



CMPE 472 – Computer Networks

Lab 4: Ip

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We will use ip-trace answering the questions for this lab.

Questions

1. Select the first ICMP Echo Request message sent by your computer:
 - 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.

No.	Time	Source	Destination	Protocol	Length	Info
8	6.183845	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=20481/848, ttl=1 (no response found)
9	6.192626	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
10	6.195279	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=20776/849, ttl=2 (no response found)
11	6.202957	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
12	6.208597	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=20995/850, ttl=3 (no response found)
13	6.214516	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
14	6.238695	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=21251/851, ttl=4 (no response found)
15	6.257672	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
16	6.252959	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=21567/852, ttl=5 (no response found)
17	6.268617	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
18	6.288758	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=21761/853, ttl=6 (no response found)
19	6.297457	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
20	6.301748	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=22016/854, ttl=7 (no response found)
21	6.334320	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
22	6.338884	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=22275/855, ttl=8 (no response found)
23	6.350888	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=22531/856, ttl=9 (no response found)
24	6.365981	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
25	6.382957	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
26	6.393811	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=22771/857, ttl=10 (no response found)
29	6.408895	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=23041/858, ttl=11 (no response found)
30	6.415141	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
31	6.422619	192.168.1.182	128.59.23.100	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
32	6.430837	192.168.1.182	128.59.23.100	ICMP	88	Echo (ping) request id=0x300, seq=23296/859, ttl=12 (no response found)

> Frame 8: 88 bytes on wire (704 bits), 88 bytes captured (704 bits) on interface 0
> Ethernet II, Src: Actionte_Ba70:1a (00:20:e0:8a:70:1a), Dst: Linksys_daiaf:73 (00:06:25:da:af:73)
> Internet Protocol Version 4, Src: 192.168.1.182, Dst: 128.59.23.100
6100 = Version: 4
..... 0101 = Header Length: 20 bytes (5)
..... Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 84
Identification: 0x3200 (13000)
Flags: 0x00
..... = Reserved bit: Not set
..... = Don't fragment: Not set
..... = More fragments: Not set
..... 0000 0000 = Fragment Offset: 0
Time to Live: 1
Protocol: ICMP (1)
Header Checksum: 0x262c [validation disabled]
[Header checksum status: Unverified]
Source Address: 192.168.1.182
Destination Address: 128.59.23.100
> Internet Control Message Protocol

Answer: There are 20 bytes in the IP header, and 84 bytes total length, this gives 64 bytes in the payload of the IP datagram.

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

```
> 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: 0x00
        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 Address: 192.168.1.102
    Destination Address: 128.59.23.100
> Internet Control Message Protocol
```

Answer: The fragment offset is set to 0, therefore, the packet has not been fragmented.

- Sort the traced packets according to IP source address by clicking on the Source column header. Select the first ICMP Echo Request message sent by your computer:
 - Which fields in the IP datagram *always* change from one datagram to the next within this series of ICMP messages sent by your computer?

Answer:

- Checksum increase
- Timing constant
- Identifier increase

```
35 6.490987 128.59.23.100 192.168.1.102 ICMP 98 Echo (ping) reply id=0x300, seq=23555/800, ttl=242 (request in 33)
63 11.408063 128.59.23.100 192.168.1.102 ICMP 98 Echo (ping) reply id=0x300, seq=26883/873, ttl=242 (request in 61)
89 16.499919 128.59.23.100 192.168.1.102 ICMP 98 Echo (ping) reply id=0x300, seq=30211/886, ttl=242 (request in 87)
130 29.291816 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0954) [Reassembled in #131]
131 29.299545 128.59.23.100 192.168.1.102 ICMP 562 Echo (ping) reply id=0x300, seq=33539/899, ttl=242 (request in 122)
171 34.299695 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0955) [Reassembled in #172]
172 34.305470 128.59.23.100 192.168.1.102 ICMP 562 Echo (ping) reply id=0x300, seq=36867/912, ttl=242 (request in 163)
173 34.312864 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0955) [Reassembled in #214]
213 39.314263 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0956) [Reassembled in #214]
214 39.322566 128.59.23.100 192.168.1.102 ICMP 562 Echo (ping) reply id=0x300, seq=40195/925, ttl=242 (request in 205)
267 44.950331 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0957) [Reassembled in #269]
268 44.957057 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0957) [Reassembled in #269]
269 44.964332 128.59.23.100 192.168.1.102 ICMP 582 Echo (ping) reply id=0x300, seq=45523/938, ttl=242 (request in 257)
270 44.971663 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0957) [Reassembled in #324]
322 49.954679 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0958) [Reassembled in #324]
323 49.963285 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0958) [Reassembled in #324]
324 49.970589 128.59.23.100 192.168.1.102 ICMP 582 Echo (ping) reply id=0x300, seq=46851/951, ttl=242 (request in 312)
378 54.958387 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0959) [Reassembled in #380]
379 54.967104 128.59.23.100 192.168.1.102 IPv4 1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0959) [Reassembled in #380]
380 54.973666 128.59.23.100 192.168.1.102 ICMP 582 Echo (ping) reply id=0x300, seq=50179/964, ttl=242 (request in 368)

> Frame 35: 98 bytes on wire (784 bits), 98 bytes captured (784 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)
    Destination: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
    Source: LinksysG_da:af:73 (00:06:25:da:af:73)
    Type: IPv4 (0x0800)
> Internet Protocol Version 4, Src: 128.59.23.100, Dst: 192.168.1.102
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 84
    Identification: 0x0951 (2385)
    Flags: 0x40, Don't fragment
        0... .... = Reserved bit: Not set
        .1.. .... = Don't fragment: Set
        ..0. .... = More fragments: Not set
    ...0 0000 0000 0000 = Fragment Offset: 0
    Time to Live: 242
    Protocol: ICMP (1)
    Header Checksum: 0x25aa [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 128.59.23.100
    Destination Address: 192.168.1.102
> Internet Control Message Protocol
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63	11.480063	128.59.23.100	192.168.1.102	ICMP	98 Echo (ping) reply	id=0x0300, seq=26883/873, ttl=242 (request in 61)
89	16.499919	128.59.23.100	192.168.1.102	ICMP	98 Echo (ping) reply	id=0x0300, seq=30211/886, ttl=242 (request in 87)
130	29.291816	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0954) [Reassembled in #131]	
131	29.299545	128.59.23.100	192.168.1.102	ICMP	562 Echo (ping) reply	id=0x0300, seq=33539/899, ttl=242 (request in 122)
171	34.299695	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0955) [Reassembled in #172]	
172	34.305470	128.59.23.100	192.168.1.102	ICMP	562 Echo (ping) reply	id=0x0300, seq=36867/912, ttl=242 (request in 163)
173	34.312864	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0955)	
213	39.314263	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0956) [Reassembled in #214]	
214	39.322566	128.59.23.100	192.168.1.102	ICMP	562 Echo (ping) reply	id=0x0300, seq=40195/925, ttl=242 (request in 205)
267	44.950331	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0957) [Reassembled in #269]	
268	44.957057	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=0957) [Reassembled in #269]	
269	44.964332	128.59.23.100	192.168.1.102	ICMP	582 Echo (ping) reply	id=0x0300, seq=43523/938, ttl=242 (request in 257)
270	44.971663	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0957)	
322	49.954679	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0958) [Reassembled in #324]	
323	49.963285	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=0958) [Reassembled in #324]	
324	49.970589	128.59.23.100	192.168.1.102	ICMP	582 Echo (ping) reply	id=0x0300, seq=46851/951, ttl=242 (request in 312)
378	54.958387	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0959) [Reassembled in #380]	
379	54.967184	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=0959) [Reassembled in #380]	
380	54.973666	128.59.23.100	192.168.1.102	ICMP	582 Echo (ping) reply	id=0x0300, seq=50179/964, ttl=242 (request in 368)

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> Frame 63: 98 bytes on wire (784 bits), 98 bytes captured (784 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)
  > Destination: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
  > Source: LinksysG_da:af:73 (00:06:25:da:af:73)
  Type: IPv4 (0x0800)
> Internet Protocol Version 4, Src: 128.59.23.100, Dst: 192.168.1.102
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  Total Length: 84
  Identification: 0x0952 (2386)
  > Flags: 0x40, Don't fragment
    0... .... = Reserved bit: Not set
    .1.. .... = Don't fragment: Set
    ..0. .... = More fragments: Not set
    ...0 0000 0000 0000 = Fragment Offset: 0
  Time to Live: 242
  Protocol: ICMP (1)
  Header Checksum: 0x25a9 [validation disabled]
  [Header checksum status: Unverified]
  Source Address: 128.59.23.100
  Destination Address: 192.168.1.102
> Internet Control Message Protocol
```

35	6.490987	128.59.23.100	192.168.1.102	ICMP	98 Echo (ping) reply	id=0x0300, seq=23555/860, ttl=242 (request in 33)
63	11.480063	128.59.23.100	192.168.1.102	ICMP	98 Echo (ping) reply	id=0x0300, seq=26883/873, ttl=242 (request in 61)
89	16.499919	128.59.23.100	192.168.1.102	ICMP	98 Echo (ping) reply	id=0x0300, seq=30211/886, ttl=242 (request in 87)
130	29.291816	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0954) [Reassembled in #131]	
131	29.299545	128.59.23.100	192.168.1.102	ICMP	562 Echo (ping) reply	id=0x0300, seq=33539/899, ttl=242 (request in 122)
171	34.299695	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0955) [Reassembled in #172]	
172	34.305470	128.59.23.100	192.168.1.102	ICMP	562 Echo (ping) reply	id=0x0300, seq=36867/912, ttl=242 (request in 163)
173	34.312864	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0955)	
213	39.314263	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0956) [Reassembled in #214]	
214	39.322566	128.59.23.100	192.168.1.102	ICMP	562 Echo (ping) reply	id=0x0300, seq=40195/925, ttl=242 (request in 205)
267	44.950331	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0957) [Reassembled in #269]	
268	44.957057	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=0957) [Reassembled in #269]	
269	44.964332	128.59.23.100	192.168.1.102	ICMP	582 Echo (ping) reply	id=0x0300, seq=43523/938, ttl=242 (request in 257)
270	44.971663	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0957)	
322	49.954679	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0958) [Reassembled in #324]	
323	49.963285	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=0958) [Reassembled in #324]	
324	49.970589	128.59.23.100	192.168.1.102	ICMP	582 Echo (ping) reply	id=0x0300, seq=46851/951, ttl=242 (request in 312)
378	54.958387	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0959) [Reassembled in #380]	
379	54.967184	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=0959) [Reassembled in #380]	
380	54.973666	128.59.23.100	192.168.1.102	ICMP	582 Echo (ping) reply	id=0x0300, seq=50179/964, ttl=242 (request in 368)

```
> Frame 89: 98 bytes on wire (784 bits), 98 bytes captured (784 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)
  > Destination: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
  > Source: LinksysG_da:af:73 (00:06:25:da:af:73)
  Type: IPv4 (0x0800)
> Internet Protocol Version 4, Src: 128.59.23.100, Dst: 192.168.1.102
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  Total Length: 84
  Identification: 0x0953 (2387)
  > Flags: 0x40, Don't fragment
    0... .... = Reserved bit: Not set
    .1.. .... = Don't fragment: Set
    ..0. .... = More fragments: Not set
    ...0 0000 0000 0000 = Fragment Offset: 0
  Time to Live: 242
  Protocol: ICMP (1)
  Header Checksum: 0x25a8 [validation disabled]
  [Header checksum status: Unverified]
  Source Address: 128.59.23.100
  Destination Address: 192.168.1.102
> Internet Control Message Protocol
```

- Which fields stay constant? Which of the fields *must* stay constant? Which fields must change? Why?

Answer:

- source IP stay constant because my computer IP address is constant
- destination IP stay constant because website IP address is constant
- differentiated services using same protocol
- upper layer protocol using same protocol

The header checksum, identification fields that are change.

(I observe same steps as previous question)

- What is the value in the Identification field and the TTL field?

35	6.490987	128.59.23.100	192.168.1.102	ICMP	98 Echo (ping) reply	id=0x0300, seq=23555/860, ttl=242 (request in 33)
63	11.480063	128.59.23.100	192.168.1.102	ICMP	98 Echo (ping) reply	id=0x0300, seq=26883/873, ttl=242 (request in 61)
89	16.499919	128.59.23.100	192.168.1.102	ICMP	98 Echo (ping) reply	id=0x0300, seq=30211/886, ttl=242 (request in 87)
130	29.291816	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0954)	[Reassembled in #131]
131	29.299545	128.59.23.100	192.168.1.102	ICMP	562 Echo (ping) reply	id=0x0300, seq=33539/899, ttl=242 (request in 122)
171	34.299695	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0955)	[Reassembled in #172]
172	34.305470	128.59.23.100	192.168.1.102	ICMP	562 Echo (ping) reply	id=0x0300, seq=36867/912, ttl=242 (request in 163)
173	34.312864	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0955)	
213	39.314263	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0956)	[Reassembled in #214]
214	39.322566	128.59.23.100	192.168.1.102	ICMP	562 Echo (ping) reply	id=0x0300, seq=40195/925, ttl=242 (request in 205)
267	44.950331	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0957)	[Reassembled in #269]
268	44.957057	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=0957)	[Reassembled in #269]
269	44.964332	128.59.23.100	192.168.1.102	ICMP	582 Echo (ping) reply	id=0x0300, seq=43523/938, ttl=242 (request in 257)
270	44.971663	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0957)	
322	49.954679	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0958)	[Reassembled in #324]
323	49.963285	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=1480, ID=0958)	[Reassembled in #324]
324	49.970589	128.59.23.100	192.168.1.102	ICMP	582 Echo (ping) reply	id=0x0300, seq=46851/951, ttl=242 (request in 312)
378	54.958387	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0959)	[Reassembled in #380]

```

> Frame 35: 98 bytes on wire (784 bits), 98 bytes captured (784 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)
    > Destination: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
    > Source: LinksysG_da:af:73 (00:06:25:da:af:73)
    Type: IPv4 (0x0800)
  > Internet Protocol Version 4, Src: 128.59.23.100, Dst: 192.168.1.102
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 84
    Identification: 0x0951 (2385)
    > Flags: 0x40, Don't fragment
      0... .... = Reserved bit: Not set
      .1. .... = Don't fragment: Set
      ..0. .... = More fragments: Not set
      ...0 0000 0000 0000 = Fragment Offset: 0
    Time to Live: 242
    Protocol: ICMP (1)
    Header Checksum: 0x25aa [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 128.59.23.100
    Destination Address: 192.168.1.102
  > Internet Control Message Protocol

```

Answer: Identification: 2385

Time to live: 242

3. Now, look at the first fragmented IP protocol and its reassembled package with a response.
- Has that message been fragmented across more than one IP datagram? Explain how you find the answer.

Answer: The flag being set for multiple segments indicates that the datagram has been broken apart.

```
> Frame 121: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
v Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
  > Destination: LinksysG_da:af:73 (00:06:25:da:af:73)
  > Source: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
  Type: IPv4 (0x0800)
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: 0x3305 (13061)
  v Flags: 0x20, 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: 13
  Protocol: ICMP (1)
  Header Checksum: 0xfb6e [validation disabled]
  [Header checksum status: Unverified]
  Source Address: 192.168.1.102
  Destination Address: 128.59.23.100
  [Reassembled IPv4 in frame: 122]
> Data (1480 bytes)
```

- What fields change in the IP header among the fragments?

Answer: Length, flags, header checksum, fragment offset.

122	28.741708	192.168.1.102	128.59.23.100	ICMP	562 Echo (ping) request id=0x0300, seq=33539/899, ttl=13 (reply in 131)
123	28.804963	12.123.40.218	192.168.1.102	IPv4	554 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0000)
124	28.871954	12.122.10.22	192.168.1.102	IPv4	554 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0000)
125	28.936889	12.122.12.54	192.168.1.102	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
126	29.004477	192.205.32.106	192.168.1.102	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
127	29.078887	216.140.10.30	192.168.1.102	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
128	29.140439	67.99.58.194	192.168.1.102	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
129	29.207167	128.59.1.41	192.168.1.102	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
130	29.291816	128.59.23.100	192.168.1.102	IPv4	1514 Fragmented IP protocol (proto=ICMP 1, off=0, ID=0954) [Reassembled in 131]
131	29.299545	128.59.23.100	192.168.1.102	ICMP	562 Echo (ping) reply id=0x0300, seq=33539/899, ttl=242 (request in 122)

> Frame 122: 562 bytes on wire (4496 bits), 562 bytes captured (4496 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)

> Destination: LinksysG_da:af:73 (00:06:25:da:af:73)

> Source: Actionte_8a:70:1a (00:20:e0:8a:70:1a)

Type: IPv4 (0x0800)

▼ 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: 548

Identification: 0x3305 (13061)

▼ Flags: 0x00

0... = Reserved bit: Not set

.0. = Don't fragment: Not set

.0. = More fragments: Not set

...0 0101 1100 1000 = Fragment Offset: 1400

Time to Live: 13

Protocol: ICMP (1)

Header Checksum: 0x1e6e [validation disabled]

[Header checksum status: Unverified]

Source Address: 192.168.1.102

Destination Address: 128.59.23.100

> [2 IPv4 Fragments (2008 bytes): #121(1480), #122(520)]

> Internet Control Message Protocol