

# Лабораторная работа №12

## Настройки сети в Linux

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## Цель работы

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Получить навыки настройки сетевых параметров системы и управления подключениями в Linux.

## Ход выполнения работы

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# Проверка конфигурации сети

```
titukaev@titukaev:~$ su
Password:
root@titukaev:/home/titukaev# 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
         2532      24      0      0      0      0
    TX: bytes packets errors dropped carrier collsns
         2532      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 08:00:27:08:b0:a5 brd ff:ff:ff:ff:ff:ff
    RX: bytes packets errors dropped missed mcast
        150622351 107965      0      0      0      1
    TX: bytes packets errors dropped carrier collsns
        1817432   29786      0      0      0      0
    altnam enx000278b0a5
root@titukaev:/home/titukaev#
root@titukaev:/home/titukaev# 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@titukaev:/home/titukaev# 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 08:00:27:08:b0:a5 brd ff:ff:ff:ff:ff:ff
    altnam enx000278b0a5
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86192sec preferred_lft 86192sec
    inet6 fd17:625c:f037:2:a00:27ff:fe88:b0a5/64 scope global dynamic noprefixroute
        valid_lft 86194sec preferred_lft 14194sec
    inet6 fe80::a00:27ff:fe88:b0a5/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@titukaev:/home/titukaev#
```

Рис. 1: Вывод информации о сетевых интерфейсах

## Проверка подключения к Интернету

```
root@titukaev:/home/titukaev# 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=21.0 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=21.3 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=21.7 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 3019ms
rtt min/avg/max/mdev = 21.035/21.394/21.734/0.262 ms
root@titukaev:/home/titukaev#
```

Рис. 2: Проверка подключения к Интернету

Тест соединения командой `ping -c 4 8.8.8.8` подтвердил доступность сети.

# Добавление дополнительного IP-адреса

```
root@titukaev:/home/titukaev# ip addr add 10.0.0.10/24 dev enp0s3
root@titukaev:/home/titukaev# 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 08:00:27:88:b0:a5 brd ff:ff:ff:ff:ff:ff
    altname enx08002788b0a5
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86063sec preferred_lft 86063sec
    inet 10.0.0.10/24 scope global enp0s3
        valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:a00:27ff:fe88:b0a5/64 scope global dynamic noprefixroute
        valid_lft 86397sec preferred_lft 14397sec
    inet6 fe80::a00:27ff:fe88:b0a5/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@titukaev:/home/titukaev#
root@titukaev:/home/titukaev# 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:fe88:b0a5  prefixlen 64  scopeid 0x20<link>
    inet6 fd17:625c:f037:2:a00:27ff:fe88:b0a5  prefixlen 64  scopeid 0x0<global>
    ether 08:00:27:88:b0:a5  txqueuelen 1000  (Ethernet)
    RX packets 107985  bytes 150624125 (143.6 MiB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 29813  bytes 1820108 (1.7 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 2532 (2.4 KiB)
    RX errors 0  dropped 0  overruns 0  frame 0
```

Рис. 3: Добавление дополнительного IP-адреса

# Прослушиваемые порты и маршруты

```
root@titukaev:/home/titukaev# ss -tul
root@titukaev:/home/titukaev# ss -tul
```

Netid	State	Recv-Q	Send-Q	Local Address:Port	Peer Address:Port
udp	UNCONN	0	0	127.0.0.1:523	0.0.0.0:*
udp	UNCONN	0	0	0.0.0.0:ndns	0.0.0.0:*
udp	UNCONN	0	0	:::523	:::*
udp	UNCONN	0	0	:::ndns	:::*
tcp	LISTEN	0	128	0.0.0.0:ssh	0.0.0.0:*
tcp	LISTEN	0	4096	127.0.0.1:tp	0.0.0.0:*
tcp	LISTEN	0	4096	*:webm	*:*
tcp	LISTEN	0	511	*:http	*:*
tcp	LISTEN	0	128	:::ssh	:::*
tcp	LISTEN	0	4096	:::tp	:::*

```
root@titukaev:/home/titukaev#
```

Рис. 4: Прослушиваемые порты TCP и UDP

Просмотр активных портов через `ss -tul` и маршрутов командой `ip route show`.



```
root@titukaev:/home/titukaev#  
root@titukaev:/home/titukaev# nmcli connection show  
NAME      UUID                                  TYPE      DEVICE  
enp0s3    bb2aaa94-ddf4-33e9-88b0-5095720827a1 ethernet  enp0s3  
lo        f833cd4f-8ab2-4008-8a34-51a99aef2190 loopback   lo  
root@titukaev:/home/titukaev# nmcli connection add con-name "dhcp" type ethernet ifname enp0s3  
Connection 'dhcp' (cec890fe-8c0c-4468-995f-456f09dc3d1e) successfully added.  
root@titukaev:/home/titukaev# nmcli connection add con-name "static" ifname enp0s3 autoconnect no type ethernet ip4 10.0.0.10/24 gw4 10.0.0.1 ifname enp0s3  
Connection 'static' (94831f79-81a7-4a4f-8aab-021fa0524f71) successfully added.  
root@titukaev:/home/titukaev# nmcli connection show  
NAME      UUID                                  TYPE      DEVICE  
enp0s3    bb2aaa94-ddf4-33e9-88b0-5095720827a1 ethernet  enp0s3  
lo        f833cd4f-8ab2-4008-8a34-51a99aef2190 loopback   lo  
dhcp      cec890fe-8c0c-4468-995f-456f09dc3d1e ethernet   --  
static    94831f79-81a7-4a4f-8aab-021fa0524f71 ethernet   --  
root@titukaev:/home/titukaev#
```

Рис. 5: Просмотр текущих подключений

Создание подключений **dhcp** и **static**, их активация и переключение с помощью **nmcli**.

## Активация статического подключения

```
root@titukaev:/home/titukaev# nmcli connection up static
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/3)
root@titukaev:/home/titukaev# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
static    94831f79-81a7-4a4f-8aab-021fa0524f71 ethernet  enp0s3
lo        f833cd4f-8ab2-4008-8a34-51a99aef2190 loopback  lo
dhcp      cec890fe-8c0c-4468-995f-456f09dc3d1e ethernet  --
enp0s3    bb2aaa94-ddf4-33e9-88b0-5095720827a1 ethernet  --
root@titukaev:/home/titukaev# 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 08:00:27:88:b0:a5 brd ff:ff:ff:ff:ff:ff
    altname enx08002788b0a5
    inet 10.0.0.10/24 brd 10.0.0.255 scope global noprefixroute enp0s3
        valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:5c76:76d6:b5e2:939/64 scope global dynamic noprefixroute
        valid_lft 86395sec preferred_lft 14395sec
    inet6 fe80::8700:6fb5:7b86:e3ae/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@titukaev:/home/titukaev# █
```

Рис. 6: Активация статического соединения

Интерфейс получил адрес 10.0.0.10/24, шлюз 10.0.0.1.

## Переключение на DHCP

```
root@titukaev:/home/titukaev#  
root@titukaev:/home/titukaev# nmcli connection up dhcp  
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/4)  
root@titukaev:/home/titukaev# nmcli connection show  
NAME      UUID                                  TYPE      DEVICE  
dhcp      cec890fe-8c0c-4468-995f-456f09dc3d1e ethernet  enp0s3  
lo        f833cd4f-8ab2-4008-8a34-51a99aef2190 loopback  lo  
enp0s3    bb2aaa94-ddf4-33e9-88b0-5095720827a1 ethernet  --  
static    94831f79-81a7-4a4f-8aab-021fa0524f71 ethernet  --  
root@titukaev:/home/titukaev# 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 08:00:27:88:b0:a5 brd ff:ff:ff:ff:ff:ff  
    altname enx08002788b0a5  
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3  
        valid_lft 86393sec preferred_lft 86393sec  
    inet6 fd17:625c:f037:2:6445:dac5:33e0:671/64 scope global dynamic noprefixroute  
        valid_lft 86395sec preferred_lft 14395sec  
    inet6 fe80::7f1:af77:2f11:2298/64 scope link noprefixroute  
        valid_lft forever preferred_lft forever  
root@titukaev:/home/titukaev#
```

Рис. 7: Переключение обратно на DHCP

# Изменение параметров static через nmcli

```
root@titukaev:/home/titukaev# nmcli connection modify static connection.autoconnect no
root@titukaev:/home/titukaev# nmcli connection modify static ipv4.dns 10.0.0.10
root@titukaev:/home/titukaev# nmcli connection modify static +ipv4.dns 8.8.8.8
root@titukaev:/home/titukaev# nmcli connection modify static ipv4.addresses 10.0.0.20/24
root@titukaev:/home/titukaev# nmcli connection modify static +ipv4.addresses 10.20.30.40/16
root@titukaev:/home/titukaev# nmcli connection up static
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/5)
root@titukaev:/home/titukaev# nmcli connection show
NAME UUID TYPE DEVICE
static 94831f79-81a7-4a4f-8aab-021fa0524f71 ethernet enp0s3
lo f833cd4f-8ab2-4008-8a34-51a99aef2190 loopback lo
dhcp cec890fe-8c0c-4468-995f-456f09dc3d1e ethernet --
enp0s3 bb2aaa94-ddf4-33e9-88b0-5095720827a1 ethernet --
root@titukaev:/home/titukaev# 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 08:00:27:88:b0:a5 brd ff:ff:ff:ff:ff:ff
    altname enx08002788b0a5
    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:f037:2:5c76:76d6:b5e2:939/64 scope global dynamic noprefixroute
        valid_lft 86389sec preferred_lft 14389sec
    inet6 fe80::8700:6fb5:7b86:e3ae/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@titukaev:/home/titukaev#
```

Рис. 8: Просмотр параметров после изменения соединения



Рис. 9: Настройки статического соединения в nmtui

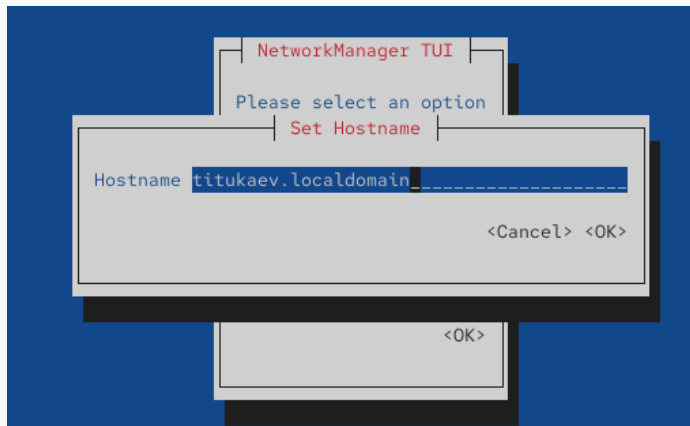


Рис. 10: Изменение имени хоста в nmtui

Имя хоста изменено на `titukaev.localdomain`.

# Просмотр активного статического профиля

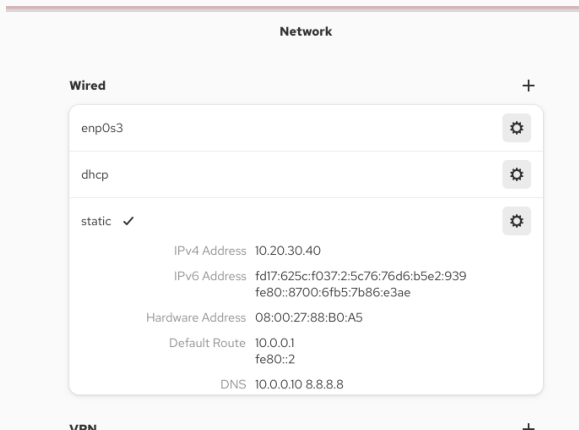


Рис. 11: Просмотр активного статического соединения в графическом интерфейсе

Отображаются IP-адреса, шлюз и DNS-серверы.

## Возврат к динамическому подключению

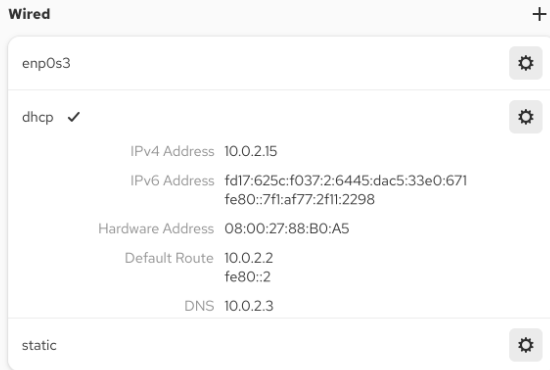


Рис. 12: Возврат к динамическому подключению

Интерфейс **enp0s3** снова получил адрес **10.0.2.15** по DHCP.



## Итоги работы

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Освоены инструменты настройки сети в Linux:

- просмотр интерфейсов и маршрутов (`ip`);
- управление соединениями (`nmcli` и `nmtui`);
- настройка статических и динамических профилей;
- добавление DNS и изменение имени хоста.

Получены практические навыки администрирования сетевой конфигурации в ОС семейства RHEL.