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Lớp : L01

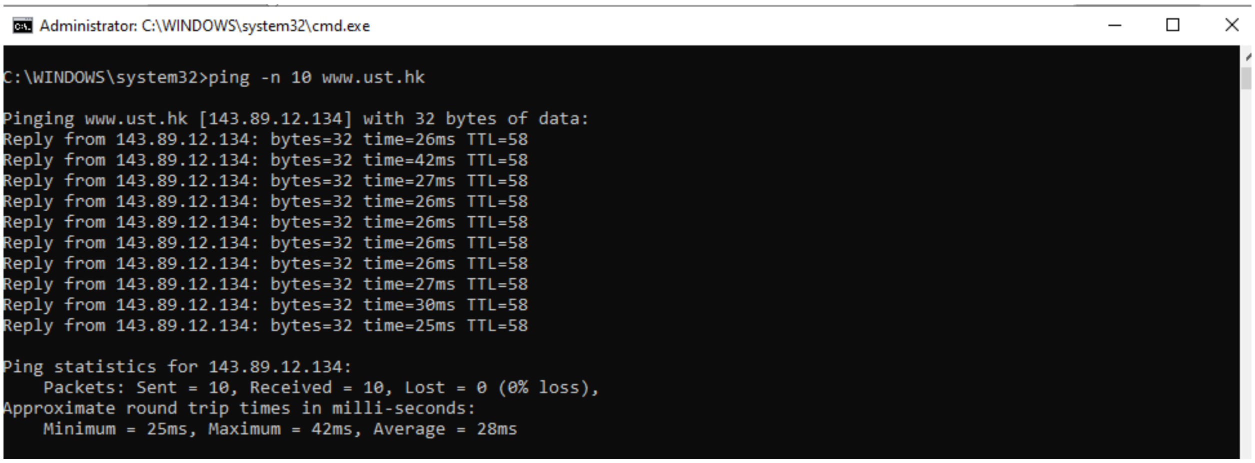
LAB 5

1. ICMP and Ping

Question 1: What is the IP address of your host? What is the IP address of the destination host?

ANSWER:

My host IP address: 192.168.1.8
Destination host IP address: 143.89.12.134

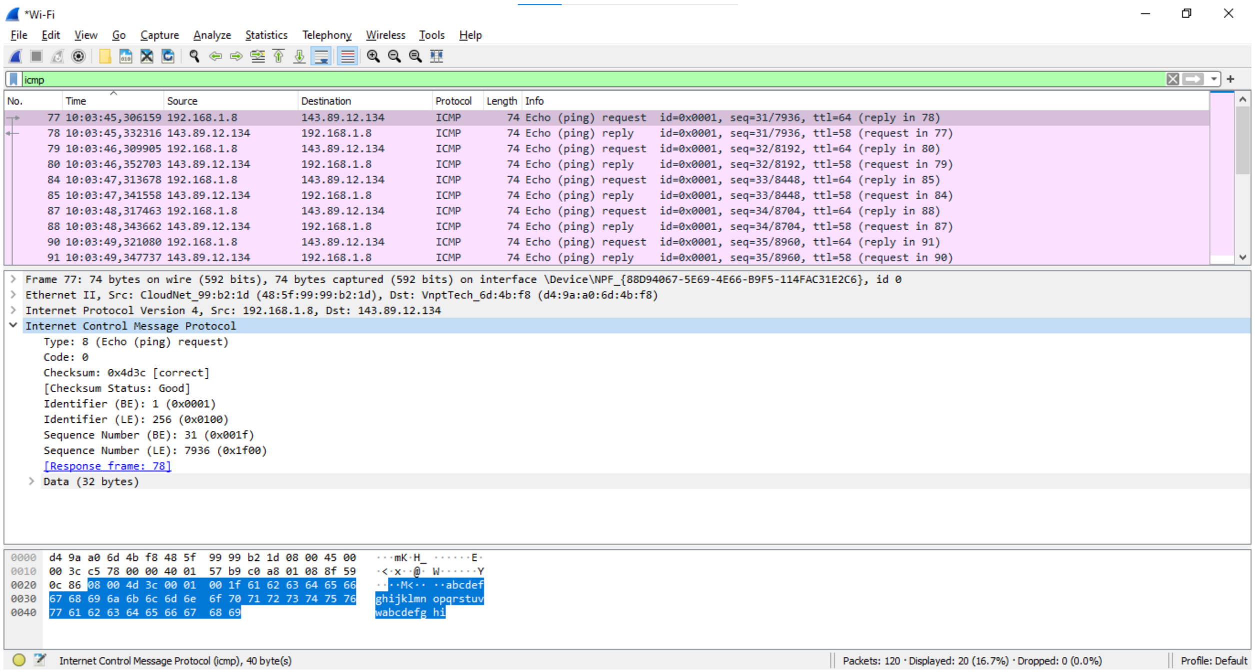


```
C:\WINDOWS\system32>ping -n 10 www.ust.hk

Pinging www.ust.hk [143.89.12.134] with 32 bytes of data:
Reply from 143.89.12.134: bytes=32 time=26ms TTL=58
Reply from 143.89.12.134: bytes=32 time=42ms TTL=58
Reply from 143.89.12.134: bytes=32 time=27ms TTL=58
Reply from 143.89.12.134: bytes=32 time=26ms TTL=58
Reply from 143.89.12.134: bytes=32 time=26ms TTL=58
Reply from 143.89.12.134: bytes=32 time=26ms TTL=58
Reply from 143.89.12.134: bytes=32 time=26ms TTL=58
Reply from 143.89.12.134: bytes=32 time=27ms TTL=58
Reply from 143.89.12.134: bytes=32 time=30ms TTL=58
Reply from 143.89.12.134: bytes=32 time=25ms TTL=58

Ping statistics for 143.89.12.134:
    Packets: Sent = 10, Received = 10, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 25ms, Maximum = 42ms, Average = 28ms
```

Question 2 Why is it that an ICMP packet does not have source and destination port numbers?

ANSWER:

ICMP packet is designed to communicate network-layer information between hosts and routers, not between application layer processes.
Each ICMP packet has a "Type" and a "Code". The Type/Code combination identifies the specific message being received.
Because the network software itself interprets all ICMP messages
=> NO source/ destination port numbers are needed to direct the ICMP message to an application layer process.



```
No.  Time                Source         Destination    Protocol Length Info
  77 10:03:45,306159 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=31/7936, ttl=64 (reply in 78)
  78 10:03:45,332316 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=31/7936, ttl=58 (request in 77)
  79 10:03:46,309905 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=32/8192, ttl=64 (reply in 80)
  80 10:03:46,352703 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=32/8192, ttl=58 (request in 79)
  84 10:03:47,313678 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=33/8448, ttl=64 (reply in 85)
  85 10:03:47,341558 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=33/8448, ttl=58 (request in 84)
  87 10:03:48,317463 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=34/8704, ttl=64 (reply in 88)
  88 10:03:48,343662 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=34/8704, ttl=58 (request in 87)
  90 10:03:49,321080 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=35/8960, ttl=64 (reply in 91)
  91 10:03:49,347737 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=35/8960, ttl=58 (request in 90)
```

```
> Frame 77: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF_{88D94067-5E69-4E66-B9F5-114FAC31E2C6}, id 0
> Ethernet II, Src: CloudNet_99:b2:1d (48:5f:99:99:b2:1d), Dst: VnptTech_6d:4b:f8 (d4:9a:a0:6d:4b:f8)
> Internet Protocol Version 4, Src: 192.168.1.8, Dst: 143.89.12.134
v Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x4d3c [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence Number (BE): 31 (0x001f)
    Sequence Number (LE): 7936 (0x1f00)
    [Response frame: 78]
  > Data (32 bytes)
```

```
0000  d4 9a a0 6d 4b f8 48 5f  99 99 b2 1d 08 00 45 00   ···mK·H_ ······E·
0010  00 3c c5 78 00 00 40 01  57 b9 c0 a8 01 08 8f 59   ·<·x··@· W······Y
0020  0c 86 08 00 4d 3c 00 01  00 1f 61 62 63 64 65 66   ····M<·· ··abcdef
0030  67 68 69 6a 6b 6c 6d 6e  6f 70 71 72 73 74 75 76   ghijklmn opqrstuv
0040  77 61 62 63 64 65 66 67  68 69                     wabcdefg hi
```

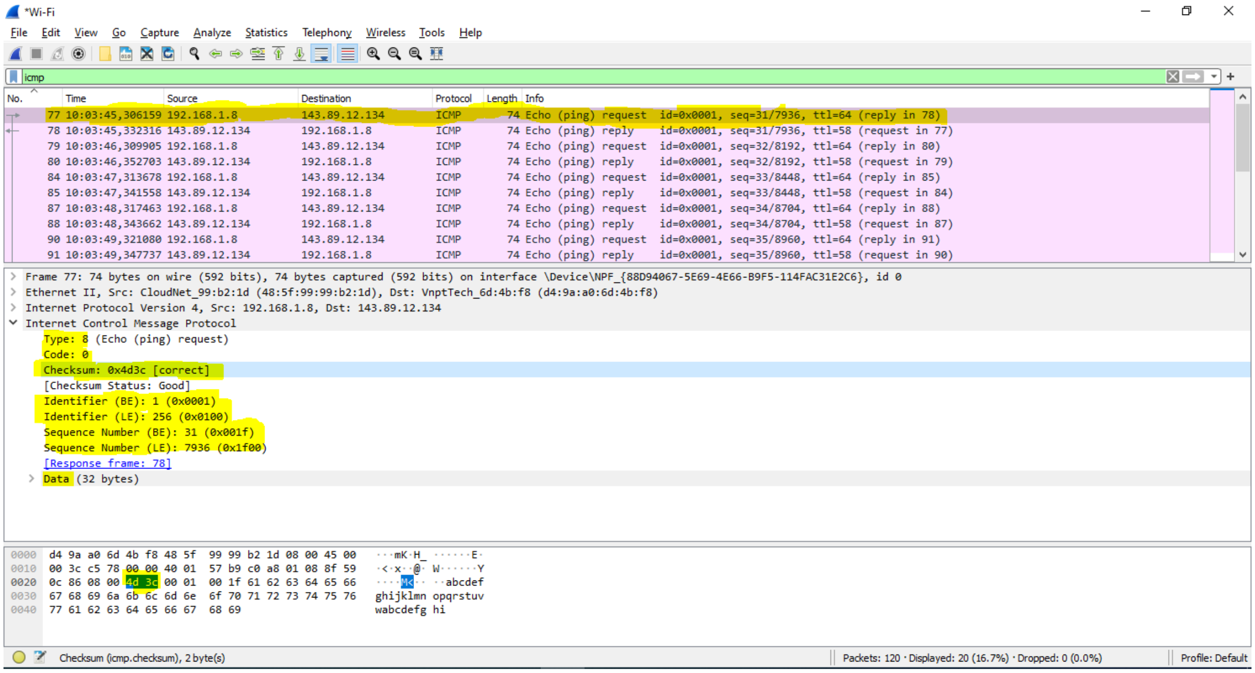
Internet Control Message Protocol (icmp), 40 byte(s) | Packets: 120 · Displayed: 20 (16.7%) · Dropped: 0 (0.0%) | Profile: Default

Question 3: Examine one of the ping request packets sent by your host. What are the ICMP type and code numbers? What other fields does this ICMP packet have? How many bytes are the checksum, sequence number and identifier fields?

ANSWER:

ICMP type: 8, code number: 0.

Other field: checksum (2 byte), identifier (2 byte), sequence number (2 byte), and data fields.


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
icmp

```
No.  Time                Source         Destination    Protocol Length Info
  77 10:03:45,306159 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=31/7936, ttl=64 (reply in 78)
  78 10:03:45,332316 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=31/7936, ttl=58 (request in 77)
  79 10:03:46,309905 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=32/8192, ttl=64 (reply in 80)
  80 10:03:46,352703 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=32/8192, ttl=58 (request in 79)
  84 10:03:47,313678 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=33/8448, ttl=64 (reply in 85)
  85 10:03:47,341558 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=33/8448, ttl=58 (request in 84)
  87 10:03:48,317463 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=34/8704, ttl=64 (reply in 88)
  88 10:03:48,343662 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=34/8704, ttl=58 (request in 87)
  90 10:03:49,321080 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=35/8960, ttl=64 (reply in 91)
  91 10:03:49,347737 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=35/8960, ttl=58 (request in 90)
```

```
> Frame 77: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF_{88D94067-5E69-4E66-B9F5-114FAC31E2C6}, id 0
> Ethernet II, Src: CloudNet_99:b2:1d (48:5f:99:99:b2:1d), Dst: VnptTech_6d:4b:f8 (d4:9a:a0:6d:4b:f8)
> Internet Protocol Version 4, Src: 192.168.1.8, Dst: 143.89.12.134
v Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x4d3c [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence Number (BE): 31 (0x001f)
    Sequence Number (LE): 7936 (0x1f00)
    [Response frame: 78]
  > Data (32 bytes)
```

```
0000  d4 9a a0 6d 4b f8 48 5f  99 99 b2 1d 08 00 45 00   ···mK·H_ ······E·
0010  00 3c c5 78 00 00 40 01  57 b9 c0 a8 01 08 8f 59   ·<·x··@· W······Y
0020  0c 86 08 00 4d 3c 00 01  00 1f 61 62 63 64 65 66   ····M<·· ··abcdef
0030  67 68 69 6a 6b 6c 6d 6e  6f 70 71 72 73 74 75 76   ghijklmn opqrstuv
0040  77 61 62 63 64 65 66 67  68 69                     wabcdefg hi
```

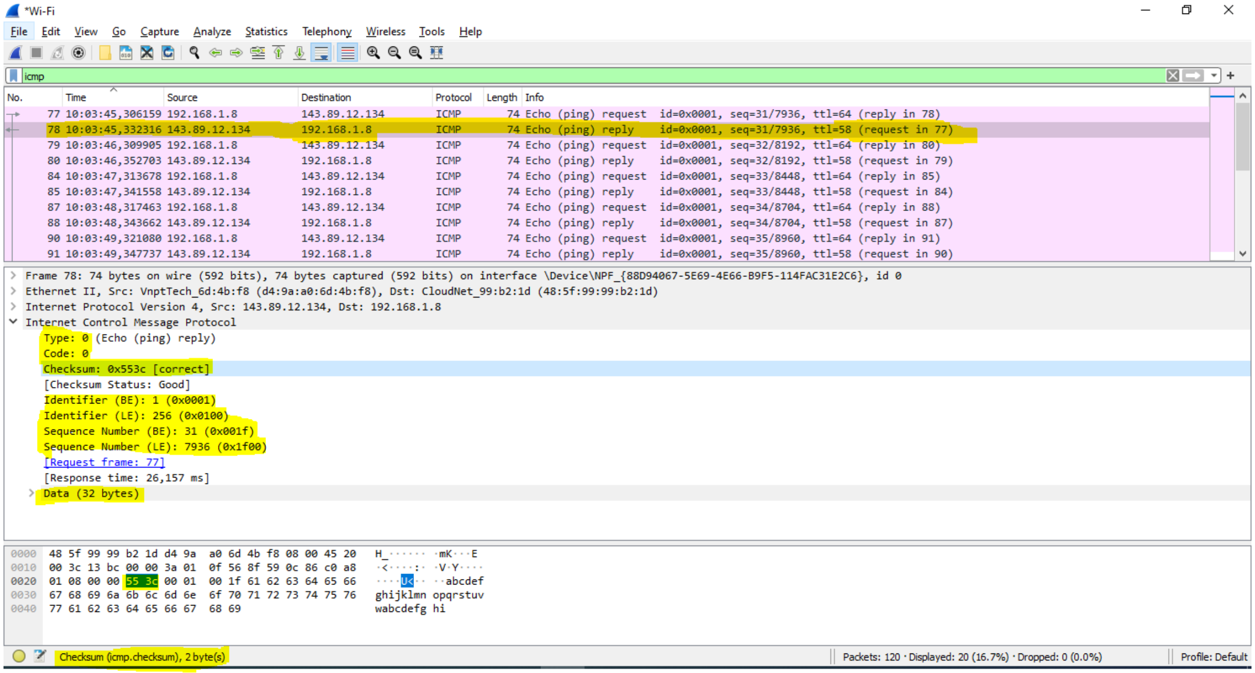
Checksum (icmp.checksum), 2 byte(s) | Packets: 120 · Displayed: 20 (16.7%) · Dropped: 0 (0.0%) | Profile: Default

Question 4 Examine the corresponding ping reply packet. What are the ICMP type and code numbers? What other fields does this ICMP packet have? How many bytes are the checksum, sequence number and identifier fields?

ANSWER:

ICMP type: 0, code number: 0.

Other field: checksum (2 byte), identifier (2 byte), sequence number (2 byte), and data fields.


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
icmp

```
No.  Time             Source         Destination    Protocol Length Info
  77 10:03:45,306159 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=31/7936, ttl=64 (reply in 78)
  78 10:03:45,332316 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=31/7936, ttl=58 (request in 77)
  79 10:03:46,309905 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=32/8192, ttl=64 (reply in 80)
  80 10:03:46,352703 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=32/8192, ttl=58 (request in 79)
  84 10:03:47,313678 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=33/8448, ttl=64 (reply in 85)
  85 10:03:47,341558 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=33/8448, ttl=58 (request in 84)
  87 10:03:48,317463 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=34/8704, ttl=64 (reply in 88)
  88 10:03:48,343662 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=34/8704, ttl=58 (request in 87)
  90 10:03:49,321080 192.168.1.8    143.89.12.134  ICMP       74 Echo (ping) request  id=0x0001, seq=35/8960, ttl=64 (reply in 91)
  91 10:03:49,347737 143.89.12.134  192.168.1.8    ICMP       74 Echo (ping) reply    id=0x0001, seq=35/8960, ttl=58 (request in 90)
```

```
> Frame 78: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF_{88D94067-5E69-4E66-B9F5-114FAC31E2C6}, id 0
> Ethernet II, Src: VnptTech_6d:4b:f8 (d4:9a:a0:6d:4b:f8), Dst: CloudNet_99:b2:1d (48:5f:99:99:b2:1d)
> Internet Protocol Version 4, Src: 143.89.12.134, Dst: 192.168.1.8
v Internet Control Message Protocol
    Type: 0 (Echo (ping) reply)
    Code: 0
    Checksum: 0x553c [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence Number (BE): 31 (0x001f)
    Sequence Number (LE): 7936 (0x1f00)
    [Request frame: 77]
    [Response time: 26,157 ms]
  > Data (32 bytes)
```

```
0000  48 5f 99 99 b2 1d d4 9a  a0 6d 4b f8 08 00 45 20   H_······ ·mK···E
0010  00 3c 13 bc 00 00 3a 01  0f 56 8f 59 0c 86 c0 a8   ·<····:· ·V·Y····
0020  01 08 00 00 55 3c 00 01  00 1f 61 62 63 64 65 66   ····U<·· ··abcdef
0030  67 68 69 6a 6b 6c 6d 6e  6f 70 71 72 73 74 75 76   ghijklmn opqrstuv
0040  77 61 62 63 64 65 66 67  68 69                     wabcdefg hi
```

Checksum (icmp.checksum), 2 byte(s) | Packets: 120 · Displayed: 20 (16.7%) · Dropped: 0 (0.0%) | Profile: Default

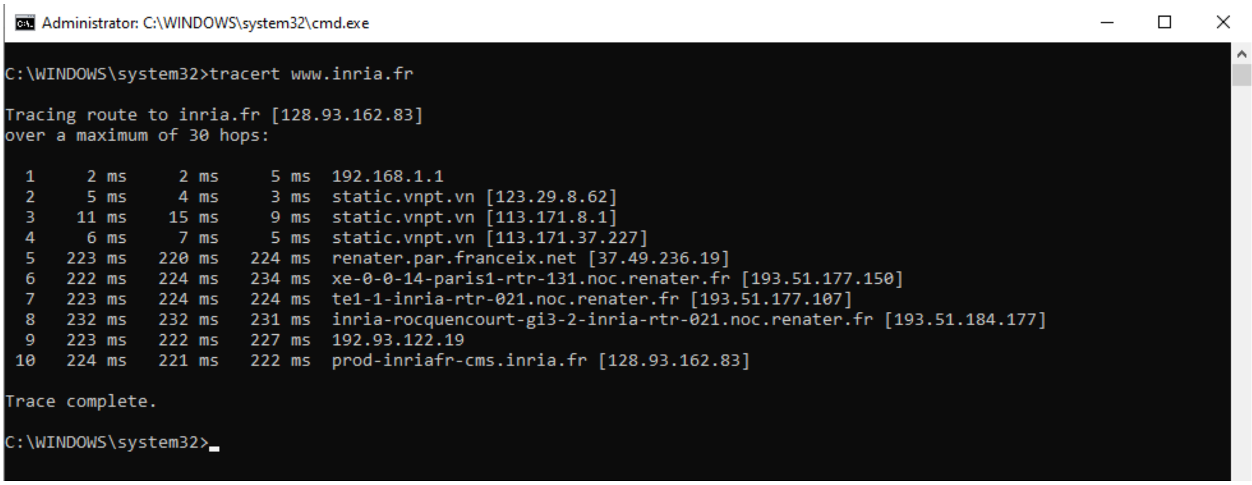
2. ICMP and Traceroute

Question 5: What is the IP address of your host? What is the IP address of the target destination host?

ANSWER:

My host IP address: 192.168.1.8

Destination host IP address: 128.93.162.83



```
C:\WINDOWS\system32>tracert www.inria.fr

Tracing route to inria.fr [128.93.162.83]
over a maximum of 30 hops:

  1     2 ms     2 ms     5 ms  192.168.1.1
  2     5 ms     4 ms     3 ms  static.vnpt.vn [123.29.8.62]
  3    11 ms    15 ms     9 ms  static.vnpt.vn [113.171.8.1]
  4     6 ms     7 ms     5 ms  static.vnpt.vn [113.171.37.227]
  5   223 ms   220 ms   224 ms  renater.par.franceix.net [37.49.236.19]
  6   222 ms   224 ms   234 ms  xe-0-0-14-paris1-rtr-131.noc.renater.fr [193.51.177.150]
  7   223 ms   224 ms   224 ms  te1-1-inria-rtr-021.noc.renater.fr [193.51.177.107]
  8   232 ms   232 ms   231 ms  inria-rocquencourt-gi3-2-inria-rtr-021.noc.renater.fr [193.51.184.177]
  9   223 ms   222 ms   227 ms  192.93.122.19
 10   224 ms   221 ms   222 ms  prod-inriafr-cms.inria.fr [128.93.162.83]

Trace complete.

C:\WINDOWS\system32>_
```

Question 6: If ICMP sent UDP packets instead (as in Unix/Linux), would the IP protocol number still be 01 for the probe packets? If not, what would it be?

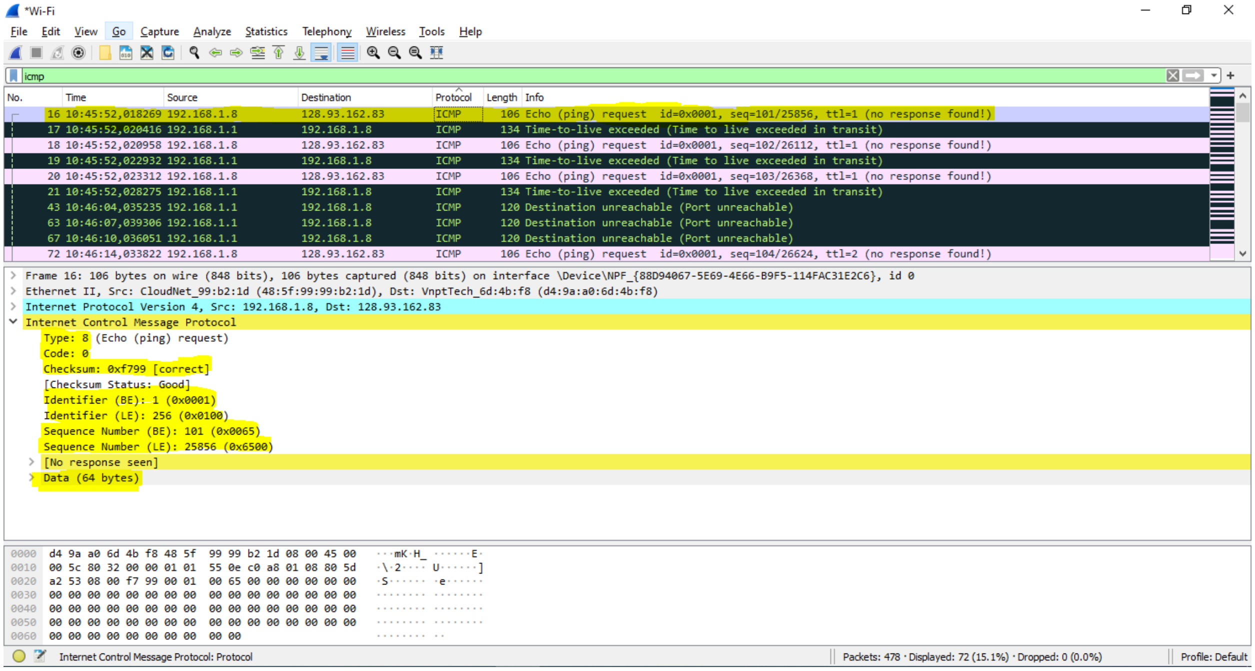
ANSWER:

No.
If ICMP sent UDP packets instead => the IP protocol number would be 0x11

Question 7: Examine the ICMP echo packet in your screenshot. Is this different from the ICMP ping query packets in the first half of this lab? If yes, how so?

ANSWER:

The ICMP echo packet has the same fields as the ping query packets.


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

```
icmp
```

```
No.  Time               Source        Destination    Protocol Length Info
 16 10:45:52,018269 192.168.1.8   128.93.162.83  ICMP  106 Echo (ping) request  id=0x0001, seq=101/25856, ttl=1 (no response found!)
 17 10:45:52,020416 192.168.1.1   192.168.1.8    ICMP  134 Time-to-live exceeded (Time to live exceeded in transit)
 18 10:45:52,020958 192.168.1.8   128.93.162.83  ICMP  106 Echo (ping) request  id=0x0001, seq=102/26112, ttl=1 (no response found!)
 19 10:45:52,022932 192.168.1.1   192.168.1.8    ICMP  134 Time-to-live exceeded (Time to live exceeded in transit)
 20 10:45:52,023312 192.168.1.8   128.93.162.83  ICMP  106 Echo (ping) request  id=0x0001, seq=103/26368, ttl=1 (no response found!)
 21 10:45:52,028275 192.168.1.1   192.168.1.8    ICMP  134 Time-to-live exceeded (Time to live exceeded in transit)
 43 10:46:04,035235 192.168.1.1   192.168.1.8    ICMP  120 Destination unreachable (Port unreachable)
 63 10:46:07,039306 192.168.1.1   192.168.1.8    ICMP  120 Destination unreachable (Port unreachable)
 67 10:46:10,036051 192.168.1.1   192.168.1.8    ICMP  120 Destination unreachable (Port unreachable)
 72 10:46:14,033822 192.168.1.8   128.93.162.83  ICMP  106 Echo (ping) request  id=0x0001, seq=104/26624, ttl=2 (no response found!)
```

```
> Frame 16: 106 bytes on wire (848 bits), 106 bytes captured (848 bits) on interface \Device\NPF_{88D94067-5E69-4E66-B9F5-114FAC31E2C6}, id 0
> Ethernet II, Src: CloudNet_99:b2:1d (48:5f:99:99:b2:1d), Dst: VnptTech_6d:4b:f8 (d4:9a:a0:6d:4b:f8)
> Internet Protocol Version 4, Src: 192.168.1.8, Dst: 128.93.162.83
v Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0xf799 [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence Number (BE): 101 (0x0065)
    Sequence Number (LE): 25856 (0x6500)
  > [No response seen]
  > Data (64 bytes)
```

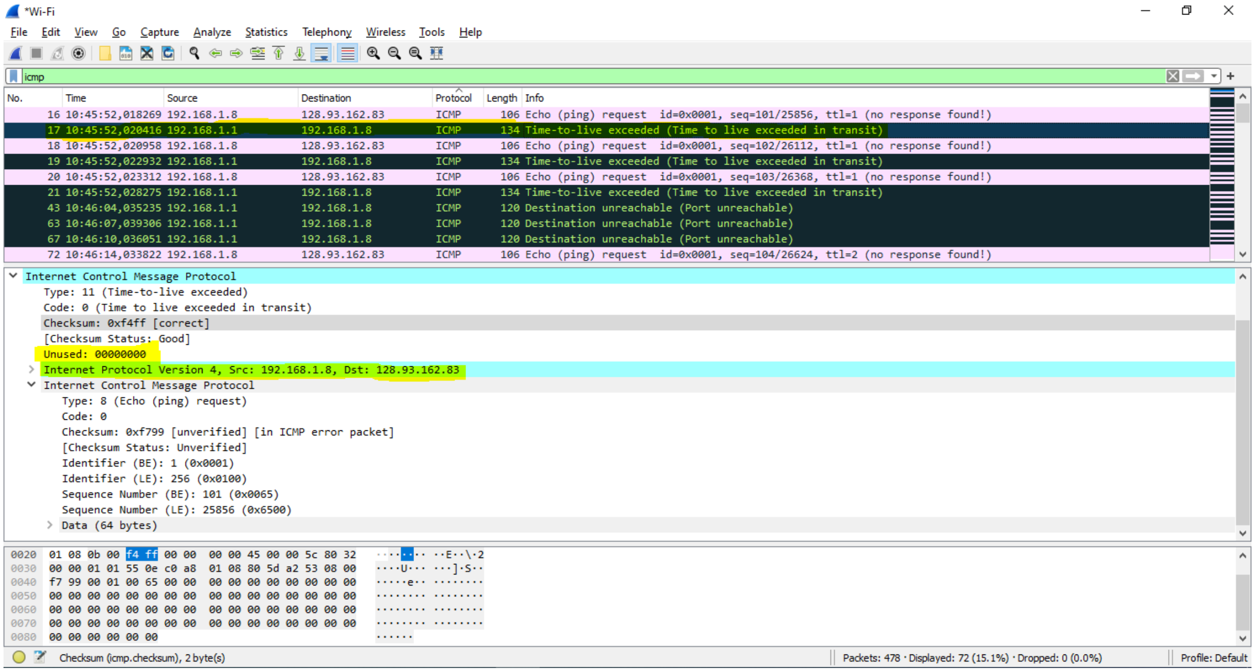
```
0000  d4 9a a0 6d 4b f8 48 5f  99 99 b2 1d 08 00 45 00   ···mK·H_ ······E·
0010  00 5c 80 32 00 00 01 01  55 0e c0 a8 01 08 80 5d   ·\·2···· U······]
0020  a2 53 08 00 f7 99 00 01  00 65 00 00 00 00 00 00   ·S······ ·e······
0030  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········ ········
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                     ········ ··
```

```
Internet Control Message Protocol: Protocol    Packets: 478 · Displayed: 72 (15.1%) · Dropped: 0 (0.0%)    Profile: Default
```

<u>Question 8:</u> Examine the ICMP error packet in your screenshot. It has more fields than the ICMP echo packet. What is included in those fields?

ANSWER:

The ICMP error packet has more fields than the ICMP echo packet.
It contains both the IP header and the first 8 bytes of the original ICMP packet that the error is for.


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
icmp

No.	Time	Source	Destination	Protocol	Length	Info
16	10:45:52,018269	192.168.1.8	128.93.162.83	ICMP	106	Echo (ping) request id=0x0001, seq=101/25856, ttl=1 (no response found!)
17	10:45:52,020416	192.168.1.1	192.168.1.8	ICMP	134	Time-to-live exceeded (Time to live exceeded in transit)
18	10:45:52,020958	192.168.1.8	128.93.162.83	ICMP	106	Echo (ping) request id=0x0001, seq=102/26112, ttl=1 (no response found!)
19	10:45:52,022932	192.168.1.1	192.168.1.8	ICMP	134	Time-to-live exceeded (Time to live exceeded in transit)
20	10:45:52,023312	192.168.1.8	128.93.162.83	ICMP	106	Echo (ping) request id=0x0001, seq=103/26368, ttl=1 (no response found!)
21	10:45:52,028275	192.168.1.1	192.168.1.8	ICMP	134	Time-to-live exceeded (Time to live exceeded in transit)
43	10:46:04,035235	192.168.1.1	192.168.1.8	ICMP	120	Destination unreachable (Port unreachable)
63	10:46:07,039306	192.168.1.1	192.168.1.8	ICMP	120	Destination unreachable (Port unreachable)
67	10:46:10,036051	192.168.1.1	192.168.1.8	ICMP	120	Destination unreachable (Port unreachable)
72	10:46:14,033822	192.168.1.8	128.93.162.83	ICMP	106	Echo (ping) request id=0x0001, seq=104/26624, ttl=2 (no response found!)

```
Internet Control Message Protocol
    Type: 11 (Time-to-live exceeded)
    Code: 0 (Time to live exceeded in transit)
    Checksum: 0xf4ff [correct]
    [Checksum Status: Good]
    Unused: 00000000
  > Internet Protocol Version 4, Src: 192.168.1.8, Dst: 128.93.162.83
  ∨ Internet Control Message Protocol
        Type: 8 (Echo (ping) request)
        Code: 0
        Checksum: 0xf799 [unverified] [in ICMP error packet]
        [Checksum Status: Unverified]
        Identifier (BE): 1 (0x0001)
        Identifier (LE): 256 (0x0100)
        Sequence Number (BE): 101 (0x0065)
        Sequence Number (LE): 25856 (0x6500)
      > Data (64 bytes)
```

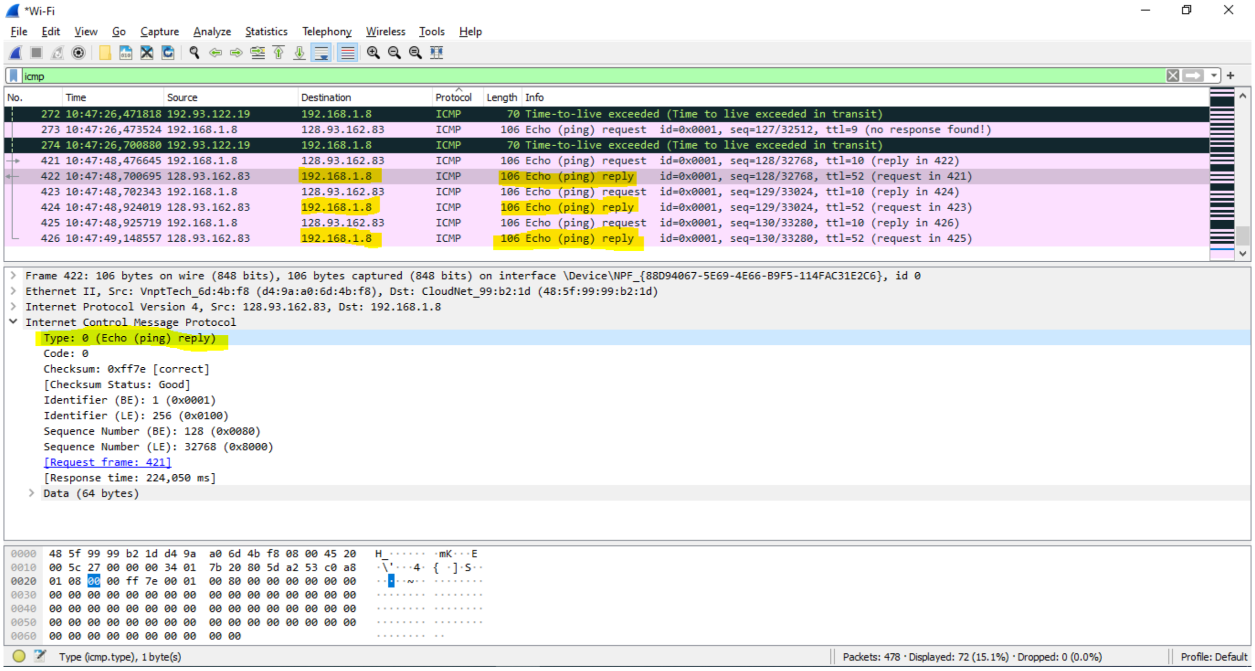
```
0020  01 08 0b 00 f4 ff 00 00  00 00 45 00 00 5c 80 32   ········ ··E··\·2
0030  00 00 01 01 55 0e c0 a8  01 08 80 5d a2 53 08 00   ····U··· ···]·S··
0040  f7 99 00 01 00 65 00 00  00 00 00 00 00 00 00 00   ·····e·· ········
0050  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········ ········
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   ········ ········
0080  00 00 00 00 00 00                                  ······
```

Checksum (icmp.checksum), 2 byte(s) | Packets: 478 · Displayed: 72 (15.1%) · Dropped: 0 (0.0%) | Profile: Default

<u>Question 9</u>: Examine the last three ICMP packets received by the source host. How are these packets different from the ICMP error packets? Why are they different?

ANSWER:

The last three ICMP packets are message type 0 (echo reply) rather than type 11 (TTL expired).
=> They are different because the datagrams have made it all the way to the destination host before the TTL expired.

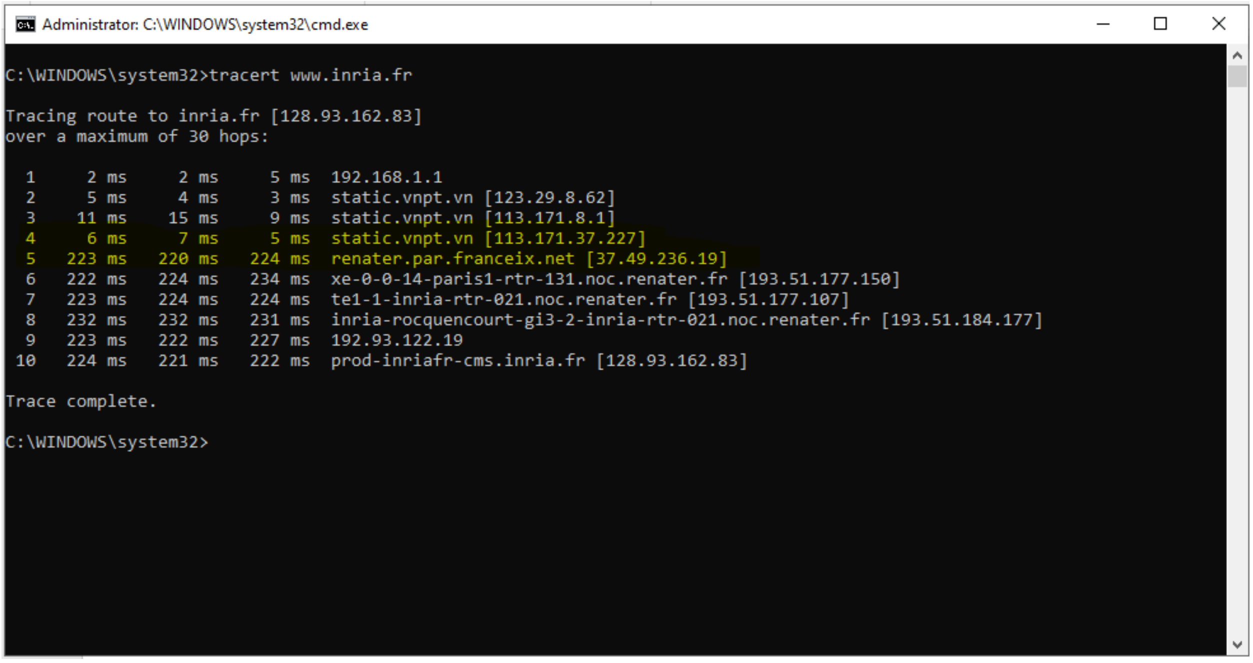

*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
icmp

```
No.  Time               Source          Destination     Protocol Length Info
 272 10:47:26,471818 192.93.122.19   192.168.1.8     ICMP      70 Time-to-live exceeded (Time to live exceeded in transit)
 273 10:47:26,473524 192.168.1.8     128.93.162.83   ICMP     106 Echo (ping) request  id=0x0001, seq=127/32512, ttl=9 (no response found!)
 274 10:47:26,700880 192.93.122.19   192.168.1.8     ICMP      70 Time-to-live exceeded (Time to live exceeded in transit)
 421 10:47:48,476645 192.168.1.8     128.93.162.83   ICMP     106 Echo (ping) request  id=0x0001, seq=128/32768, ttl=10 (reply in 422)
 422 10:47:48,700695 128.93.162.83   192.168.1.8     ICMP     106 Echo (ping) reply    id=0x0001, seq=128/32768, ttl=52 (request in 421)
 423 10:47:48,702343 192.168.1.8     128.93.162.83   ICMP     106 Echo (ping) request  id=0x0001, seq=129/33024, ttl=10 (reply in 424)
 424 10:47:48,924019 128.93.162.83   192.168.1.8     ICMP     106 Echo (ping) reply    id=0x0001, seq=129/33024, ttl=52 (request in 423)
 425 10:47:48,925719 192.168.1.8     128.93.162.83   ICMP     106 Echo (ping) request  id=0x0001, seq=130/33280, ttl=10 (reply in 426)
 426 10:47:49,148557 128.93.162.83   192.168.1.8     ICMP     106 Echo (ping) reply    id=0x0001, seq=130/33280, ttl=52 (request in 425)

> Frame 422: 106 bytes on wire (848 bits), 106 bytes captured (848 bits) on interface \Device\NPF_{88D94067-5E69-4E66-B9F5-114FAC31E2C6}, id 0
> Ethernet II, Src: VnptTech_6d:4b:f8 (d4:9a:a0:6d:4b:f8), Dst: CloudNet_99:b2:1d (48:5f:99:99:b2:1d)
> Internet Protocol Version 4, Src: 128.93.162.83, Dst: 192.168.1.8
v Internet Control Message Protocol
    Type: 0 (Echo (ping) reply)
    Code: 0
    Checksum: 0xff7e [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence Number (BE): 128 (0x0080)
    Sequence Number (LE): 32768 (0x8000)
    [Request frame: 421]
    [Response time: 224,050 ms]
  > Data (64 bytes)

0000  48 5f 99 99 b2 1d d4 9a  a0 6d 4b f8 08 00 45 20   H_······ ·mK···E
0010  00 5c 27 00 00 00 34 01  7b 20 80 5d a2 53 c0 a8   ·\'···4· { ·]·S··
0020  01 08 00 00 ff 7e 00 01  00 80 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                     ········ ··

Type (icmp.type), 1 byte(s)        Packets: 478 · Displayed: 72 (15.1%) · Dropped: 0 (0.0%)        Profile: Default
```

Question 10: Within the tracert measurements, is there a link whose delay is significantly longer than others? Refer to the screenshot in Figure 4, is there a link whose delay is significantly longer than others? On the basis of the router names, can you guess the location of the two routers on the end of this link?

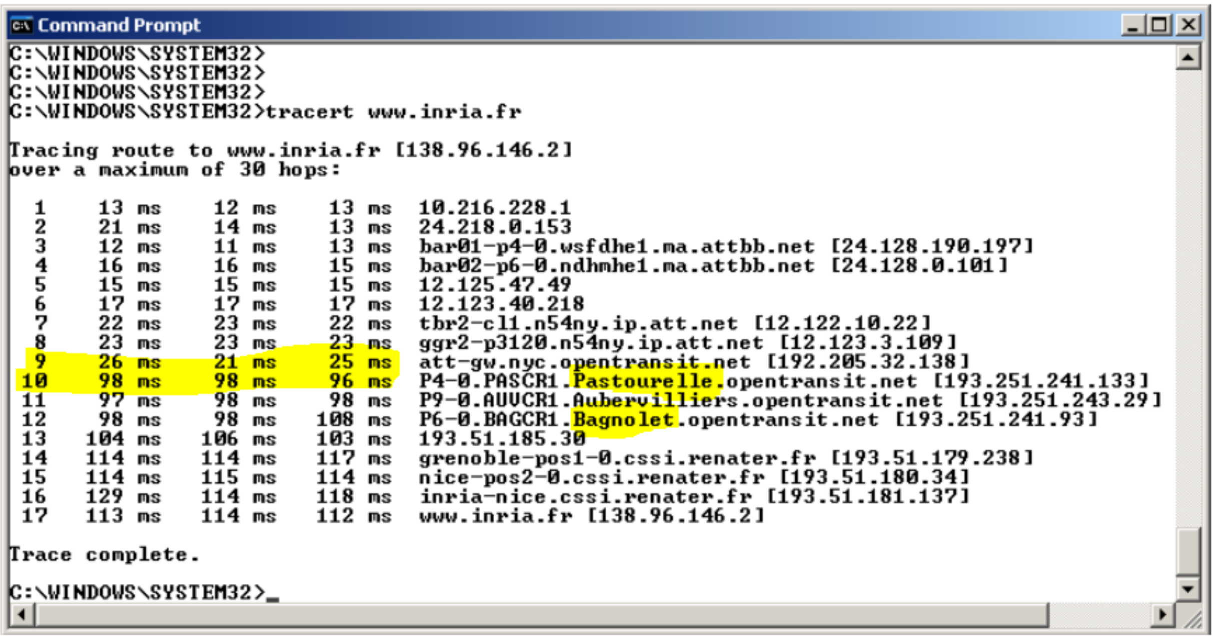
ANSWER:

There is a link between router 4 and 5 that has a significantly longer delay.



```
C:\WINDOWS\system32>tracert www.inria.fr

Tracing route to inria.fr [128.93.162.83]
over a maximum of 30 hops:

  1     2 ms     2 ms     5 ms  192.168.1.1
  2     5 ms     4 ms     3 ms  static.vnpt.vn [123.29.8.62]
  3    11 ms    15 ms     9 ms  static.vnpt.vn [113.171.8.1]
  4     6 ms     7 ms     5 ms  static.vnpt.vn [113.171.37.227]
  5   223 ms   220 ms   224 ms  renater.par.franceix.net [37.49.236.19]
  6   222 ms   224 ms   234 ms  xe-0-0-14-paris1-rtr-131.noc.renater.fr [193.51.177.150]
  7   223 ms   224 ms   224 ms  te1-1-inria-rtr-021.noc.renater.fr [193.51.177.107]
  8   232 ms   232 ms   231 ms  inria-rocquencourt-gi3-2-inria-rtr-021.noc.renater.fr [193.51.184.177]
  9   223 ms   222 ms   227 ms  192.93.122.19
 10   224 ms   221 ms   222 ms  prod-inriafr-cms.inria.fr [128.93.162.83]

Trace complete.

C:\WINDOWS\system32>
```

*In figure 4:
There is a link between router 9 and 10 whose delay is significantly longer than others. This link is from New York to Pastourelle (France)
2 routers on the end of this link are from New York and Bagnolet (France)



```
C:\WINDOWS\SYSTEM32>
C:\WINDOWS\SYSTEM32>
C:\WINDOWS\SYSTEM32>
C:\WINDOWS\SYSTEM32>tracert www.inria.fr

Tracing route to www.inria.fr [138.96.146.2]
over a maximum of 30 hops:

  1    13 ms    12 ms    13 ms  10.216.228.1
  2    21 ms    14 ms    13 ms  24.218.0.153
  3    12 ms    11 ms    13 ms  bar01-p4-0.wsfdhe1.ma.attbb.net [24.128.190.197]
  4    16 ms    16 ms    15 ms  bar02-p6-0.ndhmhe1.ma.attbb.net [24.128.0.101]
  5    15 ms    15 ms    15 ms  12.125.47.49
  6    17 ms    17 ms    17 ms  12.123.40.218
  7    22 ms    23 ms    22 ms  tbr2-cl1.n54ny.ip.att.net [12.122.10.22]
  8    23 ms    23 ms    23 ms  ggr2-p3120.n54ny.ip.att.net [12.123.3.109]
  9    26 ms    21 ms    25 ms  att-gw.nyc.opentransit.net [192.205.32.138]
 10    98 ms    98 ms    96 ms  P4-0.PASCR1.Pastourelle.opentransit.net [193.251.241.133]
 11    97 ms    98 ms    98 ms  P9-0.AUVCR1.Aubervilliers.opentransit.net [193.251.243.29]
 12    98 ms    98 ms   108 ms  P6-0.BAGCR1.Bagnolet.opentransit.net [193.251.241.93]
 13   104 ms   106 ms   103 ms  193.51.185.30
 14   114 ms   114 ms   117 ms  grenoble-pos1-0.cssi.renater.fr [193.51.179.238]
 15   114 ms   115 ms   114 ms  nice-pos2-0.cssi.renater.fr [193.51.180.34]
 16   129 ms   114 ms   118 ms  inria-nice.cssi.renater.fr [193.51.181.137]
 17   113 ms   114 ms   112 ms  www.inria.fr [138.96.146.2]

Trace complete.

C:\WINDOWS\SYSTEM32>_
```

Figure 4 Command Prompt window displays the results of the Traceroute program.