

Сетевые технологии

Настройка DHCP, DHCPv6, SLAAC и IPv6 в GNS3

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Цель работы

Основная цель

Получить навыки настройки DHCP, DHCPv6 Stateless и Stateful, SLAAC и IPv6-адресации в виртуальной среде GNS3.

Выполнение работы

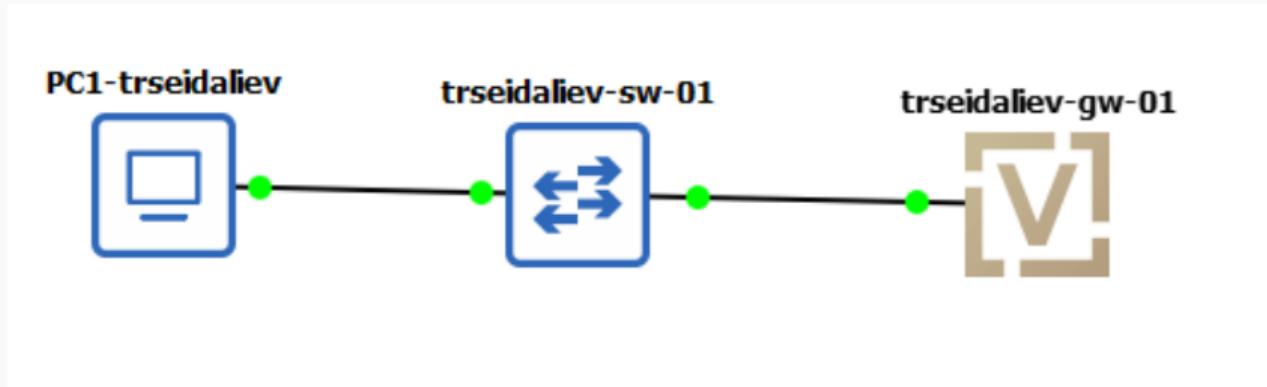
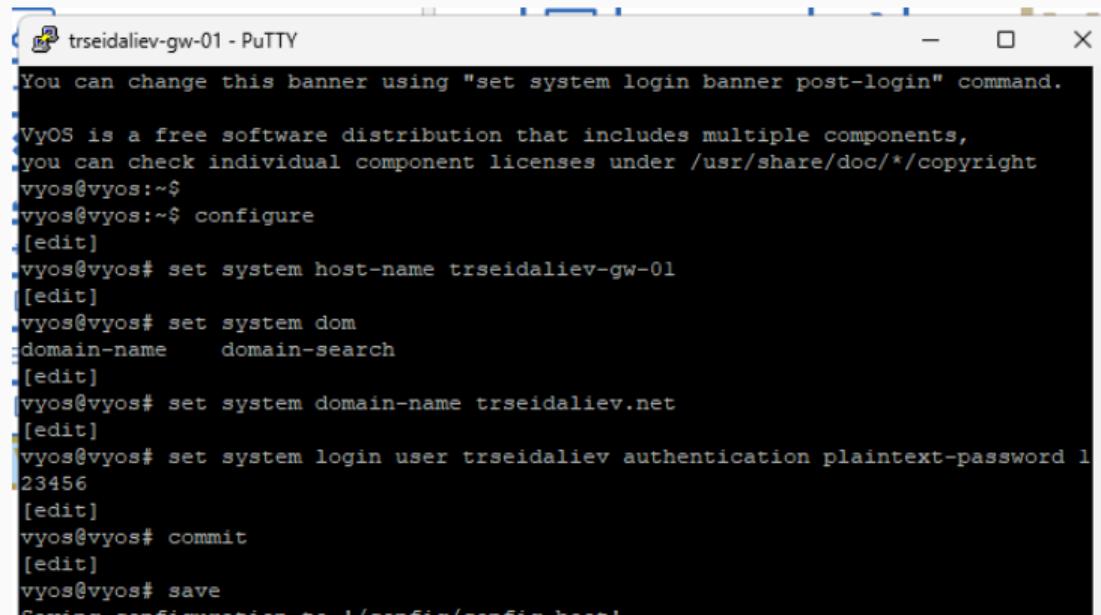


Рис. 1: Топология

Настройка VyOS

- Смена имени хоста и доменного имени
- Создание нового пользователя
- Назначение адреса 10.0.0.1/24
- Настройка DHCP-сервера

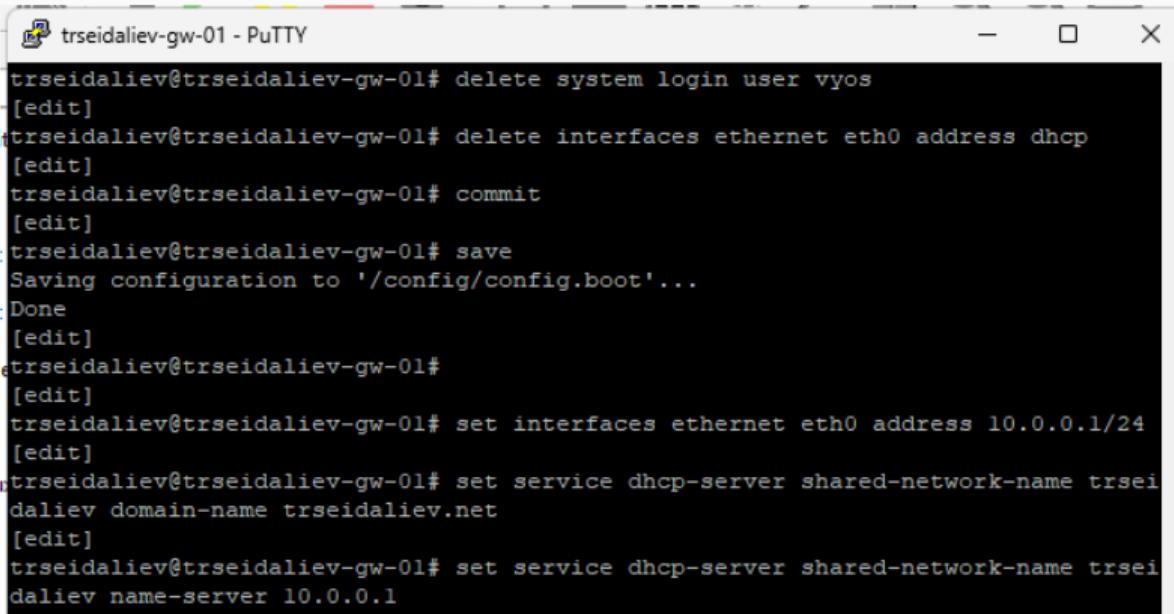


```
You can change this banner using "set system login banner post-login" command.

VyOS is a free software distribution that includes multiple components,
you can check individual component licenses under /usr/share/doc/*copyright
vyos@vyos:~$ configure
[edit]
vyos@vyos# set system host-name trseidaliev-gw-01
[edit]
vyos@vyos# set system dom
domain-name      domain-search
[edit]
vyos@vyos# set system domain-name trseidaliev.net
[edit]
vyos@vyos# set system login user trseidaliev authentication plaintext-password 1
23456
[edit]
vyos@vyos# commit
[edit]
vyos@vyos# save
Saving configuration to /config/config.boot!
```

DHCP-сервер

- Подсеть: 10.0.0.0/24
- Диапазон: 10.0.0.2–10.0.0.253
- DNS: 10.0.0.1
- Домен: trseidaliev.net



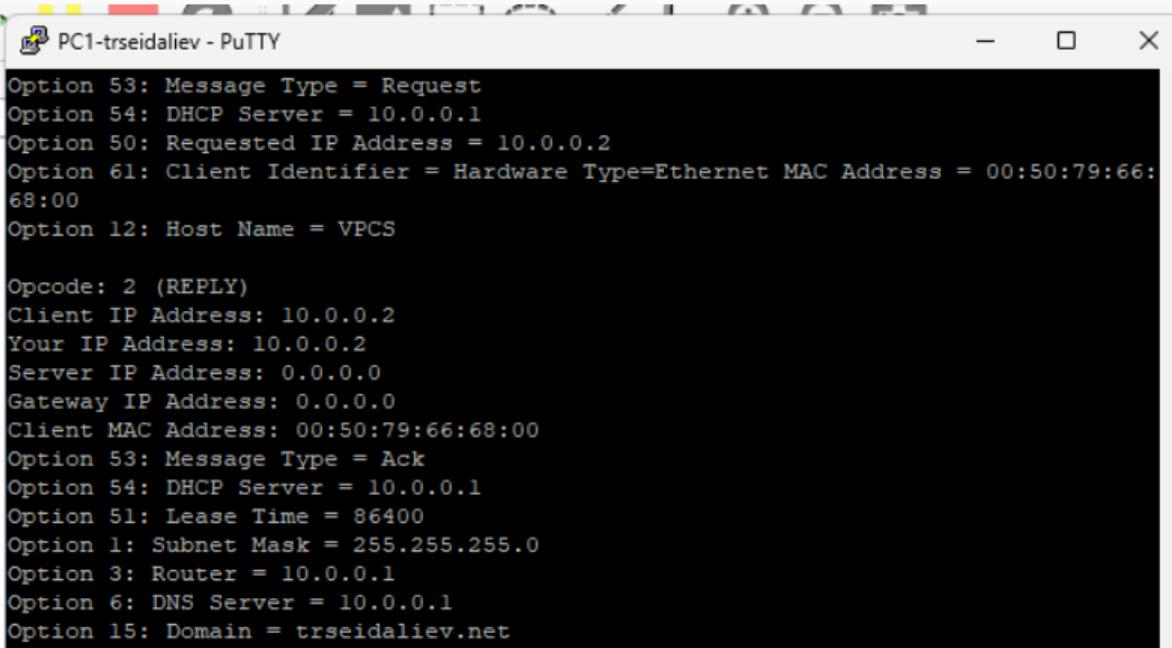
```
trseidaliev@trseidaliev-gw-01# delete system login user vyos
[edit]
trseidaliev@trseidaliev-gw-01# delete interfaces ethernet eth0 address dhcp
[edit]
trseidaliev@trseidaliev-gw-01# commit
[edit]
trseidaliev@trseidaliev-gw-01# save
Saving configuration to '/config/config.boot'...
Done
[edit]
trseidaliev@trseidaliev-gw-01#
[edit]
trseidaliev@trseidaliev-gw-01# set interfaces ethernet eth0 address 10.0.0.1/24
[edit]
trseidaliev@trseidaliev-gw-01# set service dhcp-server shared-network-name trsei
daliev domain-name trseidaliev.net
[edit]
trseidaliev@trseidaliev-gw-01# set service dhcp-server shared-network-name trsei
daliev name-server 10.0.0.1
```

Клиент PC1

IP: 10.0.0.2/24

Gateway: 10.0.0.1

DNS: 10.0.0.1



```
PC1-trseidaliev - 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 = VPCS

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 = trseidaliev.net
```

Проверка работы DHCP

```
PC1-trseidaliev - PuTTY
VPCS> save
Saving startup configuration to startup.vpc
. done

VPCS> show ip

NAME      : VPCS[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  : 86381, 86400/43200/75600
DOMAIN NAME : trseidaliev.net
MAC        : 00:50:79:66:68:00
LPORT      : 10004
RHOST:PORT : 127.0.0.1:10005
MTU        : 1500

VPCS> ping 10.0.0.1 -c 2

84 bytes from 10.0.0.1 icmp_seq=1 ttl=64 time=1.187 ms
84 bytes from 10.0.0.1 icmp_seq=2 ttl=64 time=1.244 ms

VPCS>
```

Последовательность обмена

- Discover
- Offer
- Request
- ACK

No.	Time	Source	Destination	Protocol	Length	Info
1	8.0.0.00008	0.0.0.0	255.255.255.255	DHCP	406	Discover - Transaction ID 0x9e1caa42
2	8.0.0.0027	0:c0:ca:c1:c1:c1:ff:00:00	Broadcast	ARP	68	Who has 10.0.0.2? Tell 10.0.0.1
3	1.0000419	0.0.0.0	255.255.255.255	DHCP	406	DHCP Discover - Transaction ID 0x9e1caa42
4	1.0100003	10.0.0.1	10.0.0.2	DHCP	342	DHCP Offer - Transaction ID 0x9e1caa42
5	1.0650904	0:c0:ca:c1:c1:c1:ff:00:00	Broadcast	ARP	68	Who has 10.0.0.2? Tell 10.0.0.1
6	2.091927	0:c0:ca:c1:c1:c1:ff:00:00	Broadcast	ARP	68	Who has 10.0.0.2? Tell 10.0.0.1
7	4.0001773	0.0.0.0	255.255.255.255	DHCP	406	DHCP Request - Transaction ID 0x9e1caa42
8	4.0100975	10.0.0.1	10.0.0.2	DHCP	342	DHCP ACK - Transaction ID 0x9e1caa42
9	5.0001855	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.0.2 (Request)
10	6.0002875	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.0.2 (Request)
11	7.0003779	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.0.2 (Request)

> Frame 7: 406 bytes on wire (3248 bits), 406 bytes captured (3248 bits) on interface -, Id 0
> Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: 0:c0:ca:c1:c1:c1:ff:00:00 (0:c0:ca:c1:c1:c1:ff:00:00)
> 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 (Request)
 Message type: Boot Request (1)
 Hardware type: Ethernet (0x01)
 Hardware address length: 6
 Hop limit: 0
 Transaction ID: 0x9e1caa42
 Seconds elapsed: 0
 Bootp flags: 0x0000 (Unicast)
 Client IP address: 10.0.0.2
 Your (client) IP address: 0.0.0.0
 Next server IP address: 0.0.0.0
 Relay agent IP address: 0.0.0.0
 Client MAC address: Private_66:68:00 (00:50:79:66:68:00)
 Client hardware address padding: 000000000000000000000000
 Server host name not given
 Boot file name not given
 Magic cookie: DHCP
 Option: (53) DHCP Message Type (Request)
 Length: 1
 DHCP Request (3)
 Option: (54) DHCP Server Identifier (10.0.0.1)
 Length: 4
 DHCP Server Identifier: 10.0.0.1
 Option: (50) Requested IP Address (10.0.0.2)
 Option: (61) Client identifier
 Length: 7
 Client identifier: 0:c0:ca:c1:c1:c1:ff:00:00
 Option: (1) User Name (Ethernet (0x01))
 Length: 1
 User Name: 0:c0:ca:c1:c1:c1:ff:00:00

Новая расширенная топология

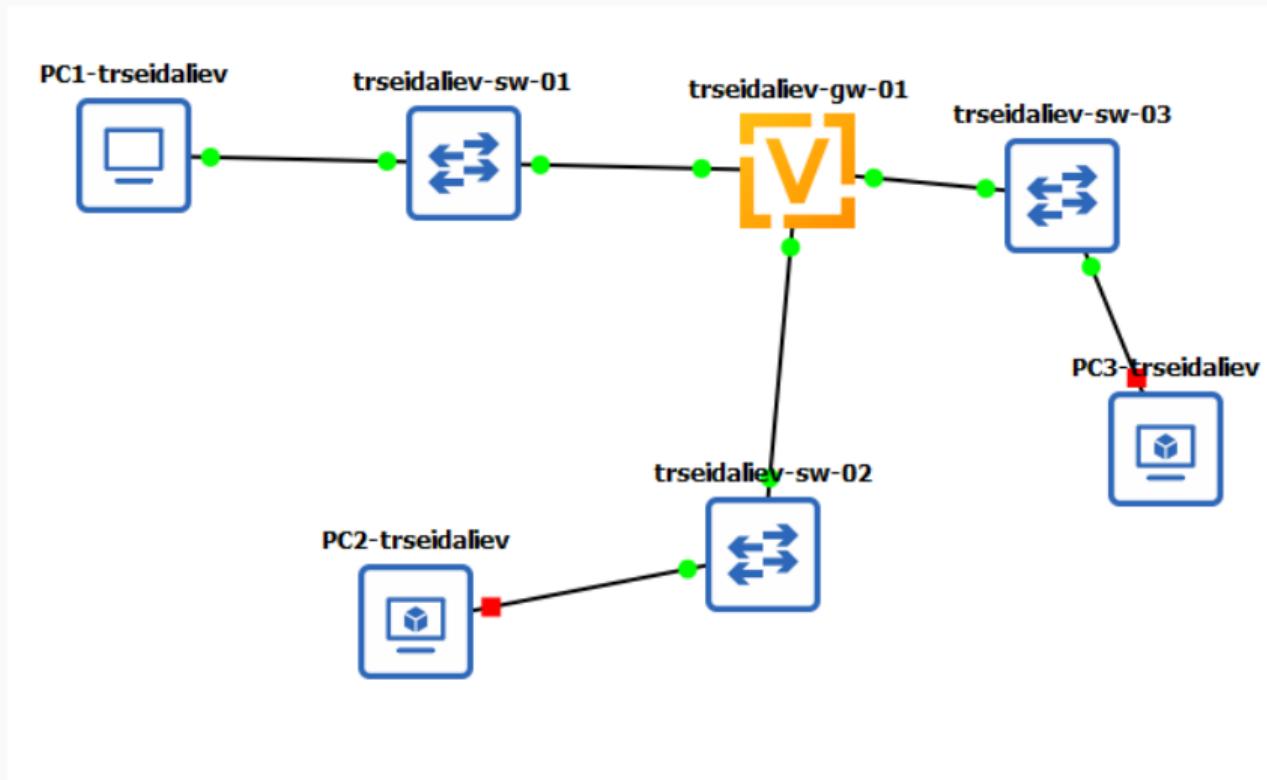
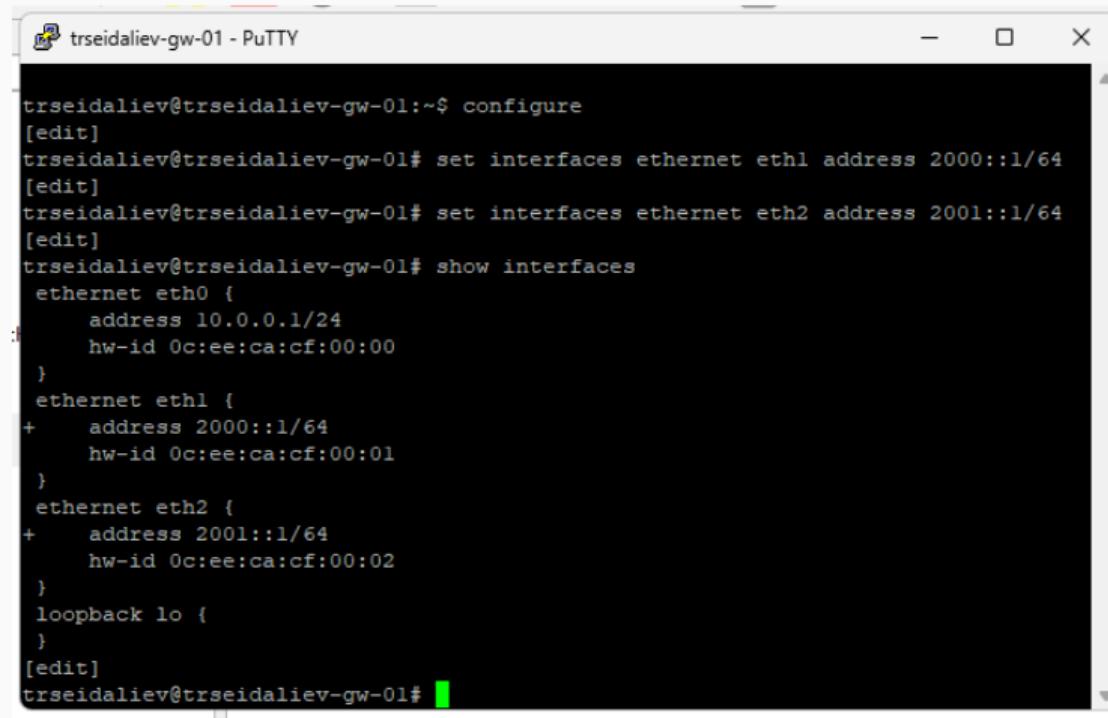


Рис. 7: Топология IPv6

Настройка адресов IPv6

- eth1 → 2000::1/64
- eth2 → 2001::1/64

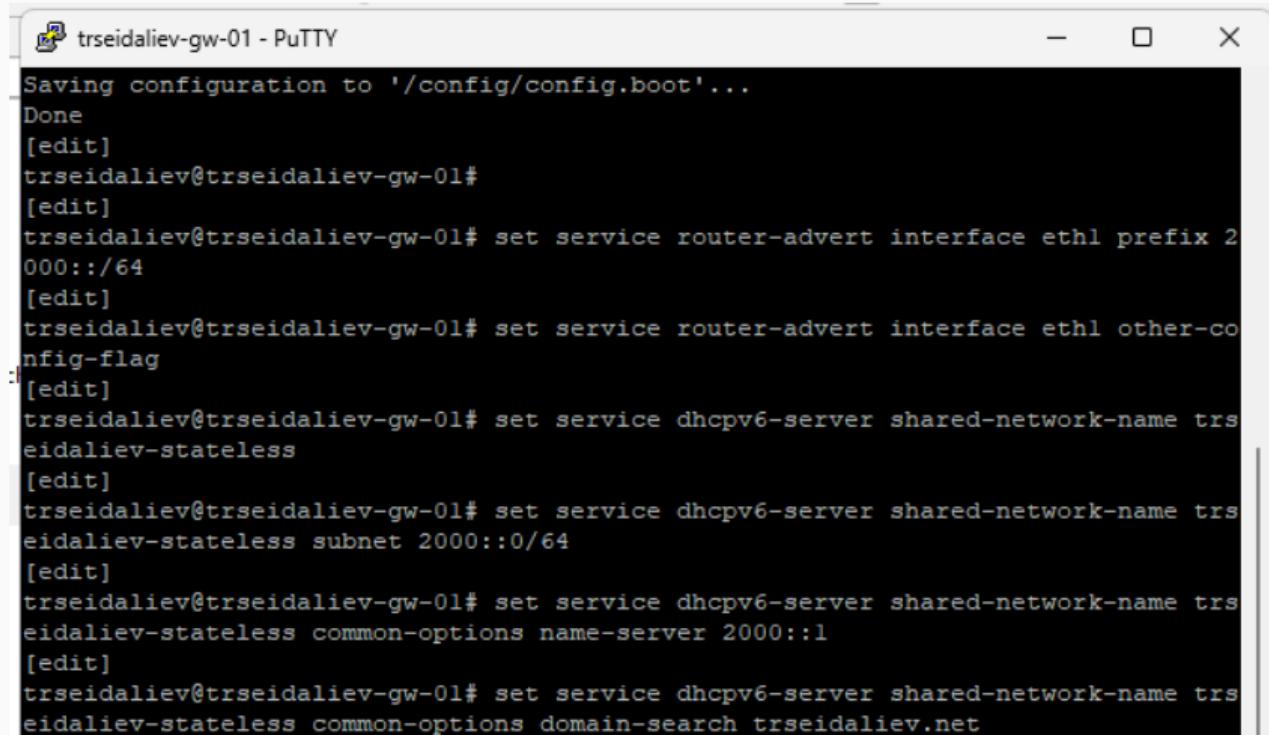


The screenshot shows a PuTTY terminal window titled "trseidaliev-gw-01 - PuTTY". The terminal displays the following command-line session:

```
trseidaliev@trseidaliev-gw-01:~$ configure
[edit]
trseidaliev@trseidaliev-gw-01# set interfaces ethernet eth1 address 2000::1/64
[edit]
trseidaliev@trseidaliev-gw-01# set interfaces ethernet eth2 address 2001::1/64
[edit]
trseidaliev@trseidaliev-gw-01# show interfaces
ethernet eth0 {
    address 10.0.0.1/24
    hw-id 0c:ee:ca:cf:00:00
}
ethernet eth1 {
+    address 2000::1/64
    hw-id 0c:ee:ca:cf:00:01
}
ethernet eth2 {
+    address 2001::1/64
    hw-id 0c:ee:ca:cf:00:02
}
loopback lo {
}
[edit]
trseidaliev@trseidaliev-gw-01#
```

Router Advertisement (RA)

- Префикс 2000::/64
- other-config-flag: получение DNS через DHCPv6



```
trseidaliev-gw-01 - PuTTY
Saving configuration to '/config/config.boot'...
Done
[edit]
trseidaliev@trseidaliev-gw-01#
[edit]
trseidaliev@trseidaliev-gw-01# set service router-advert interface eth1 prefix 2
000::/64
[edit]
trseidaliev@trseidaliev-gw-01# set service router-advert interface eth1 other-co
nfig-flag
[edit]
trseidaliev@trseidaliev-gw-01# set service dhcpv6-server shared-network-name trs
eidaliev-stateless
[edit]
trseidaliev@trseidaliev-gw-01# set service dhcpv6-server shared-network-name trs
eidaliev-stateless subnet 2000::0/64
[edit]
trseidaliev@trseidaliev-gw-01# set service dhcpv6-server shared-network-name trs
eidaliev-stateless common-options name-server 2000::1
[edit]
trseidaliev@trseidaliev-gw-01# set service dhcpv6-server shared-network-name trs
eidaliev-stateless common-options domain-search trseidaliev.net
```

DHCPv6 Stateless

Параметры выдаются:

- DNS: 2000::1
 - Domain-search: trseidaliev.net

Клиент PC2 (SLAAC)

Адрес: SLAAC (2000::/64)

Маршруты добавлены автоматически

```
—(kali㉿kali)-[~]
└─$ ifconfig eth0
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
      inet6 2000::ffe3:631:d25d:28c0  prefixlen 64  scopeid 0x0<global>
      inet6 fe80::a3d5:64fd:43a:4cee  prefixlen 64  scopeid 0x20<link>
        ether 0c:9c:dd:5f:00:00  txqueuelen 1000  (Ethernet)
          RX packets 5 bytes 576 (576.0 B)
          RX errors 0  dropped 0  overruns 0  frame 0
          TX packets 21 bytes 3168 (3.0 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
::/128                ::                  U    256  2    0   lo
2000::/64              ::                  U    100  1    0   eth0
fe80::/64              ::                  U    100  1    0   eth0
::/0                   fe80::eee:caff:fecf:1  UG   100  1    0   eth0
::/128                ::                  Un   0    4    0   lo
2000::ffe3:631:d25d:28c0/128  ::                  Un   0    2    0   eth0
fe80::a3d5:64fd:43a:4cee/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=4.49 ms
64 bytes from 2000::1: icmp_seq=2 ttl=64 time=2.45 ms
--- 2000::1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
```

DHCPv6 Stateless: получение DNS

```
(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\014\234\335_\000\000".
PRC: Requesting information (INIT).
XMT: Forming Info-Request, 0 ms elapsed.
XMT: Info-Request on eth0, interval 1010ms.
RCV: Reply message on eth0 from fe80::eee:caff:fecf: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=1.53 ms
64 bytes from 2000::1: icmp_seq=2 ttl=64 time=2.82 ms

--- 2000::1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 1.531/2.174/2.818/0.643 ms

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

(kali㉿kali)-[~]
└─$
```

Анализ DHCPv6 Stateless

No.	Time	Source	Destination	Protocol	Length	Info
37	89.400741	fe80::eee:caff:fece.. fe80::a3d5:64fd:43a..		ICMPv6	78	Neighbor Advertisement fe80::eee:caff:fece:1 (rtr, sol)
38	94.518922	fe80::eee:caff:fece.. fe80::a3d5:64fd:43a..		ICMPv6	86	Neighbor Solicitation for fe80::a3d5:64fd:43a:4cee from 0:ee:ca:cf:00:01
39	94.520758	fe80::a3d5:64fd:43a.. fe80::eee:caff:fece..		ICMPv6	78	Neighbor Advertisement fe80::a3d5:64fd:43a:4cee (sol)
40	120.056819	fe80::a3d5:64fd:43a.. ff02::1:1:2		DHCPv6	98	Information-request XID: 0x6ec460 CID: 000300010c9cd5f0000
41	120.059588	fe80::eee:caff:fece.. fe80::a3d5:64fd:43a..		DHCPv6	139	Reply XID: 0x6ec460 CID: 000300010c9cd5f0000
42	125.423299	fe80::eee:caff:fece.. fe80::a3d5:64fd:43a..		ICMPv6	86	Neighbor Solicitation for fe80::a3d5:64fd:43a:4cee from 0:ee:ca:cf:00:01
43	125.425528	fe80::a3d5:64fd:43a.. fe80::eee:caff:fece..		ICMPv6	78	Neighbor Advertisement fe80::a3d5:64fd:43a:4cee (sol)
44	126.551152	2000::ffe3:631:d25d.. 2000::1		ICMPv6	118	Echo (ping) request id=0x1fd7, seq=1, hop limit=64 (reply in 45)
45	126.551880	2000::1	2000::ffe3:631:d25d..	ICMPv6	118	Echo (ping) reply id=0x1fd7, seq=1, hop limit=64 (request in 44)
46	127.322252	0.0.0.0	255.255.255.255	DHCP	324	DHCP Discover - Transaction ID 0xa6b50f25
47	127.557229	2000::ffe3:631:d25d.. 2000::1		ICMPv6	118	Echo (ping) request id=0x1fd7, seq=2, hop limit=64 (reply in 48)
48	127.558543	2000::1	2000::ffe3:631:d25d..	ICMPv6	118	Echo (ping) reply id=0x1fd7, seq=2, hop limit=64 (request in 47)
49	129.590810	fe80::eee:caff:fece.. fe80::a3d5:64fd:43a:4cee		DHCPv6	86	Neighbor Solicitation for 2000::ffe3:631:d25d:28c0 from 0:ee:ca:cf:00:01
50	131.502512	2000::ffe3:631:d25d.. fe80::eee:caff:fece..		ICMPv6	78	Neighbor Advertisement 2000::ffe3:631:d25d:28c0 (sol)

Frame 41: 139 bytes on wire (1112 bits), 139 bytes captured (1112 bits) on interface -, id 0

Ethernet II, Src: 0:ee:ca:cf:00:01 (0:ee:ca:cf:00:01), Dst: 0:c9:dd:5f:00:00 (0:c9:dd:5f:00:00)

Internet Protocol Version 6, Src: fe80::eee:caff:fece:1, Dst: fe80::a3d5:64fd:43a:4cee

User Datagram Protocol, Src Port: 547, Dst Port: 546

DHCPv6

Message type: Reply (7)

Transaction ID: 0x6ec460

Client Identifier

Option: Client Identifier (1)

Length: 10

DUID: 000300010c9cd5f0000

DUID Type: link-layer address (3)

Hardware type: Ethernet (1)

Link-layer address: 0:c9:dd:5f:00:00

Link-layer address (Ethernet): 0:c9:dd:5f:00:00 (0:c9:dd:5f:00:00)

Server Identifier

Option: Server Identifier (2)

Length: 14

DUID: 0001000130bc3cd90ceecacf0001

DUID Type: link-layer address plus time (1)

Hardware type: Ethernet (1)

DUID Time: Nov 28, 2025 13:58:33.000000000 RTZ 2 (зима)

Link-layer address: 0:ee:ca:cf:00:01

Link-layer address (Ethernet): 0:ee:ca:cf:00:01 (0:ee:ca:cf:00:01)

DNS recursive name server

Option: DNS recursive name server (23)

Length: 16

1 DNS server address: 2000::1

Domain Search List

Option: Domain Search List (24)

Length: 17

Domain name suffix search list

list entry: tcselidaliyev.net

Включение режима Stateful

- RA: managed-flag
- Диапазон адресов: 2001::100 – 2001::199
- DNS: 2001::1
- Domain-search: trseidaliev.net

```
# Re [edit]
trseidaliev@trseidaliev-gw-01#
[edit]
trseidaliev@trseidaliev-gw-01# set service router-advert interface eth2 managed-
flag
[edit]
trseidaliev@trseidaliev-gw-01# set service dhcpcv6-server shared-network-name trs-
eidaliev-stateful
[edit]
trseidaliev@trseidaliev-gw-01# set service dhcpcv6-server shared-network-name trs-
eidaliev-stateful subnet 2001::0/64
[edit]
trseidaliev@trseidaliev-gw-01# set service dhcpcv6-server shared-network-name trs-
eidaliev-stateful subnet 2001::0/64 name-server 2001::1
[edit]
trseidaliev@trseidaliev-gw-01# set service dhcpcv6-server shared-network-name trs-
```

Рис. 14: Stateful настройки

PC3 – до получения адреса

```
(kali㉿kali)-[~]
$ ifconfig eth0
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet6 2001::199  prefixlen 128  scopeid 0x0<global>
        inet6 fe80::a572:e73f:51ff:904a  prefixlen 64  scopeid 0x20<link>
        ether 0c:17:39:a2:00:00  txqueuelen 1000  (Ethernet)
        RX packets 5  bytes 632 (632.0 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
```

```
(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:: 199/128       ::                U     100  1    0   eth0
fe80:: /64           ::                U     100  1    0   eth0
:: /0                fe80::eee:caff:fecf:2 UG    100  1    0   eth0
:: 1/128             ::                Un   0     4    0   lo
2001:: 199/128       ::                Un   0     2    0   eth0
fe80:: a572:e73f:51ff:904a/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 trseidaliev.net
nameserver 2001::1
```

```
(kali㉿kali)-[~]
$
```

PC3 – получение адреса DHCPv6 Stateful

```
(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@\004\014\0279\242\000\000".
PRC: Soliciting for leases (INIT).
XMT: Forming Solicit, 0 ms elapsed.
XMT: X-- IA_NA 39:a2:00:00
XMT: | X-- Request renew in +3600
XMT: | X-- Request rebind in +5400
XMT: Solicit on eth0, interval 1030ms.
RCV: Advertise message on eth0 from fe80::eee:caff:fe:cf:2.
RCV: X-- IA_NA 39:a2:00:00
RCV: | X-- starts 1764328325
RCV: | X-- t1 - renew +0
RCV: | X-- t2 - rebind +0
RCV: | X-- [Options]
RCV: | | X-- IAADDR 2001::198
RCV: | | X-- Preferred lifetime 27000.
RCV: | | X-- Max lifetime 43200.
RCV: | X-- Server ID: 00:01:00:01:30:bc:3c:d9:0c:ee:ca:cf:00:01
RCV: Advertisement recorded.
PRC: Selecting best advertised lease.
PRC: Considering best lease.
PRC: X-- Initial candidate 00:01:00:01:30:bc:3c:d9:0c:ee:ca:cf:00:01 (s: 10105, p: 0).
XMT: Forming Request, 0 ms elapsed.
XMT: X-- IA_NA 39:a2:00:00
XMT: | X-- Requested renew +3600
XMT: | X-- Requested rebind +5400
XMT: | | X-- IAADDR 2001::198
XMT: | | X-- Preferred lifetime +7200
XMT: | | X-- Max lifetime +7500
XMT: V IA_NA appended.
```

PC3 – после получения адреса

Полная конфигурация:

- IPv6: 2001::198 или 2001::199
- DNS: 2001::1
- Пинг до 2001::1 успешен

```
└$ ifconfig eth0
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet6 2001::199  prefixlen 128  scopeid 0x0<global>
      inet6 fe80::a572:e73f:51ff:904a  prefixlen 64  scopeid 0x20<link>
      inet6 2001::198  prefixlen 128  scopeid 0x0<global>
      ether 0c:17:39:a2:00:00  txqueuelen 1000  (Ethernet)
        RX packets 9  bytes 1170 (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    256  1    0   eth0
2001:: 199/128        ::                U    100  2    0   eth0
fe80::/64             ::                U    100  1    0   eth0
:: /0                 fe80::eee:caff:fecf:2  UG   100  1    0   eth0
:: 1/128              ::                Un   0    4    0   lo
2001:: 198/128        ::                Un   0    2    0   eth0
2001:: 199/128        ::                Un   0    3    0   eth0
fe80::a572:e73f:51ff:904a/128  ::                Un   0    3    0   eth0
ff00::/8               ::                U    256  3    0   eth0
:: /0                 ::                !n   -1   1    0   lo
```

Просмотр аренд DHCPv6 Stateful

```
trseidaliev@trseidaliev-gw-01# run show dhcpcv6 server leases
IPv6 address      State    Last communication   Lease expiration      Remaining
↓ Type            Pool                IAID_DUID
-----  
2001::198        active   2025/11/28 11:12:06   2025/11/28 13:17:06  2:03:49
non-temporary    trseidaliev-stateful 00:00:a2:39:00:01:00:01:30:bc:40:04:0c:17:
39:a2:00:00
2001::199        active   2025/11/28 11:09:58   2025/11/28 23:09:58  11:56:41
non-temporary    trseidaliev-stateful 35:67:50:2b:00:04:60:7a:53:d0:9a:66:2b:b0:
14:8c:4d:83:41:5a:14:7d
[edit]
trseidaliev@trseidaliev-gw-01#
```

Рис. 18: Stateful leases

Пакеты Solicit, Advertise, Request, Reply

29	32.784559	0.0.0.0	255.255.255.255	DHCP	324 DHCP Discover - Transaction ID 0x19f56df0
30	65.067775	0.0.0.0	255.255.255.255	DHCP	324 DHCP Discover - Transaction ID 0xcede84ac8
31	129.969913	0.0.0.0	255.255.255.255	DHCP	324 DHCP Discover - Transaction ID 0x38a42908
32	131.182556	fe80::a572:e73f:51ff:ff02::1:2		DHCPv6	118 Solicit XID: 0x1f0eae CID: 0001000130bc40040c1739a20000
33	131.187483	fe80::eee:caff:fecc::a572:e73f:51ff:ff02::1:2		DHCPv6	187 Advertise XID: 0x1f0eae IAA: 2001::198 CID: 0001000130bc40040c1739a20000
34	132.216188	fe80::a572:e73f:51ff:ff02::1:2		DHCPv6	164 Request XID: 0x76686c CID: 0001000130bc40040c1739a20000
35	132.218347	fe80::eee:caff:fecc::a572:e73f:51ff:ff02::1:2		DHCPv6	187 Reply XID: 0x76686c IAA: 2001::198 CID: 0001000130bc40040c1739a20000
36	132.239929	fe80::a572:e73f:51ff:ff02::1:6		ICMPv6	130 Multicast Listener Report Message v2
37	132.436836	::	ff02::1:ff00:198	ICMPv6	86 Neighbor Solicitation for 2001::198
38	132.925377	fe80::a572:e73f:51ff:ff02::1:6		ICMPv6	130 Multicast Listener Report Message v2
39	136.648712	fe80::eee:caff:fecc::a572:e73f:51ff:ff02::1:6		ICMPv6	86 Neighbor Solicitation for fe80::a572:e73f:51ff:904a from 0:ee:ca:cf:00:02
40	136.658647	fe80::a572:e73f:51ff:ff02::eee:caff:fecc::1:6		ICMPv6	78 Neighbor Advertisement fe80::a572:e73f:51ff:904a (sol)
Frame 34: 164 bytes on wire (1312 bits), 164 bytes captured (1312 bits) on interface -, id 0					
Ethernet II, Src: 0c:17:39:a2:00:00 (0c:17:39:a2:00:00), Dst: IPv6mcast_01:00:02 (33:33:00:01:00:02)					
Internet Protocol Version 6, Src: fe80::a572:e73f:51ff:904a, Dst: ff02::1:2					
User Datagram Protocol, Src Port: 546, Dst Port: 547					
DHCPv6					
Message type: Request (3)					
Transaction ID: 0x76686c					
Client Identifier					
Option: Client Identifier (1)					
Length: 14					
DUID: 0001000130bc40040c1739a20000					
DUID Type: link-layer address plus time (1)					
Hardware type: Ethernet (1)					
DUID Time: Nov 28, 2025 14:12:04.000000000 RTZ 2 (зима)					
Link-layer address: 0c:17:39:a2:00:00					
Link-layer address (Ethernet): 0c:17:39:a2:00:00 (0c:17:39:a2:00:00)					
Server Identifier					
Option: Server Identifier (2)					
Length: 14					
DUID: 0001000130bc3cd90ceecacf0001					
DUID Type: link-layer address plus time (1)					
Hardware type: Ethernet (1)					
DUID Time: Nov 28, 2025 13:58:33.000000000 RTZ 2 (зима)					
Link-layer address: 0:ee:ca:cf:00:01					
Link-layer address (Ethernet): 0:ee:ca:cf:00:01 (0:ee:ca:cf: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)					
Requested Option code: Simple Network Time Protocol Server (31)					
Elapsed time					
Option: Elapsed time (8)					
Length: 2					
Elapsed time: 0ms					
Identity Association for Non-temporary Address					
Option: Identity Association for Non-temporary Address (3)					
Length: 40					
IAID: 39a20000					
T1: 3600					
T2: 5400					
IA Address					

Итоги

Основные достижения

- Настроен DHCP для IPv4
- Настроены SLAAC, DHCPv6 Stateless и Stateful
- Выполнена полная проверка маршрутизации и связности
- Проанализирован сетевой трафик всех DHCP-механизмов
- Подтверждена корректная работа всех служб распределения адресов