

РОССИЙСКИЙ УНИВЕРСИТЕТ ДРУЖБЫ НАРОДОВ

Факультет физико-математических и естественных наук

ОТЧЕТ

**ПО ЛАБОРАТОРНОЙ РАБОТЕ №5: ПРОСТЫЕ СЕТИ В GNS3. АНАЛИЗ
ТРАФИКА**

дисциплина: Сетевые технологии

Студент: Талебу Тенке Франк Устон

Группа: НФИбд-02-23

МОСКВА

2025 г.

Цель работы

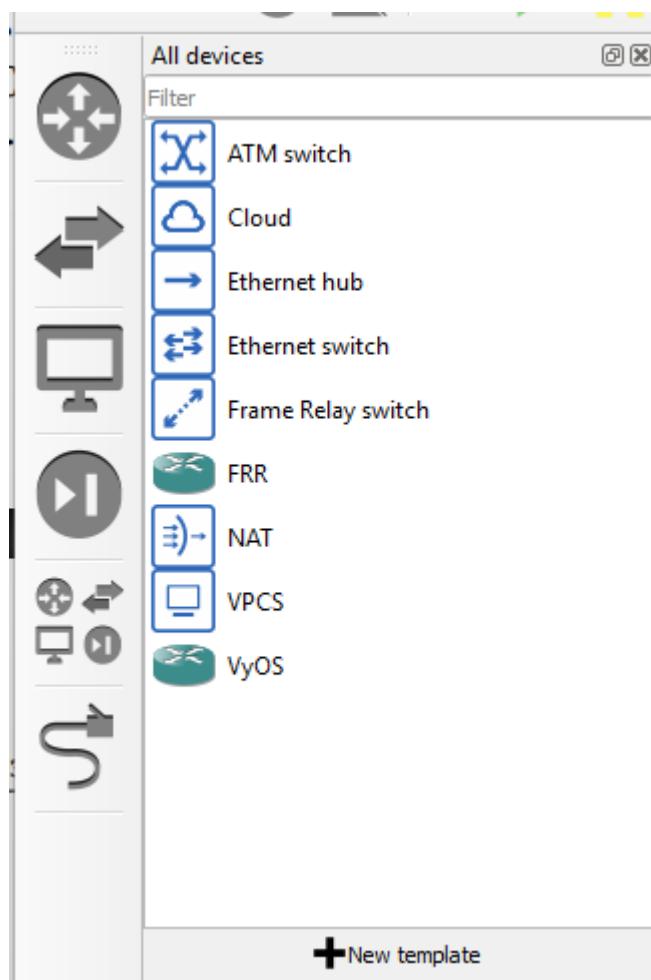
Построить простейшие модели сетей на базе коммутатора и маршрутизаторов FRR и VyOS в GNS3, проанализировать трафик посредством Wireshark.

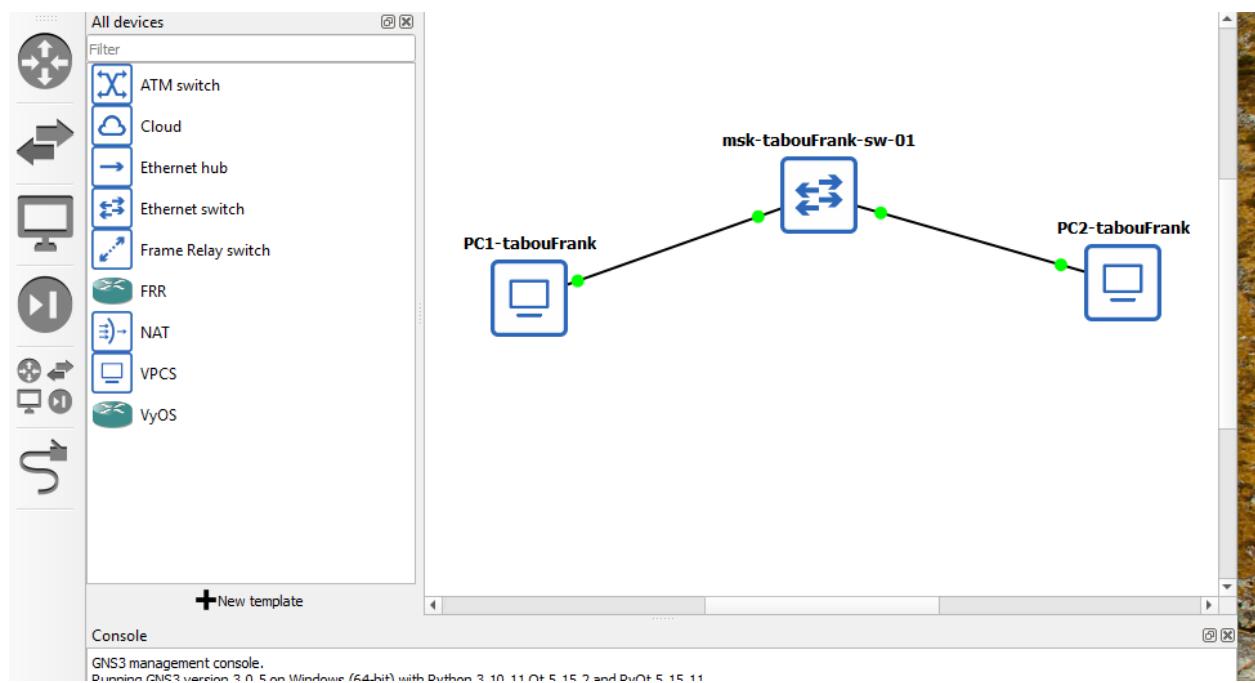
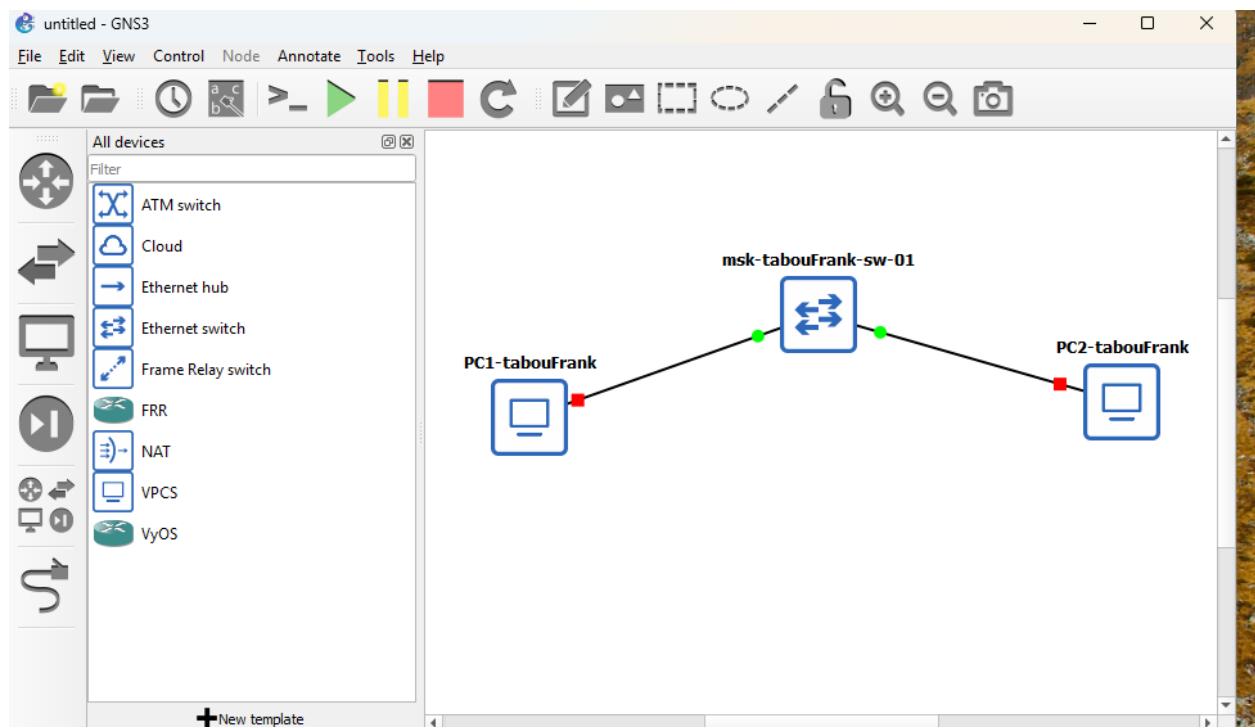
Задание

1. Смоделировать простейшую сеть на базе коммутатора в GNS3;
2. Проанализировать трафик в GNS3 посредством Wireshark;
3. Смоделировать простейшую сеть на базе маршрутизатора FRR в GNS3;
4. Смоделировать простейшую сеть на базе маршрутизатора VyOS в GNS3.

Задание

5.3.1.2. Порядок выполнения работы 1. Запустите GNS3 VM и GNS3. Создайте новый проект. 2. В рабочей области GNS3 разместите коммутатор Ethernet и два VPCS. Щёлкнув на устройстве правой кнопкой мыши выберете в меню **Configure**. Измените название устройства, включив в имя устройства имя учётной записи выполняющего работу студента. Коммутатору присвойте название **msk-user-sw-01**, где вместо user укажите имя вашей учётной записи. Соедините VPCS с коммутатором. Отобразите обозначение интерфейсов соединения





```
PC1-tabouFrank - PuTTY

Welcome to Virtual PC Simulator, version 0.8.3
Dedicated to Daling.
Build time: Sep 9 2023 11:15:00
Copyright (c) 2007-2015, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

Hostname is too long. (Maximum 12 characters)

VPCS> 
```

```
VPCS> /?

?
arp Print help
clear ARG Shortcut for: show arp. Show arp table
dhcp [OPTION] Clear IPv4/IPv6, arp/neighbor cache, command history
disconnect Shortcut for: ip dhcp. Get IPv4 address via DHCP
echo TEXT Exit the telnet session (daemon mode)
help Display TEXT in output. See also set echo ?
history Print help
ip ARG ... [OPTION] Shortcut for: show history. List the command history
load [FILENAME] Configure the current VPC's IP settings. See ip ?
ping HOST [OPTION ...] Load the configuration/script from the file FILENAME
quit Ping HOST with ICMP (default) or TCP/UDP. See ping ?
relay ARG ... Quit program
rlogin [ip] port Configure packet relay between UDP ports. See relay ?
save [FILENAME] Telnet to port on host at ip (relative to host PC)
set ARG ... Save the configuration to the file FILENAME
show [ARG ...] Set VPC name and other options. Try set ?
sleep [seconds] [TEXT] Print the information of VPCs (default). See show ?
trace HOST [OPTION ...] Print TEXT and pause running script for seconds
version Print the path packets take to network HOST
Shortcut for: show version

To get command syntax help, please enter '?' as an argument of the command.

VPCS> 
```

```
VPCS> ip 192.168.1.11/24 192.168.1.1
Checking for duplicate address...
VPCS : 192.168.1.11 255.255.255.0 gateway 192.168.1.1

VPCS> 
```

```
VPCS> save
Saving startup configuration to startup.vpc
. done

VPCS> 
```

```
VPCS> /?

?
Print help
arp Shortcut for: show arp. Show arp table
clear ARG Clear IPv4/IPv6, arp/neighbor cache, command history
dhcp [OPTION] Shortcut for: ip dhcp. Get IPv4 address via DHCP
disconnect Exit the telnet session (daemon mode)
echo TEXT Display TEXT in output. See also set echo ?
help Print help
history Shortcut for: show history. List the command history
ip ARG ... [OPTION] Configure the current VPC's IP settings. See ip ?
load [FILENAME] Load the configuration/script from the file FILENAME
ping HOST [OPTION ...] Ping HOST with ICMP (default) or TCP/UDP. See ping ?
quit Quit program
relay ARG ... Configure packet relay between UDP ports. See relay ?
rlogin [ip] port Telnet to port on host at ip (relative to host PC)
save [FILENAME] Save the configuration to the file FILENAME
set ARG ... Set VPC name and other options. Try set ?
show [ARG ...] Print the information of VPCs (default). See show ?
sleep [seconds] [TEXT] Print TEXT and pause running script for seconds
trace HOST [OPTION ...] Print the path packets take to network HOST
version Shortcut for: show version

To get command syntax help, please enter '?' as an argument of the command.

VPCS> 
```

```
VPCS> /?

?
Print help
arp Shortcut for: show arp. Show arp table
clear ARG Clear IPv4/IPv6, arp/neighbor cache, command history
dhcp [OPTION] Shortcut for: ip dhcp. Get IPv4 address via DHCP
disconnect Exit the telnet session (daemon mode)
echo TEXT Display TEXT in output. See also set echo ?
help Print help
history Shortcut for: show history. List the command history
ip ARG ... [OPTION]
load [FILENAME]
ping HOST [OPTION ...] Ping HOST with ICMP (default) or TCP/UDP. See ping ?
quit Quit program
relay ARG ... Configure packet relay between UDP ports. See relay ?
rlogin [ip] port Telnet to port on host at ip (relative to host PC)
save [FILENAME]
set ARG ...
show [ARG ...] Print the information of VPCs (default). See show ?
sleep [seconds] [TEXT] Print TEXT and pause running script for seconds
trace HOST [OPTION ...] Print the path packets take to network HOST
version Shortcut for: show version

To get command syntax help, please enter '?' as an argument of the command.

VPCS> ip 192.168.1.12/24 192.168.1.1
Checking for duplicate address...
VPCS : 192.168.1.12 255.255.255.0 gateway 192.168.1.1

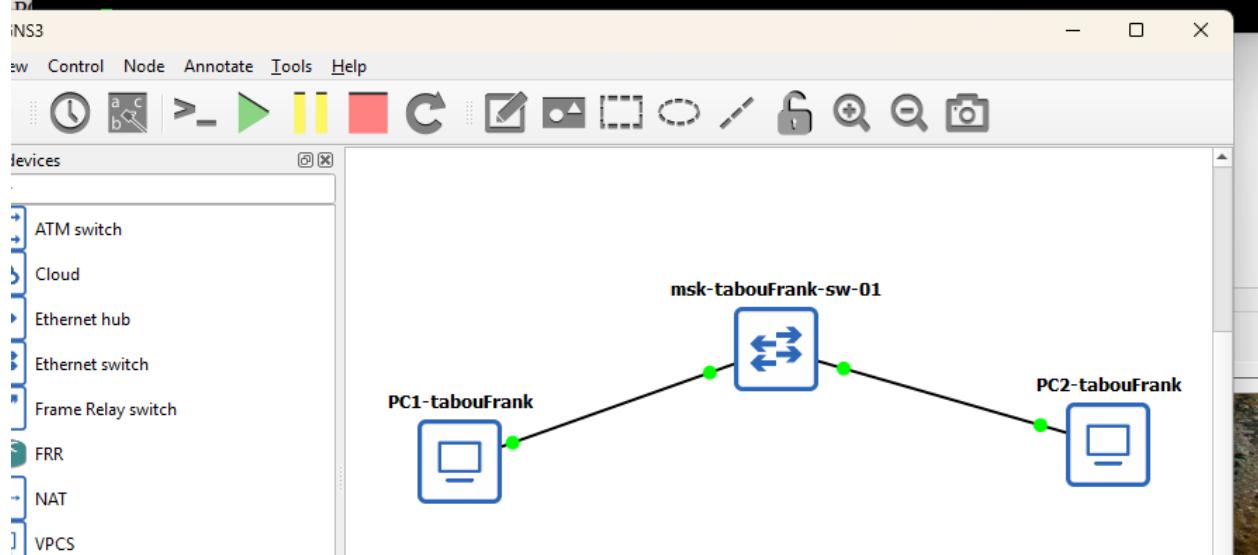
VPCS> save
Saving startup configuration to startup.vpc
. done

VPCS> [ ]
```

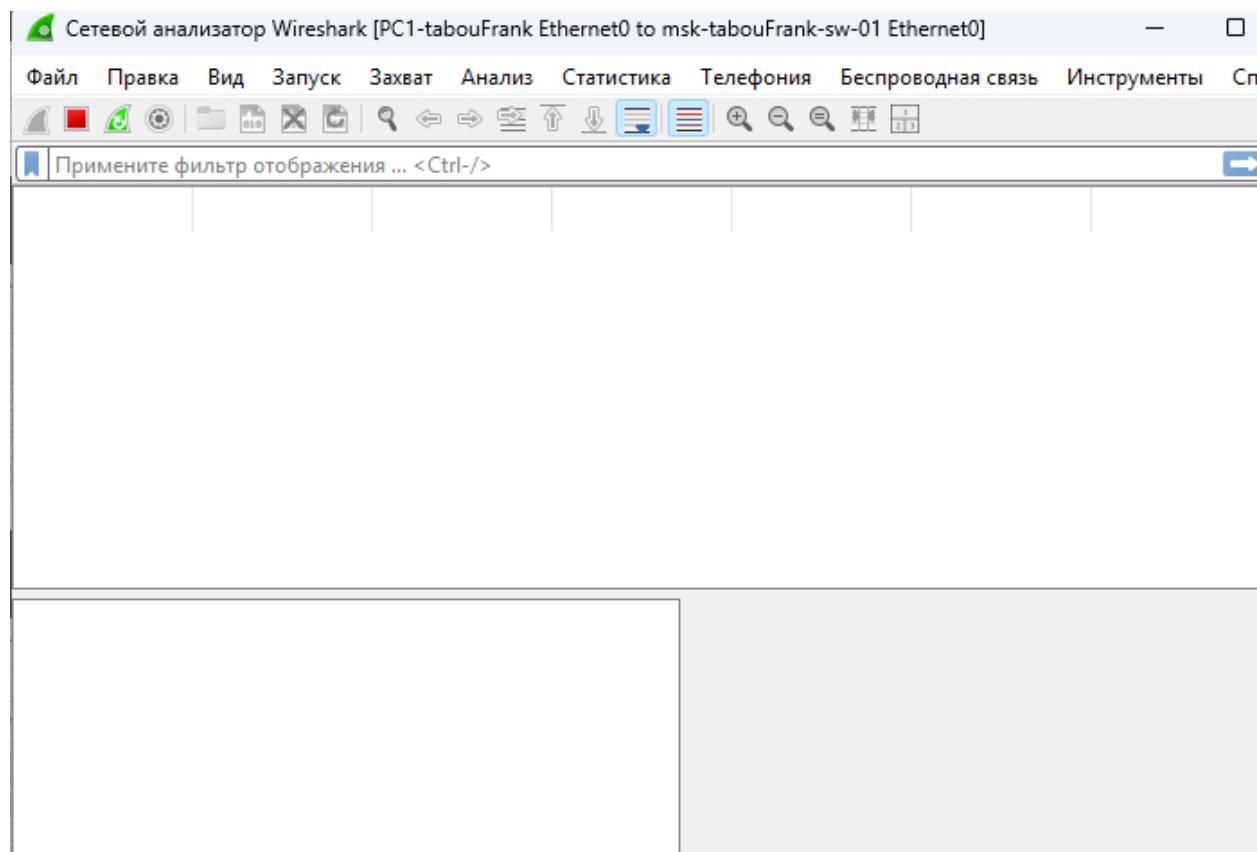
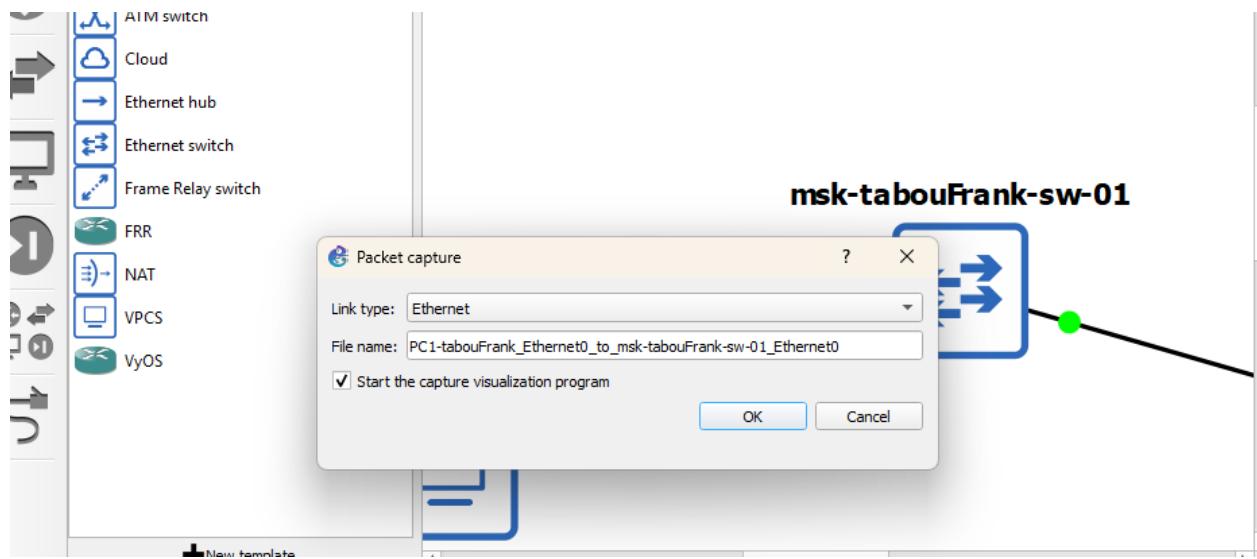
```
VPCS> ping

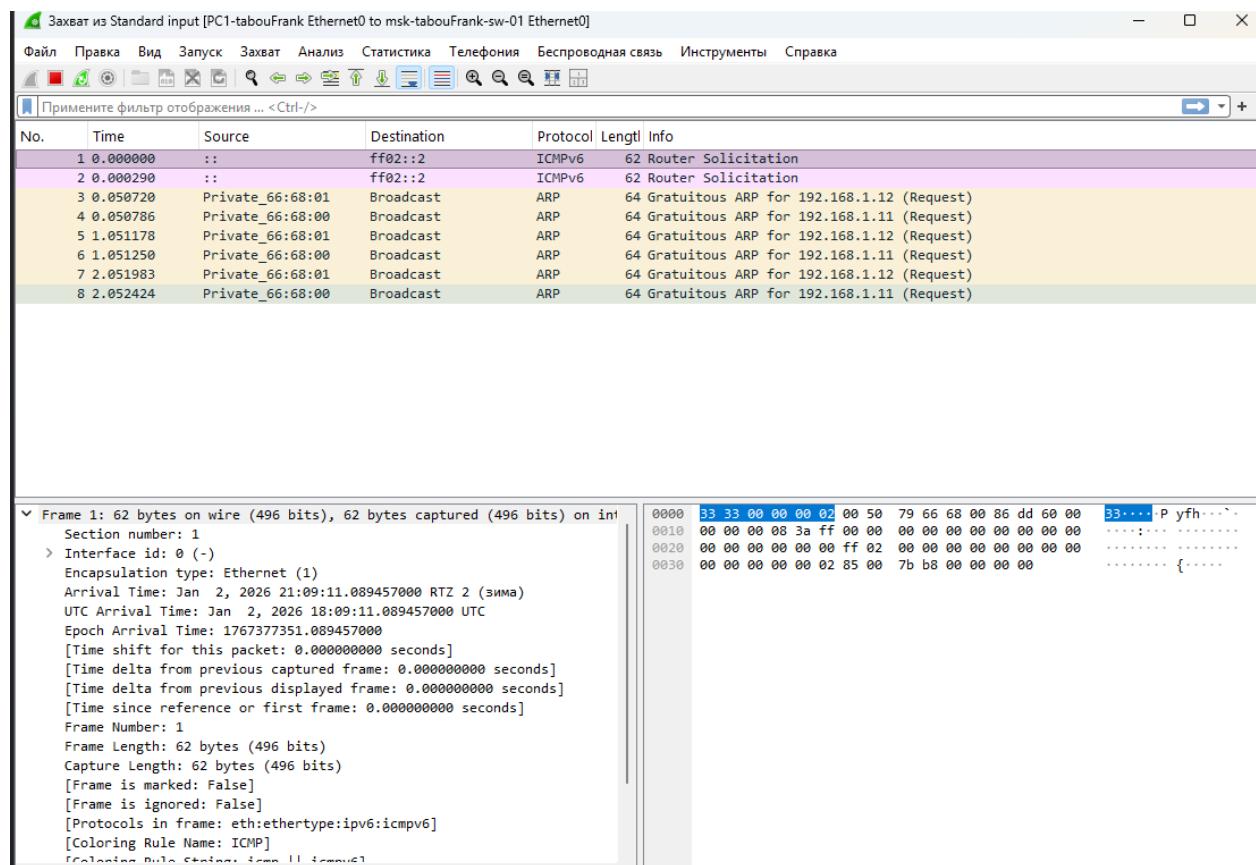
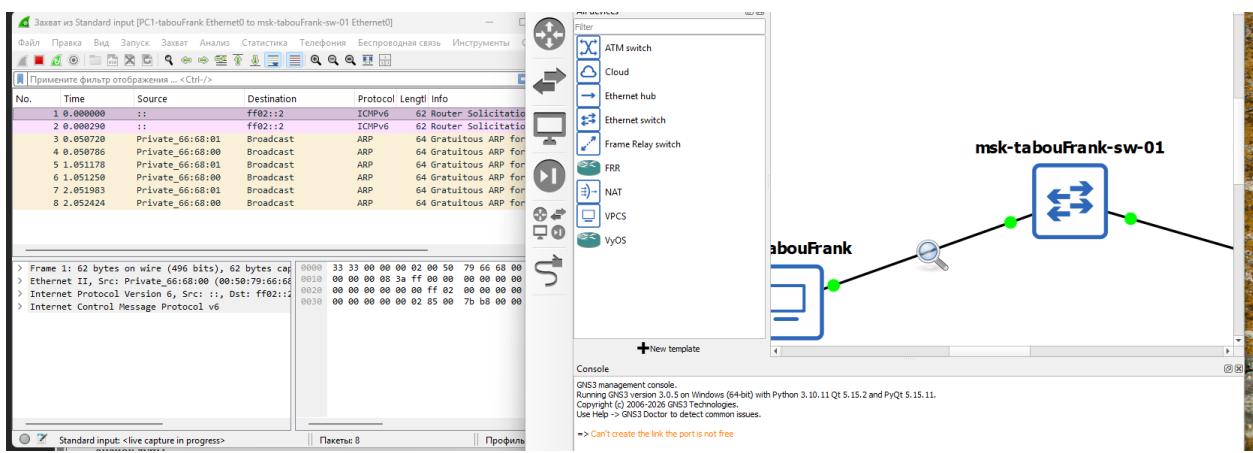
ping HOST [OPTION ...]
Ping the network HOST. HOST can be an ip address or name
Options:
  -1           ICMP mode, default
  -2           UDP mode
  -3           TCP mode
  -c count   Packet count, default 5
  -D           Set the Don't Fragment bit
  -f FLAG    Tcp header FLAG |C|E|U|A|P|R|S|F|
                bits |7 6 5 4 3 2 1 0|
  -i ms      Wait ms milliseconds between sending each packet
  -l size    Data size
  -P protocol Use IP protocol in ping packets
                1 - ICMP (default), 17 - UDP, 6 - TCP
  -p port    Destination port
  -s port    Source port
  -T ttl     Set ttl, default 64
  -t           Send packets until interrupted by Ctrl+C
  -w ms      Wait ms milliseconds to receive the response

Notes: 1. Using names requires DNS to be set.
       2. Use Ctrl+C to stop the command.
```



```
VPCS> ping 192.168.1.11
84 bytes from 192.168.1.11 icmp_seq=1 ttl=64 time=2.815 ms
84 bytes from 192.168.1.11 icmp_seq=2 ttl=64 time=2.968 ms
84 bytes from 192.168.1.11 icmp_seq=3 ttl=64 time=1.948 ms
84 bytes from 192.168.1.11 icmp_seq=4 ttl=64 time=1.397 ms
84 bytes from 192.168.1.11 icmp_seq=5 ttl=64 time=1.327 ms
VPCS>
```

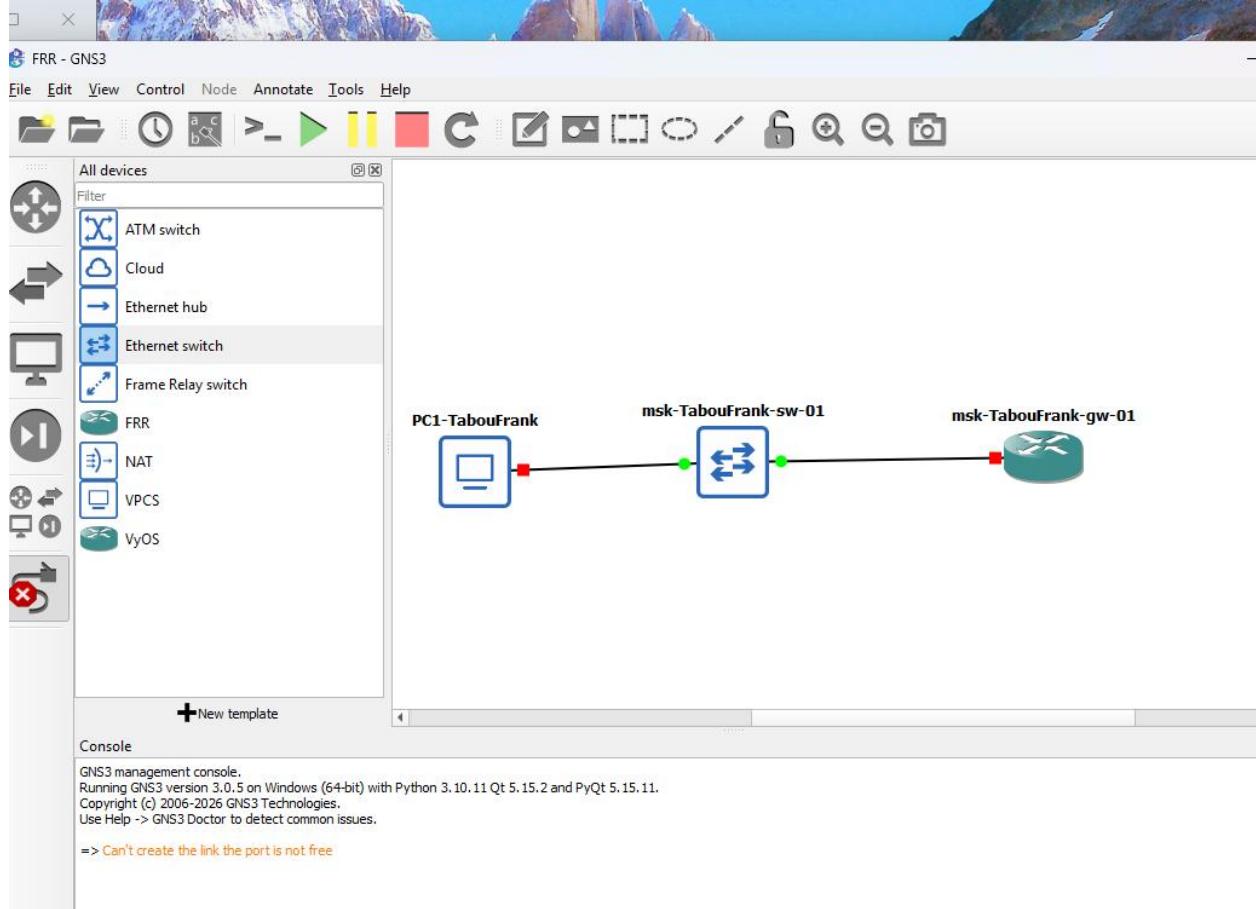
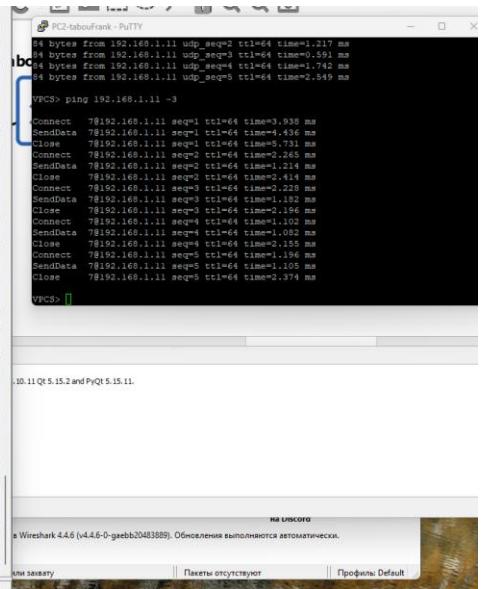


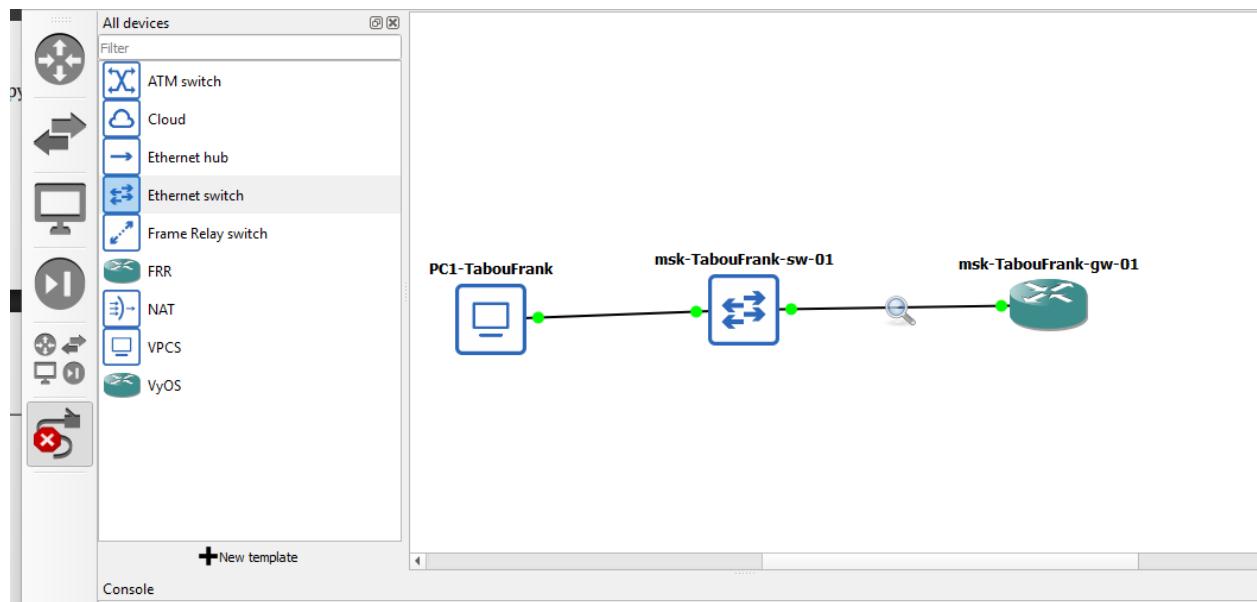
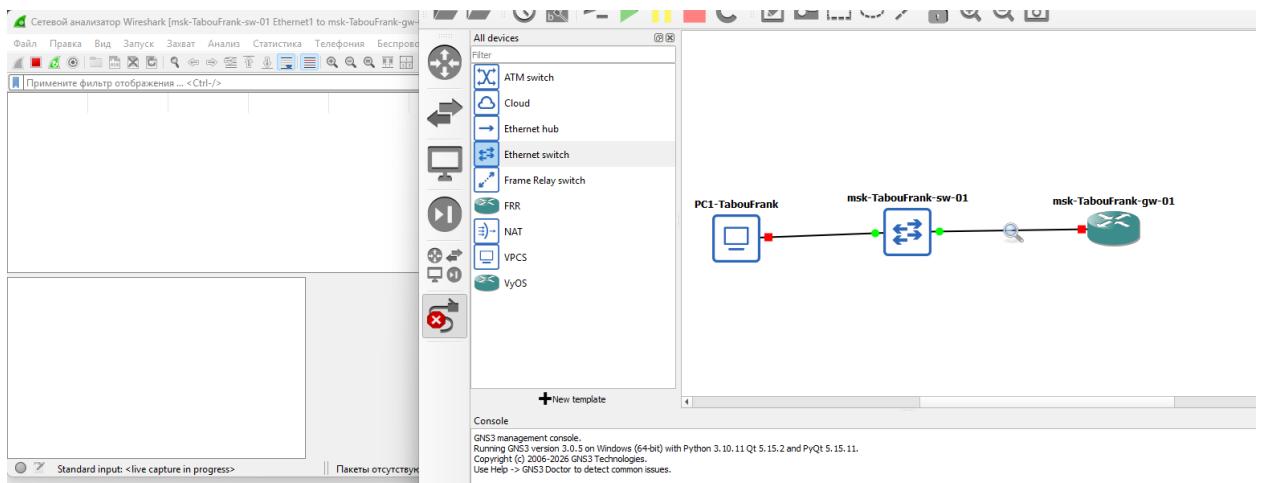


```
    ✓ Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: IPv6mcast_02 (33:33:00:00:00:02)
        ✓ Destination: IPv6mcast_02 (33:33:00:00:00:02)
            .... ..1. .... ..... .... = LG bit: Locally administered address (this is NOT the f...
            .... ..1 .... ..... .... = IG bit: Group address (multicast/broadcast)
        ✓ Source: Private_66:68:00 (00:50:79:66:68:00)
            .... ..0. .... ..... .... = LG bit: Globally unique address (factory default)
            .... ..0 .... ..... .... = IG bit: Individual address (unicast)
    Type: IPv6 (0x86dd)
    [Stream index: 0]
```

```
.... ..0. .... .... .... = LG bit: Globally unique address (factory default)
.... ..0. .... .... .... = IG bit: Individual address (unicast)
Source: Private_66:68:01 (00:50:79:66:68:01)
.... ..0. .... .... .... = LG bit: Globally unique address (factory default)
.... ..0. .... .... .... = IG bit: Individual address (unicast)
Type: IPv4 (0x0800)
[Stream index: 4]
Internet Protocol Version 4, Src: 192.168.1.12, Dst: 192.168.1.11
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    0000 00.. = Differentiated Services Codepoint: Default (0)
    .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 84
Identification: 0x0cc5 (3269)
> 000. .... = Flags: 0x0
...0 0000 0000 0000 = Fragment Offset: 0
Time to Live: 64
Protocol: UDP (17)
Header Checksum: 0xea6c [validation disabled]
[Header checksum status: Unverified]
Source Address: 192.168.1.12
Destination Address: 192.168.1.11
[Stream index: 0]
User Datagram Protocol, Src Port: 6310, Dst Port: 7
Source Port: 6310
Destination Port: 7
Length: 64
Checksum: 0xc7ce [unverified]
[Checksum Status: Unverified]
[Stream index: 0]
[Stream Packet Number: 9]
> [Timestamp]
```

NO.	TIME	SOURCE	Destinatnion	PROTOCOL	Length	INFO
53	082.979579	Private_66:68:01	Broadcast	ARP	64	lwho at 192.168.1.11 Tell 192.168.1.12
54	082.998428	Private_66:68:00	Private_66:68:01	ARP	64	192.168.1.11 ls at 00:59:59-00:00:00
55	082.982238	192.168.1.12	192.168.1.11	TCP	74	36870 > 7 [SYN] Seq=0 Win=2920 Len=0 MSS=1468 TSeq=0 TS=0
56	082.983720	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [SYN, ACK] Seq=1 Ack=1 Win=2920 Len=0
57	082.966572	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [ACK] Seq=1 Ack=1 Win=2920 Len=0 TSeq=0 TS=0
58	082.982238	192.168.1.12	192.168.1.11	TCP	122	[TCP Port numbers reused] 36870 > 7 [SYN] Seq=0 Win=2920 Len=0 TSeq=0 TS=0
59	082.998764	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [ACK] Seq=1 Ack=57 Win=2920 Len=0
60	082.995125	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [FIN, PSH, ACK] Seq=57 Ack=1 Win=2920 Len=0 TSeq=1767378234 TS=0
61	082.997400	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [ACK] Seq=1 Ack=58 Win=2920 Len=0
62	082.997811	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [FIN, ACK] Seq=1 Ack=58 Win=2920 Len=0
63	083.001510	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [ACK] Seq=58 Ack=2 Win=2920 Len=0 TSeq=1767378234 TS=0
64	083.001511	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [SYN, ACK] Seq=0 Ack=1 Win=2920 Len=0
65	084.003331	192.168.1.11	192.168.1.12	TCP	66	36870 > 7 [SYN, ACK] Seq=0 Ack=1 Win=2920 Len=0 MSS=1468 TS=0
66	084.003169	192.168.1.12	192.168.1.11	TCP	54	7 + 36870 [ACK] Seq=1 Ack=1 Win=2920 Len=0 TSeq=1767378235 TS=0
67	084.004226	192.168.1.12	192.168.1.11	ECHO	122	Request
68	084.004688	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [ACK] Seq=1 Ack=57 Win=2920 Len=0
69	084.006740	192.168.1.11	192.168.1.11	TCP	66	36870 > 7 [FIN, ACK] Seq=1 Ack=58 Win=2920 Len=0 TSeq=1767378235 TS=0
70	084.011769	192.168.1.11	192.168.1.11	TCP	54	7 + 36870 [ACK] Seq=1 Ack=59 Win=2920 Len=0
71	084.008889	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [FIN, ACK] Seq=1 Ack=58 Win=2920 Len=0
72	084.009248	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [ACK] Seq=58 Ack=2 Win=2920 Len=0 TSeq=1767378235 TS=0
73	085.009417	192.168.1.12	192.168.1.11	TCP	74	[TCP Port numbers reused] 36870 > 7 [SYN] Seq=0 Win=2920 Len=0 MSS=1468 TS=0
74	085.011057	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [SYN, ACK] Seq=1 Ack=1 Win=2920 Len=0
75	085.011427	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [FIN, ACK] Seq=1 Ack=1 Win=2920 Len=0 TSeq=1767378236 TS=0
76	085.011559	192.168.1.12	192.168.1.11	ECHO	122	Request
77	085.011611	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [ACK] Seq=1 Ack=57 Win=2920 Len=0
78	085.014738	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [FIN, PSH, ACK] Seq=57 Ack=1 Win=2920 Len=0 TSeq=1767378236 TS=0
79	085.015155	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [ACK] Seq=1 Ack=58 Win=2920 Len=0
80	085.015186	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [FIN, ACK] Seq=1 Ack=58 Win=2920 Len=0
81	085.016887	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [ACK] Seq=58 Ack=2 Win=2920 Len=0 TSeq=1767378236 TS=0
82	086.017917	192.168.1.12	192.168.1.11	TCP	74	[TCP Port numbers reused] 36870 > 7 [SYN] Seq=0 Win=2920 Len=0 MSS=1468 TS=0
83	086.017974	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [SYN, ACK] Seq=1 Ack=1 Win=2920 Len=0
84	086.017978	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [ACK] Seq=1 Ack=1 Win=2920 Len=0 TSeq=1767378237 TS=0
85	086.018301	192.168.1.12	192.168.1.11	ECHO	122	Request
86	086.018443	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [ACK] Seq=1 Ack=57 Win=2920 Len=0
87	086.019544	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [FIN, PSH, ACK] Seq=57 Ack=1 Win=2920 Len=0 TSeq=1767378237 TS=0
88	086.019586	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [ACK] Seq=1 Ack=58 Win=2920 Len=0
89	086.020131	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [ACK] Seq=58 Ack=1 Win=2920 Len=0 TSeq=1767378237 TS=0
90	086.021464	192.168.1.12	192.168.1.11	TCP	54	7 + 36870 [FIN, ACK] Seq=58 Ack=2 Win=2920 Len=0
91	087.031781	192.168.1.12	192.168.1.11	TCP	74	[TCP Port numbers reused] 36870 > 7 [SYN] Seq=0 Win=2920 Len=0 MSS=1468 TS=0
92	087.022374	192.168.1.11	192.168.1.12	TCP	66	36870 > 7 [ACK] Seq=58 Ack=2 Win=2920 Len=0 TSeq=1767378237 TS=0
93	087.023085	192.168.1.12	192.168.1.11	TCP	54	7 + 36870 [ACK] Seq=1 Ack=1 Win=2920 Len=0 TSeq=1767378238 TS=0
94	087.023149	192.168.1.12	192.168.1.11	ECHO	122	Request
95	087.023602	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [ACK] Seq=1 Ack=57 Win=2920 Len=0
96	087.024012	192.168.1.11	192.168.1.12	TCP	66	36870 > 7 [ACK] Seq=1 Ack=58 Win=2920 Len=0 TSeq=1767378238 TS=0
97	087.024812	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [ACK] Seq=1 Ack=58 Win=2920 Len=0
98	087.024956	192.168.1.11	192.168.1.12	TCP	54	7 + 36870 [FIN, ACK] Seq=1 Ack=58 Win=2920 Len=0
99	087.027233	192.168.1.12	192.168.1.11	TCP	66	36870 > 7 [ACK] Seq=58 Ack=2 Win=2920 Len=0 TSeq=1767378238 TS=0





PC1-TabouFrank - PuTTY

```
Welcome to Virtual PC Simulator, version 0.8.3
Dedicated to Daling.
Build time: Sep  9 2023 11:15:00
Copyright (c) 2007-2015, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.
<
Executing the startup file

Hostname is too long. (Maximum 12 characters)

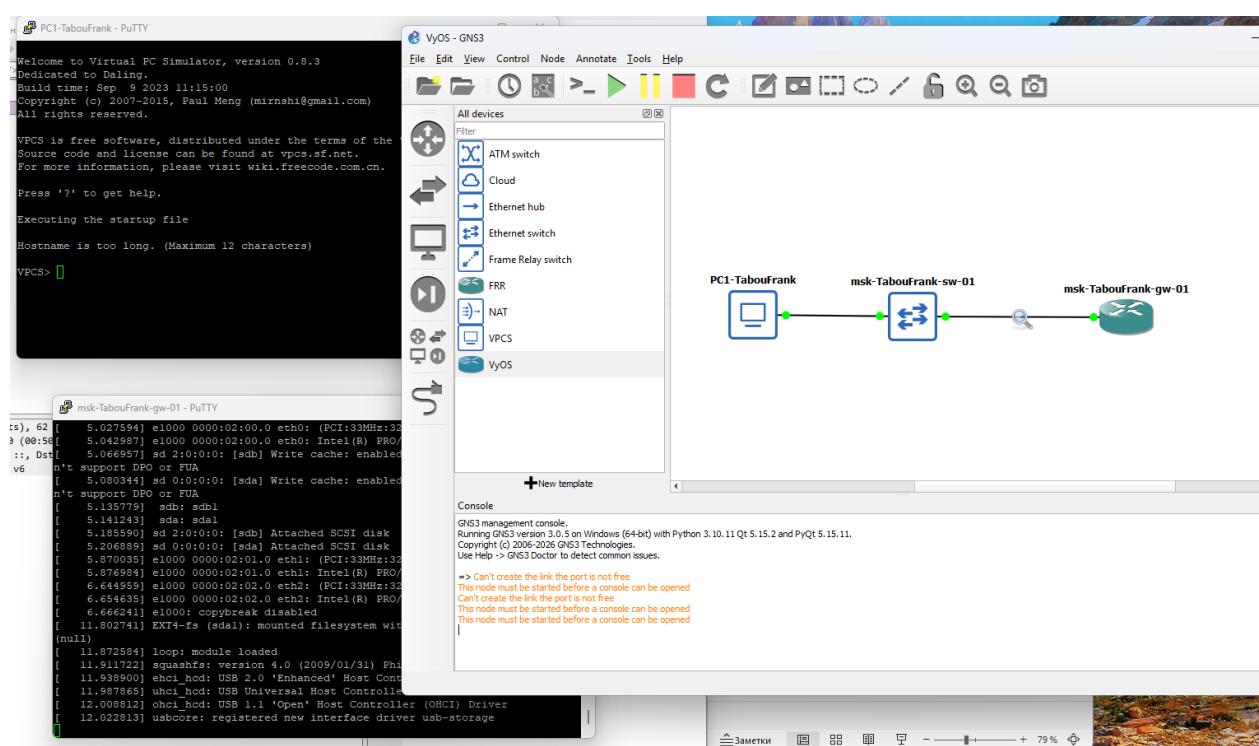
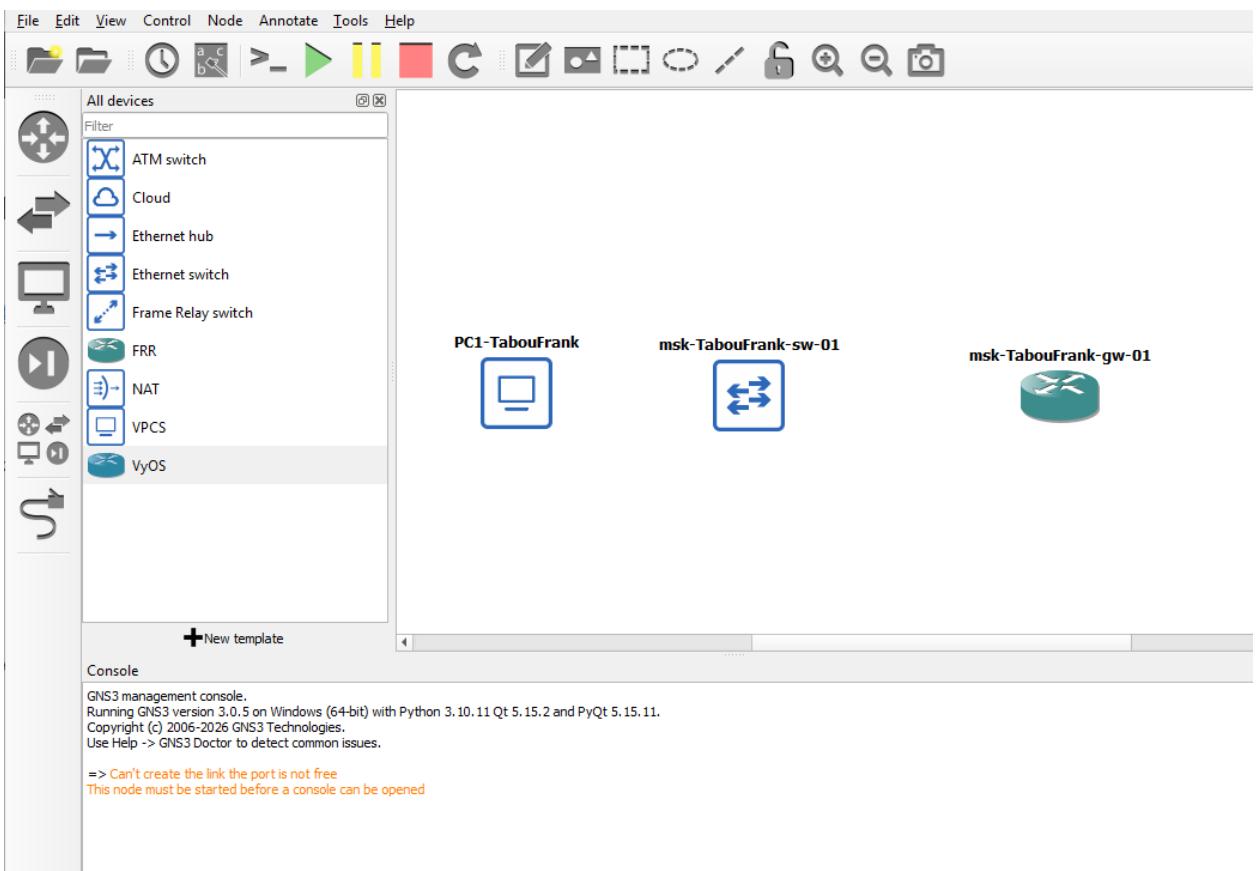
VPCS> ip
```

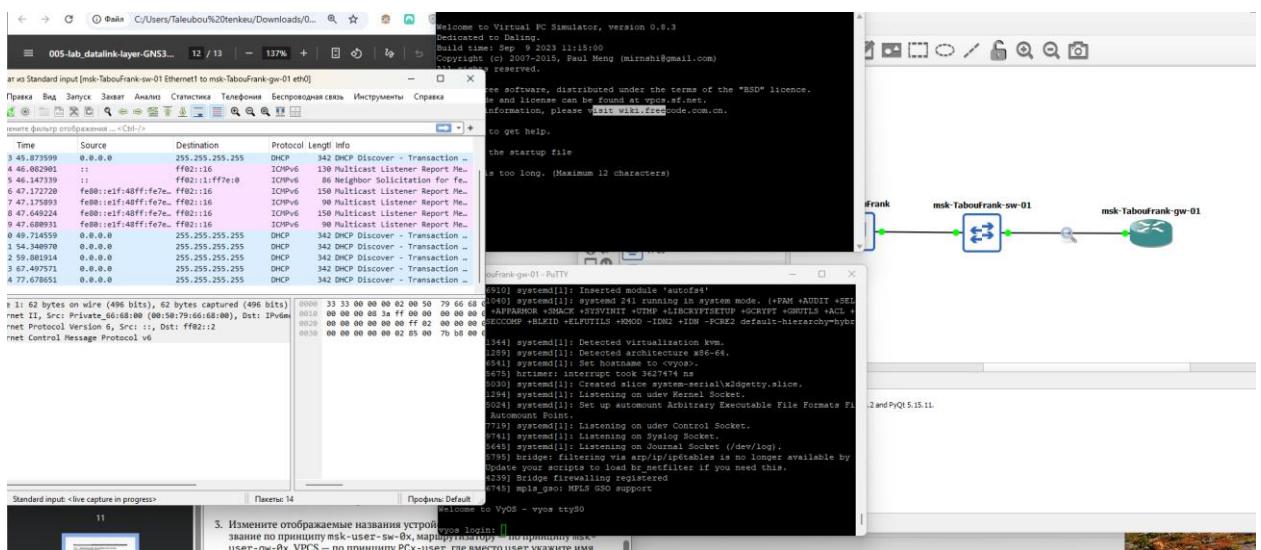
msk-TabouFrank-gw-01 - PuTTY

```
9776 blocks
/dev/sdal: clean, 24/12824 files, 25801/51200 blocks
[ ok ]
* Remounting root filesystem read/write ... [ ok ]
* Remounting filesystems ... [ ok ]
* Mounting local filesystems ... [ ok ]
* Configuring kernel parameters ... [ ok ]
* Creating user login records ... [ ok ]
* Setting hostname ... [ ok ]
* Setting keymap ... [ ok ]
* Starting networking ... *  lo ... [ ok ]
* Starting busybox syslog ... [ ok ]
* Seeding 256 bits and crediting
* Saving 256 bits of creditable seed for next boot
* Starting busybox acpid ... [ ok ]
* Starting busybox crond ... [ ok ]
Started watchfrr
* Starting sshd ... [ ok ]

Hello, this is FRRouting (version 8.2.2).
Copyright 1996-2005 Kunihiro Ishiguro, et al.

frr#
```





```

PC1-TabouFrank - PuTTY

Build time: Sep 9 2023 11:15:00
Copyright (c) 2007-2015, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

Hostname is too long. (Maximum 12 characters)

VPCS> ip 192.168.1.10/24 192.168.1.1
Checking for duplicate address...
VPCS : 192.168.1.10 255.255.255.0 gateway 192.168.1.1

VPCS> save
Saving startup configuration to startup.vpc
. done

VPCS>

```

PC1-TabouFrank - PuTTY

```
Hostname is too long. (Maximum 12 characters)

VPCS> ip 192.168.1.10/24 192.168.1.1
Checking for duplicate address...
VPCS : 192.168.1.10 255.255.255.0 gateway 192.168.1.1

VPCS> save
Saving startup configuration to startup.vpc
. done

VPCS> show ip

NAME      : VPCS[1]
IP/MASK   : 192.168.1.10/24
GATEWAY   : 192.168.1.1
DNS       :
MAC       : 00:50:79:66:68:00
LPORT     : 10004
RHOST:PORT: 127.0.0.1:10005
MTU       : 1500

VPCS> 
```

msk-TabouFrank-gw-01 - PuTTY

```
[ 21.285024] systemd[1]: Set up automount Arbitrary Executable File Formats File System Automount Point.
[ 21.307719] systemd[1]: Listening on udev Control Socket.
[ 21.319741] systemd[1]: Listening on Syslog Socket.
[ 21.335645] systemd[1]: Listening on Journal Socket (/dev/log).
[ 21.515795] bridge: filtering via arp/ip/ip6tables is no longer available by default. Update your scripts to load br_netfilter if you need this.
[ 21.594239] Bridge firewalling registered
[ 21.616745] mpls_gso: MPLS GSO support

Welcome to VyOS - vyos ttyS0

vyos login: vyos
Password:
Welcome to VyOS!

Check out project news at https://blog.vyos.io
and feel free to report bugs at https://vyos.dev

You can change this banner using "set system login banner post-login" command.

VyOS is a free software distribution that includes multiple components,
you can check individual component licenses under /usr/share/doc/*/*copyright
vyos@vyos:~$ 
```

```
Welcome to VyOS - vyos ttyS0

vyos login: vyos
Password:
Welcome to VyOS!

Check out project news at https://blog.vyos.io
and feel free to report bugs at https://vyos.dev

You can change this banner using "set system login banner post-login" command.

VyOS is a free software distribution that includes multiple components,
you can check individual component licenses under /usr/share/doc/*/copyright

You are trying to install from an already installed system. An ISO
image file to install or URL must be specified.

Exiting...
vyos@vyos:~$ configure
[edit]
vyos@vyos# set system host-name msk-TabouFrank-gw-01
[edit]
vyos@vyos# save
Warning: you have uncommitted changes that will not be saved.

Saving configuration to '/config/config.boot'...
Done
[edit]
vyos@vyos# commit
[edit]
vyos@vyos# save
Saving configuration to '/config/config.boot'...
Done
[edit]
vyos@vyos#
```

```
[edit]
vyos@vyos# set interfaces ethernet eth0 address 192.168.1.1/24
[edit]
vyos@vyos# compare
[edit interfaces ethernet eth0]
+address 192.168.1.1/24
[edit]
vyos@vyos# commit

Can't configure both static IPv4 and DHCP address on the same interface

[[interfaces ethernet eth0]] failed
Commit failed
[edit]
vyos@vyos# delete interfaces ethernet eth0 address dhcp
[edit]
vyos@vyos# commit
[edit]
vyos@vyos# show interfaces
ethernet eth0 {
    address 192.168.1.1/24
    hw-id 0c:lf:48:7e:00:00
}
ethernet eth1 {
    hw-id 0c:lf:48:7e:00:01
}
ethernet eth2 {
    hw-id 0c:lf:48:7e:00:02
}
loopback lo {
}
[edit]
vyos@vyos# save
Saving configuration to '/config/config.boot'...
Done
[edit]
vyos@vyos# commit
No configuration changes to commit
[edit]
vyos@vyos# save
Saving configuration to '/config/config.boot'...
Done
[edit]
vyos@vyos#
```

Захват из Standard input [msk-TabouFrank-sw-01 Ethernet1 to msk-TabouFrank-gw-01 eth0]

Файл Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты Справка

Примените фильтр отображения ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
36	400.822255	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x34a41c76
37	413.439096	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x34a41c76
38	422.145143	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x34a41c76
39	430.731454	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x34a41c76
40	440.486873	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x34a41c76
41	505.852931	::	ff02::16	ICMPv6	130	Multicast Listener Report Message v2
42	506.306771	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x88554109
43	506.518557	::	ff02::1:ff7e:0	ICMPv6	86	Neighbor Solicitation for fe80::e1f:48ff:fe7e::0
44	506.646382	::	ff02::16	ICMPv6	130	Multicast Listener Report Message v2
45	507.54498	fe80::e1f:48ff:fe7e::	ff02::16	ICMPv6	150	Multicast Listener Report Message v2
46	507.547694	fe80::e1f:48ff:fe7e::	ff02::16	ICMPv6	90	Multicast Listener Report Message v2
47	507.821748	fe80::e1f:48ff:fe7e::	ff02::16	ICMPv6	150	Multicast Listener Report Message v2
48	508.437111	fe80::e1f:48ff:fe7e::	ff02::16	ICMPv6	90	Multicast Listener Report Message v2
49	509.684491	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x88554109
50	513.811442	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x88554109
51	519.459337	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x88554109
52	528.085984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x88554109
53	543.179855	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x88554109
54	563.682491	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x88554109
55	654.564863	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xd46de406

Epoch Arrival Time: 1767382140.861528000
[Time shift for this packet: 0.000000000 seconds]
[Time delta from previous captured frame: 8.626647000 seconds]
[Time delta from previous displayed frame: 8.626647000 seconds]
[Time since reference or first frame: 528.085984000 seconds]
Frame Number: 52
Frame Length: 342 bytes (2736 bits)
Capture Length: 342 bytes (2736 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:udp:dhcp]
[Coloring Rule Name: UDP]
[Coloring Rule String: udp]
▼ Ethernet II, Src: 0c:1f:48:7e:00:00 (0c:1f:48:7e:00:00), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
 ▼ Destination: Broadcast (ff:ff:ff:ff:ff:ff)
 1..... = LG bit: Locally administered address (this is NOT the factory default)
 1..... = IG bit: Group address (multicast/broadcast)
 ▼ Source: 0c:1f:48:7e:00:00 (0c:1f:48:7e:00:00)
 0..... = LG bit: Globally unique address (factory default)
 0..... = IG bit: Individual address (unicast)
 Type: IPv4 (0x0800)
 [Stream index: 2]
 > Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
 > User Datagram Protocol, Src Port: 68, Dst Port: 67
 > Dynamic Host Configuration Protocol (Discover)

Standard input: <live capture in progress> Пакеты: 83 || Профиль: Default

Epoch Arrival Time: 1767382140.861528000
[Time shift for this packet: 0.000000000 seconds]
[Time delta from previous captured frame: 8.626647000 seconds]
[Time delta from previous displayed frame: 8.626647000 seconds]
[Time since reference or first frame: 528.085984000 seconds]
Frame Number: 52
Frame Length: 342 bytes (2736 bits)
Capture Length: 342 bytes (2736 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:udp:dhcp]
[Coloring Rule Name: UDP]
[Coloring Rule String: udp]
▼ Ethernet II, Src: 0c:1f:48:7e:00:00 (0c:1f:48:7e:00:00), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
 ▼ Destination: Broadcast (ff:ff:ff:ff:ff:ff)
 1..... = LG bit: Locally administered address (this is NOT the factory default)
 1..... = IG bit: Group address (multicast/broadcast)
 ▼ Source: 0c:1f:48:7e:00:00 (0c:1f:48:7e:00:00)
 0..... = LG bit: Globally unique address (factory default)
 0..... = IG bit: Individual address (unicast)
 Type: IPv4 (0x0800)
 [Stream index: 2]
 > Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
 > User Datagram Protocol, Src Port: 68, Dst Port: 67
 > Dynamic Host Configuration Protocol (Discover)

Frame Number (frame.number) Пакеты: 83 || Профиль: Default

Saving startup configuration to startup.vpc
done
VPCs> show ip
NAME : VPCs[1]
IP/MASK : 192.168.1.1/24
GATEWAY : 192.168.1.1
SNIC : 1
MAC : 00:50:79:66:68:00
LBORT : 10004
RHOST:PORT : 127.0.0.1:10005
MTU : 1500
WINS :
NETBIOS :
VPCs> ping 192.168.1.1
64 bytes from 192.168.1.1! Tell 192.168.1.0
60 192.168.1.1 is at 0c:1f:48:7e:00:00
92.1441.329743 192.168.1.10 192.168.1.1 ICMP 98 Echo (ping) request id=0x020, seq=1/256, ttl=64 (request in 87)
92.1441.331188 192.168.1.1 192.168.1.10 ICMP 98 Echo (ping) reply id=0x020, seq=1/256, ttl=64 (request in 86)
92.1441.332965 192.168.1.10 192.168.1.1 ICMP 98 Echo (ping) request id=0x020, seq=2/512, ttl=64 (reply in 89)
92.1441.335615 192.168.1.10 192.168.1.10 ICMP 98 Echo (ping) reply id=0x020, seq=2/512, ttl=64 (request in 88)
92.1441.337227 192.168.1.10 192.168.1.1 ICMP 98 Echo (ping) request id=0x020, seq=3/704, ttl=64 (request in 91)
92.1441.340012 192.168.1.1 192.168.1.10 ICMP 98 Echo (ping) reply id=0x020, seq=3/704, ttl=64 (request in 90)VPCs> ping 192.168.1.1
92.1441.341439 192.168.1.10 192.168.1.1 ICMP 98 Echo (ping) request id=0x120, seq=4/1024, ttl=64 (reply in 93)
92.1441.343427 192.168.1.1 192.168.1.10 ICMP 98 Echo (ping) reply id=0x120, seq=4/1024, ttl=64 (reply in 92)
92.1445.345498 192.168.1.10 192.168.1.1 ICMP 98 Echo (ping) request id=0x120, seq=5/1280, ttl=64 (request in 95)
92.1445.346456 192.168.1.1 192.168.1.10 ICMP 98 Echo (ping) reply id=0x120, seq=5/1280, ttl=64 (request in 94)VPCs> ping 192.168.1.1
92.1446.370091 0c:1f:48:7e:00:00 Private_66:68:00 ARP 60 Who has 192.168.1.1? Tell 192.168.1.1
92.1446.372272 Private_66:68:00 0c:1f:48:7e:00:00 ARP 60 192.168.1.10 is at 00:50:79:66:68:00
Epoch Arrival Time: 1767382140.861528000
[Time shift for this packet: 0.000000000 seconds]
[Time delta from previous captured frame: 8.626647000 seconds]
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 [Stream index: 2]
 > Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
 > User Datagram Protocol, Src Port: 68, Dst Port: 67
 > Dynamic Host Configuration Protocol (Discover)

Frame Number (frame.number) Пакеты: 83 || Профиль: Default

Выводы:

В ходе выполнения лабораторной работы были последовательно смоделированы простейшие сети в GNS3 с использованием коммутатора, маршрутизаторов FRR и VyOS. Были освоены навыки настройки IP-адресации, проверки связности сети, а также анализа сетевого трафика с применением Wireshark. Полученные результаты наглядно демонстрируют принципы работы протоколов ARP, ICMP, UDP и TCP в локальных сетях.