COMPUTER NETWORKING
WIRESHARK LAB: IP
BY:
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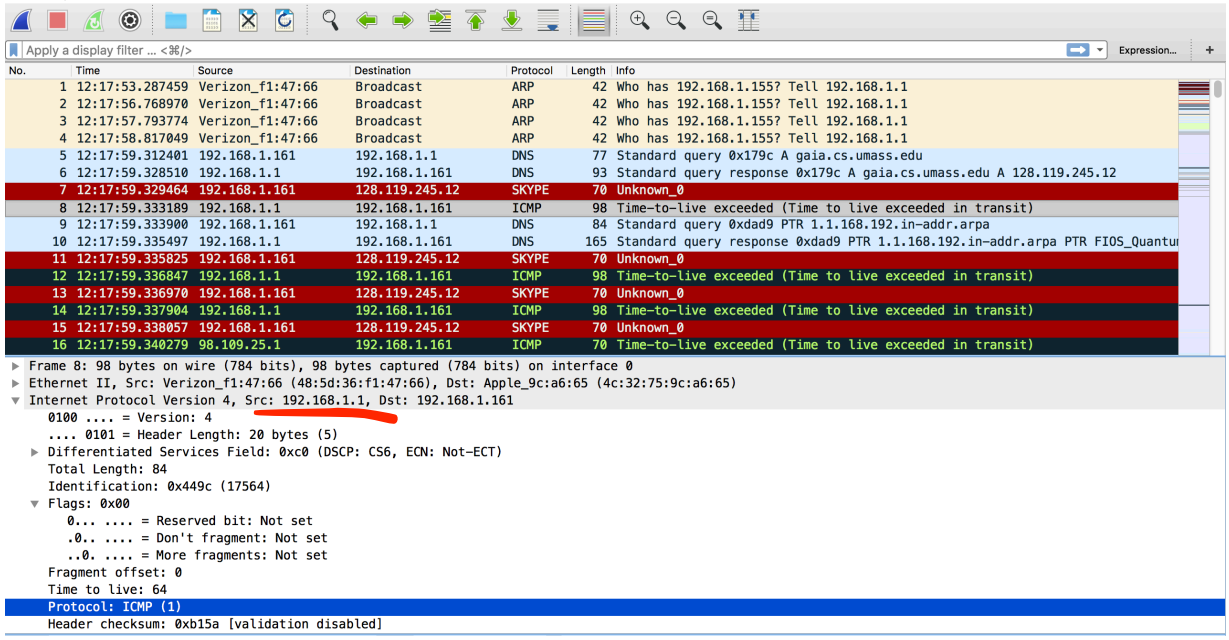
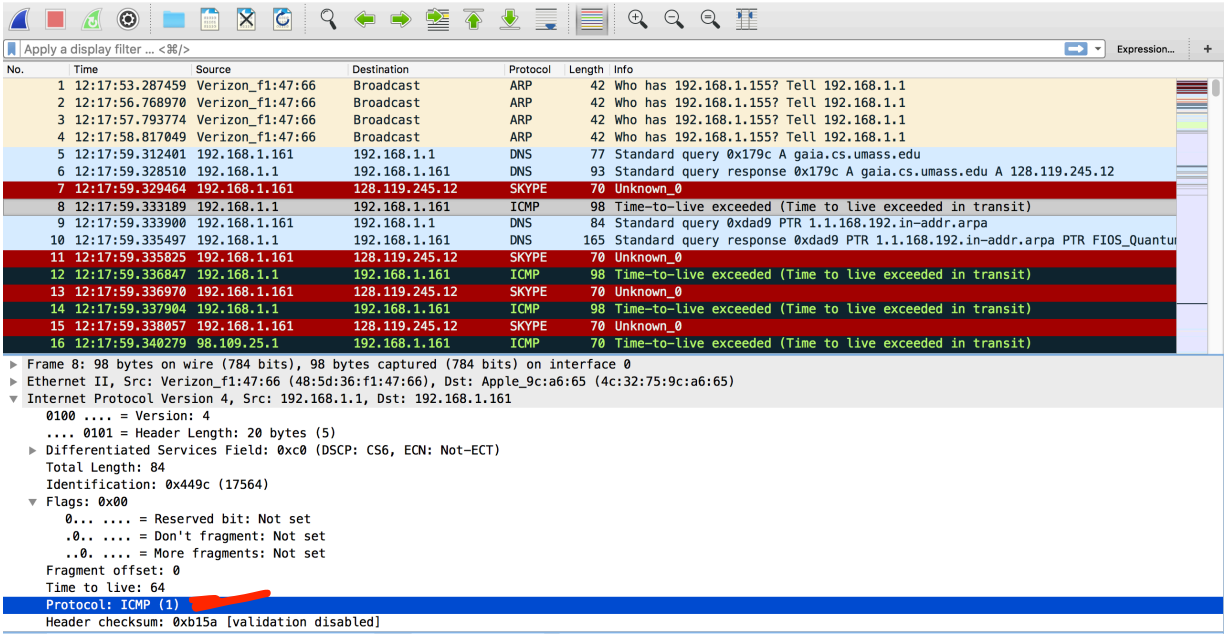
1. Select the first ICMP Echo Request message sent by your computer, and expand the Internet Protocol part of the packet in the packet details window. What is the IP address of your computer?
Ans) 192.168.1.1



2. Within the IP packet header, what is the value in the upper layer protocol field?
Ans.) ICMP (1)

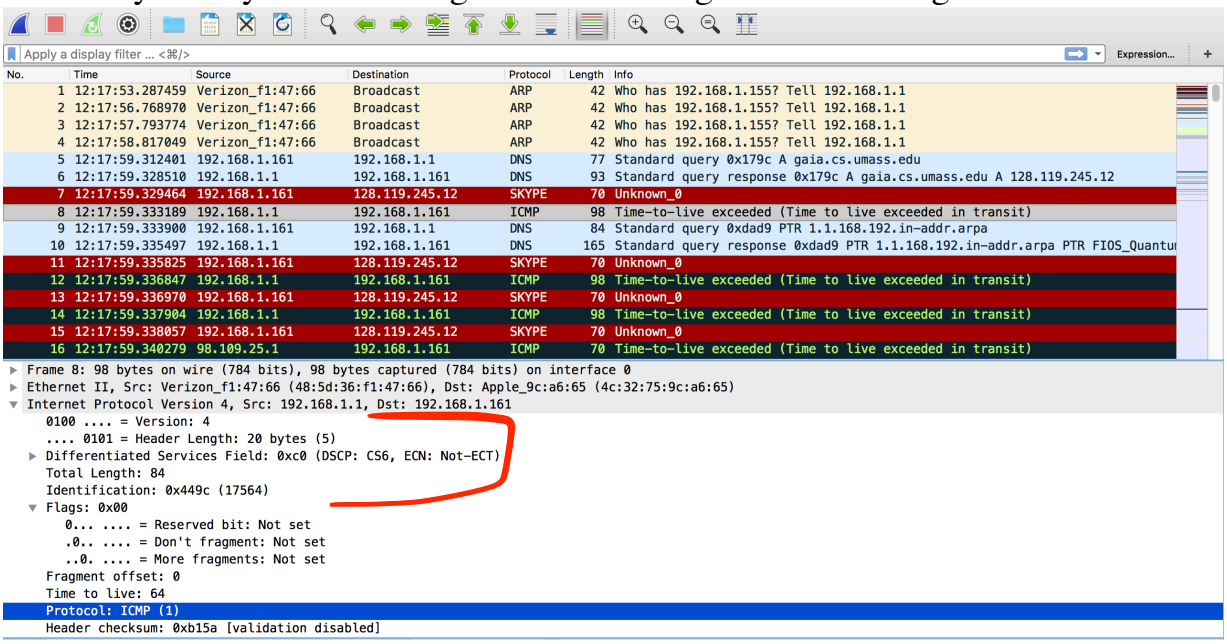


3. How many bytes are in the IP header? How many bytes are in the payload of the IP datagram? Explain how you determined the number of payload bytes.

Ans.) IP Header Length = 20 bytes

Payload bytes in IP datagram = 64 bytes

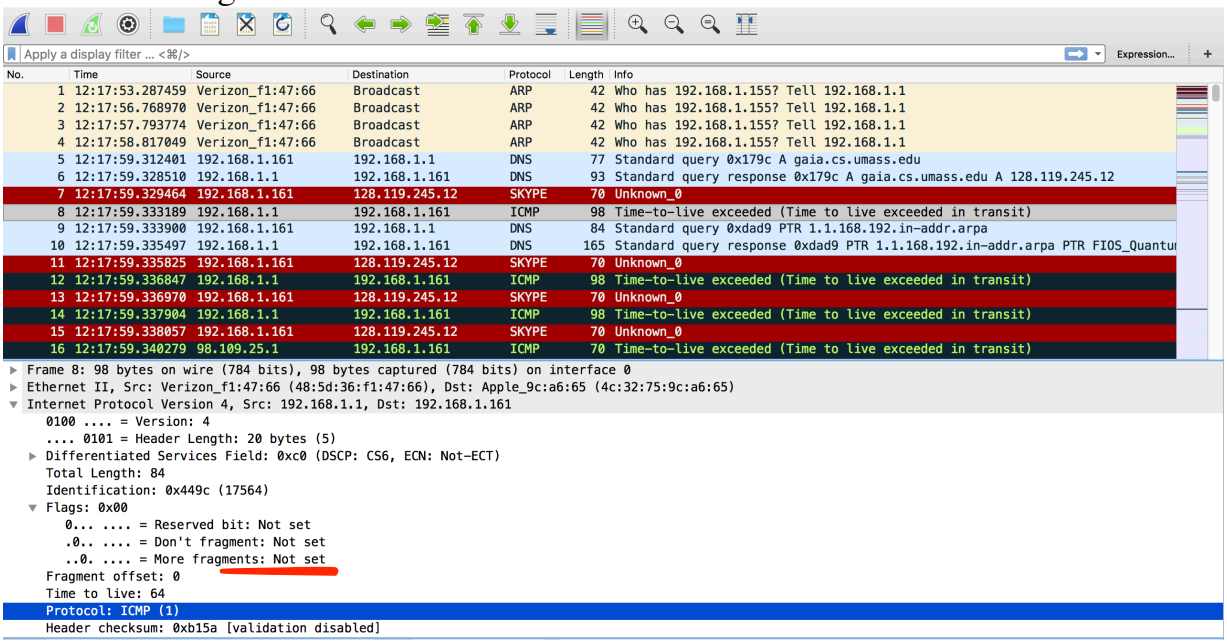
Payload bytes in IP datagram = Total length - Header length



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

Ans.) IP datagram is not fragmented. The datagram is not fragment as in the Flags : 0x00 -> More Fragments : Not Set.

Refer Fig. below



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 change.

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

Ans.) The fields that stay constant across the IP datagrams are:

- Version
- header length
- source IP
- destination IP
- Differentiated Services
- Upper Layer Protocol

The fields that must stay constant are:

- Version
- header length
- destination IP (since we are sending to the same dest)
- Differentiated Services (since all packets are ICMP they use the same Type of Service class)

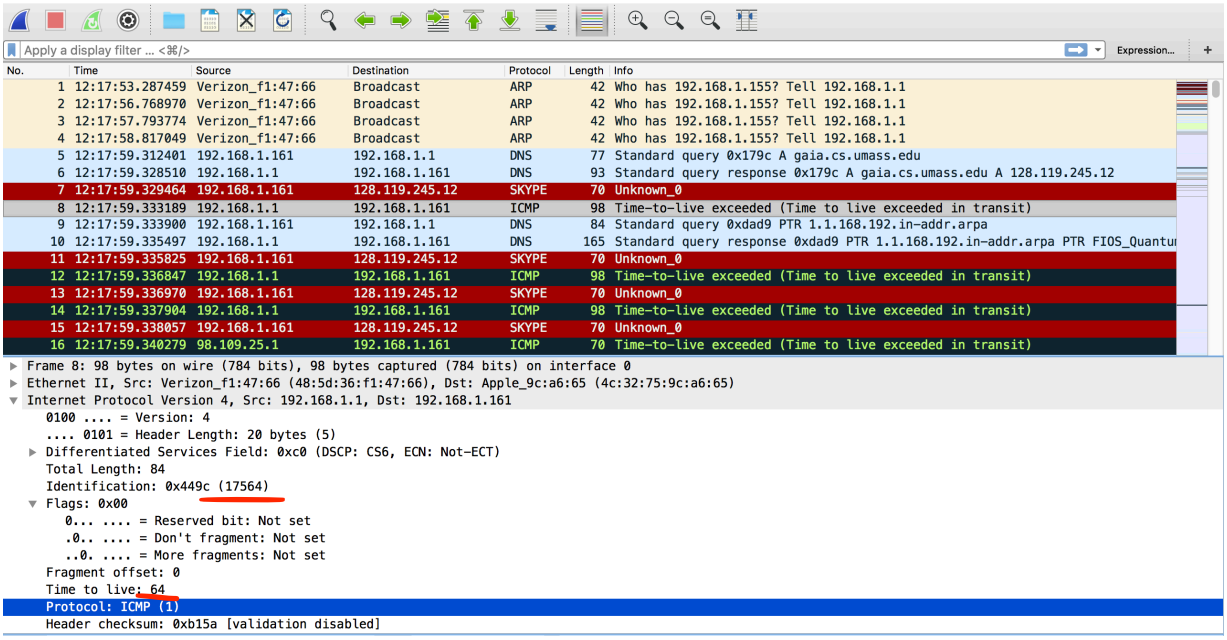
- Upper Layer Protocol (since these are ICMP packets)

The fields that must change are:

- Identification
- Time to live
- Header checksum

7. Describe the pattern you see in the values in the Identification field of the IP datagram
Ans.) Decrement by 1 every time.

8. What is the value in the Identification field and the TTL field?
Ans.) Identification field : 17564
TTL field : 64



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 value changes but the TTL values remain the same because all values are received from same 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? [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 ipethereal-trace-1packet trace. If your computer has an Ethernet interface, a packet size of 2000 should cause fragmentation.3]

Ans.) The message is fragmented in two packets that are of length 1500 and 520.

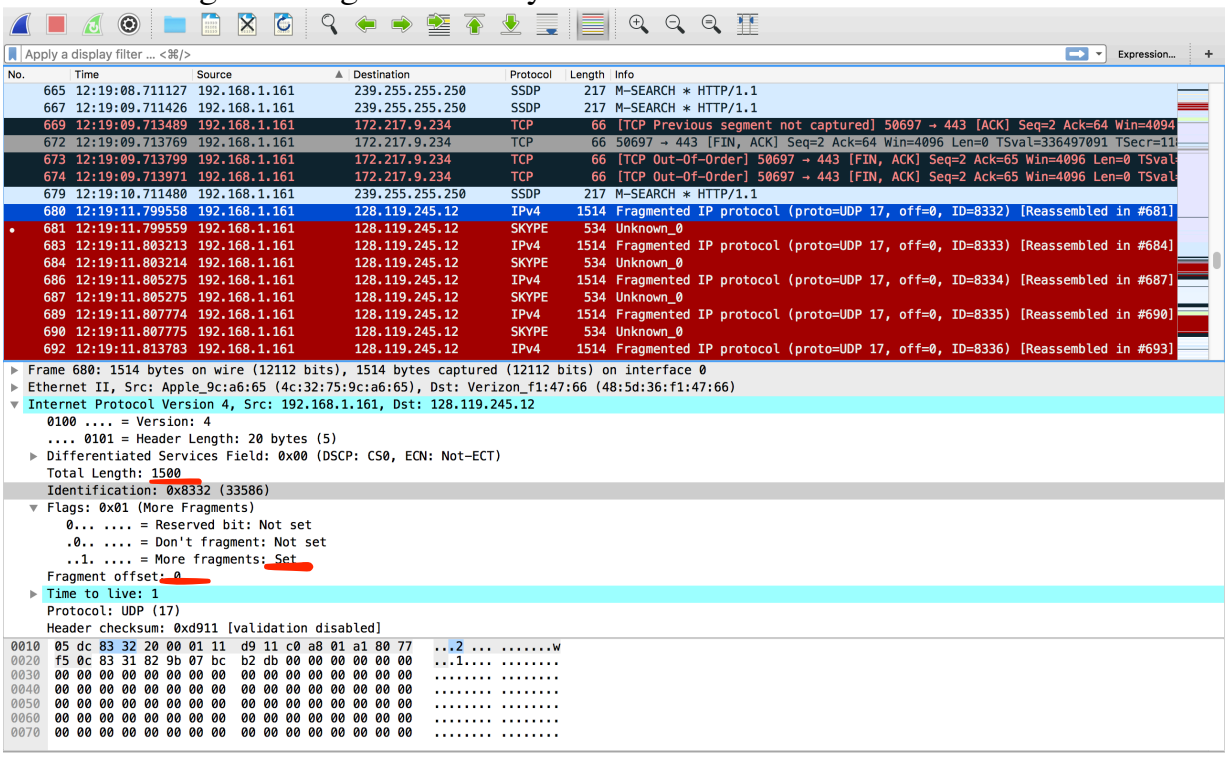
11. Print out the first fragment of the fragmented IP datagram. What information in the IP header indicates that the datagram been fragmented? What information in the IP header indicates whether this is the first fragment versus a latter fragment? How long is this IP datagram?

Ans.) Flags 0x01:

More Fragments: Set, indicates datagram has been fragmented.

Fragment Offset = 0 indicates this is first fragment.

IP datagram Length = 1500 bytes.

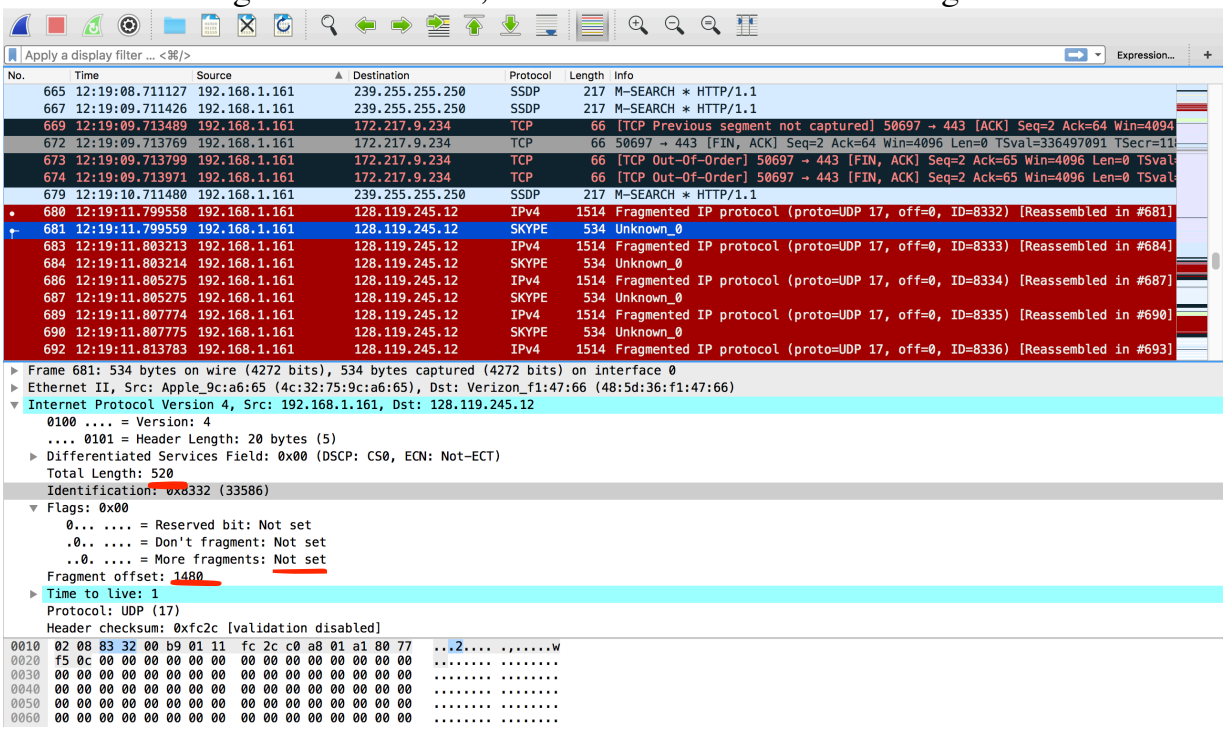


12. Print out the second fragment of the fragmented IP datagram. What information in the IP header indicates that this is not the first datagram fragment? Are the more fragments? How can you tell?

Ans.) Fragment Offset: 1480 bytes , hence not first datagram fragment.

Flags:

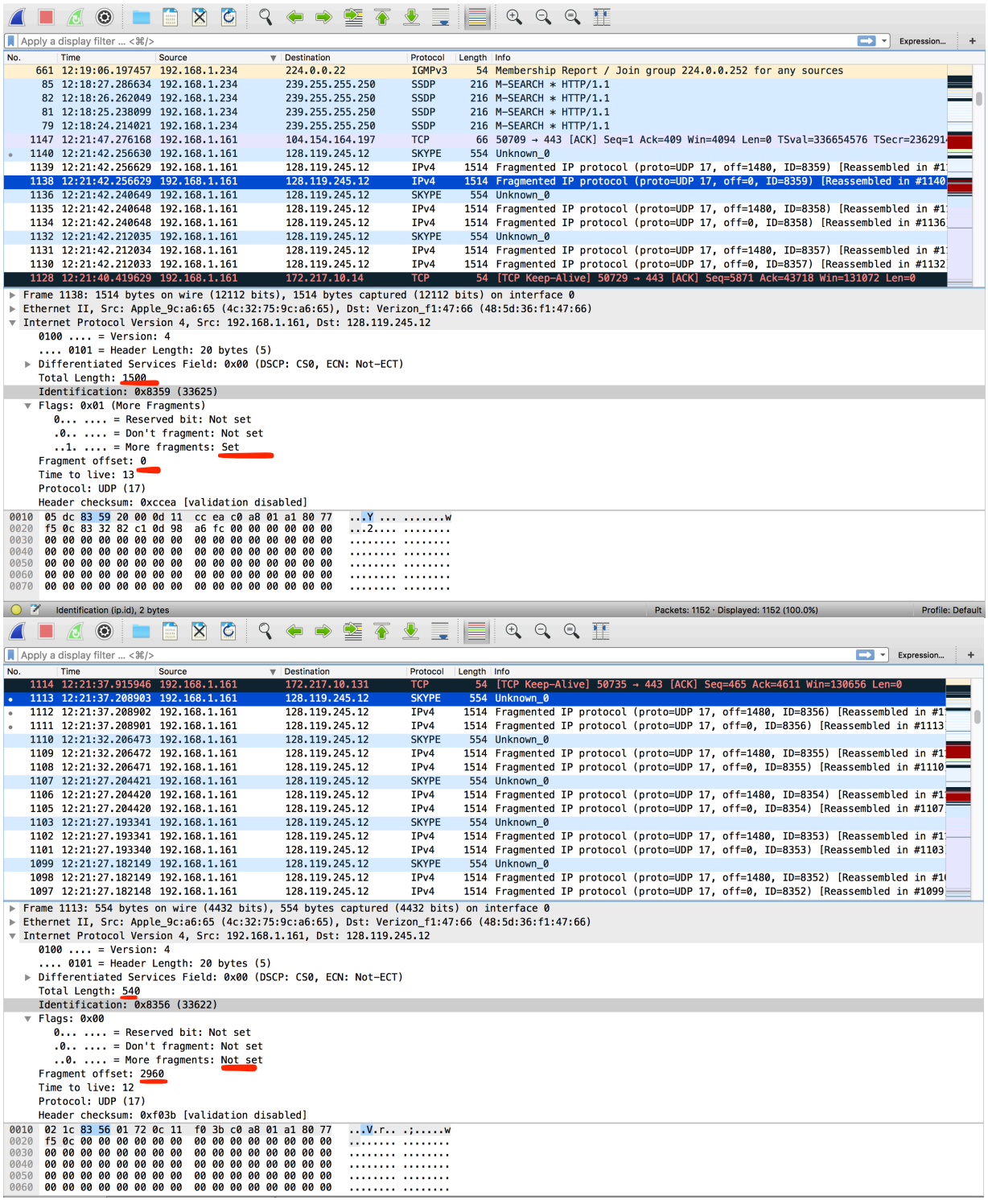
More Fragments: Not Set., indicates there are no more fragments.

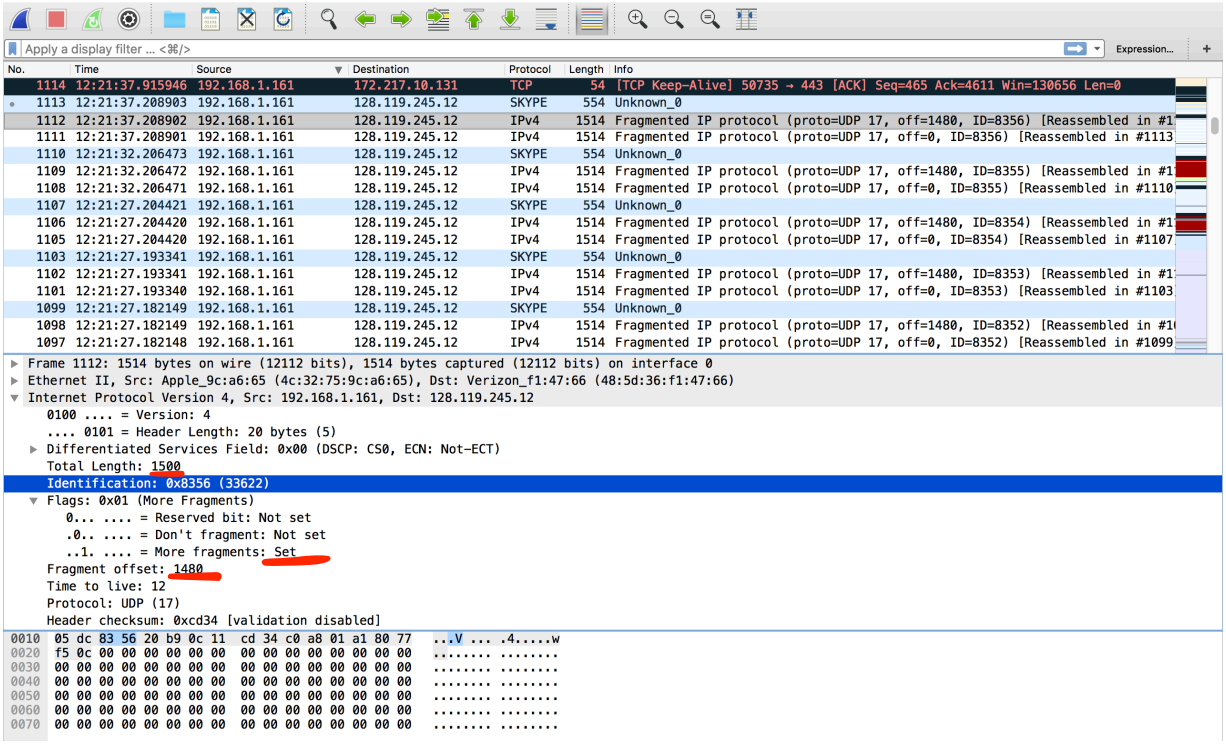


13. What fields change in the IP header between the first and second fragment?
Ans.) The fields like Total Length, flags and fragment Offset change between the first and second fragment.

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

15. What fields change in the IP header among the fragments?
Ans.) Fragment 1 -> Fragment2 : Fragment Offset (0 -> 1480)
Fragment 2 - > Fragment 3 : Total Length (1500-> 540) , Fragment Offset(1490 -> 2960) , Flags(More Fragment: Set -> More Fragment : Not Set)


Apply a display filter ... <⌘/>
Expression...
No. Time Source Destination Protocol Length Info
661 12:19:06.197457 192.168.1.234 224.0.0.22 IGMPv3 54 Membership Report / Join group 224.0.0.252 for any sources
85 12:18:27.286634 192.168.1.234 239.255.255.250 SSDP 216 M-SEARCH * HTTP/1.1
82 12:18:26.262049 192.168.1.234 239.255.255.250 SSDP 216 M-SEARCH * HTTP/1.1
81 12:18:25.238099 192.168.1.234 239.255.255.250 SSDP 216 M-SEARCH * HTTP/1.1
79 12:18:24.214021 192.168.1.234 239.255.255.250 SSDP 216 M-SEARCH * HTTP/1.1
1147 12:21:47.276168 192.168.1.161 104.154.164.197 TCP 66 50709 → 443 [ACK] Seq=1 Ack=409 Win=4094 Len=0 TSval=336654576 TSecr=236291
1140 12:21:42.256630 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1139 12:21:42.256629 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8359) [Reassembled in #1
1138 12:21:42.256629 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8359) [Reassembled in #1140
1136 12:21:42.240649 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1135 12:21:42.240648 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8358) [Reassembled in #1
1134 12:21:42.240648 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8358) [Reassembled in #1136
1132 12:21:42.212035 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1131 12:21:42.212034 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8357) [Reassembled in #1
1130 12:21:42.212033 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8357) [Reassembled in #1132
1128 12:21:40.419629 192.168.1.161 172.217.10.14 TCP 54 [TCP Keep-Alive] 50729 → 443 [ACK] Seq=5871 Ack=43718 Win=131072 Len=0
Frame 1138: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits) on interface 0
Ethernet II, Src: Apple_9c:a6:65 (4c:32:75:9c:a6:65), Dst: Verizon_f1:47:66 (48:5d:36:f1:47:66)
Internet Protocol Version 4, Src: 192.168.1.161, Dst: 128.119.245.12
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 1500
Identification: 0x8359 (33625)
Flags: 0x01 (More Fragments)
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..1. .... = More fragments: Set
Fragment offset: 0
Time to live: 13
Protocol: UDP (17)
Header checksum: 0xccea [validation disabled]
0010 05 dc 83 59 20 00 0d 11 cc ea c0 a8 01 a1 80 77 ...Y ... .w
0020 f5 0c 83 32 82 c1 0d 98 a6 fc 00 00 00 00 00 00 ...2.... ....
0030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0040 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0050 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
Identification (ip.id), 2 bytes
Packets: 1152 · Displayed: 1152 (100.0%)
Profile: Default
Apply a display filter ... <⌘/>
Expression...
No. Time Source Destination Protocol Length Info
1114 12:21:37.915946 192.168.1.161 172.217.10.131 TCP 54 [TCP Keep-Alive] 50735 → 443 [ACK] Seq=465 Ack=4611 Win=130656 Len=0
1113 12:21:37.208903 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1112 12:21:37.208902 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8356) [Reassembled in #1
1111 12:21:37.208901 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8356) [Reassembled in #1113
1110 12:21:32.206473 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1109 12:21:32.206472 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8355) [Reassembled in #1
1108 12:21:32.206471 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8355) [Reassembled in #1110
1107 12:21:27.204421 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1106 12:21:27.204420 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8354) [Reassembled in #1
1105 12:21:27.204420 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8354) [Reassembled in #1107
1103 12:21:27.193341 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1102 12:21:27.193341 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8353) [Reassembled in #1
1101 12:21:27.193340 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8353) [Reassembled in #1103
1099 12:21:27.182149 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1098 12:21:27.182149 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8352) [Reassembled in #1
1097 12:21:27.182148 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8352) [Reassembled in #1099
Frame 1113: 554 bytes on wire (4432 bits), 554 bytes captured (4432 bits) on interface 0
Ethernet II, Src: Apple_9c:a6:65 (4c:32:75:9c:a6:65), Dst: Verizon_f1:47:66 (48:5d:36:f1:47:66)
Internet Protocol Version 4, Src: 192.168.1.161, Dst: 128.119.245.12
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 540
Identification: 0x8356 (33622)
Flags: 0x00
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..0. .... = More fragments: Not set
Fragment offset: 2960
Time to live: 12
Protocol: UDP (17)
Header checksum: 0xf03b [validation disabled]
0010 02 1c 83 56 01 72 0c 11 f0 3b c0 a8 01 a1 80 77 ...V.r.. .;.....w
0020 f5 0c 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0040 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0050 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....


Apply a display filter ... <⌘/>
Expression...
No. Time Source Destination Protocol Length Info
1114 12:21:37.915946 192.168.1.161 172.217.10.131 TCP 54 [TCP Keep-Alive] 50735 → 443 [ACK] Seq=465 Ack=4611 Win=130656 Len=0
1113 12:21:37.208903 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1112 12:21:37.208902 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8356) [Reassembled in #1
1111 12:21:37.208901 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8356) [Reassembled in #1113
1110 12:21:32.206473 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1109 12:21:32.206472 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8355) [Reassembled in #1
1108 12:21:32.206471 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8355) [Reassembled in #1110
1107 12:21:27.204421 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1106 12:21:27.204420 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8354) [Reassembled in #1
1105 12:21:27.204420 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8354) [Reassembled in #1107
1103 12:21:27.193341 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1102 12:21:27.193341 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8353) [Reassembled in #1
1101 12:21:27.193340 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8353) [Reassembled in #1103
1099 12:21:27.182149 192.168.1.161 128.119.245.12 SKYPE 554 Unknown_0
1098 12:21:27.182149 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=1480, ID=8352) [Reassembled in #1
1097 12:21:27.182148 192.168.1.161 128.119.245.12 IPv4 1514 Fragmented IP protocol (proto=UDP 17, off=0, ID=8352) [Reassembled in #1099
Frame 1112: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits) on interface 0
Ethernet II, Src: Apple_9c:a6:65 (4c:32:75:9c:a6:65), Dst: Verizon_f1:47:66 (48:5d:36:f1:47:66)
Internet Protocol Version 4, Src: 192.168.1.161, Dst: 128.119.245.12
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 1500
Identification: 0x8356 (33622)
Flags: 0x01 (More Fragments)
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..1. .... = More fragments: Set
Fragment offset: 1480
Time to live: 12
Protocol: UDP (17)
Header checksum: 0xcd34 [validation disabled]
0010 05 dc 83 56 20 b9 0c 11 cd 34 c0 a8 01 a1 80 77 ...V ... .4.....w
0020 f5 0c 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0040 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0050 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....