



Using ModemManager with Telit Modems Application Note

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APPLICABILITY TABLE

PRODUCTS

- ■ GE910-QUAD
- ■ UL865 SERIES
- ■ UE910 SERIES
- ■ HE910 SERIES
- ■ HE910 MINI PCIE
- ■ 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 ModemManager 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

For general contact, technical support services, technical questions and report documentation errors contact Telit Technical Support at:

- TS-EMEA@telit.com
- TS-AMERICAS@telit.com
- TS-APAC@telit.com

Alternatively, use:

<http://www.telit.com/support>

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

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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

- CE/DE/LE910, HE/LE920, LE922, LE940A6 Linux USB Driver - User Guide, 1VV0301254
- GE/HE/UE910, UL865, LE910 V2, LE940B6 Linux USB Driver - User Guide, 1VV0301255
- Using NetworkManager with Telit Modems - Application Note, 80455NT11504A

2. MODEMMANAGER

2.1. Overview

ModemManager is a DBus-activated daemon which controls mobile broadband (2G/3G/4G) devices and connections.

ModemManager provides a unified high level API for communicating with mobile broadband modems, regardless of the protocol used to communicate with the actual device (AT commands, MBIM, QMI).

For managing non AT-based modems ModemManager uses external libraries: freedesktop.org libqmi for QMI-based modems, libmbim for MBIM-based modems.

ModemManager can be used with freedesktop.org NetworkManager for easier network connections management: please refer to NetworkManager documentation for further details.

This guide focuses on using ModemManager with Telit modems.



When ModemManager is up and running, it assumes to have exclusive control over the modem, so avoid direct communication (e.g. sending AT commands through minicom, or MBIM messages with mbimcli).

2.2. License

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

2.3. Availability

ModemManager is usually available in desktop Linux distributions. If missing, it can be generally installed using the package manager of your distribution of choice. For example in Ubuntu 16.04 the command apt can be used:

```
user@pc:~$ sudo apt install modemmanager
```

Source code of ModemManager 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](#)
- [libqmi project official page](#)
- [libmbim project official page](#)
- Additional documentation is available using man (e.g. man ModemManager)

3. MODEMMANAGER 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
LE910 Series	0x1201
LE920 AUTO Series	0x1201
LE910 V2 Series	0x0032
LE910 Cat.1 Series	0x0032
LN930 Series	Contact customer support

4. MMCLI

4.1. Overview

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

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

For further details please refer to mmcli man page:

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

4.2. Checking modem availability

Modem availability can be checked with:

```
user@pc:~$ mmcli -L
```

```
Found 1 modems:
```

```
  /org/freedesktop/ModemManager1/Modem/1 [Telit] HE910-D
```

This is the output when using an HE910-D; it holds four important pieces of information:

- The modem **<PATH>**: `/org/freedesktop/ModemManager1/Modem/1` in this example.
- The modem **<INDEX>** or **<ID>** that is the terminating number of the path: `1` in this example.
- The **PLUGIN** chosen by ModemManager for managing the modem: `[Telit]` in this example. The plugin choice is done according to different reasons (VID/PID of the modem, protocol used, udev rules...).
- Modem **NAME**: `HE910-D` in this example.

<PATH> and **<INDEX>** are created by ModemManager once a modem has been properly probed and managed by the daemon. These values are important since most of mmcli commands need them.

4.3. Getting modem information

Modem information can be retrieved with:

```
user@pc:~$ mmcli -m <ID>
```

e.g.

```
user@pc:~$ mmcli -m 1
```

```
/org/freedesktop/ModemManager1/Modem/1 (device id
'c45a149f2f0b35583688d850d2fbf0955e1b322b')
```

```
-----
Hardware | manufacturer: 'Telit'
          | model: 'HE910'
          | revision: '12.00.007'
          | supported: 'gsm-umts'
          | current: 'gsm-umts'
          | equipment id: '357164041005136'
```

```
-----
System   | device: '/sys/devices/pci0000:00/0000:00:14.0/usb3/3-1/3-
1.2/3-1.2.3'
          | drivers: 'cdc_acm'
```

```

|         plugin: 'Telit'
|         primary port: 'ttyACM0'
|         ports: 'ttyACM3 (at), ttyACM4 (unknown), ttyACM5 (unknown),
ttyACM0 (at), ttyACM1 (unknown), ttyACM2 (unknown)'
-----
Numbers |         own : '912313191111'
-----
Status  |         lock: 'none'
|         unlock retries: 'sim-pin (3), sim-pin2 (3), sim-puk (10), sim-puk2
(10)'
|         state: 'connected'
|         power state: 'on'
|         access tech: 'hsdpa'
|         signal quality: '57' (recent)
-----
Modes   |         supported: 'allowed: 2g; preferred: none
|         allowed: 3g; preferred: none
|         allowed: 2g, 3g; preferred: none'
|         current: 'allowed: 2g, 3g; preferred: none'
-----
Bands   |         supported: 'egsm, dcs, pcs, g850, u2100, u1900, u850, u900,
u17iv'
|         current: 'egsm, dcs, u900'
-----
IP       |         supported: 'ipv4, ipv6, ipv4v6'
-----
3GPP    |         imei: '357164041005136'
|         enabled locks: 'none'
|         operator id: '22201'
|         operator name: 'I TIM'
|         subscription: 'unknown'
|         registration: 'home'
-----
SIM      |         path: '/org/freedesktop/ModemManager1/SIM/1'
-----
Bearers  |         paths: '/org/freedesktop/ModemManager1/Bearer/0'

```

Most of the information fields are self-explaining; to check if one of the modems in the Applicability Table has been properly recognized check the drivers, plugin and primary port fields according to the following table:

MODEM	DRIVERS	PLUGIN	PRIMARY PORT
GE910- QUAD, UL865, UE910, HE910, HE910 Mini PCIe Series	cdc_acm	Telit	ttyACM0
LE910, LE920 AUTO Series	qmi_wwan, option1	Generic	cdc-wdm0
LE910 V2, LE910	cdc_acm, cdc_mbim	Generic	cdc-wdm0

Cat.1 Series			
LN930 Series	cdc_mbim	Generic	cdc-wdm0

The command returns also two other important paths:

- The sim path, in which the terminating number is the **<SIM ID>** to be used in sim related operations:
/org/freedesktop/ModemManager1/SIM/1 in this example.
- The bearer path, in which the terminating number is the **<BEARER ID>** to be used in data connection related operations:
/org/freedesktop/ModemManager1/Bearer/0 in this example.

4.4. Getting sim information

Sim information can be retrieved with:

```
user@pc:~$ mmcli -i <SIM ID>
```

e.g.

```
user@pc:~$ mmcli -i 1
SIM '/org/freedesktop/ModemManager1/SIM/1'
-----
Properties |          imsi : '222016502151656'
           |          id   : '89390100000787049160'
           | operator id  : '22201'
           | operator name: 'I TIM'
```

4.5. Getting bearer information

Bearer information can be retrieved with:

```
user@pc:~$ mmcli -b <BEARER ID>
```

e.g.

```
user@pc:~$ mmcli -b 0
Bearer '/org/freedesktop/ModemManager1/Bearer/0'
-----
Status          | connected: 'yes'
                | suspended: 'no'
                | interface: 'ttyACM0'
                | IP timeout: '20'
-----
Properties      |          apn: 'ibox.tim.it'
                | roaming: 'allowed'
                | IP type: 'ipv4v6'
                | user: 'none'
                | password: 'none'
                | number: '*99#'
```

```
-----  
| Rm protocol: 'unknown'  
-----  
IPv4 configuration | method: 'ppp'  
| address: 'unknown'  
| prefix: '0'  
| gateway: 'unknown'  
| DNS: none  
-----  
IPv6 configuration | method: 'ppp'  
| address: 'unknown'  
| prefix: '0'  
| gateway: 'unknown'  
| DNS: none  
-----  
Stats | Duration: '89'  
| Bytes received: 'N/A'  
| Bytes transmitted: 'N/A'
```

5. DEBUGGING MODEMMANAGER

5.1. Syslog output

By default ModemManager 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:~$ mmcli --set-logging=DEBUG
```



Continuous syslog output can be achieved with:

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

5.2. Enabling debug mode

When using AT commands based modems, it is possible to use ModemManager debug mode to directly send generic AT commands to the modem through mmcli.

For enabling debug mode ModemManager should be started with the debug flag:

```
user@pc:~$ ModemManager --debug
```

Once in debug mode, use mmcli to send the AT command:

```
user@pc:~$ mmcli -m <ID> --command=<AT COMMAND>
```

e.g.

```
user@pc:~$ mmcli -m 0 --command=AT+GMR
```



ModemManager is usually started as a service: to enable debug mode modify the service definition file for adding the debug flag.

For example, in distributions that use systemd, check the ModemManager service definition file (usually `/lib/systemd/system/ModemManager.service`).

Modify the ExecStart line according to the following:

```
ExecStart=/usr/local/sbin/ModemManager --debug
```

Restart the service for activating the change.

6. GLOSSARY AND ACRONYMS

	Description
USB	Universal Serial Bus
PID	Product ID
MBIM	Mobile Broadband Interface Model
API	Application Programming Interface

7. DOCUMENT HISTORY

Revision	Date	Changes
0	2016-10-14	First issue



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