

МИНОБРНАУКИ РОССИИ

Федеральное государственное бюджетное образовательное учреждение высшего
образования



НИЖЕГОРОДСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ
УНИВЕРСИТЕТ им. Р.Е.АЛЕКСЕЕВА

Институт радиоэлектроники и информационных технологий

Кафедра информатики и систем управления

ОТЧЕТ

по лабораторной работе №4

по дисциплине

Сети и телекоммуникации

РУКОВОДИТЕЛЬ:

(подпись)

Гай В.Е.
(фамилия, и.,о.)

СТУДЕНТ:

(подпись)

Береснева М.А.
(фамилия, и.,о.)

18-АС
(шифр группы)

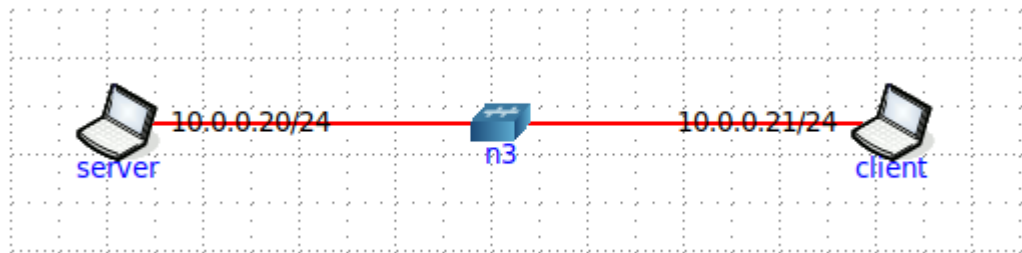
Работа защищена «__» _____

С оценкой _____

Нижний Новгород 2020

Задание на лабораторную работу:

1. Создать сеть в Core, состоящую из двух компьютеров.



2. Запустить UDP сервер на одном из компьютеров. Подключиться к UDP серверу с помощью TCP клиента. Объяснить полученные пакеты в Wireshark

```
Терминал
Файл Правка Вид Поиск Терминал Справка
root@server:/tmp/pycore.33065/server.conf# nc -u -l 2399

Терминал
Файл Правка Вид Поиск Терминал Справка
root@client:/tmp/pycore.33065/client.conf# nc 10.0.0.20 2399
root@client:/tmp/pycore.33065/client.conf#
```

Capturing from veth1.0.a8

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.0.21	10.0.0.20	TCP	74	56076 → 2399 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK
2	0.000015867	10.0.0.20	10.0.0.21	TCP	54	2399 → 56076 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
3	5.182703657	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	Who has 10.0.0.21? Tell 10.0.0.20
4	5.182780213	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
5	5.182813025	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	10.0.0.21 is at 00:00:00_aa:00:01
6	5.182808345	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00
7	10.814890069	fe80::3ce2:6dff:fe...	ff02::2	ICMPv6	70	Router Solicitation from 5e:a3:9b:f7:60:51
8	25.151030211	fe80::200:ff:feaa:0	ff02::2	ICMPv6	70	Router Solicitation from 00:00:00_aa:00:00
9	31.294767398	fe80::6469:5eff:fee...	ff02::2	ICMPv6	70	Router Solicitation from 66:69:5e:e2:dc:09

Capturing from veth2.0.a8

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.0.21	10.0.0.20	TCP	74	56076 → 2399 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SA
2	0.000029666	10.0.0.20	10.0.0.21	TCP	54	2399 → 56076 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
3	2.623014905	fe80::5ca3:9bff:fe...	ff02::2	ICMPv6	70	Router Solicitation from 5e:a3:9b:f7:60:51
4	5.182780821	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	Who has 10.0.0.21? Tell 10.0.0.20
5	5.182751187	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
6	5.182810517	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	10.0.0.21 is at 00:00:00_aa:00:01
7	5.182829414	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00
8	10.814880614	fe80::3ce2:6dff:fe...	ff02::2	ICMPv6	70	Router Solicitation from 5e:a3:9b:f7:60:51

Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0
Ethernet II, Src: 00:00:00_aa:00:01 (00:00:00_aa:00:01), Dst: 00:00:00_aa:00:00 (00:00:00_aa:00:00)
Internet Protocol Version 4, Src: 10.0.0.21, Dst: 10.0.0.20
Transmission Control Protocol, Src Port: 56076, Dst Port: 2399, Seq: 0, Len: 0

3. Запустить TCP клиент, сервер, передать данные, затем прервать соединение (Ctrl + C) на стороне сервера. Объяснить полученные пакеты в WireShark

До прерывания

The screenshot shows a terminal window and the Wireshark network protocol analyzer. The terminal window, titled "Терминал", shows a root user at a server with IP 10.0.0.20. A netcat listener is running on port 2399. It receives a connection from 10.0.0.21, which sends the word "hell". The Wireshark interface, titled "Capturing from veth1.0.a8", shows a list of captured packets. The selected packet (No. 4) is a TCP packet from 10.0.0.20 to 10.0.0.21, port 2399 to 56252, with sequence number 1 and acknowledgment number 1. The packet details pane shows the Ethernet II header, Internet Protocol Version 4 header, and Transmission Control Protocol header. The data field shows the word "hell" in ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.0.21	10.0.0.20	TCP	74	56252 → 2399 [SYN] Seq=0 Win=64240 Len=
2	0.000016658	10.0.0.20	10.0.0.21	TCP	74	2399 → 56252 [SYN, ACK] Seq=0 Ack=1 Win=
3	0.000032629	10.0.0.21	10.0.0.20	TCP	66	56252 → 2399 [ACK] Seq=1 Ack=1 Win=6425
4	4.862920046	10.0.0.20	10.0.0.21	TCP	71	2399 → 56252 [PSH, ACK] Seq=1 Ack=1 Win=
5	4.862954456	10.0.0.21	10.0.0.20	TCP	66	56252 → 2399 [ACK] Seq=1 Ack=6 Win=6425
6	5.167133926	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
7	5.167154265	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00

Frame 4: 71 bytes on wire (568 bits), 71 bytes captured (568 bits) on interface 0
Ethernet II, Src: 00:00:00_aa:00:00 (00:00:00_aa:00:00), Dst: 00:00:00_aa:00:01 (00:00:00_aa:00:01)
Internet Protocol Version 4, Src: 10.0.0.20, Dst: 10.0.0.21
Transmission Control Protocol, Src Port: 2399, Dst Port: 56252, Seq: 1, Ack: 1, Len: 5
Data (5 bytes)
0000 00 00 00 aa 00 01 00 00 00 aa 00 00 08 00 45 00E.
0010 00 39 7b 9d 40 00 06 aa f9 0a 00 00 14 0a 00 ..9{.0.0.
0020 00 15 09 5f db bc 37 0c a8 26 9c e3 54 ed 80 187. .&.T..
0030 01 fe 0b 56 00 00 01 01 08 0a bd ce 61 e0 eb 76 ...V.....a..v
0040 b5 1c 68 65 6c 6c 0ahell..

Tools Widgets Session Help

Файл Правка Вид Поиск Терминал Справка

```
root@client:/tmp/pycore.33065/client.conf# nc 10.0.0.20 2399
hell
```

Capturing from veth2.0.a8

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.0.21	10.0.0.20	TCP	74	56252 → 2399 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK
2	0.000030382	10.0.0.20	10.0.0.21	TCP	74	2399 → 56252 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MS
3	0.000042573	10.0.0.21	10.0.0.20	TCP	66	56252 → 2399 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=3
4	4.862941880	10.0.0.20	10.0.0.21	TCP	71	2399 → 56252 [PSH, ACK] Seq=1 Ack=1 Win=65280 Len=5 TS
5	4.862963572	10.0.0.21	10.0.0.20	TCP	66	56252 → 2399 [ACK] Seq=1 Ack=6 Win=64256 Len=0 TSval=3
6	5.167070851	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
7	5.167170005	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00

Frame 4: 71 bytes on wire (568 bits), 71 bytes captured (568 bits) on interface 0

Ethernet II, Src: 00:00:00_aa:00:00 (00:00:00_aa:00:00), Dst: 00:00:00_aa:00:01 (00:00:00_aa:00:01)

Internet Protocol Version 4, Src: 10.0.0.20, Dst: 10.0.0.21

Transmission Control Protocol, Src Port: 2399, Dst Port: 56252, Seq: 1, Ack: 1, Len: 5

Data (5 bytes)

```
0000 00 00 00 aa 00 01 00 00 00 aa 00 00 08 00 45 00 .....E-
0010 00 39 7b 9d 40 00 40 06 aa f9 0a 00 00 14 0a 00 ..9{.0.0.
0020 00 15 09 5f db bc 37 0c a8 26 9c e3 54 ed 80 18 .....7.~T-
0030 01 fe 0b 56 00 00 01 01 08 0a bd ce 61 e0 eb 76 ...V....a..v
0040 b5 1c 68 65 6c 6c 0a .....hell.
```

После прерывания

Файл Правка Вид Поиск Терминал Справка

```
root@server:/tmp/pycore.33065/server.conf# nc -l 2399
hell
^C
root@server:/tmp/pycore.33065/server.conf#
```

Canvas View Tools Widgets

Capturing from veth1.0.a8

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
4	11.022211236	10.0.0.21	10.0.0.20	TCP	66	56340 → 2399 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval
5	17.193152868	10.0.0.20	10.0.0.21	TCP	71	2399 → 56340 [PSH, ACK] Seq=1 Ack=1 Win=65280 Len=5
6	17.193194997	10.0.0.21	10.0.0.20	TCP	66	56340 → 2399 [ACK] Seq=1 Ack=6 Win=64256 Len=0 TSval
7	22.271908535	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	Who has 10.0.0.21? Tell 10.0.0.20
8	22.271986466	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	10.0.0.21 is at 00:00:00_aa:00:01
9	60.025382110	10.0.0.20	10.0.0.21	TCP	66	2399 → 56340 [FIN, ACK] Seq=6 Ack=1 Win=65280 Len=0
10	60.068748689	10.0.0.21	10.0.0.20	TCP	66	56340 → 2399 [ACK] Seq=1 Ack=7 Win=64256 Len=0 TSval
11	65.280707922	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
12	65.280679658	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	Who has 10.0.0.21? Tell 10.0.0.20
13	65.280735163	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00
14	65.280751562	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	10.0.0.21 is at 00:00:00_aa:00:01
15	114.687970379	fe80::200:ff:feaa:0	ff02::2	ICMPv6	70	Router Solicitation from 00:00:00_aa:00:00

Frame 5: 71 bytes on wire (568 bits), 71 bytes captured (568 bits) on interface 0

Ethernet II, Src: 00:00:00_aa:00:00 (00:00:00_aa:00:00), Dst: 00:00:00_aa:00:01 (00:00:00_aa:00:01)

Internet Protocol Version 4, Src: 10.0.0.20, Dst: 10.0.0.21

Transmission Control Protocol, Src Port: 2399, Dst Port: 56340, Seq: 1, Ack: 1, Len: 5

Data (5 bytes)

```
0000 00 00 00 aa 00 01 00 00 00 aa 00 00 08 00 45 00 .....E-
0010 00 39 95 79 40 00 40 06 91 1d 0a 00 00 14 0a 00 ..9.y0.0.
0020 00 15 09 5f dc 14 ab 41 f2 c2 96 a3 aa 8e 80 18 .....A
0030 01 fe f1 28 00 00 01 01 08 0a bd d3 6a 3a eb 7b ...(.....j:~{
0040 b8 5a 68 65 6c 6c 0a .....Zhell.
```

Терминал

Файл Правка Вид Поиск Терминал Справка

root@client:/tmp/pycore.33065/client.conf# nc 10.0.0.20 2399

hell

Capturing from veth2.0.a8

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
5	17.193174967	10.0.0.20	10.0.0.21	TCP	71	2399 → 56340 [PSH, ACK] Seq=1 Ack=1 Win=65280 Len=5
6	17.193201345	10.0.0.21	10.0.0.20	TCP	66	56340 → 2399 [ACK] Seq=1 Ack=6 Win=64256 Len=0 TSval
7	22.271977143	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	Who has 10.0.0.21? Tell 10.0.0.20
8	22.271992764	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	10.0.0.21 is at 00:00:00_aa:00:01
9	49.151782840	fe80::5ca3:9bff:fe...	ff02::2	ICMPv6	70	Router Solicitation from 5e:a3:9b:f7:60:51
10	60.025414904	10.0.0.20	10.0.0.21	TCP	66	2399 → 56340 [FIN, ACK] Seq=6 Ack=1 Win=65280 Len=0
11	60.068629519	10.0.0.21	10.0.0.20	TCP	66	56340 → 2399 [ACK] Seq=1 Ack=7 Win=64256 Len=0 TSval
12	65.280660744	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
13	65.280726181	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	Who has 10.0.0.21? Tell 10.0.0.20
14	65.280756697	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00
15	65.280753134	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	10.0.0.21 is at 00:00:00_aa:00:01
16	114.688076213	fe80::200:ff:fea...	ff02::2	ICMPv6	70	Router Solicitation from 00:00:00_aa:00:00

Frame 5: 71 bytes on wire (568 bits), 71 bytes captured (568 bits) on interface 0

Ethernet II, Src: 00:00:00_aa:00:00 (00:00:00_aa:00:00), Dst: 00:00:00_aa:00:01 (00:00:00_aa:00:01)

Internet Protocol Version 4, Src: 10.0.0.20, Dst: 10.0.0.21

Transmission Control Protocol, Src Port: 2399, Dst Port: 56340, Seq: 1, Ack: 1, Len: 5

Data (5 bytes)

```

0000 00 00 00 aa 00 01 00 00 00 aa 00 00 08 00 45 00 .....E.
0010 00 39 95 79 40 00 40 06 91 1d 0a 00 00 14 0a 00 .9-y@.@.....
0020 00 15 09 5f dc 14 ab 41 f2 c2 96 a3 aa 8e 80 18 .....A.....
0030 01 fe f1 28 00 00 01 01 08 0a bd d3 6a 3a eb 7b .....j:~{
0040 d8 5a 68 65 6c 6c 0a .....hell

```

4. Запустить TCP клиент, сервер, передать данные, затем прервать соединение (Ctrl + C) на стороне клиента. Объяснить полученные пакеты в WireShark

Терминал

Корз. Файл Правка Вид Поиск Терминал Справка

root@server:/tmp/pycore.33065/server.conf# nc -l 2399

qwerty

Capturing from veth1.0.a8

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
3	0.000032647	10.0.0.21	10.0.0.20	TCP	66	56382 → 2399 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval
4	5.141128848	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
5	5.141156413	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00
6	40.466174424	10.0.0.20	10.0.0.21	TCP	73	2399 → 56382 [PSH, ACK] Seq=1 Ack=1 Win=65280 Len=7
7	40.466218145	10.0.0.21	10.0.0.20	TCP	66	56382 → 2399 [ACK] Seq=1 Ack=8 Win=64256 Len=0 TSval
8	45.589543503	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
9	45.589485799	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	Who has 10.0.0.21? Tell 10.0.0.20
10	45.589564929	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00
11	45.589578415	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	10.0.0.21 is at 00:00:00_aa:00:01
12	45.692240998	10.0.0.21	10.0.0.20	TCP	66	56382 → 2399 [FIN, ACK] Seq=1 Ack=8 Win=64256 Len=0
13	45.692398303	10.0.0.20	10.0.0.21	TCP	66	2399 → 56382 [FIN, ACK] Seq=8 Ack=2 Win=65280 Len=0
14	45.692440979	10.0.0.21	10.0.0.20	TCP	66	56382 → 2399 [ACK] Seq=2 Ack=9 Win=64256 Len=0 TSval

Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0

Ethernet II, Src: 00:00:00_aa:00:01 (00:00:00_aa:00:01), Dst: 00:00:00_aa:00:00 (00:00:00_aa:00:00)

Internet Protocol Version 4, Src: 10.0.0.21, Dst: 10.0.0.20

Transmission Control Protocol, Src Port: 56382, Dst Port: 2399, Seq: 0, Len: 0

```

0000 00 00 00 aa 00 00 00 00 00 aa 00 01 08 00 45 00 .....E.
0010 00 3c c9 76 40 00 40 06 5d 1d 0a 00 00 15 0a 00 .<-v@.@.....
0020 00 14 dc 3e 09 5f ee 23 5a 99 00 00 00 00 a0 02 ...>_#Z.....
0030 fa f0 d8 d5 00 00 02 04 05 b4 04 02 08 0a eb 7f .....
0040 46 36 00 00 00 00 01 03 03 07 .....F6.....

```


Widgets Session Help

Терминал

Файл Правка Вид Поиск Терминал Справка

root@client:/tmp/pycore.33065/client.conf# nc 10.0.0.20 2399

Capturing from veth2.0.a8

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.0.21	10.0.0.20	TCP	74	56382 → 2399 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SA
2	0.000029151	10.0.0.20	10.0.0.21	TCP	74	2399 → 56382 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0
3	0.000041513	10.0.0.21	10.0.0.20	TCP	66	56382 → 2399 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval
4	5.141088922	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
5	5.141173765	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00
6	40.466197060	10.0.0.20	10.0.0.21	TCP	73	2399 → 56382 [PSH, ACK] Seq=1 Ack=1 Win=65280 Len=7
7	40.466224582	10.0.0.21	10.0.0.20	TCP	66	56382 → 2399 [ACK] Seq=1 Ack=8 Win=64256 Len=0 TSval
8	45.589473694	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
9	45.589560185	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	Who has 10.0.0.21? Tell 10.0.0.20
10	45.589585389	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00
11	45.589582197	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	10.0.0.21 is at 00:00:00_aa:00:01
12	45.692230679	10.0.0.21	10.0.0.20	TCP	66	56382 → 2399 [FIN, ACK] Seq=1 Ack=8 Win=64256 Len=0
13	45.692417234	10.0.0.20	10.0.0.21	TCP	66	2399 → 56382 [FIN, ACK] Seq=8 Ack=2 Win=65280 Len=0

Frame 6: 73 bytes on wire (584 bits), 73 bytes captured (584 bits) on interface 0

Ethernet II, Src: 00:00:00_aa:00:00 (00:00:00_aa:00:00), Dst: 00:00:00_aa:00:01 (00:00:00_aa:00:01)

Internet Protocol Version 4, Src: 10.0.0.20, Dst: 10.0.0.21

Transmission Control Protocol, Src Port: 2399, Dst Port: 56382, Seq: 1, Ack: 1, Len: 7

Data (7 bytes)

```

0000 00 00 00 aa 00 01 00 00 00 aa 00 00 08 00 45 00 .....E.
0010 00 3b 7e 81 40 00 40 06 a8 13 0a 00 00 14 0a 00 .;~@.
0020 00 15 09 5f dc 3e 1f 28 01 b7 ee 23 5a 9a 80 18 .>(.#Z
0030 01 fe 4e 46 00 00 01 01 08 0a bd d7 7e 0d eb 7f ..NF
0040 46 36 71 77 65 72 74 79 0a                      F6qwerty

```

5. Запустить UDP сервер на одном из компьютеров. Подключиться к UDP серверу с помощью UDP клиента. Передать данные. Объяснить полученные пакеты в Wireshark

Терминал

Файл Правка Вид Поиск Терминал Справка

root@server:/tmp/pycore.43503/server.conf# nc -u -l 2399

nbvcx
fghj

Capturing from veth1.0.46

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
19	99.205186815	00:00:00_aa:00:01	Broadcast	ARP	42	Who has 10.0.0.20? Tell 10.0.0.21
20	99.205208817	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	10.0.0.20 is at 00:00:00_aa:00:00
21	99.205217161	10.0.0.21	10.0.0.20	UDP	47	49591 → 2399 Len=5
22	99.205336021	10.0.0.20	10.0.0.21	UDP	48	2399 → 49591 Len=6
23	104.447608568	00:00:00_aa:00:00	00:00:00_aa:00:01	ARP	42	Who has 10.0.0.21? Tell 10.0.0.20
24	104.447873283	00:00:00_aa:00:01	00:00:00_aa:00:00	ARP	42	10.0.0.21 is at 00:00:00_aa:00:01
25	104.959573350	fe80::78f3:d3ff:fe5...	ff02::2	ICMPv6	70	Router Solicitation from 46:2d:28:7f:80:b2
26	115.852234392	fe80::78f3:d3ff:fe5...	ff02::fb	MDNS	107	Standard query 0x0000 PTR _ipps_tcp.local, "QM" que
27	115.883747827	fe80::442d:28ff:fe7...	ff02::fb	MDNS	107	Standard query 0x0000 PTR _ipps_tcp.local, "QM" que
28	119.295552834	fe80::200:ff:feaa:1	ff02::2	ICMPv6	70	Router Solicitation from 00:00:00_aa:00:01
29	125.439589161	fe80::442d:28ff:fe7...	ff02::2	ICMPv6	70	Router Solicitation from 46:2d:28:7f:80:b2
30	127.487672237	fe80::200:ff:feaa:0	ff02::2	ICMPv6	70	Router Solicitation from 00:00:00_aa:00:00

Frame 21: 47 bytes on wire (376 bits), 47 bytes captured (376 bits) on interface 0

Ethernet II, Src: 00:00:00_aa:00:01 (00:00:00_aa:00:01), Dst: 00:00:00_aa:00:00 (00:00:00_aa:00:00)

Internet Protocol Version 4, Src: 10.0.0.21, Dst: 10.0.0.20

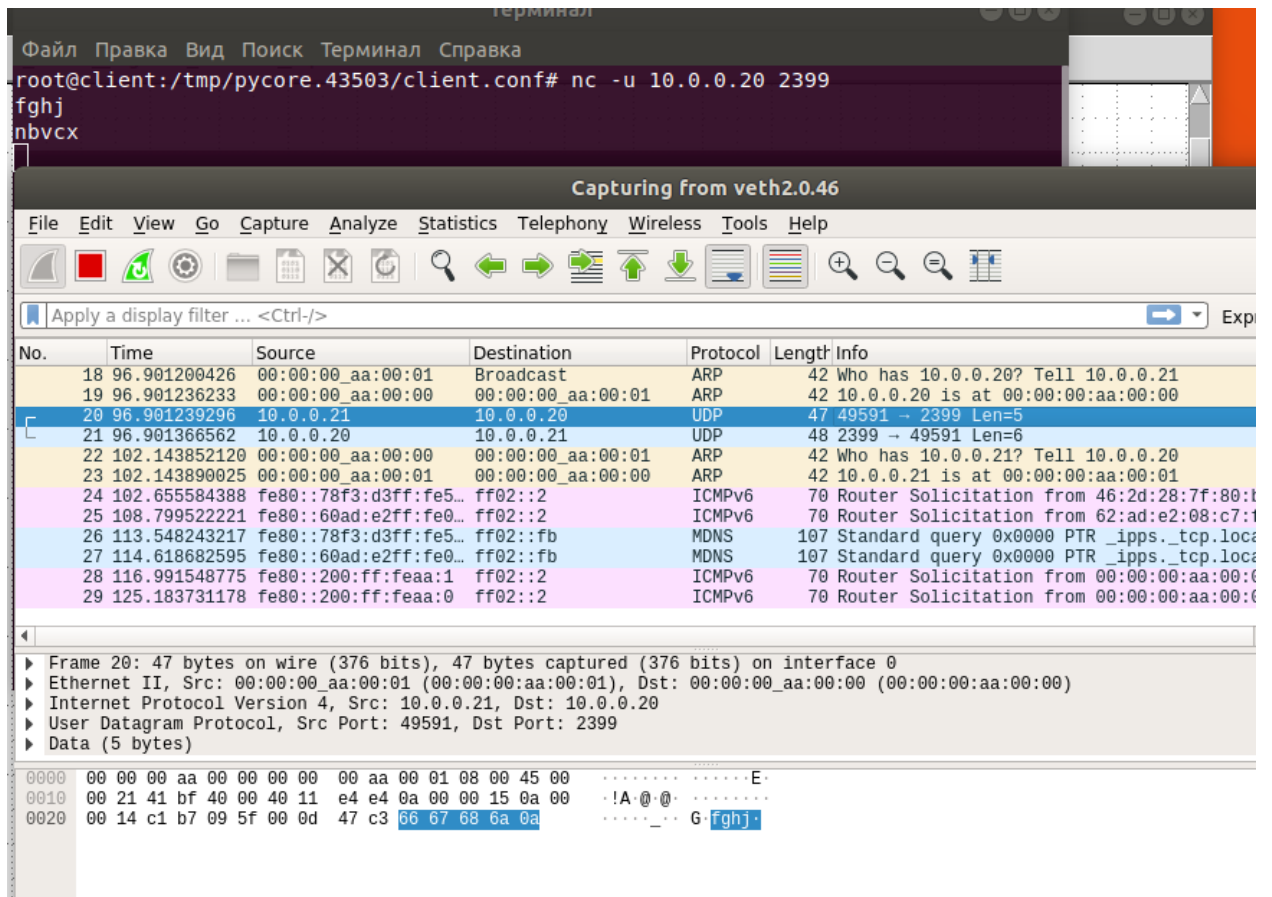
User Datagram Protocol, Src Port: 49591, Dst Port: 2399

Data (5 bytes)

```

0000 00 00 00 aa 00 00 00 00 00 aa 00 01 08 00 45 00 .....E.
0010 00 21 41 bf 40 00 40 11 e4 e4 0a 00 00 15 0a 00 .!A@.
0020 00 14 c1 b7 09 5f 00 0d 47 c3 66 67 68 6a 0a     ._.G.fghj

```



TCP сервер (10.0.0.20)

`nc -l 2399`

TCP клиент

`nc 10.0.0.20 2399`

UDP сервер (10.0.0.20)

`nc -u -l 2399`

UDP клиент

`nc -u 10.0.0.20 2399`