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Согласовано

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Утверждаю

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**Лабораторная работа 1-3
по курсу «Системы передачи данных»**

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“ _____ ” _____

Содержание

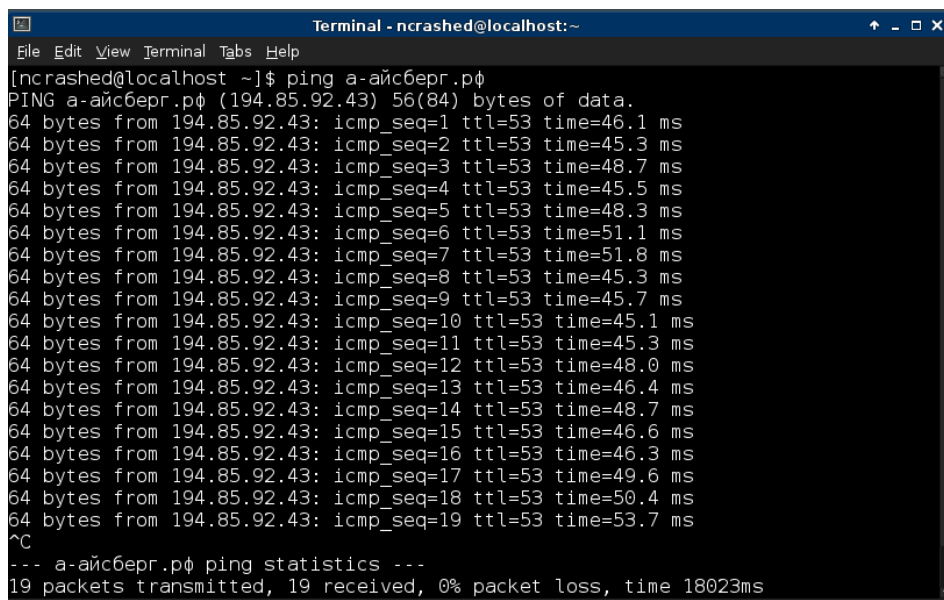
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1 Задание

Вариант	Удаленный хост	Ping	Traceroute	Проверка сервисов	Запрос
7	а-айсберг.рф	+		+	whois, lookup

2 Выполнение

Выполним команду ping на хост а-айсберг.рф:



```
Terminal - ncrashed@localhost: ~
File Edit View Terminal Tabs Help
[ncrashed@localhost ~]$ ping а-айсберг.рф
PING а-айсберг.рф (194.85.92.43) 56(84) bytes of data:
64 bytes from 194.85.92.43: icmp_seq=1 ttl=53 time=46.1 ms
64 bytes from 194.85.92.43: icmp_seq=2 ttl=53 time=45.3 ms
64 bytes from 194.85.92.43: icmp_seq=3 ttl=53 time=48.7 ms
64 bytes from 194.85.92.43: icmp_seq=4 ttl=53 time=45.5 ms
64 bytes from 194.85.92.43: icmp_seq=5 ttl=53 time=48.3 ms
64 bytes from 194.85.92.43: icmp_seq=6 ttl=53 time=51.1 ms
64 bytes from 194.85.92.43: icmp_seq=7 ttl=53 time=51.8 ms
64 bytes from 194.85.92.43: icmp_seq=8 ttl=53 time=45.3 ms
64 bytes from 194.85.92.43: icmp_seq=9 ttl=53 time=45.7 ms
64 bytes from 194.85.92.43: icmp_seq=10 ttl=53 time=45.1 ms
64 bytes from 194.85.92.43: icmp_seq=11 ttl=53 time=45.3 ms
64 bytes from 194.85.92.43: icmp_seq=12 ttl=53 time=48.0 ms
64 bytes from 194.85.92.43: icmp_seq=13 ttl=53 time=46.4 ms
64 bytes from 194.85.92.43: icmp_seq=14 ttl=53 time=48.7 ms
64 bytes from 194.85.92.43: icmp_seq=15 ttl=53 time=46.6 ms
64 bytes from 194.85.92.43: icmp_seq=16 ttl=53 time=46.3 ms
64 bytes from 194.85.92.43: icmp_seq=17 ttl=53 time=49.6 ms
64 bytes from 194.85.92.43: icmp_seq=18 ttl=53 time=50.4 ms
64 bytes from 194.85.92.43: icmp_seq=19 ttl=53 time=53.7 ms
^C
--- а-айсберг.рф ping statistics ---
19 packets transmitted, 19 received, 0% packet loss, time 18023ms
```

Отловим все ICMP сообщения по адресу 194.85.92.43 через wireshark:

Проведем подробный анализ содержимого пакета:

Capturing from any [Wireshark 1.10.10 (Git Rev Unknown from unknown)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: icmp && ip.addr == 194.85.92.43 Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Info
77	21.435420000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) request id=0x7119, seq=1/256, ttl=64 (request in 77)
78	21.435420000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=1/256, ttl=53 (reply in 77)
83	22.389301000	192.168.1.230	194.85.92.43	ICMP	100	Echo (ping) request id=0x7119, seq=2/512, ttl=64 (reply in 84)
84	22.434668000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=2/512, ttl=53 (request in 83)
90	23.390328000	192.168.1.230	194.85.92.43	ICMP	100	Echo (ping) request id=0x7119, seq=3/768, ttl=64 (reply in 91)
91	23.439570000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=3/768, ttl=53 (request in 90)
94	24.391014000	192.168.1.230	194.85.92.43	ICMP	100	Echo (ping) request id=0x7119, seq=4/1024, ttl=64 (reply in 95)
95	24.444893000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=4/1024, ttl=53 (request in 94)
104	25.392037000	192.168.1.230	194.85.92.43	ICMP	100	Echo (ping) request id=0x7119, seq=5/1280, ttl=64
105	25.437386000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=5/1280, ttl=53 (request in 104)
112	26.393210000	192.168.1.230	194.85.92.43	ICMP	100	Echo (ping) request id=0x7119, seq=6/1536, ttl=64
115	26.442670000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=6/1536, ttl=53 (request in 112)
125	27.394622000	192.168.1.230	194.85.92.43	ICMP	100	Echo (ping) request id=0x7119, seq=7/1792, ttl=64
127	27.441587000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=7/1792, ttl=53 (request in 125)
130	28.395493000	192.168.1.230	194.85.92.43	ICMP	100	Echo (ping) request id=0x7119, seq=8/2048, ttl=64
131	28.442521000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=8/2048, ttl=53 (request in 130)
135	29.396506000	192.168.1.230	194.85.92.43	ICMP	100	Echo (ping) request id=0x7119, seq=9/2304, ttl=64
136	29.441332000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=9/2304, ttl=53 (request in 135)
139	30.397931000	192.168.1.230	194.85.92.43	ICMP	100	Echo (ping) request id=0x7119, seq=10/2560, ttl=64
140	30.444976000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=10/2560, ttl=53 (request in 139)
143	31.398943000	192.168.1.230	194.85.92.43	ICMP	100	Echo (ping) request id=0x7119, seq=11/2816, ttl=64 (reply in 144)
144	31.444657000	194.85.92.43	192.168.1.230	ICMP	100	Echo (ping) reply id=0x7119, seq=11/2816, ttl=53 (request in 143)

Frame 135: 100 bytes on wire (800 bits), 100 bytes captured (800 bits) on interface 0

Linux cooked capture

Internet Protocol Version 4, Src: 192.168.1.230 (192.168.1.230), Dst: 194.85.92.43 (194.85.92.43)

Internet Control Message Protocol

```
0000 00 04 00 01 00 06 74 de 2b e2 ed 61 00 00 08 00 .....t.+.a....
0010 45 00 00 54 37 b1 40 00 40 01 21 e9 c0 a8 01 e6 E..T7.@.@!.....
0020 c2 55 5c 2b 08 00 27 f1 71 19 00 09 13 6d 29 54 .U+...q....m)T
0030 00 00 00 00 5f 58 04 00 00 00 00 10 11 12 13 ....X.....
0040 14 15 16 17 18 19 1a 1b 1c 1d 1e 1f 20 21 22 23 .....!..*#
```

any: <live capture in progress> File: ... Packets: 2112 · Displayed: 22 (1.0%) Profile: Default

135 29.396506000 192.168.1.230 194.85.92.43 ICMP 100 Echo (ping) request id=0x7119, seq=9/2304, ttl=64 (reply in 136)

Frame 135: 100 bytes on wire (800 bits), 100 bytes captured (800 bits) on interface 0

Linux cooked capture

Internet Protocol Version 4, Src: 192.168.1.230 (192.168.1.230), Dst: 194.85.92.43 (194.85.92.43)

Version: 4

Header Length: 20 bytes

Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00: Not-ECT (Not ECN-Capable Transport))

Total Length: 84

Identification: 0x37b1 (14257)

Flags: 0x02 (Don't Fragment)

Fragment offset: 0

Time to live: 64

Protocol: ICMP (1)

Header checksum: 0x21e9 [validation disabled]

Source: 192.168.1.230 (192.168.1.230)

Destination: 194.85.92.43 (194.85.92.43)

[Source GeoIP: Unknown]

[Destination GeoIP: Unknown]

Internet Control Message Protocol

Type: 8 (Echo (ping) request)

Code: 0

Checksum: 0x27f1 [correct]

Identifier (BE): 28953 (0x7119)

Identifier (LE): 6513 (0x1971)

Sequence number (BE): 9 (0x0009)

Sequence number (LE): 2304 (0x0900)

[Response frame: 136]

Timestamp from icmp data: Sep 29, 2014 18:30:43.000000000 MSK

[Timestamp from icmp data (relative): 0.284837000 seconds]

Data (48 bytes)

Data: 5f58040000000000010112131415161718191a1b1c1d1e1f20212223

[Length: 48]

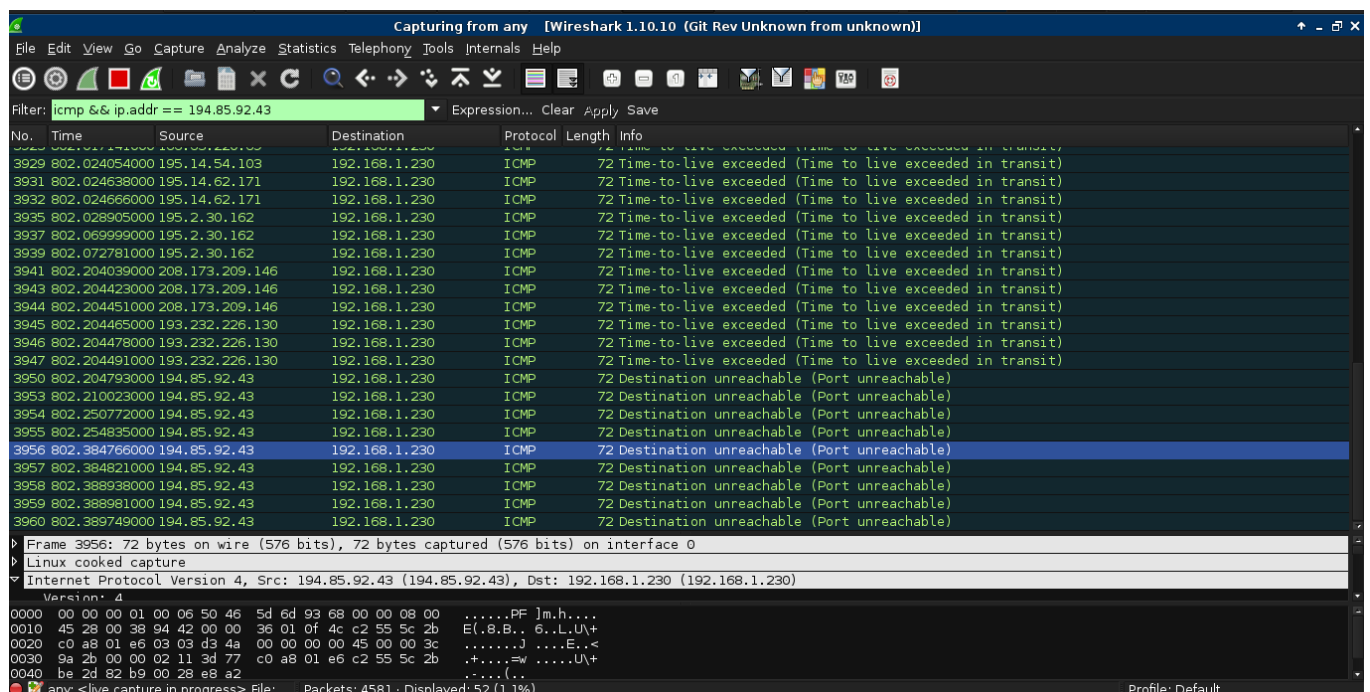
```
0000 00 04 00 01 00 06 74 de 2b e2 ed 61 00 00 08 00 .....t.+.a....
0010 45 00 00 54 37 b1 40 00 40 01 21 e9 c0 a8 01 e6 E..T7.@.@!.....
0020 c2 55 5c 2b 08 00 27 f1 71 19 00 09 13 6d 29 54 .U+...q....m)T
0030 00 00 00 00 5f 58 04 00 00 00 00 10 11 12 13 ....X.....
0040 14 15 16 17 18 19 1a 1b 1c 1d 1e 1f 20 21 22 23 .....!..*#
```

Исходя из данной информации можно сделать выводы:

- Использовался ICMP поверх IPv4. В сообщении есть все поля из IP (адрес назначения и источника, время жизни, контрольная сумма и т.д.)
- Тип ICMP сообщения 8, который означает эхо-запрос. Просмотр аналогичного сообщения ответа показывает Type равным 0, что означает ответ на полученное сообщение.

Используем команду traceroute:

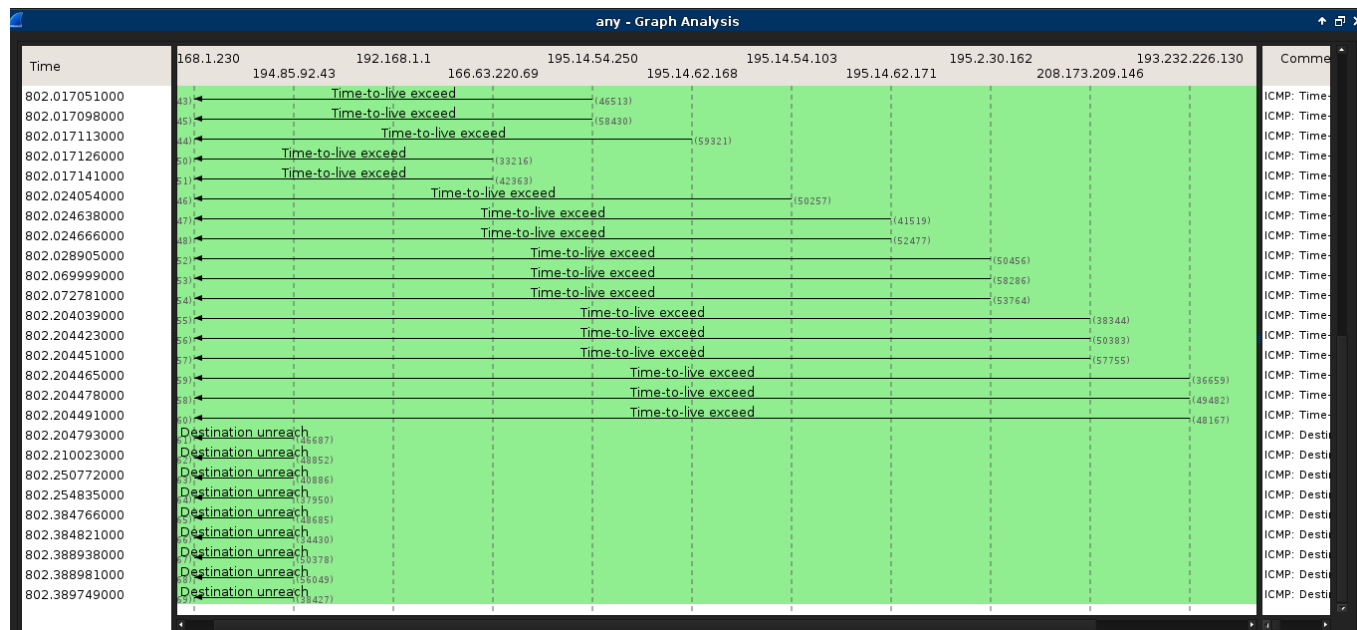
```
Terminal - ncrashed@localhost:~
File Edit View Terminal Tabs Help
ncrashed@localhost:~
[ncrashed@localhost ~]$ traceroute a-айсбепр.рф
traceroute to a-айсбепр.рф (194.85.92.43), 30 hops max, 60 byte packets
 1 www.asusnetwork.net (192.168.1.1)  3.910 ms  3.840 ms  3.803 ms
 2 * * *
 3 * * *
 4 mo-crs-be9.corbina.net (195.14.54.250)  35.885 ms  hq-crs-be9.msk.corbina.net
  (195.14.62.168)  35.880 ms  mo-crs-be9.corbina.net (195.14.54.250)  35.796 ms
 5 tc-bb-ae2.sto.corbina.net (195.14.54.103)  42.694 ms  tc-bb-hq-crs.msk.corbin
 a.net (195.14.62.171)  43.221 ms  43.191 ms
 6 xe-7-2-0.skt.cw.net (166.63.220.69)  30.584 ms  28.768 ms  28.680 ms
 7 ae10-xcrl.amt.cw.net (195.2.30.162)  40.333 ms  57.578 ms  55.497 ms
 8 retn-gw.cw.net (208.173.209.146)  186.641 ms  186.955 ms  186.919 ms
 9 msk-khouse-hr1.nic.ru (193.232.226.130)  186.860 ms  180.129 ms  179.750 ms
10 194.85.92.43 (194.85.92.43)  179.939 ms  180.901 ms  180.494 ms
[ncrashed@localhost ~]$
```



Traceroute отправляет пакеты с заранее малым значением TTL, которое постепенно увеличивается, что позволяет получать статистику о узлах, через ко-

которые проходят пакеты. При уменьшении значения поля TTL до 0, отправителю отправляется сообщение-ошибка.

Это подтверждается на packet-flow графике:



Проверим все сервисы и порты на хосте а-айсберг.рф с помощью утилиты nmap: Открыт только порт с номером 80 - HTTP порт.

```
Terminal - ncrashed@localhost:~  
File Edit View Terminal Tabs Help  
ncrashed@localhost:~  
[ncrashed@localhost ~]$ nmap -v -sT 194.85.92.43  
  
Starting Nmap 6.45 ( http://nmap.org ) at 2014-09-29 18:59 MSK  
Initiating Ping Scan at 18:59  
Scanning 194.85.92.43 [2 ports]  
Completed Ping Scan at 18:59, 1.47s elapsed (1 total hosts)  
Initiating Parallel DNS resolution of 1 host. at 18:59  
Completed Parallel DNS resolution of 1 host. at 18:59, 0.10s elapsed  
Initiating Connect Scan at 18:59  
Scanning 194.85.92.43 [1000 ports]  
Discovered open port 80/tcp on 194.85.92.43  
Completed Connect Scan at 18:59, 4.95s elapsed (1000 total ports)  
Nmap scan report for 194.85.92.43  
Host is up (0.047s latency).  
Not shown: 999 filtered ports  
PORT      STATE SERVICE  
80/tcp    open  http  
  
Read data files from: /usr/bin/./share/nmap  
Nmap done: 1 IP address (1 host up) scanned in 6.59 seconds  
[ncrashed@localhost ~]$
```

Проверим доступные службы:

После сканирования было выявлено, что на 80-м порту запущен веб сервер nginx.

Сделаем запрос whois: Вся информация получена из базы данных Internet Network Information Center - interNIC.

Сделаем запрос lookup: DNS сервер ответил, что домен а-айсберг.рф имеет IP адрес 194.85.92.43.

```
Terminal - ncrashed@localhost:~
File Edit View Terminal Tabs Help
ncrashed@localhost:~
[ncrashed@localhost ~]$ nmap -sV 194.85.92.43

Starting Nmap 6.45 ( http://nmap.org ) at 2014-09-29 19:00 MSK
Nmap scan report for 194.85.92.43
Host is up (0.047s latency).
Not shown: 999 filtered ports
PORT      STATE SERVICE VERSION
80/tcp    open  http    nginx 1.2.1

Service detection performed. Please report any incorrect results at http://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 12.78 seconds
[ncrashed@localhost ~]$
```

```
Terminal - ncrashed@localhost:~
File Edit View Terminal Tabs Help
ncrashed@localhost:~
[ncrashed@localhost ~]$ whois a-айсберг.рф
[Querying whois.tcinet.ru]
[whois.tcinet.ru]
% By submitting a query to RIPN's Whois Service
% you agree to abide by the following terms of use:
% http://www.ripn.net/about/servpol.html#3.2 (in Russian)
% http://www.ripn.net/about/en/servpol.html#3.2 (in English).

domain:      XN---7SBBEKL0A2DG.XN--P1AI
nserver:     ns3.nic.ru.
nserver:     ns4.nic.ru.
nserver:     ns8.nic.ru.
state:       REGISTERED, DELEGATED, VERIFIED
org:         LTD "MGSBS"
registrar:   RUCENTER-REG-RF
admin-contact: https://www.nic.ru/whois
created:     2009.11.25
paid-till:   2014.11.25
free-date:   2014.12.26
source:      TCI

Last updated on 2014.09.29 19:06:30 MSK
```

```
Terminal - ncrashed@localhost:~
File Edit View Terminal Tabs Help
ncrashed@localhost:~
[ncrashed@localhost ~]$ dig a-айсберг.рф

; <<>> DiG 9.9.4-P2-RedHat-9.9.4-15.P2.fc20 <<>> a-айсберг.рф
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 7611
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;a-айсберг.рф.      IN      A

;; ANSWER SECTION:
a-айсберг.рф.      1739    IN      A      194.85.92.43

;; Query time: 3 msec
;; SERVER: 192.168.1.1#53(192.168.1.1)
;; WHEN: Mon Sep 29 19:14:37 MSK 2014
;; MSG SIZE rcvd: 61
```

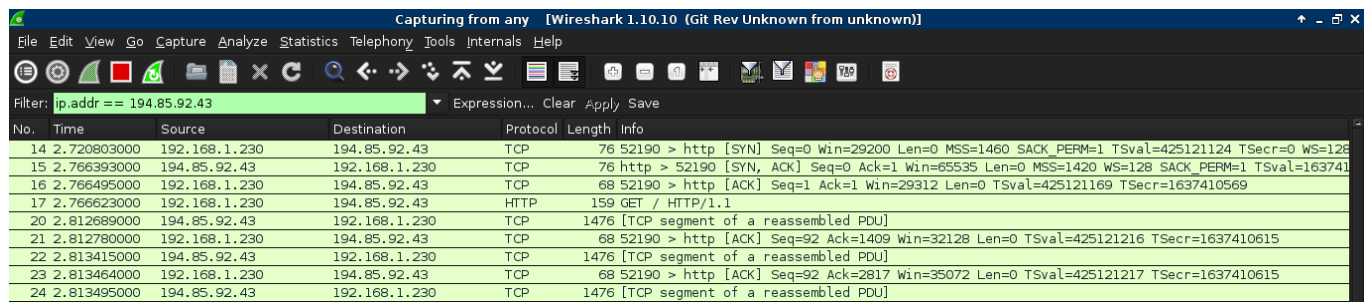
Произведем HTTP запрос на a-айсберг.рф:

```
Terminal - ncrashed@localhost:~
File Edit View Terminal Tabs Help
ncrashed@localhost:~ x ncrashed@localhost:~

[ncrashed@localhost ~]$ curl a-айсберг.рф
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8" />
<meta http-equiv="X-UA-Compatible" content="IE=9" /><title>ECC «А-Айсберг» - ремонт бытовой техники</title>
<meta name="description" content="Ремонт всех видов бытовой техники в Москве и Подмосковье." /><link rel="canonical" href="http://iceberg.ru/" /><meta name="viewport" content="width=device-width, initial-scale=1.0, user-scalable=yes" />
<script type="text/javascript">function E(M,U,L){new Image().src='/error?M='+encodeURIComponent(M)+'&U='+encodeURIComponent(U)+'&L='+L+'&N='+navigator.userAgent};window.onerror=function(M,U,L){E(M,U,L)};</script>
<meta name="google-site-verification" content="0rN5_TmLEBB9BrxUbq_6yVdJNls0eczfwli-VfZ7Fm0" />
<!--[if IE]><script src="http://html5shiv.googlecode.com/svn/trunk/html5.js"></script><![endif]-->
<!--[if lt IE 9]><script src="http://ie7-js.googlecode.com/svn/version/2.0(beta3)/IE9.js"></script><![endif]-->
<link href="/assets/css/main.min.css" rel="stylesheet" type="text/css" />
</head>
<body>
<div id="wrapper">

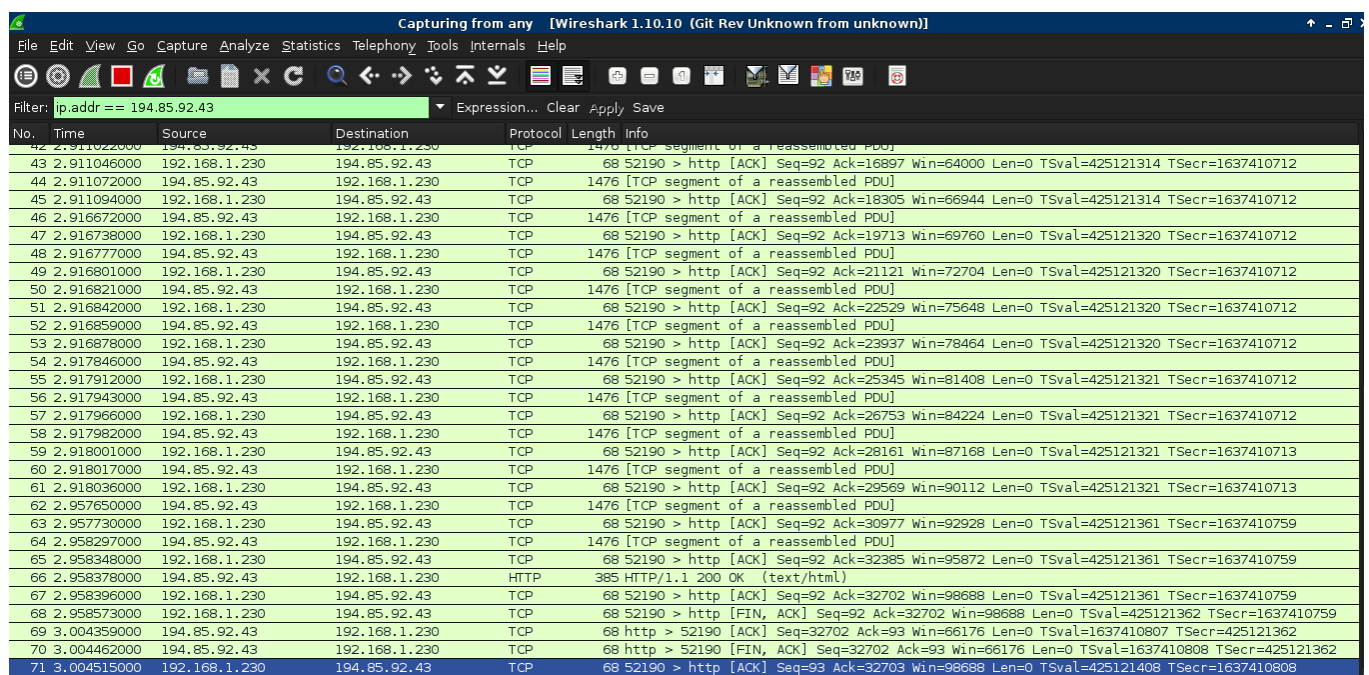
    <header id="header">
        <a href="/" id="logo"></a>
        <div id="phones">
            <div class="phone">
                <span class="phoneTime">круглосуточно</span>
```


Проанализируем запрос в пакетном анализаторе:



No.	Time	Source	Destination	Protocol	Length	Info
14	2.720803000	192.168.1.230	194.85.92.43	TCP	76	52190 > http [SYN] Seq=0 Win=29200 Len=0 MSS=1460 SACK_PERM=1 TSval=425121124 TSecr=0 WS=128
15	2.766393000	194.85.92.43	192.168.1.230	TCP	76	http > 52190 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1420 WS=128 SACK_PERM=1 TSval=1637410615 TSecr=425121124
16	2.766495000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=1 Ack=1 Win=29312 Len=0 TSval=425121169 TSecr=1637410569
17	2.766623000	192.168.1.230	194.85.92.43	HTTP	159	GET / HTTP/1.1
20	2.812689000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
21	2.812780000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=1409 Win=32128 Len=0 TSval=425121216 TSecr=1637410615
22	2.813415000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
23	2.813464000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=2817 Win=35072 Len=0 TSval=425121217 TSecr=1637410615
24	2.813495000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]

Соединение производится по трехэтапной процедуре (SYN-SYN-ACK-ACK), называемой three-way handshake. Далее идет передача данных страницы с подтверждением на каждую часть.



No.	Time	Source	Destination	Protocol	Length	Info
42	2.911022000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
43	2.911046000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=16897 Win=64000 Len=0 TSval=425121314 TSecr=1637410712
44	2.911072000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
45	2.911094000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=18305 Win=66944 Len=0 TSval=425121314 TSecr=1637410712
46	2.916672000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
47	2.916738000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=19713 Win=69760 Len=0 TSval=425121320 TSecr=1637410712
48	2.916777000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
49	2.916801000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=21121 Win=72704 Len=0 TSval=425121320 TSecr=1637410712
50	2.916821000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
51	2.916842000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=22529 Win=75648 Len=0 TSval=425121320 TSecr=1637410712
52	2.916859000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
53	2.916878000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=23937 Win=78464 Len=0 TSval=425121320 TSecr=1637410712
54	2.917846000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
55	2.917912000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=25345 Win=81408 Len=0 TSval=425121321 TSecr=1637410712
56	2.917943000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
57	2.917966000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=26753 Win=84224 Len=0 TSval=425121321 TSecr=1637410712
58	2.917982000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
59	2.918001000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=28161 Win=87168 Len=0 TSval=425121321 TSecr=1637410713
60	2.918017000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
61	2.918036000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=29569 Win=90112 Len=0 TSval=425121321 TSecr=1637410713
62	2.957650000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
63	2.957730000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=30977 Win=92928 Len=0 TSval=425121361 TSecr=1637410759
64	2.958297000	194.85.92.43	192.168.1.230	TCP	1476	[TCP segment of a reassembled PDU]
65	2.958348000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=32385 Win=95872 Len=0 TSval=425121361 TSecr=1637410759
66	2.958378000	194.85.92.43	192.168.1.230	HTTP	385	HTTP/1.1 200 OK (text/html)
67	2.958396000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=92 Ack=32702 Win=98688 Len=0 TSval=425121361 TSecr=1637410759
68	2.958573000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [FIN, ACK] Seq=92 Ack=32702 Win=98688 Len=0 TSval=425121362 TSecr=1637410759
69	3.004359000	194.85.92.43	192.168.1.230	TCP	68	http > 52190 [ACK] Seq=32702 Ack=93 Win=66176 Len=0 TSval=1637410807 TSecr=425121362
70	3.004462000	194.85.92.43	192.168.1.230	TCP	68	http > 52190 [FIN, ACK] Seq=32702 Ack=93 Win=66176 Len=0 TSval=1637410808 TSecr=425121362
71	3.004515000	192.168.1.230	194.85.92.43	TCP	68	52190 > http [ACK] Seq=93 Ack=32703 Win=98688 Len=0 TSval=425121408 TSecr=1637410808

Завершение соединения производится в четыре этапа (по два на каждое направление передачи, так как виртуальный канал полнодуплексный). Последовательность сообщений: FIN, ACK-ACK-FIN, ACK-ACK.