragmented, you should download the zip file

Yes, this packet 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 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?

The Flags bit for more fragments is set, indicating that the datagram has been fragmented. Since the fragment offset is 0, we know that this is the first fragment. This first datagram has a total length of 1500, including the header.

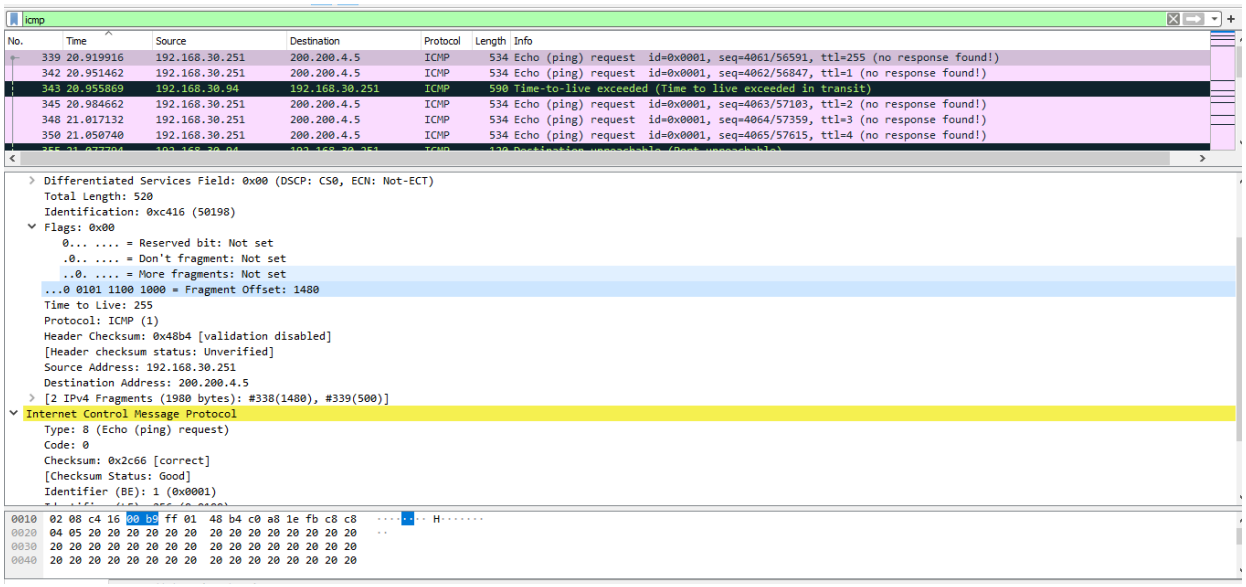



12. Print out the second fragment of the fragmented IP datagram. What information in the IP header indicates that this is not the first datagram fragment? Are the more fragments? How can you tell?

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.

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

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?
After switching to 3500, there are 3 packets created from the original datagram.

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