

ЛАБОРАТОРНАЯ РАБОТА №5

Студент: Талебу Тенке Франк Устон

Группа: НФИбд-02-23

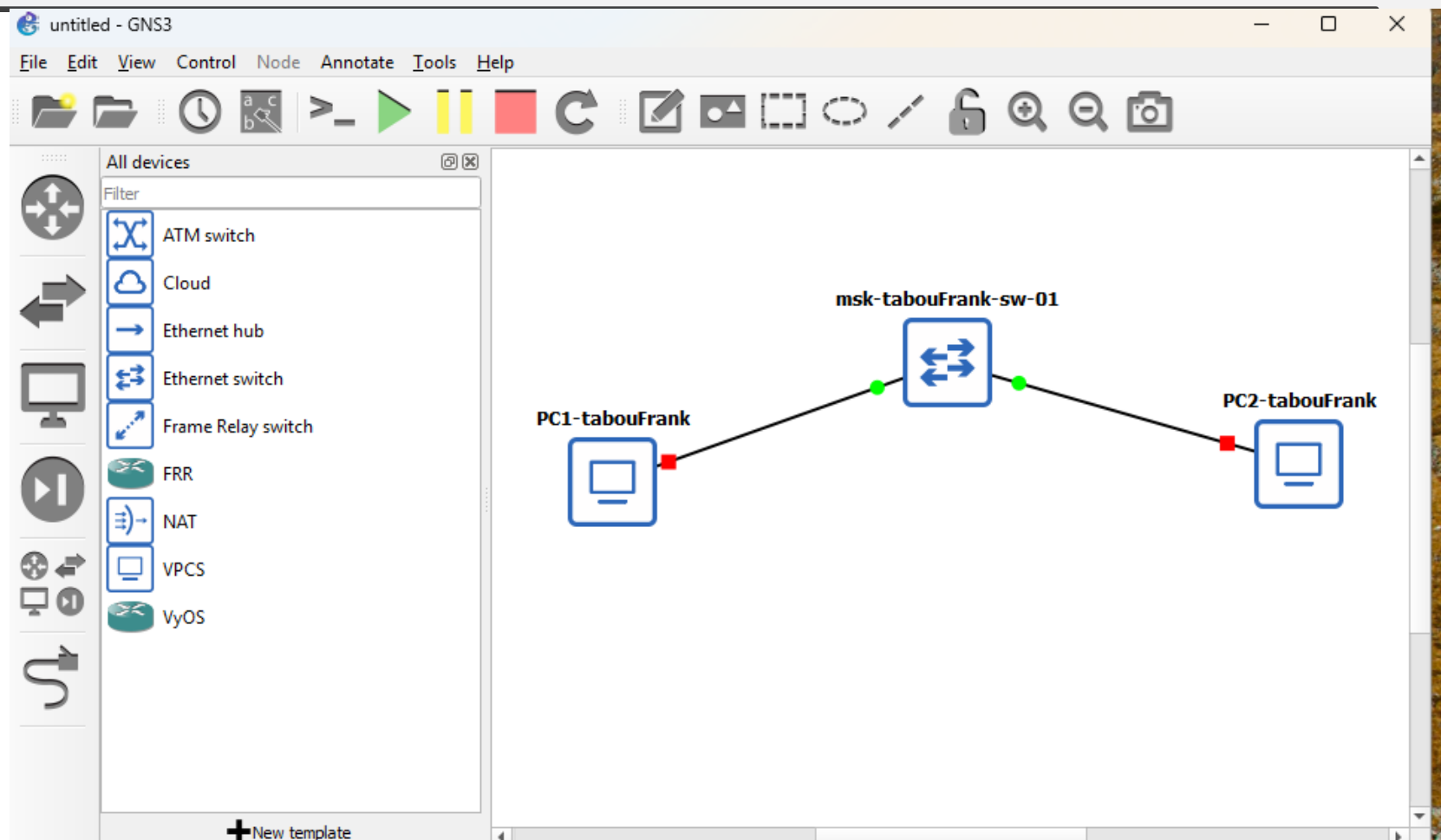
ЦЕЛЬ РАБОТА

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

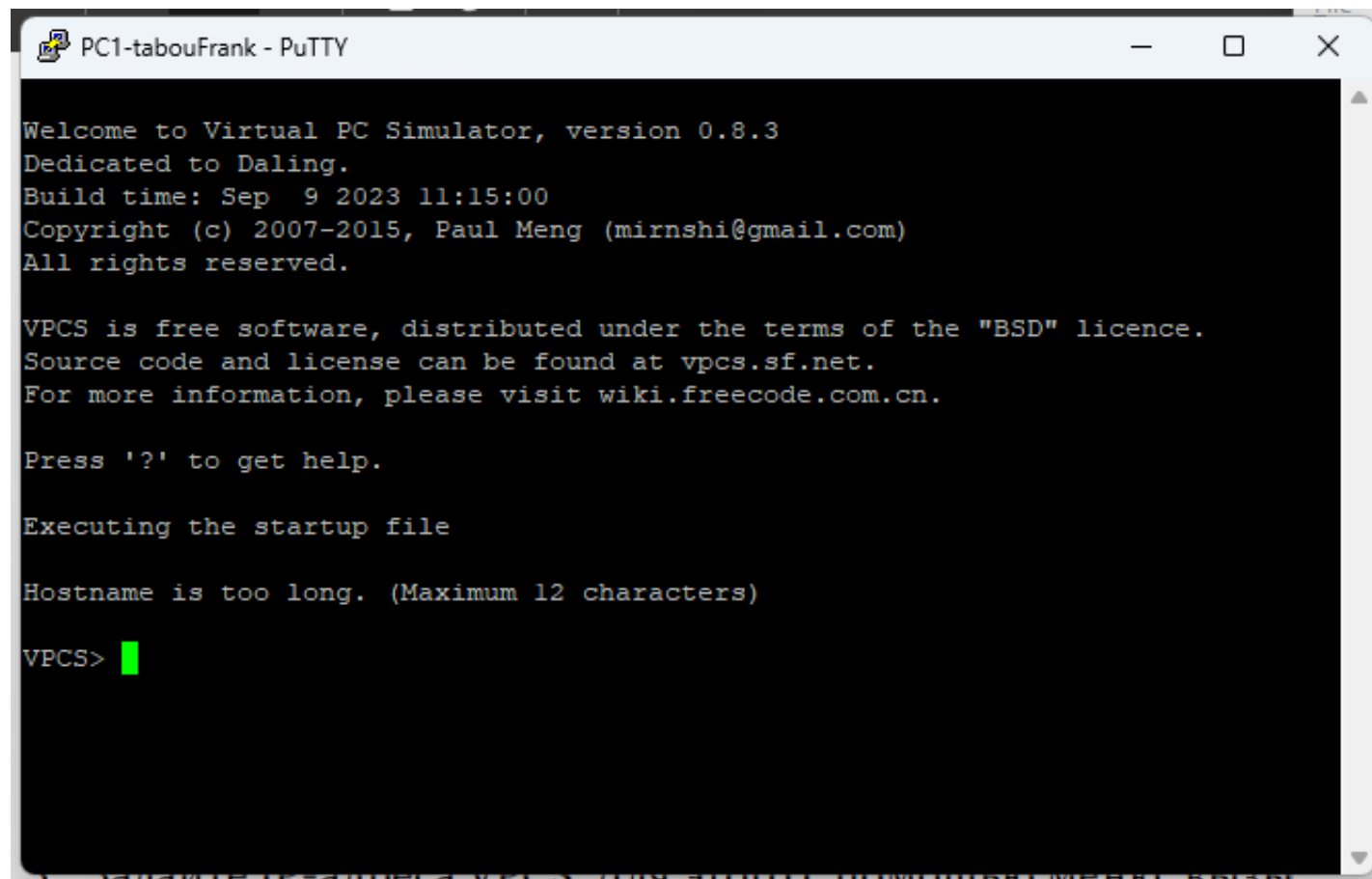
ЗАДАНИЕ

- С моделировать простейшую сеть на базе коммутатора в GNS3;
- Проанализировать трафик в GNS3 посредством Wireshark;
- С моделировать простейшую сеть на базе маршрутизатора FRR в GNS3;
- С моделировать простейшую сеть на базе маршрутизатора VyOS в GNS3.

ВЫПОЛНЕНИЕ
ЛАБОРАТОРНОЙ
РАБОТЫ



ВЫПОЛНЕ
НИЕ
ЛАБОРАТ
ОРНОЙ
РАБОТЫ



```
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> █
```


ВЫПОЛНЕНИЕ ЛАБОРАТОРНОЙ РАБОТЫ

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


ВЫПОЛНЕНИЕ ЛАБОРАТОРНОЙ РАБОТЫ

```
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> 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> █
```

ВЫПОЛНЕНИЕ
ЛАБОРАТОРНОЙ
РАБОТЫ

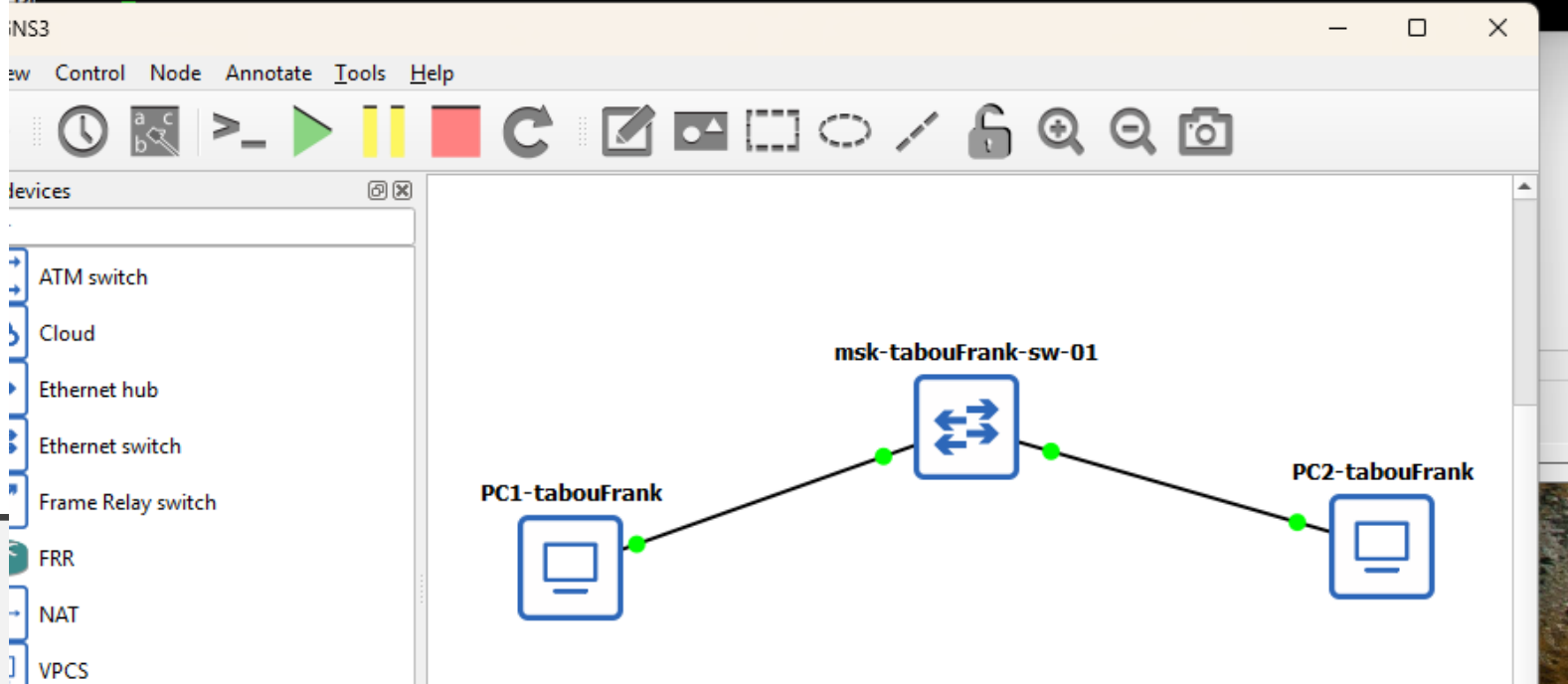
```
VPCS> ping

ping HOST [OPTION ...]

Ping the network HOST. HOST can be an ip address or name

Options:
  -l 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.
```



ВЫПОЛНЕНИЕ ЛАБОРАТОРНОЙ РАБОТЫ

Захват из Standard input (Ethernet0 to msk-tabouFrank-sw-01 Ethernet0)

Файл Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты

Примените фильтр отображения ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	::	ff02::2	ICMPv6	62	Router Solicitation
2	0.000290	::	ff02::2	ICMPv6	62	Router Solicitation
3	0.050720	Private_66:68:01	Broadcast	ARP	64	Gratuitous ARP for
4	0.050786	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for
5	1.051178	Private_66:68:01	Broadcast	ARP	64	Gratuitous ARP for
6	1.051250	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for
7	2.051983	Private_66:68:01	Broadcast	ARP	64	Gratuitous ARP for
8	2.052424	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for

> Frame 1: 62 bytes on wire (496 bits), 62 bytes captured on interface Ethernet0, 62 bytes from Private_66:68:00 (00:50:79:66:68:00) to ff02::2 (02:00:5e:00:00:02) on interface Ethernet0

> Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: ff02::2 (02:00:5e:00:00:02)

> Internet Protocol Version 6, Src: ::, Dst: ff02::2

> Internet Control Message Protocol v6

Standard input: <live capture in progress> | Пакеты: 8 | Профиль

Filter

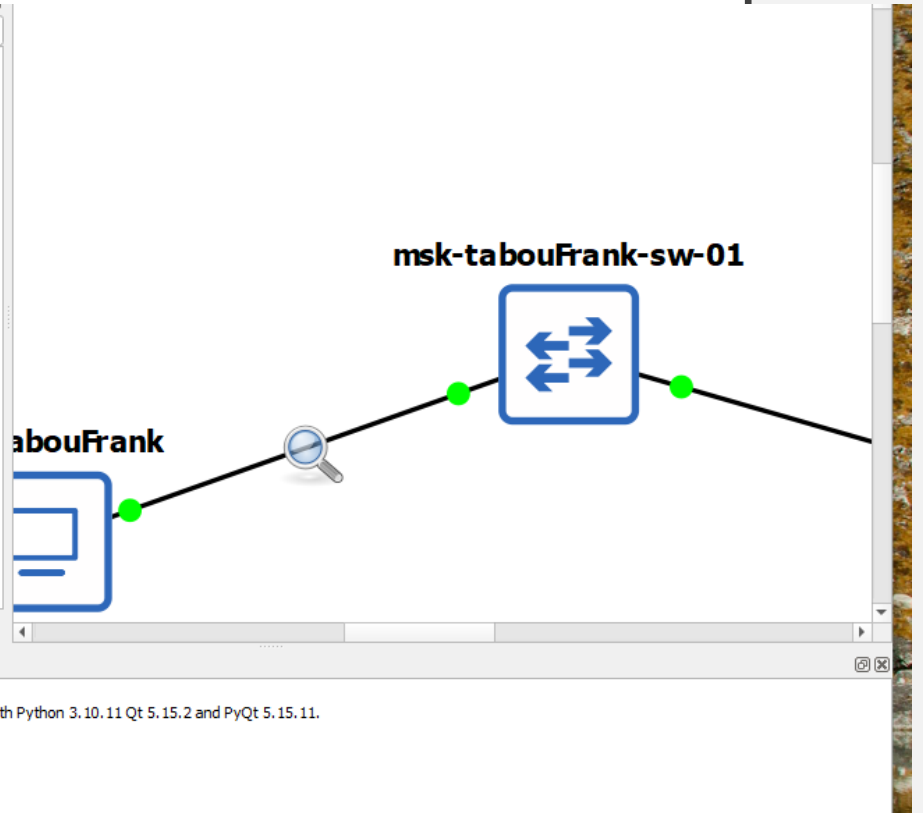
- ATM switch
- Cloud
- Ethernet hub
- Ethernet switch
- Frame Relay switch
- FRR
- NAT
- VPCS
- VyOS

+ New template

Console

GNS3 management console.
Running GNS3 version 3.0.5 on Windows (64-bit) with Python 3.10.11 Qt 5.15.2 and PyQt 5.15.11.
Copyright (c) 2006-2026 GNS3 Technologies.
Use Help -> GNS3 Doctor to detect common issues.

=> Can't create the link the port is not free





ВЫПОЛНЕНИЕ
ЛАБОРАТОРНОЙ
РАБОТЫ

Захват из Standard input [PC1-tabouFrank Ethernet0 to msk-tabouFrank-sw-01 Ethernet0]

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

Примените фильтр отображения ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	::	ff02::2	ICMPv6	62	Router Solicitation
2	0.000290	::	ff02::2	ICMPv6	62	Router Solicitation
3	0.050720	Private_66:68:01	Broadcast	ARP	64	Gratuitous ARP for 192.168.1.12 (Request)
4	0.050786	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 192.168.1.11 (Request)
5	1.051178	Private_66:68:01	Broadcast	ARP	64	Gratuitous ARP for 192.168.1.12 (Request)
6	1.051250	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 192.168.1.11 (Request)
7	2.051983	Private_66:68:01	Broadcast	ARP	64	Gratuitous ARP for 192.168.1.12 (Request)
8	2.052424	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 192.168.1.11 (Request)

▼ Frame 1: 62 bytes on wire (496 bits), 62 bytes captured (496 bits) on interface 0
 Section number: 1
 > Interface id: 0 (-)
 Encapsulation type: Ethernet (1)
 Arrival Time: Jan 2, 2026 21:09:11.089457000 RTZ 2 (зима)
 UTC Arrival Time: Jan 2, 2026 18:09:11.089457000 UTC
 Epoch Arrival Time: 1767377351.089457000
 [Time shift for this packet: 0.00000000 seconds]
 [Time delta from previous captured frame: 0.00000000 seconds]
 [Time delta from previous displayed frame: 0.00000000 seconds]
 [Time since reference or first frame: 0.00000000 seconds]
 Frame Number: 1
 Frame Length: 62 bytes (496 bits)
 Capture Length: 62 bytes (496 bits)
 [Frame is marked: False]
 [Frame is ignored: False]
 [Protocols in frame: eth:ethertype:ipv6:icmpv6]
 [Coloring Rule Name: ICMP]
 [Coloring Rule String: icmp, icmpv6]

0000 33 33 00 00 00 02 00 50 79 66 68 00 86 dd 60 00 33... P yfh...
 0010 00 00 00 08 3a ff 00 00 00 00 00 00 00 00 00 00 00 00
 0020 00 00 00 00 00 00 ff 02 00 00 00 00 00 00 00 00 00 00
 0030 00 00 00 00 00 02 85 00 7b b8 00 00 00 00 00 00 {...

ВЫПОЛНЕНИЕ ЛАБОРАТОРНОЙ РАБОТЫ

14	347.347653	192.168.1.11	192.168.1.12	ICMP	98 Echo (ping) reply	id=0x220b, seq=2/512, ttl=64 (request in 13)
15	348.348333	192.168.1.12	192.168.1.11	ICMP	98 Echo (ping) request	id=0x230b, seq=3/768, ttl=64 (reply in 16)
16	348.348598	192.168.1.11	192.168.1.12	ICMP	98 Echo (ping) reply	id=0x230b, seq=3/768, ttl=64 (request in 15)
17	349.350190	192.168.1.12	192.168.1.11	ICMP	98 Echo (ping) request	id=0x240b, seq=4/1024, ttl=64 (reply in 18)
18	349.351914	192.168.1.11	192.168.1.12	ICMP	98 Echo (ping) reply	id=0x240b, seq=4/1024, ttl=64 (request in 17)
19	350.354578	192.168.1.12	192.168.1.11	ICMP	98 Echo (ping) request	id=0x250b, seq=5/1280, ttl=64 (reply in 20)
20	350.355793	192.168.1.11	192.168.1.12	ICMP	98 Echo (ping) reply	id=0x250b, seq=5/1280, ttl=64 (request in 19)
21	368.296985	192.168.1.12	192.168.1.11	ICMP	98 Echo (ping) request	id=0x370b, seq=1/256, ttl=64 (reply in 22)
22	368.297751	192.168.1.11	192.168.1.12	ICMP	98 Echo (ping) reply	id=0x370b, seq=1/256, ttl=64 (request in 21)
23	369.299346	192.168.1.12	192.168.1.11	ICMP	98 Echo (ping) request	id=0x380b, seq=2/512, ttl=64 (reply in 24)
24	369.299856	192.168.1.11	192.168.1.12	ICMP	98 Echo (ping) reply	id=0x380b, seq=2/512, ttl=64 (request in 23)
25	370.300648	192.168.1.12	192.168.1.11	ICMP	98 Echo (ping) request	id=0x390b, seq=3/768, ttl=64 (reply in 26)
26	370.301200	192.168.1.11	192.168.1.12	ICMP	98 Echo (ping) reply	id=0x390b, seq=3/768, ttl=64 (request in 25)
27	371.302082	192.168.1.12	192.168.1.11	ICMP	98 Echo (ping) request	id=0x3a0b, seq=4/1024, ttl=64 (reply in 28)
28	371.302733	192.168.1.11	192.168.1.12	ICMP	98 Echo (ping) reply	id=0x3a0b, seq=4/1024, ttl=64 (request in 27)
29	372.304642	192.168.1.12	192.168.1.11	ICMP	98 Echo (ping) request	id=0x3b0b, seq=5/1280, ttl=64 (reply in 30)
30	372.305737	192.168.1.11	192.168.1.12	ICMP	98 Echo (ping) reply	id=0x3b0b, seq=5/1280, ttl=64 (request in 29)

> Frame 1: 62 bytes on wire (496 bits), 62 bytes captured (496 bits) on interface
 > Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: IPv6mcast_0:
 > Destination: IPv6mcast_02 (33:33:00:00:00:02)
 > Source: Private_66:68:00 (00:50:79:66:68:00)

0000	33 33 00 00 00 02 00 50 79 66 68 00 86 dd 60 00	33.....P yfh....
0010	00 00 00 08 3a ff 00 00 00 00 00 00 00 00 00
0020	00 00 00 00 00 00 ff 02 00 00 00 00 00 00 00
0030	00 00 00 00 00 02 85 00 7b b8 00 00 00 00 00{.....

```

VPCS> ping -l 192.168.1.11
Cannot resolve -l

VPCS> ping 192.168.1.11

84 bytes from 192.168.1.11 icmp_seq=1 ttl=64 time=0.303 ms
84 bytes from 192.168.1.11 icmp_seq=2 ttl=64 time=0.949 ms
84 bytes from 192.168.1.11 icmp_seq=3 ttl=64 time=0.630 ms
84 bytes from 192.168.1.11 icmp_seq=4 ttl=64 time=3.107 ms
84 bytes from 192.168.1.11 icmp_seq=5 ttl=64 time=2.574 ms

VPCS> ping 192.168.1.11

84 bytes from 192.168.1.11 icmp_seq=1 ttl=64 time=1.447 ms
84 bytes from 192.168.1.11 icmp_seq=2 ttl=64 time=0.750 ms
84 bytes from 192.168.1.11 icmp_seq=3 ttl=64 time=0.919 ms
84 bytes from 192.168.1.11 icmp_seq=4 ttl=64 time=1.247 ms
84 bytes from 192.168.1.11 icmp_seq=5 ttl=64 time=1.866 ms

VPCS> s

```


ВЫПОЛНЕНИЕ ЛАБОРАТОРНОЙ РАБОТЫ

Time	Source	Destination	Protocol	Length	Info
53.882.979570	Private_66:68:01	Broadcast	ARP	64	Who has 192.168.1.11? Tell 192.168.1.12
54.882.980428	Private_66:68:00	Private_66:68:01	ARP	64	192.168.1.11 is at 00:50:79:66:68:00
55.882.982230	192.168.1.12	192.168.1.11	TCP	74	36070 → 7 [SYN] Seq=0 Win=2920 Len=0 MSS=1460 TSval=1767378234 TSecr=0 WS=2
56.882.983720	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [SYN, ACK] Seq=0 Ack=1 Win=2920 Len=0
57.882.986572	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [ACK] Seq=1 Ack=1 Win=2920 Len=0 TSval=1767378234 TSecr=0
58.882.989429	192.168.1.12	192.168.1.11	ECHO	122	Request
59.882.990764	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [ACK] Seq=1 Ack=57 Win=2920 Len=0
60.882.995125	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [FIN, PSH, ACK] Seq=57 Ack=1 Win=2920 Len=0 TSval=1767378234 TSecr=0
61.882.997400	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [ACK] Seq=1 Ack=58 Win=2920 Len=0
62.882.997811	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [FIN, ACK] Seq=1 Ack=58 Win=2920 Len=0
63.883.001519	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [ACK] Seq=58 Ack=2 Win=2920 Len=0 TSval=1767378234 TSecr=0
64.884.000837	192.168.1.12	192.168.1.11	TCP	74	[TCP Port numbers reused] 36070 → 7 [SYN] Seq=0 Win=2920 Len=0 MSS=1460 TS...
65.884.001321	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [SYN, ACK] Seq=0 Ack=1 Win=2920 Len=0
66.884.003169	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [ACK] Seq=1 Ack=1 Win=2920 Len=0 TSval=1767378235 TSecr=0
67.884.004226	192.168.1.12	192.168.1.11	ECHO	122	Request
68.884.004688	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [ACK] Seq=1 Ack=57 Win=2920 Len=0
69.884.006477	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [FIN, PSH, ACK] Seq=57 Ack=1 Win=2920 Len=0 TSval=1767378235 TSecr=0
70.884.006780	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [ACK] Seq=1 Ack=58 Win=2920 Len=0
71.884.006809	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [FIN, ACK] Seq=1 Ack=58 Win=2920 Len=0
72.884.009248	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [ACK] Seq=58 Ack=2 Win=2920 Len=0 TSval=1767378235 TSecr=0
73.885.009417	192.168.1.12	192.168.1.11	TCP	74	[TCP Port numbers reused] 36070 → 7 [SYN] Seq=0 Win=2920 Len=0 MSS=1460 TS...
74.885.010157	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [SYN, ACK] Seq=0 Ack=1 Win=2920 Len=0
75.885.011427	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [ACK] Seq=1 Ack=1 Win=2920 Len=0 TSval=1767378236 TSecr=0
76.885.012555	192.168.1.12	192.168.1.11	ECHO	122	Request
77.885.013169	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [ACK] Seq=1 Ack=57 Win=2920 Len=0
78.885.014734	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [FIN, PSH, ACK] Seq=57 Ack=1 Win=2920 Len=0 TSval=1767378236 TSecr=0
79.885.015155	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [ACK] Seq=1 Ack=58 Win=2920 Len=0
80.885.015186	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [FIN, ACK] Seq=1 Ack=58 Win=2920 Len=0
81.885.016887	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [ACK] Seq=58 Ack=2 Win=2920 Len=0 TSval=1767378236 TSecr=0
82.886.017017	192.168.1.12	192.168.1.11	TCP	74	[TCP Port numbers reused] 36070 → 7 [SYN] Seq=0 Win=2920 Len=0 MSS=1460 TS...
83.886.017445	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [SYN, ACK] Seq=0 Ack=1 Win=2920 Len=0
84.886.017978	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [ACK] Seq=1 Ack=1 Win=2920 Len=0 TSval=1767378237 TSecr=0
85.886.018301	192.168.1.12	192.168.1.11	ECHO	122	Request
86.886.018441	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [ACK] Seq=1 Ack=57 Win=2920 Len=0
87.886.019544	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [FIN, PSH, ACK] Seq=57 Ack=1 Win=2920 Len=0 TSval=1767378237 TSecr=0
88.886.019686	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [ACK] Seq=1 Ack=58 Win=2920 Len=0
89.886.019705	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [FIN, ACK] Seq=1 Ack=58 Win=2920 Len=0
90.886.021464	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [ACK] Seq=58 Ack=2 Win=2920 Len=0 TSval=1767378237 TSecr=0
91.887.021781	192.168.1.12	192.168.1.11	TCP	74	[TCP Port numbers reused] 36070 → 7 [SYN] Seq=0 Win=2920 Len=0 MSS=1460 TS...
92.887.022374	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [SYN, ACK] Seq=0 Ack=1 Win=2920 Len=0
93.887.023085	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [ACK] Seq=1 Ack=1 Win=2920 Len=0 TSval=1767378238 TSecr=0
94.887.023145	192.168.1.12	192.168.1.11	ECHO	122	Request
95.887.023602	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [ACK] Seq=1 Ack=57 Win=2920 Len=0
96.887.024529	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [FIN, PSH, ACK] Seq=57 Ack=1 Win=2920 Len=0 TSval=1767378238 TSecr=0
97.887.024812	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [ACK] Seq=1 Ack=58 Win=2920 Len=0
98.887.024956	192.168.1.11	192.168.1.12	TCP	54	7 → 36070 [FIN, ACK] Seq=1 Ack=58 Win=2920 Len=0
99.887.027233	192.168.1.12	192.168.1.11	TCP	66	36070 → 7 [ACK] Seq=58 Ack=2 Win=2920 Len=0 TSval=1767378238 TSecr=0

PC2-tabouFrank - PuTTY

```
84 bytes from 192.168.1.11 udp_seq=2 ttl=64 time=1.217 ms
84 bytes from 192.168.1.11 udp_seq=3 ttl=64 time=0.591 ms
84 bytes from 192.168.1.11 udp_seq=4 ttl=64 time=1.742 ms
84 bytes from 192.168.1.11 udp_seq=5 ttl=64 time=2.549 ms

VPCS> ping 192.168.1.11 -3

Connect 7@192.168.1.11 seq=1 ttl=64 time=3.938 ms
SendData 7@192.168.1.11 seq=1 ttl=64 time=4.436 ms
Close 7@192.168.1.11 seq=1 ttl=64 time=5.731 ms
Connect 7@192.168.1.11 seq=2 ttl=64 time=2.265 ms
SendData 7@192.168.1.11 seq=2 ttl=64 time=1.214 ms
Close 7@192.168.1.11 seq=2 ttl=64 time=2.414 ms
Connect 7@192.168.1.11 seq=3 ttl=64 time=2.228 ms
SendData 7@192.168.1.11 seq=3 ttl=64 time=1.182 ms
Close 7@192.168.1.11 seq=3 ttl=64 time=2.196 ms
Connect 7@192.168.1.11 seq=4 ttl=64 time=1.102 ms
SendData 7@192.168.1.11 seq=4 ttl=64 time=1.082 ms
Close 7@192.168.1.11 seq=4 ttl=64 time=2.155 ms
Connect 7@192.168.1.11 seq=5 ttl=64 time=1.196 ms
SendData 7@192.168.1.11 seq=5 ttl=64 time=1.105 ms
Close 7@192.168.1.11 seq=5 ttl=64 time=2.374 ms

VPCS> █
```

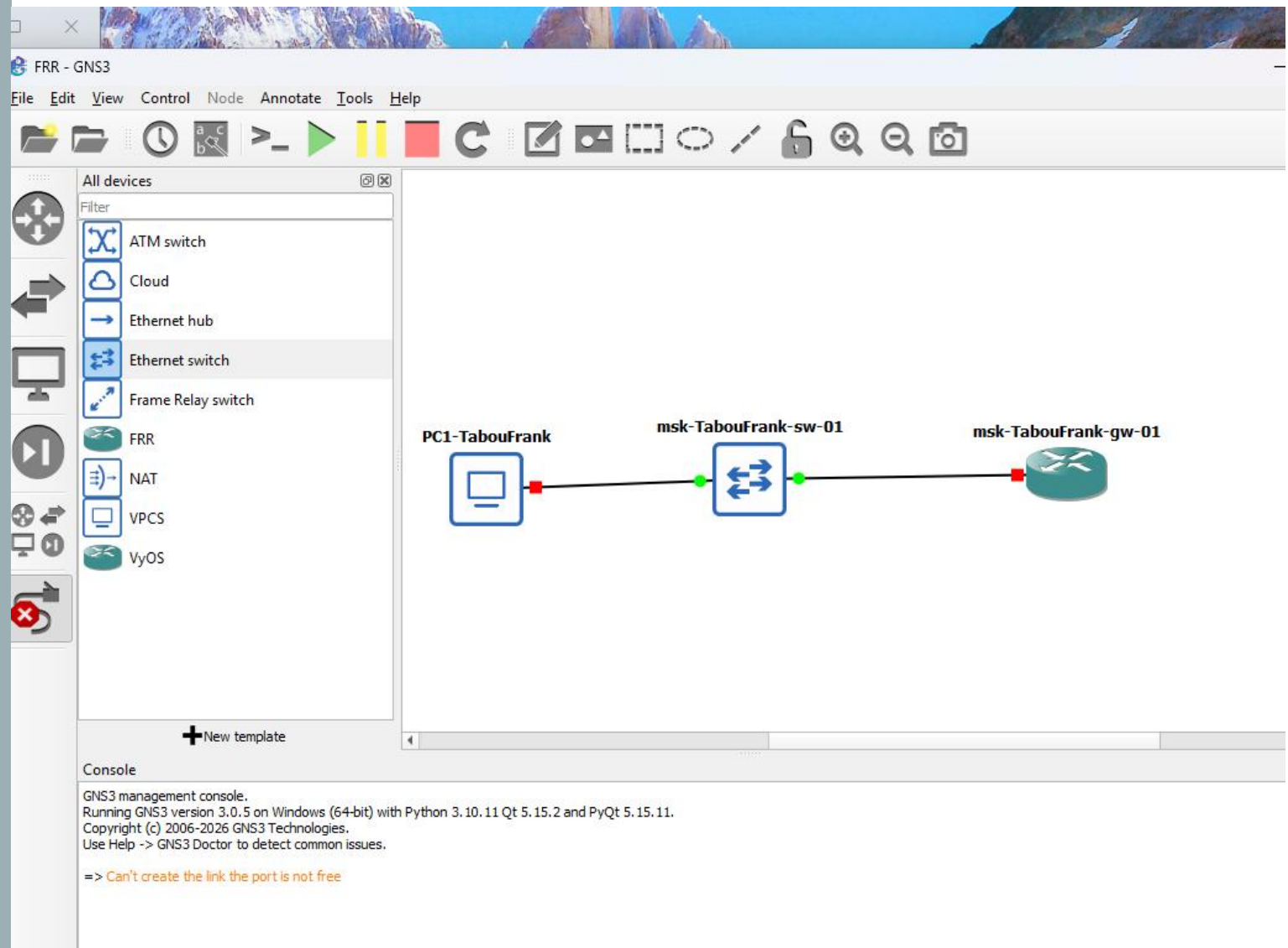
10.11 Qt 5.15.2 and PyQt 5.15.11.

на Discord

Wireshark 4.4.6 (v4.4.6-0-gaebb20483889). Обновления выполняются автоматически.

или захвату | Пакеты отсутствуют | Профили: Default

ВЫПОЛНЕНИЕ
ЛАБОРАТОРНОЙ
РАБОТЫ



ВЫПОЛНЕНИЕ
ЛАБОРАТОРНОЙ
РАБОТЫ

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#
```


ВЫПОЛНЕНИЕ ЛАБОРАТОРНОЙ РАБОТЫ

PCI-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
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> █
```

msk-TabouFrank-gw-01 - PuTTY

```
ts), 62 [ 5.027594] e1000 0000:02:00:00 eth0: (PCI:33MHz:32
0 (00:56 [ 5.042987] e1000 0000:02:00:00 eth0: Intel(R) PRO/
:, Dst [ 5.066957] sd 2:0:0:0: [sdb] Write cache: enabled
v6 n't support DPO or FUA
[ 5.080344] sd 0:0:0:0: [sda] Write cache: enabled
n't support DPO or FUA
[ 5.135779] sdb: sdb1
[ 5.141243] sda: sda1
[ 5.185590] sd 2:0:0:0: [sdb] Attached SCSI disk
[ 5.206889] sd 0:0:0:0: [sda] Attached SCSI disk
[ 5.870035] e1000 0000:02:01:00 eth1: (PCI:33MHz:32
[ 5.876984] e1000 0000:02:01:00 eth1: Intel(R) PRO/
[ 6.644959] e1000 0000:02:02:00 eth2: (PCI:33MHz:32
[ 6.654635] e1000 0000:02:02:00 eth2: Intel(R) PRO/
[ 6.666241] e1000: copybreak disabled
[ 11.802741] EXT4-fs (sda1): mounted filesystem wit
(null)
[ 11.872584] loop: module loaded
[ 11.911722] squashfs: version 4.0 (2009/01/31) Phi
[ 11.938900] ehci_hcd: USB 2.0 'Enhanced' Host Cont
[ 11.987865] uhci_hcd: USB Universal Host Controller
[ 12.008812] ohci_hcd: USB 1.1 'Open' Host Controller (OHCI) Driver
[ 12.022813] usbcore: registered new interface driver usb-storage
█
```

ViOS - GNS3

File Edit View Control Node Annotate Tools Help

All devices

- Filter
- ATM switch
- Cloud
- Ethernet hub
- Ethernet switch
- Frame Relay switch
- FRR
- NAT
- VPCS
- ViOS

+ New template

Console

GNS3 management console.
Running GNS3 version 3.0.5 on Windows (64-bit) with Python 3.10.11 Qt 5.15.2 and PyQt 5.15.11.
Copyright (c) 2006-2026 GNS3 Technologies.
Use Help -> GNS3 Doctor to detect common issues.

=> Can't create the link the port is not free
This node must be started before a console can be opened
Can't create the link the port is not free
This node must be started before a console can be opened
This node must be started before a console can be opened

PC1-TabouFrank msk-TabouFrank-sw-01 msk-TabouFrank-gw-01

Заметки

ВЫПОЛНЕНИЕ ЛАБОРАТОРНОЙ РАБОТЫ

005-lab_datalink-layer-GNS3... 12 / 13 137% +

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

Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты Справка

Изменить фильтр отображения ... <Ctrl-/>

Time	Source	Destination	Protocol	Length	Info
3 45.873599	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ...
4 46.082901	::	ff02::16	ICMPv6	130	Multicast Listener Report Me...
5 46.147339	::	ff02::1:ff7e:0	ICMPv6	86	Neighbor Solicitation for fe...
6 47.172720	fe80::e1f:48ff:fe7e...	ff02::16	ICMPv6	150	Multicast Listener Report Me...
7 47.175893	fe80::e1f:48ff:fe7e...	ff02::16	ICMPv6	90	Multicast Listener Report Me...
8 47.649224	fe80::e1f:48ff:fe7e...	ff02::16	ICMPv6	150	Multicast Listener Report Me...
9 47.680931	fe80::e1f:48ff:fe7e...	ff02::16	ICMPv6	90	Multicast Listener Report Me...
0 49.714559	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ...
1 54.340970	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ...
2 59.801914	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ...
3 67.497571	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ...
4 77.678651	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ...

1: 62 bytes on wire (496 bits), 62 bytes captured (496 bits) on 0
 Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: IPv6m...
 Internet Protocol Version 6, Src: ::, Dst: ff02::2
 Internet Control Message Protocol v6

Standard input: <live capture in progress> | Пакеты: 14 | Профиль: Default

11

3. Измените отображаемые названия устройств в GNS3:
 - msk-user-sw-0x — по принципу msk-user-sw-0x, маршрутизатор — по принципу msk-user-gw-0x, VPCS — по принципу PCx-user, где вместо user укажите имя

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.
 This software is distributed under the terms of the "BSD" licence.
 The source code and license can be found at vpcs.sf.net.
 For more information, please visit wiki.freecode.com.cn.
 If you need help, please visit wiki.freecode.com.cn.

msk-TabouFrank-sw-01

msk-TabouFrank-gw-01

msk-TabouFrank-gw-01 - PuTTY

```

6910] systemd[1]: Inserted module 'autofs4'
1040] systemd[1]: systemd 241 running in system mode. (+PAM +AUDIT +SEL
+APPARMOR +SMACK +SYSVINIT +UTMP +LIBCRYPTSETUP +GCRYPT +GNUTLS +ACL +
+SECCOMP +BLKID +ELFUTILS +RMD -IDN2 -IDN -PCRE2 default-hierarchy=hybr
1344] systemd[1]: Detected virtualization kvm.
1289] systemd[1]: Detected architecture x86-64.
6541] systemd[1]: Set hostname to <vyos>.
5675] hrtimer: interrupt took 3627474 ns
5030] systemd[1]: Created slice system-serial\x2dgetty.slice.
1294] systemd[1]: Listening on udev Kernel Socket.
5024] systemd[1]: Set up automount Arbitrary Executable File Formats Fi
Automount Point.
7719] systemd[1]: Listening on udev Control Socket.
9741] systemd[1]: Listening on Syslog Socket.
5645] systemd[1]: Listening on Journal Socket (/dev/log).
5795] bridge: filtering via arp/ip/ip6tables is no longer available by
Update your scripts to load br_netfilter if you need this.
4239] Bridge firewalling registered
6745] mpls_gso: MPLS GSO support
  
```

welcome to VyOS - vyos tty50

vyos login: []

ВЫПОЛНЕНИЕ
ЛАБОРАТОРНОЙ
РАБОТЫ

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>

ВЫПОЛНЕНИЕ
ЛАБОРАТОРНОЙ
РАБОТЫ

```
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:~$ install image
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#
```


ВЫПОЛНЕНИЕ ЛАБОРАТОРНОЙ РАБОТЫ

No.	Time	Source	Destination	Protocol	Length	Info
78	1076.798883	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xaa2dc025
79	1079.539130	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xaa2dc025
80	1084.394536	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xaa2dc025
81	1094.110077	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xaa2dc025
82	1110.914059	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xaa2dc025
83	1123.391951	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xaa2dc025
84	1441.327429	Private_66:68:00	Broadcast	ARP	64	Who has 192.168.1.1? Tell 192.168.1.10
85	1441.328830	0c:1f:48:7e:00:00	Private_66:68:00	ARP	60	192.168.1.1 is at 0c:1f:48:7e:00:00
86	1441.329743	192.168.1.10	192.168.1.1	ICMP	98	Echo (ping) request id=0x0e20, seq=1/256, ttl=64 (reply in 87)
87	1441.331188	192.168.1.1	192.168.1.10	ICMP	98	Echo (ping) reply id=0x0e20, seq=1/256, ttl=64 (request in 86)
88	1442.332965	192.168.1.10	192.168.1.1	ICMP	98	Echo (ping) request id=0x0f20, seq=2/512, ttl=64 (reply in 89)
89	1442.335615	192.168.1.1	192.168.1.10	ICMP	98	Echo (ping) reply id=0x0f20, seq=2/512, ttl=64 (request in 88)
90	1443.337674	192.168.1.10	192.168.1.1	ICMP	98	Echo (ping) request id=0x1020, seq=3/768, ttl=64 (reply in 91)
91	1443.340016	192.168.1.1	192.168.1.10	ICMP	98	Echo (ping) reply id=0x1020, seq=3/768, ttl=64 (request in 90)
92	1444.341430	192.168.1.10	192.168.1.1	ICMP	98	Echo (ping) request id=0x1120, seq=4/1024, ttl=64 (reply in 93)
93	1444.343427	192.168.1.1	192.168.1.10	ICMP	98	Echo (ping) reply id=0x1120, seq=4/1024, ttl=64 (request in 92)
94	1445.345490	192.168.1.10	192.168.1.1	ICMP	98	Echo (ping) request id=0x1220, seq=5/1280, ttl=64 (reply in 95)
95	1445.346456	192.168.1.1	192.168.1.10	ICMP	98	Echo (ping) reply id=0x1220, seq=5/1280, ttl=64 (request in 94)
96	1446.370091	0c:1f:48:7e:00:00	Private_66:68:00	ARP	60	Who has 192.168.1.10? Tell 192.168.1.1
97	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]
[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)

```
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> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=1.027 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=3.797 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=2.925 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=2.562 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=1.362 ms
```

0000 ff ff ff ff ff 0c 1f 48 7e 00 00 00 00 00 00
0010 01 48 00 00 00 00 11 39 96 00 00 00 00 ff ff
0020 ff ff 00 44 00 43 01 34 8f 06 01 01 06 00 a8 55
0030 41 09 00 16 00 00 00 00 00 00 00 00 00 00 00
0040 00 00 00 00 00 0c 1f 48 7e 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 63 82 53 63 35 01 01 32 04 0a
0120 00 02 0f 0c 04 76 79 6f 73 37 07 01 1c 03 06 79
0130 0f 1a ff 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

Frame Number (frame.number) | Пакеты: 97 | Профили: Default

ВЫВОДЫ

В процессе выполнения данной лабораторной работы я построил простейшие модели сети на базе коммутатора и маршрутизатора VyOS в GNS3, проанализировал трафик посредством Wireshark.