

**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ  
НАВЧАЛЬНО-НАУКОВИЙ КОМПЛЕКС  
«ІНСТИТУТ ПРИКЛАДНОГО СИСТЕМНОГО АНАЛІЗУ»  
НАЦІОНАЛЬНОГО ТЕХНІЧНОГО УНІВЕРСИТЕТУ УКРАЇНИ  
«КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ ІМЕНІ ІГОРЯ СІКОРСЬКОГО»  
КАФЕДРА МАТЕМАТИЧНИХ МЕТОДІВ СИСТЕМНОГО АНАЛІЗУ**

**Практична робота №4  
з курсу «Комп'ютерні мережі»**

**Виконала: студентка 3 курсу  
групи КА-73  
Федоренко А. П.  
Прийняв: Кухарєв С. О.**

dump1:

```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.18363.778]
(c) Корпорация Майкрософт (Microsoft Corporation), 2019. Все права защищены.

C:\Users\Роман>ping -n 10 www.ust.hk

Обмен пакетами с www.ust.hk [143.89.14.1] с 32 байтами данных:
Превышен интервал ожидания для запроса.
Превышен интервал ожидания для запроса.
Превышен интервал ожидания для запроса.
Превышен интервал ожидания для запроса.
Превышен интервал ожидания для запроса.
Превышен интервал ожидания для запроса.
Превышен интервал ожидания для запроса.
Превышен интервал ожидания для запроса.
Превышен интервал ожидания для запроса.
Превышен интервал ожидания для запроса.

Статистика Ping для 143.89.14.1:
    Пакетов: отправлено = 10, получено = 0, потеряно = 10
    (100% потеря)
```

lab4\_dump1.pcapng

Файл Редактирование Просмотр Запуск Захват Анализ Статистика Телефония Беспроводной Инструменты Помощь

icmp

No.	Time	Source	Destination	Protocol	Length	Info
29	2.546963	192.168.0.103	143.89.14.1	ICMP	74	Echo (ping) request id=0x0001, seq=9/2304, ttl=128 (no response found!)
44	7.402737	192.168.0.103	143.89.14.1	ICMP	74	Echo (ping) request id=0x0001, seq=10/2560, ttl=128 (no response found!)
50	12.395070	192.168.0.103	143.89.14.1	ICMP	74	Echo (ping) request id=0x0001, seq=11/2816, ttl=128 (no response found!)
56	17.398732	192.168.0.103	143.89.14.1	ICMP	74	Echo (ping) request id=0x0001, seq=12/3072, ttl=128 (no response found!)
86	22.399503	192.168.0.103	143.89.14.1	ICMP	74	Echo (ping) request id=0x0001, seq=13/3328, ttl=128 (no response found!)
91	27.397423	192.168.0.103	143.89.14.1	ICMP	74	Echo (ping) request id=0x0001, seq=14/3584, ttl=128 (no response found!)
101	32.401700	192.168.0.103	143.89.14.1	ICMP	74	Echo (ping) request id=0x0001, seq=15/3840, ttl=128 (no response found!)
107	37.395887	192.168.0.103	143.89.14.1	ICMP	74	Echo (ping) request id=0x0001, seq=16/4096, ttl=128 (no response found!)
114	42.398244	192.168.0.103	143.89.14.1	ICMP	74	Echo (ping) request id=0x0001, seq=17/4352, ttl=128 (no response found!)
119	47.403160	192.168.0.103	143.89.14.1	ICMP	74	Echo (ping) request id=0x0001, seq=18/4608, ttl=128 (no response found!)

<

>

> Frame 29: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF\_{CC431E3D-E278-4CA9-8757-FF32C2AC82FE}, id 0

> Ethernet II, Src: RivetNet\_6b:7b:13 (9c:b6:d0:6b:7b:13), Dst: Tp-LinkT\_50:ec:fe (c4:71:54:50:ec:fe)

> Internet Protocol Version 4, Src: 192.168.0.103, Dst: 143.89.14.1

> Internet Control Message Protocol

0000 c4 71 54 50 ec fe 9c b6 d0 6b 7b 13 08 00 45 00 qTP-----k{---E-

0010 00 3c 16 d0 00 00 00 01 c5 87 c0 a8 00 67 8f 59 <-----g.Y

0020 0e 01 08 00 4d 52 00 01 00 09 61 62 63 64 65 66 --.MR...abcdef

0030 67 68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76 ghijklmnopqrstuv

0040 77 61 62 63 64 65 66 67 68 69 wabdefghij

Internet Control Message Protocol (icmp), 40 байты

Пакеты: 135 - Показаны: 10 (7.4%)

Профиль: Default

Контрольні запитання

1. Які IP адреси вашої та цільової робочих станцій?

Моя: 192.168.0.103

Цільова: 143.89.14.1

## 2. Чому ICMP пакет не вказує/використовує номери вихідного та цільового портів?

Тому що ICMP пакети були розроблені для обміну інформацією на мережевому рівні між хостами та маршрутизаторами, а не для обміну між процесами на прикладному рівні.

**3. Дослідіть один з пакетів-запитів ICMP. Які тип та код зазначені у цьому пакеті? Скільки байтів займають поля контрольної суми, номер послідовності та ідентифікатору?**

```
Type: 8 (Echo (ping) request)
Code: 0
Checksum: 0x4d52 [correct]
[Checksum Status: Good]
Identifier (BE): 1 (0x0001)
Identifier (LE): 256 (0x0100)
Sequence number (BE): 9 (0x0009)
Sequence number (LE): 2304 (0x0900)
Data (32 bytes)
```

**4. Дослідіть відповідний пакет з відповіддю на пакет із пункту 3. Які тип та код зазначені у цьому пакеті? Які інші поля має цей пакет? Скільки байтів займають поля контрольної суми, номера послідовності та ідентифікатору?**

The screenshot displays the Wireshark network protocol analyzer interface. The top menu bar includes options like 'Файл', 'Редактирование', 'Просмотр', 'Запуск', 'Захват', 'Анализ', 'Статистика', 'Телефония', 'Беспроводной', 'Инструменты', and 'Помощь'. The toolbar contains icons for various functions such as opening files, saving, and analyzing.

The main window is divided into three panes:

- Packet List:** Shows a list of 119 captured packets. All are ICMP Echo (ping) requests from source IP 192.168.0.103 to destination IP 143.89.14.1. The 'Info' column provides details for each packet, such as '74 Echo (ping) request id=0x0001, seq=9/2304, ttl=128 (no response found!)'.
- Packet Details:** Expanded for packet 29, it shows the structure of an Internet Control Message Protocol (ICMP) Echo request. Fields include:
  - Type: 8 (Echo (ping) request)
  - Code: 0
  - Checksum: 0x4d52 [correct]
  - [Checksum Status: Good]
  - Identifier (BE): 1 (0x0001)
  - Identifier (LE): 256 (0x0100)
  - Sequence number (BE): 9 (0x0009)
  - Sequence number (LE): 2304 (0x0900)
  - [No response seen]
  - [Expert Info (Warning/Sequence): No response seen to ICMP request]
  - [Data (32 bytes): 6162636465666768696a6b6c6d6e6f7071727374757671...]
- Packet Bytes:** Displays the raw data of the selected packet in hexadecimal and ASCII. The ASCII column shows the sequence of characters 'abcdefghijklmnopqrstuvw...'.

The status bar at the bottom indicates 'Data (data), 32 байты' and 'Пакеты: 135 - Показаны: 10 (7.4%)'.

dump 2:

The image shows two windows from a Windows operating system. The top window is a Command Prompt titled "C:\WINDOWS\system32\cmd.exe" showing the execution of the command `tracert www.inria.fr`. The output displays the route from the local machine to `inria-cms.inria.fr` [128.93.162.63] with 11 hops. The bottom window is Wireshark, titled "lab4\_dump2.pcapng", showing a packet capture of ICMP Echo (ping) requests. The packet list shows multiple requests from source IP 192.168.0.103 to destination IP 128.93.162.63. The packet details pane for the selected packet (No. 8) shows it is an Internet Control Message Protocol (ICMP) Echo (ping) request. The packet bytes pane shows the raw data in hexadecimal and ASCII.

```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.18363.778]
(c) Корпорация Майкрософт (Microsoft Corporation), 2019. Все права защищены.

C:\Users\Роман>tracert www.inria.fr

Трассировка маршрута к inria-cms.inria.fr [128.93.162.63]
с максимальным числом прыжков 30:

  1  2 ms    2 ms    1 ms   192.168.0.1
  2  3 ms   24 ms   10 ms   10.0.255.255
  3  3 ms  123 ms    4 ms   194.33.189.21
  4  4 ms    5 ms    4 ms   ae17.RT.NTL.KIV.UA.retn.net [87.245.237.40]
  5 44 ms   42 ms   41 ms   ae0-9.RT.THV.PAR.FR.retn.net [87.245.233.186]
  6    *      *      *      Превышен интервал ожидания для запроса.
  7 48 ms   48 ms   49 ms   xe-1-0-6-paris1-rtr-131.noc.renater.fr [193.51.177.126]
  8 46 ms   48 ms   45 ms   te1-1-inria-rtr-021.noc.renater.fr [193.51.177.107]
  9 47 ms   50 ms   47 ms   inria-rocquencourt-te1-4-inria-rtr-021.noc.renater.fr [193.51.184.177]
 10 49 ms   47 ms   53 ms   unit240-reth1-vfw-ext-dc1.inria.fr [192.93.122.19]
 11 49 ms   48 ms   47 ms   inria-cms.inria.fr [128.93.162.63]

Трассировка завершена.
```

lab4\_dump2.pcapng

File Edit View Packets Packets List Packets Details Packet Bytes Statistics Statistics Tools Help

icmp

No.	Time	Source	Destination	Protocol	Length	Info
8	2.986167	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=62/15872, ttl=1 (no response found!)
9	2.988249	192.168.0.1	192.168.0.103	ICMP	134	Time-to-live exceeded (Time to live exceeded in transit)
10	2.988972	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=63/16128, ttl=1 (no response found!)
11	2.991635	192.168.0.1	192.168.0.103	ICMP	134	Time-to-live exceeded (Time to live exceeded in transit)
12	2.992643	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=64/16384, ttl=1 (no response found!)
13	2.994343	192.168.0.1	192.168.0.103	ICMP	134	Time-to-live exceeded (Time to live exceeded in transit)
19	3.001117	192.168.0.1	192.168.0.103	ICMP	120	Destination unreachable (Port unreachable)
25	4.501904	192.168.0.1	192.168.0.103	ICMP	120	Destination unreachable (Port unreachable)
28	6.002223	192.168.0.1	192.168.0.103	ICMP	120	Destination unreachable (Port unreachable)
37	8.506727	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=65/16640, ttl=2 (no response found!)
38	8.509814	10.0.255.255	192.168.0.103	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
39	8.513524	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=66/16896, ttl=2 (no response found!)
40	8.538180	10.0.255.255	192.168.0.103	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
41	8.540447	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=67/17152, ttl=2 (no response found!)
42	8.550454	10.0.255.255	192.168.0.103	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
66	14.051441	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=68/17408, ttl=3 (no response found!)
67	14.054984	194.33.189.21	192.168.0.103	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
68	14.058676	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=69/17664, ttl=3 (no response found!)
69	14.181744	194.33.189.21	192.168.0.103	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
70	14.186084	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=70/17920, ttl=3 (no response found!)
71	14.186161	194.33.189.21	192.168.0.103	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
72	14.190375	194.33.189.21	192.168.0.103	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
92	19.703388	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=71/18176, ttl=4 (no response found!)
93	19.708209	87.245.237.40	192.168.0.103	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
94	19.710742	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=72/18432, ttl=4 (no response found!)
95	19.715883	87.245.237.40	192.168.0.103	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
96	19.718719	192.168.0.103	128.93.162.63	ICMP	106	Echo (ping) request id=0x0001, seq=73/18688, ttl=4 (no response found!)

> Frame 8: 106 bytes on wire (848 bits), 106 bytes captured (848 bits) on interface \Device\NPF\_{CC431E3D-E278-4CA9-8757-FF32C2AC82FE}, id 0  
> Ethernet II, Src: RivetNet\_6b:7b:13 (9c:b6:d0:6b:7b:13), Dst: Tp-LinkT\_50:ec:fe (c4:71:54:50:ec:fe)  
> Internet Protocol Version 4, Src: 192.168.0.103, Dst: 128.93.162.63  
> Internet Control Message Protocol

0000 c4 71 54 50 ec fe 9c b6 d0 6b 7b 13 08 00 45 00 .qTP....k{...E.  
0010 00 5c f0 d8 00 00 01 01 e5 1c c0 a8 00 67 80 5d .\.....:g.]  
0020 a2 3f 08 00 f7 c0 00 01 00 3e 00 00 00 00 00 00 .?.....>.....  
0030 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 .....  
0050 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 .....  
0070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
00a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
00b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
00c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
00d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
00e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
00f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0120 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0140 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0150 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0160 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0170 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0180 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0190 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
01a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
01b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
01c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
01d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
01e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
01f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0200 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0210 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0220 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0230 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0240 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0250 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0260 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0270 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0280 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0290 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
02a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
02b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
02c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
02d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
02e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
02f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0300 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0310 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0320 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0330 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0340 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0350 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0360 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0370 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0380 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0390 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
03a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
03b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
03c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
03d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
03e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
03f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0400 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0410 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0420 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0430 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0440 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0450 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0460 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0470 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0480 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0490 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
04a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
04b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
04c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
04d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
04e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
04f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0500 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0510 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0520 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0530 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0540 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0550 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0560 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0570 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0580 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0590 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
05a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
05b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
05c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
05d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
05e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
05f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0600 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0610 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0620 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0630 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0640 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0650 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0660 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0670 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0680 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0690 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
06a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
06b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
06c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
06d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
06e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
06f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0700 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0710 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0720 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0730 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0740 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0750 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0760 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0770 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0780 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0790 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
07a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
07b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
07c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
07d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
07e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
07f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0800 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0810 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0820 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0830 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0840 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0850 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0860 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0870 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0880 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0890 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
08a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
08b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
08c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
08d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
08e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
08f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0900 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0910 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0920 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0930 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0940 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0950 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0960 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0970 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0980 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0990 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
09a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
09b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
09c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
09d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
09e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
09f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....  
0a00 00 00

**7. Чи відрізняється пакет із запитом програми traceroute від пакету із запитом програми ping? Якщо так, наведіть приклади.**

Так, розміром повідомлення та параметром time to live

**8. Проаналізуйте пакет ICMP з повідомленням про помилку. Чи є у ньому деякі додаткові поля, які не зазначаються у повідомленні з підтвердженням. Якщо є – які саме поля і яку інформацію вони вміщують?**

Пакет помилки ICMP не подібний до пінгового запиту, також в ньому знаходяться заголовки IP та 8 байтовий оригінальний пакет про помилку ICMP.

**9. Проаналізуйте три останні відповіді протоколу ICMP, які отримала ваша робоча станція. Як ці пакети відрізняються від пакетів з повідомленням про помилку? Чому вони відрізняються?**

Останні три пакети – це пакети повідомлення, вони мають тип 0 (Echo (ping) reply), а не 11 (Time-to-live exceeded). Це значить, що датаграми дійшли до цільового призначення. Також там є пакет про помилку (Port unreachable), що свідчить про кінець роботи утиліти tracert.

**10. Знайдіть етап ретрансляції повідомлень з найбільшою середньою затримкою. Чи є можливість оцінити географічну відстань між маршрутизаторами на цьому етапі?**

~37 ms

Так, можна.

**Висновки:** при виконанні роботи мною були отримані навички аналізу роботи протоколів ICMP, а також зразків запитів ping та tracert.