

Презентация по лабораторной работе №12

Настройки сети в Linux

Анна Саенко

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Российский университет дружбы народов, Москва, Россия

Цели и задачи работы

Получить практические навыки настройки сетевых параметров и управления сетевыми подключениями в Linux.

- 1 Проверить конфигурацию сети с помощью команд `ip` и `ifconfig`
- 2 Настроить подключение к интернету и проверить его работу
- 3 Создать и изменить сетевые соединения с помощью `nmcli`
- 4 Управлять параметрами IP-адресации, DNS и шлюзов
- 5 Изучить графические инструменты `nmtui` и интерфейс NetworkManager

Ход выполнения работы

Проверка конфигурации сети

```
aasaenko@aasaenko:~$ su
Password:
root@aasaenko:/home/aasaenko#
root@aasaenko:/home/aasaenko# 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
         2130      18      0      0      0      0
    TX:  bytes packets errors dropped carrier collsns
         2130      18      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:c9:fb:06 brd ff:ff:ff:ff:ff:ff
    RX:  bytes packets errors dropped missed mcast
         14810     107      0      0      0      2
    TX:  bytes packets errors dropped carrier collsns
         15783     159      0      0      0      0
        altnames enx080027c9fb06
root@aasaenko:/home/aasaenko# 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@aasaenko:/home/aasaenko#
root@aasaenko:/home/aasaenko# 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:c9:fb:06 brd ff:ff:ff:ff:ff:ff
    altnames enx080027c9fb06
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86289sec preferred_lft 86289sec
    inet6 fd17:625c:f037:2:a00:27ff:fec9:fb06/64 scope global dynamic noprefixroute
        valid_lft 86290sec preferred_lft 14290sec
    inet6 fe80::a00:27ff:fec9:fb06/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@aasaenko:/home/aasaenko#
```

Рис. 1: Информация о сетевых интерфейсах

```
root@aasaenko: /home/aasaenko# 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=21.4 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=21.7 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=21.9 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=21.5 ms

--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3014ms
rtt min/avg/max/mdev = 21.411/21.649/21.921/0.194 ms
root@aasaenko: /home/aasaenko#
```

Рис. 2: Просмотр таблицы маршрутизации

Проверка маршрутов и IP-адресов

```
root@aasaenko:/home/aasaenko# ip addr add 10.0.0.10/24 dev enp0s3
root@aasaenko:/home/aasaenko# 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:c9:fb:06 brd ff:ff:ff:ff:ff:ff
    altname enx080027c9fb06
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86085sec preferred_lft 86085sec
    inet 10.0.0.10/24 scope global enp0s3
        valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:a00:27ff:fec9:fb06/64 scope global dynamic noprefixroute
        valid_lft 86315sec preferred_lft 14315sec
    inet6 fe80::a00:27ff:fec9:fb06/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@aasaenko:/home/aasaenko#
```

Рис. 3: Добавление дополнительного IP-адреса

Проверка подключения к сети

```
root@aasaenko:/home/aasaenko# 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 fd17:625c:f037:2:a00:27ff:fec9:fb06 prefixlen 64 scopeid 0x0<global>
    inet6 fe80::a00:27ff:fec9:fb06 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:c9:fb:06 txqueuelen 1000 (Ethernet)
    RX packets 283 bytes 81648 (79.7 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 321 bytes 33138 (32.3 KiB)
    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 18 bytes 2130 (2.0 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 18 bytes 2130 (2.0 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@aasaenko:/home/aasaenko#
```

Рис. 4: Проверка подключения к Интернету

Управление подключениями через nmcli

```
root@aasaenko:/home/aasaenko#  
root@aasaenko:/home/aasaenko# nmcli connection show  
NAME      UUID                                  TYPE      DEVICE  
enp0s3    69930629-f77c-3b58-b77e-35a3fa00d581  ethernet  enp0s3  
lo        5578b055-5912-4dcc-b9a1-855fe2bca648  loopback  lo  
root@aasaenko:/home/aasaenko#  
root@aasaenko:/home/aasaenko# nmcli connection add con-name "dhcp" type ethernet ifname enp0s3  
Connection 'dhcp' (18d788c6-5fb5-4554-8602-b9372457860f) successfully added.  
root@aasaenko:/home/aasaenko#  
root@aasaenko:/home/aasaenko# nmcli connection add con-name "static" ifname enp0s3 autoconnect no type ethernet ip4 10.0.0.10 gw4 10.0.0.1 i  
fname enp0s3  
Connection 'static' (0ebc5767-8a83-4c8b-a9ad-b16f47543f6f) successfully added.  
root@aasaenko:/home/aasaenko#  
root@aasaenko:/home/aasaenko# nmcli connection show  
NAME      UUID                                  TYPE      DEVICE  
enp0s3    69930629-f77c-3b58-b77e-35a3fa00d581  ethernet  enp0s3  
lo        5578b055-5912-4dcc-b9a1-855fe2bca648  loopback  lo  
dhcp      18d788c6-5fb5-4554-8602-b9372457860f  ethernet  --  
static    0ebc5767-8a83-4c8b-a9ad-b16f47543f6f  ethernet  --  
root@aasaenko:/home/aasaenko#
```

Рис. 5: Создание соединений dhcp и static

Переключение между типами соединений

```
root@aasaenko:/home/aasaenko#
root@aasaenko:/home/aasaenko# nmcli connection up static
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/3)
root@aasaenko:/home/aasaenko# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
static    0ebc5767-8a83-4c8b-a9ad-b16f47543f6f ethernet  enp0s3
lo        5578b055-5912-4dcc-b9a1-855fe2bca648 loopback  lo
dhcp      18d788c6-5fb5-4554-8602-b9372457860f ethernet  --
enp0s3    69930629-f77c-3b58-b77e-35a3fa00d581 ethernet  --
root@aasaenko:/home/aasaenko# 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:c9:fb:06 brd ff:ff:ff:ff:ff:ff
    altname enx080027c9fb06
    inet 10.0.0.10/24 brd 10.0.0.255 scope global noprefixroute enp0s3
        valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:21be:d9d:7946:9be1/64 scope global dynamic noprefixroute
        valid_lft 86396sec preferred_lft 14396sec
    inet6 fe80::2617:2389:f692:1055/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@aasaenko:/home/aasaenko#
```

Рис. 6: Активация и проверка статического соединения

Переключение между типами соединений

```
root@aasaenko:/home/aasaenko#
root@aasaenko:/home/aasaenko# nmcli connection up dhcp
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/4)
root@aasaenko:/home/aasaenko# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
dhcp      18d788c6-5fb5-4554-8602-b9372457860f  ethernet  enp0s3
lo        5578b055-5912-4dcc-b9a1-855fe2bca648  loopback  lo
enp0s3    69930629-f77c-3b58-b77e-35a3fa00d581  ethernet  --
static    0ebc5767-8a83-4c8b-a9ad-b16f47543f6f  ethernet  --
root@aasaenko:/home/aasaenko# 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:c9:fb:06 brd ff:ff:ff:ff:ff:ff
    altname enx080027c9fb06
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86389sec preferred_lft 86389sec
    inet6 fd17:625c:f037:2:b16a:7e23:b524:7b8e/64 scope global dynamic noprefixroute
        valid_lft 86391sec preferred_lft 14391sec
    inet6 fe80::fea3:da0a:1610:5912/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@aasaenko:/home/aasaenko#
```

Рис. 7: Переключение обратно на dhcp

Изменение параметров соединения

```
root@aasaenko:/home/aasaenko#
root@aasaenko:/home/aasaenko# nmcli connection modify static connection.autoconnect no
root@aasaenko:/home/aasaenko# nmcli connection modify static ipv4.dns 10.0.0.10
root@aasaenko:/home/aasaenko# nmcli connection modify static +ipv4.dns 8.8.8.8
root@aasaenko:/home/aasaenko# nmcli connection modify static ipv4.addresses 10.0.0.20/24
root@aasaenko:/home/aasaenko# nmcli connection modify static +ipv4.addresses 10.20.30.40/16
root@aasaenko:/home/aasaenko# nmcli connection up static
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/5)
root@aasaenko:/home/aasaenko# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
static    0ebc5767-8a83-4c8b-a9ad-b16f47543f6f ethernet  enp0s3
lo        5578b055-5912-4dcc-b9a1-855fe2bca648 loopback  lo
dhcp      18d788c6-5fb5-4554-8602-b9372457860f ethernet  --
enp0s3    69930629-f77c-3b58-b77e-35a3fa00d581 ethernet  --
root@aasaenko:/home/aasaenko#
root@aasaenko:/home/aasaenko# 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:c9:fb:06 brd ff:ff:ff:ff:ff:ff
    altname enx080027c9fb06
    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:f037:2:21be:d9d:7946:9be1/64 scope global dynamic noprefixroute
        valid_lft 86388sec preferred_lft 14388sec
    inet6 fe80::2617:2389:f692:1055/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@aasaenko:/home/aasaenko#
```

Рис. 8: Изменение параметров соединения с помощью nmcli

Просмотр конфигурации через nmtui

Edit Connection

Profile name static

Device enp0s3 (08:00:27:C9:FB:06)

= ETHERNET <Show>

= 802.1X SECURITY <Show>

= IPv4 CONFIGURATION <Manual> <Hide>

Addresses 10.0.0.20/24 <Remove>

10.20.30.40/16 <Remove>

<Add...>

Gateway 10.0.0.1

DNS servers 10.0.0.10 <Remove>

8.8.8.8 <Remove>

<Add...>

Search domains <Add...>

Routing (No custom routes) <Edit...>

[] Never use this network for default route

[] Ignore automatically obtained routes

[] Ignore automatically obtained DNS parameters

[] Require IPv4 addressing for this connection

= IPv6 CONFIGURATION <Automatic> <Show>

[] Automatically connect

[X] Available to all users

<Cancel> <OK>

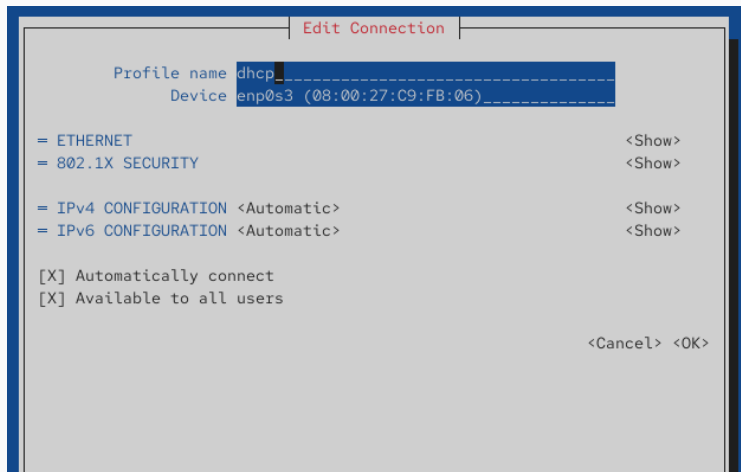


Рис. 10: Просмотр настроек соединения dhcp через nmtui

Просмотр конфигурации в графическом интерфейсе

Cancel

static

Apply

Details Identity **IPv4** IPv6 Security

IPv4 Method

☐ Automatic (DHCP)

☒ Manual

☐ Shared to other computers

☐ Link-Local Only

☐ Disable

Addresses

Address	Netmask	Gateway	
10.0.0.20	255.255.255.0	10.0.0.1	ⓧ
10.20.30.40	255.255.0.0		ⓧ
			ⓧ

DNS

Automatic ☒

10.0.0.10, 8.8.8.8

Separate IP addresses with commas

Routes

Automatic ☒

Address	Netmask	Gateway	Metric	
				ⓧ

Use this connection only for resources on its network

Выводы по проделанной работе

В ходе лабораторной работы были освоены:

- управление сетевыми интерфейсами и IP-адресами;
- настройка статических и динамических соединений с помощью `nmcli`;
- изменение параметров сети, DNS и шлюзов;
- использование интерфейсов `nmtui` и графических инструментов NetworkManager.

Полученные навыки позволили уверенно выполнять настройку и диагностику сетевых подключений в системах Linux.