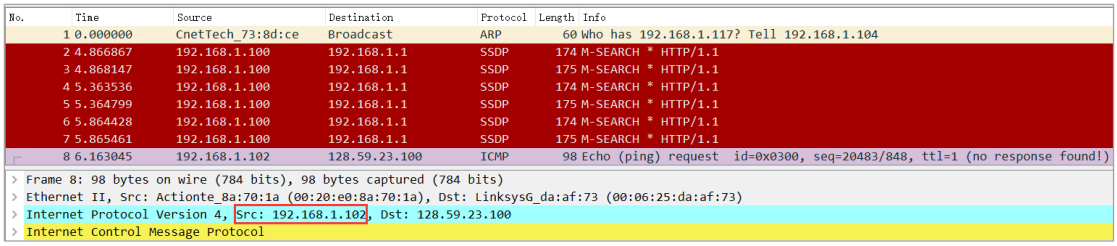
Wireshark Lab 4 – IP
Xiaoying Li

NOTE: I used the downloaded trace to answer all the questions.

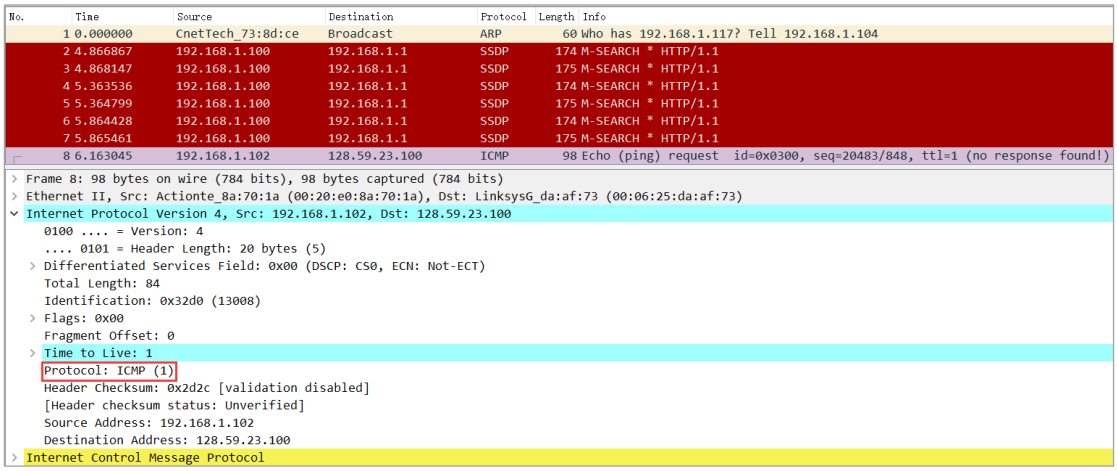
1. What is the IP address of your computer?

IP address of the computer: 192.168.1.102



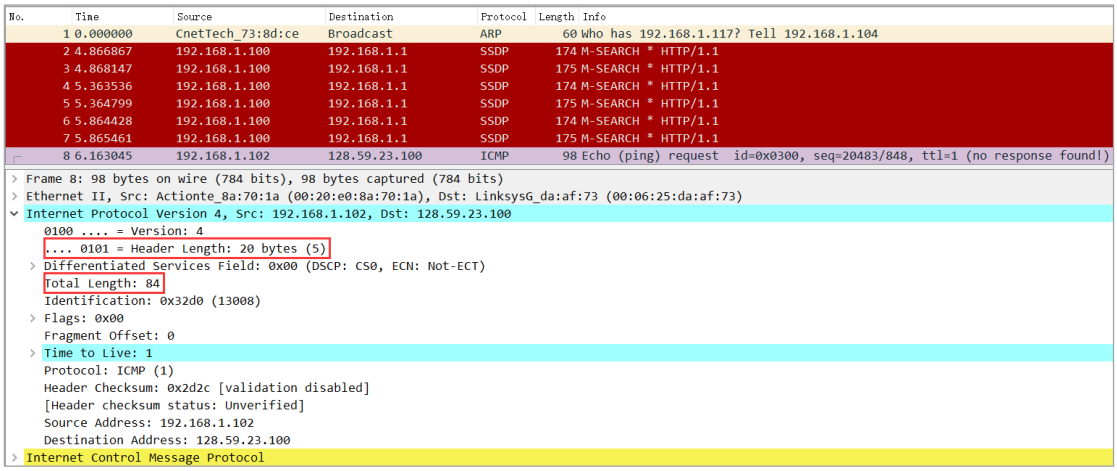
2. Within the IP packet header, what is the value in the upper layer protocol field?

Value in the upper layer protocol field: ICMP (1)



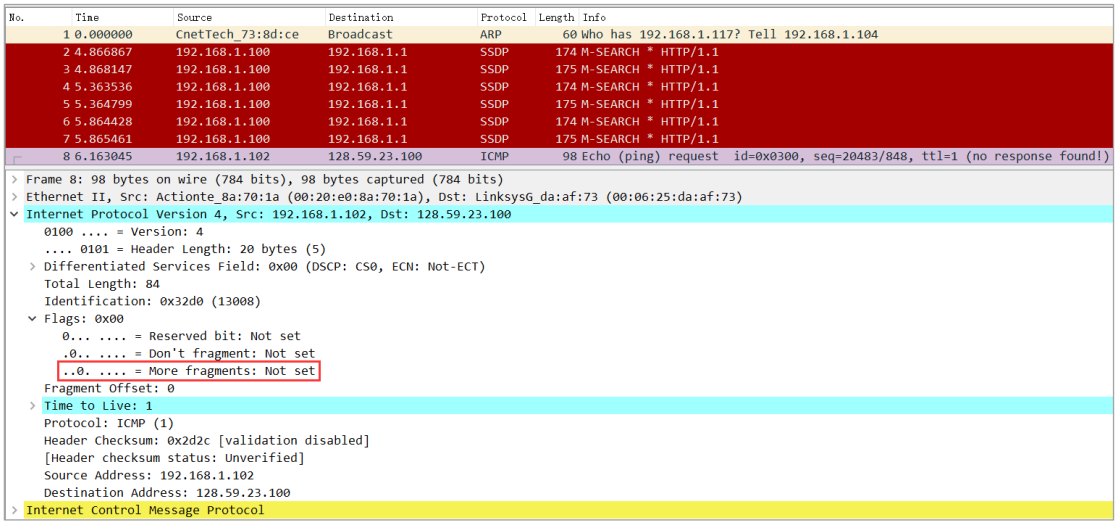
3. How many bytes are in the IP header? How many bytes are in the payload of the IP datagram? Explain how you determined the number of payload bytes.

IP header length = 20 bytes
IP datagram total length = 84 bytes
Payload of the IP datagram length
= IP datagram total length – IP header length
= 84 bytes – 20 bytes
= 64 bytes



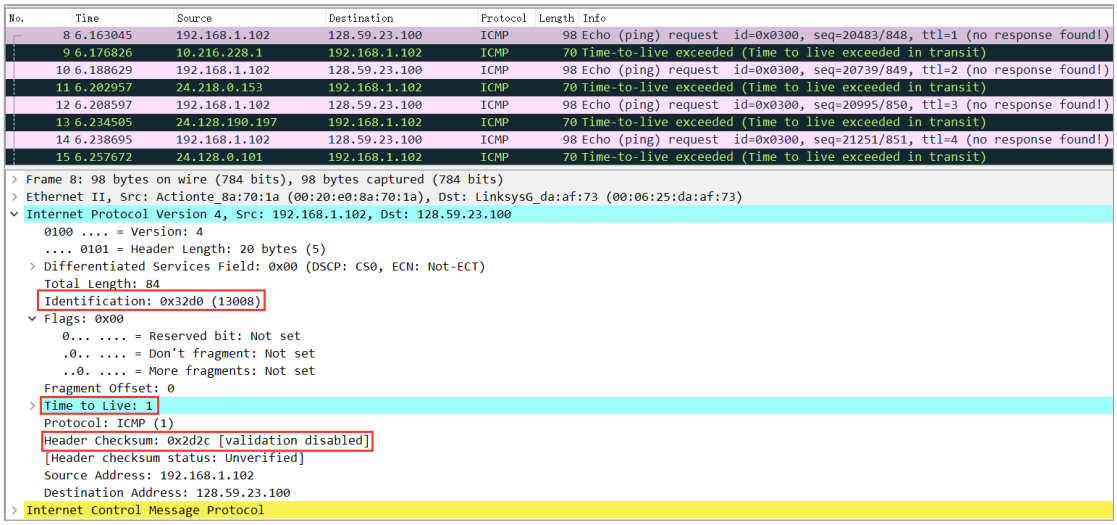
4. Has this IP datagram been fragmented? Explain how you determined whether or not the datagram has been fragmented.

This IP datagram has not been fragmented. Because the “More fragment” flag is “Not set”.



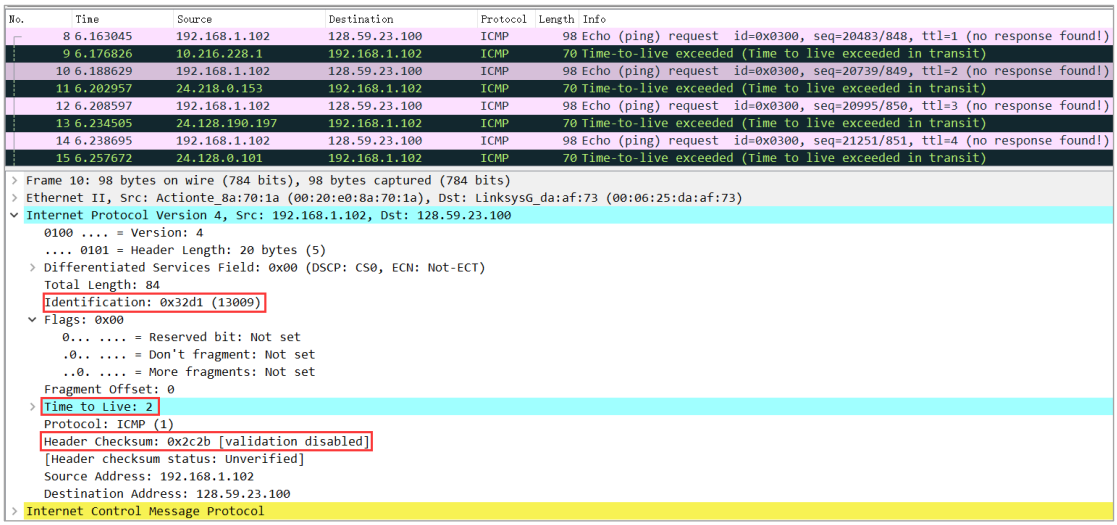
5. Which fields in the IP datagram always change from one datagram to the next within this series of ICMP messages sent by your computer?

Identification, Time to Live, and Header Checksum in the IP datagram always change from one datagram to the next within this series of ICMP messages sent by the computer.



No.	Time	Source	Destination	Protocol	Length	Info
8	6.163045	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request id=0x0300, seq=20483/848, ttl=1 (no response found!)
9	6.176826	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
10	6.188629	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request id=0x0300, seq=20739/849, ttl=2 (no response found!)
11	6.202957	24.218.0.153	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
12	6.208597	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request id=0x0300, seq=20995/850, ttl=3 (no response found!)
13	6.234505	24.128.190.197	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
14	6.238695	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request id=0x0300, seq=21251/851, ttl=4 (no response found!)
15	6.257672	24.128.0.101	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)

```
> Frame 8: 98 bytes on wire (784 bits), 98 bytes captured (784 bits)
> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
v Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 84
    Identification: 0x32d0 (13008)
  v Flags: 0x00
      0... .... = Reserved bit: Not set
      .0.. .... = Don't fragment: Not set
      ..0. .... = More fragments: Not set
    Fragment Offset: 0
  > Time to Live: 1
    Protocol: ICMP (1)
    Header Checksum: 0x2d2c [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 192.168.1.102
    Destination Address: 128.59.23.100
> Internet Control Message Protocol
```



No.	Time	Source	Destination	Protocol	Length	Info
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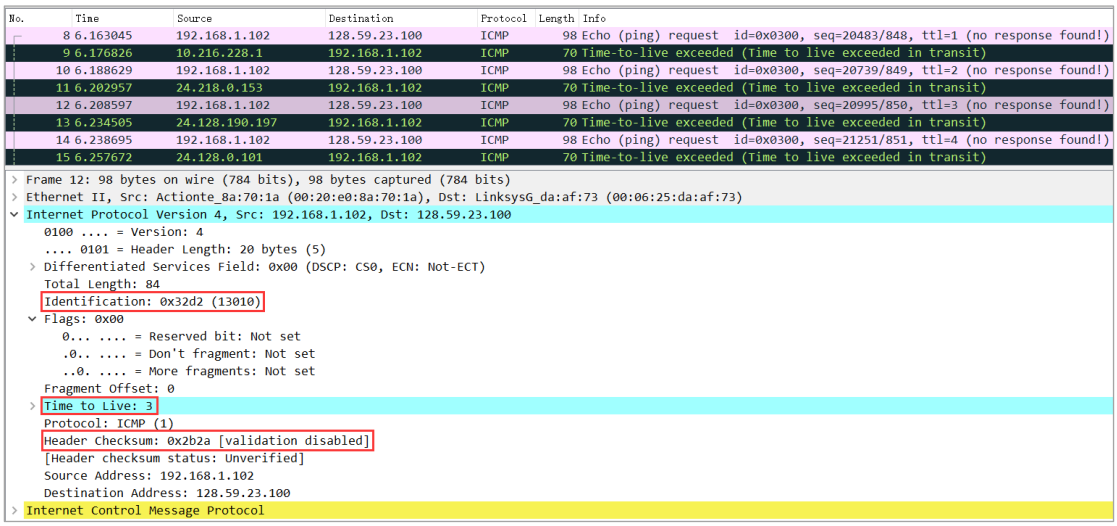
11	6.202957	24.218.0.153	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
12	6.208597	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request id=0x0300, seq=20995/850, ttl=3 (no response found!)
13	6.234505	24.128.190.197	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
14	6.238695	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request id=0x0300, seq=21251/851, ttl=4 (no response found!)
15	6.257672	24.128.0.101	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)

```
> Frame 10: 98 bytes on wire (784 bits), 98 bytes captured (784 bits)
> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
v Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 84
    Identification: 0x32d1 (13009)
  v Flags: 0x00
      0... .... = Reserved bit: Not set
      .0.. .... = Don't fragment: Not set
      ..0. .... = More fragments: Not set
    Fragment Offset: 0
  > Time to Live: 2
    Protocol: ICMP (1)
    Header Checksum: 0x2c2b [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 192.168.1.102
    Destination Address: 128.59.23.100
> Internet Control Message Protocol
```



No.	Time	Source	Destination	Protocol	Length	Info
8	6.163045	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request id=0x0300, seq=20483/848, ttl=1 (no response found!)
9	6.176826	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
10	6.188629	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request id=0x0300, seq=20739/849, ttl=2 (no response found!)
11	6.202957	24.218.0.153	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
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13	6.234505	24.128.190.197	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
14	6.238695	192.168.1.102	128.59.23.100	ICMP	98	Echo (ping) request id=0x0300, seq=21251/851, ttl=4 (no response found!)
15	6.257672	24.128.0.101	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)

```
> Frame 12: 98 bytes on wire (784 bits), 98 bytes captured (784 bits)
> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
v Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 84
    Identification: 0x32d2 (13010)
  v Flags: 0x00
      0... .... = Reserved bit: Not set
      .0.. .... = Don't fragment: Not set
      ..0. .... = More fragments: Not set
    Fragment Offset: 0
  > Time to Live: 3
    Protocol: ICMP (1)
    Header Checksum: 0x2b2a [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 192.168.1.102
    Destination Address: 128.59.23.100
> Internet Control Message Protocol
```

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

Fields stay constant:

Version, Header length, Differentiated Services Field, Upper Layer Protocol, Source Address, Destination Address

Fields must stay constant and why:

Version – because we are using IPv4 for all IP datagram packets

Header Length – because these IP datagrams are all ICMP packets

Differentiated Services Field – because these IP datagrams are all ICMP packets

Upper Layer Protocol – because these IP datagrams are all ICMP packets

Source Address – because these IP datagrams are all sent by the same computer

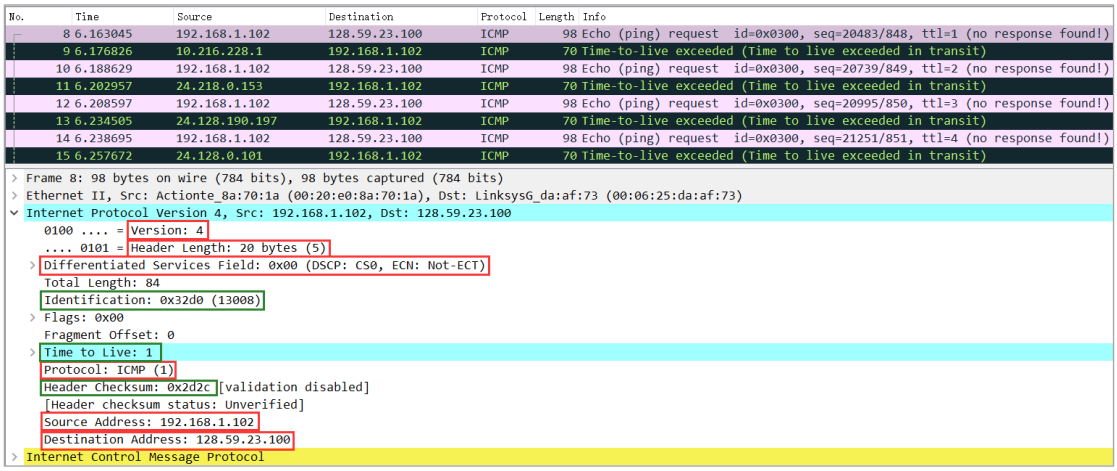
Destination Address – because these IP datagrams are all sent to the same destination

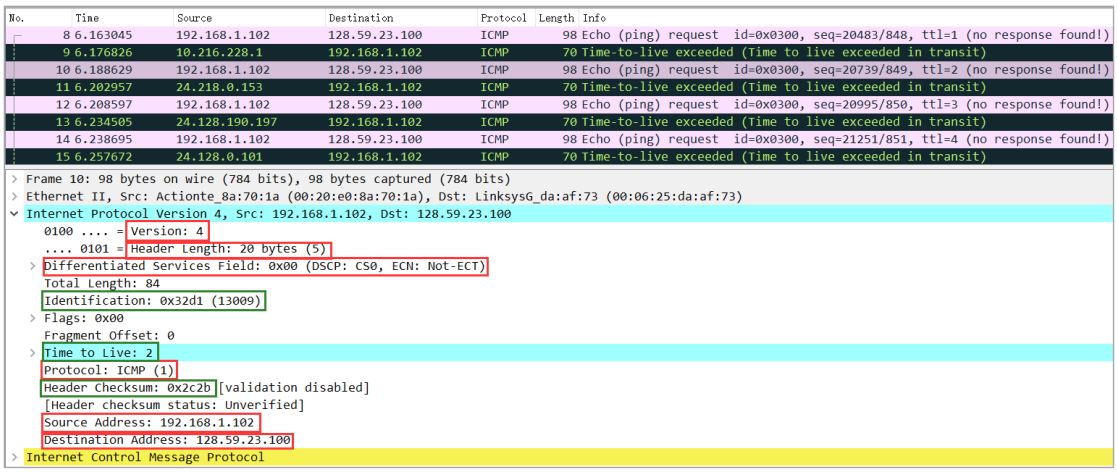
Fields must change and why:

Identification – because every Ip datagram packet must have different ids

Time to Live – because traceroute increments every time an IP datagram is sent

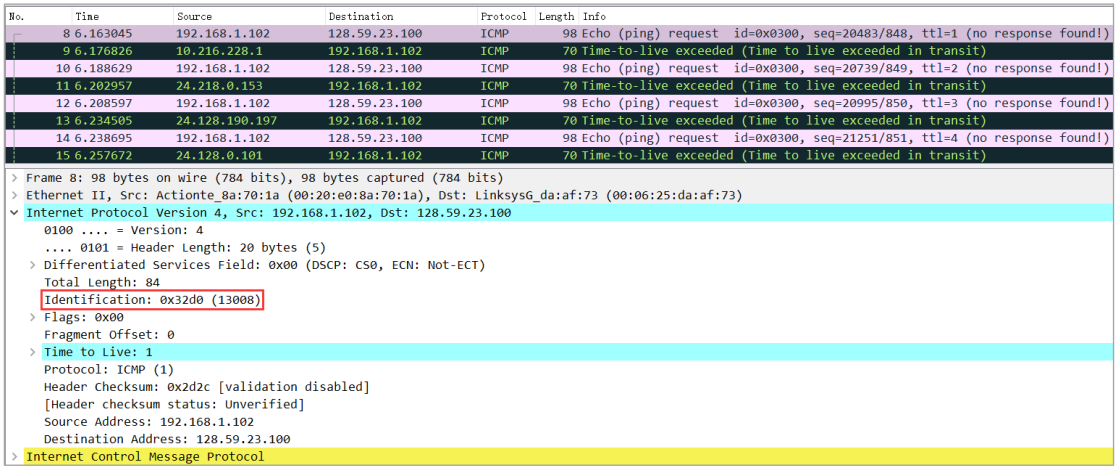
Header Checksum – because IP datagram's header changes, so header checksum must change

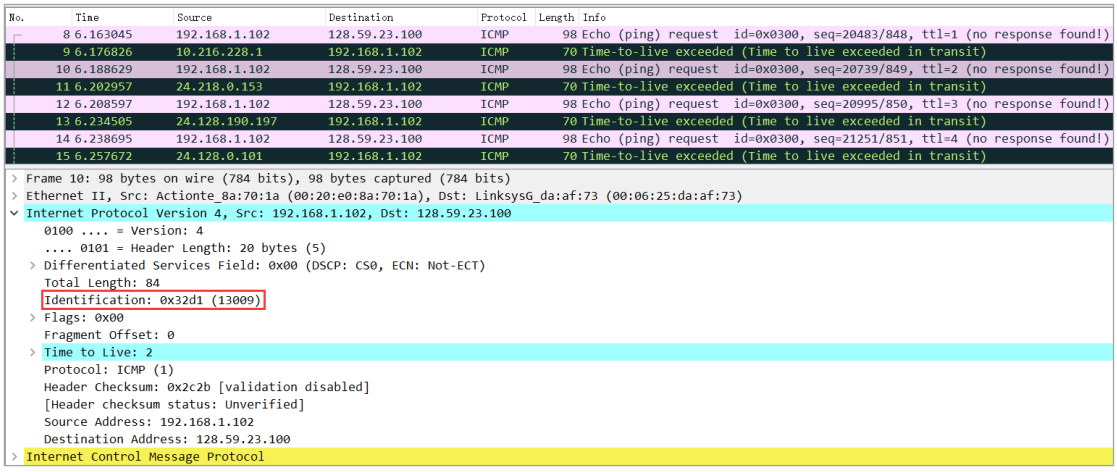


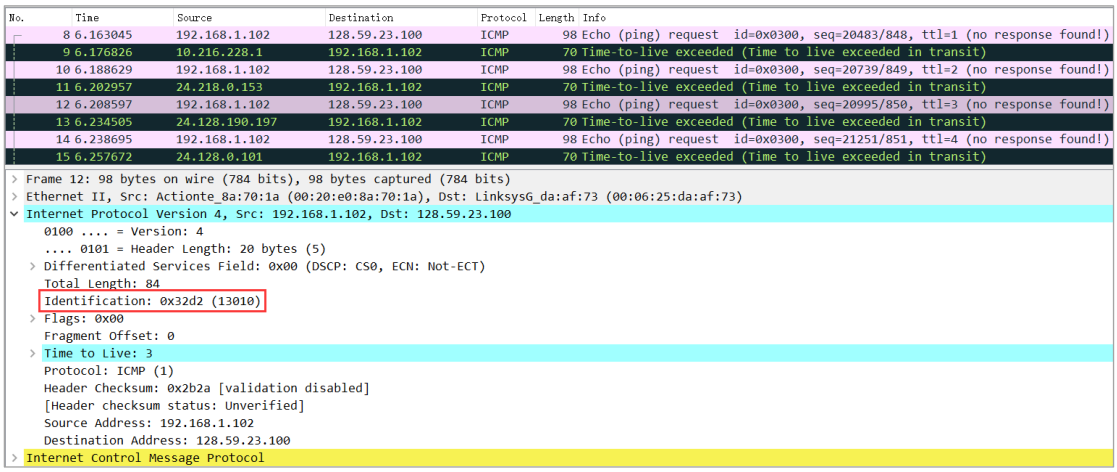


7. Describe the pattern you see in the values in the Identification field of the IP datagram.

The values in the Identification field of the IP datagram increment by 1 with every ICMP Echo (ping) request messages sent by the computer.

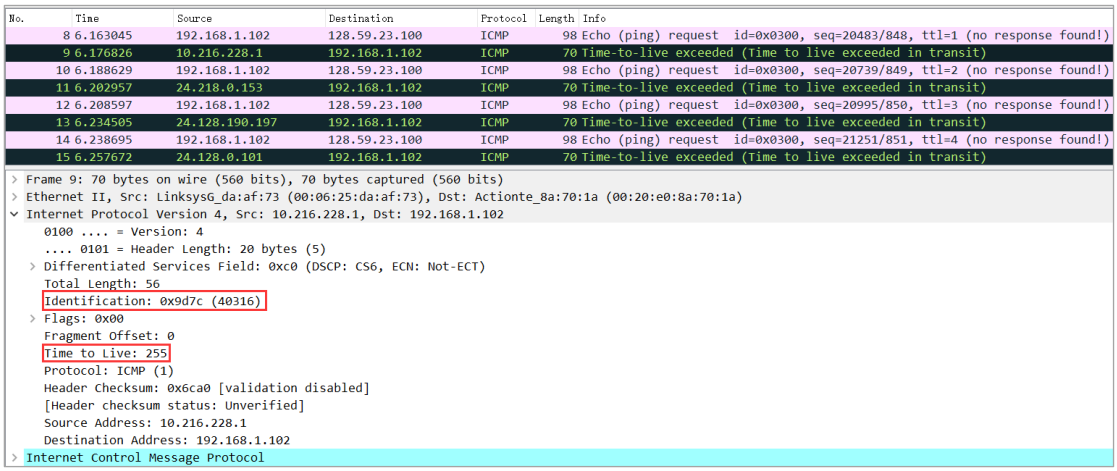






8. What is the value in the Identification field and the TTL field?

Identification: 40316
TTL (Time to Live): 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?

The value in the Identification field changes for all of the ICMP TTL-exceeded replies sent to the computer by the nearest (first hop) router. Because every IP datagram has a unique identification number, unless they are fragments of a large IP datagram.

The value of the TTL field remains unchanged for all of the ICMP TTL-exceeded replies sent to the computer by the nearest (first hop) router. Because the value of TTL only changes (minus one) when the IP datagram transfers through another router.

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?

Yes. The message has been fragmented across more than one IP datagram.

11. Screenshot the first fragment of the fragmented IP datagram (with sufficient details to answer these questions). 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?

Information in the IP header indicates that the datagram been fragmented:

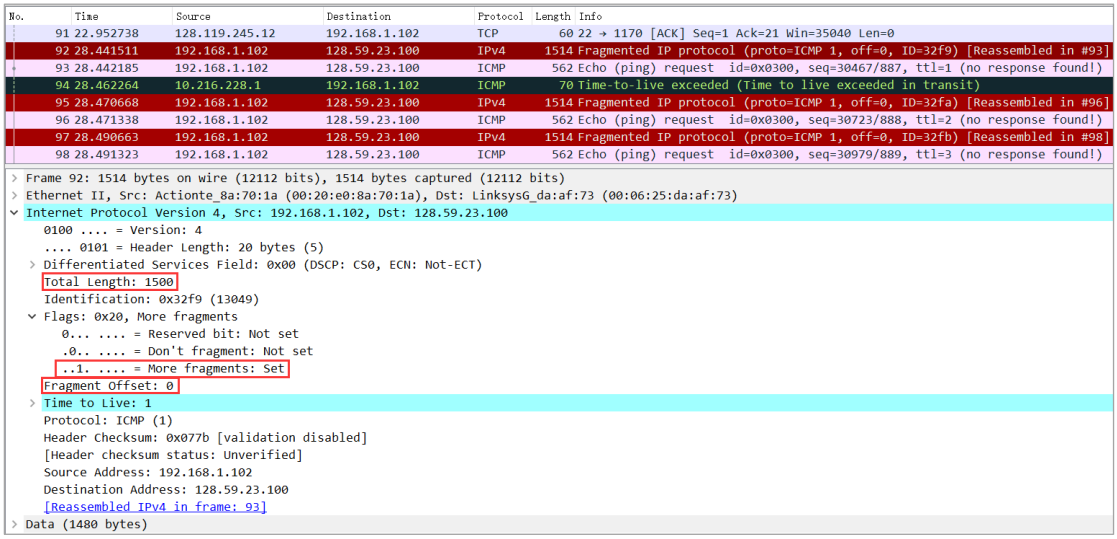
The flag bit for “More fragments” is set.

Information in the IP header indicates this is the first fragment:

The fragment offset is 0.

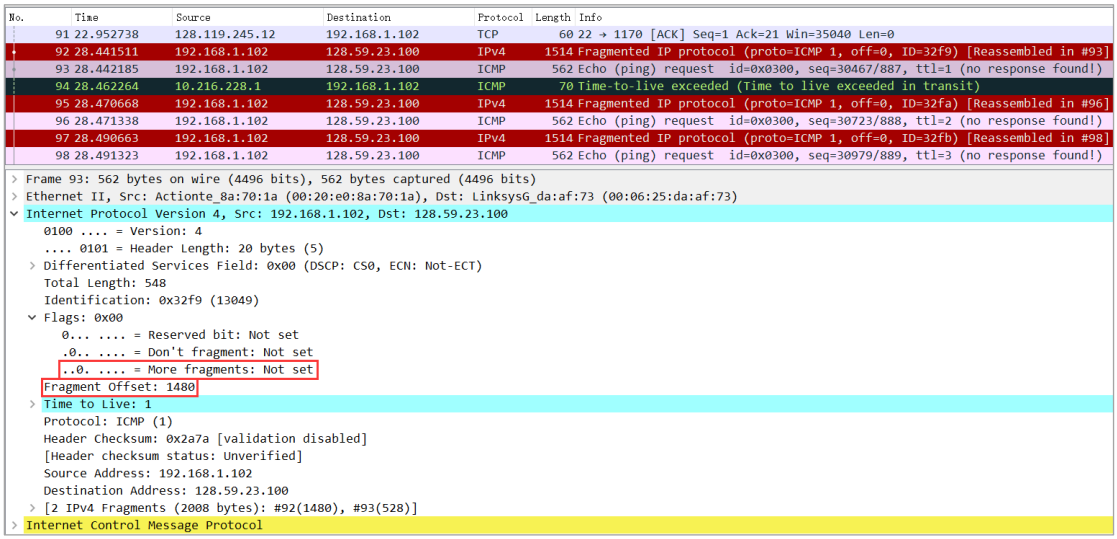
IP datagram length:

Total Length – 1500 bytes.



12. Screenshot the second fragment of the fragmented IP datagram (with sufficient details to answer these questions). What information in the IP header indicates that this is not the first datagram fragment? Are the more fragments? How can you tell?

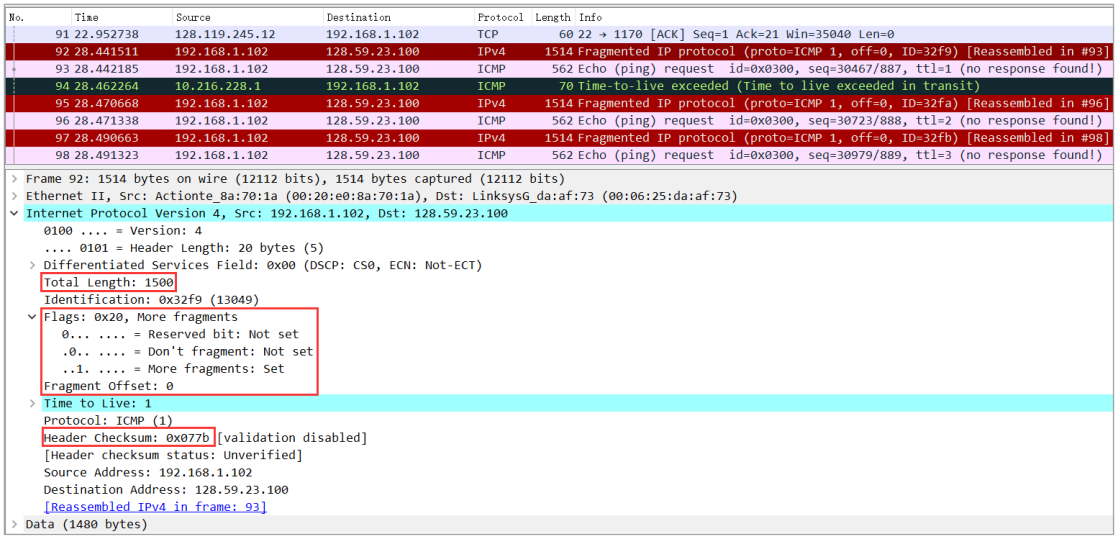
The fragment offset is 1480 instead of 0, indicates that this is not the first datagram fragment. There are no more fragments, because flag bit for “More fragments” is not set.

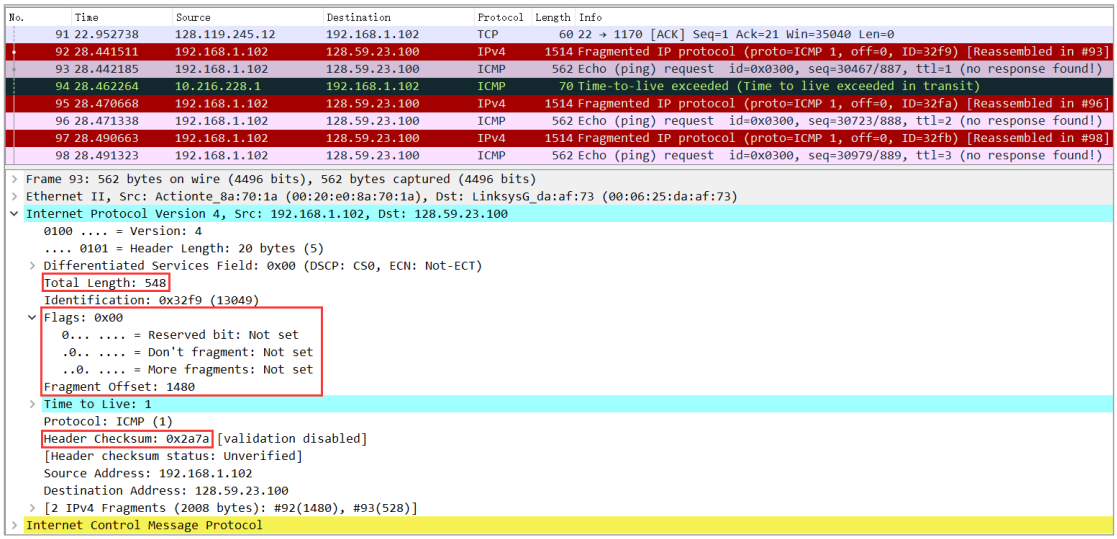


13. What fields change in the IP header between the first and second fragment?

Fields change in the IP header between the first and second fragment:

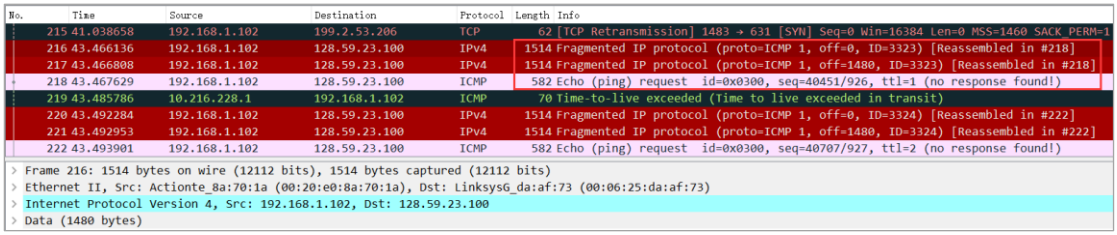
- Total Length
- Flags
- Fragment Offset
- Header Checksum





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

Three fragments were created from the original datagram.

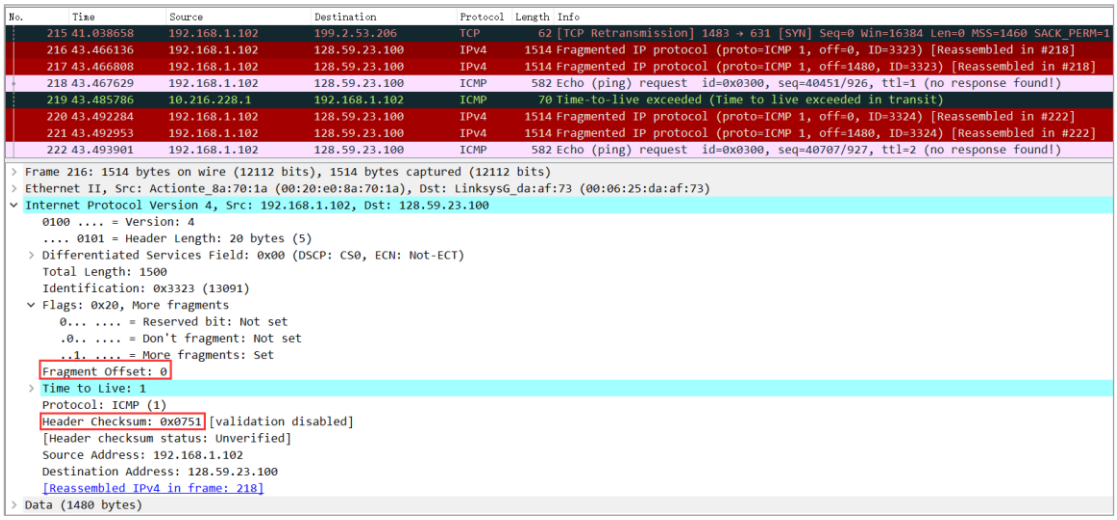


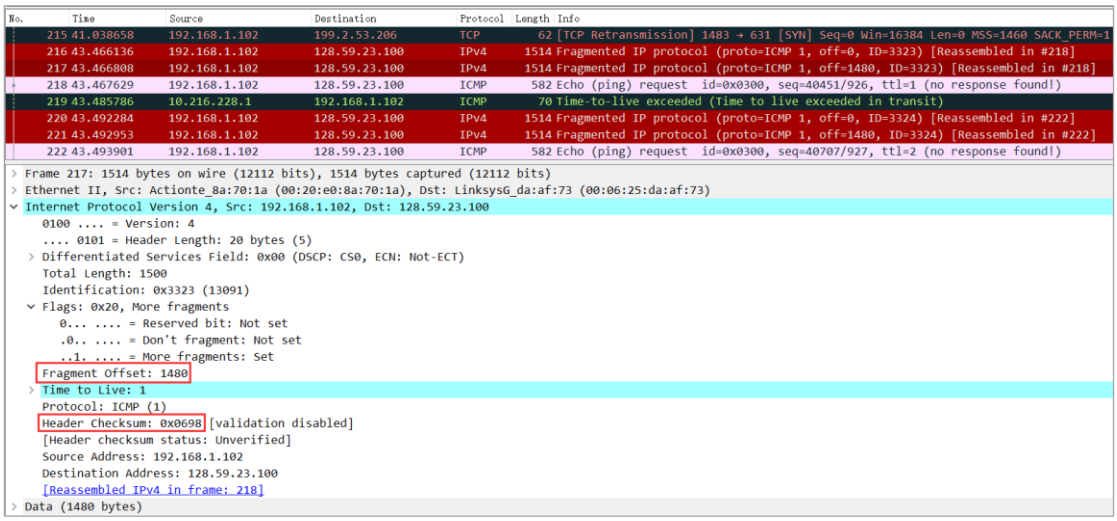
15. What fields change in the IP header among the fragments?

Fields change in the IP header among the fragments:

Fragment Offset

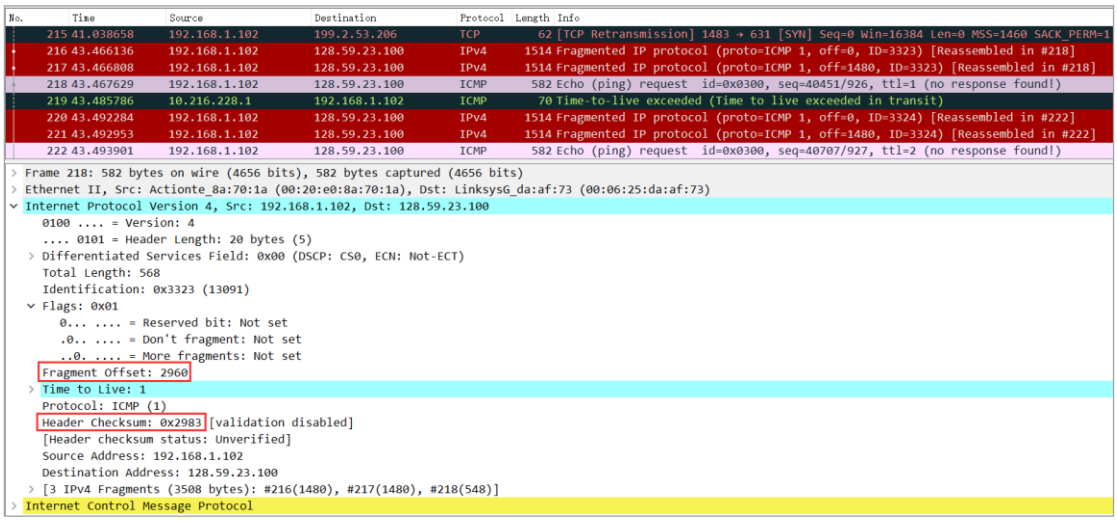
Header Checksum





No.	Time	Source	Destination	Protocol	Length	Info
215	41.038658	192.168.1.102	199.2.53.206	TCP	62	[TCP Retransmission] 1483 → 631 [SYN] Seq=0 Win=16384 Len=0 MSS=1460 SACK_PERM=1
216	43.466136	192.168.1.102	128.59.23.100	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=3323) [Reassembled in #218]
217	43.466808	192.168.1.102	128.59.23.100	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=3323) [Reassembled in #218]
218	43.467629	192.168.1.102	128.59.23.100	ICMP	582	Echo (ping) request id=0x0300, seq=40451/926, ttl=1 (no response found!)
219	43.485786	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
220	43.492284	192.168.1.102	128.59.23.100	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=3324) [Reassembled in #222]
221	43.492953	192.168.1.102	128.59.23.100	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=3324) [Reassembled in #222]
222	43.493901	192.168.1.102	128.59.23.100	ICMP	582	Echo (ping) request id=0x0300, seq=40707/927, ttl=2 (no response found!)

```
> Frame 217: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
v Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 1500
    Identification: 0x3323 (13091)
  v Flags: 0x20, More fragments
      0... .... = Reserved bit: Not set
      .0.. .... = Don't fragment: Not set
      ..1. .... = More fragments: Set
    Fragment Offset: 1480
  > Time to Live: 1
    Protocol: ICMP (1)
    Header Checksum: 0x0698 [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 192.168.1.102
    Destination Address: 128.59.23.100
    [Reassembled IPv4 in frame: 218]
> Data (1480 bytes)
```



No.	Time	Source	Destination	Protocol	Length	Info
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216	43.466136	192.168.1.102	128.59.23.100	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=3323) [Reassembled in #218]
217	43.466808	192.168.1.102	128.59.23.100	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=3323) [Reassembled in #218]
218	43.467629	192.168.1.102	128.59.23.100	ICMP	582	Echo (ping) request id=0x0300, seq=40451/926, ttl=1 (no response found!)
219	43.485786	10.216.228.1	192.168.1.102	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
220	43.492284	192.168.1.102	128.59.23.100	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=0, ID=3324) [Reassembled in #222]
221	43.492953	192.168.1.102	128.59.23.100	IPv4	1514	Fragmented IP protocol (proto=ICMP 1, off=1480, ID=3324) [Reassembled in #222]
222	43.493901	192.168.1.102	128.59.23.100	ICMP	582	Echo (ping) request id=0x0300, seq=40707/927, ttl=2 (no response found!)

```
> Frame 218: 582 bytes on wire (4656 bits), 582 bytes captured (4656 bits)
> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
v Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 568
    Identification: 0x3323 (13091)
  v Flags: 0x01
      0... .... = Reserved bit: Not set
      .0.. .... = Don't fragment: Not set
      ..0. .... = More fragments: Not set
    Fragment Offset: 2960
  > Time to Live: 1
    Protocol: ICMP (1)
    Header Checksum: 0x2983 [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 192.168.1.102
    Destination Address: 128.59.23.100
  > [3 IPv4 Fragments (3508 bytes): #216(1480), #217(1480), #218(548)]
> Internet Control Message Protocol
```