

# Лабораторная работа №12

## Настройки сети в Linux

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## Цель работы

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## Формулировка цели

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Получить навыки настройки сетевых параметров системы.

## Ход выполнения работы

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# Сетевые интерфейсы и статистика

```
ivschemelev@ivschemelev:~$ su
Password:
root@ivschemelev:/home/ivschemelev# 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
        1911      17      0      0      0      0
    TX: bytes packets errors dropped carrier collsns
        1911      17      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:f3:2f:6e brd ff:ff:ff:ff:ff:ff
    RX: bytes packets errors dropped missed mcast
        9453974    6770      0      0      0      2
    TX: bytes packets errors dropped carrier collsns
        139787    1726      0      0      0      0
    altname enx080027f32f6e
root@ivschemelev:/home/ivschemelev#
```

Рис. 1: Информация о сетевых интерфейсах

## IP-адреса интерфейса

```
root@ivschemelev:/home/ivschemelev# 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@ivschemelev:/home/ivschemelev# 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:f3:2f:6e brd ff:ff:ff:ff:ff:ff
    altname enx080027f32f6e
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86241sec preferred_lft 86241sec
    inet6 fd17:625c:f037:2:a00:27ff:fef3:2f6e/64 scope global dynamic noprefixroute
        valid_lft 86275sec preferred_lft 14275sec
    inet6 fe80::a00:27ff:fef3:2f6e/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@ivschemelev:/home/ivschemelev#
```

Рис. 2: Назначенные IP-адреса

## Проверка сетевой связности

```
root@ivschemelev:/home/ivschemelev# 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=20.4 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=20.8 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=20.6 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=20.9 ms

--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3028ms
rtt min/avg/max/mdev = 20.416/20.681/20.892/0.185 ms
root@ivschemelev:/home/ivschemelev#
```

Рис. 3: Проверка доступности сети

## Добавление дополнительного IPv4-адреса

```
root@ivschemelev:/home/ivschemelev#
root@ivschemelev:/home/ivschemelev# ip addr add 10.0.0.10/24 dev enp0s3
root@ivschemelev:/home/ivschemelev# 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:f3:2f:6e brd ff:ff:ff:ff:ff:ff
    altname enx080027f32f6e
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86091sec preferred_lft 86091sec
    inet 10.0.0.10/24 scope global enp0s3
        valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:a00:27ff:fef3:2f6e/64 scope global dynamic noprefixroute
        valid_lft 86125sec preferred_lft 14125sec
    inet6 fe80::a00:27ff:fef3:2f6e/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@ivschemelev:/home/ivschemelev#
```

Рис. 4: Проверка добавленного адреса

## Сравнение ip и ifconfig

```
root@ivschemelev:/home/ivschemelev# 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:fef3:2f6e prefixlen 64 scopeid 0x0<global>
        inet6 fe80::a00:27ff:fef3:2f6e prefixlen 64 scopeid 0x20<link>
        ether 08:00:27:f3:2f:6e txqueuelen 1000 (Ethernet)
        RX packets 6785 bytes 9455278 (9.0 MiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 1747 bytes 141901 (138.5 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 17 bytes 1911 (1.8 KiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 17 bytes 1911 (1.8 KiB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@ivschemelev:/home/ivschemelev#
```

Рис. 5: Вывод ifconfig

## Прослушиваемые порты

```
root@ivschemelev:/home/ivschemelev#  
root@ivschemelev:/home/ivschemelev# 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              [::]: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            4096            *:webasm              *:  
tcp        LISTEN      0            128             [::]:ssh               [::]:*  
tcp        LISTEN      0            4096            [::]:ipp               [::]:*  
root@ivschemelev:/home/ivschemelev#
```

Рис. 6: Прослушиваемые порты

## Создание профилей dhcp и static

```
root@ivschemelev:/home/ivschemelev# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
enp0s3   0c423cbe-1e47-3223-a0f2-45b19c0bd3af  ethernet  enp0s3
lo       25eb0553-a819-4596-854c-779d4ad97593  loopback  lo
root@ivschemelev:/home/ivschemelev# nmcli connection add con-name "dhcp" type ethernet ifname enp0s3
Connection 'dhcp' (1c124455-d04f-440a-a291-b49c42d14606) successfully added.
root@ivschemelev:/home/ivschemelev# nmcli connection add con-name "static" ifname enp0s3 autoconnect no type ethernet ip4 10.0.0.10 gw4 10.0.0.1 ifname enp0s3
Connection 'static' (28beb91d-984e-4ebf-bbe8-10ce8ceaa032) successfully added.
root@ivschemelev:/home/ivschemelev# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
enp0s3   0c423cbe-1e47-3223-a0f2-45b19c0bd3af  ethernet  enp0s3
lo       25eb0553-a819-4596-854c-779d4ad97593  loopback  lo
dhcp     1c124455-d04f-440a-a291-b49c42d14606  ethernet  --
static   28beb91d-984e-4ebf-bbe8-10ce8ceaa032  ethernet  --
```

Рис. 7: Проверка сетевых профилей

## Переключение на static

```
root@ivschemelev:/home/ivschemelev# nmcli connection up static
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/3)
root@ivschemelev:/home/ivschemelev# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
static    28beb91d-984e-4ebf-bbe8-10ce8ceaa032  ethernet  enp0s3
lo        25eb0553-a819-4596-854c-779d4ad97593  loopback  lo
dhcp      1c124455-d04f-440a-a291-b49c42d14606  ethernet  --
enp0s3   0c423cbe-1e47-3223-a0f2-45b19c0bd3af  ethernet  --
root@ivschemelev:/home/ivschemelev# 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:f3:2f:6e brd ff:ff:ff:ff:ff:ff
    altname enx080027f32f6e
    inet 10.0.0.10/24 brd 10.0.0.255 scope global noprefixroute enp0s3
        valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:708d:4433:9c38:d95/64 scope global dynamic noprefixroute
        valid_lft 86393sec preferred_lft 14393sec
    inet6 fe80::bede:1746:bbc9:11d6/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@ivschemelev:/home/ivschemelev#
```

Рис. 8: Активация static-соединения

## Возврат к dhcp

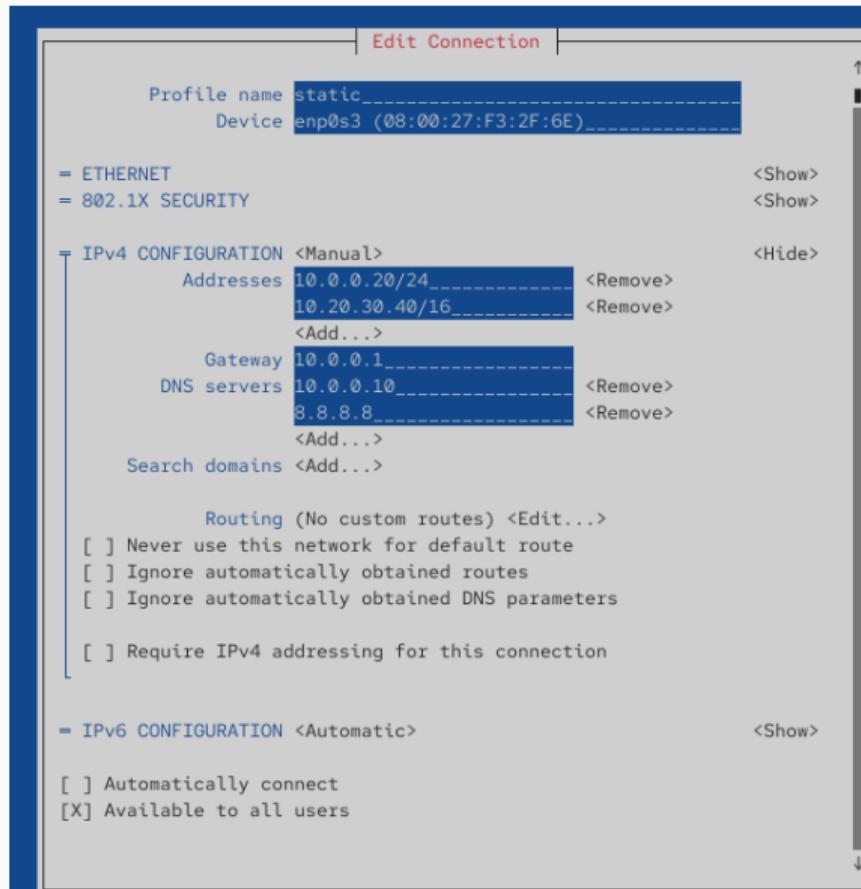
```
root@ivschemelev:/home/ivschemelev# nmcli connection up dhcp
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/4)
root@ivschemelev:/home/ivschemelev# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
dhcp      1c124455-d04f-440a-a291-b49c42d14606  ethernet  enp0s3
lo        25eb0553-a819-4596-854c-779d4ad97593  loopback  lo
enp0s3    0c423cbe-1e47-3223-a0f2-45b19c0bd3af  ethernet  --
static    28beb91d-984e-4ebf-bbe8-10ce8ceaa032  ethernet  --
root@ivschemelev:/home/ivschemelev# 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:f3:2f:6e brd ff:ff:ff:ff:ff:ff
    altname enx080027f32f6e
        inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
            valid_lft 86385sec preferred_lft 86385sec
        inet6 fd17:625c:f037:2:f788:9d0c:f6ac:e37d/64 scope global dynamic noprefixroute
            valid_lft 86386sec preferred_lft 14386sec
        inet6 fe80::5403:394:3c6b:ee9/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
root@ivschemelev:/home/ivschemelev#
```

Рис. 9: Возврат к DHCP-соединению

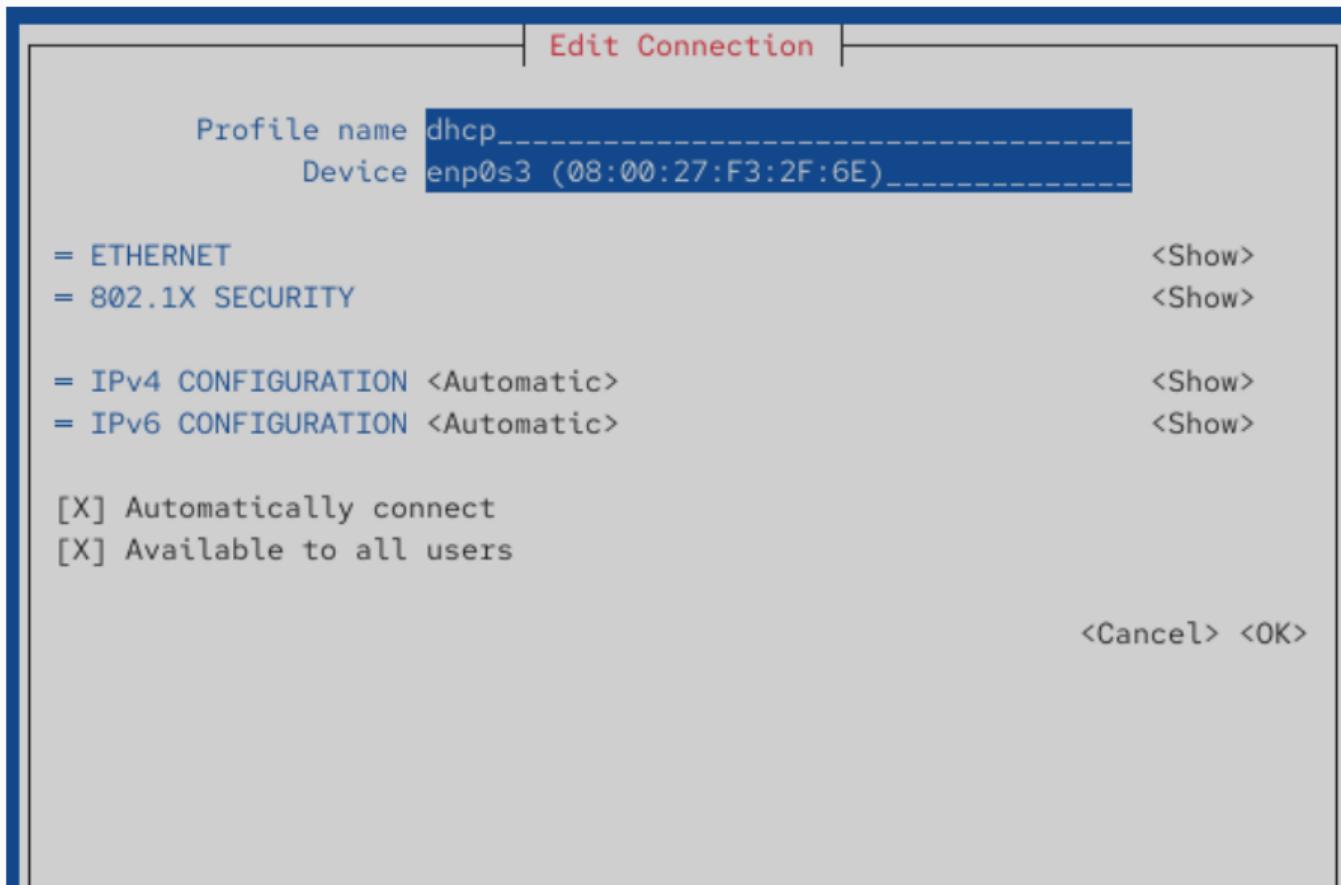
## Активация static и проверка

```
root@ivschemelev:/home/ivschemelev# nmcli connection modify static connection.autoconnect no
root@ivschemelev:/home/ivschemelev# nmcli connection modify static ipv4.dns 10.0.0.10
root@ivschemelev:/home/ivschemelev# nmcli connection modify static +ipv4.dns 8.8.8.8
root@ivschemelev:/home/ivschemelev# nmcli connection modify static ipv4.addresses 10.0.0.20/24
root@ivschemelev:/home/ivschemelev# nmcli connection modify static +ipv4.addresses 10.20.30.40/16
root@ivschemelev:/home/ivschemelev# nmcli connection up static
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/5)
root@ivschemelev:/home/ivschemelev# nmcli connection show
NAME      UUID              TYPE      DEVICE
static    28beb91d-984e-4ebf-bbe8-10ce8ceaa032  ethernet  enp0s3
lo        25eb0553-a819-4596-854c-779d4ad97593  loopback  lo
dhcp     1c124455-d04f-440a-a291-b49c42d14606  ethernet  --
enp0s3   0c423cbe-1e47-3223-a0f2-45b19c0bd3af  ethernet  --
root@ivschemelev:/home/ivschemelev# 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:f3:2f:6e brd ff:ff:ff:ff:ff:ff
    altname enx080027f32f6e
    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:f037:2:708d:4433:9c38:d95/64 scope global dynamic noprefixroute
        valid_lft 86384sec preferred_lft 14384sec
    inet6 fe80::bede:1746:bbc9:11d6/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@ivschemelev:/home/ivschemelev#
```

# Проверка параметров через nmtui



## Просмотр DHCP-профиля в nmtui



# Параметры в графическом интерфейсе

Cancel **static** Apply

Details Identity **IPv4** IPv6 Security

**IPv4 Method**

Automatic (DHCP)  Manual  Link-Local Only  Disable  
 Shared to other computers

**Addresses**

Address	Netmask	Gateway	X
10.0.0.20	255.255.255.0	10.0.0.1	X
10.20.30.40	255.255.0.0		X
			X

**DNS** Automatic   
10.0.0.10, 8.8.8.8  
Separate IP addresses with commas

**Routes** Automatic

Address	Netmask	Gateway	Metric	X
				X

# DHCP в графическом интерфейсе

**Cancel** **dhcp** **Apply**

Details Identity **IPv4** IPv6 Security

**IPv4 Method**

Automatic (DHCP)  Link-Local Only  
 Manual  Disable  
 Shared to other computers

**DNS** Automatic

Separate IP addresses with commas

**Routes** Automatic

Address	Netmask	Gateway	Metric
			<input type="button" value="x"/>

Use this connection only for resources on its network

## Итоги работы

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Изучены и отработаны приёмы диагностики и настройки сети в RHEL-подобной системе: анализ интерфейсов, маршрутов и IP-адресов, проверка доступности сети, управление профилями NetworkManager, настройка DHCP и статических параметров, а также проверка конфигурации через `nmcli`, `nmtui` и графический интерфейс.