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CS6843 - Computer Networking
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# Wireshark Lab - IP

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? IP Address: `192.168.1.151`

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

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: `20 bytes` Payload: `36 bytes` The total length of the datagram is `56 bytes` and the header is `20 bytes` therefore the payload must be `36`

bytes

4. Has this IP datagram been fragmented? Explain how you determined whether or not the datagram has been fragmented. No. The Fragment offset is 0 in the flags for the IP packet.

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, frame, and header checksum fields change.

wireshark_lab-ip.pcapng
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
984 57.6266… 192.168.1.13 239.255.255.250 UDP 771 38474 → 3702 Len=729
8 1.68733… 192.168.1.151 192.168.1.1 DNS 77 Standard query 0x535d A
9 1.68741… 192.168.1.151 192.168.1.1 DNS 77 Standard query 0x2765 AA
12 1.71905… 192.168.1.151 128.119.245.12 UDP 70 39959 → 33434 Len=28
13 1.71914… 192.168.1.151 128.119.245.12 UDP 70 54829 → 33435 Len=28
14 1.71917… 192.168.1.151 128.119.245.12 UDP 70 60344 → 33436 Len=28
15 1.71927… 192.168.1.151 128.119.245.12 UDP 70 43467 → 33437 Len=28
16 1.71937… 192.168.1.151 128.119.245.12 UDP 70 59152 → 33438 Len=28
17 1.71945… 192.168.1.151 128.119.245.12 UDP 70 39198 → 33439 Len=28
18 1.71948… 192.168.1.151 128.119.245.12 UDP 70 41024 → 33440 Len=28
19 1.71958… 192.168.1.151 128.119.245.12 UDP 70 53173 → 33441 Len=28
20 1.71966… 192.168.1.151 128.119.245.12 UDP 70 53302 → 33442 Len=28
21 1.71974… 192.168.1.151 128.119.245.12 UDP 70 42098 → 33443 Len=28
22 1.71977… 192.168.1.151 128.119.245.12 UDP 70 55470 → 33444 Len=28
23 1.71986… 192.168.1.151 128.119.245.12 UDP 70 60931 → 33445 Len=28
24 1.71994… 192.168.1.151 128.119.245.12 UDP 70 55695 → 33446 Len=28
Frame 12: 70 bytes on wire (560 bits), 70 bytes captured (560 bits) on interface 0
Ethernet II, Src: PcsCompu_0a:94:54 (08:00:27:0a:94:54), Dst: Netgear_f1:e9:d6 (6c:b0:ce:f1:e9:d6)
Internet Protocol Version 4, Src: 192.168.1.151, 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: 56
Identification: 0x241f (9247)
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: UDP (17)
Header checksum: 0x5dd3 [validation disabled]
[Header checksum status: Unverified]
Source: 192.168.1.151
Destination: 128.119.245.12
User Datagram Protocol, Src Port: 39959, Dst Port: 33434
Data (28 bytes)
0010 00 38 24 1f 00 00 01 11 5d d3 c0 a8 01 97 80 77 ·8$····· ]·····w
Protocol (ip.proto), 1 byte
Packets: 997 · Displayed: 997 (100.0%)
Profile: Default

6. Which fields stay constant? Which of the fields must stay constant? Which fields must change? Why? IPv4, Length of the header, Source IP, Destination IP and the protocol (always using UDP). The header checksum and the identification change each time to verify the packets and keep track of header changes.
7. Describe the pattern you see in the values in the Identification field of the IP datagram The identification field increases by one in each echo request.
8. What is the value in the Identification field and the TTL field? Identification Field: `0x5f16 (24342)` 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? TTL does not change, but the identification field does. Identification field has to change if the packets are unique (non-fragmented) the identification field needs to be unique. The TTL field doesn't change 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 pingplotterto 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.zipand extract the ip-ethereal-trace-1packet trace. If your computer has an Ethernet interface, a packet size of 2000 should cause fragmentation.]

Yes, it is.

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? The flag for more segments is set in the header. The offset is 0, which indicates that this is the first packet. The total length of the datagram is 1500bytes.

C:\Users\joelb\Dropbox\School\Graduate\fall_2018\CS6843-Computer_Networking\assignments\wireshark_lab_05\wireshark_lab-ip.pcapng 997 total packets, 997 shown

```
No.     Time           Source                Destination           Protocol Length Info
    330 32.798715931   192.168.1.151         128.119.245.12        IPv4     1514   Fragmented IP protocol (proto=UDP 17, off=0,
ID=31e5) [Reassembled in #331]
Frame 330: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits) on interface 0
Ethernet II, Src: PcsCompu_0a:94:54 (08:00:27:0a:94:54), Dst: Netgear_f1:e9:d6 (6c:b0:ce:f1:e9:d6)
Internet Protocol Version 4, Src: 192.168.1.151, 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: 0x31e5 (12773)
    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: UDP (17)
    Header checksum: 0x2a69 [validation disabled]
    [Header checksum status: Unverified]
    Source: 192.168.1.151
    Destination: 128.119.245.12
    Reassembled IPv4 in frame: 331
Data (1480 bytes)
0000  c4 e3 82 9a 07 bc b4 a1 40 41 42 43 44 45 46 47   ........@ABCDEFG
0010  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0020  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0030  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0040  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0050  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0060  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0070  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0080  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0090  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
00a0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
00b0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
00c0  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
00d0  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
00e0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
00f0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0100  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0110  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0120  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0130  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0140  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0150  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0160  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0170  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0180  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0190  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
01a0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
01b0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
01c0  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
01d0  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
01e0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
01f0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0200  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0210  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0220  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0230  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0240  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0250  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0260  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0270  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0280  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0290  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
02a0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
02b0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
02c0  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
02d0  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
02e0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
02f0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0300  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0310  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0320  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0330  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0340  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0350  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0360  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
```

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```
0370  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0380  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0390  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
03a0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
03b0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
03c0  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
03d0  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
03e0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
03f0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0400  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0410  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0420  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0430  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0440  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0450  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0460  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0470  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0480  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0490  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
04a0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
04b0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
04c0  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
04d0  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
04e0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
04f0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0500  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0510  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0520  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0530  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0540  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0550  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
0560  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
0570  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
0580  78 79 7a 7b 7c 7d 7e 7f 40 41 42 43 44 45 46 47   xyz{|}~.@ABCDEFG
0590  48 49 4a 4b 4c 4d 4e 4f 50 51 52 53 54 55 56 57   HIJKLMNOPQRSTUVW
05a0  58 59 5a 5b 5c 5d 5e 5f 60 61 62 63 64 65 66 67   XYZ[\]^_`abcdefg
05b0  68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 77   hijklmnopqrstuvw
05c0  78 79 7a 7b 7c 7d 7e 7f                           xyz{|}~.
```

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? This fragment has an offset of 1480. There are no more fragments because the flag for more fragments is not set.

```
No.     Time           Source                Destination           Protocol Length Info
    331 32.798778306   192.168.1.151         128.119.245.12        UDP      534    50403 → 33434 Len=1972
Frame 331: 534 bytes on wire (4272 bits), 534 bytes captured (4272 bits) on interface 0
Ethernet II, Src: PcsCompu_0a:94:54 (08:00:27:0a:94:54), Dst: Netgear_f1:e9:d6 (6c:b0:ce:f1:e9:d6)
Internet Protocol Version 4, Src: 192.168.1.151, 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: 520
    Identification: 0x31e5 (12773)
    Flags: 0x00b9
        0... .... .... .... = Reserved bit: Not set
        .0.. .... .... .... = Don't fragment: Not set
        ..0. .... .... .... = More fragments: Not set
        ...0 0000 1011 1001 = Fragment offset: 185
    Time to live: 1
    Protocol: UDP (17)
    Header checksum: 0x4d84 [validation disabled]
    [Header checksum status: Unverified]
    Source: 192.168.1.151
    Destination: 128.119.245.12
    [2 IPv4 Fragments (1980 bytes): #330(1480), #331(500)]
User Datagram Protocol, Src Port: 50403, Dst Port: 33434
Data (1972 bytes)
0000  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0010  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0020  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0030  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0040  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0050  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0060  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0070  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0080  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0090  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
00a0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
00b0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
00c0  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
00d0  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
00e0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
00f0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0100  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0110  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0120  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0130  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0140  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0150  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0160  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0170  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0180  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0190  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
01a0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
01b0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
01c0  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
01d0  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
01e0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
01f0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0200  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0210  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0220  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0230  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0240  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0250  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0260  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0270  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0280  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0290  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
02a0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
02b0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
02c0  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
02d0  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
02e0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
02f0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0300  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0310  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0320  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0330  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0340  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0350  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0360  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0370  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0380  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0390  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
03a0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
```

```
03b0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
03c0  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
03d0  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
03e0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
03f0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0400  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0410  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0420  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0430  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0440  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0450  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0460  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0470  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0480  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0490  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
04a0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
04b0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
04c0  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
04d0  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
04e0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
04f0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0500  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0510  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0520  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0530  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0540  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0550  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0560  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0570  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0580  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0590  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
05a0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
05b0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
05c0  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
05d0  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
05e0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
05f0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0600  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0610  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0620  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0630  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0640  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0650  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0660  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0670  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0680  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0690  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
06a0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
06b0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
06c0  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
06d0  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
06e0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
06f0  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0700  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0710  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0720  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0730  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0740  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0750  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
0760  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
0770  70 71 72 73 74 75 76 77 78 79 7a 7b 7c 7d 7e 7f   pqrstuvwxyz{|}~.
0780  40 41 42 43 44 45 46 47 48 49 4a 4b 4c 4d 4e 4f   @ABCDEFGHIJKLMNO
0790  50 51 52 53 54 55 56 57 58 59 5a 5b 5c 5d 5e 5f   PQRSTUVWXYZ[\]^_
07a0  60 61 62 63 64 65 66 67 68 69 6a 6b 6c 6d 6e 6f   `abcdefghijklmno
07b0  70 71 72 73                                       pqrs
```

13. What fields change in the IP header between the first and second fragment? Length, Flags Set, Fragment Offset, and Header Checksum

14. How many fragments were created from the original datagram? 3 fragments

wireshark_lab-ip.pcapng
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
616 43.4976… 192.168.1.151 128.119.245.12 UDP 534 57260 → 33509 Len=1972
617 43.4977… 192.168.1.151 128.119.245.12 IPv4 1514 Fragmented IP protocol (
618 43.4977… 192.168.1.151 128.119.245.12 UDP 534 56082 → 33510 Len=1972
621 43.5217… 192.168.1.151 192.168.1.1 DNS 87 Standard query 0x8b90 PT
629 43.5704… 192.168.1.151 192.168.1.1 DNS 77 Standard query 0xbfa8 A
630 43.5705… 192.168.1.151 192.168.1.1 DNS 77 Standard query 0x25b3 AA
633 43.5943… 192.168.1.151 128.119.245.12 IPv4 1514 Fragmented IP protocol (
634 43.5944… 192.168.1.151 128.119.245.12 IPv4 1514 Fragmented IP protocol (
635 43.5944… 192.168.1.151 128.119.245.12 UDP 554 54213 → 33434 Len=3472
636 43.5944… 192.168.1.151 128.119.245.12 IPv4 1514 Fragmented IP protocol (
637 43.5944… 192.168.1.151 128.119.245.12 IPv4 1514 Fragmented IP protocol (
638 43.5944… 192.168.1.151 128.119.245.12 UDP 554 56623 → 33435 Len=3472
639 43.5945… 192.168.1.151 128.119.245.12 IPv4 1514 Fragmented IP protocol (
640 43.5946… 192.168.1.151 128.119.245.12 IPv4 1514 Fragmented IP protocol (
641 43.5947… 192.168.1.151 128.119.245.12 UDP 554 59074 → 33436 Len=3472
642 43.5947… 192.168.1.151 128.119.245.12 IPv4 1514 Fragmented IP protocol (
Frame 634: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits) on interface 0
Ethernet II, Src: PcsCompu_0a:94:54 (08:00:27:0a:94:54), Dst: Netgear_f1:e9:d6 (6c:b0:ce:f1:e9:d6)
Internet Protocol Version 4, Src: 192.168.1.151, 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: 0x3909 (14601)
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: UDP (17)
Header checksum: 0x228c [validation disabled]
[Header checksum status: Unverified]
Source: 192.168.1.151
Destination: 128.119.245.12
Reassembled IPv4 in frame: 635
Data (1480 bytes)
0000 6c b0 ce f1 e9 d6 08 00 27 0a 94 54 08 00 45 00
Differentiated Services Field (ip.dsfield), 1 byte
Packets: 997 · Displayed: 997 (100.0%)
Profile: Default

15. What fields change in the IP header among the fragments? Fragment Offset (0, 185, 370) Total Length: 1500 for the first two packets, 540 for the last one More Fragments: First Two Packets it is set, Not set in the last packet