



Using NetworkManager with Telit Modems Application Note

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DOCUMENTATION

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APPLICABILITY TABLE

PRODUCTS

- ■ GE910-QUAD
- ■ UL865 SERIES
- ■ UE910 SERIES
- ■ HE910 SERIES
- ■ HE910 MINI PCIE
- ■ LE866 SERIES
- ■ LE910 SERIES
- ■ LE920 AUTO SERIES
- ■ LE910 V2 SERIES
- ■ LE910 CAT.1 SERIES
- ■ LN930 SERIES

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1. INTRODUCTION

1.1. Scope

Scope of this document is to provide a quick-start guide for using Linux freedesktop.org NetworkManager with Telit modems.

1.2. Audience

This document is intended for Linux users who are going to use a Telit modem.

1.3. Contact Information, Support

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- TS-EMEA@telit.com
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Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4. Text Conventions



Danger – This information **MUST** be followed or catastrophic equipment failure or bodily injury may occur.



Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.



Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.5. Related Documents

- [Telit Modules Linux USB Drivers - User Guide, 1VV0301371](#)
- [Using ModemManager with Telit Modems - Application Note, 80455NT11505A](#)

2. NETWORKMANAGER

2.1. Overview

NetworkManager is the standard Linux network configuration tool suite. It supports large range of networking setups, from desktop to server and mobile, integrating well with popular desktop environments and server configuration management tools.

NetworkManager provides a complete D-Bus API used to access the NetworkManager daemon. This interface can be used to query network state and the details of network interfaces like current IP addresses or DHCP options. The API can be also used for managing the connections (creation, activation, deactivation...).

NetworkManager uses freedesktop.org ModemManager for mobile broadband device support: please refer to ModemManager documentation for further details.

This guide focuses on using NetworkManager with Telit modems and assumes that ModemManager is already in place and properly working.

2.2. License

At the moment of writing NetworkManager is distributed according to the GPL V2 license.

2.3. Availability

NetworkManager is usually available in recent desktop Linux distributions. If missing, it can be generally installed using the package manager of your distribution of choice. For example in Ubuntu the command apt can be used:

```
user@pc:~$ sudo apt install network-manager
```

Source code of NetworkManager is publicly available to allow custom builds if packages are missing. Refer to the project documentation for instructions on the build process.

2.4. Resources

Following a list of useful resources:

- [Project official page](#)
- [Git repository](#)
- Additional documentation is available using man (e.g. man NetworkManager)

3. NETWORKMANAGER WITH TELIT MODEMS

3.1. Compatibility list

Following the list of supported Telit modems according to their USB composition (identified by the PID):

MODEM	PID
GE910-QUAD	0x0022
UL865 Series	0x0021
UE910 Series	0x0021
HE910 Series, HE910 Mini PCIe	0x0021
LE866 Series	0x2300
LE910 Series	0x1201
LE920 AUTO Series	0x1201
LE910 V2 Series	0x0032
LE910 Cat.1 Series	0x0032
LN930 Series	Contact customer support

4. NMCLI

4.1. Overview

Once the NetworkManager daemon is properly setup and running, it can be managed through the D-Bus API. nmcli is a command line client tool that allows controlling NetworkManager and reporting its status.

Some examples of nmcli usage with Telit modems are shown in the next paragraphs.

For further details please refer to nmcli man page:

```
user@pc:~$ man nmcli
```

4.2. Checking device status

Device status of all the network interfaces managed by NetworkManager can be checked with:

```
user@pc:~$ nmcli d status
DEVICE   TYPE      STATE      CONNECTION
enol     ethernet  connected  Wired connection 1
ttyACM0  gsm     disconnected --
lo       loopback  unmanaged  --
```

Telit modems are characterized by the value **gsm** in the **TYPE** column. The **DEVICE** column value depends on the modem in use, according to the following table:

MODEM	DEVICE
GE910-QUAD, UL865 Series, UE910 Series, HE910 Series, HE910 Mini PCIe	ttyACMx
LE910 Series, LE920 AUTO Series, LE910 V2 SERIES, LE910 Cat.1 SERIES, LN930 Series	cdc-wdmx

where x is a number depending on the host system configuration.

The value in the STATE column indicates the modem state.



The STATE unavailable means that the modem is not properly enabled. This is typically due to an error in ModemManager: please check ModemManager log.

4.3. Checking NetworkManager wwan status

NetworkManager wwan status can be checked with:

```
user@pc:~$ nmcli general status
STATE      CONNECTIVITY  WIFI-HW  WIFI      WWAN-HW  WWAN
connected  full          enabled  enabled   enabled  enabled
```

Column **WWAN-HW** indicates if the modem is powered on or off: usually a change in this value implies an action by rfkill (when supported by the physical connection).



USB connection is not supported by rfkill.

Column **WWAN** indicates if the modem radio is turned on or off (airplane mode). See paragraph 4.5 for understanding how to modify this setting.

4.4. Checking modem properties

Modem properties can be checked with:

```
user@pc:~$ nmcli device show <DEVICE>
```

where **<DEVICE>** is the name listed in table 1. For example, when using an HE910:

```
user@pc:~$ nmcli device show ttyACM0
GENERAL.DEVICE:          ttyACM0
GENERAL.TYPE:            gsm
GENERAL.HWADDR:          (unknown)
GENERAL.MTU:              0
GENERAL.STATE:           30 (disconnected)
GENERAL.CONNECTION:      --
GENERAL.CON-PATH:        --
```

Modem properties depend on the modem status: for example, if the device is connected more data connection related properties are listed:

```
user@pc:~$ nmcli device show cdc-wdm0
GENERAL.DEVICE:          cdc-wdm0
GENERAL.TYPE:            gsm
GENERAL.HWADDR:          (unknown)
GENERAL.MTU:              0
GENERAL.STATE:           100 (connected)
GENERAL.CONNECTION:      Vodafone
GENERAL.CON-PATH:        /org/freedesktop/NetworkManager/ActiveConnection/6
IP4.ADDRESS[1]:          5.92.155.162/24
```

```
IP4.GATEWAY:                5.92.155.1
IP4.DNS[1]:                 10.133.15.210
IP4.DNS[2]:                 10.132.100.212
IP6.ADDRESS[1]:
fe80::3a2f:8abf:97e4:f444/64
IP6.GATEWAY:
```

4.5. Enabling/disabling the radio

Modem radio can be disabled with:

```
user@pc:~$ nmcli radio wwan off
```

When modem radio is disabled, the status of wwan is:

```
user@pc:~$ nmcli general status
STATE      CONNECTIVITY  WIFI-HW  WIFI    WWAN-HW  WWAN
connected  full          enabled  enabled enabled  disabled
```

Modem radio can be enabled with:

```
user@pc:~$ nmcli radio wwan on
```

4.6. Adding a connection

The simplest command for adding a connection is:

```
user@pc:~$ nmcli connection add con-name <NAME> type gsm ifname
<DEVICE> apn <APN>
```

For example, when using a HE910:

```
user@pc:~$ nmcli connection add con-name Vodafone type gsm ifname
ttyACM0 apn web.omnitel.it
```

4.7. Showing and editing the connection properties

Connections can be listed with:

```
user@pc:~$ nmcli connection show
NAME                UUID                                TYPE
DEVICE
Wired connection 1  3549a30d-2eab-4c43-a3a3-b43f39c3dfc5  802-3-
ethernet  eno1
gsm-ttyACM0         13ae7aac-9553-443b-9e94-c7e172f24a1b  gsm
ttyACM0
```

The value of column UUID uniquely identifies a connection.

Connection properties can be listed with:

```
user@pc:~$ nmcli connection show <UUID>
```

e.g.

```

user@pc:~$ nmcli connection show 13ae7aac-9553-443b-9e94-
c7e172f24alb
connection.id:                Vodafone
connection.uuid:              13ae7aac-9553-443b-9e94-
c7e172f24alb
connection.interface-name:    --
connection.type:              gsm
connection.autoconnect:      yes
connection.autoconnect-priority: 0
connection.timestamp:        1475569114
connection.read-only:        no
connection.permissions:       user:user
connection.zone:              --
connection.master:           --
connection.slave-type:       --
connection.autoconnect-slaves: -1 (default)
connection.secondaries:
connection.gateway-ping-timeout: 0
connection.metered:          unknown
connection.lldp:             -1 (default)
ipv4.method:                  auto
ipv4.dns:
ipv4.dns-search:
ipv4.dns-options:            (default)
ipv4.addresses:
ipv4.gateway:                --
ipv4.routes:
ipv4.route-metric:           -1
ipv4.ignore-auto-routes:     no
ipv4.ignore-auto-dns:        no
ipv4.dhcp-client-id:         --
ipv4.dhcp-timeout:           0
ipv4.dhcp-send-hostname:     yes
ipv4.dhcp-hostname:          --
ipv4.dhcp-fqdn:              --
ipv4.never-default:          no
ipv4.may-fail:               yes
ipv4.dad-timeout:            -1 (default)

```

```

ipv6.method: auto
ipv6.dns:
ipv6.dns-search:
ipv6.dns-options: (default)
ipv6.addresses:
ipv6.gateway: --
ipv6.routes:
ipv6.route-metric: -1
ipv6.ignore-auto-routes: no
ipv6.ignore-auto-dns: no
ipv6.never-default: no
ipv6.may-fail: yes
ipv6.ip6-privacy: -1 (unknown)
ipv6.addr-gen-mode: stable-privacy
ipv6.dhcp-send-hostname: yes
ipv6.dhcp-hostname: --
ppp.noauth: yes
ppp.refuse-eap: no
ppp.refuse-pap: no
ppp.refuse-chap: no
ppp.refuse-mschap: no
ppp.refuse-mschapv2: no
ppp.nobsdcomp: no
ppp.nodeflate: no
ppp.no-vj-comp: no
ppp.require-mppe: no
ppp.require-mppe-128: no
ppp.mppe-stateful: no
ppp.crtscts: no
ppp.baud: 0
ppp.mru: 0
ppp.mtu: 0
ppp.lcp-echo-failure: 0
ppp.lcp-echo-interval: 0
gsm.number: --
gsm.username: --
gsm.password: <hidden>
gsm.password-flags: 4 (not required)

```

```

gsm.apn: web.omnitel.it
gsm.network-id: --
gsm.pin: <hidden>
gsm.pin-flags: 4 (not required)
gsm.home-only: no
gsm.device-id: --
gsm.sim-id: --
gsm.sim-operator-id: --
GENERAL.NAME: Vodafone
GENERAL.UUID: 13ae7aac-9553-443b-9e94-
c7e172f24a1b
GENERAL.DEVICES: ttyACM0
GENERAL.STATE: activated
GENERAL.DEFAULT: no
GENERAL.DEFAULT6: no
GENERAL.VPN: no
GENERAL.ZONE: --
GENERAL.DBUS-PATH:
/org/freedesktop/NetworkManager/ActiveConnection/13
GENERAL.CON-PATH:
/org/freedesktop/NetworkManager/Settings/2
GENERAL.SPEC-OBJECT: /
GENERAL.MASTER-PATH: --
IP4.ADDRESS[1]: 176.246.137.147/32
IP4.GATEWAY: 176.246.137.147
IP4.DNS[1]: 10.133.14.210
IP4.DNS[2]: 10.132.100.181
IP6.ADDRESS[1]:
fe80::c99c:98dd:ed1b:678a/64
IP6.GATEWAY:

```

Connection properties can be edited with:

```
user@pc:~$ nmcli connection edit <UUID>
```

e.g.

```
user@pc:~$ nmcli connection edit 13ae7aac-9553-443b-9e94-
c7e172f24a1b
```

Follow in program instructions to understand which properties can be modified and how.

4.8. Enabling/disabling a connection

A connection can be enabled with:

```
user@pc:~$ nmcli connection up <UUID>
```

e.g.

```
user@pc:~$ nmcli connection up 13ae7aac-9553-443b-9e94-  
c7e172f24a1b
```

A connection can be disabled with:

```
user@pc:~$ nmcli connection down <UUID>
```

e.g.

```
user@pc:~$ nmcli connection down 13ae7aac-9553-443b-9e94-  
c7e172f24a1b
```

4.9. Deleting a connection

A connection can be deleted with:

```
user@pc:~$ nmcli connection delete <UUID>
```

e.g.

```
user@pc:~$ nmcli connection down 13ae7aac-9553-443b-9e94-  
c7e172f24a1b
```

5. DEBUGGING NETWORKMANAGER

5.1. Syslog output

By default NetworkManager writes logs into syslog: different log levels can be set, in order to modify logging verbosity. When dealing with an issue it can be useful to set the maximum level of log verbosity with the command:

```
user@pc:~$ sudo nmcli general logging level DEBUG
```



Continuous syslog output can be achieved with:

```
user@pc:~$ tail -F /var/log/syslog
```

5.2. Monitoring NetworkManager activity

It is possible to monitor NetworkManager activity through nmcli.

Device activity can be monitored with:

```
user@pc:~$ nmcli device monitor <DEVICE>
```

e.g.

```
user@pc:~$ nmcli device monitor ttyACM0
```

Connection activity can be monitored with:

```
user@pc:~$ nmcli connection monitor <UUID>
```

e.g.

```
user@pc:~$ nmcli connection monitor <UUID>
```

6. USING NETWORKMANAGER WITH THE GUI

6.1. [Overview](#)

GUI tools for using NetworkManager highly depends on the system used: please refer to the instructions of your distribution of choice for further details.

7. GLOSSARY AND ACRONYMS

	Description
USB	Universal Serial Bus
PID	Product ID
GUI	Graphical User Interface

8. DOCUMENT HISTORY

Revision	Date	Changes
0	2017-07-20	First issue



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