

Лабораторная работа №12

Настройки сети в Linux

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Цель работы

Получить навыки настройки и управления сетевыми параметрами системы Linux с использованием инструментов **ip**, **nmcli** и **nmtui**.

Ход выполнения работы

Проверка конфигурации сети

```
sigamberdov@sigamberdov:~$ su
Password:
root@sigamberdov:/home/sigamberdov# 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
         2148      18      0      0      0      0
    TX:  bytes packets errors dropped carrier collsns
         2148      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:e1:8b:2d brd ff:ff:ff:ff:ff:ff
    RX:  bytes packets errors dropped missed  mcast
         74352     231      0      0      0      1
    TX:  bytes packets errors dropped carrier collsns
         26336     252      0      0      0      0
    altnamename enx080027e18b2d
root@sigamberdov:/home/sigamberdov#
root@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov#
```

Рис. 1: Информация о сетевых интерфейсах и статистике пакетов

Назначенные IP-адреса

```
root@sigamberdov:/home/sigamberdov# 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:e1:8b:2d brd ff:ff:ff:ff:ff:ff
    altname enx080027e18b2d
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86007sec preferred_lft 86007sec
    inet6 fd17:625c:f037:2:a00:27ff:fe1:8b2d/64 scope global dynamic noprefixroute
        valid_lft 86372sec preferred_lft 14372sec
    inet6 fe80::a00:27ff:fe1:8b2d/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@sigamberdov:/home/sigamberdov#
```

Рис. 2: Информация о назначенных IP-адресах

```
root@sigamberdov: /home/sigamberdov#  
root@sigamberdov:/home/sigamberdov# 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=24.2 ms  
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=24.5 ms  
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=25.0 ms  
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=24.6 ms  
  
--- 8.8.8.8 ping statistics ---  
4 packets transmitted, 4 received, 0% packet loss, time 3062ms  
rtt min/avg/max/mdev = 24.191/24.588/24.979/0.280 ms  
root@sigamberdov:/home/sigamberdov#
```

Рис. 3: Проверка подключения к Интернету

Добавление дополнительного IP-адреса

```
root@sigamberdov:/home/sigamberdov# ip addr add 10.0.0.10/24 dev enp0s3
root@sigamberdov:/home/sigamberdov# 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:e1:8b:2d brd ff:ff:ff:ff:ff:ff
    altname enx080027e18b2d
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 85948sec preferred_lft 85948sec
    inet 10.0.0.10/24 scope global enp0s3
        valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:a00:27ff:fe1:8b2d/64 scope global dynamic noprefixroute
        valid_lft 86313sec preferred_lft 14313sec
    inet6 fe80::a00:27ff:fe1:8b2d/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@sigamberdov:/home/sigamberdov#
```

Рис. 4: Добавление дополнительного IP-адреса

Сравнение ip и ifconfig

```
root@sigamberdov:/home/sigamberdov#  
root@sigamberdov:/home/sigamberdov# 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:fee1:8b2d prefixlen 64 scopeid 0x20<link>  
    inet6 fd17:625c:f037:2:a00:27ff:fee1:8b2d prefixlen 64 scopeid 0x0<global>  
    ether 08:00:27:e1:8b:2d txqueuelen 1000 (Ethernet)  
    RX packets 256 bytes 76550 (74.7 KiB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 286 bytes 29670 (28.9 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 2148 (2.0 KiB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 18 bytes 2148 (2.0 KiB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
root@sigamberdov:/home/sigamberdov#
```

Рис. 5: Сравнение вывода команд ip и ifconfig

Прослушиваемые TCP и UDP порты

```
root@sigamberdov: /home/sigamberdov# 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	4096	127.0.0.1:ipp	0.0.0.0:*
tcp	LISTEN	0	128	0.0.0.0:ssh	0.0.0.0:*
tcp	LISTEN	0	4096	*:websm	*:*
tcp	LISTEN	0	32	*:ftp	*:*
tcp	LISTEN	0	128	:::ssh	:::*
tcp	LISTEN	0	4096	:::1:ipp	:::*
tcp	LISTEN	0	511	*:http	*:*

```
root@sigamberdov: /home/sigamberdov#
```

Рис. 6: Прослушиваемые TCP и UDP порты

```
root@sigamberdov:/home/sigamberdov#  
root@sigamberdov:/home/sigamberdov# nmcli connection show  
NAME      UUID                                TYPE      DEVICE  
enp0s3    110dae5e-e81a-37aa-a6a9-d5f02d5f4e2f  ethernet  enp0s3  
lo        66985216-59fb-4d17-9c61-185d7ddd2700  loopback  lo  
root@sigamberdov:/home/sigamberdov# nmcli connection add con-name "dhcp" type ethernet ifname enp0s3  
Connection 'dhcp' (e5be1b5b-8c64-4d38-9a29-daae2dcc7e21) successfully added.  
root@sigamberdov:/home/sigamberdov# 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' (ced669f0-3c06-446e-8125-02e2ac4aeed5) successfully added.  
root@sigamberdov:/home/sigamberdov# nmcli connection show  
NAME      UUID                                TYPE      DEVICE  
enp0s3    110dae5e-e81a-37aa-a6a9-d5f02d5f4e2f  ethernet  enp0s3  
lo        66985216-59fb-4d17-9c61-185d7ddd2700  loopback  lo  
dhcp      e5be1b5b-8c64-4d38-9a29-daae2dcc7e21  ethernet  --  
static    ced669f0-3c06-446e-8125-02e2ac4aeed5  ethernet  --  
root@sigamberdov:/home/sigamberdov#
```

Рис. 7: Просмотр текущих соединений

Переключение на статическое соединение

```
root@sigamberdov:/home/sigamberdov#  
root@sigamberdov:/home/sigamberdov# nmcli connection up "static"  
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/3)  
root@sigamberdov:/home/sigamberdov# nmcli connection show  
NAME      UUID                                  TYPE      DEVICE  
static    ced669f0-3c06-446e-8125-02e2ac4aee55 ethernet  enp0s3  
lo        66985216-59fb-4d17-9c61-185d7ddd2700 loopback  lo  
dhcp      e5be1b5b-8c64-4d38-9a29-daae2dcc7e21 ethernet  --  
enp0s3     110dae5e-e81a-37aa-a6a9-d5f02d5f4e2f ethernet  --  
root@sigamberdov:/home/sigamberdov# 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:e1:8b:2d brd ff:ff:ff:ff:ff:ff  
    altname enx080027e18b2d  
    inet 10.0.0.10/24 brd 10.0.0.255 scope global noprefixroute enp0s3  
        valid_lft forever preferred_lft forever  
    inet6 fd17:625c:f037:2:588b:9424:80d6:b80e/64 scope global dynamic noprefixroute  
        valid_lft 86395sec preferred_lft 14395sec  
    inet6 fe80::d7f8:bc68:bca1:117/64 scope link noprefixroute  
        valid_lft forever preferred_lft forever  
root@sigamberdov:/home/sigamberdov#
```

Рис. 8: Активация статического соединения

Возврат к DHCP-соединению

```
root@sigamberdov:/home/sigamberdov#  
root@sigamberdov:/home/sigamberdov# nmcli connection up "dhcp"  
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/4)  
root@sigamberdov:/home/sigamberdov# nmcli connection show  
NAME      UUID                                  TYPE      DEVICE  
dhcp      e5be1b5b-8c64-4d38-9a29-daae2dcc7e21 ethernet  enp0s3  
lo        66985216-59fb-4d17-9c61-185d7ddd2700 loopback  lo  
enp0s3    110dae5e-e81a-37aa-a6a9-d5f02d5f4e2f ethernet  --  
static    ced669f0-3c06-446e-8125-02e2ac4aee55 ethernet  --  
root@sigamberdov:/home/sigamberdov# 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:e1:8b:2d brd ff:ff:ff:ff:ff:ff  
    altname enx080027e18b2d  
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3  
        valid_lft 86395sec preferred_lft 86395sec  
    inet6 fd17:625c:f037:2:9f36:7461:4ee4:c6ef/64 scope global dynamic noprefixroute  
        valid_lft 86397sec preferred_lft 14397sec  
    inet6 fe80::bde3:bd4a:e063:5d87/64 scope link noprefixroute  
        valid_lft forever preferred_lft forever  
root@sigamberdov:/home/sigamberdov#
```

Рис. 9: Переключение обратно на DHCP-соединение

Настройка DNS и IP-адресов

```
root@sigamberdov:/home/sigamberdov#
root@sigamberdov:/home/sigamberdov# nmcli connection modify "static" connection.autoconnect no
root@sigamberdov:/home/sigamberdov# nmcli connection modify "static" ipv4.dns 10.0.0.10
root@sigamberdov:/home/sigamberdov# nmcli connection modify "static" +ipv4.dns 8.8.8.8
root@sigamberdov:/home/sigamberdov# nmcli connection modify "static" ipv4.addresses 10.0.0.20/24
root@sigamberdov:/home/sigamberdov# nmcli connection modify "static" +ipv4.addresses 10.20.30.40/16
root@sigamberdov:/home/sigamberdov# nmcli connection up "static"
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/5)
root@sigamberdov:/home/sigamberdov# nmcli connection show
NAME        UUID                                  TYPE      DEVICE
static      ced669f0-3c06-446e-8125-02e2ac4aed5  ethernet  enp0s3
lo          66985216-59fb-4d17-9c61-185d7ddd2700  loopback  lo
dhcp        e5be1b5b-8c64-4d38-9a29-daae2dcc7e21  ethernet  --
enp0s3      110dae5e-e81a-37aa-a6a9-d5f02d5f4e2f  ethernet  --
root@sigamberdov:/home/sigamberdov# 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:e1:8b:2d brd ff:ff:ff:ff:ff:ff
    altname enx080027e18b2d
    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:f037:2:588b:9424:80d6:b80e/64 scope global dynamic noprefixroute
        valid_lft 86390sec preferred_lft 14390sec
    inet6 fe80::d7f8:bc68:bca1:117/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@sigamberdov:/home/sigamberdov#
```

Просмотр параметров через nmtui

Edit Connection

Profile name static

Device enp0s3 (08:00:27:E1:8B:2D)

= 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

Проверка соединений в интерфейсе GNOME

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

Итоги работы

В ходе работы были изучены основные приёмы настройки и управления сетевыми подключениями в Linux.

Были освоены команды **ip**, **nmcli**, **nmtui**, а также методы добавления IP-адресов, настройки маршрутов и DNS.

Полученные знания позволяют уверенно администрировать сетевую инфраструктуру и диагностировать сетевые проблемы.