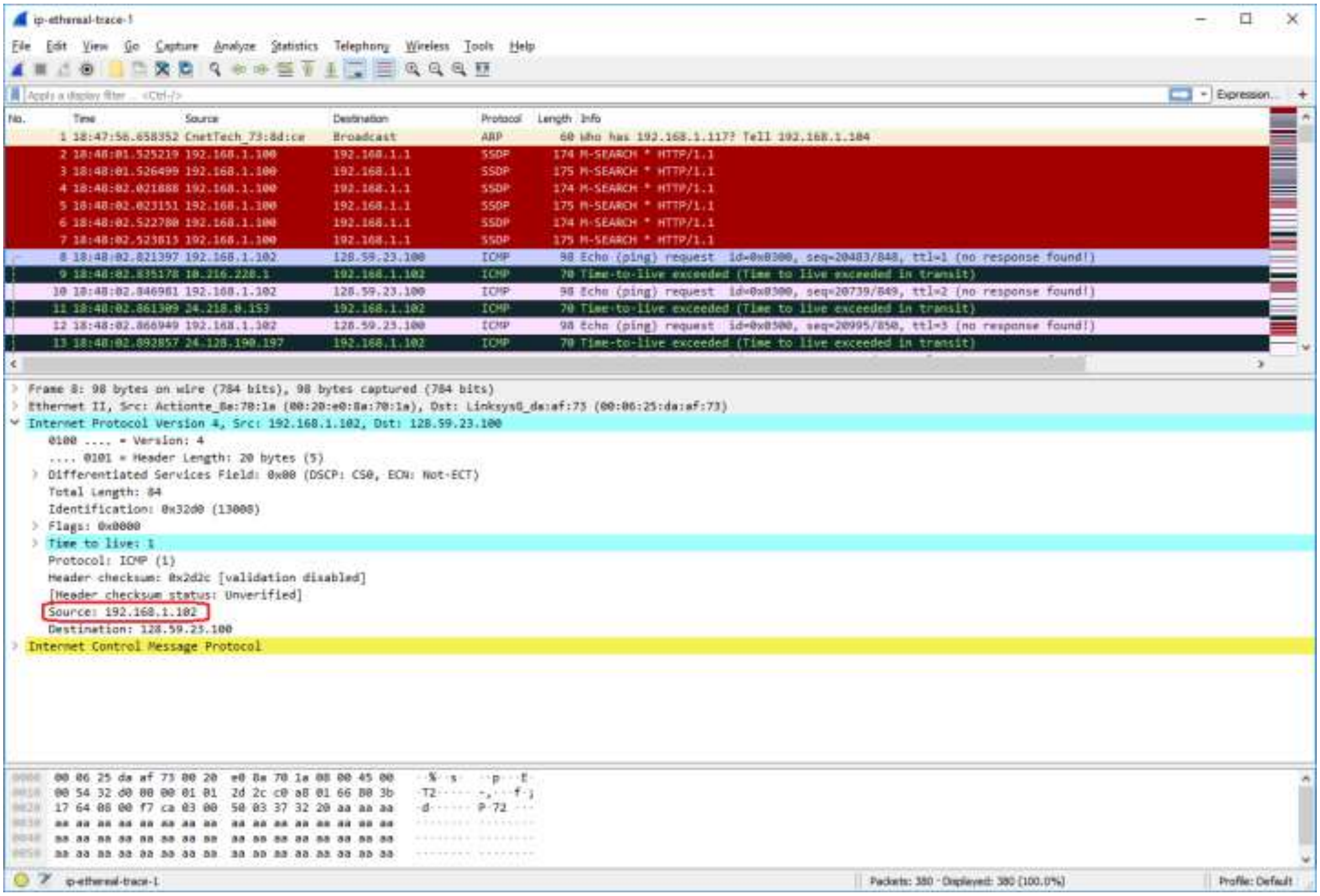
CS372-400 Edmund Dea
11/18/2019 ID# 933280343

Lab 4: Wireshark

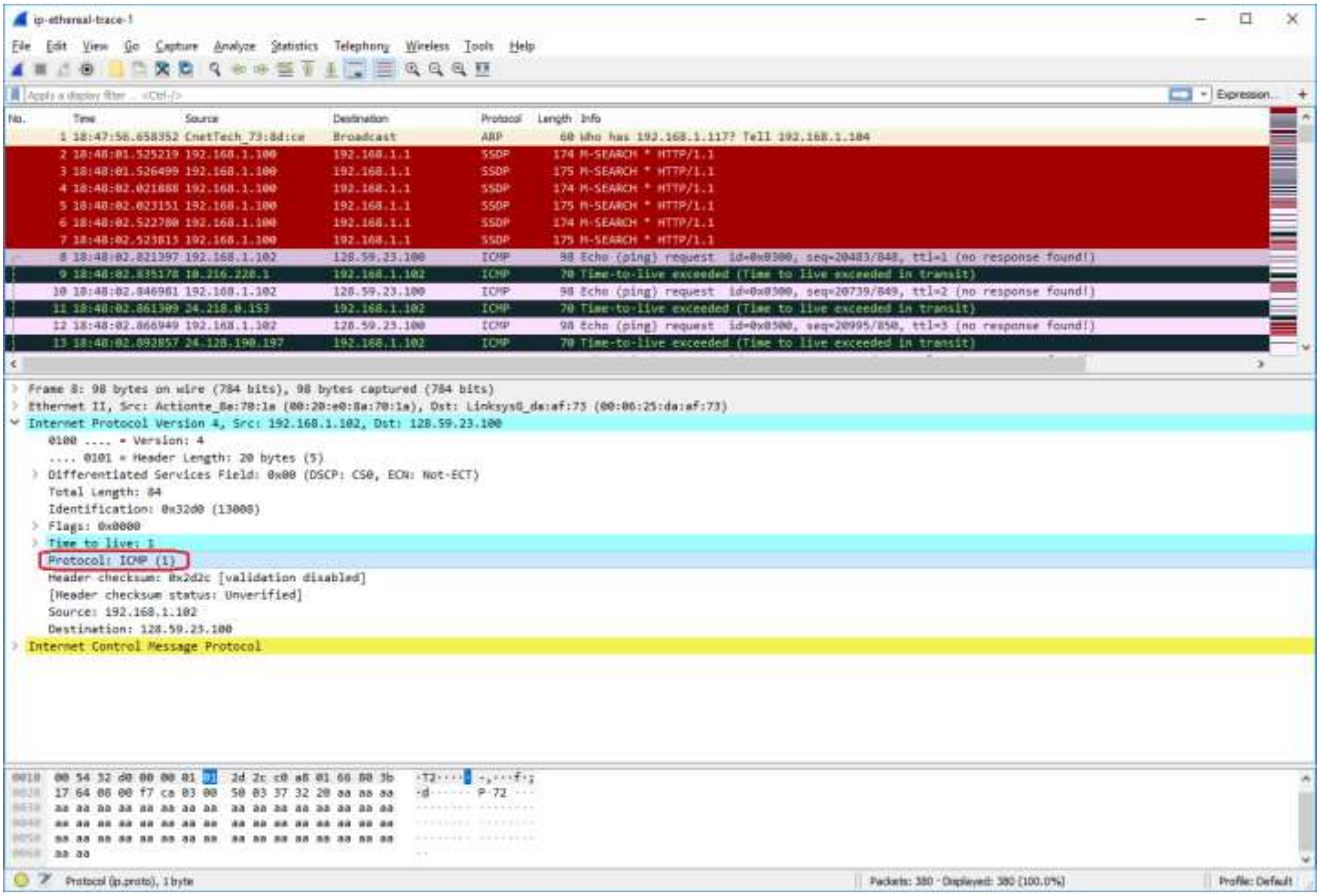
1) Select the first ICMP Echo Request message sent by your computer, and expand the Internet Protocol part of the packet in the packet details window. What is the IP address of your computer?

   Using the author's trace, the IP address of my computer is 192.168.1.102.



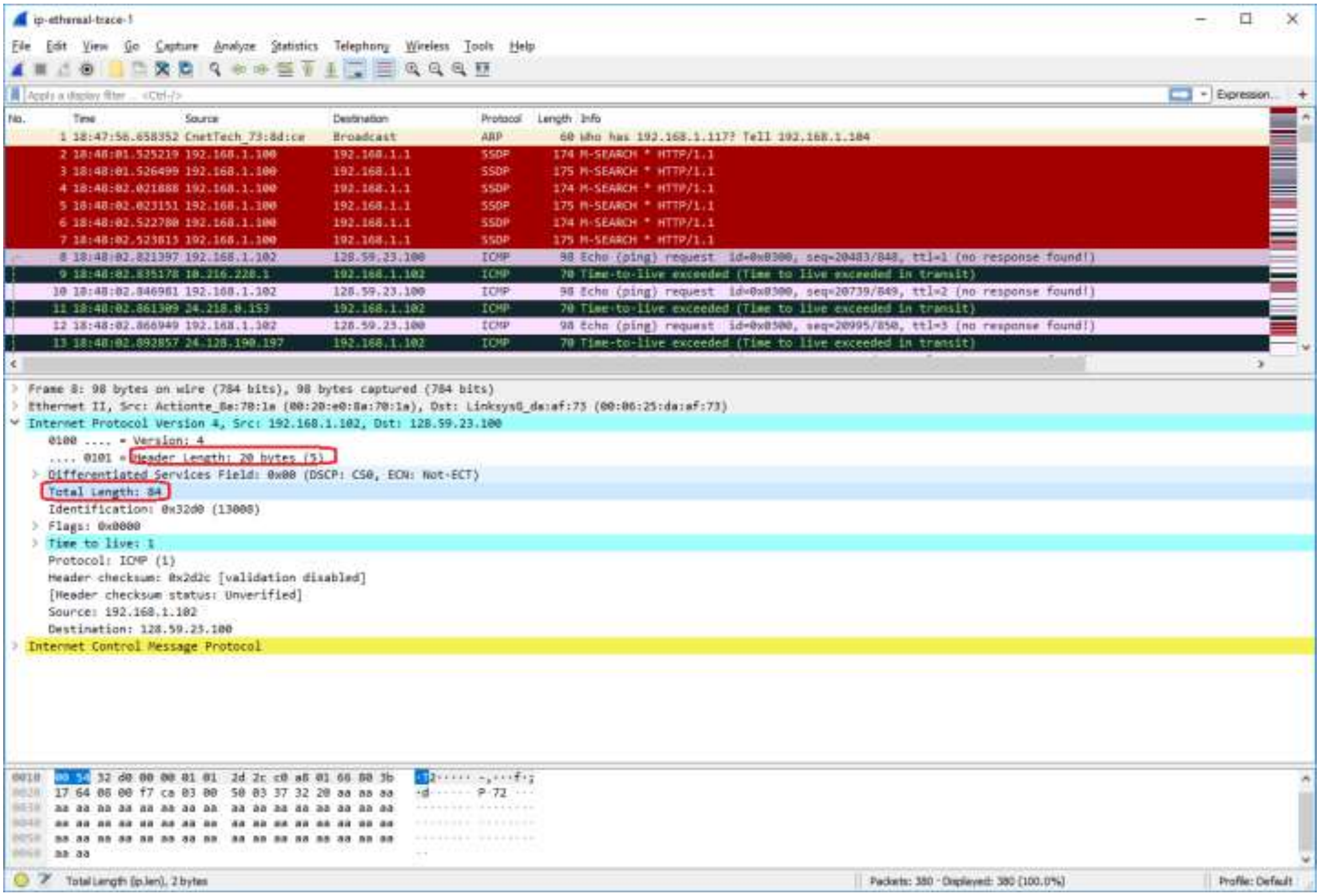
2) Within the IP packet header, what is the value in the upper layer protocol field?

   The value in the upper layer protocol field is ICMP (1).



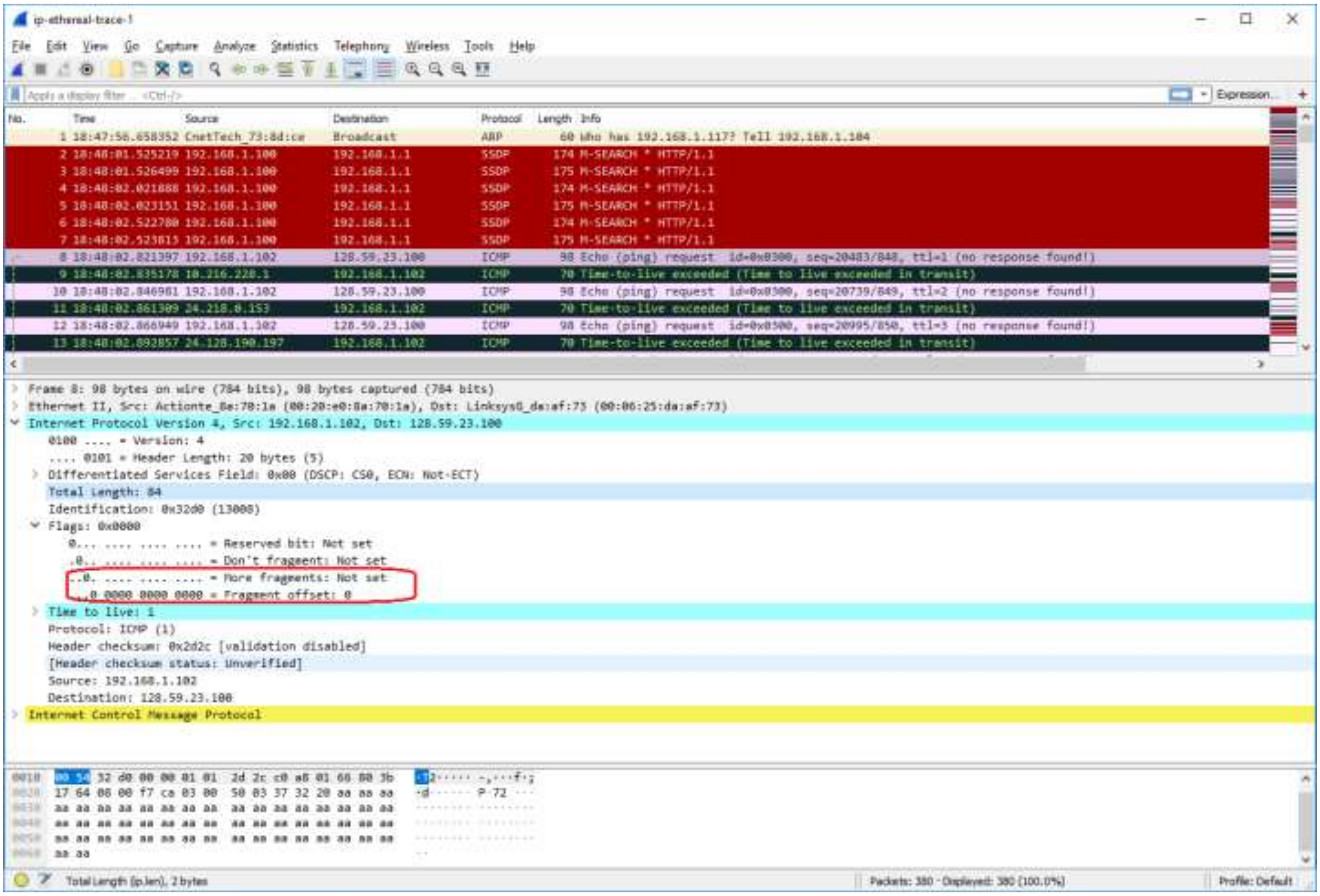
3) How many bytes are in the IP header? How many bytes are in the payload *of the IP datagram*? Explain how you determined the number of payload bytes.

   There are 20 bytes are in the IP header. This IP packet's total length is 84 bytes. Therefore, the payload of the IP datagram is 64 bytes (84 – 20 bytes = 64 bytes).



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

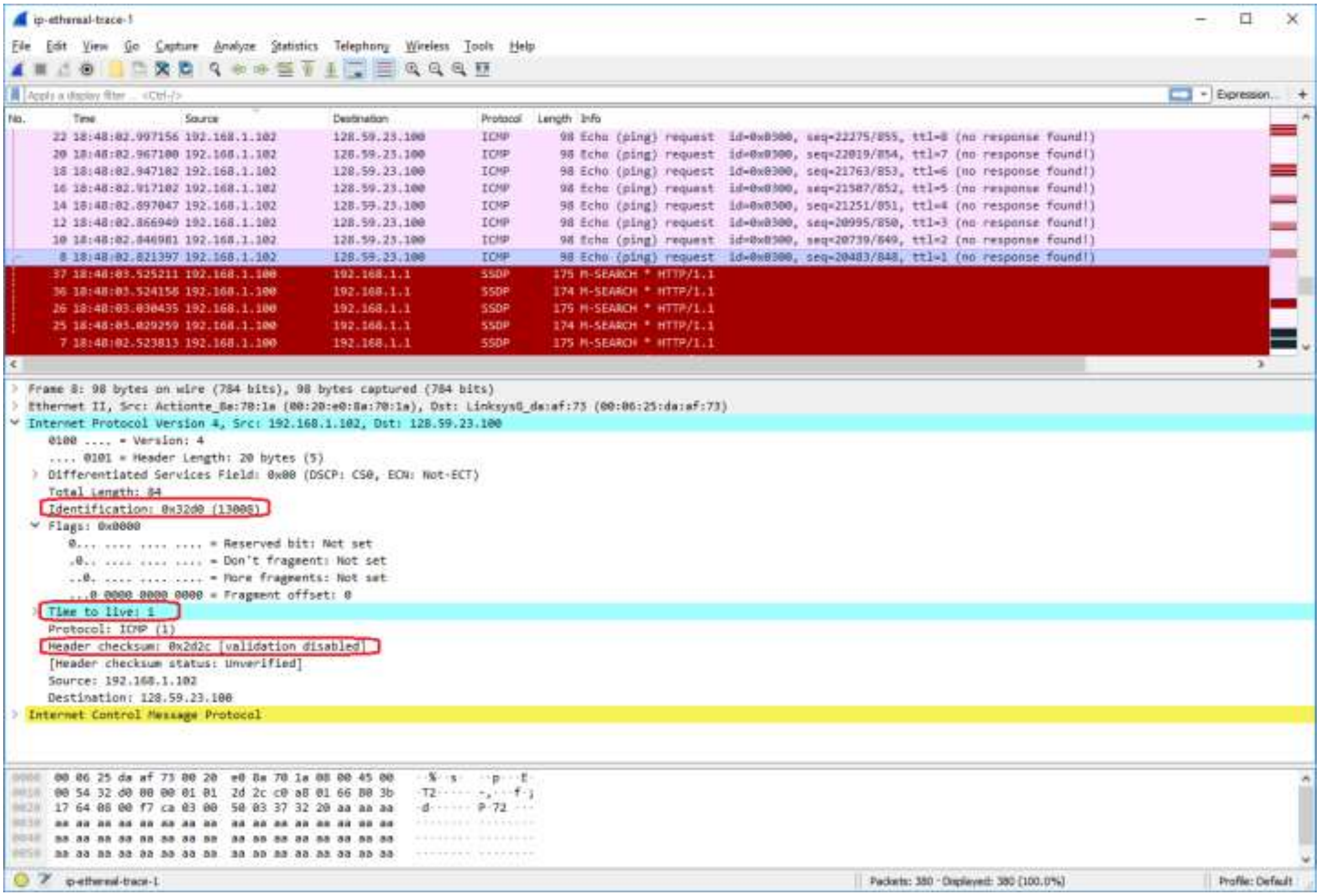
No, this IP datagram has not been fragmented. If it was fragmented, then this first IP datagram would either have the “More fragments” bit set or have a non-zero fragment offset, and the bottom of this IP datagram would have a list of IP fragments. Since this IP datagram does not have the More Fragments bit set and does not have a non-zero fragment offset and there is no list of fragments, it is not fragmented.

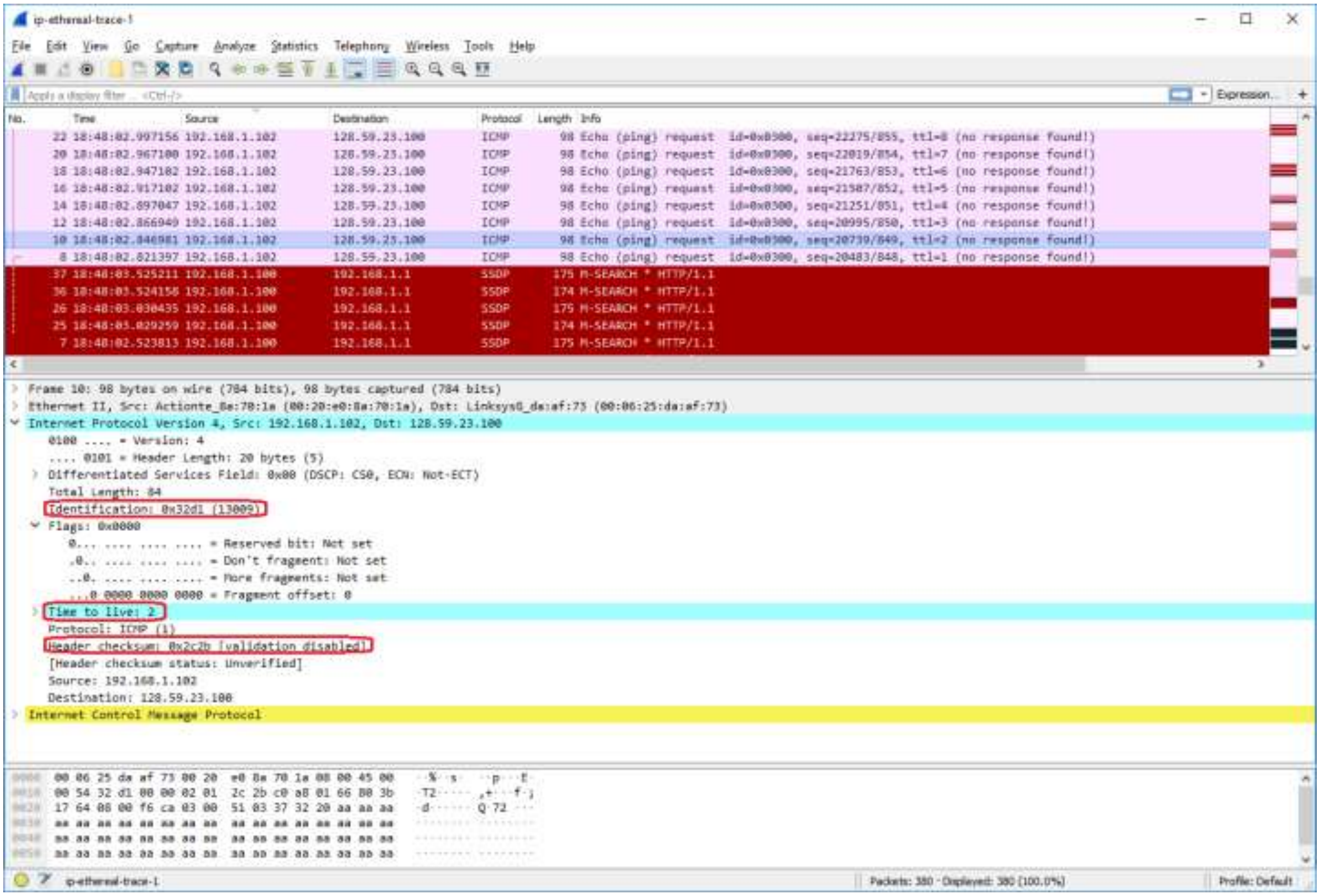


Next, sort the traced packets according to IP source address by clicking on the *Source* column header; a small downward pointing arrow should appear next to the word *Source*. If the arrow points up, click on the *Source* column header again. Select the first ICMP Echo Request message sent by your computer, and expand the Internet Protocol portion in the "details of selected packet header" window. In the "listing of captured packets" window, you should see all of the subsequent ICMP messages (perhaps with additional interspersed packets sent by other protocols running on your computer) below this first ICMP. Use the down arrow to move through the ICMP messages sent by your computer.

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?

   The identification, time to live, and header checksum fields always change from one datagram to the next in this series of ICMP messages, as shown below.


ip-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
22 18:48:02.997156 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=22275/855, ttl=8 (no response found!)
20 18:48:02.967100 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=22019/854, ttl=7 (no response found!)
18 18:48:02.947102 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=21763/853, ttl=6 (no response found!)
16 18:48:02.917102 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=21507/852, ttl=5 (no response found!)
14 18:48:02.897047 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=21251/851, ttl=4 (no response found!)
12 18:48:02.866949 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=20995/850, ttl=3 (no response found!)
10 18:48:02.846981 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=20739/849, ttl=2 (no response found!)
8 18:48:02.821397 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=20483/848, ttl=1 (no response found!)
37 18:48:03.525211 192.168.1.100 192.168.1.1 SSDP 175 M-SEARCH * HTTP/1.1
36 18:48:03.524156 192.168.1.100 192.168.1.1 SSDP 174 M-SEARCH * HTTP/1.1
26 18:48:03.030435 192.168.1.100 192.168.1.1 SSDP 175 M-SEARCH * HTTP/1.1
25 18:48:03.029259 192.168.1.100 192.168.1.1 SSDP 174 M-SEARCH * HTTP/1.1
7 18:48:02.523813 192.168.1.100 192.168.1.1 SSDP 175 M-SEARCH * HTTP/1.1
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)
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)
Flags: 0x0000
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..0. .... = More fragments: Not set
...0 0000 0000 0000 = Fragment offset: 0
Time to live: 1
Protocol: ICMP (1)
Header checksum: 0x2d2c [validation disabled]
[Header checksum status: Unverified]
Source: 192.168.1.102
Destination: 128.59.23.100
Internet Control Message Protocol
00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00
00 54 32 d0 00 00 01 01 2d 2c c0 a8 01 66 80 3b
17 64 08 00 f7 ca 03 00 50 03 37 32 20 aa aa aa
ip-ethereal-trace-1
Packets: 380 · Displayed: 380 (100.0%)
Profile: Default



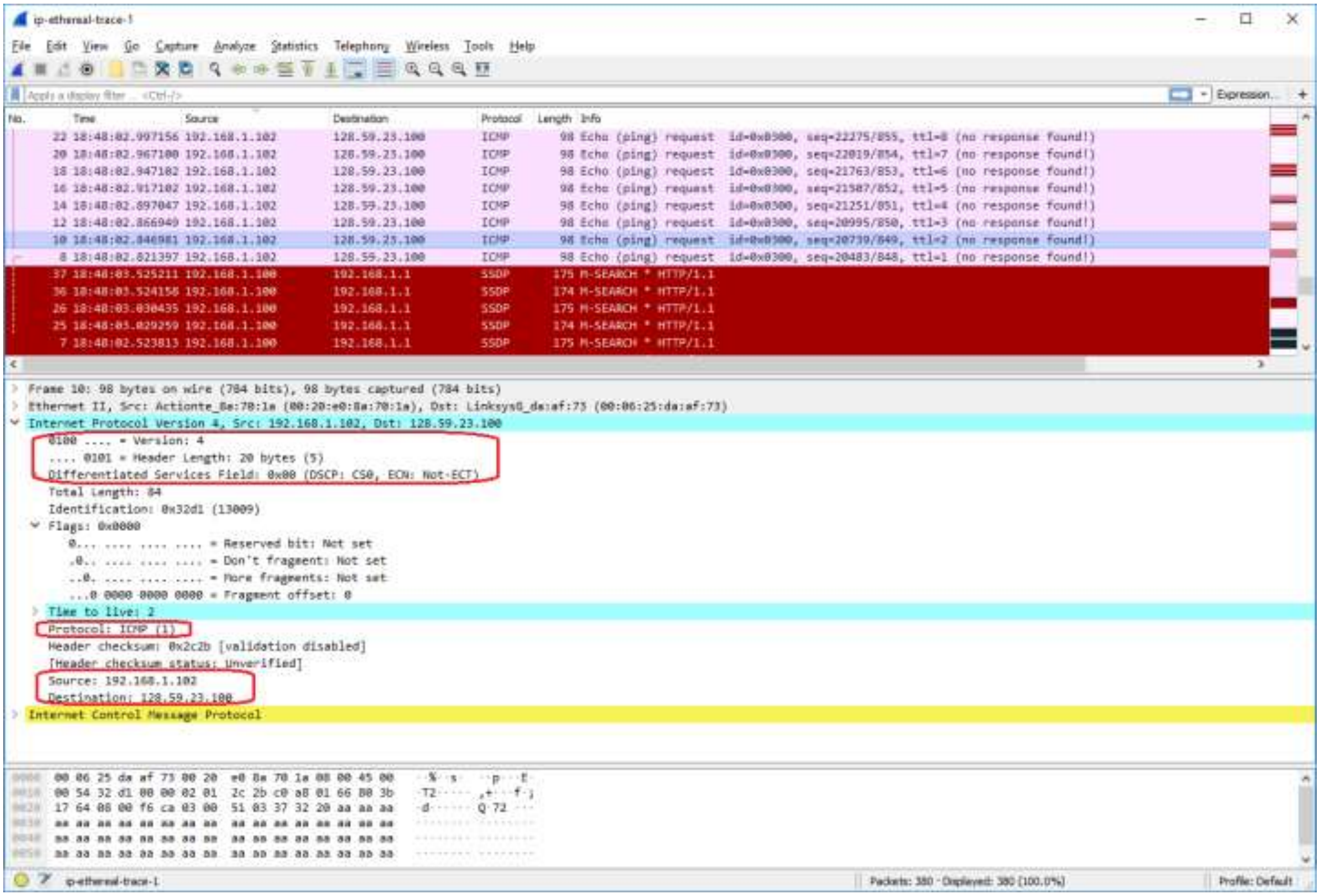
6) Which fields stay constant? Which of the fields *must* stay constant? Which fields must change? Why?

The Version, Header Length, Differentiated Services Field, Protocol, Source, and Destination fields stay constant.

- Version does not change since all the ICMP echo packets are using the same IPv4 network protocol.
- Header Length does not change since these are all ICMP packets, which has a fixed size of 20 bytes.
- Differentiated Services does not change because all the ICMP packets don't use any service options, which is the default value 0x0 for Differentiated Services.
- Protocol does not change since all the packets are ICMP packets.
- Source address does not change since all of these ICMP packets are sent by the same source address.
- Destination address does not change since all of these ICMP packets are received by the same destination address.

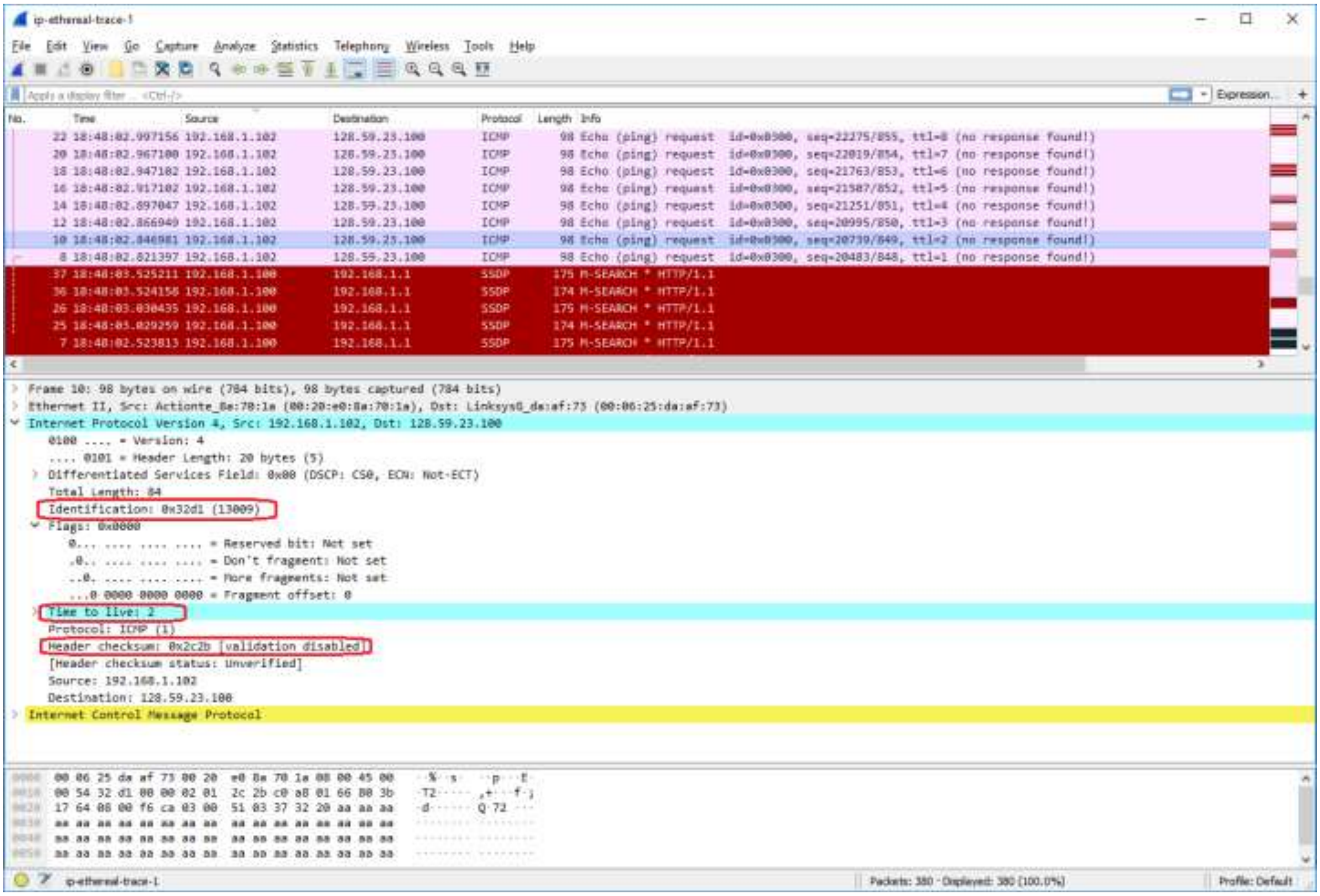
The Version, Header Length, Differentiated Services, Protocol, Source, and Destination fields must stay constant.

- Version must stay constant since the IPv4 network protocol is used for all ICMP packets.
- Header Length must stay constant since we are referring to all ICMP packets and ICMP IP header packets have a fixed length of 20 bytes.
- Differentiated Services must stay constant because all the ICMP packets don't use any service options, which is the default value 0x0 for Differentiated Services.
- Protocol must stay constant since all the packets are ICMP packets.
- Source address must stay constant since all of these ICMP packets are sent by the same source address.
- Destination address must stay constant since all of these ICMP packets are received by the same destination address.



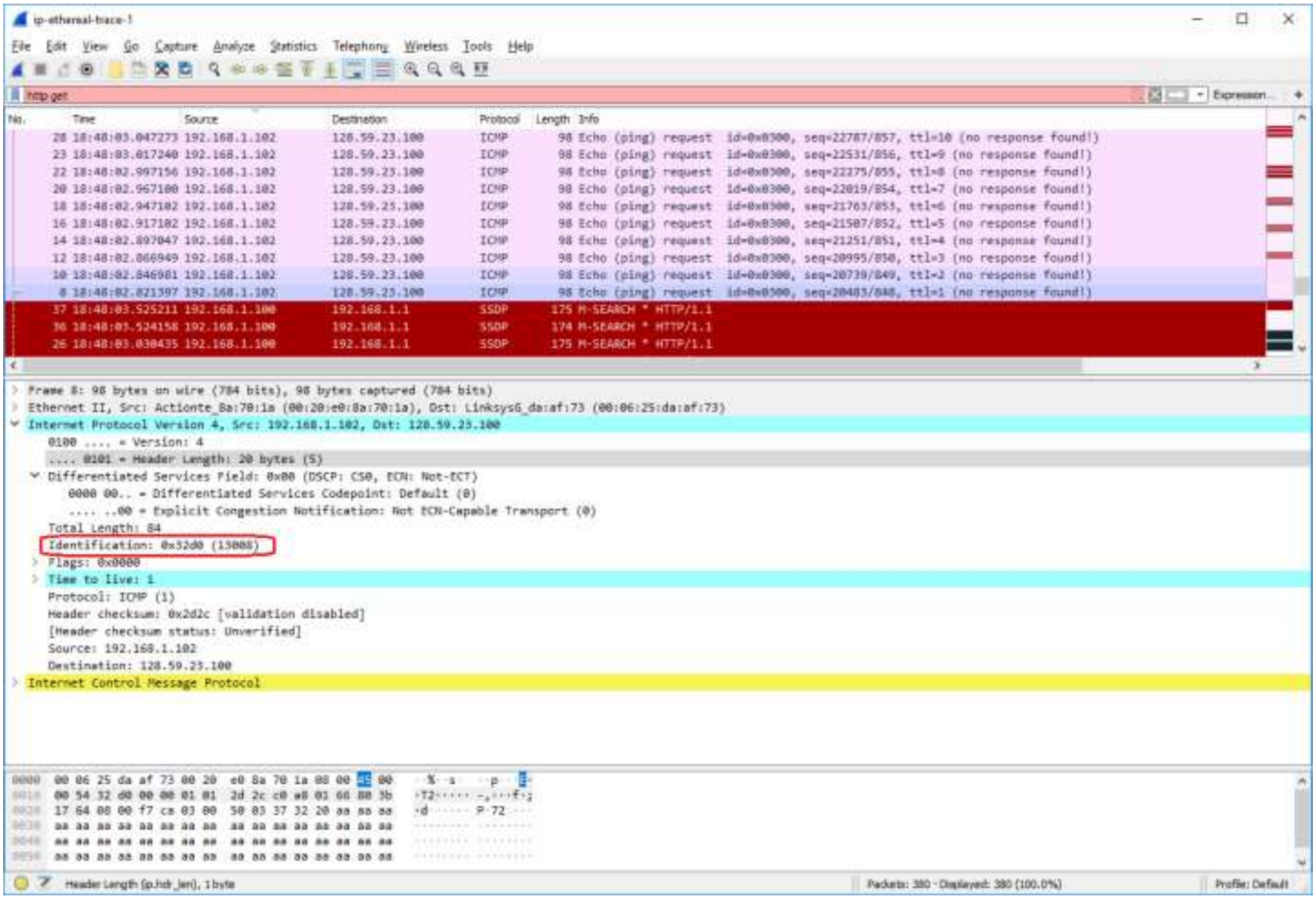
The Identification, Time to Live, and Header Checksum fields must change.

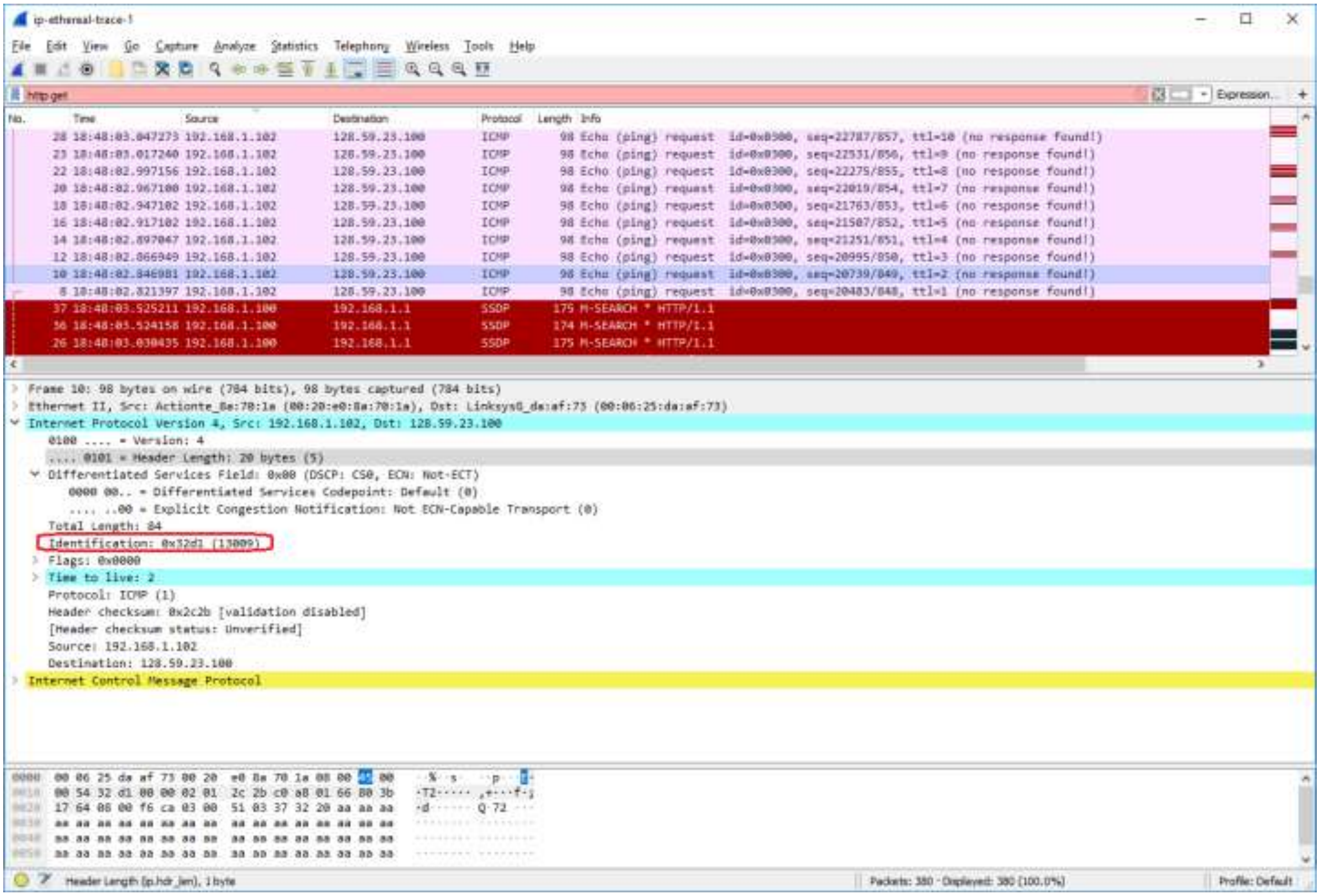
- Identification must change because it uniquely identifies each IP packet that is transmitted.
- Time to Live must change because traceroute increments each IP datagram with each hop.
- Header Checksum must change because other fields within the header must change, such as Identification and Time to Live, which alter the checksum value of the header.

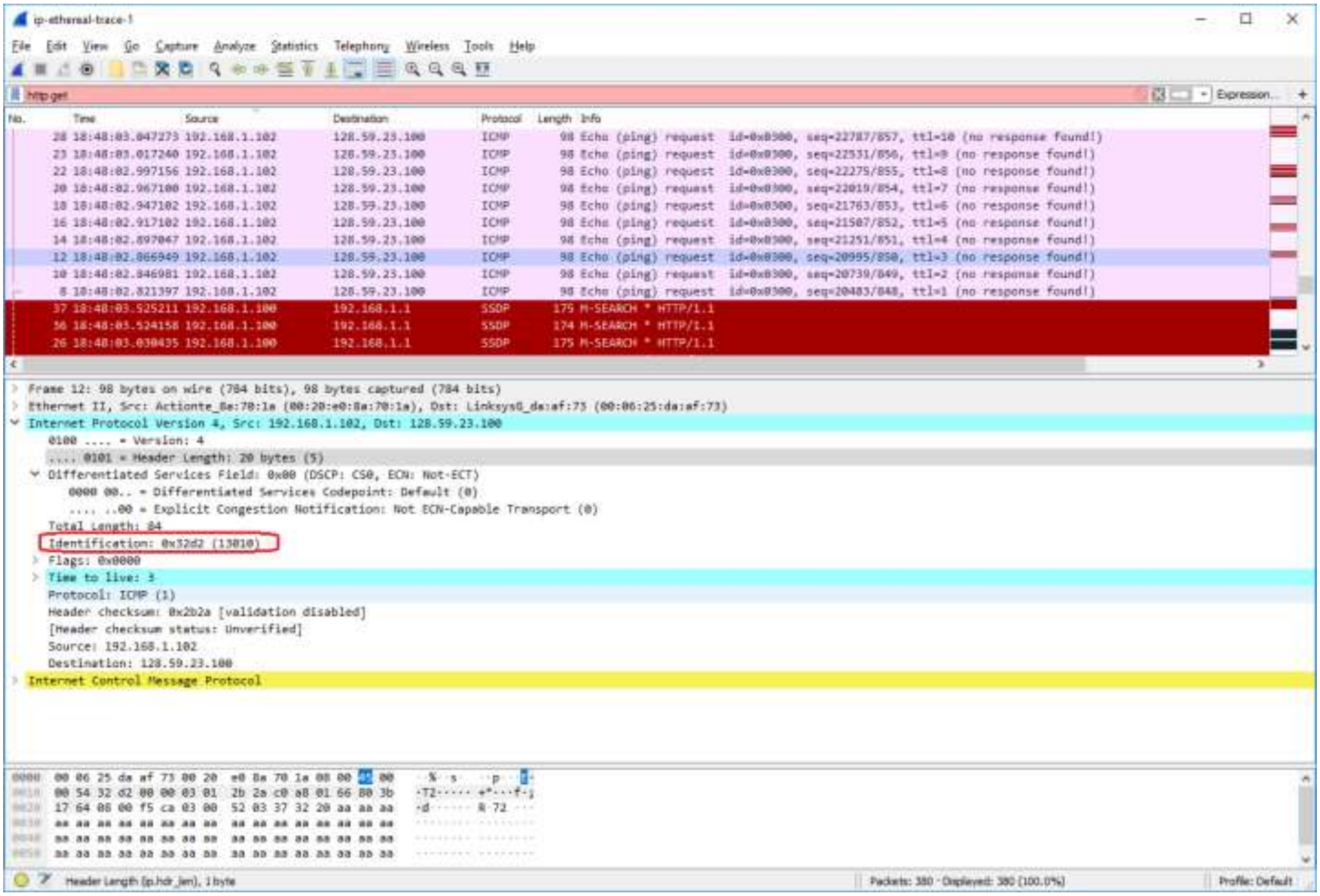


7) Describe the pattern you see in the values in the Identification field of the IP datagram.

Each subsequent ICMP Echo request has an Identification value that is incremented by 1.


ip-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
http.get
No. Time Source Destination Protocol Length Info
28 18:48:03.047273 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=22787/857, ttl=10 (no response found!)
23 18:48:03.017240 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=22531/856, ttl=9 (no response found!)
22 18:48:02.997156 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=22275/855, ttl=8 (no response found!)
20 18:48:02.967100 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=22019/854, ttl=7 (no response found!)
18 18:48:02.947102 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=21763/853, ttl=6 (no response found!)
16 18:48:02.917102 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=21507/852, ttl=5 (no response found!)
14 18:48:02.897047 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=21251/851, ttl=4 (no response found!)
12 18:48:02.866949 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=20995/850, ttl=3 (no response found!)
10 18:48:02.846981 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=20739/849, ttl=2 (no response found!)
8 18:48:02.821397 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=20483/848, ttl=1 (no response found!)
37 18:48:03.525211 192.168.1.100 192.168.1.1 SSDP 175 M-SEARCH * HTTP/1.1
36 18:48:03.524158 192.168.1.100 192.168.1.1 SSDP 174 M-SEARCH * HTTP/1.1
26 18:48:03.030435 192.168.1.100 192.168.1.1 SSDP 175 M-SEARCH * HTTP/1.1
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)
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)
0000 00.. = Differentiated Services Codepoint: Default (0)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 84
Identification: 0x32d0 (13008)
Flags: 0x0000
Time to live: 1
Protocol: ICMP (1)
Header checksum: 0x2d2c [validation disabled]
[Header checksum status: Unverified]
Source: 192.168.1.102
Destination: 128.59.23.100
Internet Control Message Protocol
Header Length (ip.hdr_len), 1 byte
Packets: 380 · Displayed: 380 (100.0%)
Profile: Default

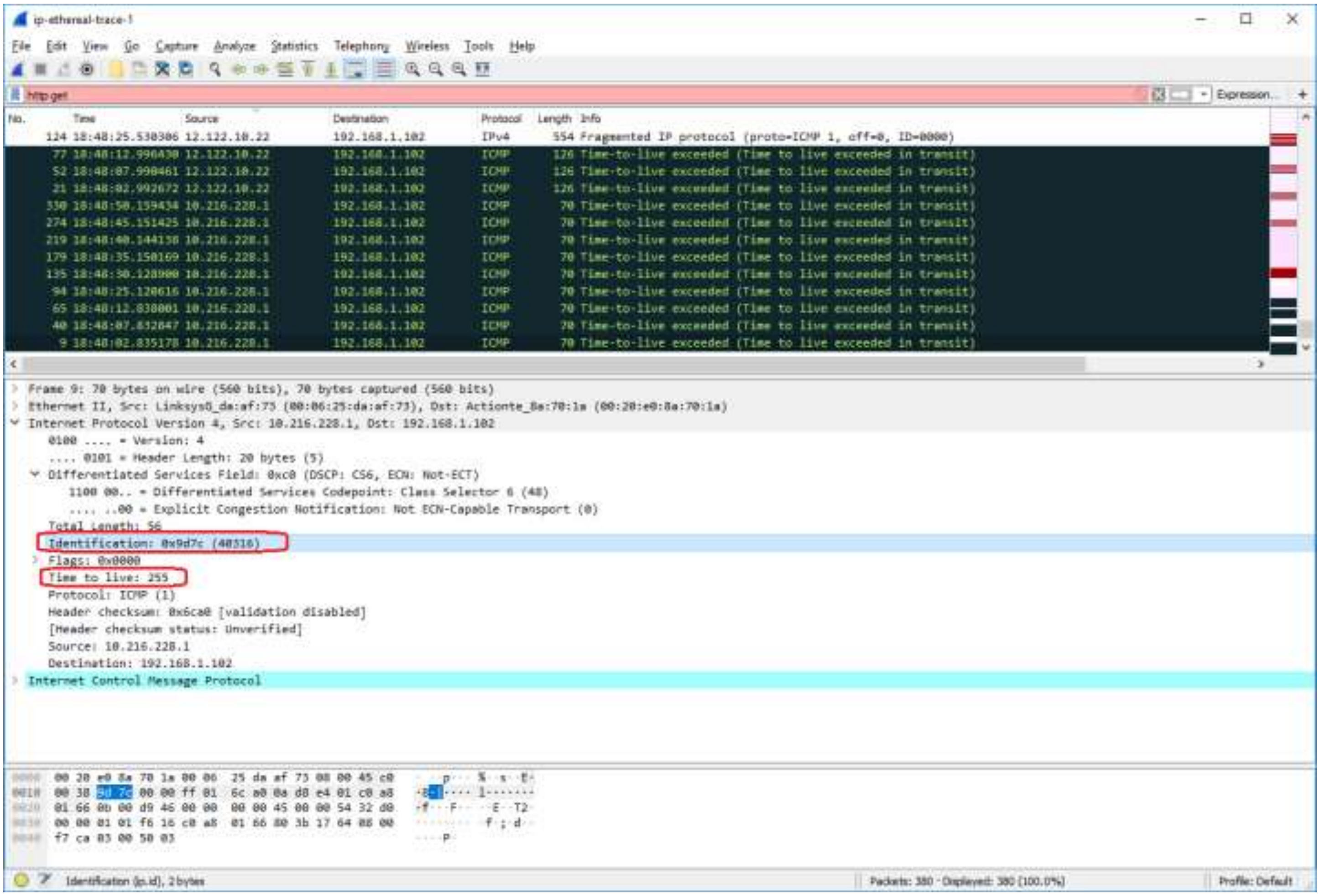

ip-ethereal-trace-1
Frame 10: 98 bytes on wire (784 bits), 98 bytes captured (784 bits)
Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.59.23.100
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
0000 00.. = Differentiated Services Codepoint: Default (0)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 84
Identification: 0x32d1 (13009)
Flags: 0x0000
Time to live: 2
Protocol: ICMP (1)
Header checksum: 0x2c2b [validation disabled]
[Header checksum status: Unverified]
Source: 192.168.1.102
Destination: 128.59.23.100
Internet Control Message Protocol
Header Length (ip.hdr_len), 1 byte
Packets: 380 · Displayed: 380 (100.0%)
Profile: Default



Next (with the packets still sorted by source address) find the series of ICMP TTL-exceeded replies sent to your computer by the nearest (first hop) router.

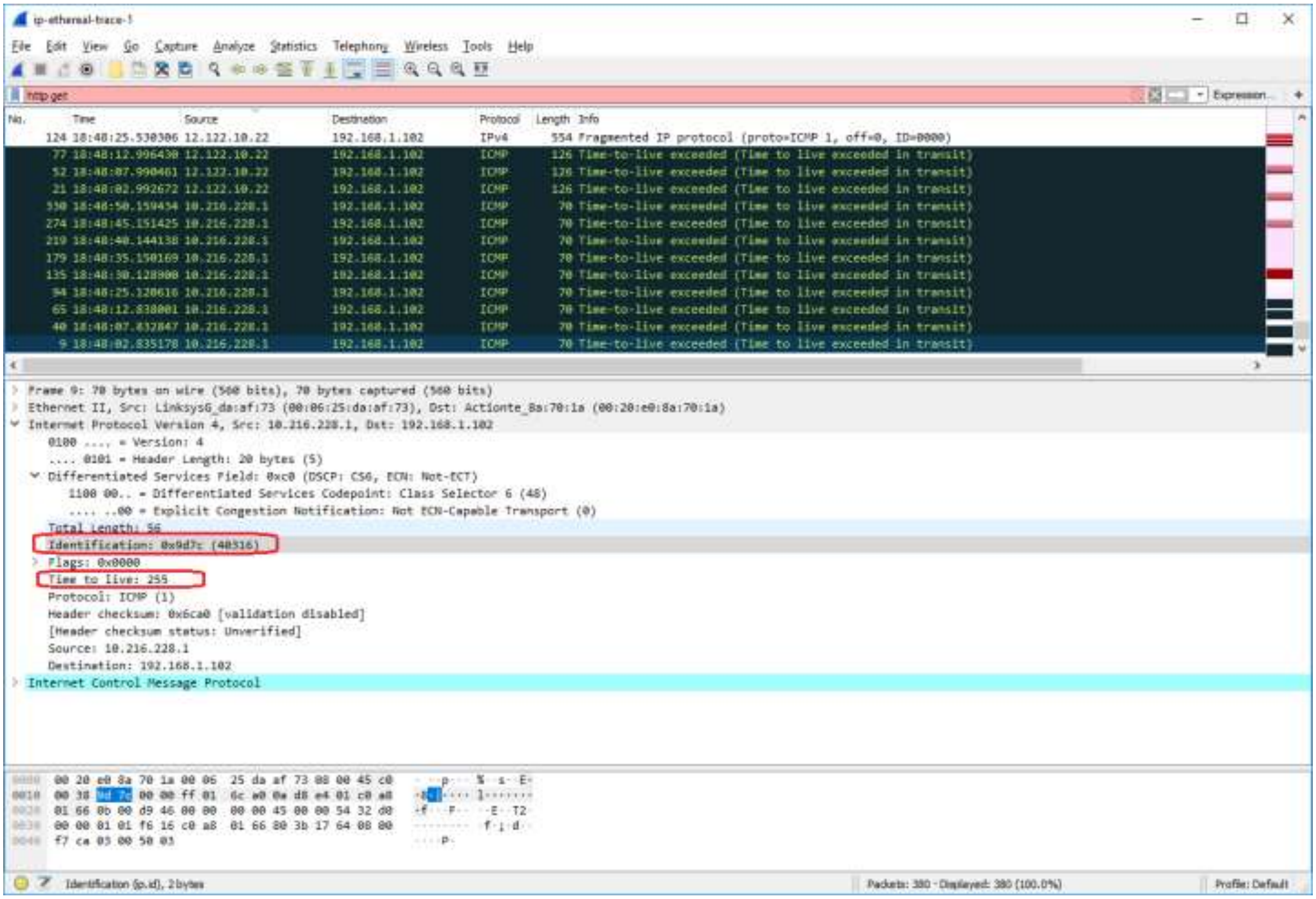
8) What is the value in the Identification field and the TTL field?

The value in the Identification field is 0x9d7c (40316). The value in the TTL field is 255.

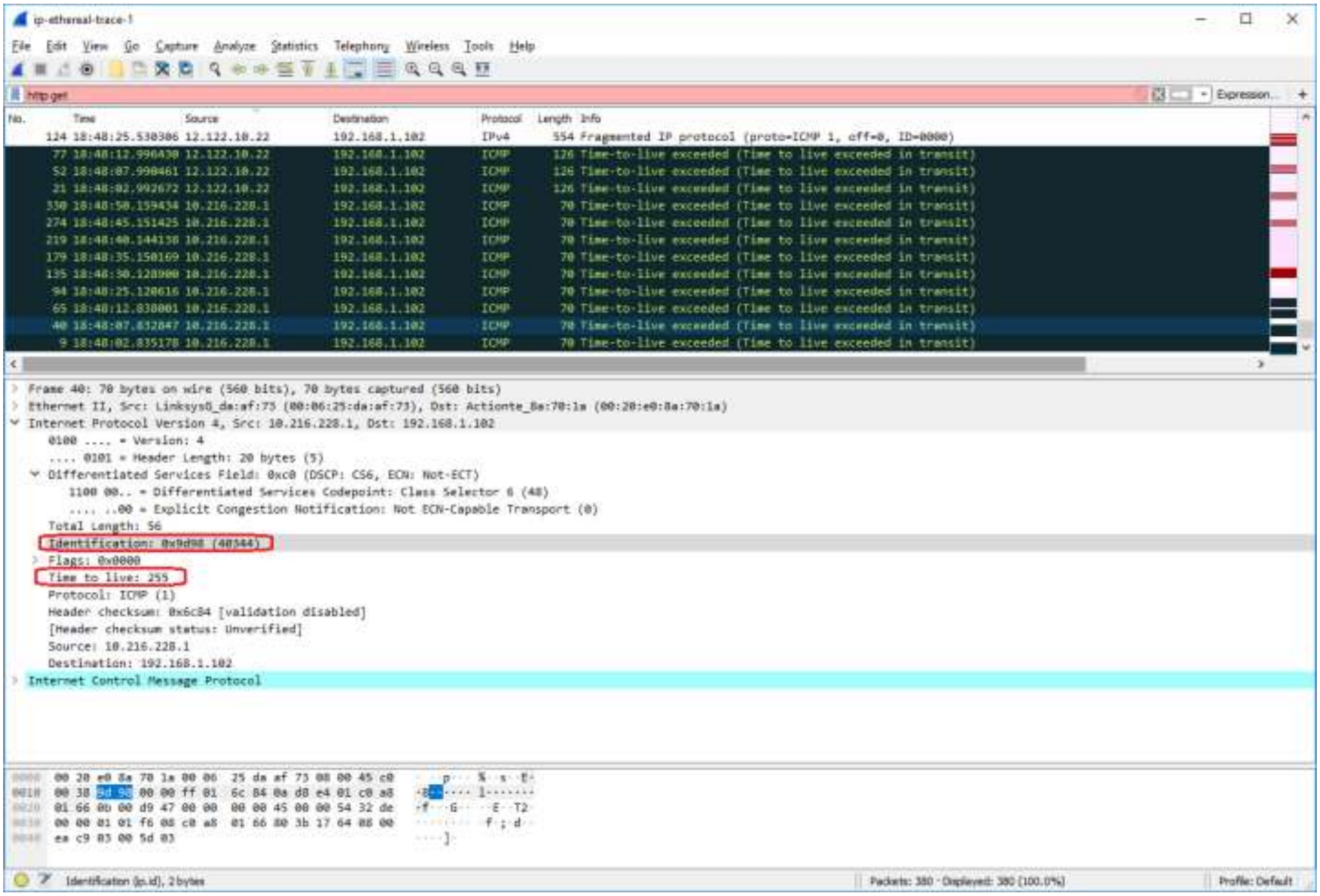


9) Do these values remain unchanged for all of the ICMP TTL-exceeded replies sent to your computer by the nearest (first hop) router? Why?

The Identification field changes for each ICMP IP datagram sent to my computer because each packet needs a unique value that identifies it. The Time to Live field stays at 255 for each ICMP TTL-exceeded packet and does not change because traceroute only increments the TTL with each hop. Since all of these ICMP TTL-exceeded packets are replies from the nearest (first hop) router, they all have the same TTL value.



ip-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
http get
No. Time Source Destination Protocol Length Info
124 18:48:25.530306 12.122.10.22 192.168.1.102 IPv4 554 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0000)
77 18:48:12.996430 12.122.10.22 192.168.1.102 ICMP 126 Time-to-live exceeded (Time to live exceeded in transit)
52 18:48:07.990461 12.122.10.22 192.168.1.102 ICMP 126 Time-to-live exceeded (Time to live exceeded in transit)
21 18:48:02.992672 12.122.10.22 192.168.1.102 ICMP 126 Time-to-live exceeded (Time to live exceeded in transit)
330 18:48:50.159434 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
274 18:48:45.151425 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
219 18:48:40.144138 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
179 18:48:35.150169 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
135 18:48:30.128900 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
94 18:48:25.120616 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
65 18:48:12.838001 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
40 18:48:07.832847 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
9 18:48:02.835178 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
Frame 9: 70 bytes on wire (560 bits), 70 bytes captured (560 bits)
Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
Internet Protocol Version 4, Src: 10.216.228.1, Dst: 192.168.1.102
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0xc0 (DSCP: CS6, ECN: Not-ECT)
1100 00.. = Differentiated Services Codepoint: Class Selector 6 (48)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 56
Identification: 0x9d7c (40316)
Flags: 0x0000
Time to live: 255
Protocol: ICMP (1)
Header checksum: 0x6ca0 [validation disabled]
[Header checksum status: Unverified]
Source: 10.216.228.1
Destination: 192.168.1.102
Internet Control Message Protocol
Identification (ip.id), 2 bytes
Packets: 380 · Displayed: 380 (100.0%)
Profile: Default

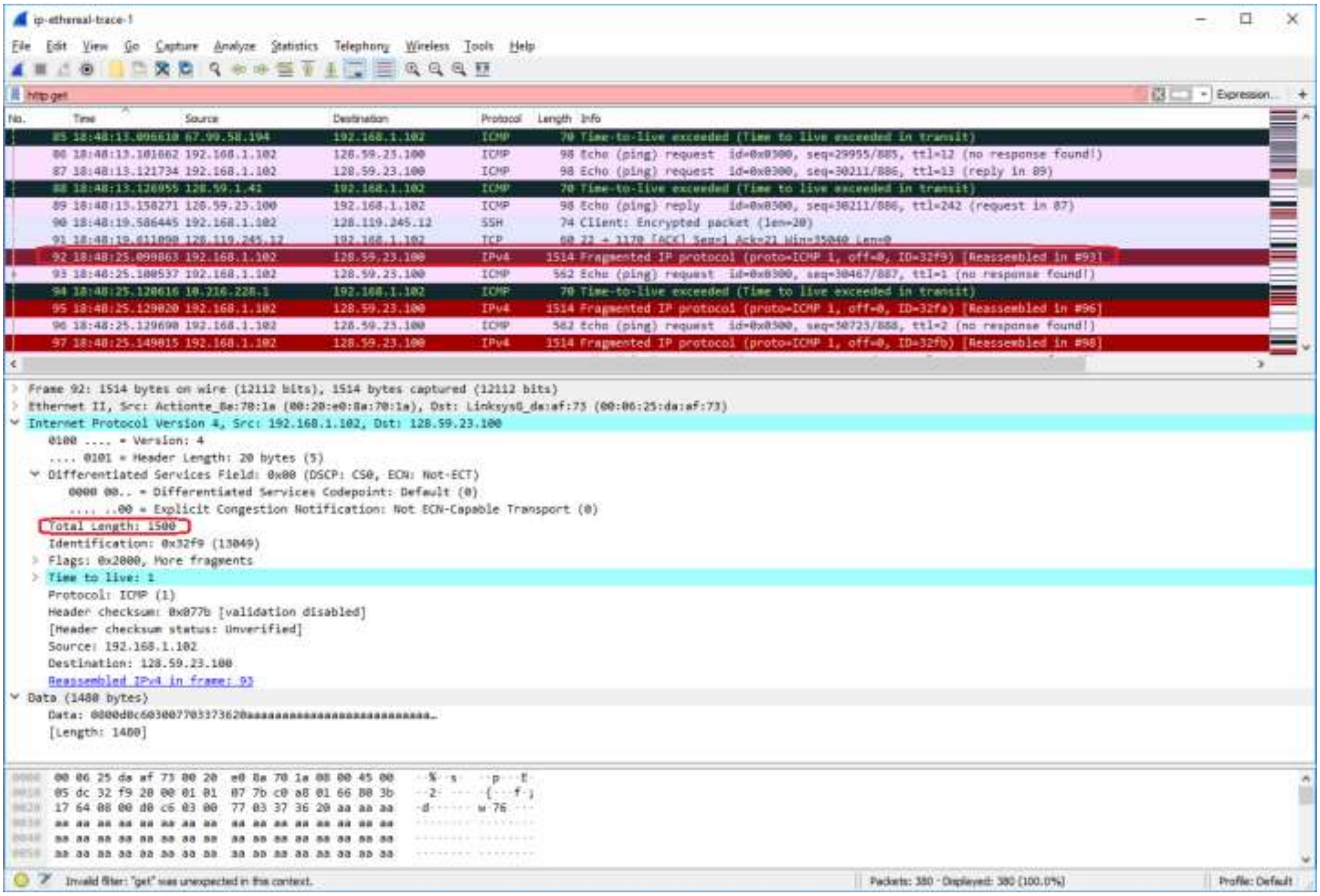


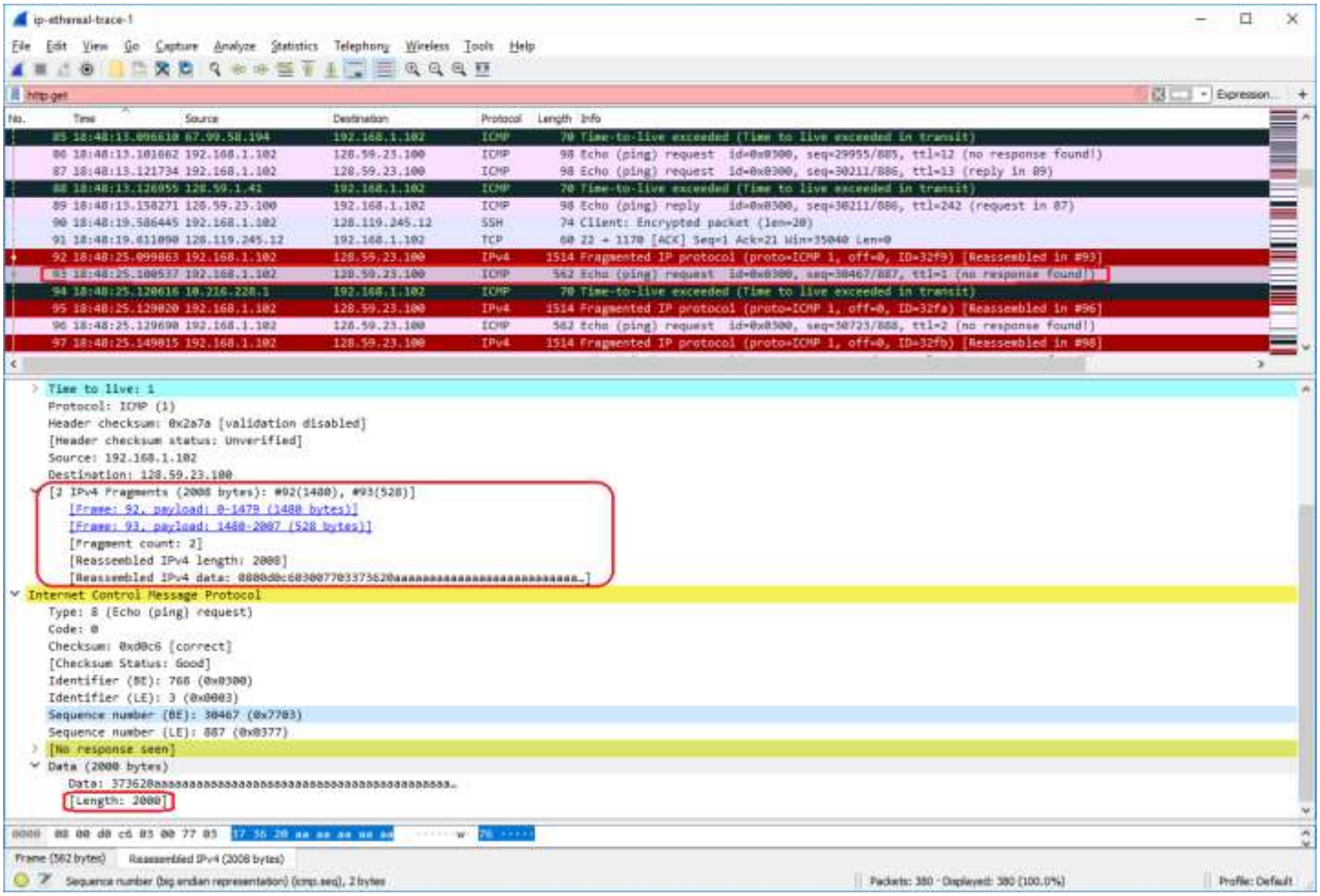
Sort the packet listing according to time again by clicking on the *Time* column.

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 http://gaia.cs.umass.edu/wireshark-labs/wireshark-traces.zip and extract the *ip-ethereal-trace-1*packet trace. If your computer has an Ethernet interface, a packet size of 2000 *should* cause fragmentation.[1]]

    Yes, this message was fragmented into 2 IP datagrams in frames 92 and 93. Frame 92 stored 1480 bytes of data and Frame 93 stored 528 bytes of data.

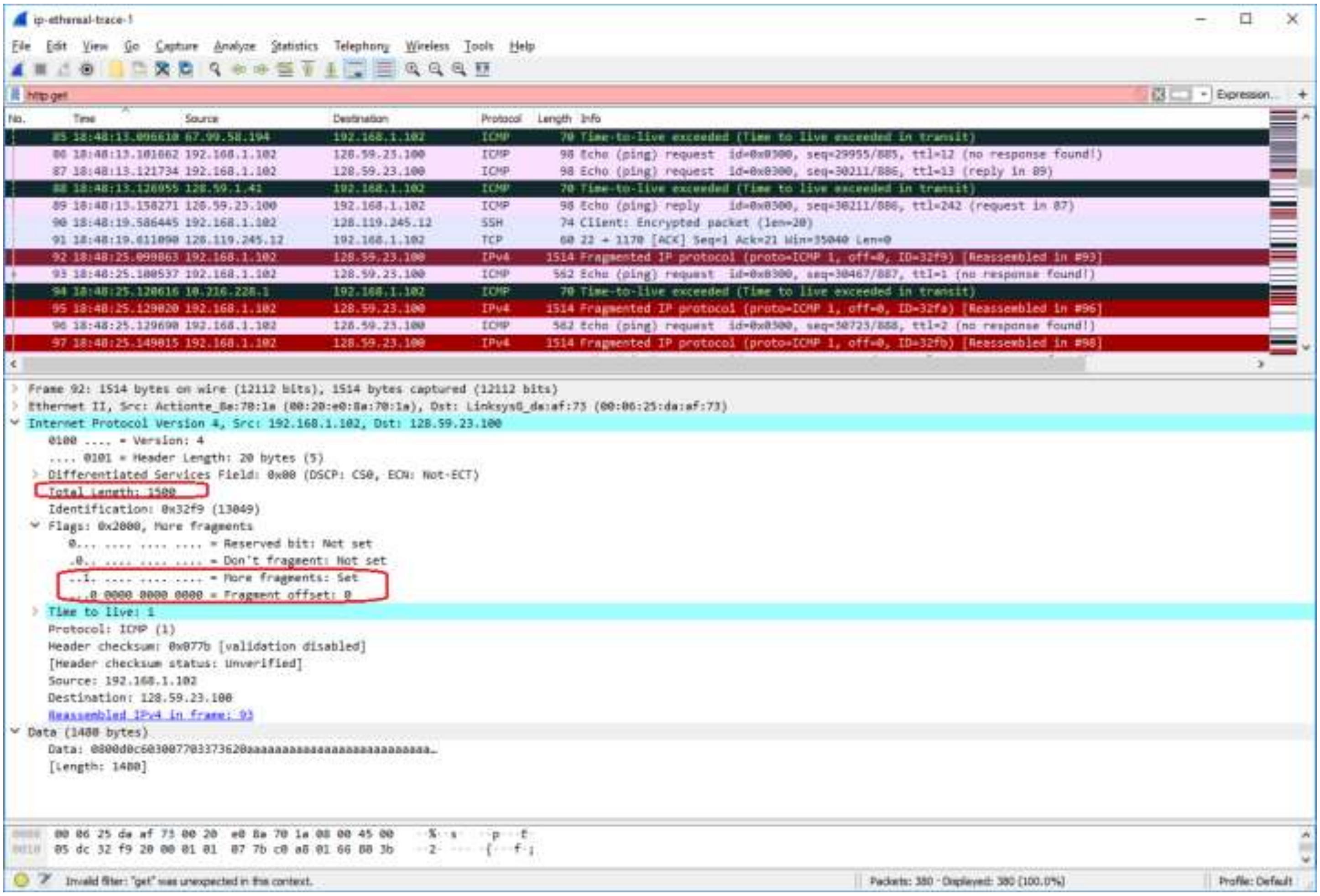
[1] The packets in the *ip-ethereal-trace-1* trace file in http://gaia.cs.umass.edu/wireshark-labs/wireshark-traces.zip are all less that 1500 bytes. This is because the computer on which the trace was gathered has an Ethernet card that limits the length of the maximum IP packet to 1500 bytes (40 bytes of TCP/IP header data and 1460 bytes of upper-layer protocol payload). This 1500 byte value is the standard maximum length allowed by Ethernet. If your trace indicates a datagram longer 1500 bytes, and your computer is using an Ethernet connection, then Wireshark is reporting the wrong IP datagram length; it will likely also show only one large IP datagram rather than multiple smaller datagrams.. This inconsistency in reported lengths is due to the interaction between the Ethernet driver and the Wireshark software. We recommend that if you have this inconsistency, that you perform this lab using the *ip-ethereal-trace-1* trace file.


ip-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
http get
Expression...
No. Time Source Destination Protocol Length Info
85 18:48:13.096610 67.99.58.194 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
86 18:48:13.101662 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=29955/885, ttl=12 (no response found!)
87 18:48:13.121734 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=30211/886, ttl=13 (reply in 89)
88 18:48:13.126955 128.59.1.41 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
89 18:48:13.158271 128.59.23.100 192.168.1.102 ICMP 98 Echo (ping) reply id=0x0300, seq=30211/886, ttl=242 (request in 87)
90 18:48:19.586445 192.168.1.102 128.119.245.12 SSH 74 Client: Encrypted packet (len=20)
92 18:48:25.099863 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=32f9) [Reassembled in #93]
93 18:48:25.100537 192.168.1.102 128.59.23.100 ICMP 562 Echo (ping) request id=0x0300, seq=30467/887, ttl=1 (no response found!)
94 18:48:25.120616 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
95 18:48:25.129020 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=32fa) [Reassembled in #96]
96 18:48:25.129698 192.168.1.102 128.59.23.100 ICMP 562 Echo (ping) request id=0x0300, seq=30723/888, ttl=2 (no response found!)
97 18:48:25.149815 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=32fb) [Reassembled in #98]
Frame 92: 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)
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)
0000 00.. = Differentiated Services Codepoint: Default (0)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 1500
Identification: 0x32f9 (13049)
Flags: 0x2000, More fragments
Time to live: 1
Protocol: ICMP (1)
Header checksum: 0x077b [validation disabled]
[Header checksum status: Unverified]
Source: 192.168.1.102
Destination: 128.59.23.100
Reassembled IPv4 in frame: 93
Data (1480 bytes)
[Length: 1480]
Invalid filter: "get" was unexpected in this context.
Packets: 380 · Displayed: 380 (100.0%)
Profile: Default



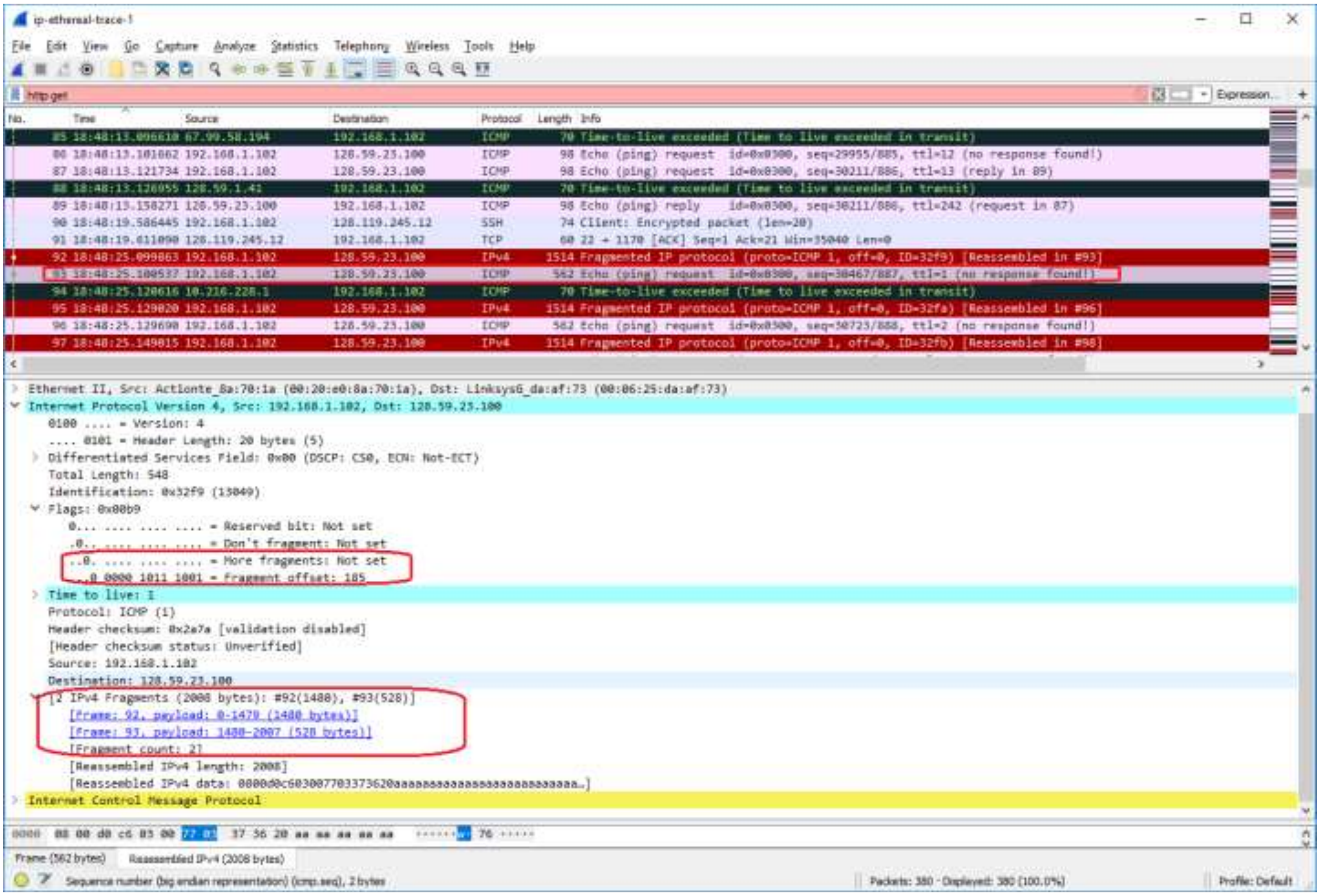
11) Screenshot the first fragment of the fragmented IP datagram (with sufficient details to answer these questions). What information in the IP header indicates that the datagram been fragmented? What information in the IP header indicates whether this is the first fragment versus a latter fragment? How long is this IP datagram?

In the first fragment of the fragmented IP datagram, the Flags field is set to 0x2000 and bit 13 is set. Since bit 13 controls the More Fragments bit field and this bit is set, then this indicates that the datagram has been fragmented. Since the Fragment Offset is set to 0, then this indicates that this IP datagram is the first fragment. This IP datagram has Total Length = 1500 bytes.



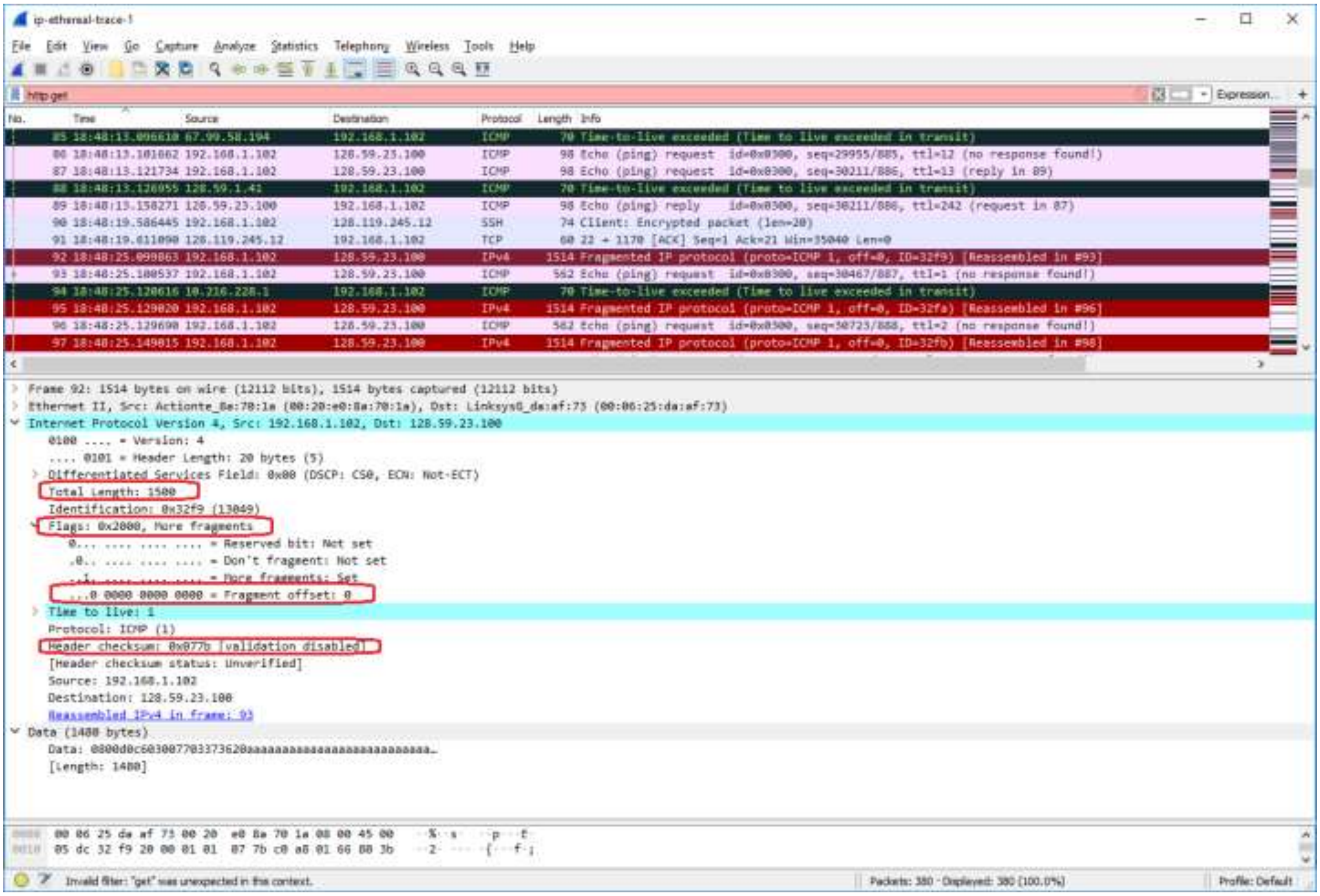
12) Screenshot the second fragment of the fragmented IP datagram (with sufficient details to answer these questions). What information in the IP header indicates that this is not the first datagram fragment? Are the more fragments? How can you tell?

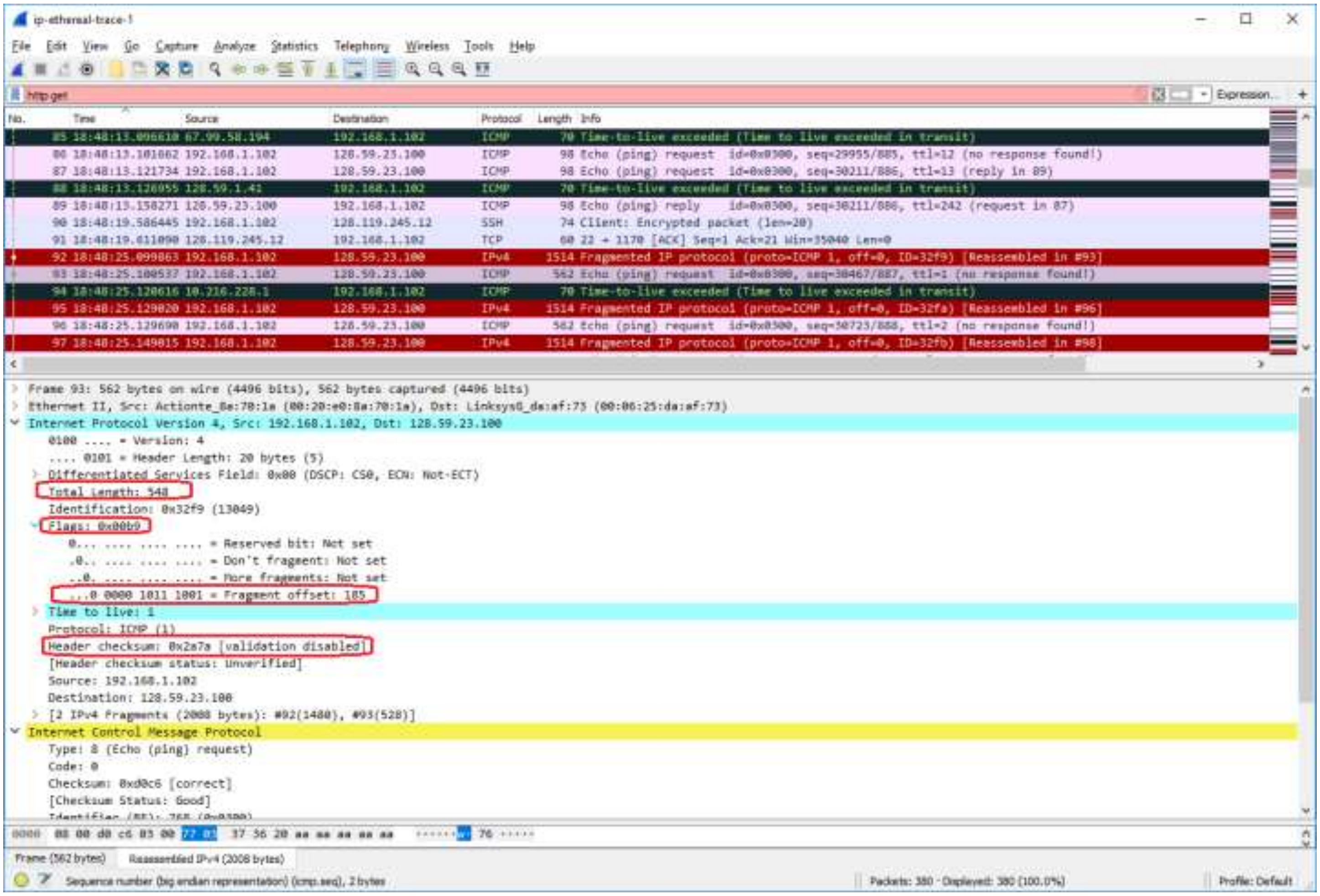
Firstly, the More Fragments field = 0 and the Fragment Count = 2, which means that there are no more fragments after this IP datagram and there are 2 total fragments, so this IP datagram cannot be the first fragment. Secondly, Fragment Offset = 185 bytes, which is a non-zero value, so this IP datagram cannot be the first datagram fragment. There are no more fragments because the IP header indicates that the Fragment Count = 2, which means that Frame 92 and 93 are the only packets associated with this 2000-byte IP packet.



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

Total Length, Flags, and Header Checksum change between the first and second fragment. Within the Flags field, the Fragment Offset changed between the first and second fragment.

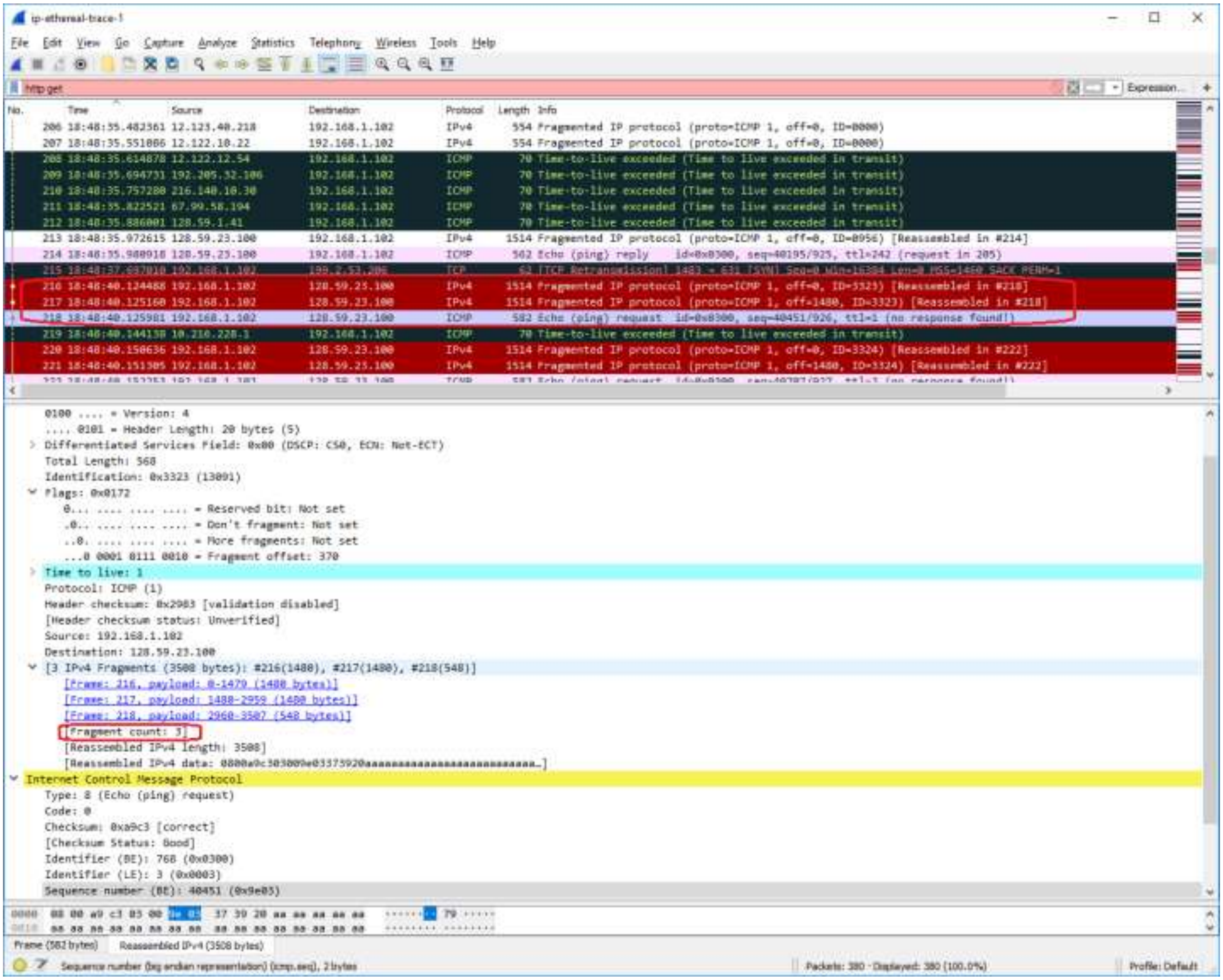

ip-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
http.get
Expression...
No. Time Source Destination Protocol Length Info
85 18:48:13.096610 67.99.58.194 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
86 18:48:13.101662 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=29955/885, ttl=12 (no response found!)
87 18:48:13.121734 192.168.1.102 128.59.23.100 ICMP 98 Echo (ping) request id=0x0300, seq=30211/886, ttl=13 (reply in 89)
88 18:48:13.126955 128.59.1.41 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
89 18:48:13.158271 128.59.23.100 192.168.1.102 ICMP 98 Echo (ping) reply id=0x0300, seq=30211/886, ttl=242 (request in 87)
90 18:48:19.586445 192.168.1.102 128.119.245.12 SSH 74 Client: Encrypted packet (len=20)
91 18:48:19.611090 128.119.245.12 192.168.1.102 TCP 60 22 → 1170 [ACK] Seq=1 Ack=21 Win=35040 Len=0
92 18:48:25.099863 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=32f9) [Reassembled in #93]
93 18:48:25.100537 192.168.1.102 128.59.23.100 ICMP 562 Echo (ping) request id=0x0300, seq=30467/887, ttl=1 (no response found!)
94 18:48:25.120616 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
95 18:48:25.129020 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=32fa) [Reassembled in #96]
96 18:48:25.129698 192.168.1.102 128.59.23.100 ICMP 562 Echo (ping) request id=0x0300, seq=30723/888, ttl=2 (no response found!)
97 18:48:25.149015 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=32fb) [Reassembled in #98]
Frame 92: 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)
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: 0x32f9 (13049)
Flags: 0x2000, More fragments
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..1. .... = More fragments: Set
...0 0000 0000 0000 = Fragment offset: 0
Time to live: 1
Protocol: ICMP (1)
Header checksum: 0x077b [validation disabled]
[Header checksum status: Unverified]
Source: 192.168.1.102
Destination: 128.59.23.100
Reassembled IPv4 in frame: 93
Data (1480 bytes)
Data: 0800d0c603007703373620aaaaaaaaaaaaaaaaaaaaaaaaaa…
[Length: 1480]
00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00
05 dc 32 f9 20 00 01 01 07 7b c0 a8 01 66 80 3b
Invalid filter: "get" was unexpected in this context.
Packets: 380 · Displayed: 380 (100.0%)
Profile: Default



Now find the first ICMP Echo Request message that was sent by your computer after you changed the *Packet Size* in *pingplotter* to be 3500.

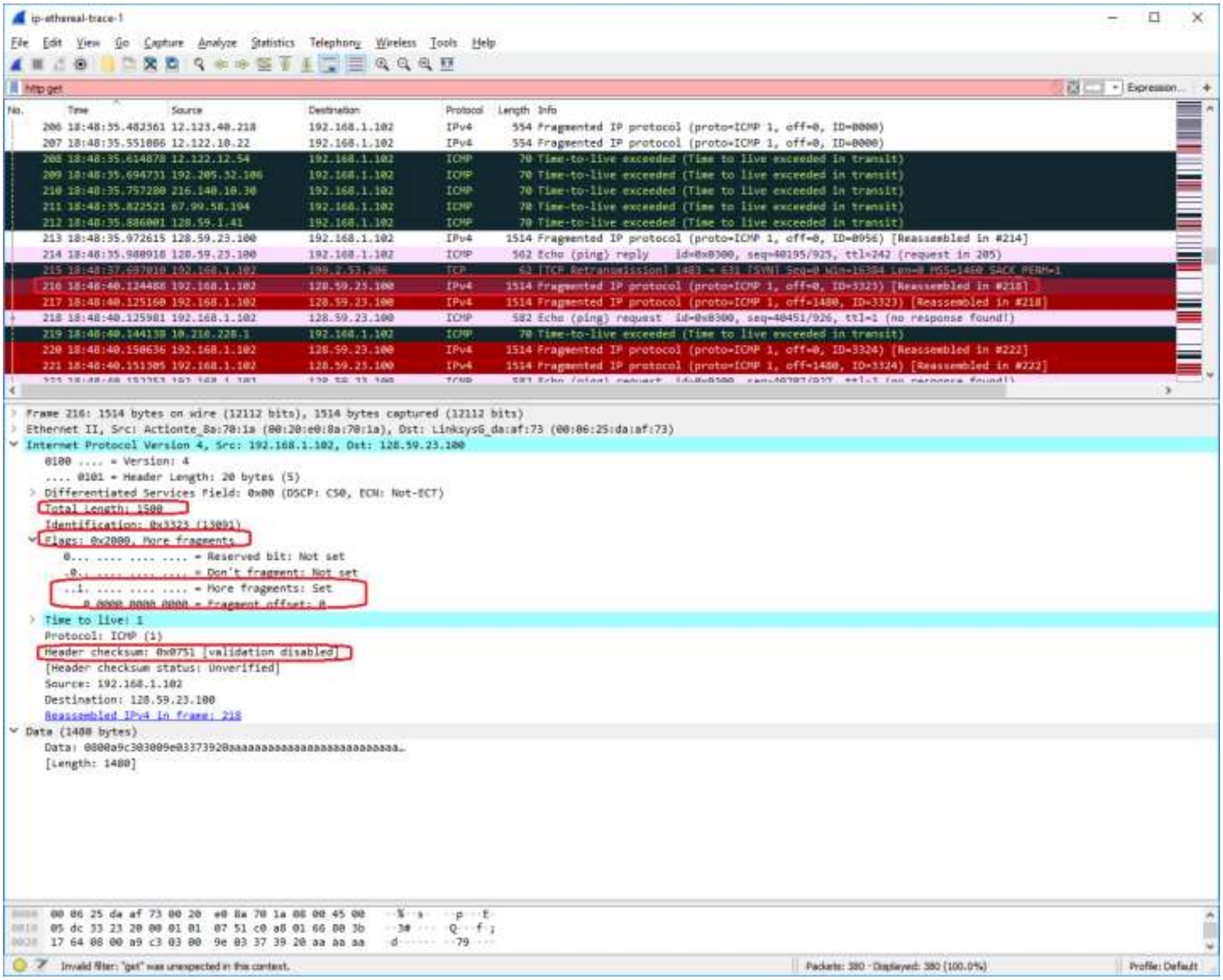
14) How many fragments were created from the original datagram?

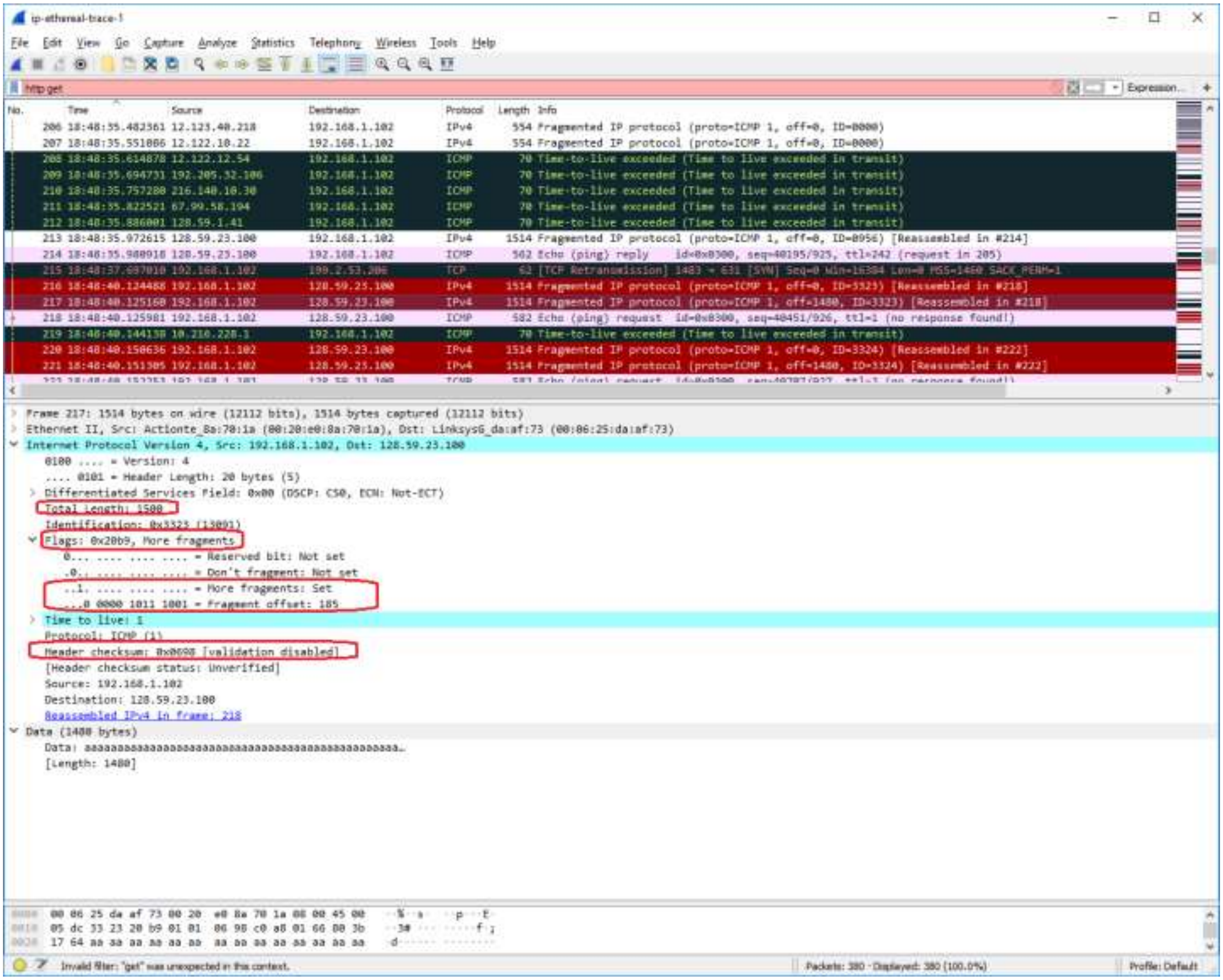
3 fragments were created from the original datagram.



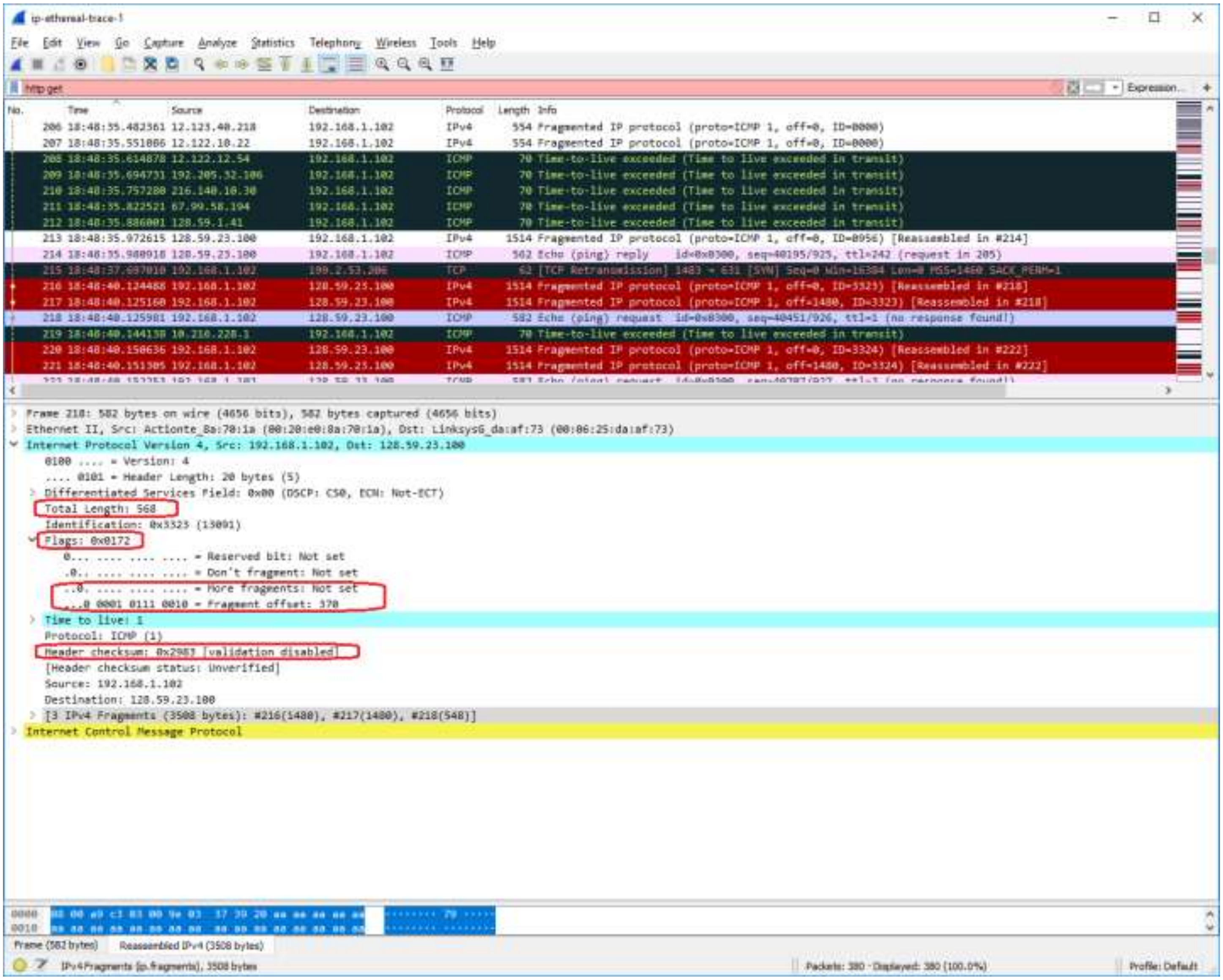
15) What fields change in the IP header among the fragments?

Total Length, Flags (More Fragments and Fragment Offset bit fields), and Header Checksum fields change in the IP header among the fragments.


ip-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
http get
No. Time Source Destination Protocol Length Info
206 18:48:35.482361 12.123.40.218 192.168.1.102 IPv4 554 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0000)
207 18:48:35.551086 12.122.10.22 192.168.1.102 IPv4 554 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0000)
208 18:48:35.614878 12.122.12.54 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
209 18:48:35.694731 192.205.32.106 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
210 18:48:35.757280 216.140.10.30 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
211 18:48:35.822521 67.99.58.194 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
212 18:48:35.886001 128.59.1.41 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
213 18:48:35.972615 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0956) [Reassembled in #214]
214 18:48:35.980918 128.59.23.100 192.168.1.102 ICMP 562 Echo (ping) reply id=0x0300, seq=40195/925, ttl=242 (request in 205)
216 18:48:40.124488 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=3323) [Reassembled in #218]
217 18:48:40.125160 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=3323) [Reassembled in #218]
218 18:48:40.125981 192.168.1.102 128.59.23.100 ICMP 582 Echo (ping) request id=0x0300, seq=40451/926, ttl=1 (no response found!)
219 18:48:40.144138 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
220 18:48:40.150636 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=3324) [Reassembled in #222]
221 18:48:40.151305 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=3324) [Reassembled in #222]
Frame 216: 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)
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)
Flags: 0x2000, More fragments
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..1. .... = More fragments: Set
...0 0000 0000 0000 = Fragment offset: 0
Time to live: 1
Protocol: ICMP (1)
Header checksum: 0x0751 [validation disabled]
[Header checksum status: Unverified]
Source: 192.168.1.102
Destination: 128.59.23.100
Reassembled IPv4 in frame: 218
Data (1480 bytes)
Data: 0800a9c303009e03373920aaaaaaaaaaaaaaaaaaaaaaaaa…
[Length: 1480]
00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00
05 dc 33 23 20 00 01 01 07 51 c0 a8 01 66 80 3b
17 64 08 00 a9 c3 03 00 9e 03 37 39 20 aa aa aa
Invalid filter: "get" was unexpected in this context.
Packets: 380 · Displayed: 380 (100.0%)
Profile: Default



ip-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
http get
No. Time Source Destination Protocol Length Info
206 18:48:35.482361 12.123.40.218 192.168.1.102 IPv4 554 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0000)
207 18:48:35.551086 12.122.10.22 192.168.1.102 IPv4 554 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0000)
208 18:48:35.614878 12.122.12.54 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
209 18:48:35.694731 192.205.32.106 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
210 18:48:35.757280 216.140.10.30 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
211 18:48:35.822521 67.99.58.194 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
212 18:48:35.886001 128.59.1.41 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
213 18:48:35.972615 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0956) [Reassembled in #214]
214 18:48:35.980918 128.59.23.100 192.168.1.102 ICMP 582 Echo (ping) reply id=0x0300, seq=40195/925, ttl=242 (request in 205)
215 18:48:37.697010 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 18:48:40.124488 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=3323) [Reassembled in #218]
217 18:48:40.125160 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=3323) [Reassembled in #218]
218 18:48:40.125981 192.168.1.102 128.59.23.100 ICMP 582 Echo (ping) request id=0x0300, seq=40451/926, ttl=1 (no response found!)
219 18:48:40.144138 10.216.228.1 192.168.1.102 ICMP 70 Time-to-live exceeded (Time to live exceeded in transit)
220 18:48:40.150636 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=3324) [Reassembled in #222]
221 18:48:40.151305 192.168.1.102 128.59.23.100 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=3324) [Reassembled in #222]
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)
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)
Flags: 0x20b9, More fragments
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..1. .... = More fragments: Set
...0 0000 1011 1001 = Fragment offset: 185
Time to live: 1
Protocol: ICMP (1)
Header checksum: 0x0098 [validation disabled]
[Header checksum status: Unverified]
Source: 192.168.1.102
Destination: 128.59.23.100
Reassembled IPv4 in frame: 218
Data (1480 bytes)
Data: aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa…
[Length: 1480]
Invalid filter: "get" was unexpected in this context.
Packets: 380 · Displayed: 380 (100.0%)
Profile: Default


ip-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
http get
No. Time Source Destination Protocol Length Info
Frame 218: 582 bytes on wire (4656 bits), 582 bytes captured (4656 bits)
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)
Flags: 0x0172
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..0. .... = More fragments: Not set
...0 0001 0111 0010 = Fragment offset: 370
Time to live: 1
Protocol: ICMP (1)
Header checksum: 0x2983 [validation disabled]
[Header checksum status: Unverified]
Source: 192.168.1.102
Destination: 128.59.23.100
[3 IPv4 Fragments (3508 bytes): #216(1480), #217(1480), #218(548)]
Internet Control Message Protocol
Frame (582 bytes) Reassembled IPv4 (3508 bytes)
IPv4 Fragments (ip.fragments), 3508 bytes
Packets: 380 · Displayed: 380 (100.0%)
Profile: Default