Лабораторная работа №12

Настройки сети в Linux

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Цель работы

Основная цель

Получение навыков настройки сетевых параметров системы в Linux с использованием инструментов **ip**, **nmcli**, **nmtui** и **NetworkManager**.

Ход выполнения работы

Проверка конфигурации сети

```
raliev@raliev:~$ su
Password:
root@raliev:/home/raliev# ip -s link
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    RX:  bytes packets errors dropped  missed   mcast
          2520      24      0       0       0       0
    TX:  bytes packets errors dropped carrier collsns
          2520      24      0       0       0       0
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP mode DEFAULT group default qlen 1000
    link/ether 08:00:27:69:60:25 brd ff:ff:ff:ff:ff:ff
    RX:  bytes packets errors dropped  missed   mcast
     150763660  110780      0       0       0       3
    TX:  bytes packets errors dropped carrier collsns
       2036247   33425      0       0       0       0
    altname enx080027696025
root@raliev:/home/raliev#
root@raliev:/home/raliev# ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:69:60:25 brd ff:ff:ff:ff:ff:ff
    altname enx080027696025
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
       valid_lft 85560sec preferred_lft 85560sec
    inet6 fd17:625c:f037:2:a00:27ff:fe69:6025/64 scope global dynamic noprefixroute
       valid_lft 85887sec preferred_lft 13887sec
    inet6 fe80::a00:27ff:fe69:6025/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
root@raliev:/home/raliev#
```

Проверка подключения к Интернету

```
root@raliev:/home/raliev# ip route show
default via 10.0.2.2 dev enp0s3 proto dhcp src 10.0.2.15 metric 100
10.0.2.0/24 dev enp0s3 proto kernel scope link src 10.0.2.15 metric 100
root@raliev:/home/raliev#
root@raliev:/home/raliev# ping -c 4 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=255 time=21.8 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=22.2 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=22.6 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=21.7 ms

--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3023ms
rtt min/avg/max/mdev = 21.727/22.079/22.608/0.355 ms
root@raliev:/home/raliev#
```

Рис. 2: Проверка соединения с Интернетом (ping)

Добавление дополнительного IP-адреса

```
root@raliev:/home/raliev# ip addr add 10.0.0.10/24 dev enp0s3
root@raliev:/home/raliev# ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:69:60:25 brd ff:ff:ff:ff:ff:ff
    altname enx080027696025
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
       valid_lft 85329sec preferred_lft 85329sec
    inet 10.0.0.10/24 scope global enp0s3
       valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:a00:27ff:fe69:6025/64 scope global dynamic noprefixroute
       valid_lft 86234sec preferred_lft 14234sec
    inet6 fe80::a00:27ff:fe69:6025/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
root@raliev:/home/raliev#
```

Рис. 3: Добавление IP-адреса

Сравнение ip и ifconfig

```
root@raliev:/home/raliev# ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::a00:27ff:fe69:6025  prefixlen 64  scopeid 0x20<link>
        inet6 fd17:625c:f037:2:a00:27ff:fe69:6025  prefixlen 64  scopeid 0x0<global>
        ether 08:00:27:69:60:25  txqueuelen 1000  (Ethernet)
        RX packets 110804  bytes 150765768 (143.7 MiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 33456  bytes 2039241 (1.9 MiB)
        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 24  bytes 2520 (2.4 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 24  bytes 2520 (2.4 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

root@raliev:/home/raliev#
```

Рис. 4: Вывод ifconfig

Просмотр активных портов

```
root@raliev:/home/raliev# ss -tul
Netid         State          Recv-Q         Send-Q                 Local Address:Port                  Peer Address:Port
udp           UNCONN         0              0                          127.0.0.1:323                      0.0.0.0:*
udp           UNCONN         0              0                            0.0.0.0:mdns                     0.0.0.0:*
udp           UNCONN         0              0                              [::1]:323                        [::]:*
udp           UNCONN         0              0                              [::]:mdns                        [::]:*
tcp           LISTEN         0              128                          0.0.0.0:ssh                      0.0.0.0:*
tcp           LISTEN         0              4096                       127.0.0.1:ipp                      0.0.0.0:*
tcp           LISTEN         0              32                               *:ftp                            *:*
tcp           LISTEN         0              128                            [::]:ssh                         [::]:*
tcp           LISTEN         0              511                              *:http                           *:*
tcp           LISTEN         0              4096                             *:websm                          *:*
tcp           LISTEN         0              4096                         [::1]:ipp                          [::]:*
root@raliev:/home/raliev#
```

Рис. 5: Список портов TCP и UDP

Управление подключениями через nmcli

Список подключений

```
root@raliev:/home/raliev# nmcli connection show
NAME    UUID                                  TYPE      DEVICE
enp0s3  2e1628ec-d0a2-3ec3-831d-d65a68979f5d  ethernet  enp0s3
lo      282e1873-808c-44b6-b5e8-66479bbe674f  loopback  lo
root@raliev:/home/raliev# nmcli connection add con-name "dhcp" type ethernet ifname enp0s3
Connection 'dhcp' (8880098d-b1db-4bc5-af5a-c90262371c06) successfully added.
root@raliev:/home/raliev# nmcli connection add con-name "static" ifname enp0s3 autoconnect no type ethernet ip4 10.0.0.10/24 gw
4 10.0.0.1 ifname enp0s3
Connection 'static' (7240cf69-237f-428c-bfbc-beb062c788ba) successfully added.
root@raliev:/home/raliev# nmcli connection show
NAME    UUID                                  TYPE      DEVICE
enp0s3  2e1628ec-d0a2-3ec3-831d-d65a68979f5d  ethernet  enp0s3
lo      282e1873-808c-44b6-b5e8-66479bbe674f  loopback  lo
dhcp    8880098d-b1db-4bc5-af5a-c90262371c06  ethernet  --
static  7240cf69-237f-428c-bfbc-beb062c788ba  ethernet  --
root@raliev:/home/raliev#
```

Рис. 6: Список существующих подключений

Активация статического соединения

```
root@raliev:/home/raliev#
root@raliev:/home/raliev# nmcli connection up static
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/3)
root@raliev:/home/raliev# nmcli connection show
NAME    UUID                                  TYPE      DEVICE
static  7240cf69-237f-428c-bfbc-beb062c788ba  ethernet  enp0s3
lo      282e1873-808c-44b6-b5e8-66479bbe674f  loopback  lo
dhcp    8880098d-b1db-4bc5-af5a-c90262371c06  ethernet  --
enp0s3  2e1628ec-d0a2-3ec3-831d-d65a68979f5d  ethernet  --
root@raliev:/home/raliev# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:69:60:25 brd ff:ff:ff:ff:ff:ff
    altname enx080027696025
    inet 10.0.0.10/24 brd 10.0.0.255 scope global noprefixroute enp0s3
       valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:924b:315e:5442:4920/64 scope global dynamic noprefixroute
       valid_lft 86397sec preferred_lft 14397sec
    inet6 fe80::d9ef:4ec9:ca8c:3d6e/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
root@raliev:/home/raliev#
```

Рис. 7: Активация static и проверка IP

Переключение обратно на DHCP

```
root@raliev:/home/raliev# nmcli connection up dhcp
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/4)
root@raliev:/home/raliev# nmcli connection show
NAME    UUID                                  TYPE      DEVICE
dhcp    8880098d-b1db-4bc5-af5a-c90262371c06  ethernet  enp0s3
lo      282e1873-808c-44b6-b5e8-66479bbe674f  loopback  lo
enp0s3  2e1628ec-d0a2-3ec3-831d-d65a68979f5d  ethernet  --
static  7240cf69-237f-428c-bfbc-beb062c788ba  ethernet  --
root@raliev:/home/raliev# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:69:60:25 brd ff:ff:ff:ff:ff:ff
    altname enx080027696025
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
       valid_lft 86396sec preferred_lft 86396sec
    inet6 fd17:625c:f037:2:89d3:2c18:4a1b:690c/64 scope global dynamic noprefixroute
       valid_lft 86398sec preferred_lft 14398sec
    inet6 fe80::356a:4235:1b83:b0ff/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
root@raliev:/home/raliev#
```

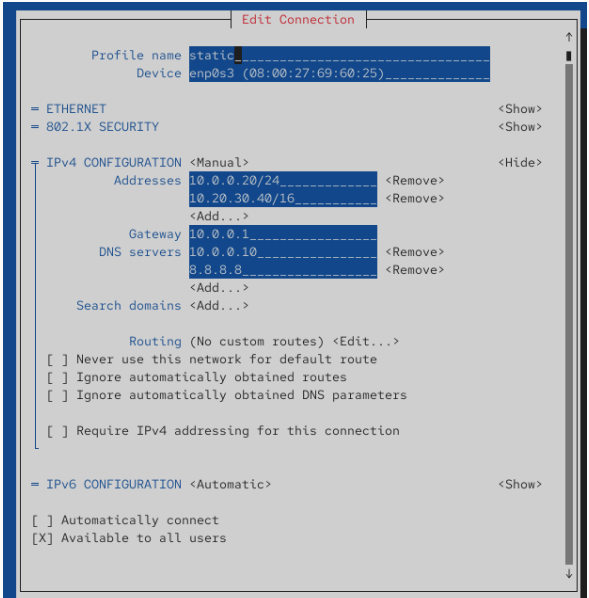
Рис. 8: Активация dhcp-подключения

Настройка параметров профиля static

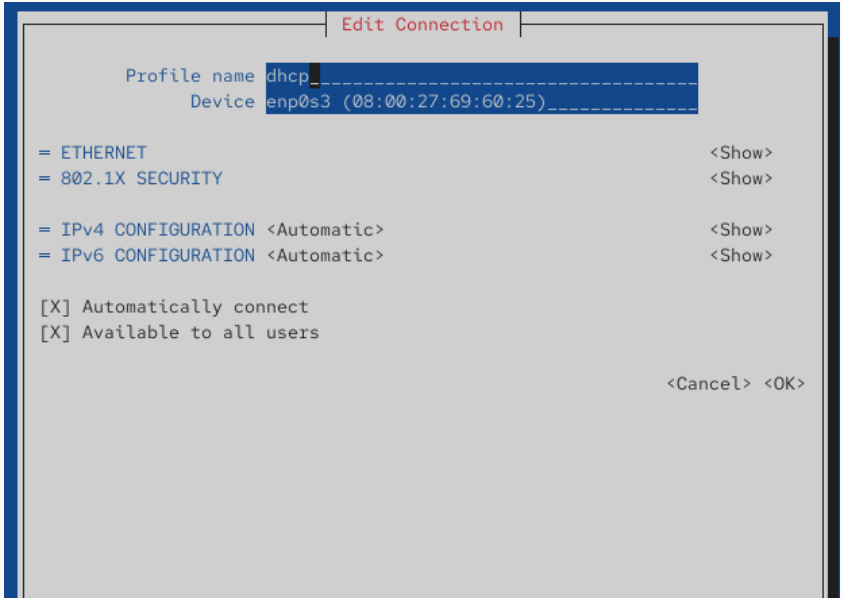
```
root@raliev:/home/raliev# nmcli connection modify "static" connection.autoconnect no
root@raliev:/home/raliev# nmcli connection modify "static" ipv4.dns 10.0.0.10
root@raliev:/home/raliev# nmcli connection modify "static" +ipv4.dns 8.8.8.8
root@raliev:/home/raliev# nmcli connection modify "static" ipv4.addresses 10.0.0.20/24
root@raliev:/home/raliev# nmcli connection modify "static" +ipv4.addresses 10.20.30.40/16
root@raliev:/home/raliev# nmcli connection up static
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/5)
root@raliev:/home/raliev# nmcli connection show
NAME    UUID                                  TYPE      DEVICE
static  7240cf69-237f-428c-bfbc-beb062c788ba  ethernet  enp0s3
lo      282e1873-808c-44b6-b5e8-66479bbe674f  loopback  lo
dhcp    8880098d-b1db-4bc5-af5a-c90262371c06  ethernet  --
enp0s3  2e1628ec-d0a2-3ec3-831d-d65a68979f5d  ethernet  --
root@raliev:/home/raliev# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:69:60:25 brd ff:ff:ff:ff:ff:ff
    altname enx080027696025
    inet 10.0.0.20/24 brd 10.0.0.255 scope global noprefixroute enp0s3
       valid_lft forever preferred_lft forever
    inet 10.20.30.40/16 brd 10.20.255.255 scope global noprefixroute enp0s3
       valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:924b:315e:5442:4920/64 scope global dynamic noprefixroute
       valid_lft 86383sec preferred_lft 14383sec
    inet6 fe80::d9ef:4ec9:ca8c:3d6e/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
root@raliev:/home/raliev#
```

Рис. 9: Изменение параметров соединения

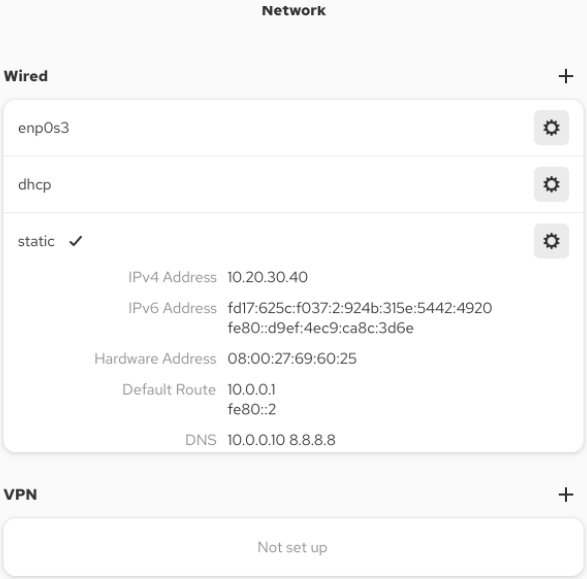
Редактирование в nmtui



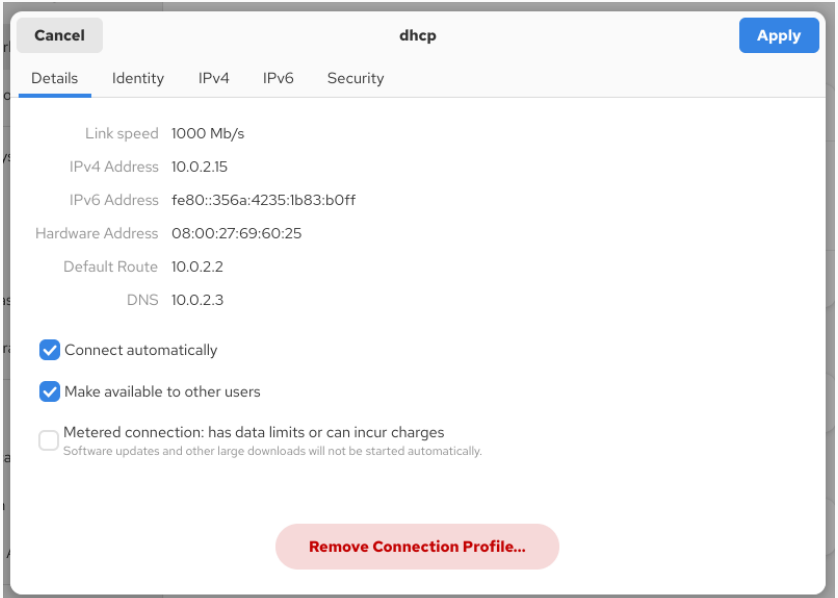
Профиль dhcp в nmtui



Проверка в графическом интерфейсе



Проверка в графическом интерфейсе



Итоги работы

Вывод

В ходе лабораторной работы были освоены методы настройки сети в Linux.

Рассмотрены способы конфигурирования сетевых параметров с помощью **ip**, **nmcli** и **nmtui**, а также управление профилями **NetworkManager**.

Изучены процедуры добавления статических и динамических IP-адресов, настройки DNS и шлюзов, а также проверка состояния соединений и маршрутов.