

Лабораторная работа №7

Сетевые технологии

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Цель работы

Получение навыков настройки службы DHCP на сетевом оборудовании для распределения адресов IPv4 и IPv6.

Выполнение лабораторной работы

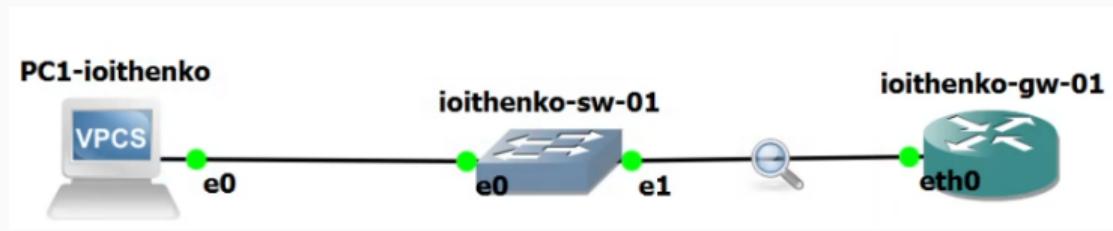


Рис. 1: Топология моделируемой сети

```
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 ioithenko-gw-01
[edit]
vyos@vyos# set system domain-name ioithenko.net
[edit]
vyos@vyos# set system login user ioithenko
[edit]
456
[edit]
vyos@vyos# compare
[edit system]
+domain-name ioithenko.net
>host-name ioithenko-gw-01
[edit system login]
+user ioithenko (
+    authentication (
+        plaintext-password 123456
+    )
+)
[edit]
vyos@vyos# commit

Invalid command: [commit]

[edit]
vyos@vyos# commit
[edit]
vyos@vyos# save
Saving configuration to '/config/config.boot'...
Done
[edit]
vyos@vyos# exit
exit
vyos@vyos:~$ exit
logout

Welcome to VyOS - ioithenko-gw-01 ttyS0
```

Рис. 2: Настройка gw-01: изменение имени, домена, пользователя

```
Welcome to VyOS - ioithenko-gw-01 ttyS0

ioithenko-gw-01 login: ioithenko
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
ioithenko@ioithenko-gw-01:~$ configure
[edit]
ioithenko@ioithenko-gw-01# delete system login user vyos
[edit]
ioithenko@ioithenko-gw-01# commit
[edit]
ioithenko@ioithenko-gw-01# save
Saving configuration to '/config/config.boot'...
Done
[edit]
```

Рис. 3: Настройка gw-01: удаление пользователя по умолчанию

```
ioithenko@ioithenko-gw-01:~$ configure
[edit]
/24thenko@ioithenko-gw-01# set service interfaces ethernet eth0 address 10.0.0.1

    Configuration path: servi
[edit]
ioithenko@ioithenko-gw-01# exit discard          net eth0 address 10.0.0.1/24.0.1/
exit0.1/240.1/240.1/240.1/24                  enet eth0 address 10.0.0.1/24
ioithenko@ioithenko-gw-01:~$ t service interfaces ethernet eth0 address 10.0.0.1/
ioithenko@ioithenko-gw-01:~$ 
ioithenko@ioithenko-gw-01:~$ configure
[edit]
ioithenko@ioithenko-gw-01# set interfaces ethernet eth0 address 10.0.0.1/24
[edit]
    domain-name ioithenko.net set service dhcp-server shared-network-name ioithenko
[edit]
    name-server 10.0.0.1
[edit]
    subnet 10.0.0.0/24 default-router 10.0.0.1-server shared-network-name ioithenko
[edit]
    subnet 10.0.0.0/24 range hosts start 10.0.0.2
[edit]
    subnet 10.0.0.0/24 range hosts stop 10.0.0.253
[edit]
ioithenko@ioithenko-gw-01# compare
[edit interfaces ethernet eth0]
+address 10.0.0.1/24
[edit service]
+dhcp-server {
+    shared-network-name ioithenko {
+        domain-name ioithenko.net
+        name-server 10.0.0.1
+        subnet 10.0.0.0/24 {
+            default-router 10.0.0.1
+            range hosts {
+                start 10.0.0.2
+                stop 10.0.0.253
+            }
+        }
+    }
+}
[edit]
```

Рис. 4: Настройка gw-01: IPv4-адресация и DHCP-сервер

```
Opcode: 1 (REQUEST)
Client IP Address: 10.0.0.2
Your IP Address: 0.0.0.0
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 = 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 = ioithenko.net

IP 10.0.0.2/24 GW 10.0.0.1

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  : 86343, 86400/43200/75600
DOMAIN NAME : ioithenko.net
MAC       : 00:50:79:66:68:00
LPORT     : 20004
RHOST:PORT : 127.0.0.1:20005
MTU      : 1500

VPCS> ping 10.0.0.1 -c 2

84 bytes from 10.0.0.1 icmp_seq=1 ttl=64 time=0.911 ms
84 bytes from 10.0.0.1 icmp_seq=2 ttl=64 time=1.018 ms
VPCS>
```

Рис. 5: Настройка РС1 и проверка конфигурации

```
ioithenko@ioithenko-gw-01:~$ show dhcp server statistics
Pool      Size   Leases   Available   Usage
-----  -----  -----  -----  -----
ioithenko    252       1        251   0%
ioithenko@ioithenko-gw-01:~$ show dhcp server leases
IP address   Hardware address   State   Lease start   Lease expiration   Re
maining   Pool   Hostname
-----  -----  -----  -----  -----  -----  -----
10.0.0.2     00:50:79:66:68:00   active   2024/12/04 12:34:31  2024/12/05 12:34:31  23
:56:53     ioithenko  VPCS
ioithenko@ioithenko-gw-01:~$
```

Рис. 6: Журнал работы

```
, "data": ["dhcp-echo"]}
Dec 04 12:33:51 sudo[16287]: ioithenko : TTY=ttyS0 ; PWD=/home/ioithenko ; USER=root ;
COMMAND=/usr/bin/sh -c /usr/sbin/vyshim /usr/libexec/vyos/conf_mode/dhcp_server.py
Dec 04 12:33:51 vyos-configd[611]: Received message: {"type": "node", "data": "/usr/libexec/vyos/conf_mode/dhcp_server.py"}
Dec 04 12:33:53 dhcpcd[16309]: Wrote 0 leases to leases file.
Dec 04 12:33:53 dhcpcd[16309]: Lease file test successful, removing temp lease file: /co
nfig/dhcpcd.leases.1733315633
Dec 04 12:33:53 dhcpcd[16311]: Wrote 0 leases to leases file.
Dec 04 12:33:53 dhcpcd[16311]:
Dec 04 12:33:53 dhcpcd[16311]: No subnet declaration for eth2 (no IPv4 addresses).
Dec 04 12:33:53 dhcpcd[16311]: ** Ignoring requests on eth2. If this is not what
Dec 04 12:33:53 dhcpcd[16311]: you want, please write a subnet declaration
Dec 04 12:33:53 dhcpcd[16311]: in your dhcpcd.conf file for the network segment
Dec 04 12:33:53 dhcpcd[16311]: to which interface eth2 is attached. **
Dec 04 12:33:53 dhcpcd[16311]:
Dec 04 12:33:53 dhcpcd[16311]:
Dec 04 12:33:53 dhcpcd[16311]: No subnet declaration for eth1 (no IPv4 addresses).
Dec 04 12:33:53 dhcpcd[16311]: ** Ignoring requests on eth1. If this is not what
Dec 04 12:33:53 dhcpcd[16311]: you want, please write a subnet declaration
Dec 04 12:33:53 dhcpcd[16311]: in your dhcpcd.conf file for the network segment
Dec 04 12:33:53 dhcpcd[16311]: to which interface eth1 is attached. **
Dec 04 12:33:53 dhcpcd[16311]:
Dec 04 12:33:53 dhcpcd[16311]: Server starting service.
Dec 04 12:34:27 dhcpcd[16311]: DHCPDISCOVER from 00:50:79:66:68:00 via eth0
Dec 04 12:34:28 dhcpcd[16311]: DHCPOFFER on 10.0.0.2 to 00:50:79:66:68:00 (VPCS) via eth
0
Dec 04 12:34:31 dhcpcd[16311]: DHCPREQUEST for 10.0.0.2 (10.0.0.1) from 00:50:79:66:68:0
0 (VPCS) via eth0
Dec 04 12:34:31 dhcpcd[16311]: DHCPACK on 10.0.0.2 to 00:50:79:66:68:00 (VPCS) via eth0
Dec 04 12:37:14 sudo[16387]: ioithenko : TTY=ttyS0 ; PWD=/home/ioithenko ; USER=root ;
COMMAND=/usr/libexec/vyos/op_mode/show_dhcp.py --statistics
Dec 04 12:37:37 sudo[16413]: ioithenko : TTY=ttyS0 ; PWD=/home/ioithenko ; USER=root ;
COMMAND=/usr/libexec/vyos/op_mode/show_dhcp.py --leases
ioithenko@ioithenko-gw-01:~$
```

Рис. 7: Просмотр статистики DHCP, выданных адресов и журнала работы

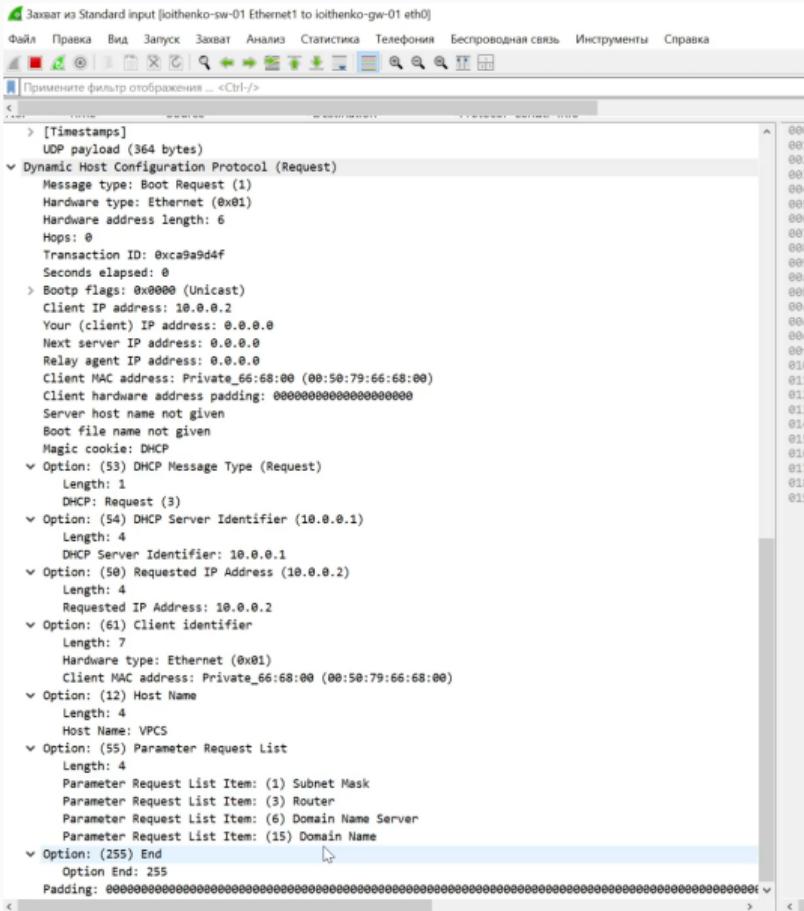


Рис. 8: Проверка захваченных анализатором трафика пакетов

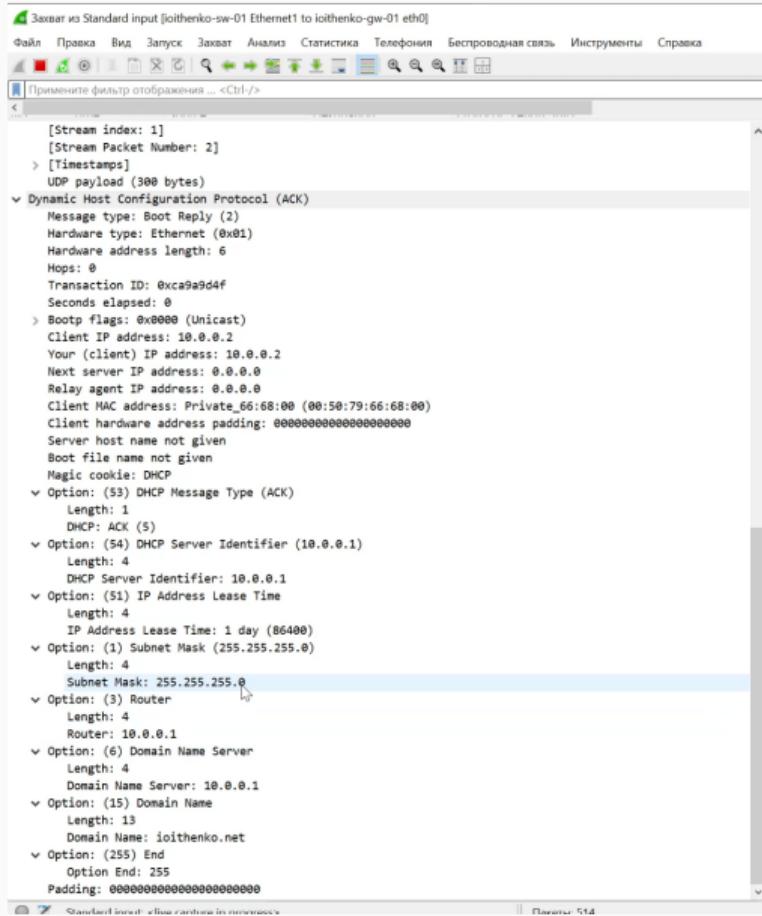


Рис. 9: Проверка захваченных анализатором трафика пакетов

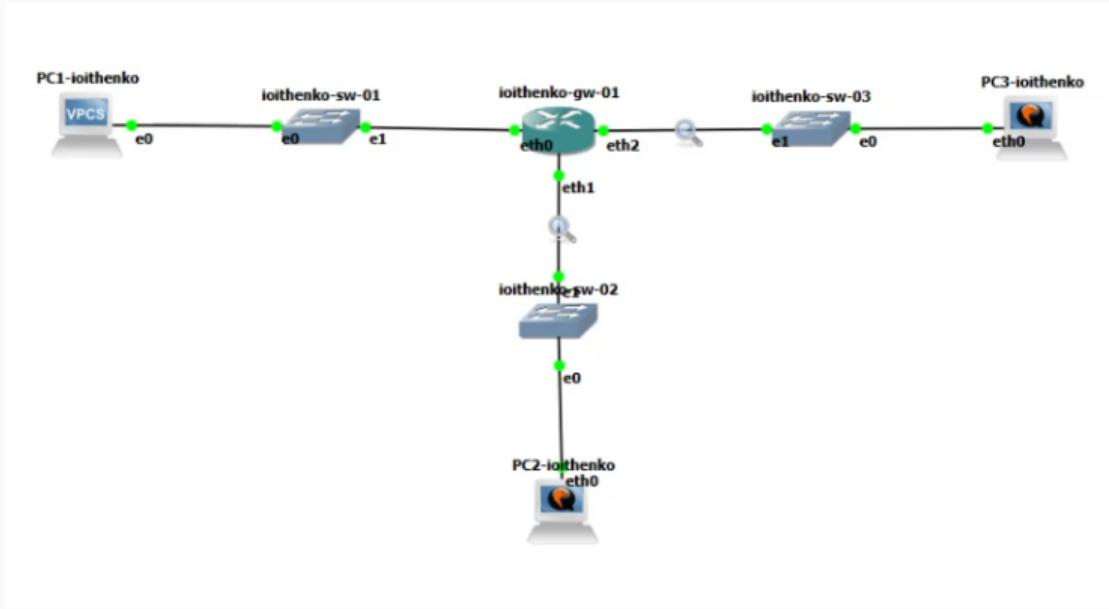


Рис. 10: Топология дополненной сети

```
Welcome to VyOS - ioithenko-gw-01 ttyS0

ioithenko-gw-01 login: ioithenko
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
ioithenko@ioithenko-gw-01:~$ configure
[edit]
ioithenko@ioithenko-gw-01# set interfaces ethernet eth1 address 2000::1/64
[edit]
ioithenko@ioithenko-gw-01# set interfaces ethernet eth2 address 2001::1/64
[edit]
ioithenko@ioithenko-gw-01# show interfaces
    ethernet eth0 {
        address 10.0.0.1/24
        hw-id 0c:a9:fa:46:00:00
    }
    ethernet eth1 {
        +   address 2000::1/64
        +   hw-id 0c:a9:fa:46:00:01
    }
    ethernet eth2 {
        +   address 2001::1/64
        +   hw-id 0c:a9:fa:46:00:02
    }
    loopback lo {
    }
[edit]
ioithenko@ioithenko-gw-01# commit
[edit]
ioithenko@ioithenko-gw-01# save
Saving configuration to '/config/config.boot'...
Done
[edit]
```

Рис. 11: Настройка gw-01: IPv6-адресация

```
root@ioithenko-gw-01: ~# set service dhcpv6-server shared-network-name ioithen
[edit]
root@ioithenko-gw-01: ~# service dhcpv6-server shared-network-name ioithen
[edit]
root@ioithenko-gw-01: ~# common-options name-server 2000::1 server shared-network-name ioithen
[edit]
root@ioithenko-gw-01: ~# common-options domain-search ioithenko.netared-network-name ioithen
[edit]
root@ioithenko-gw-01: ~# compare
[edit service]
+ dhcpv6-server {
+   shared-network-name ioithenko-stateless {
+     common-options {
+       domain-search ioithenko.net
+       name-server 2000::1
+     }
+     subnet 2000::0/64 {
+     }
+   }
+ }
+routing-advert {
+   interface eth1 {
+     other-config-flag
+     prefix 2000::/64 {
+     }
+   }
+ }
[edit]
root@ioithenko-gw-01: ~# commit
[edit]
root@ioithenko-gw-01: ~# save
Saving configuration to '/config/config.boot'...
Done
[edit]
root@ioithenko-gw-01: ~# run show configuration
interfaces {
  ethernet eth0 {
    address 10.0.0.1/24
    hw-id 0:ca9:fa:46:00:00
  }
  ethernet eth1 {
    address 2000::1/64
    hw-id 0:ca9:fa:46:00:01
  }
  ethernet eth2 {
    address 2001::1/64
    hw-id 0:ca9:fa:46:00:02
  }
  loopback lo {
  }
}
service {
  dhcp-server {
    shared-network-name ioithenko {
      domain-name ioithenko.net
      name-server 10.0.0.1
      subnet 10.0.0.0/24 {
        default-router 10.0.0.1
      }
    }
  }
}
```

Рис. 12: Настройка gw-01: DHCPv6 без отслеживания состояния

```
root@kali:~# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet6 2000::4ce7:1c37:fee7:bba9  prefixlen 64  scopeid 0x0
        <global>
          inet6 fe80::bc7e:bd1d:3fd3:44d3  prefixlen 64  scopeid 0x2
        <link>
          ether 0c:65:9f:c1:00:00  txqueuelen 1000  (Ethernet)
            RX packets 12  bytes 1376 (1.3 KiB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 40  bytes 4863 (4.7 KiB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

eth1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:65:9f:c1:00:01  txqueuelen 1000  (Ethernet)
      RX packets 0  bytes 0 (0.0 B)
      RX errors 0  dropped 0  overruns 0  frame 0
      TX packets 0  bytes 0 (0.0 B)
      TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

eth2: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:65:9f:c1:00:02  txqueuelen 1000  (Ethernet)
      RX packets 0  bytes 0 (0.0 B)
      RX errors 0  dropped 0  overruns 0  frame 0
      TX packets 0  bytes 0 (0.0 B)
      TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

eth3: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:65:9f:c1:00:03  txqueuelen 1000  (Ethernet)
      RX packets 0  bytes 0 (0.0 B)
      RX errors 0  dropped 0  overruns 0  frame 0
      TX packets 0  bytes 0 (0.0 B)
      TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

eth4: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:65:9f:c1:00:04  txqueuelen 1000  (Ethernet)
```

Рис. 13: Проверка настроек сети на РС2, пинг маршрутизатора, проверка DNS

```
root@kali:~ 
File Edit View Search Terminal Help
root@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
2      0 eth0
fe80::/64             ::                 U    100
1      0 eth0
::/0                  fe80::ea9:faff:fe46:1   UG   100
1      0 eth0
::1/128              ::                 UAn  0
4      0 lo
2000:::4ce7:1c37:fee7:bba9/128  ::                 UAn  0
3      0 eth0
fe80:::bc7e:bd1d:3fd3:44d3/128  ::                 UAn  0
3      0 eth0
ff00::/8               ::                 U    256
3      0 eth0
::/0                  ::                 In   -1
1      0 lo
root@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=7.61 ms
64 bytes from 2000::1: icmp_seq=2 ttl=64 time=2.66 ms

--- 2000::1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 2.656/5.131/7.606/2.475 ms
root@kali:~# cat /etc/resolv.conf
# Generated by NetworkManager
search ioithenko.net
nameserver 2000::1
root@kali:~#
```

Рис. 14: Пинг маршрутизатора, проверка DNS

```
root@kali:~# 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\014e\237\301\000\000".
PRC: Requesting information (INIT).
XMT: Forming Info-Request, 0 ms elapsed.
XMT: Info-Request on eth0, interval 950ms.
RCV: Reply message on eth0 from fe80::ea9:faff:fe46:1.
PRC: Done.

root@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=3.32 ms
64 bytes from 2000::1: icmp_seq=2 ttl=64 time=4.16 ms

--- 2000::1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 3.323/3.741/4.160/0.418 ms
root@kali:~# cat /etc/resolv.conf
search ioithenko.net.
nameserver 2000::1
root@kali:~#
```

Рис. 15: Получение адреса на PC2, пинг маршрутизатора, проверка DNS

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

Рис. 16: Просмотр статистики DHCP, выданных адресов, пинг PC2

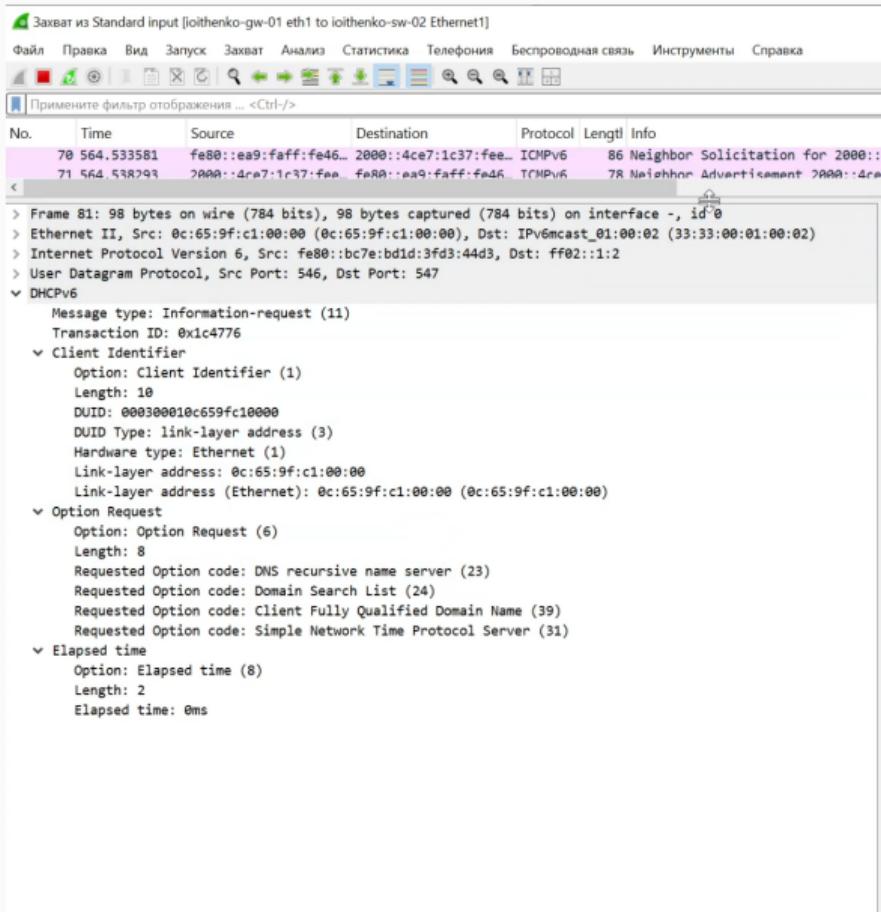


Рис. 17: Проверка захваченных анализатором трафика пакетов

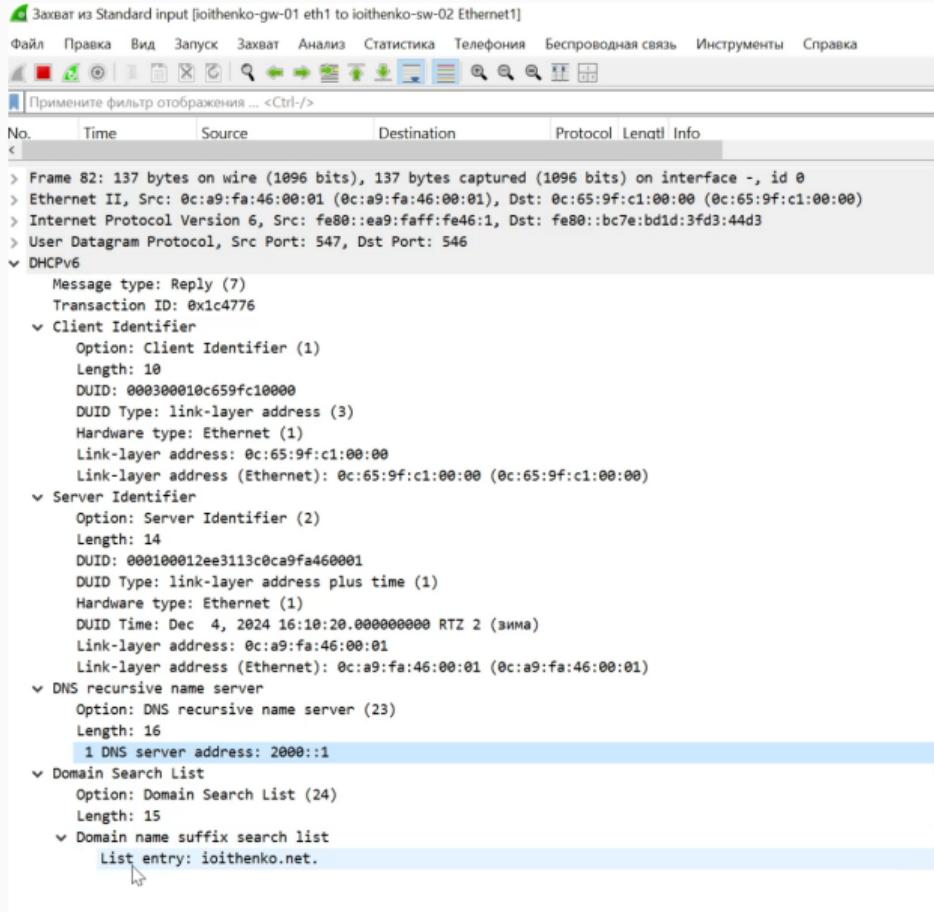


Рис. 18: Проверка захваченных анализатором трафика пакетов

```
[edit]
[edit]nko@ioithenko-gw-01# set service router-advert interface eth2 managed-flag
ko-statefulioithenko-gw-01# set service dhcipv6-server shared-network-name ioithen
[edit]
ko-stateful subnet 2001::0/64t service dhcipv6-server shared-network-name ioithen
[edit]
ko-stateful subnet 2001::0/64 name-server 2001::1ver shared-network-name ioithen
[edit]
ko-stateful subnet 2001::0/64 domain-search ioithenko.net
[edit]
ko-stateful subnet 2001::0/64 address-range start 2001::100 stop 2001::199
[edit]
ioithenko@ioithenko-gw-01# compare
[edit service dhcipv6-server]
+shared-network-name ioithenko-stateful {
+    subnet 2001::0/64 {
+        address-range {
+            start 2001::100 {
+                stop 2001::199
+            }
+        }
+        domain-search ioithenko.net
+        name-server 2001::1
+    }
+}
[edit service router-advert]
+interface eth2 {
+    managed-flag
+}
[edit]
ioithenko@ioithenko-gw-01# commit
[edit]
ioithenko@ioithenko-gw-01# save
Saving configuration to '/config/config.boot'...
Done
[edit]
ioithenko@ioithenko-gw-01# run show dhcipv6 server leases
IPv6 address      State      Last communication      Lease expiration      Remaining      Type
  Pool      IAID_DUID
-----  -----
-----  -----
[edit]
ioithenko@ioithenko-gw-01# 
```

Рис. 19: Настройка gw-01: DHCPv6 с отслеживанием состояния

```
root@kali:~# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet6 2001::198 prefixlen 128 scopeid 0x0<global>
        inet6 fe80::badd:cfcfe:3c2f prefixlen 64 scopeid
          0x20<link>
          ether 0c:54:26:e1:00:00 txqueuelen 1000 (Ethernet)
          RX packets 13 bytes 1480 (1.4 KiB)
          RX errors 0 dropped 0 overruns 0 frame 0
          TX packets 231 bytes 35440 (34.6 KiB)
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:54:26:e1:00:01 txqueuelen 1000 (Ethernet)
      RX packets 0 bytes 0 (0.0 B)
      RX errors 0 dropped 0 overruns 0 frame 0
      TX packets 0 bytes 0 (0.0 B)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:54:26:e1:00:02 txqueuelen 1000 (Ethernet)
      RX packets 0 bytes 0 (0.0 B)
      RX errors 0 dropped 0 overruns 0 frame 0
      TX packets 0 bytes 0 (0.0 B)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth3: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:54:26:e1:00:03 txqueuelen 1000 (Ethernet)
      RX packets 0 bytes 0 (0.0 B)
      RX errors 0 dropped 0 overruns 0 frame 0
      TX packets 0 bytes 0 (0.0 B)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Рис. 20: Проверка настроек сети и DNS на PC3

```
root@kali:~# route -n -A inet6
Kernel IPv6 routing table
Destination          Next Hop           Fla
g 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:::ea9:faff:fe46:2   UG
      100 2      0 eth0
::1/128              ::                UAn
      0  4      0 lo
2001:::198/128        ::                UAn
      0  3      0 eth0
fe80:::badd:cfle:e376:3c2f/128  ::                UAn
      0  3      0 eth0
ff00:::/8              ::                U
      256 3      0 eth0
:::/0                 ::                !n
      -1  1      0 lo
root@kali:~# cat /etc/resolv.conf
# Generated by NetworkManager
search ioithenko.net
nameserver 2001::1
root@kali:~# dhclient -6
```

Рис. 21: Проверка настроек сети и DNS на РС3

```
root@kali: ~
File Edit View Search Terminal Help
nameserver 2001::1
root@kali:~# 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\001.\343,x\014T&\341\000\000".
PRC: Soliciting for leases (INIT).
XMT: Forming Solicit, 0 ms elapsed.
XMT: X-- IA_NA 26:e1:00:00
XMT: | X-- Request renew in +3600
XMT: | X-- Request rebind in +5400
XMT: Solicit on eth0, interval 1020ms.
RCV: Advertise message on eth0 from fe80::ea9:faff:fe46:2.
RCV: X-- IA_NA 26:e1:00:00
RCV: | X-- starts 1733324793
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: 00:01:00:01:2e:e3:11:3c:0c:a9:fa:46:00:0
1
RCV: Advertisement recorded.
PRC: Selecting best advertised lease.
PRC: Considering best lease.
PRC: X-- Initial candidate 00:01:00:01:2e:e3:11:3c:0c:a9:fa:
46:00:01 (s: 10105, p: 0).
XMT: Forming Request, 0 ms elapsed.
XMT: X-- IA_NA 26:e1:00:00
XMT: | X-- Requested renew +3600
```

Рис. 22: Получение адреса на РС3

```
root@kali:~# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet6 2001::198  prefixlen 128  scopeid 0x0<global>
      inet6 2001::199  prefixlen 128  scopeid 0x0<global>
      inet6 fe80::badd:cfle:e376:3c2f  prefixlen 64  scopeid
      0x20<link>
          ether 0c:54:26:e1:00:00  txqueuelen 1000  (Ethernet)
          RX packets 17  bytes 2014 (1.9 KiB)
          RX errors 0  dropped 0  overruns 0  frame 0
          TX packets 241  bytes 36474 (35.6 KiB)
          TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

eth1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:54:26:e1:00:01  txqueuelen 1000  (Ethernet)
      RX packets 0  bytes 0 (0.0 B)
      RX errors 0  dropped 0  overruns 0  frame 0
      TX packets 0  bytes 0 (0.0 B)
      TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

eth2: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:54:26:e1:00:02  txqueuelen 1000  (Ethernet)
      RX packets 0  bytes 0 (0.0 B)
      RX errors 0  dropped 0  overruns 0  frame 0
      TX packets 0  bytes 0 (0.0 B)
      TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

eth3: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:54:26:e1:00:03  txqueuelen 1000  (Ethernet)
      RX packets 0  bytes 0 (0.0 B)
```

Рис. 23: Проверка настроек сети на РС3

```
root@kali:~# route -n -A inet6
Kernel IPv6 routing table
Destination          Next Hop          Fl
g 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::ea9:faff:fe46:2   UG
    100 2      0 eth0
::1/128              ::               UAn
    0  4      0 lo
2001:::198/128        ::               UAn
    0  4      0 eth0
2001:::199/128        ::               UAn
    0  2      0 eth0
fe80:::badd:cfle:e376:3c2f/128  ::   UAn
    0  3      0 eth0
ff00:::/8              ::               U
    256 3      0 eth0
:::/0                 ::               !n
    -1  1      0 lo
```

Рис. 24: Проверка настроек сети на РС3

```
root@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=12.1 ms
64 bytes from 2001::1: icmp_seq=2 ttl=64 time=2.13 ms

--- 2001::1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 2.126/7.093/12.060/4.967 ms
root@kali:~# cat /etc/resolv.conf
search ioithenko.net.
nameserver 2001::1
root@kali:~#
```

Рис. 25: Пинг маршрутизатора

```
[edit]
ioithenko@ioithenko-gw-01# run show dhcpcv6 server leases
IPv6 address      State      Last communication      Lease expiration      Remaining      Type
    Pool          IAID_DUID
-----
----- I -----
2001::198      active     2024/12/04 14:55:56     2024/12/04 17:00:56  1:52:36      non-te
mportary ioithenko-stateful  00:00:e1:26:00:04:f3:31:a8:fe:2f:23:6e:06:f8:53:14:35:b8:b
b:d5:61
2001::199      active     2024/12/04 15:06:33     2024/12/04 17:11:33  2:03:13      non-te
mportary ioithenko-stateful  00:00:e1:26:00:01:00:01:2e:e3:2c:78:0c:54:26:e1:00:00
[edit]
ioithenko@ioithenko-gw-01#
```

Рис. 26: Просмотр статистики DHCP и выданных адресов

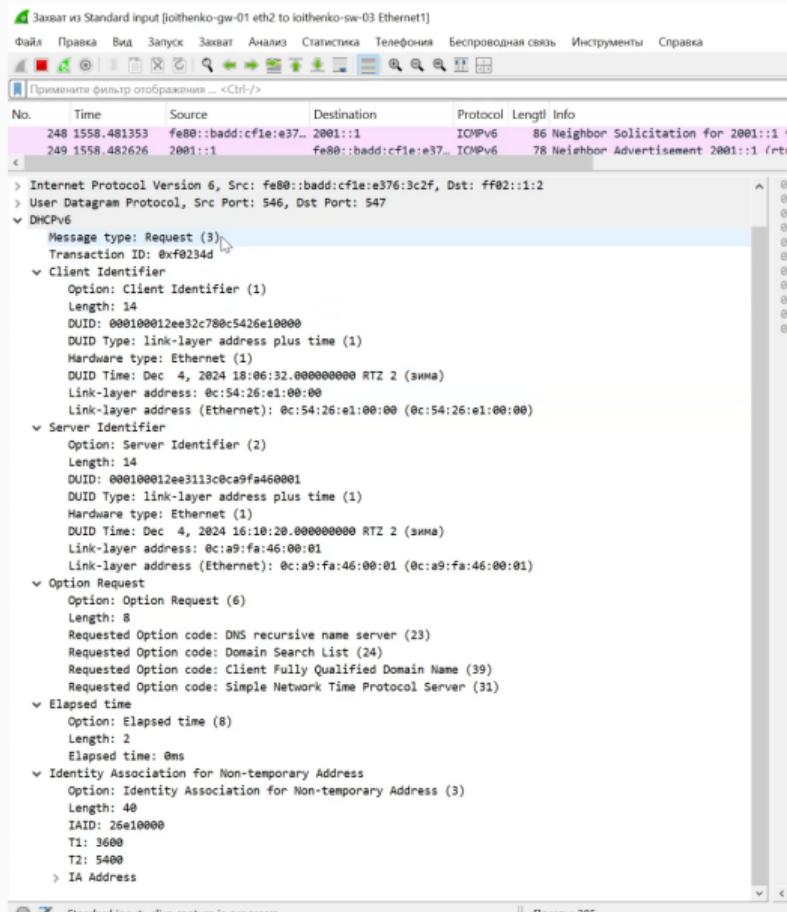


Рис. 27: Проверка захваченных анализатором трафика пакетов

Выводы

В ходе выполнения лабораторной работы я получила навыки настройки службы DHCP на сетевом оборудовании для распределения адресов IPv4 и IPv6.