

# Лабораторная работа №7

## Настройка DHCP для IPv4 и IPv6

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## Цель работы

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## Основная цель

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Получить практические навыки настройки DHCP  
для IPv4 и IPv6 на маршрутизаторе VyOS.

## Настройка IPv4

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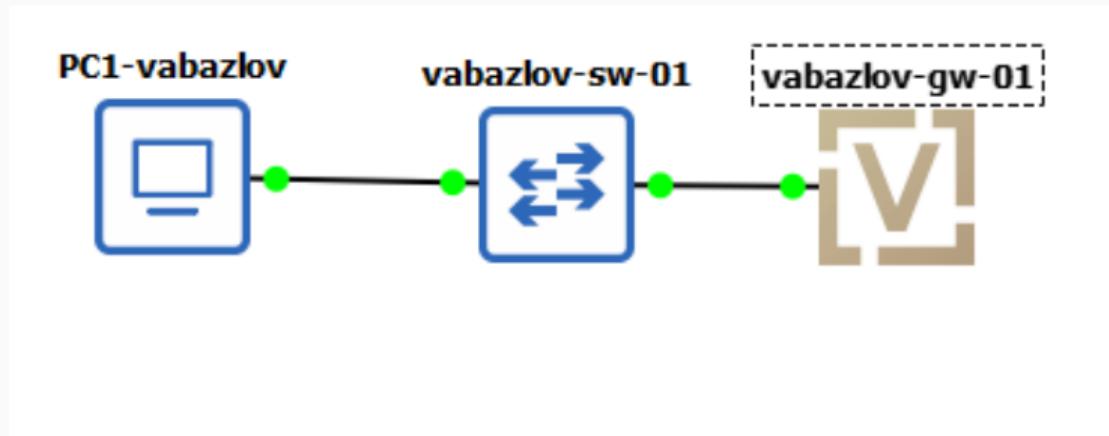
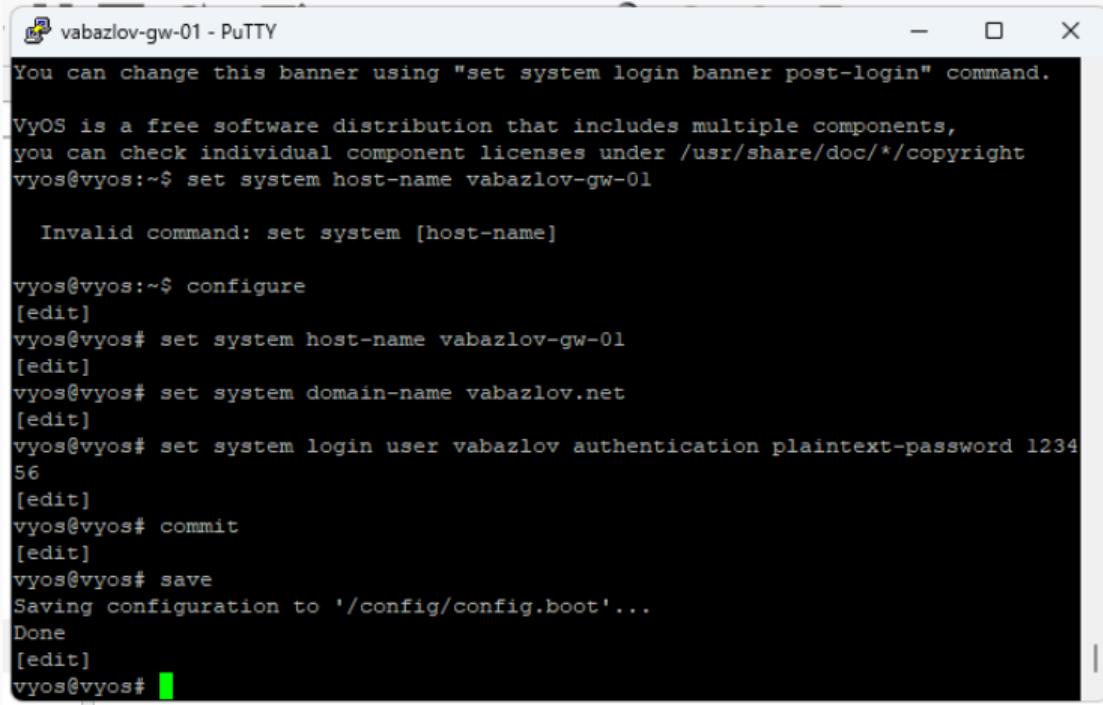


Рис. 1: Топология сети

## Конфигурация маршрутизатора



The screenshot shows a PuTTY terminal window titled "vabazlov-gw-01 - PuTTY". The session banner indicates that the user can change the banner using the command "set system login banner post-login". The terminal displays the configuration process for a VyOS router:

```
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:~$ set system host-name vabazlov-gw-01

    Invalid command: set system [host-name]

vyos@vyos:~$ configure
[edit]
vyos@vyos# set system host-name vabazlov-gw-01
[edit]
vyos@vyos# set system domain-name vabazlov.net
[edit]
vyos@vyos# set system login user vabazlov authentication plaintext-password 1234
56
[edit]
vyos@vyos# commit
[edit]
vyos@vyos# save
Saving configuration to '/config/config.boot'...
Done
[edit]
vyos@vyos#
```

Рис. 2: Системные параметры

## DHCP-сервер IPv4

```
[edit]
vabazlov@vabazlov-gw-01# set interfaces ethernet eth0 address 10.0.0.1/24
[edit]
vabazlov@vabazlov-gw-01# set service dhcp-server shared-network-name vabazlov do
ma
domain-name      domain-search
[edit]
vabazlov@vabazlov-gw-01# set service dhcp-server shared-network-name vabazlov do
main-name vabazlov.net
[edit]
vabazlov@vabazlov-gw-01# set service dhcp-server shared-network-name vabazlov na
me-server 10.0.0.1
[edit]
vabazlov@vabazlov-gw-01# set service dhcp-server shared-network-name vabazlov su
bnet 10.0.0.0/24 f=def

    Configuration path: service dhcp-server shared-network-name vabazlov subnet 10
.0.0.0/24 [f] is not valid

[edit]
vabazlov@vabazlov-gw-01# set service dhcp-server shared-network-name vabazlov su
bnet 10.0.0.0/24 default-router 10.0.0.1
[edit]
vabazlov@vabazlov-gw-01# set service dhcp-server shared-network-name vabazlov su
```

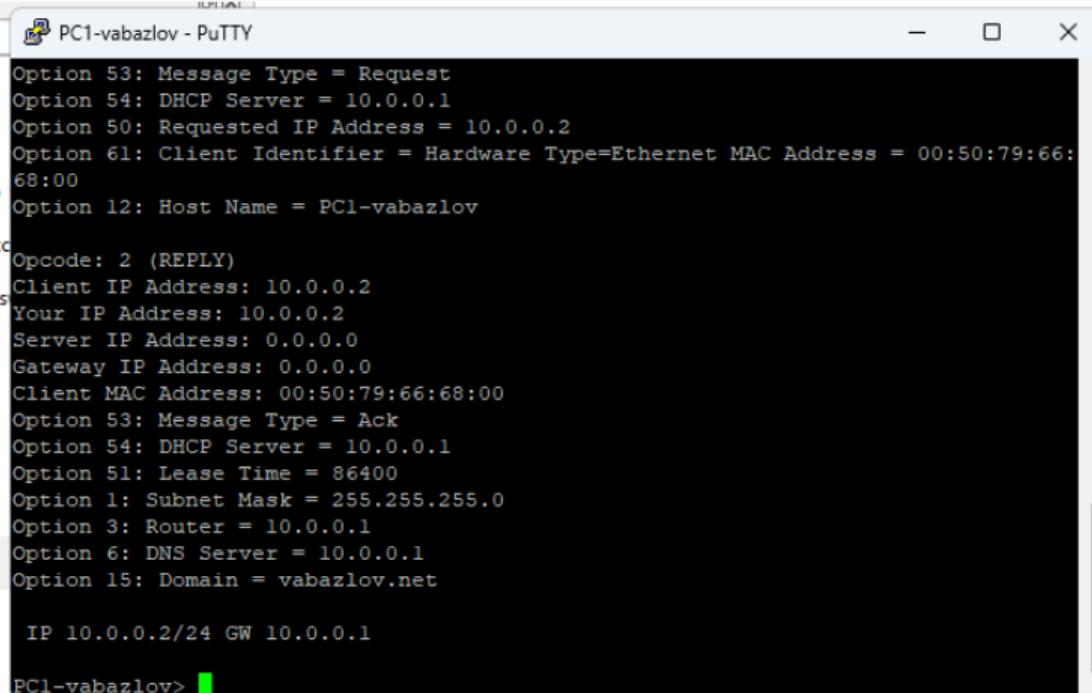
Рис. 3: Настройка DHCP IPv4

## Проверка работы DHCP

```
exit
vabazlov@vabazlov-gw-01:~$ show dhcp server statistics
Pool      Size     Leases   Available   Usage
-----  -----  -----
vabazlov    252        0       252   0%
vabazlov@vabazlov-gw-01:~$ show dhcp server leases
IP address   Hardware address   State   Lease start   Lease expiration   Re
maining   Pool   Hostname
-----  -----  -----
vabazlov@vabazlov-gw-01:~$
```

Рис. 4: DHCP статистика

## Адресация PC1



```
PC1-vabazlov - PuTTY
Option 53: Message Type = Request
Option 54: DHCP Server = 10.0.0.1
Option 50: Requested IP Address = 10.0.0.2
Option 61: Client Identifier = Hardware Type=Ethernet MAC Address = 00:50:79:66:68:00
Option 12: Host Name = PC1-vabazlov

Opcode: 2 (REPLY)
Client IP Address: 10.0.0.2
Your IP Address: 10.0.0.2
Server IP Address: 0.0.0.0
Gateway IP Address: 0.0.0.0
Client MAC Address: 00:50:79:66:68:00
Option 53: Message Type = Ack
Option 54: DHCP Server = 10.0.0.1
Option 51: Lease Time = 86400
Option 1: Subnet Mask = 255.255.255.0
Option 3: Router = 10.0.0.1
Option 6: DNS Server = 10.0.0.1
Option 15: Domain = vabazlov.net

IP 10.0.0.2/24 GW 10.0.0.1

PC1-vabazlov>
```

Рис. 5: Выдача адреса PC1

## Проверка связности

```
PC1-vabazlov> save
Saving startup configuration to startup.vpc
. done

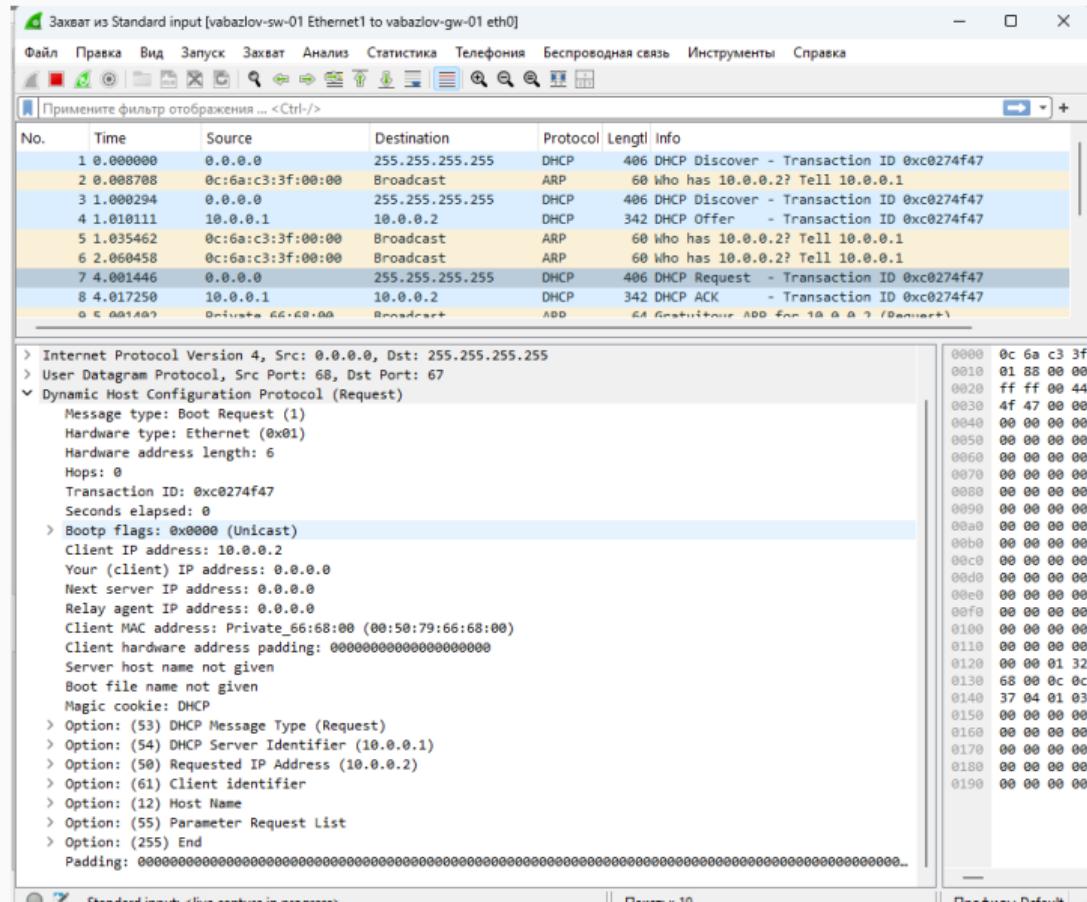
PC1-vabazlov> show ip

NAME      : PC1-vabazlov[1]
IP/MASK   : 10.0.0.2/24
GATEWAY   : 10.0.0.1
DNS       : 10.0.0.1
DHCP SERVER : 10.0.0.1
DHCP LEASE  : 86380, 86400/43200/75600
DOMAIN NAME : vabazlov.net
MAC        : 00:50:79:66:68:00
LPORT      : 10004
RHOST:PORT : 127.0.0.1:10005
MTU       : 1500

PC1-vabazlov> ping 10.0.0.1 -c 2
84 bytes from 10.0.0.1 icmp_seq=1 ttl=64 time=2.515 ms
84 bytes from 10.0.0.1 icmp_seq=2 ttl=64 time=0.902 ms

PC1-vabazlov>
```

## Журнал DHCP и анализ трафика



## Настройка IPv6 Stateless

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## Расширенная топология

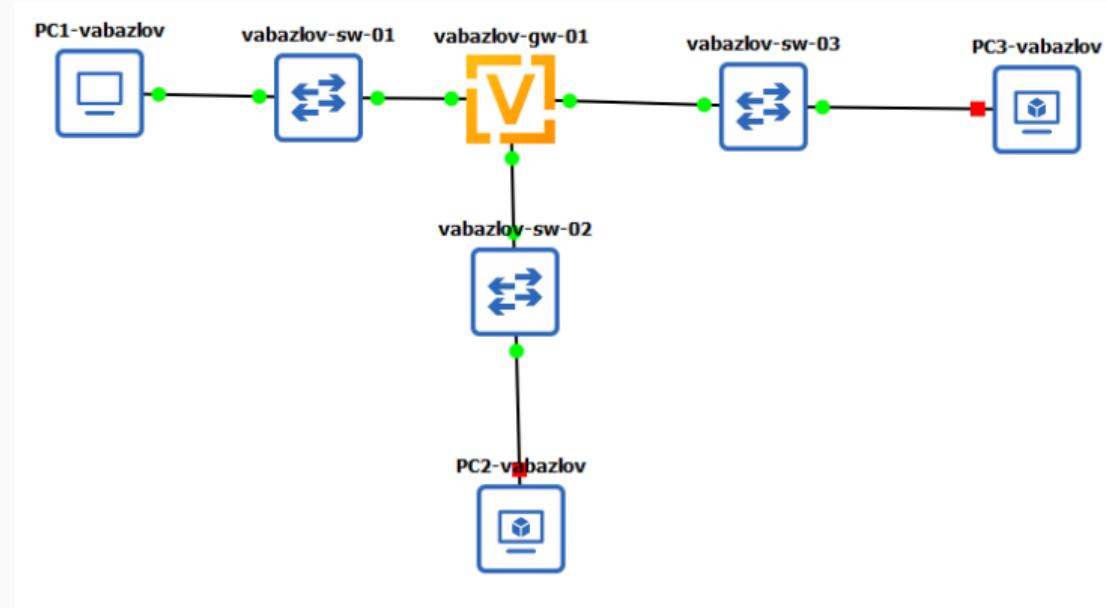
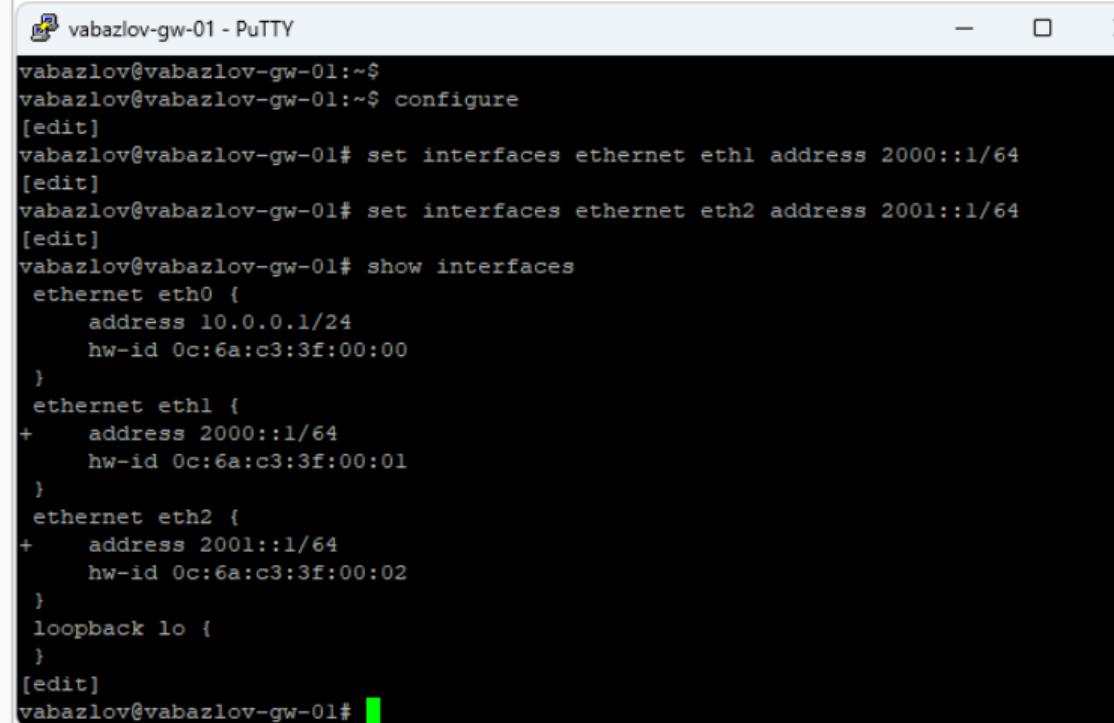


Рис. 8: Топология сети

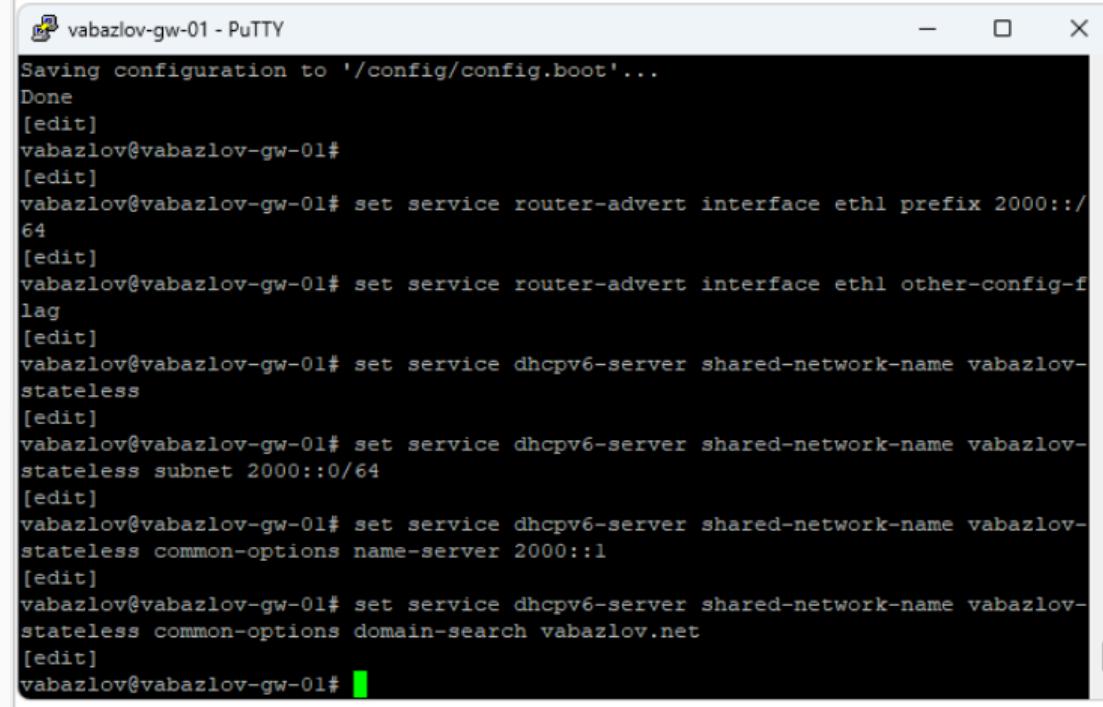
## IPv6-адреса маршрутизатора



```
vabazlov@vabazlov-gw-01:~$ configure
[edit]
vabazlov@vabazlov-gw-01# set interfaces ethernet eth1 address 2000::1/64
[edit]
vabazlov@vabazlov-gw-01# set interfaces ethernet eth2 address 2001::1/64
[edit]
vabazlov@vabazlov-gw-01# show interfaces
ethernet eth0 {
    address 10.0.0.1/24
    hw-id 0c:6a:c3:3f:00:00
}
ethernet eth1 {
+    address 2000::1/64
    hw-id 0c:6a:c3:3f:00:01
}
ethernet eth2 {
+    address 2001::1/64
    hw-id 0c:6a:c3:3f:00:02
}
loopback lo {
}
[edit]
vabazlov@vabazlov-gw-01#
```

Рис. 9: Интерфейсы IPv6

## Router Advertisements и DHCPv6 Stateless



```
vabazlov-gw-01 - PuTTY
Saving configuration to '/config/config.boot'...
Done
[edit]
vabazlov@vabazlov-gw-01#
[edit]
vabazlov@vabazlov-gw-01# set service router-advert interface eth1 prefix 2000::/
64
[edit]
vabazlov@vabazlov-gw-01# set service router-advert interface eth1 other-config-f
lag
[edit]
vabazlov@vabazlov-gw-01# set service dhcipv6-server shared-network-name vabazlov-
stateless
[edit]
vabazlov@vabazlov-gw-01# set service dhcipv6-server shared-network-name vabazlov-
stateless subnet 2000::0/64
[edit]
vabazlov@vabazlov-gw-01# set service dhcipv6-server shared-network-name vabazlov-
stateless common-options name-server 2000::1
[edit]
vabazlov@vabazlov-gw-01# set service dhcipv6-server shared-network-name vabazlov-
stateless common-options domain-search vabazlov.net
[edit]
vabazlov@vabazlov-gw-01#
```

Рис. 10: DHCPv6 Stateless

## Конфигурация RA и DHCPv6

```
vabazlov-gw-01 - PuTTY
stop 10.0.0.253
    }
}
}

dhcpv6-server {
    shared-network-name vabazlov-stateless {
        common-options {
            domain-search vabazlov.net
            name-server 2000::1
        }
        subnet 2000::0/64 {
        }
    }
}
router-advert {
    interface eth1 {
        other-config-flag
        prefix 2000::/64 {
        }
    }
}
ssh {
```

Рис. 11: Конфиг VyOS

## Адресация PC2

```
inet6 2000::c469:7891:6358:745c  prefixlen 64  scopeid 0x0<global>
inet6 fe80::7bb4:7290:6915:8bf  prefixlen 64  scopeid 0x20<link>
  ether 0c:6c:f8:55:00:00  txqueuelen 1000  (Ethernet)
    RX packets 5 bytes 570 (570.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 25 bytes 3976 (3.8 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Floppy Disk

```
(kali㉿kali)-[~]
└─$ route -n -A inet6
Kernel IPv6 routing table
```

Destination	Next Hop	Flag	Met	Ref	Use	If
:: 1/128	::	U	256	2	0	lo
2000::/64	::	U	100	1	0	eth0
fe80::/64	::	U	100	1	0	eth0
::/0	fe80::e6a:c3ff:fe3f:1	UG	100	1	0	eth0
:: 1/128	::	Un	0	4	0	lo
2000::c469:7891:6358:745c/128	::	Un	0	2	0	eth0
fe80::7bb4:7290:6915:8bf/128	::	Un	0	3	0	eth0
ff00::/8	::	U	256	3	0	eth0
::/0	::	!n	-1	1	0	lo

```
(kali㉿kali)-[~]
└─$ ping 2000::1 -c 2
```

```
PING 2000::1(2000::1) 56 data bytes
64 bytes from 2000::1: icmp_seq=1 ttl=64 time=4.08 ms
64 bytes from 2000::1: icmp_seq=2 ttl=64 time=4.94 ms

--- 2000::1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 4.076/4.507/4.938/0.431 ms
```

```
(kali㉿kali)-[~]
└─$ cat /etc/resolv.conf
# Generated by NetworkManager
search vabazlov.net
nameserver 2000::1
```

## DHCPv6 Stateless – запрос параметров

```
(kali㉿kali)-[~]
└─$ sudo dhclient -6 -S -v eth0
Internet Systems Consortium DHCP Client 4.4.1
Copyright 2004-2018 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/

Listening on Socket/eth0
Sending on Socket/eth0
Created duid "\000\003\000\001\014l\370U\000\000".
PRC: Requesting information (INIT).
XMT: Forming Info-Request, 0 ms elapsed.
XMT: Info-Request on eth0, interval 930ms.
RCV: Reply message on eth0 from fe80::e6a:c3ff:fe3f:1.
PRC: Done.

(kali㉿kali)-[~]
└─$ ping 2000::1 -c 2
PING 2000::1(2000::1) 56 data bytes
64 bytes from 2000::1: icmp_seq=1 ttl=64 time=1.55 ms
64 bytes from 2000::1: icmp_seq=2 ttl=64 time=2.83 ms

--- 2000::1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 1.548/2.190/2.833/0.642 ms

(kali㉿kali)-[~]
└─$ cat /etc/resolv.conf
search vabazlov.net.
nameserver 2000::1

(kali㉿kali)-[~]
└─$ █
```

## DHCPv6 leases

```
]
[edit]
vabazlov@vabazlov-gw-01# run show dhcpv6 server leases
IPv6 address      State      Last communication      Lease expiration      Remaining
Type    Pool      IAID_DUID
-----  -----  -----
-----  -----  -----
[edit]
vabazlov@vabazlov-gw-01#
```

Рис. 14: DHCPv6 leases Stateless

# Анализ DHCPv6 Stateless

Захват из Standard input [vabazov-gw-01 eth1 to vabazov-sw-02 Ethernet1]

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

Приимните фильтр отображения ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
12	1.819045	fe80::e6a:c3ff:fe3f.. fe80::7bb4:7290:691..	ICMPv6	118	Router Advertisement from 0c:6a:c3:3f:00:01	
13	1.820790	fe80::7bb4:7290:691.. ff02::1:2	DHCPv6	106	Information-request XID: 0x67e38d CID: 0004116e400a239d38b6804388443c8eb22c	
14	1.826156	fe80::e6a:c3ff:fe3f.. fe80::7bb4:7290:691..	DHCPv6	144	Reply XID: 0x67e38d CID: 0004116e400a239d38b6804388443c8eb22c	
15	1.834766	fe80::7bb4:7290:691.. ff02::1:16	ICMPv6	110	Multicast Listener Report Message v2	
16	2.059289	:: ff02::1:ff58:745c	ICMPv6	86	Neighbor Solicitation for 2000::c469:7891:6358:745c	
17	2.725851	0.0.0.0 255.255.255.255	DHCP	324	DHCP Discover - Transaction ID 0xb426e4ba	
18	2.744757	fe80::7bb4:7290:691.. ff02::1:2	DHCPv6	106	Information-request XID: 0x67e38d CID: 0004116e400a239d38b6804388443c8eb22c	
19	2.746327	fe80::e6a:c3ff:fe3f.. fe80::7bb4:7290:691..	DHCPv6	144	Reply XID: 0x67e38d CID: 0004116e400a239d38b6804388443c8eb22c	
20	2.783125	fe80::7bb4:7290:691.. ff02::1:16	ICMPv6	110	Multicast Listener Report Message v2	
21	2.834608	fe80::7bb4:7290:691.. ff02::1:16	ICMPv6	110	Multicast Listener Report Message v2	
22	3.102995	fe80::7bb4:7290:691.. ff02::1:16	ICMPv6	110	Multicast Listener Report Message v2	

> Frame 18: 106 bytes on wire (848 bits), 106 bytes captured (848 bits) on interface -, id 0  
> Ethernet II, Src: 0c:6c:f8:55:00:00 (0c:6c:f8:55:00:00), Dst: IPv6mcast\_01:00:02 (33:33:00:01:00:02)  
> Internet Protocol Version 6, Src: fe80::7bb4:7290:6915:8bf, Dst: ff02::1:2  
> User Datagram Protocol, Src Port: 546, Dst Port: 547

▼ DHCPv6

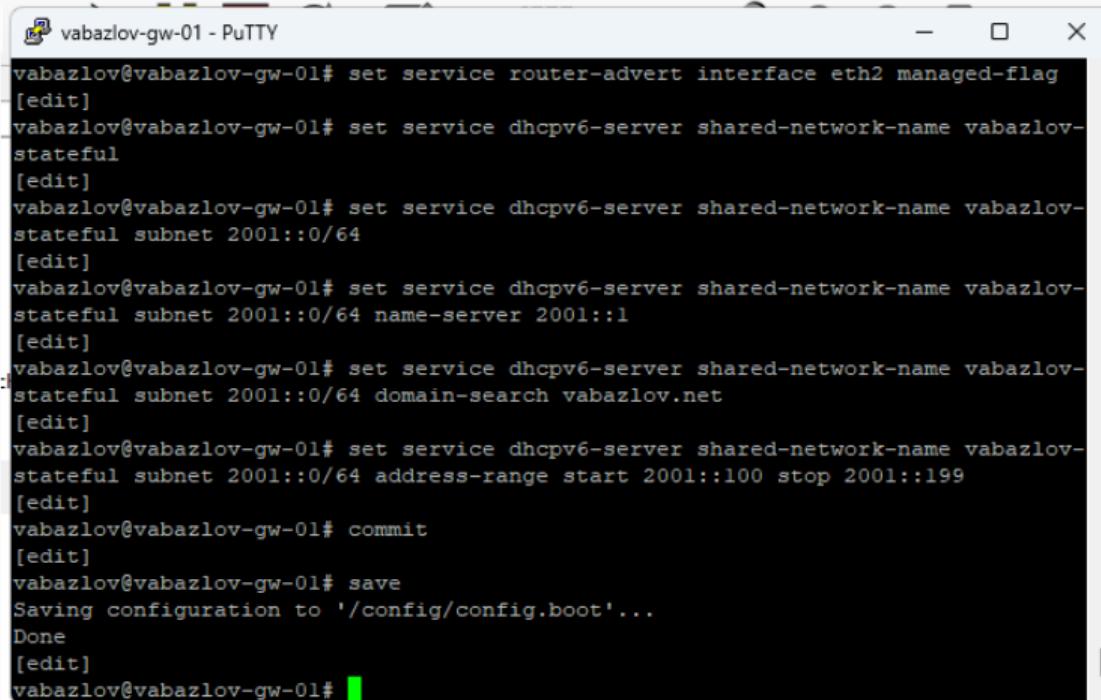
- Message type: Information-request (11)
- Transaction ID: 0x67e38d
- ▼ Option Request
  - Option: Option Request (6)
  - Length: 8
  - Requested Option code: DNS recursive name server (23)
  - Requested Option code: Domain Search List (24)
  - Requested Option code: NTP Server (56)
  - Requested Option code: Simple Network Time Protocol Server (31)
- ▼ Client Identifier
  - Option: Client Identifier (1)
  - Length: 18
  - DUID: 0004116e400a239d38b6804388443c8eb22c
  - DUID Type: Universally Unique Identifier (UUID) (4)
  - UUID: 116e400a239d38b6804388443c8eb22c
- ▼ Elapsed time
  - Option: Elapsed time (8)
  - Length: 2
  - Elapsed time: 920ms

0000	33 33 00 01 00
0010	a5 d3 00 34 11
0020	72 90 69 15 08
0030	00 00 00 01 00
0040	e3 8d 00 00 00
0050	00 12 00 04 11
0060	3c 8e b2 2c 00

## Настройка IPv6 Stateful

---

## DHCPv6 Stateful – конфигурация маршрутизатора



vabazlov@vabazlov-gw-01 - PuTTY

```
vabazlov@vabazlov-gw-01# set service router-advert interface eth2 managed-flag
[edit]
vabazlov@vabazlov-gw-01# set service dhcpcsv6-server shared-network-name vabazlov-
stateful
[edit]
vabazlov@vabazlov-gw-01# set service dhcpcsv6-server shared-network-name vabazlov-
stateful subnet 2001::0/64
[edit]
vabazlov@vabazlov-gw-01# set service dhcpcsv6-server shared-network-name vabazlov-
stateful subnet 2001::0/64 name-server 2001::1
[edit]
vabazlov@vabazlov-gw-01# set service dhcpcsv6-server shared-network-name vabazlov-
stateful subnet 2001::0/64 domain-search vabazlov.net
[edit]
vabazlov@vabazlov-gw-01# set service dhcpcsv6-server shared-network-name vabazlov-
stateful subnet 2001::0/64 address-range start 2001::100 stop 2001::199
[edit]
vabazlov@vabazlov-gw-01# commit
[edit]
vabazlov@vabazlov-gw-01# save
Saving configuration to '/config/config.boot'...
Done
[edit]
vabazlov@vabazlov-gw-01#
```

Рис. 16: DHCPv6 Stateful настройки

# Адресация PC3 (SLAAC)

```
(kali㉿kali)-[~]
└─$ ifconfig eth0
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet6 2001::198  prefixlen 128  scopeid 0x0<global>
      inet6 fe80::2604:37e6:7585:1aa4  prefixlen 64  scopeid 0x20<link>
        ether 0c:22:8e:c0:00:00  txqueuelen 1000 (Ethernet)
          RX packets 5 bytes 626 (626.0 B)
          RX errors 0 dropped 0 overruns 0 frame 0
          TX packets 25 bytes 3824 (3.7 KiB)
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

Floppy D

(kali㉿kali)-[~]
└─$ route -n -A inet6
Kernel IPv6 routing table
Destination           Next Hop            Flag Met Ref Use If
::1/128              ::                  U    256 2   0 lo
2001::198/128         ::                  U    100 1   0 eth0
fe80::/64             ::                  U    100 1   0 eth0
::/0                  fe80::e6a:c3ff:fe3f:2  UG   100 1   0 eth0
::1/128              ::                  Un   0   4   0 lo
2001::198/128         ::                  Un   0   2   0 eth0
fe80::2604:37e6:7585:1aa4/128 ::                  Un   0   3   0 eth0
ff00::/8              ::                  U    256 3   0 eth0
::/0                  ::                  !n  -1   1   0 lo
```

```
(kali㉿kali)-[~]
└─$ cat /etc/resolv.conf
# Generated by NetworkManager
search vabazlov.net
nameserver 2001::1
```

```
(kali㉿kali)-[~]
└─$ █
```

## DHCPv6 Stateful – получение адреса

```
[kali㉿kali: ~] $ sudo dhclient -6 -v eth0
Internet Systems Consortium DHCP Client 4.4.1
Copyright 2004-2018 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/

Listening on Socket/eth0
Sending on  Socket/eth0
Created duid "\000\001\000\0010\274\"376\014\"216\300\000\000".
PRC: Soliciting for leases (INIT).
XMT: Forming Solicit, 0 ms elapsed.
XMT: X-- IA_NA 8e:c0:00:00
XMT: | X-- Request renew in +3600
XMT: | X-- Request rebind in +5400
XMT: Solicit on eth0, interval 1010ms.
RCV: Advertise message on eth0 from fe80::e6a:c3ff:fe3f:2.
RCV: X-- IA_NA 8e:c0:00:00
RCV: | X-- starts 1764320895
RCV: | X-- t1 - renew +0
RCV: | X-- t2 - rebind +0
RCV: | X-- [Options]
RCV: | | X-- IAADDR 2001::199
RCV: | | X-- Preferred lifetime 27000.
RCV: | | X-- Max lifetime 43200.
RCV: | X-- Server ID: 00:01:00:01:30:bc:1f:a7:0c:6a:c3:3f:00:01
RCV: Advertisement recorded.
PRC: Selecting best advertised lease.
PRC: Considering best lease.
PRC: X-- Initial candidate 00:01:00:01:30:bc:1f:a7:0c:6a:c3:3f:00:01 (s: 10105, p: 0).
XMT: Forming Request, 0 ms elapsed.
XMT: X-- IA_NA 8e:c0:00:00
XMT: | X-- Requested renew +3600
XMT: | X-- Requested rebind +5400
XMT: | | X-- IAADDR 2001::199
XMT: | | X-- Preferred lifetime +7200
XMT: | | X-- Max lifetime +7500
XMT: V IA_NA appended.
XMT: Request on eth0, interval 1040ms.
RCV: Reply message on eth0 from fe80::e6a:c3ff:fe3f:2.
RCV: X-- IA_NA 8e:c0:00:00
```

# Проверка настроек PC3

```
└$ ifconfig eth0
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet6 2001::199  prefixlen 128  scopeid 0x0<global>
      inet6 2001::198  prefixlen 128  scopeid 0x0<global>
      inet6 fe80::2604:37e6%1:1aa4  prefixlen 64  scopeid 0x20<link>
        ether 0c:22:8e:c0:00:00  txqueuelen 1000  (Ethernet)
          RX packets 9  bytes 1158 (1.1 KiB)
          RX errors 0  dropped 0  overruns 0  frame 0
          TX packets 33  bytes 4940 (4.8 KiB)
          TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0
```

```
└(kali㉿kali)-[~]
└$ route -n -A inet6
Kernel IPv6 routing table
Destination           Next Hop            Flag Met Ref Use If
::1/128              ::                  U    256 2   0 lo
2001::198/128         ::                  U    100 2   0 eth0
2001::199/128         ::                  U    256 1   0 eth0
fe80::/64             ::                  U    100 1   0 eth0
::/0                  fe80:::e6a:c3ff:fe3f:2  UG   100 1   0 eth0
::1/128              ::                  Un   0   4   0 lo
2001::198/128         ::                  Un   0   3   0 eth0
2001::199/128         ::                  Un   0   2   0 eth0
fe80::2604:37e6%1:1aa4/128  ::                  Un   0   3   0 eth0
ff00::/8              ::                  U    256 3   0 eth0
::/0                  ::                  !n   -1   1   0 lo
```

```
└(kali㉿kali)-[~]
└$ ping 2001::1 -c 2
PING 2001::1(2001::1) 56 data bytes
64 bytes from 2001::1: icmp_seq=1 ttl=64 time=2.07 ms
64 bytes from 2001::1: icmp_seq=2 ttl=64 time=3.15 ms

--- 2001::1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 2.074/2.610/3.146/0.536 ms
```

```
└(kali㉿kali)-[~]
└$ cat /etc/resolv.conf
search vabazlov.net.
nameserver 2001::1
```

## DHCPv6 Stateful – leases

```
[edit]
vabazlov@vabazlov-gw-01# run show dhcpv6 server leases
IPv6 address      State    Last communication    Lease expiration    Remaining
Type             Pool          IAID_DUID
-----  -----  -----
-----  -----
2001::198        active   2025/11/28 09:05:50  2025/11/28 21:05:50  11:56:33
non-temporary    vabazlov-stateful  35:67:50:2b:00:04:eb:7a:5a:2a:10:92:f8:4f:18:
a8:66:6a:0f:54:07:76
2001::199        active   2025/11/28 09:08:14   2025/11/28 11:13:14  2:03:57
non-temporary    vabazlov-stateful  00:00:c0:8e:00:01:00:01:30:bc:22:fe:0c:22:8e:
c0:00:00
[edit]
vabazlov@vabazlov-gw-01#
```

Рис. 20: DHCPv6 leases Stateful

# Анализ DHCPv6 Stateful

Захват из Standard input [vabazlov-gw-01 eth2 to vabazlov-sw-03 Ethernet1]

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

Приложите фильтр отображения ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
29	31.666574	0.0.0.0	255.255.255.255	DHCP	324	DHCP Discover - Transaction ID 0xa417ab97
30	64.274210	0.0.0.0	255.255.255.255	DHCP	324	DHCP Discover - Transaction ID 0x3f1b0708
31	128.284298	0.0.0.0	255.255.255.255	DHCP	324	DHCP Discover - Transaction ID 0x275882f6
32	146.731120	fe80::2604:37e6:758.. ff02::1:12	fe80::2604:37e6:758..	DHCPv6	118	Solicit XID: 0xde1b73 CID: 0001000130bc22fe0c228ec00000
33	146.731068	fe80:::6a:c3ff:fe3f.. fe80::2604:37e6:758..	fe80:::6a:c3ff:fe3f.. fe80::2604:37e6:758..	DHCPv6	184	Advertise XID: 0xde1b73 IAA: 2001:1:199 CID: 0001000130bc22fe0c228ec00000
34	147.732628	fe80::2604:37e6:758.. ff02::1:12	fe80::2604:37e6:758.. ff02::1:12	DHCPv6	164	Request XID: 0x5f6f12 CID: 0001000130bc22fe0c228ec00000 IAA: 2001:1:199
35	147.733492	fe80:::6a:c3ff:fe3f.. fe80::2604:37e6:758..	fe80:::6a:c3ff:fe3f.. fe80::2604:37e6:758..	DHCPv6	184	Reply XID: 0x5f6f12 IAA: 2001:1:199 CID: 0001000130bc22fe0c228ec00000
36	147.755324	fe80::2604:37e6:758.. ff02::1:16	fe80::2604:37e6:758.. ff02::1:16	ICMPv6	138	Multicast Listener Report Message v2
37	148.036108	:: ff02::1:ff00:199	ff02::1:ff00:199	ICMPv6	86	Neighbor Solicitation for 2001:1:199
38	148.163795	fe80::2604:37e6:758.. ff02::1:16	fe80::2604:37e6:758.. ff02::1:16	ICMPv6	138	Multicast Listener Report Message v2
39	152.225724	fe80:::6a:c3ff:fe3f.. fe80::2604:37e6:758..	fe80:::6a:c3ff:fe3f.. fe80::2604:37e6:758..	ICMPv6	86	Neighbor Solicitation for fe80::2604:37e6:7585:1aa4 from 0c:6a:c3:3f:00:02

> Frame 34: 164 bytes on wire (1312 bits), 164 bytes captured (1312 bits) on interface -, id 0  
> Ethernet II, Src: 0c:22:8e:c0:00:00 (0c:22:8e:c0:00:00), Dst: IPv6mcast\_01:00:02 (33:33:00:01:00:02)  
> Internet Protocol Version 6, Src: fe80::2604:37e6:7585:1aa4, Dst: ff02::1:2  
> User Datagram Protocol, Src Port: 546, Dst Port: 547  
    DHCPv6  
        Message type: Request (3)  
        Transaction ID: 0x5f6f12  
        Client Identifier  
            Option: Client Identifier (1)  
            Length: 14  
            DUID: 0001000130bc22fe0c228ec00000  
            DUID Type: link-layer address plus time (1)  
            Hardware type: Ethernet (1)  
            DUID Time: Nov 28, 2025 12:08:14.0000000000 RTZ 2 (зима)  
            Link-layer address: 0c:22:8e:c0:00:00  
            Link-layer address (Ethernet): 0c:22:8e:c0:00:00 (0c:22:8e:c0:00:00)  
        Server Identifier  
            Option: Server Identifier (2)  
            Length: 14  
            DUID: 0001000130bc1fa70c6ac33f0001  
            DUID Type: link-layer address plus time (1)  
            Hardware type: Ethernet (1)  
            DUID Time: Nov 28, 2025 11:53:59.0000000000 RTZ 2 (зима)  
            Link-layer address: 0c:6a:c3:3f:00:01  
            Link-layer address (Ethernet): 0c:6a:c3:3f:00:01 (0c:6a:c3:3f:00:01)  
        Option Request  
            Option: Option Request (6)  
            Length: 8  
            Requested Option code: DNS recursive name server (23)  
            Requested Option code: Domain Search List (24)  
            Requested Option code: Client Fully Qualified Domain Name (39)

Standard input: <live capture in progress> || Пакеты: 53 || Профили: Default

## Итоги работы

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## Выводы

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- Настроена сеть с поддержкой IPv4 и IPv6
- Реализованы DHCP, DHCPv6 Stateless и DHCPv6 Stateful
- Проверена автонастройка IPv6 через RA и DHCPv6
- Выполнен анализ DHCP-трафика для обеих версий протокола
- Подтверждена корректная работа распределения адресов в сети