

Лабораторная работа №12

Настройки сети в Linux

Шаханеоядж Хаоладар

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Российский университет дружбы народов, Москва, Россия

Цель работы

Основная цель

Получение практических навыков настройки сетевых параметров системы с использованием утилит `ip`, `nmcli` и `nmtui` в ОС семейства RHEL.

Проверка конфигурации сети

Информация о сетевых интерфейсах

```
haoladar@haoladar:~$ su
Password:
root@haoladar:/home/haoladar# 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 08:00:27:61:1c:23 brd ff:ff:ff:ff:ff:ff
        RX: bytes packets errors dropped missed mcast
            150757858  112515      0      0      0      1
        TX: bytes packets errors dropped carrier collsns
            2005027   33010      0      0      0      0
        altname enx080027611c23
root@haoladar:/home/haoladar#
root@haoladar:/home/haoladar# 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@haoladar:/home/haoladar#
```

Рис. 1: Вывод команды ip -s link

Адреса интерфейсов

```
root@haoladar:/home/haoladar# 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 08:00:27:61:1c:23 brd ff:ff:ff:ff:ff:ff
    altname enx080027611c23
        inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
            valid_lft 86249sec preferred_lft 86249sec
        inet6 fd17:625c:f037:2:a00:27ff:fe61:1c23/64 scope global dynamic noprefixroute
            valid_lft 86250sec preferred_lft 14250sec
        inet6 fe80::a00:27ff:fe61:1c23/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
root@haoladar:/home/haoladar#
```

Рис. 2: Вывод ip addr show

Проверка подключения к интернету

```
root@haoladar:/home/haoladar# 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=21.4 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=22.0 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=21.8 ms

--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 2998ms
rtt min/avg/max/mdev = 20.986/21.550/22.004/0.395 ms
root@haoladar:/home/haoladar#
```

Рис. 3: Проверка подключения к интернету

Добавление дополнительного IP-адреса

```
root@haoladar:/home/haoladar# ip addr add 10.0.0.10/24 dev enp0s3
root@haoladar:/home/haoladar# 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 08:00:27:61:1c:23 brd ff:ff:ff:ff:ff:ff
    altname enx080027611c23
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86154sec preferred_lft 86154sec
    inet 10.0.0.10/24 scope global enp0s3
        valid_lft forever preferred_lft forever
    inet6 fd17:625c:f037:2:a00:27ff:fe61:1c23/64 scope global dynamic noprefixroute
        valid_lft 86155sec preferred_lft 14155sec
    inet6 fe80::a00:27ff:fe61:1c23/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@haoladar:/home/haoladar#
```

Рис. 4: Добавление адреса к интерфейсу

Адреса интерфейсов

```
root@haoladar:/home/haoladar# 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:fe61:1c23  prefixlen 64  scopeid 0x0<global>
        inet6 fe80::a00:27ff:fe61:1c23  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:61:1c:23  txqueuelen 1000  (Ethernet)
        RX packets 112539  bytes 150759946 (143.7 MiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 33040  bytes 2007903 (1.9 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 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@haoladar:/home/haoladar#
```

Рис. 5: Вывод ifconfig

Прослушиваемые порты

```
root@haoladar:/home/haoladar# ss -tul
Netid State Recv-Q Send-Q Local Address:Port Peer Address:Port
udp UNCONN 0 0 0.0.0.0:mdns 0.0.0.0:*
udp UNCONN 0 0 127.0.0.1:323 0.0.0.0:*
udp UNCONN 0 0 [::]:mdns [::]:*
udp UNCONN 0 0 [::1]:323 [::]:*
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 *:websm *:*
tcp LISTEN 0 511 *:http *:*
tcp LISTEN 0 32 *:ftp *:*
tcp LISTEN 0 128 [::]:ssh [::]:*
tcp LISTEN 0 4096 [::1]:ipp [::]:*
```

Рис. 6: Прослушиваемые порты TCP и UDP

Просмотр и создание соединений

```
root@haoladar:/home/haoladar# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
enp0s3    f1986581-5db5-3f91-9cd2-0abdeb1d37c1  ethernet  enp0s3
lo        40b35c2b-c086-4b7a-824d-bc0774bc7116  loopback  lo
root@haoladar:/home/haoladar# nmcli connection add con-name "dhcp" type ethernet ifname enp0s3
Connection 'dhcp' (3e5fd209-a829-4524-b2bc-d8e565a1bb45) successfully added.
root@haoladar:/home/haoladar# nmcli connection add con-name "static" ifname enp0s3 autoconnect no type ether
net ip4 10.0.0.10/24 gw4 10.0.0.1 ifname enp0s3
Connection 'static' (e82768de-3126-4c18-b698-72fc44445ef7) successfully added.
root@haoladar:/home/haoladar# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
enp0s3    f1986581-5db5-3f91-9cd2-0abdeb1d37c1  ethernet  enp0s3
lo        40b35c2b-c086-4b7a-824d-bc0774bc7116  loopback  lo
dhcp     3e5fd209-a829-4524-b2bc-d8e565a1bb45  ethernet  --
static   e82768de-3126-4c18-b698-72fc44445ef7  ethernet  --
root@haoladar:/home/haoladar#
```

Рис. 7: Просмотр существующих подключений

Создание соединений dhcp и static

```
root@haoladar:/home/haoladar# nmcli connection up static
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/3)
root@haoladar:/home/haoladar# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
static    e82768de-3126-4c18-b698-72fc44445ef7  ethernet  enp0s3
lo        40b35c2b-c086-4b7a-824d-bc0774bc7116  loopback  lo
dhcp      3e5fd209-a829-4524-b2bc-d8e565a1bb45  ethernet  --
enp0s3   f1986581-5db5-3f91-9cd2-0abdeb1d37c1  ethernet  --
root@haoladar:/home/haoladar# 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 08:00:27:61:1c:23 brd ff:ff:ff:ff:ff:ff
    altname enx080027611c23
        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:afdf:2891:2681:409f/64 scope global dynamic noprefixroute
            valid_lft 86391sec preferred_lft 14391sec
        inet6 fe80::be56:8c1e:8cf8:8148/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
root@haoladar:/home/haoladar#
```

Рис. 8: Создание соединений

Переключение между соединениями

```
root@haoladar:/home/haoladar# nmcli connection up "dhcp"
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/4)
root@haoladar:/home/haoladar# nmcli connection show
NAME      UUID                                  TYPE      DEVICE
dhcp      3e5fd209-a829-4524-b2bc-d8e565a1bb45  ethernet  enp0s3
lo        40b35c2b-c086-4b7a-824d-bc0774bc7116  loopback  lo
enp0s3    f1986581-5db5-3f91-9cd2-0abdeb1d37c1  ethernet  --
static    e82768de-3126-4c18-b698-72fc44445ef7  ethernet  --
root@haoladar:/home/haoladar# 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 00:00:27:61:1c:23 brd ff:ff:ff:ff:ff:ff
    altname enx000027611c23
        inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
            valid_lft 86397sec preferred_lft 86397sec
        inet6 fd17:625c:f037:2:cc8f:8cbe:3b8b:c2c5/64 scope global dynamic noprefixroute
            valid_lft 86398sec preferred_lft 14398sec
        inet6 fe80::9865:5d2:2de7:a4df/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
root@haoladar:/home/haoladar#
```

Рис. 9: Переключение между DHCP и Static

Изменение параметров static

```
#!/bin/bash
root@haoladar:/home/haoladar# nmcli connection modify static connection.autoconnect no
root@haoladar:/home/haoladar# nmcli connection modify static ipv4.dns 10.0.0.10
root@haoladar:/home/haoladar# nmcli connection modify static +ipv4.dns 8.8.8.8
root@haoladar:/home/haoladar# nmcli connection modify static ipv4.addresses 10.0.0.20/24
root@haoladar:/home/haoladar# nmcli connection modify static +ipv4.addresses 10.20.30.40/16
root@haoladar:/home/haoladar# nmcli connection up static
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/5)
root@haoladar:/home/haoladar# nmcli connection show
NAME      UUID              TYPE      DEVICE
static    e82768de-3126-4c18-b698-72fc44445ef7  ethernet  enp0s3
lo        40b35c2b-c086-4b7a-824d-bc0774bc7116  loopback  lo
dhcp     3e5fd209-a829-4524-b2bc-d8e565a1bb45  ethernet  --
enp0s3   f1986581-5db5-3f91-9cd2-0abdeb1d37c1  ethernet  --
root@haoladar:#
```

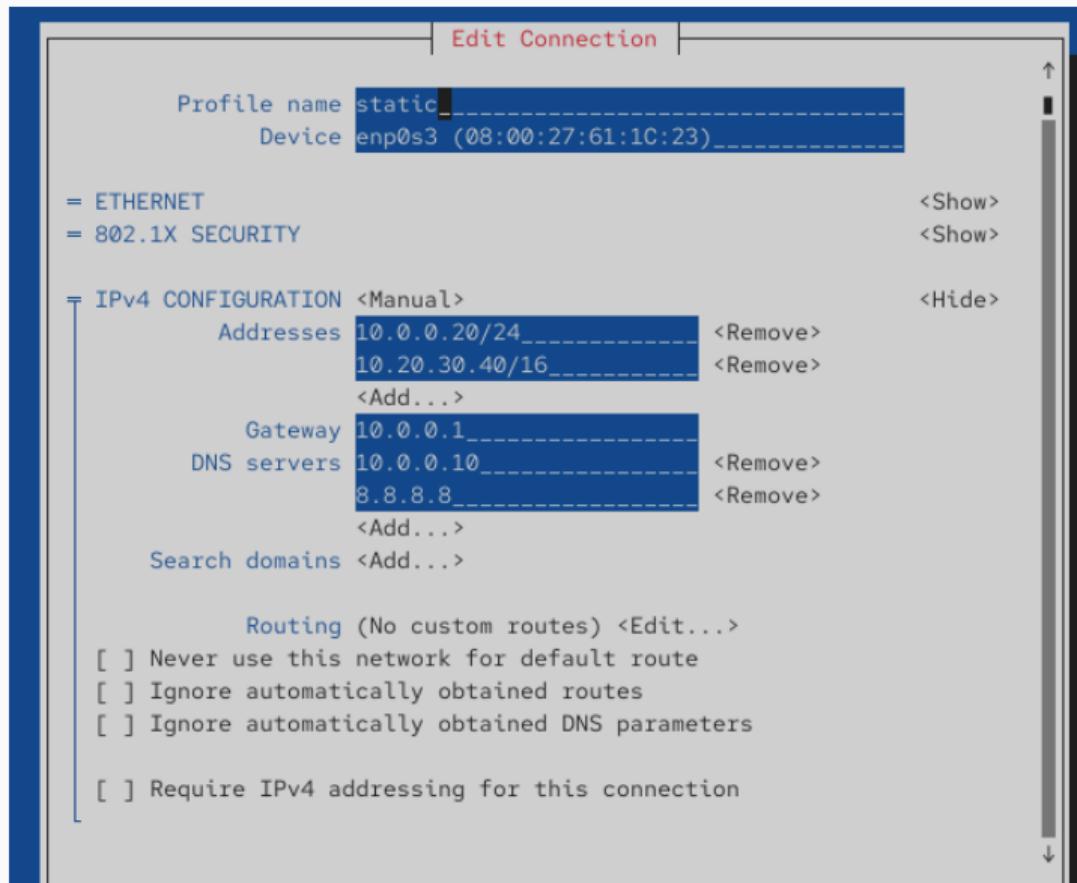
Рис. 10: Активация статического соединения после изменений

Проверка адресов

```
root@haoladar:/home/haoladar# 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 08:00:27:61:c2:33 brd ff:ff:ff:ff:ff:ff
    altname enx08002761c23
    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:afdf:2891:2681:409f/64 scope global dynamic noprefixroute
        valid_lft 86374sec preferred_lft 14374sec
    inet6 fe80::be56:8c1e:8cf8:8148/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
root@haoladar:/home/haoladar#
```

Рис. 11: Вывод ip addr после изменений

Просмотр через nmtui



Просмотр через графический интерфейс

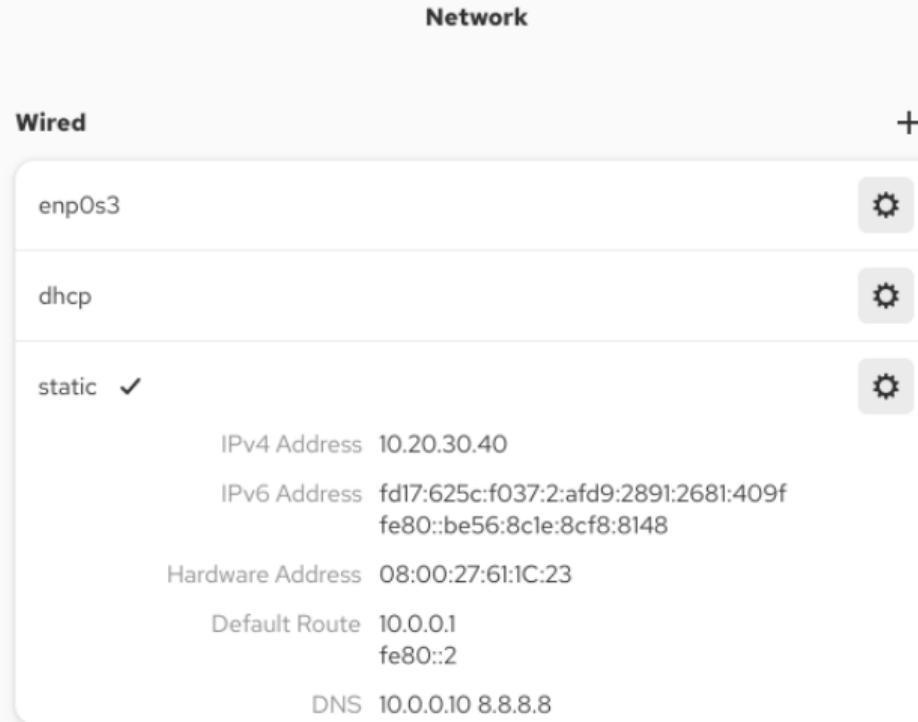


Рис. 13: Настройки сети в GUI

Возврат к DHCP

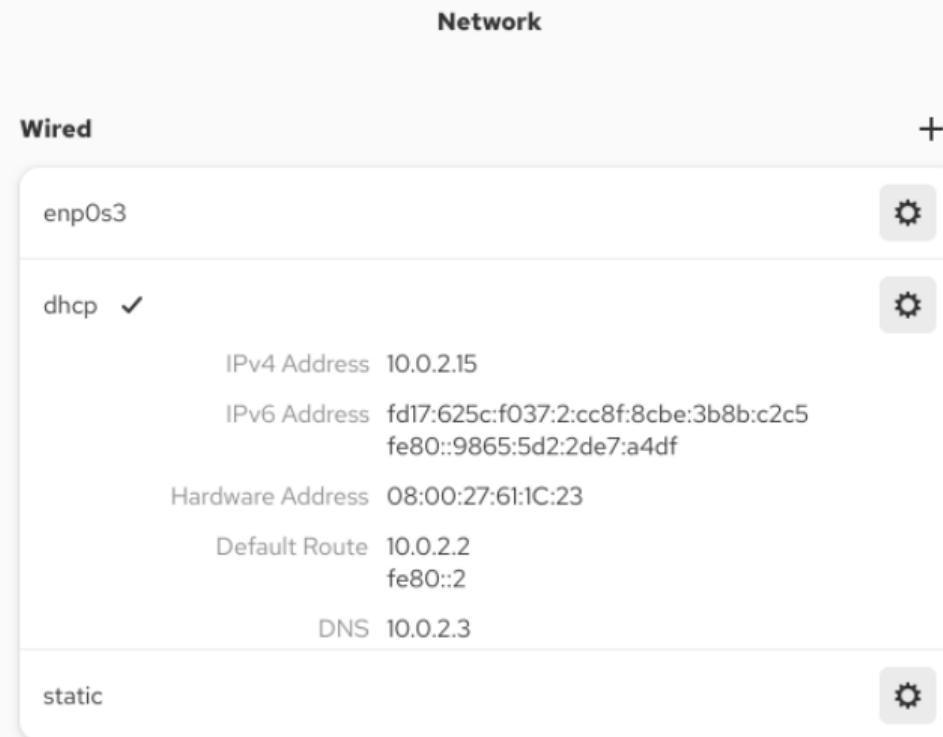


Рис. 14: Переключение на DHCP

Итоги работы

- Освоены утилиты `ip`, `nmcli`, `nmtui`
- Настроены статические и динамические соединения
- Изучены DNS и маршрутизация
- Получены навыки работы с сетевыми профайлами и параметрами интерфейсов