Telit 5G Cards on Jetson AGX Thor™ Enablement

Application Note

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Technical Documentation

Contents

1 Applicability Table

Table 1: Applicability Table

Products
FN920C04
FN990B40

Table 2: Jetson Linux version

Jetson Linux Version
38.2 released on Aug 25 2025

2 Introduction

2.1 Scope

This document describes the standard operating procedure to enable Telit 5G cards in the NVIDIA® Jetson Thor™ Developer Kit.

The features and solutions described in this document are applicable to all variants listed in the Applicability Table.

2.2 Audience

This document is intended for developers using Telit 5G cards in the NVIDIA® Jetson Thor™ Developer Kit.

2.3 Contact Information, Support

For technical support and general questions, e-mail:

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

Alternatively, use: https://www.telit.com/contact-us/

For Product information and technical documents, visit: https://www.telit.com

2.4 Conventions

Note:	Provides advice and suggestions that may be useful when integrating the module.
Danger:	This information MUST be followed, or catastrophic equipment failure or personal injury may occur.
Warning:	Alerts the user on important steps about the module integration.

All dates are in ISO 8601 format, that is YYYY-MM-DD.

2.5 Terms and Conditions

Refer to https://www.telit.com/terms-conditions/.

2.6 Disclaimer

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3 5G Cards and Jetson Thor™ Platforms

3.1 Overview

The goal of this application note is to add 5G capabilities to the NVIDIA® Jetson Thor™ Development Kit through ModemManager, using Telit modems listed in the applicability table.

3.2 Prerequisites

The following mandatory prerequisites must be fulfilled for successfully implementing the contents of this application note:

- The Thor Developer Kit in use must be running Jetson Linux 38.2 released on the 25th of August 2025.
- rmnet should be the mobile broadband in use. This means choosing one of the following compositions:
  - FN920C04: 0x10a0, 0x10a4, 0x10a9
  - FN990B40: 0x10d0

Setting the USB composition section explains how to set the correct USB composition in case this prerequisite is not verified.

4 Customizing Jetson Linux Kernel

4.1 Kernel changes

Jetson Linux 38.2 comes with Linux kernel v6.8.12.

This version has support for FN920C04, but lacks support for FN990B40, so the following patches must be back-ported:

c979fb5ece2d "USB: serial: option: add Telit Cinterion FN990B compositions"
9a665fe3d967 "USB: serial: option: match on interface class for Telit FN990B"
9dba9a45f8ca "net: usb: qmi_wwan: add Telit Cinterion FN990B composition"

Moreover, the default build is missing the kernel module qmi_wwan, required for using the rmnet mobile broadband adapter, and qcserial, required for firmware update, so the following symbols must be added to the default kernel config found at arch/arm64/configs/defconfig in the kernel source tree:

```
CONFIG_USB_NET_QMI_WWAN=m
CONFIG_USB_WDM=m
CONFIG_USB_SERIAL_QUALCOMM=m
```

4.2 Building the kernel

The kernel must be rebuilt and installed on the target after applying the changes highlighted in Kernel changes.

For instructions related to kernel building, refer to the official Jetson Linux 38.2 documentation, section “Kernel Customization”.

5 Using Telit 5G Cards with ModemManager

5.1 What is ModemManager

Freedesktop.org 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.

Jetson Linux 38.2 comes with ModemManager 1.23.4: this version can be used together with Telit 5G cards. ModemManager runs by default as a system service.

5.2 Setting the USB composition

If the modem has a USB composition different from the ones highlighted in Prerequisites, the tool qmicli can be used to set the correct one:

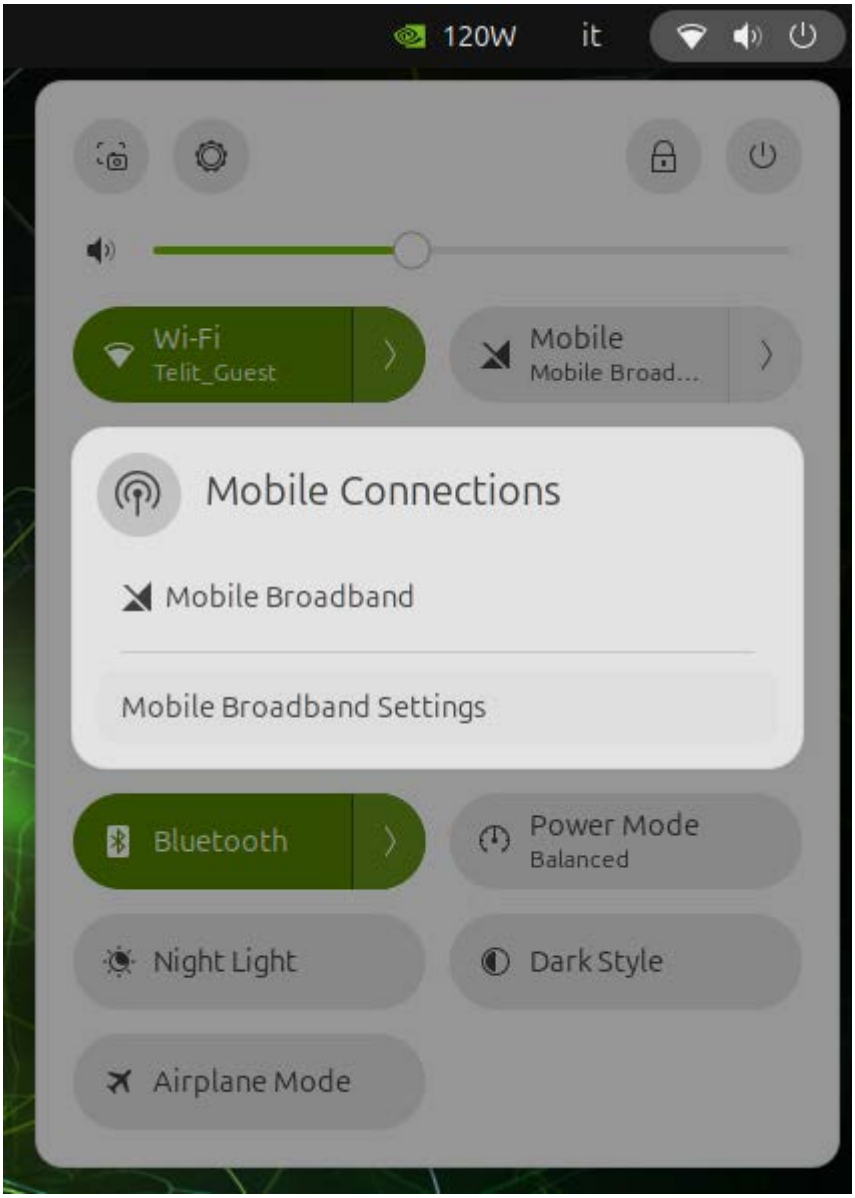
```
$ sudo qmicli -p -d <cdc wdm device> --gas-dms-set-usb-
composition=<pid>
```

For example, to set FN920C04 composition 0x10a4 the following line can be used:

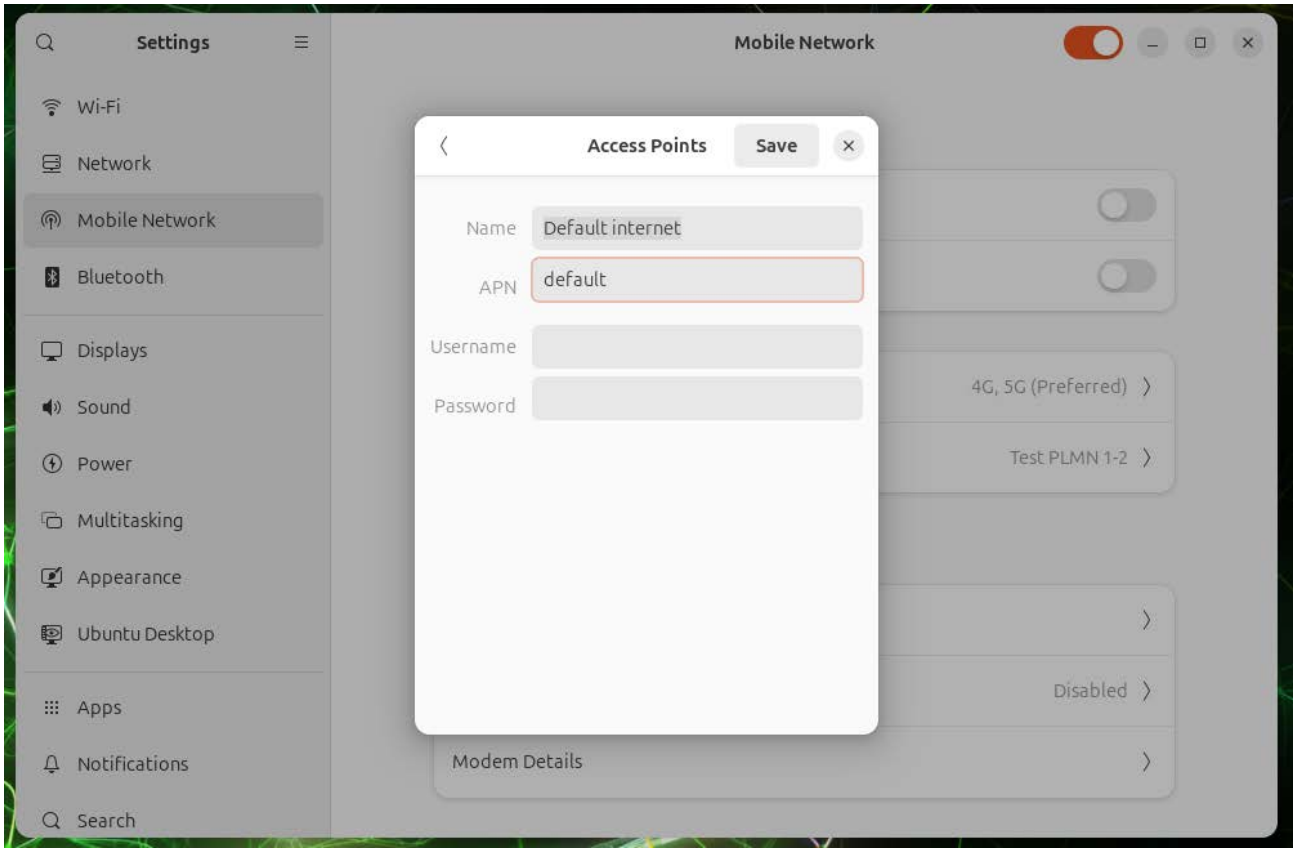
```
$ sudo qmicli -p -d /dev/cdc-wdm0 --gas-dms-set-usb-
composition=0x10a4
```

5.3 ModemManager usage through GUI

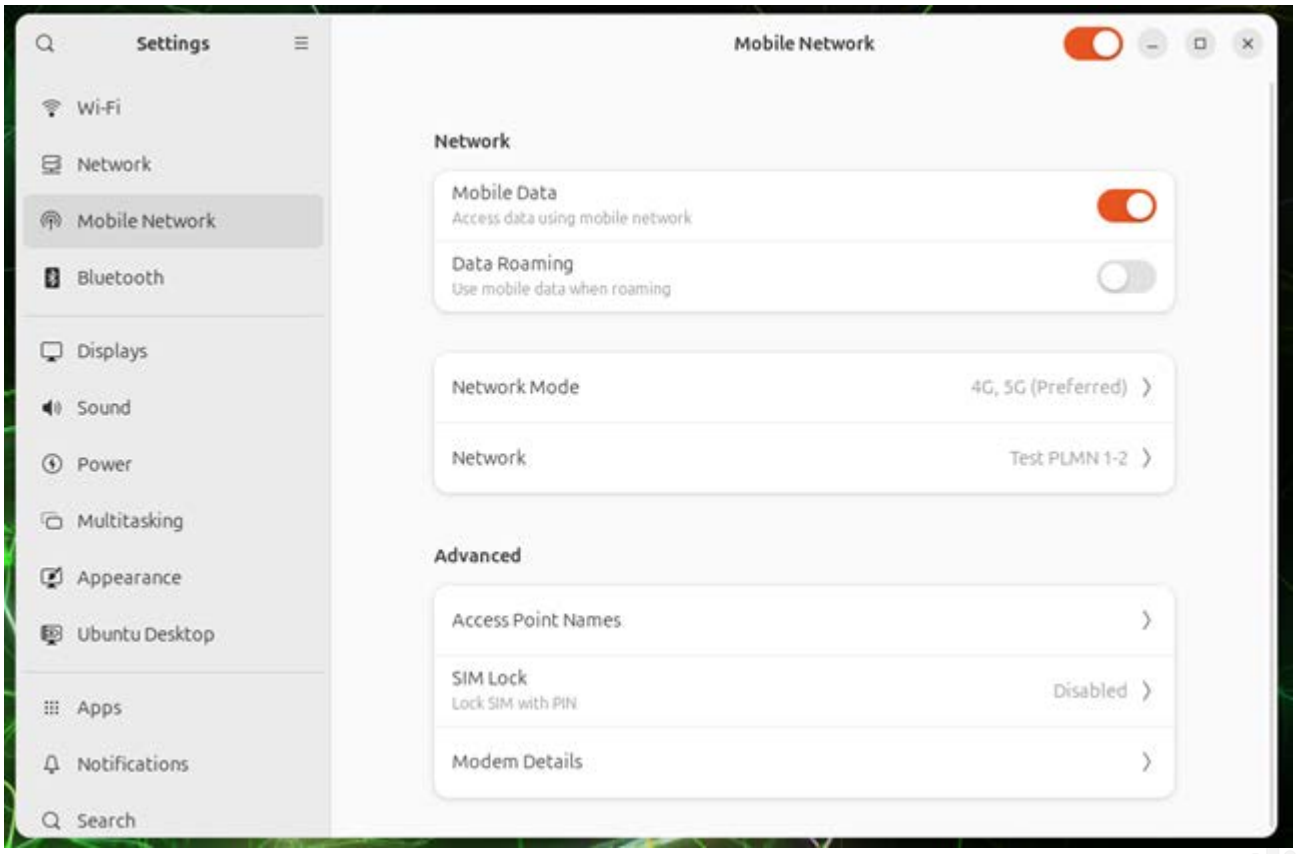
Once the modem is properly detected by the operating system, the network connection widget shows the mobile broadband device:



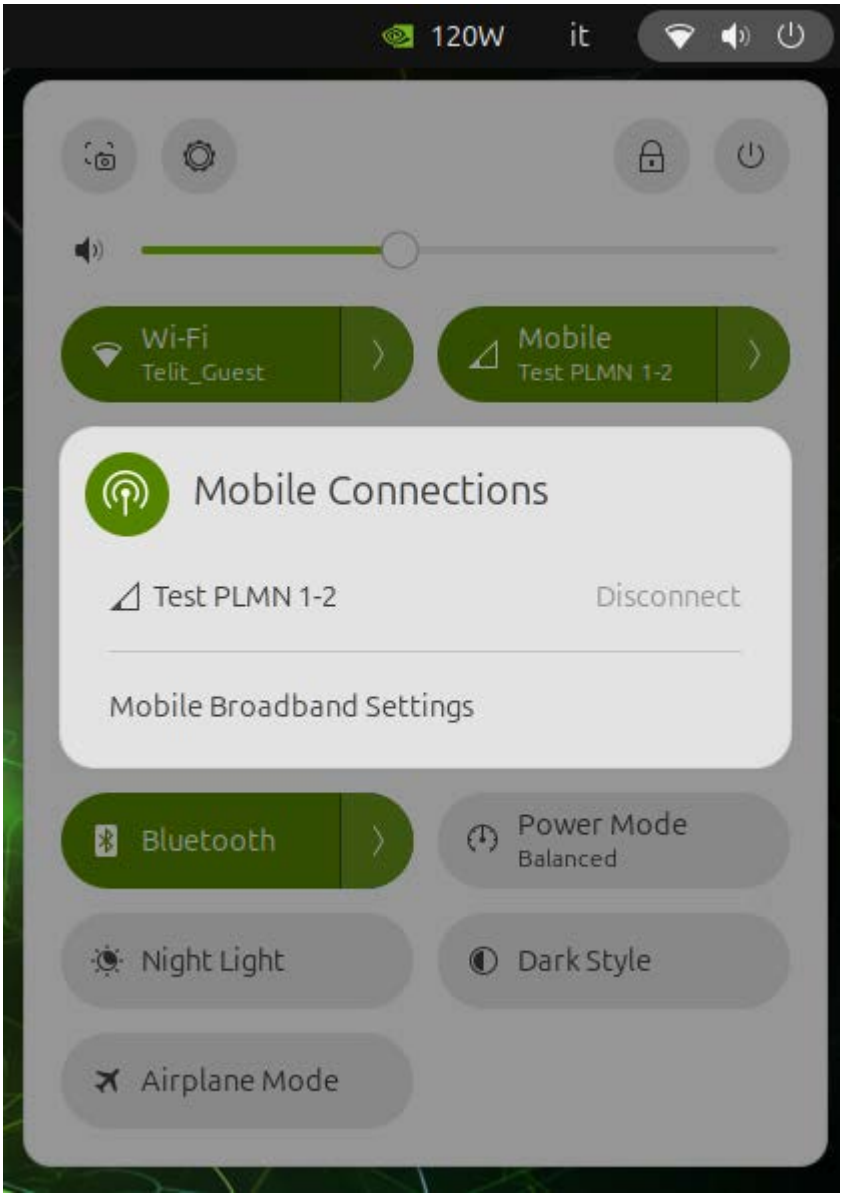
To enable the data connection, the Access Point must be configured in the Mobile Network settings panel, according to the network operator in use:



Once the Access Point is configured, the data connection switch must be set:

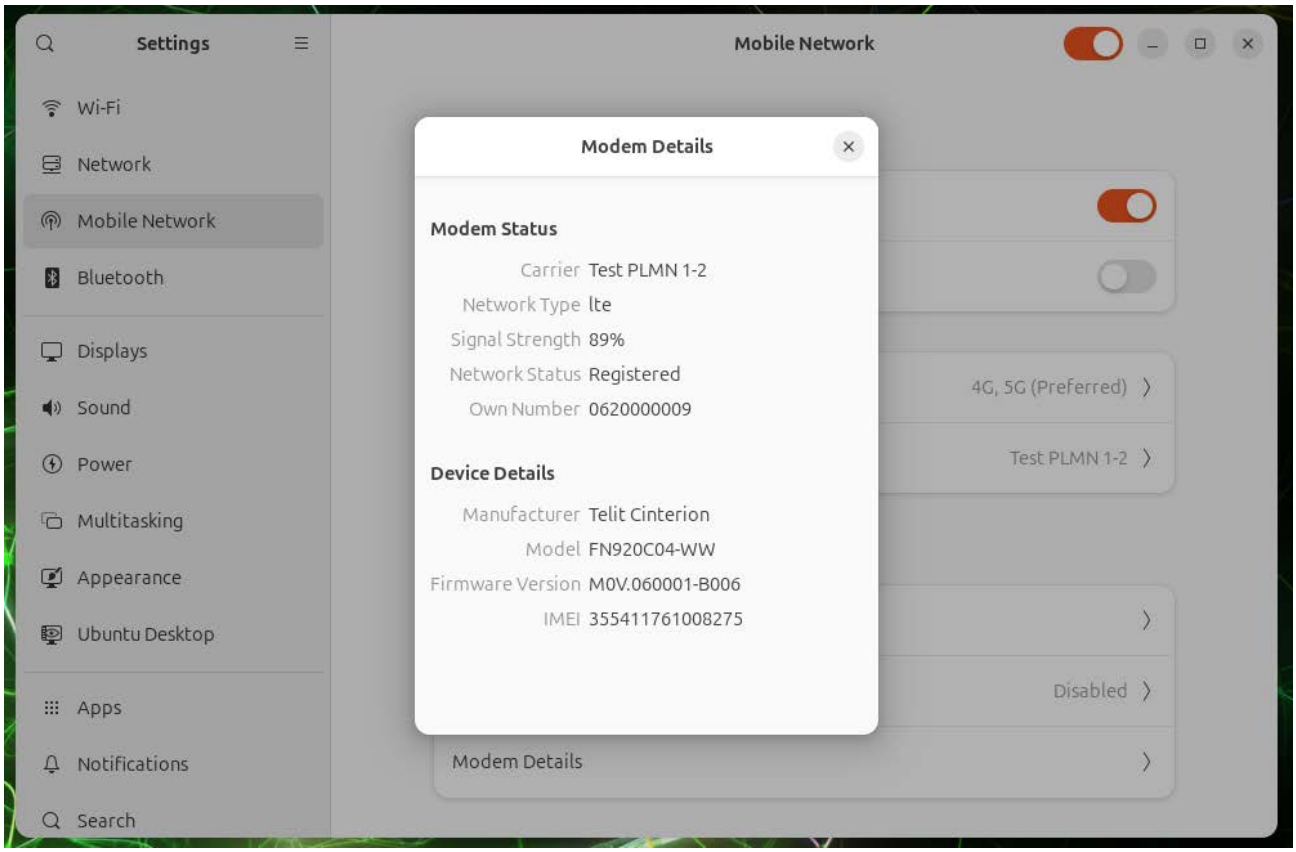


If the data connection succeeds, the network connection widget shows the mobile broadband device as connected:

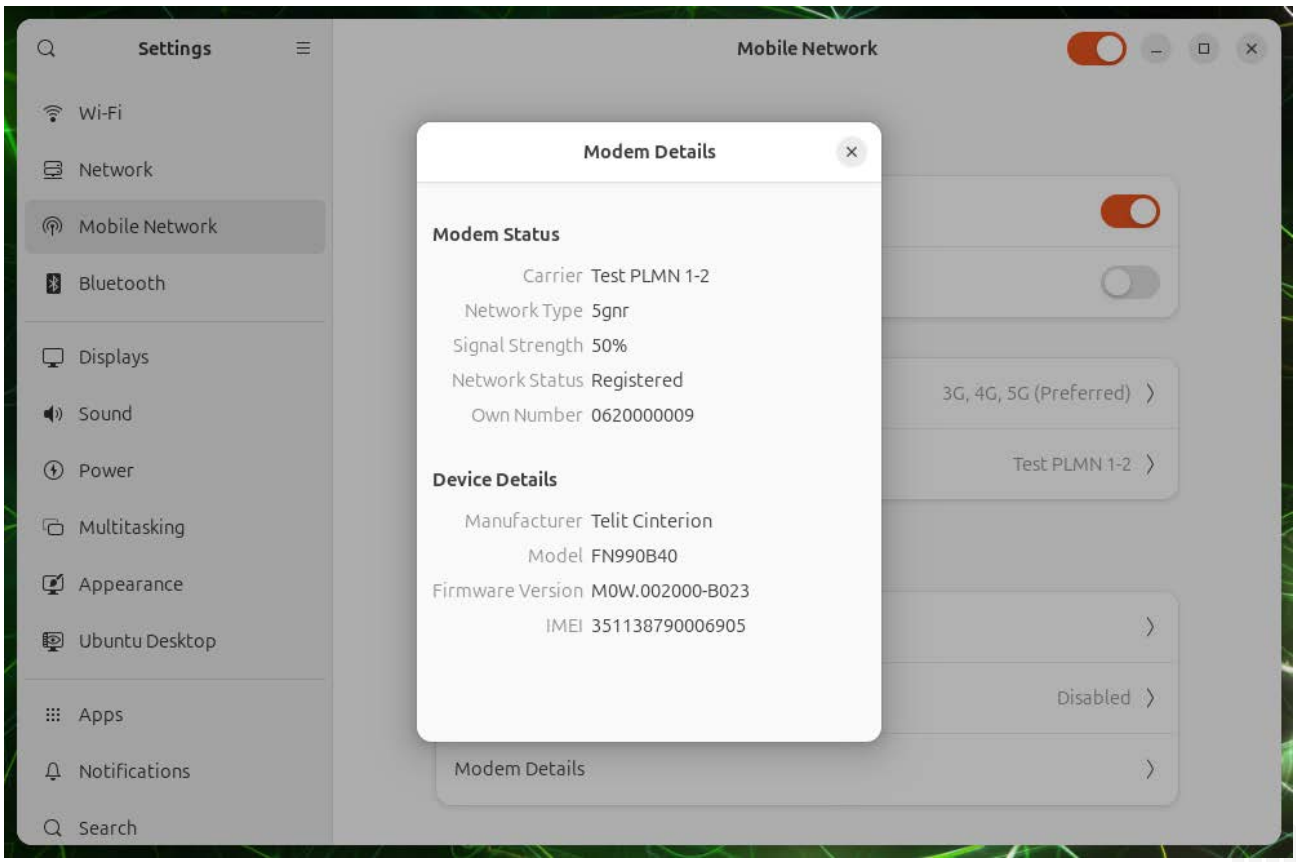


Modem information can be checked in the Mobile Network settings, item Modem Details, e.g.:

FN920C04:



FN990B40:



5.4 ModemManager usage through CLI

The command line tool mmcli can be used to perform additional operations not supported by the graphical user interface.

The list of available modems can be retrieved with:

```
$ mmcli -L
```

e.g.

```
$ mmcli -L
    /org/freedesktop/ModemManager1/Modem/0 [Telit Cinterion]
FN920C04-WW
```

Modem details can be retrieved with:

```
$ mmcli -m <modem index>
```

e.g.

```
$ mmcli -m 0
  ---------------------------------
  General  |                   path:
/org/freedesktop/ModemManager1/Modem/0
           |              device id: b6728416c31694a9dc0c0b875c18aa01b615ad40
  ---------------------------------
  Hardware |           manufacturer: Telit Cinterion
           |                  model: FN920C04-WW
           |      firmware revision: M0V.060001-B006
           |         carrier config: default
           |           h/w revision: 1.20
           |              supported: lte, 5gnr
           |                current: lte, 5gnr
           |           equipment id: 355411761008275
  ---------------------------------
  System   |                 device:
/sys/devices/platform/bus@0/a80aa10000.usb/usb1/1-2
           |                physdev:
/sys/devices/platform/bus@0/a80aa10000.usb/usb1/1-2
           |                drivers: option, qmi_wwan
           |                 plugin: telit
           |           primary port: cdc-wdm0
           |                  ports: cdc-wdm0 (qmi), ttyUSB1 (at), wwan0 (net)
  ---------------------------------
  Numbers  |                    own: 0620000009
  ---------------------------------
  Status   |                   lock: sim-pin2
           |         unlock retries: sim-pin (3), sim-puk (10), sim-pin2 (3),
sim-puk2 (10)
           |                  state: connected
           |            power state: on
           |            access tech: lte
           |         signal quality: 89% (recent)
  ---------------------------------
  Modes    |              supported: allowed: 4g; preferred: none
           |                         allowed: 5g; preferred: none
           |                         allowed: 4g, 5g; preferred: 5g
           |                         allowed: 4g, 5g; preferred: 4g
           |                current: allowed: 4g, 5g; preferred: 5g
```

```
  ---------------------------------
  Bands    |              supported: eutran-1, eutran-2, eutran-3, eutran-4,
eutran-5, eutran-7,
           |                         eutran-8, eutran-12, eutran-13, eutran-14,
eutran-17, eutran-18,
           |                         eutran-19, eutran-20, eutran-25, eutran-26,
eutran-28, eutran-30,
           |                         eutran-34, eutran-38, eutran-39, eutran-40,
eutran-41, eutran-42,
           |                         eutran-43, eutran-48, eutran-53, eutran-66,
eutran-70, eutran-71,
           |                         eutran-106
           |                current: eutran-1, eutran-2, eutran-3, eutran-4,
eutran-5, eutran-7,
           |                         eutran-8, eutran-12, eutran-13, eutran-14,
eutran-17, eutran-18,
           |                         eutran-19, eutran-20, eutran-25, eutran-26,
eutran-28, eutran-30,
           |                         eutran-34, eutran-38, eutran-39, eutran-40,
eutran-41, eutran-42,
           |                         eutran-43, eutran-48, eutran-66, eutran-70,
eutran-71
  ---------------------------------
  IP       |              supported: ipv4, ipv6, ipv4v6
  ---------------------------------
  3GPP     |                  imei: 355411761008275
           |          enabled locks: fixed-dialing
           |            operator id: 00102
           |          operator name: Test PLMN 1-2
           |           registration: home
           |   packet service state: attached
  ---------------------------------
  3GPP EPS |   ue mode of operation: csps-2
           |    initial bearer path: /org/freedesktop/ModemManager1/Bearer/0
           |     initial bearer apn: internet
           | initial bearer ip type: ipv4v6
  ---------------------------------
  SIM      |       primary sim path: /org/freedesktop/ModemManager1/SIM/0
           |         sim slot paths: slot 1:
/org/freedesktop/ModemManager1/SIM/0 (active)
           |                         slot 2:
/org/freedesktop/ModemManager1/SIM/1
  ---------------------------------
  Bearer   |                 paths: /org/freedesktop/ModemManager1/Bearer/1
```

The full list of operations supported by mmcli can be retrieved with:

```
mmcli --help-all
```

5.5 Troubleshooting

ModemManager logs are available at

```
/var/log/syslog
```

In case of issues, it is suggested to enable ModemManager debug logs through the following procedure.

Stop ModemManager:

```
$ sudo systemctl stop ModemManager.service
```

In file:

```
/usr/lib/system/ModemManager.service
```

change line:

```
ExecStart=/usr/sbin/ModemManager
```

to:

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

Reload the service configuration:

```
$ sudo systemctl daemon-reload
```

Start ModemManager again:

```
$ sudo systemctl start ModemManager.service
```

5.6 Updating ModemManager

ModemManager is a fast-paced project, constantly evolving. Developers and power-users may want to upgrade to a more recent ModemManager version than the default one in Jetson Linux release, to take advantage of bugfixes and new features.

Before installing the new tools, the old ones must be removed through the following line:

```
$ sudo apt purge modemmanager libmbim-utils libqmi-proxy libqmi-
utils libqmi-glib5 libmbim-glib4 libmbim-proxy libqrtr-glib0
```

The new version of the mobile broadband tools can be rebuilt from sources: refer to the official mobile broadband tools' documentation for further instructions.

Note: the build instructions in the official documentation are related to Intel platforms. For Thor make sure to change the meson libdir flag to:

```
/usr/lib/aarch64-linux-gnu
```

6 Acronyms and Abbreviations

Table 3: Acronyms and Abbreviations

Acronym	Definition
CLI	Command Line Interface
GUI	Graphical User Interface
QMI	Qualcomm MSM Interface
USB	Universal Serial Bus

7 Related Documents

For current documentation and downloads, refer to https://dz.telit.com/.

Table 4: Related Documents

S.no	Doc Code	Document Title
1	1VV0301371	Telit Modules Linux USB Drivers User Guide
2	80455NT12007A	Enabling QMAP in Linux Application Note

8 Document History

Table 5: Document History

Revision	Date	Changes
0	2025-11-19	Initial Release

From Mod.0809 Rev.13

Technical Documentation