

РОССИЙСКИЙ УНИВЕРСИТЕТ ДРУЖБЫ
НАРОДОВ

Факультет физико-математических и естественных
наукКафедра прикладной информатики и теории
вероятностей

ОТЧЕТ ПО ЛАБОРАТОРНОЙ РАБОТЕ № 7

дисциплина: Сетевые Технологии

Студент: Оулед

Салем Яссин

Группа:НПИбд-02-

20

МОСКВА

2022 г

Цель работы

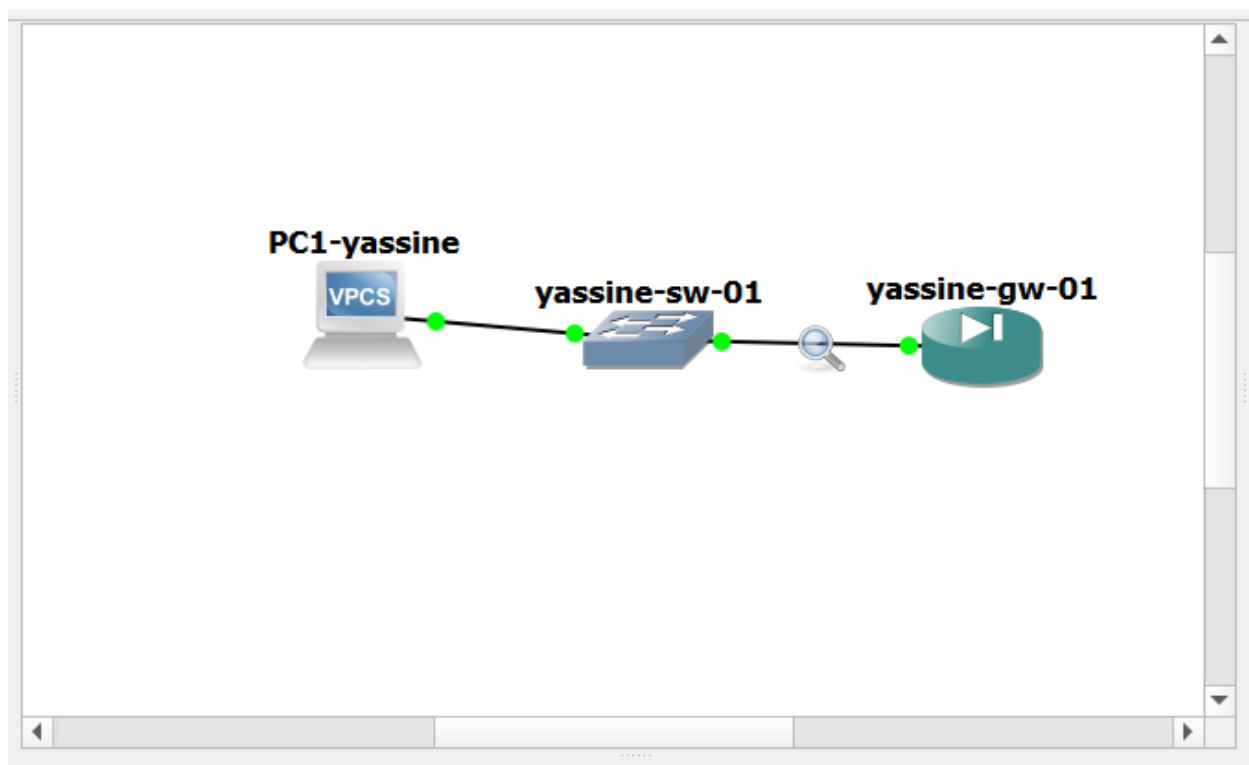
Получение навыков настройки службы DHCP на сетевом оборудовании для распределения адресов IPv4 и IPv6.

1.1-Задания для выполнения

1.2Настройка DHCP в случае IPv4

Порядок выполнения работы

1. Запустите GNS3 VM и GNS3. Создайте новый проект.
2. В рабочем пространстве разместите и соедините устройства в соответствии с топологией, приведённой на рис. 7.1. Используйте маршрутизатор VyOS и хост (клиент) VPCS.
- 3.Измените отображаемые названия устройств. Коммутаторам присвойте названия по принципу username-sw-0x, маршрутизаторам — по принципу username-gw-0x, VPCS — по принципу PCx-username, где вместо username укажите имя вашей учётной записи, вместо x — порядковый номер устройства.
4. Включите захват трафика на соединении между коммутатором sw-01 и маршрутизатором gw-01.



5. Настройте образ VyOS (для входа в систему используйте логин vyos и пароль vyos): – Установите систему на маршрутизаторы VyOS: `vyos@vyos:~$ install image` Далее ответьте на вопросы диалога установки. По завершении диалога перезапустите маршрутизатор, введя команду `reboot`. Королькова А. В., Кулябов Д. С.

– На маршрутизаторах перейдите в режим конфигурирования, измените имя устройства и доменное имя, замените системного пользователя, заданного по умолчанию, на вашего пользователя (вместо username укажите имя вашей учётной записи, вместо — пароль для доступа к устройству, например 123456 или любой другой):

```
K. This image will be named: yassine
copying squashfs image...
copying kernel and initrd images...
done!
  found the following configuration files:
    /opt/vyatta/etc/config/config.boot
    /opt/vyatta/etc/config.config.boot.default
Which one should I copy to sda? [/opt/vyatta/etc/config.config.boot]:

copying /opt/vyatta/etc/config.config.boot to sda.
Enter password for administrator account
Enter password for user 'vyos':
Repeat password for user 'vyos':
  need to install the GRUB boot loader.
  found the following drives on your system:
sda      8589MB
sdb      1MB

Which drive should GRUB modify the boot partition on? [sda]:

Setting up grub: OK
done!
vyos@vyos:~$
```

```
VyOS is a free software distribution that includes multiple components,
you can check individual component licenses under /usr/share/doc/*/copyright
Use of this pre-built image is governed by the EULA you can find at
/usr/share/vyos/EULA
vyos@vyos:~$ configure
[edit]
vyos@vyos# set system host-name yassine-gw-01
[edit]
vyos@vyos# set system domain-name yassine.net
[edit]
vyos@vyos# set system login user <yassine> authentication plaintext-password <12
3456>

Username contains illegal characters or
exceeds 100 character limitation.
Value validation failed
Set failed

[edit]
vyos@vyos# set system login user <yassine1> authentication plaintext-password <1
23456>

Configuration path: system login user <yassine1> authentication [plaintext-pas
sword] is not valid
Set failed

[edit]
vyos@vyos# set system login user yassine authentication plaintext-password 12345
6
[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 - yassine-gw-01 ttyS0

yassine-gw-01 login: yassine
Password:
```

```

Welcome to VyOS - yassine-gw-01 ttyS0

yassine-gw-01 login: yassine
Password:
Linux yassine-gw-01 5.4.156-amd64-vyos #1 SMP Thu Oct 28 18:19:14 UTC 2021 x86_64
Welcome to VyOS!

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

Visit https://support.vyos.io to create a support ticket.

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
Use of this pre-built image is governed by the EULA you can find at
/usr/share/vyos/EULA
yassine@yassine-gw-01:~$ configure
[edit]
yassine@yassine-gw-01# delete system login user vyos
[edit]
yassine@yassine-gw-01# commit
[edit]
yassine@yassine-gw-01# save
Saving configuration to '/config/config.boot'...
Done
[edit]
yassine@yassine-gw-01# █

```

6. На маршрутизаторе под созданным пользователем перейдите в режим конфигурирования и настройте адресацию IPv4: `username@username-gw-01# set interfaces ethernet eth0 address 10.0.0.1/24`

```

[edit]
yassine@yassine-gw-01# set interfaces ethernet eth0 address 10.0.0.1/24
[edit]
yassine@yassine-gw-01# █

```

7. Добавьте конфигурацию DHCP-сервера на маршрутизаторе (вместо username укажите имя вашей учётной записи):

```

[edit]
yassine@yassine-gw-01# set service dhcp-server shared-network-name yassine domain-name yassine.net
[edit]
yassine@yassine-gw-01# set service dhcp-server shared-network-name yassine name-server 10.0.0.1
[edit]
yassine@yassine-gw-01# set service dhcp-server shared-network-name yassine subnet 10.0.0.0/24 default-router 10.0.0.1
[edit]
[edit]
[edit]
t 10.0.0.0/24 range hosts start 10.0.0.2server shared-network-name yassine subnet
[edit]
t 10.0.0.0/24 range hosts stop 10.0.0.253r shared-network-name yassine subnet
[edit]
yassine@yassine-gw-01# commit
[edit]
yassine@yassine-gw-01# save
Saving configuration to '/config/config.boot'...
Done
[edit]
yassine@yassine-gw-01# exit
exit

```

8. Для просмотра статистики DHCP-сервера и выданных адресов используйте команды:

```

yassine@yassine-gw-01:~$ show dhcp server statistics
Pool      Size    Leases    Available  Usage
-----
yassine    252      0         252        0%
yassine@yassine-gw-01:~$ show dhcp server leases
IP address  Hardware address  State  Lease start  Lease expiration  Remaining  Pool
l  Hostname
-----
yassine@yassine-gw-01:~$ █

```

9. Настройте оконечное устройство PC1: PC1-username> ip dhcp -d PC1-username> save

```
PC1-yassine> ip dhcp -d
Opcode: 1 (REQUEST)
Client IP Address: 0.0.0.0
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 = Discover
Option 12: Host Name = PC1-yassine
Option 61: Client Identifier = Hardware Type=Ethernet MAC Address = 00:50:79:66:68:00
```

Оулед Салем Яссин (1032204121@pfu

```
Opcode: 1 (REQUEST)
Client IP Address: 0.0.0.0
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 = Discover
Option 12: Host Name = PC1-yassine
Option 61: Client Identifier = Hardware Type=Ethernet MAC Address = 00:50:79:66:68:00
```

```
Opcode: 2 (REPLY)
Client IP Address: 0.0.0.0
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 = Offer
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 = yassine.net
```

```
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 = PC1-yassine
```

```
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 = yassine.net
```

```
IP 10.0.0.2/24 GW 10.0.0.1
```

```
PC1-yassine> █
```

10. Проверьте конфигурацию IPv4 на узле, пропингуйте маршрутизатор: PC1-username> show ip
PC1-username> ping 10.0.0.1 -c 2

```
PC1-yassine> show ip

NAME       : PC1-yassine[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  : 86321, 86400/43200/75600
DOMAIN NAME : yassine.net
MAC        : 00:50:79:66:68:00
LPORT      : 20004
RHOST:PORT  : 127.0.0.1:20005
MTU        : 1500

PC1-yassine> ping 10.0.0.1 -c 2

84 bytes from 10.0.0.1 icmp_seq=1 ttl=64 time=0.935 ms
84 bytes from 10.0.0.1 icmp_seq=2 ttl=64 time=1.350 ms

PC1-yassine> █
```

11. На маршрутизаторе вновь посмотрите статистику DHCP-сервера и выданные адреса, в отчёте поясните полученную информацию:

username@username-gw-01\$ show dhcp server statistics

username@username-gw-01\$ show dhcp server leases

```
yassine@yassine-gw-01:~$ show dhcp server statistics
Pool      Size    Leases   Available  Usage
-----
yassine   252      1        251       0%
yassine@yassine-gw-01:~$ show dhcp server leases
IP address  Hardware address  State   Lease start      Lease expiration  Remaining
Pool        Hostname
-----
10.0.0.2    00:50:79:66:68:00 active   2022/10/22 08:26:17 2022/10/23 08:26:17 23:56:27
yassine PC1-yassine
yassine@yassine-gw-01:~$ █
```

12. На маршрутизаторе посмотрите журнал работы DHCP-сервера: username@username-gw-01\$ show log | grep dhcp

```

yassine@yassine-gw-01:~$ show log | grep dhcp
Oct 22 08:22:36 sudo[2799]: yassine : TTY=ttyS0 ; PWD=/home/yassine ; USER=root ; COMMAND=/usr
r/bin/sh -c /usr/sbin/vysshim /usr/libexec/vyos/conf_mode/dhcp_server.py
Oct 22 08:22:36 vyos-configd[686]: Received message: {"type": "node", "data": "/usr/libexec/vy
os/conf_mode/dhcp_server.py"}
Oct 22 08:22:37 dhcpd[2816]: Wrote 0 leases to leases file.
Oct 22 08:22:37 dhcpd[2816]: Lease file test successful, removing temp lease file: /config/dhc
pd.leases.1666426957
Oct 22 08:22:37 dhcpd[2818]: Wrote 0 leases to leases file.
Oct 22 08:22:37 dhcpd[2818]:
Oct 22 08:22:37 dhcpd[2818]: No subnet declaration for eth2 (no IPv4 addresses).
Oct 22 08:22:37 dhcpd[2818]: ** Ignoring requests on eth2. If this is not what
you want, please write a subnet declaration
Oct 22 08:22:37 dhcpd[2818]: in your dhcpd.conf file for the network segment
Oct 22 08:22:37 dhcpd[2818]: to which interface eth2 is attached. **
Oct 22 08:22:37 dhcpd[2818]:
Oct 22 08:22:37 dhcpd[2818]: No subnet declaration for eth1 (no IPv4 addresses).
Oct 22 08:22:37 dhcpd[2818]: ** Ignoring requests on eth1. If this is not what
you want, please write a subnet declaration
Oct 22 08:22:37 dhcpd[2818]: in your dhcpd.conf file for the network segment
Oct 22 08:22:37 dhcpd[2818]: to which interface eth1 is attached. **
Oct 22 08:22:37 dhcpd[2818]:
Oct 22 08:22:37 dhcpd[2818]: Server starting service.
Oct 22 08:23:34 sudo[2895]: yassine : TTY=ttyS0 ; PWD=/home/yassine ; USER=root ; COMMAND=/us
r/libexec/vyos/op_mode/show_dhcp.py --statistics
Oct 22 08:23:49 sudo[2921]: yassine : TTY=ttyS0 ; PWD=/home/yassine ; USER=root ; COMMAND=/us
r/libexec/vyos/op_mode/show_dhcp.py --leases
Oct 22 08:26:13 dhcpd[2818]: DHCPDISCOVER from 00:50:79:66:68:00 via eth0
Oct 22 08:26:14 dhcpd[2818]: DHCPPOFFER on 10.0.0.2 to 00:50:79:66:68:00 (PC1-yassine) via eth0
Oct 22 08:26:17 dhcpd[2818]: DHCPREQUEST for 10.0.0.2 (10.0.0.1) from 00:50:79:66:68:00 (PC1-y
assine) via eth0
Oct 22 08:26:17 dhcpd[2818]: DHCPACK on 10.0.0.2 to 00:50:79:66:68:00 (PC1-yassine) via eth0
Oct 22 08:29:37 sudo[2948]: yassine : TTY=ttyS0 ; PWD=/home/yassine ; USER=root ; COMMAND=/us
r/libexec/vyos/op_mode/show_dhcp.py --statistics
Oct 22 08:29:48 sudo[2974]: yassine : TTY=ttyS0 ; PWD=/home/yassine ; USER=root ; COMMAND=/us
r/libexec/vyos/op_mode/show_dhcp.py --leases
yassine@yassine-gw-01:~$

```

13. В отчёте проанализируйте захваченные анализатором трафика пакеты, относящиеся к работе DHCP и назначению адреса устройству.

Capture en cours de - [yassine-sw-01 Ethernet1 to yassine-sw-1 eth0]

Fichier Editer Vue Aller Capture Analyser Statistiques Telephonie Wireless Outils Aide

Appliquer un filtre d'affichage ... <Ctrl-/>

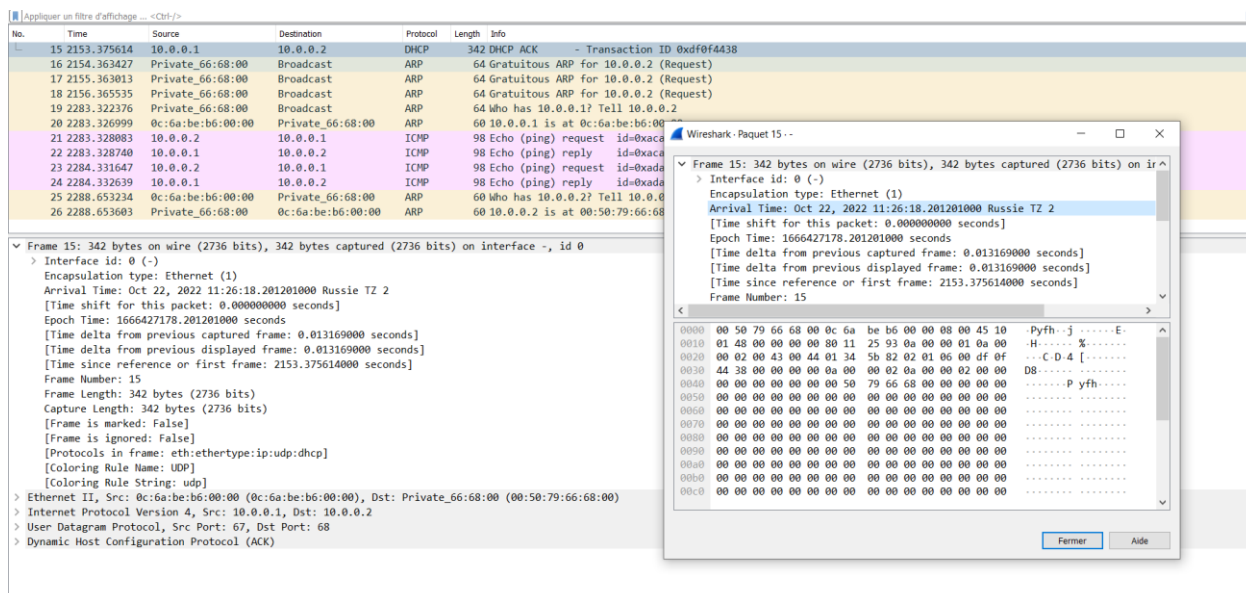
No.	Time	Source	Destination	Protocol	Length	Info
15	2153.375614	10.0.0.1	10.0.0.2	DHCP	342	DHCP ACK - Transaction ID 0xdf0f4438
16	2154.363427	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.0.2 (Request)
17	2155.363013	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.0.2 (Request)
18	2156.365535	Private_66:68:00	Broadcast	ARP	64	Gratuitous ARP for 10.0.0.2 (Request)
19	2283.322376	Private_66:68:00	Broadcast	ARP	64	Who has 10.0.0.1? Tell 10.0.0.2
20	2283.326999	0c:6a:be:b6:00:00	Private_66:68:00	ARP	60	10.0.0.1 is at 0c:6a:be:b6:00:00
21	2283.328083	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) request id=0xaca9, seq=1/256, ttl=64 (reply in 22)
22	2283.328740	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) reply id=0xaca9, seq=1/256, ttl=64 (request in 21)
23	2284.331647	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) request id=0xada9, seq=2/512, ttl=64 (reply in 24)
24	2284.332639	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) reply id=0xada9, seq=2/512, ttl=64 (request in 23)
25	2288.653234	0c:6a:be:b6:00:00	Private_66:68:00	ARP	60	Who has 10.0.0.2? Tell 10.0.0.1
26	2288.653603	Private_66:68:00	0c:6a:be:b6:00:00	ARP	60	10.0.0.2 is at 00:50:79:66:68:00

> Frame 21: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface -, id 0

> Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: 0c:6a:be:b6:00:00 (0c:6a:be:b6:00:00)

> Internet Protocol Version 4, Src: 10.0.0.2, Dst: 10.0.0.1

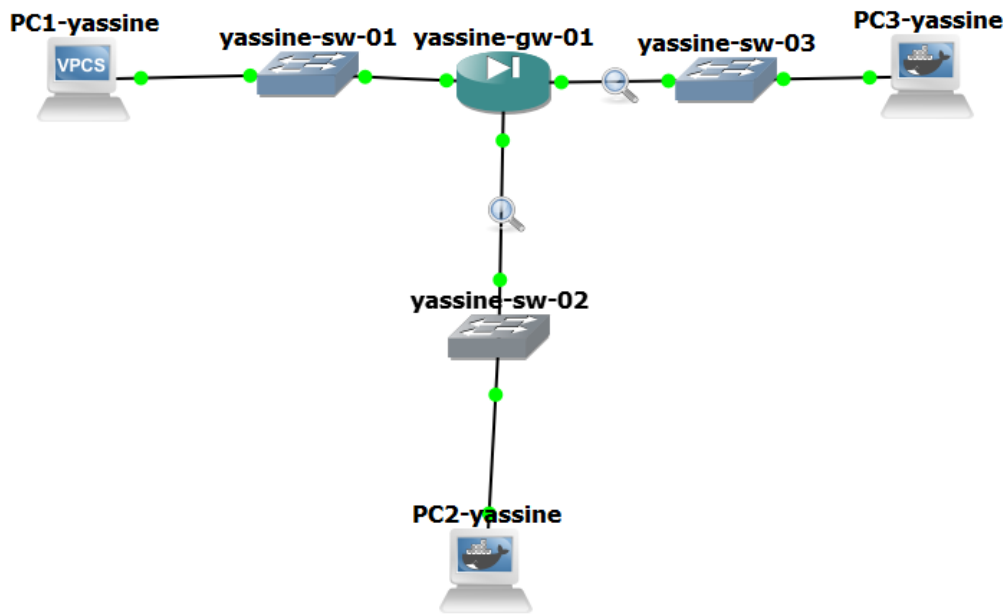
> Internet Control Message Protocol



• Настройка DHCP в случае IPv6

Порядок выполнения работы

1. В предыдущем проекте в рабочем пространстве дополните сеть, разместив и соединив устройства в соответствии с топологией, приведённой на рис. 7.2. Используйте хост (клиент) Kali Linux CLI (добавьте образ Kali Linux CLI в перечень устройств в GNS3), поскольку клиент VPCS не поддерживает DHCPv6.
2. Измените отображаемые названия устройств. Коммутаторам присвойте названия по принципу username-sw-0x, маршрутизаторам — по принципу username-gw-0x, VPCS — по принципу PCx-username, где вместо username укажите имя вашей учётной записи, вместо x — порядковый номер устройства.
3. Включите захват трафика на соединениях между маршрутизатором gw-01 и коммутаторами sw-02 и sw-03.



4. Настройте адресацию IPv6 на маршрутизаторе:

```

yassine@yassine-gw-01:~$ configure
[edit]
yassine@yassine-gw-01# set interfaces ethernet eth1 address 2000::1/64
[edit]
yassine@yassine-gw-01# set interfaces ethernet eth2 address 2001::1/64
[edit]
yassine@yassine-gw-01# show interfaces
    ethernet eth0 {
        address 10.0.0.1/24
        hw-id 0c:6a:be:b6:00:00
    }
    ethernet eth1 {
+   address 2000::1/64
        hw-id 0c:6a:be:b6:00:01
    }
    ethernet eth2 {
+   address 2001::1/64
        hw-id 0c:6a:be:b6:00:02
    }
    loopback lo {
    }
[edit]
yassine@yassine-gw-01# commit
[edit]
yassine@yassine-gw-01# saves

    Invalid command: [saves]

[edit]
yassine@yassine-gw-01# save
Saving configuration to '/config/config.boot'...
Done
[edit]
yassine@yassine-gw-01#

```

5. На маршрутизаторе настройте DHCPv6 без отслеживания состояния (DHCPv6 Stateless configuration):

– Настройка объявлен

```
[edit]
yassine@yassine-gw-01# set service router-advert interface eth1 prefix 2000::/64
[edit]
yassine@yassine-gw-01# set service router-advert interface eth1 other-config-fla
(g
[edit]
yassine@yassine-gw-01#
```

– Добавление конфигурации DHCP-сервера (вместо username укажите имя вашей учётной записи):

```
Configuration path: [service router-advert] already exists
[edit]
yassine@yassine-gw-01# set service router-advert interfaces eth1 prefix 2000::/6
#
Configuration path: service router-advert [interfaces] is not valid
Set failed
[edit]
yassine@yassine-gw-01# set service router-advert interface eth1 prefix 2000::/64
Configuration path: [service router-advert interface eth1 prefix 2000::/64] al
ready exists
[edit]
yassine@yassine-gw-01# set service router-advert interface eth1 other-config-fla
#
Configuration path: [service router-advert interface eth1 other-config-flag] a
ready exists
[edit]
yassine@yassine-gw-01# set service dhcpv6-server shared-network-name yassine-sta
teless
Configuration path: [dervice] is not valid
Set failed
[edit]
yassine@yassine-gw-01# set service dhcpv6-server shared-network-name yassine-sta
teless
Configuration path: [service dhcpv6-server shared-network-name yassine-statele
ss] already exists
[edit]
yassine@yassine-gw-01# set service dhcpv6-server shared-network-name yassine-sta
teless subnet 2000::0/64
Configuration path: [service dhcpv6-server shared-network-name yassine-statele
ss subnet 2000::0/64] already exists
[edit]
yassine@yassine-gw-01# set service dhcpv6-server shared-network-name yassine-sta
teless common-options name-server 2000::1
[edit]
```

```

[[service dhcpv6-server]] failed
Commit failed
[edit]
yassine@yassine-gw-01# save
Warning: you have uncommitted changes that will not be saved.

Saving configuration to '/config/config.boot'...
Done
[edit]
yassine@yassine-gw-01# run show configuration
interfaces {
    ethernet eth0 {
        address 10.0.0.1/24
        hw-id 0c:6a:be:b6:00:00
    }
    ethernet eth1 {
        address 2000::1/64
        hw-id 0c:6a:be:b6:00:01
    }
    ethernet eth2 {
        address 2001::1/64
        hw-id 0c:6a:be:b6:00:02
    }
    loopback lo {
    }
}
service {
    dhcp-server {
        shared-network-name yassine {
            domain-name yassine.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
                }
            }
        }
    }
}
:

```

6. На узле PC2 проверьте настройки сети: root@PC2-username:/# ifconfig root@PC2-username:/# route -n -A inet6

```

PC2-yassine console is now available... Press RETURN to get started.
root@PC2-yassine:/# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet6 2000::d8ca:daff:fe25:3768 prefixlen 64 scopeid 0x0<global>
    inet6 fe80::d8ca:daff:fe25:3768 prefixlen 64 scopeid 0x20<link>
    ether da:ca:da:25:37:68 txqueuelen 1000 (Ethernet)
    RX packets 8 bytes 968 (968.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 14 bytes 1092 (1.0 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet6 fe80::7034:44ff:fed6:27c1 prefixlen 64 scopeid 0x20<link>
    ether 72:34:44:d6:27:c1 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

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    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

root@PC2-yassine:/# route -n -A inet6
Kernel IPv6 routing table

```

Destination	Next Hop	Flag	Met	Ref	Use	If
2000::/64	::	UAe	256	1	0	eth0
fe80::/64	::	U	256	1	0	eth0
fe80::/64	::	U	256	1	0	eth1
::/0	fe80::e6a:bef:f6b6:1	UGDAe	1024	1	0	eth
0						
::1/128	::	Un	0	3	0	lo
2000::d8ca:daff:fe25:3768/128	::	Un	0	2	0	eth0
fe80::7034:44ff:fed6:27c1/128	::	Un	0	3	0	eth1
fe80::d8ca:daff:fe25:3768/128	::	Un	0	2	0	eth0
ff00::/8	::	U	256	3	0	eth0
ff00::/8	::	U	256	1	0	eth1
::/0	::	!n	-1	1	0	lo

```

root@PC2-yassine:/#

```

7. На узле PC2 пропикуйте маршрутизатор: root@PC2-username:/# ping 2000::1 -c 2

```

root@PC2-yassine:/# ping 2000::1 -c 2
PING 2000::1(2000::1) 56 data bytes
64 bytes from 2000::1: icmp_seq=1 ttl=64 time=19.1 ms
64 bytes from 2000::1: icmp_seq=2 ttl=64 time=1.49 ms

--- 2000::1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 1.499/10.319/19.140/8.821 ms
root@PC2-yassine:/#

```

8. На узле PC2 проверьте настройки DNS: root@PC2-username:/# cat /etc/resolv.conf

```

root@PC2-yassine:/# cat /etc/resolv.conf

```

9. На узле PC2 получите адрес по DHCPv6: root@PC2-username:/# dhclient -6 -S -v eth0

```
root@PC2-yassine:/# cat /etc/resolv.conf
root@PC2-yassine:/# dhclient -6 -S -v eth0
Internet Systems Consortium DHCP Client 4.3.5
Copyright 2004-2016 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\332\312\332%7h".
PRC: Requesting information (INIT).
XMT: Forming Info-Request, 0 ms elapsed.
XMT: Info-Request on eth0, interval 970ms.
XMT: Forming Info-Request, 970 ms elapsed.
XMT: Info-Request on eth0, interval 1900ms.
XMT: Forming Info-Request, 2870 ms elapsed.
XMT: Info-Request on eth0, interval 3910ms.
XMT: Forming Info-Request, 6780 ms elapsed.
XMT: Info-Request on eth0, interval 7570ms.
XMT: Forming Info-Request, 14370 ms elapsed.
XMT: Info-Request on eth0, interval 14770ms.
XMT: Forming Info-Request, 29150 ms elapsed.
XMT: Info-Request on eth0, interval 28620ms.

XMT: Forming Info-Request, 57800 ms elapsed.
XMT: Info-Request on eth0, interval 55600ms.
```

13. На маршрутизаторе настройте DHCPv6 с отслеживанием состояния (DHCPv6 Stateful configuration):

```

yassine@yassine-gw-01# set service router-advert interface eth2 managed-flag
[edit]
yassine@yassine-gw-01# set service dhcpv6-server shared-network-name yassine-sta
teful
[edit]
yassine@yassine-gw-01# set service dhcpv6-server shared-network-name yassine-sta
teful subnet 2001::0/64
[edit]
yassine@yassine-gw-01# set service dhcpv6-server shared-network-name yassine-sta
teful subnet 2001::0/64 name-server 2001::1
[edit]
yassine@yassine-gw-01# set service dhcpv6-server shared-network-name yassine-sta
teful subnet 2001::0/64 domain-search yassine.net
[edit]
yassine@yassine-gw-01# set service dhcpv6-server shared-network-name yassine-sta
teful subnet 2001::0/64 address-range start 2001::100 stop 2001::199

Configuration path: service dhcpv6-server shared-network-name yassine-stateful
subnet 2001::0/64 [address-range] is not valid
Set failed

[edit]
yassine@yassine-gw-01# set service dhcpv6-server shared-network-name yassine-sta
teful subnet 2001::0/64 address-range start 2001::100 stop 2001::199
[edit]
yassine@yassine-gw-01# commit
[ service dhcpv6-server ]
No DHCPv6 lease subnets configured for "use_". At least one
lease subnet must be configured for each shared network!

[[service dhcpv6-server]] failed
Commit failed
[edit]
yassine@yassine-gw-01# save
Warning: you have uncommitted changes that will not be saved.

Saving configuration to '/config/config.boot'...
Done
[edit]
yassine@yassine-gw-01#

```

14. На маршрутизаторе посмотрите статистику DHCP-сервера и выданные адреса:

```
username@username-gw-01# run show dhcpv6 server leases
```

15. Подключитесь к узлу PC3 и проверьте настройки сети: root@PC3-username:/# ifconfig

```
root@PC3-username:/# route -n -A inet6
```

ВЫВОД

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