«ІНСТИТУТ ПРИКЛАДНОГО СИСТЕМНОГО АНАЛІЗУ»

НАЦІОНАЛЬНОГО ТЕХНІЧНОГО УНІВЕРСИТЕТУ УКРАЇНИ

«КПІ»

КАФЕДРА МАТЕМАТИЧНИХ МЕТОДІВ СИСТЕМНОГО АНАЛІЗУ

Лабораторна робота №4

з курсу «Комп'ютерні мережі»

на тему: «Основи роботи протоколу ICMP»

Виконала: студентка 3 курсу

групи КА-74

Лященко К. С.

Прийняв: Кухарєв С. О.

Київ – 2020
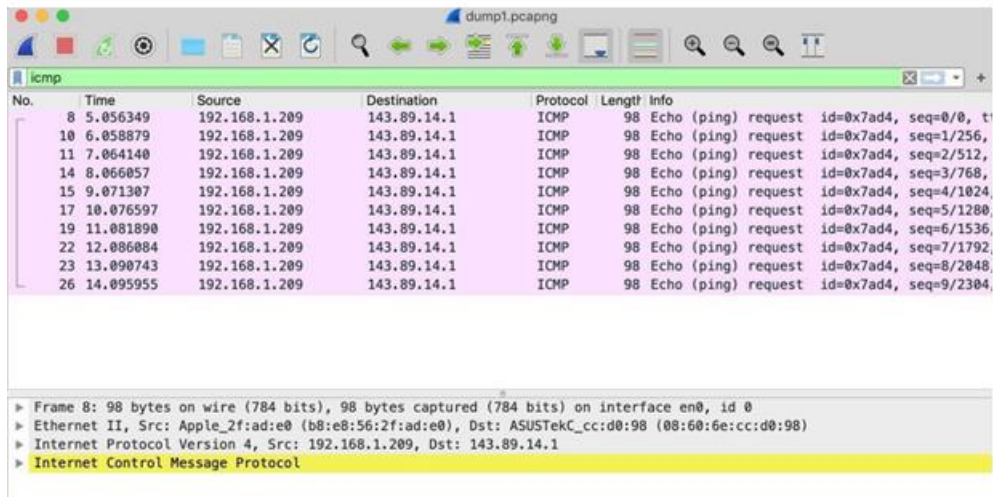
Мета роботи: аналіз деталей роботи протоколу ICMP.

Хід виконання роботи

```
user --PK:~ mac$ ping -c 10 www.ust.hk
PING www.ust.hk (143.89.14.1): 56 data bytes
Request timeout for icmp_seq 0
Request timeout for icmp_seq 1
Request timeout for icmp_seq 2
Request timeout for icmp_seq 3
Request timeout for icmp_seq 4
Request timeout for icmp_seq 5
Request timeout for icmp_seq 6
Request timeout for icmp_seq 7
Request timeout for icmp_seq 8

--- www.ust.hk ping statistics ---
10 packets transmitted, 0 packets received, 100.0% packet loss
user --PK:~ mac$
```

No.	Time	Source	Destination	Protocol	Length	Info
8	5.056349	192.168.1.209	143.89.14.1	ICMP	98	Echo (ping) request id=0x7ad4, seq=0/0, t
10	6.058879	192.168.1.209	143.89.14.1	ICMP	98	Echo (ping) request id=0x7ad4, seq=1/256,
11	7.064140	192.168.1.209	143.89.14.1	ICMP	98	Echo (ping) request id=0x7ad4, seq=2/512,
14	8.066057	192.168.1.209	143.89.14.1	ICMP	98	Echo (ping) request id=0x7ad4, seq=3/768,
15	9.071307	192.168.1.209	143.89.14.1	ICMP	98	Echo (ping) request id=0x7ad4, seq=4/1024,
17	10.076597	192.168.1.209	143.89.14.1	ICMP	98	Echo (ping) request id=0x7ad4, seq=5/1280,
19	11.081890	192.168.1.209	143.89.14.1	ICMP	98	Echo (ping) request id=0x7ad4, seq=6/1536,
22	12.086084	192.168.1.209	143.89.14.1	ICMP	98	Echo (ping) request id=0x7ad4, seq=7/1792,
23	13.090743	192.168.1.209	143.89.14.1	ICMP	98	Echo (ping) request id=0x7ad4, seq=8/2048,
26	14.095955	192.168.1.209	143.89.14.1	ICMP	98	Echo (ping) request id=0x7ad4, seq=9/2304,

▶ Frame 8: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface en0, id 0
▶ Ethernet II, Src: Apple_2f:ad:e0 (b8:e8:56:2f:ad:e0), Dst: ASUSTekC_cc:d0:98 (08:60:6e:cc:d0:98)
▶ Internet Protocol Version 4, Src: 192.168.1.209, Dst: 143.89.14.1
▶ Internet Control Message Protocol

```
[user --PK:~ mac$ traceroute -I www.inria.fr
 traceroute to inria-cms.inria.fr (128.93.162.63), 64 hops max, 72 byte packets
  1  www.asusnetwork.net (192.168.1.1)  2.185 ms  1.296 ms  0.900 ms
  2  49-8-5-195.ip.ukrtel.net (195.5.8.49)  5.795 ms  9.296 ms  9.581 ms
  3  10.80.19.54 (10.80.19.54)  12.521 ms  12.247 ms  12.399 ms
  4  ae5.rt.dsf.dnk.ua.retn.net (87.245.239.76)  26.383 ms  24.453 ms  21.704 ms
  5  ae10-11.rt.thv.par.fr.retn.net (87.245.232.252)  54.201 ms  51.490 ms  51.711 ms
  6  renater.par.franceix.net (37.49.236.19)  54.640 ms  55.470 ms  60.042 ms
  7  xe-0-0-16-paris1-rtr-131.noc.renater.fr (193.51.177.68)  54.840 ms  55.337 ms  55.404 ms
  8  te1-1-inria-rtr-021.noc.renater.fr (193.51.177.107)  55.014 ms  55.922 ms  55.043 ms
  9  inria-rocquencourt-te1-4-inria-rtr-021.noc.renater.fr (193.51.184.177)  54.870 ms  54.868 ms  54.884 ms
 10  unit240-reth1-vfw-ext-dc1.inria.fr (192.93.122.19)  55.293 ms  55.218 ms  55.275 ms
 11  inria-cms.inria.fr (128.93.162.63)  58.318 ms  58.631 ms  58.371 ms
user --PK:~ mac$
```

57 4.404789	193.51.177.107	192.168.1.209	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
58 4.404932	192.168.1.209	128.93.162.63	ICMP	86 Echo (ping) request id=0xd53a, seq=24/6144, ttl=8 (no response found!)
59 4.459828	193.51.177.107	192.168.1.209	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
60 4.460003	192.168.1.209	128.93.162.63	ICMP	86 Echo (ping) request id=0xd53a, seq=25/6400, ttl=9 (no response found!)
61 4.514693	193.51.184.177	192.168.1.209	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
62 4.515911	192.168.1.209	128.93.162.63	ICMP	86 Echo (ping) request id=0xd53a, seq=26/6656, ttl=9 (no response found!)
63 4.570652	193.51.184.177	192.168.1.209	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
64 4.570793	192.168.1.209	128.93.162.63	ICMP	86 Echo (ping) request id=0xd53a, seq=27/6912, ttl=9 (no response found!)
65 4.625534	193.51.184.177	192.168.1.209	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
66 4.625705	192.168.1.209	128.93.162.63	ICMP	86 Echo (ping) request id=0xd53a, seq=28/7168, ttl=10 (no response found!)
67 4.680819	192.93.122.19	192.168.1.209	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
68 4.682149	192.168.1.209	128.93.162.63	ICMP	86 Echo (ping) request id=0xd53a, seq=29/7424, ttl=10 (no response found!)
69 4.737196	192.93.122.19	192.168.1.209	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
70 4.737327	192.168.1.209	128.93.162.63	ICMP	86 Echo (ping) request id=0xd53a, seq=30/7680, ttl=10 (no response found!)
71 4.792456	192.93.122.19	192.168.1.209	ICMP	70 Time-to-live exceeded (Time to live exceeded in transit)
72 4.792629	192.168.1.209	128.93.162.63	ICMP	86 Echo (ping) request id=0xd53a, seq=31/7936, ttl=11 (reply in 73)
73 4.850833	128.93.162.63	192.168.1.209	ICMP	86 Echo (ping) reply id=0xd53a, seq=31/7936, ttl=51 (request in 72)
74 4.851639	192.168.1.209	128.93.162.63	ICMP	86 Echo (ping) request id=0xd53a, seq=32/8192, ttl=11 (reply in 75)
75 4.910106	128.93.162.63	192.168.1.209	ICMP	86 Echo (ping) reply id=0xd53a, seq=32/8192, ttl=51 (request in 74)
76 4.910275	192.168.1.209	128.93.162.63	ICMP	86 Echo (ping) request id=0xd53a, seq=33/8448, ttl=11 (reply in 77)
77 4.968534	128.93.162.63	192.168.1.209	ICMP	86 Echo (ping) reply id=0xd53a, seq=33/8448, ttl=51 (request in 76)

Контрольні запитання

1. Моя: 192.168.1.209, цільова: 143.89.14.1
2. Тому, що він користується адресами робочих станцій

```
Source: 192.168.1.209
Destination: 143.89.14.1
```

3.

```
Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0xeb1b [correct]
    [Checksum Status: Good]
    Identifier (BE): 31444 (0x7ad4)
    Identifier (LE): 54394 (0xd47a)
    Sequence number (BE): 0 (0x0000)
    Sequence number (LE): 0 (0x0000)
  ▶ [No response seen]
    Timestamp from icmp data: Mar 30, 2020 19:56:52.533422000 EEST
    [Timestamp from icmp data (relative): 0.000055000 seconds]
  ▼ Data (48 bytes)
      Data: 08090a0b0c0d0e0f101112131415161718191a1b1c1d1e1f…
      [Length: 48]
```

4.

```
▼ [No response seen]
  ▼ [Expert Info (Warning/Sequence): No response seen to ICMP request]
      [No response seen to ICMP request]
      [Severity level: Warning]
      [Group: Sequence]
    Timestamp from icmp data: Mar 30, 2020 19:56:52.533422000 EEST
    [Timestamp from icmp data (relative): 0.000055000 seconds]
```

5. Моя: 192.168.1.209, цільова: 128.93.162.63
6. Номер 8
7. Так. Ping не мають відповіді, а traceroute в тому ж файлі дають відповідь.

```
 86 Echo (ping) request  id=0xd53a, seq=1/256, ttl=1 (no response found!)
114 Time-to-live exceeded (Time to live exceeded in transit)
```

8. Так є

```
▼ 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: 192.168.1.209, Dst: 128.93.162.63
      0100 .... = Version: 4
      .... 0101 = Header Length: 20 bytes (5)
    ▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
      Total Length: 72
      Identification: 0xd89e (55454)
    ▶ Flags: 0x0000
      ...0 0000 0000 0000 = Fragment offset: 0
    ▶ Time to live: 1
      Protocol: ICMP (1)
      Header checksum: 0xfc00 [validation disabled]
      [Header checksum status: Unverified]
      Source: 192.168.1.209
      Destination: 128.93.162.63
```

9.
```
▼ Internet Control Message Protocol
    Type: 0 (Echo (ping) reply)
    Code: 0
    Checksum: 0x2aa4 [correct]
    [Checksum Status: Good]
    Identifier (BE): 54586 (0xd53a)
    Identifier (LE): 15061 (0x3ad5)
    Sequence number (BE): 33 (0x0021)
    Sequence number (LE): 8448 (0x2100)
    [Request frame: 76]
    [Response time: 58.259 ms]
  ▼ Data (44 bytes)
      Data: 0000000000000000000000000000000000000000000000000000…
      [Length: 44]
```

10. Так, за допомогою довжини даних.

Висновок

В ході виконання даної лабораторної роботи, були покращено навички використання програми Wireshark для захоплення пакетів. Було проаналізовано протоколи ICMP та було проведено аналіз деталей роботи даних протоколів.