

nmcli - NetworkManager

nmcli manages NetworkManager in Linux. Work with two core concepts: **Device** (physical hardware like eth0 or wlan0) and **Connection** (a saved configuration profile).

Overview & Diagnostics

* View overall network status:

```
$ nmcli general status
```

* List physical network interfaces and their status:

```
$ nmcli device status
```

* Show detailed interface info (IP, MAC, DNS, Gateway):

```
$ nmcli device show eth0
```

* List all saved connection profiles:

```
$ nmcli connection show
```

* Show only active connections:

```
$ nmcli connection show --active
```

Wi-Fi Management

* Scan for nearby Wi-Fi networks:

```
$ nmcli device wifi list
```

* Connect to a Wi-Fi network:

```
# nmcli device wifi connect "SSID_NAME" password "WIFI_PASSWORD"
```

* Prompt securely for Wi-Fi password (prevents saving password in shell history):

```
# nmcli --ask device wifi connect "SSID_NAME"
```

* Toggle Wi-Fi on or off:

```
$ nmcli radio wifi off
$ nmcli radio wifi on
```

Connection Controls (Up / Down / Delete)

* **Activate a connection profile:**

```
# nmcli connection up "MyConnection"
```

* **Deactivate a connection profile:**

```
# nmcli connection down "MyConnection"
```

* **Disconnect a hardware device directly:**

```
# nmcli device disconnect eth0
```

* **Delete a saved connection profile:**

```
sudo nmcli connection delete "MyConnection"
```

Network Configuration (IP, Gateway, DNS)

* **Set a static IPv4 address and gateway:**

```
# nmcli connection modify "Wired connection 1" ipv4.addresses
192.168.1.50/24 ipv4.gateway 192.168.1.1 ipv4.method manual
# nmcli connection up "Wired connection 1"
```

* **Switch back to dynamic IP (DHCP):**

```
# nmcli connection modify "Wired connection 1" ipv4.method auto
# nmcli connection up "Wired connection 1"
```

* **Set custom DNS servers:**

```
# nmcli connection modify "Wired connection 1" ipv4.dns "1.1.1.1 8.8.8.8"
# nmcli connection up "Wired connection 1"
```

Adding New Profiles

* **Add a standard Ethernet connection profile (DHCP):**

```
# nmcli connection add type ethernet con-name "Office-Eth" ifname eth0
```

* **Add a static Ethernet connection profile directly:**

```
# nmcli connection add type ethernet con-name "Static-Eth" ifname eth0 ip4  
10.0.0.10/24 gw4 10.0.0.1
```

Useful Shortcuts & Scripting Flags

* **Shortened syntax:** Object names can be abbreviated (c for connection, d for device, g for general, r for radio):

```
$ nmcli d status  
$ nmcli c show
```

* **Terse output (cleaner for scripts/grep):**

```
$ nmcli -t -f NAME,DEVICE connection show --active
```

* **Get a single specific field value:**

```
$ nmcli -g IP4.ADDRESS device show eth0
```

Backing Up and Restoring NetworkManager Configuration

When testing network changes such as bridges, VLANs, or bonds with `nmcli`, back up the NetworkManager connection profiles first. Also capture the current runtime state as a readable reference.

1. Back up NetworkManager connection profiles

On Debian Bookworm, persistent NetworkManager connection profiles are normally stored in:

```
/etc/NetworkManager/system-connections/
```

Create a compressed backup:

```
sudo tar --create --gzip --preserve-permissions \  
--file="$HOME/networkmanager-backup-$(date +%F-%H%M%S).tar.gz" \  
/etc/NetworkManager/system-connections
```

Alternatively, create a directory copy under /root:

```
sudo mkdir -p /root/networkmanager-backup
sudo cp -a /etc/NetworkManager/system-connections/. \
/root/networkmanager-backup/
```

The -a option preserves ownership, permissions, timestamps, and symbolic links.

Security note: NetworkManager profiles can contain Wi-Fi credentials or other secrets. Keep the backup readable only by root, especially if it is stored outside /root.

For a tar archive stored in your home directory, tighten its permissions:

```
chmod 600 "$HOME"/networkmanager-backup-*.tar.gz
```

2. Save a readable snapshot of the current state

These files are not used for automatic restoration, but they are useful for comparing the working setup with the changed configuration:

```
mkdir -p "$HOME/network-state-before-change"

nmcli connection show \
> "$HOME/network-state-before-change/nm-connections.txt"

nmcli device show \
> "$HOME/network-state-before-change/nm-devices.txt"

ip address show \
> "$HOME/network-state-before-change/ip-address.txt"

ip route show table all \
> "$HOME/network-state-before-change/ip-routes.txt"

ip rule show \
> "$HOME/network-state-before-change/ip-rules.txt"
```

For more detail, export every NetworkManager profile in a human-readable form:

```
while IFS= read -r uuid; do
  nmcli --show-secrets connection show uuid "$uuid"
  printf '\n%s\n\n' '-----'
done <<(nmcli -g UUID connection show) \
> "$HOME/network-state-before-change/nm-connections-full.txt"

chmod 600 "$HOME/network-state-before-change/nm-connections-full.txt"
```

Because --show-secrets may reveal credentials, protect this file carefully. Omit --show-secrets

if the secrets are not needed in the reference copy.

3. Restore the saved profiles

A local console, hypervisor console, IPMI/iDRAC/iLO session, or other out-of-band access is strongly recommended before restarting NetworkManager.

Restore from the directory copy

```
sudo systemctl stop NetworkManager

sudo mkdir -p /etc/NetworkManager/system-connectionsntables
sudo rm -f /etc/NetworkManager/system-connections/*

sudo cp -a /root/networkmanager-backup/. \
  /etc/NetworkManager/system-connections/

sudo chown -R root:root /etc/NetworkManager/system-connections
sudo find /etc/NetworkManager/system-connections \
  -type f -exec chmod 600 {} +

sudo systemctl start NetworkManager
sudo nmcli connection reload
```

Restore from the tar archive

Replace the archive name with the actual backup file:

```
sudo systemctl stop NetworkManager
sudo rm -rf /etc/NetworkManager/system-connections
sudo tar --extract --gzip --preserve-permissions \
  --file="$HOME/networkmanager-backup-YYYY-MM-DD-HHMMSS.tar.gz" \
  --directory=/
sudo chown -R root:root /etc/NetworkManager/system-connections
sudo systemctl start NetworkManager
sudo nmcli connection reload
```

After restoring, verify the profiles and device state:

```
nmcli connection show
nmcli device status
ip address show
ip route show
```

If the expected connection does not activate automatically, bring it up explicitly:

```
sudo nmcli connection up "CONNECTION_NAME"
```

4. Safer testing over SSH

Network changes involving a bridge can disconnect the interface carrying the SSH session. Prefer a local or out-of-band console.

If the `at` command is installed and its service is running, schedule a rollback **before** applying the test configuration.

First create a rollback script:

```
sudo tee /root/restore-networkmanager.sh >/dev/null <<'EOF'
#!/bin/sh
set -eu
systemctl stop NetworkManager
rm -f /etc/NetworkManager/system-connections/*
cp -a /root/networkmanager-backup/. /etc/NetworkManager/system-connections/
chown -R root:root /etc/NetworkManager/system-connections
find /etc/NetworkManager/system-connections -type f -exec chmod 600 {} +
systemctl start NetworkManager
nmcli connection reload
EOF

sudo chmod 700 /root/restore-networkmanager.sh
```

Schedule it, for example, ten minutes from now:

```
echo /root/restore-networkmanager.sh | sudo at now + 10 minutes
```

List the scheduled job:

```
sudo atq
```

After confirming that the new configuration works, cancel the rollback job:

```
sudo atrm JOB_ID
```

A simple scheduled `systemctl restart NetworkManager` is not a full rollback. It only restarts NetworkManager with whatever configuration is currently present. The rollback job must restore the saved profile files first.

5. Recommended quick workflow

Before the experiment:

```
sudo rm -rf /root/networkmanager-backup
```

```
sudo mkdir -p /root/networkmanager-backup
sudo cp -a /etc/NetworkManager/system-connections/. \
  /root/networkmanager-backup/

nmcli connection show
nmcli device status
```

Make the changes using nmcli. If they work, keep them and remove the temporary rollback job. If they fail, restore the profile directory from a local or out-of-band console.

6. Additional protection for a virtual machine

If the Debian host is a virtual machine, take a hypervisor snapshot before changing the network configuration. This provides a complete rollback point, not only a backup of NetworkManager profiles.

Important limitations

- The profile backup covers persistent NetworkManager connection profiles. - It does not necessarily capture temporary runtime-only changes made directly with commands such as `ip address add` or `ip route add`. - It does not back up unrelated network configuration, firewall rules, DNS server configuration outside NetworkManager, or custom dispatcher scripts. - For a broader system backup, also consider `/etc/NetworkManager/NetworkManager.conf`, `/etc/NetworkManager/conf.d/`, `/etc/NetworkManager/dispatcher.d/`, and any locally maintained firewall configuration.

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