

Презентация по лабораторной работе №12

Настройки сети в Linux

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Цели и задачи работы

Цель работы

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

Ход выполнения работы

Проверка конфигурации сети

```
aradzhigalieva@aradzhigalieva:~$ su
Password:
root@aradzhigalieva:/home/aradzhigalieva# 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
        2166     18      0      0      0      0
    TX: bytes packets errors dropped carrier collsns
        2166     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 08:00:27:12:16:f3 brd ff:ff:ff:ff:ff:ff
    RX: bytes packets errors dropped missed mcast
        81111    238      0      0      2
    TX: bytes packets errors dropped carrier collsns
        29338    269      0      0      0      0
    altname enx0800271216f3
root@aradzhigalieva:/home/aradzhigalieva#
root@aradzhigalieva:/home/aradzhigalieva# 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@aradzhigalieva:/home/aradzhigalieva#
```

Рис. 1: Вывод информации о сетевых интерфейсах

Проверка конфигурации сети

```
root@aradzhigalieva:/home/aradzhigalieva#  
root@aradzhigalieva:/home/aradzhigalieva# 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 08:00:27:12:16:f3 brd ff:ff:ff:ff:ff:ff  
    altname enx0800271216f3  
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3  
        valid_lft 86198sec preferred_lft 86198sec  
    inet6 fd17:625c:f037:2:a00:27ff:fe12:16f3/64 scope global dynamic noprefixroute  
        valid_lft 86199sec preferred_lft 14199sec  
    inet6 fe80::a00:27ff:fe12:16f3/64 scope link noprefixroute  
        valid_lft forever preferred_lft forever  
root@aradzhigalieva:/home/aradzhigalieva#
```

Рис. 2: Информация об адресах интерфейсов

Проверка конфигурации сети

```
root@aradzhigalieva:/home/aradzhigalieva#  
root@aradzhigalieva:/home/aradzhigalieva# 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=21.1 ms  
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=21.2 ms  
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=21.2 ms  
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=21.6 ms  
  
--- 8.8.8.8 ping statistics ---  
4 packets transmitted, 4 received, 0% packet loss, time 3019ms  
rtt min/avg/max/mdev = 21.065/21.264/21.577/0.190 ms  
root@aradzhigalieva:/home/aradzhigalieva# █
```

Рис. 3: Результаты проверки соединения

Добавление IP-адреса и просмотр маршрутов

```
root@aradzhigalieva:/home/aradzhigalieva# ip addr add 10.0.0.10/24 dev enp0s3
root@aradzhigalieva:/home/aradzhigalieva# 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 08:00:27:12:16:f3 brd ff:ff:ff:ff:ff:ff
    altname enx0800271216f3
        inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
            valid_lft 86058sec preferred_lft 86058sec
        inet 10.0.0.10/24 scope global enp0s3
            valid_lft forever preferred_lft forever
        inet6 fd17:625c:f037:2:a00:27ff:fe12:16f3/64 scope global dynamic noprefixroute
            valid_lft 86367sec preferred_lft 14367sec
        inet6 fe80::a00:27ff:fe12:16f3/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
root@aradzhigalieva:/home/aradzhigalieva#
```

Рис. 4: Добавление нового IP-адреса

Сравнение ip и ifconfig

```
root@aradzhigalieva:/home/aradzhigalieva# 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:fe12:16f3 prefixlen 64 scopeid 0x20<link>
        inet6 fd17:625c:f037:2:a00:27ff:fe12:16f3 prefixlen 64 scopeid 0x0<global>
        ether 08:00:27:12:16:f3 txqueuelen 1000 (Ethernet)
        RX packets 267 bytes 84067 (82.0 KiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 308 bytes 33166 (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 2166 (2.1 KiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 18 bytes 2166 (2.1 KiB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@aradzhigalieva:/home/aradzhigalieva#
```

Рис. 5: Вывод команды ifconfig

Прослушиваемые порты

```
root@aradzhigalieva:/home/aradzhigalieva# 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            511          *:http      *:*
tcp        LISTEN      0            128         [::]:ssh      [::]:*
tcp        LISTEN      0            32           *:ftp      *:*
tcp        LISTEN      0            4096        *:websm      *:*
tcp        LISTEN      0            4096        [::]:ipp      [::]:*
```

root@aradzhigalieva:/home/aradzhigalieva#

Рис. 6: Список прослушиваемых портов

Управление соединениями через nmcli

Создание подключений DHCP и Static

```
root@aradzhigalieva:/home/aradzhigalieva# nmcli connection show
NAME      UUID              TYPE      DEVICE
enp0s3    fa86e494-44ef-337a-a1b7-261fa7a22628  ethernet  enp0s3
lo        38504993-c052-44b3-8d7b-157e09ca7bec  loopback  lo
root@aradzhigalieva# nmcli connection add con-name "dhcp" type ethernet ifname enp0s3
Connection 'dhcp' (9b1fd952-1bda-4e82-9e5b-5241ccd8481a) successfully added.
root@aradzhigalieva# 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' (18d48e66-0694-4765-8e23-0db6ca2e8ed6) successfully added.
root@aradzhigalieva# nmcli connection show
NAME      UUID              TYPE      DEVICE
enp0s3    fa86e494-44ef-337a-a1b7-261fa7a22628  ethernet  enp0s3
lo        38504993-c052-44b3-8d7b-157e09ca7bec  loopback  lo
dhcp     9b1fd952-1bda-4e82-9e5b-5241ccd8481a  ethernet  --
static   18d48e66-0694-4765-8e23-0db6ca2e8ed6  ethernet  --
root@aradzhigalieva# nmcli connection up "static"
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/3)
root@aradzhigalieva# nmcli connection show
NAME      UUID              TYPE      DEVICE
static   18d48e66-0694-4765-8e23-0db6ca2e8ed6  ethernet  enp0s3
lo        38504993-c052-44b3-8d7b-157e09ca7bec  loopback  lo
dhcp     9b1fd952-1bda-4e82-9e5b-5241ccd8481a  ethernet  --
enp0s3  fa86e494-44ef-337a-a1b7-261fa7a22628  ethernet  --
```

Рис. 7: Просмотр существующих соединений

Активация статического соединения

```
root@aradzhigalieva:/home/aradzhigalieva# 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 08:00:27:12:16:f3 brd ff:ff:ff:ff:ff:ff
    altname enx0800271216f3
        inet 10.0.0.10/24 brd 10.0.0.255 scope global noprefixroute enp0s3
            valid_lft forever preferred_lft forever
        inet6 fd17:625c:f037:2:93ce:1da:5168:d6ec/64 scope global dynamic noprefixroute
            valid_lft 86379sec preferred_lft 14379sec
        inet6 fe80::e144:5056:9eb7:fd28/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
root@aradzhigalieva:/home/aradzhigalieva#
```

Рис. 8: Активация статического подключения

Переключение обратно на DHCP

```
root@aradzhigalieva:/home/aradzhigalieva# nmcli connection up "dhcp"
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/4)
root@aradzhigalieva:/home/aradzhigalieva# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
dhcp      9b1fd952-1bda-4e82-9e5b-5241ccd8481a  ethernet  enp0s3
lo        38504993-c052-44b3-8d7b-157e09ca7bec  loopback  lo
enp0s3    fa86e494-44ef-337a-a1b7-261fa7a22628  ethernet  --
static    18d48e66-0694-4765-8e23-0db6ca2e8ed6  ethernet  --
root@aradzhigalieva:/home/aradzhigalieva# 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 08:00:27:12:16:f3 brd ff:ff:ff:ff:ff:ff
    altname enx0800271216f3
        inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
            valid_lft 86317sec preferred_lft 86317sec
        inet6 fd17:625c:f037:2:76a3:60cd:ac5:86a9/64 scope global dynamic noprefixroute
            valid_lft 86318sec preferred_lft 14318sec
        inet6 fe80::9ea9:32dd:9d77:b2f2/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
root@aradzhigalieva:/home/aradzhigalieva#
```

Рис. 9: Переключение обратно на DHCP

Изменение параметров соединений

Добавление DNS и IP-адресов

```
root@aradzhigalieva:/home/aradzhigalieva# nmcli connection modify "static" connection.autoconnect no
root@aradzhigalieva:/home/aradzhigalieva# nmcli connection modify "static" ipv4.dns 10.0.0.10
root@aradzhigalieva:/home/aradzhigalieva# nmcli connection modify "static" +ipv4.dns 8.8.8.8
root@aradzhigalieva:/home/aradzhigalieva# nmcli connection modify "static" ipv4.addresses 10.0.0.20/24
root@aradzhigalieva:/home/aradzhigalieva# nmcli connection modify "static" +ipv4.addresses 10.20.30.40/16
root@aradzhigalieva:/home/aradzhigalieva# nmcli connection up "static"
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/5)
root@aradzhigalieva:/home/aradzhigalieva# nmcli connection show
NAME      UUID              TYPE      DEVICE
static    18d48e66-0694-4765-8e23-0db6ca2e8ed6  ethernet  enp0s3
lo        38504993-c052-44b3-8d7b-157e09ca7bec  loopback  lo
dhcp     9b1fd952-1bda-4e82-9e5b-5241cccd8481a  ethernet  --
enp0s3   fa86e494-44ef-337a-a1b7-261fa7a22628  ethernet  --
root@aradzhigalieva:/home/aradzhigalieva#
```

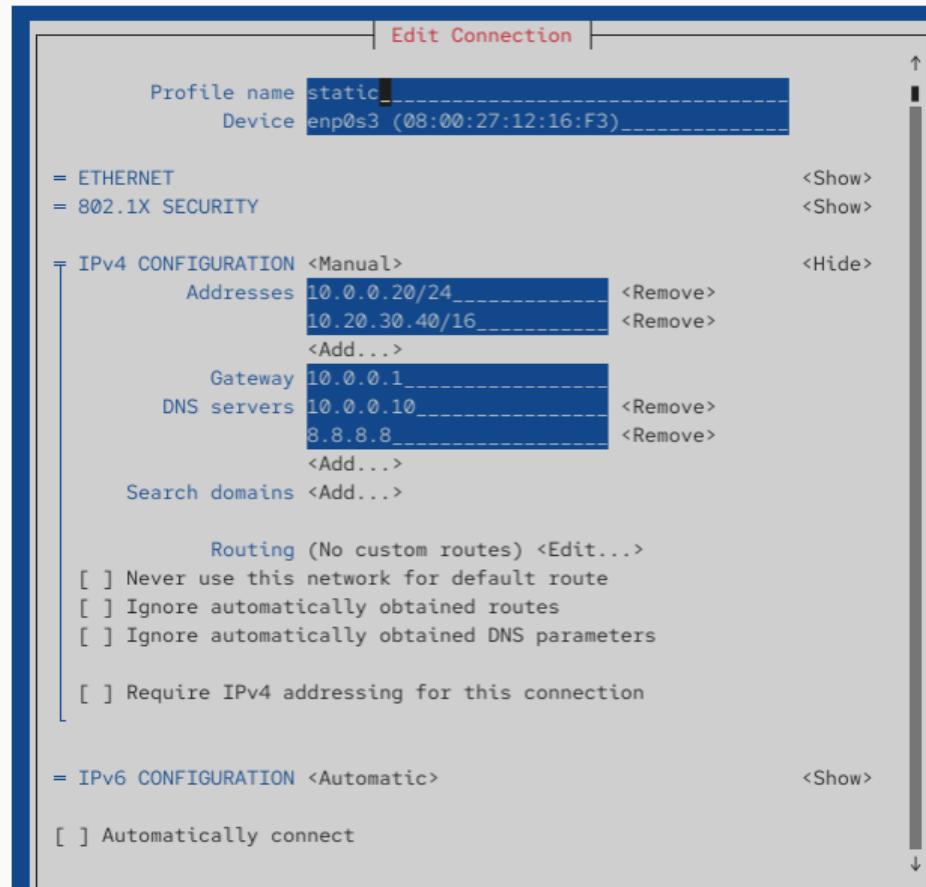
Рис. 10: Изменение параметров соединения и добавление адресов

Проверка IP-адресов

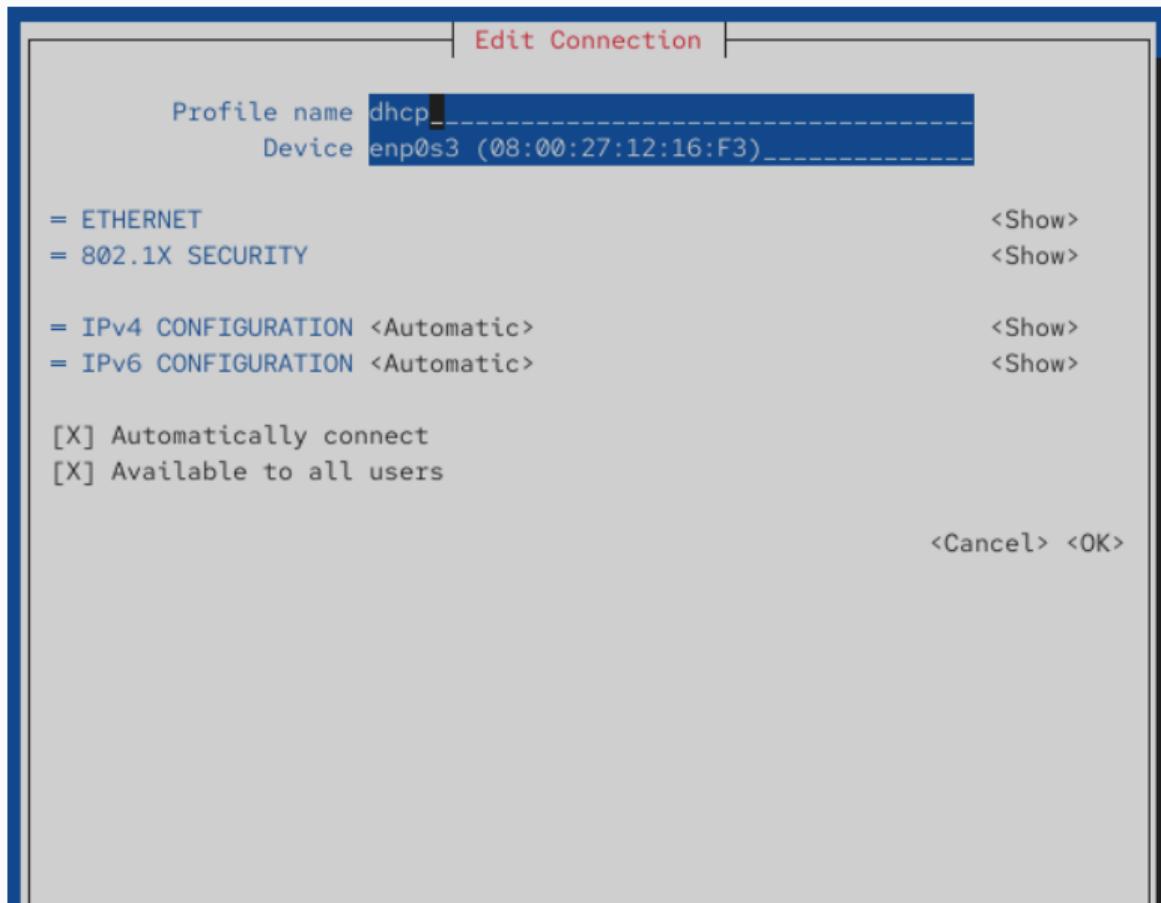
```
root@aradzhigalieva:/home/aradzhigalieva# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 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 08:00:27:12:16:f3 brd ff:ff:ff:ff:ff:ff
    altname enx0800271216f3
    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:f037:2:93ce:1da:5168:d6ec/64 scope global dynamic noprefixroute
        valid_lft 86379sec preferred_lft 14379sec
    inet6 fe80::e144:5056:9eb7:fd28/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@aradzhigalieva:/home/aradzhigalieva#
```

Рис. 11: Проверка IP-адресов интерфейса

Просмотр параметров через nmtui



Просмотр параметров через nmtui



Проверка параметров в GUI

Network

Wired

enp0s3	
dhcp	
static ✓	
IPv4 Address 10.20.30.40	
IPv6 Address fd17:625c:f037:2:93ce:1da:5168:d6ec fe80::e144:5056:9eb7:fd28	
Hardware Address 08:00:27:12:16:F3	
Default Route 10.0.0.1 fe80::2	
DNS 10.0.0.10 8.8.8.8	

VPN

Not set up

Proxy

Переключение обратно на DHCP в GUI

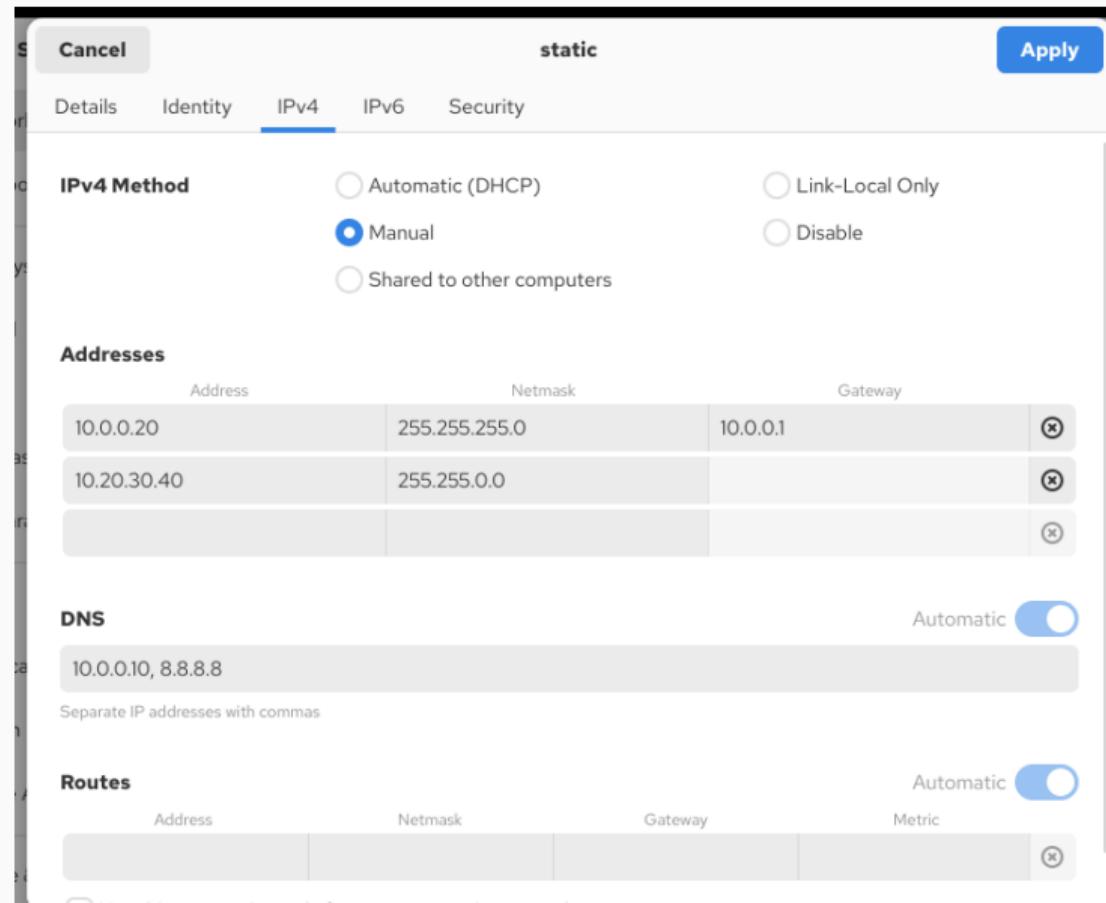
The screenshot shows a network configuration window titled "Network". It has three main sections: "Wired", "VPN", and "Proxy".

Wired: This section lists network interfaces. The first interface, "enp0s3", is currently set to "dhcp" (indicated by a checked checkbox). Its details are shown below: "Hardware Address 08:00:27:12:16:F3" and "DNS 10.0.2.3". There is a gear icon to the right of each row. A plus sign (+) is located at the top right of the "Wired" section.

VPN: This section contains a single entry: "Not set up". A plus sign (+) is located at the top right of the "VPN" section.

Proxy: This section shows a "Proxy" configuration with a "Off" status and a gear icon. A plus sign (+) is located at the top right of the "Proxy" section.

Редактирование профиля Static в GUI



Проверка после возврата к DHCP

Network

Wired

enp0s3 +

dhcp ✓

IPv4 Address 10.0.2.15

IPv6 Address fd17:625c:f037:2:76a3:60cd:ac5:86a9
fe80::9ea9:32dd:9d77:b2f2

Hardware Address 08:00:27:12:16:F3

Default Route 10.0.2.2
fe80::2

DNS 10.0.2.3

static +

VPN

Not set up

This screenshot shows a network configuration interface. At the top, it says "Network". Below that, under "Wired", there is a list of interfaces. The first interface listed is "enp0s3", which is currently using "dhcp" (indicated by a checked checkbox). Below this, its configuration details are shown: IPv4 Address (10.0.2.15), IPv6 Address (fd17:625c:f037:2:76a3:60cd:ac5:86a9 and fe80::9ea9:32dd:9d77:b2f2), Hardware Address (08:00:27:12:16:F3), Default Route (10.0.2.2 and fe80::2), and DNS (10.0.2.3). There is also a "static" entry with a gear icon. Under "VPN", it says "Not set up". A "+" sign is present in both the "Wired" and "VPN" sections, likely for adding new connections.

Вывод

Вывод

В ходе работы я изучила управление сетевыми параметрами и интерфейсами в Linux. Закрепила навыки использования `ip`, `nmcli`, `nmtui` и графических инструментов. Научилась настраивать статическую и динамическую адресацию, маршруты и DNS. Полученные знания важны для администрирования сетевой инфраструктуры и обеспечения стабильной работы системы.