

# Telit Modules Linux USB Drivers

Software User Guide

1VV0301371 Rev.20  
2025-09-23  
Released  
Confidential

# Contents

|         |                                                       |    |
|---------|-------------------------------------------------------|----|
| 1       | Applicability Table .....                             | 3  |
| 2       | Introduction.....                                     | 5  |
| 2.1     | Scope .....                                           | 5  |
| 2.2     | Audience .....                                        | 5  |
| 2.3     | Contact Information, Support .....                    | 5  |
| 2.4     | Conventions .....                                     | 5  |
| 2.5     | Terms and Conditions .....                            | 6  |
| 2.6     | Disclaimer .....                                      | 6  |
| 3       | Operating System Setup .....                          | 7  |
| 3.1     | USB Compositions .....                                | 7  |
| 3.1.1   | PIDs and Related Compositions .....                   | 7  |
| 3.2     | Multi-configuration Compositions .....                | 10 |
| 3.2.1   | Kernel Module Option .....                            | 11 |
| 3.2.2   | Kernel Module qmi_wwan .....                          | 11 |
| 3.2.2.1 | qmi_wwan and Internal QMAP .....                      | 12 |
| 3.2.2.2 | qmi_wwan and rmnet .....                              | 13 |
| 4       | Using the Modem .....                                 | 14 |
| 4.1     | Using the Serial Ports .....                          | 14 |
| 4.1.1   | Data Connection through Serial Ports .....            | 14 |
| 4.2     | Using the Network Adapter .....                       | 14 |
| 4.2.1   | Data Connection through the Network Interface .....   | 15 |
| 4.3     | Using Modem Manager and Network Manager .....         | 15 |
| 5       | Flashing Devices.....                                 | 16 |
| 5.1     | Flashing Device 0x18d1:0xd00d .....                   | 16 |
| 5.2     | Flashing Device 0x058b:0x0041 .....                   | 17 |
| 5.3     | Flashing Device 0x8087:0x0716 .....                   | 17 |
| 5.4     | Flashing Device 0x05c6:0x9008 .....                   | 17 |
| 6       | Telit Kernel Commits .....                            | 18 |
| 7       | Additional Kernel Commits .....                       | 24 |
| 7.1     | Raw-IP Support and Important Fixes for qmi_wwan ..... | 24 |
| 7.2     | QMAP Support in qmi_wwan .....                        | 24 |
| 8       | Linux Version Finder.....                             | 26 |
| 9       | Acronyms and Abbreviations.....                       | 27 |
| 10      | Related Documents .....                               | 28 |
| 11      | Document History.....                                 | 29 |

# 1 Applicability Table

**Warning:** The kernel version information is related to the default composition of the modem: for detailed information on the kernel version in which a composition is supported please refer to chapter Telit Kernel Commits.

The Products list indicates the generic modem families and does not include variants: please refer to the list of compositions in section PIDs and Related Compositions to check support for a modem.

**Table 1: Applicability Table**

| Products                   | Available Since Kernel Version |
|----------------------------|--------------------------------|
| DE910 SERIES               | 3.4                            |
| ELS63 SERIES               | 5.4                            |
| FD980 SERIES               | 5.14                           |
| FE910C04 SERIES            | 6.13                           |
| FE912C04 SERIES            | 6.10                           |
| FN920C04 SERIES            | 6.9                            |
| FE990A SERIES              | 6.3                            |
| FE990B SERIES              | 6.15                           |
| FN980 SERIES               | 5.5                            |
| FN990A SERIES              | 5.16                           |
| FN990B SERIES              | 6.15                           |
| GE910 SERIES               | 4.4                            |
| HE910 SERIES               | 4.4                            |
| LE866 SERIES               | 2.6.39                         |
| LE910 SERIES               | 3.18                           |
| LE910Cx Linux-based SERIES | 4.11                           |
| LE910Cx Thread-x SERIES    | 5.8                            |
| LE910D1 SERIES             | 2.6.39                         |
| LE910Q1 SERIES             | 5.4                            |
| LE910R1 SERIES             | 5.17                           |
| LE910S1 SERIES             | 5.13                           |
| LE910 V2 SERIES            | 3.12                           |
| LM940 SERIES               | 4.10                           |
| LM960 SERIES               | 4.10                           |
| LN920 SERIES               | 5.15                           |
| LN940 SERIES               | 4.20                           |
| ME910C1 SERIES             | 4.15                           |
| MEX10G1 SERIES             | 5.5                            |
| ML865C1 SERIES             | 4.15                           |

| Products       | Available Since Kernel Version |
|----------------|--------------------------------|
| ML865G1 SERIES | 5.5                            |
| UE866 SERIES   | 4.4                            |
| UE910 SERIES   | 4.4                            |
| UL865 SERIES   | 4.4                            |

## 2 Introduction

### 2.1 Scope

This document describes which Linux Kernel Drivers should be used for the Telit modules listed in the applicability table and how Linux devices can be used for typical use cases.

### 2.2 Audience

This document is intended for Telit customers, especially system integrators, who are about to implement the Telit modules listed in the applicability table in a Linux environment.

### 2.3 Contact Information, Support

For technical support and general questions, e-mail:

- [TS-EMEA@telit.com](mailto:TS-EMEA@telit.com)
- [TS-AMERICAS@telit.com](mailto:TS-AMERICAS@telit.com)
- [TS-APAC@telit.com](mailto:TS-APAC@telit.com)
- [TS-SRD@telit.com](mailto:TS-SRD@telit.com)
- [TS-ONEEDGE@telit.com](mailto: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

THE MATERIAL IN THIS DOCUMENT IS FOR INFORMATIONAL PURPOSES ONLY. TELIT CINTERION RESERVES THE RIGHT TO MAKE CHANGES TO THE PRODUCTS DESCRIBED HEREIN. THE SPECIFICATIONS IN THIS DOCUMENT ARE SUBJECT TO CHANGE AT THE DISCRETION OF TELIT CINTERION WITHOUT PRIOR NOTICE. THIS DOCUMENT IS PROVIDED ON "AS IS" BASIS ONLY AND MAY CONTAIN DEFICIENCIES OR INADEQUACIES. TELIT CINTERION DOES NOT ASSUME ANY LIABILITY FOR INFORMATION PROVIDED IN THE DOCUMENT OR ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT DESCRIBED HEREIN.

TELIT CINTERION GRANTS A NON-EXCLUSIVE RIGHT TO USE THE DOCUMENT. THE RECIPIENT SHALL NOT COPY, MODIFY, DISCLOSE, OR REPRODUCE THE DOCUMENT EXCEPT AS SPECIFICALLY AUTHORIZED BY TELIT CINTERION.

TELIT CINTERION AND THE TELIT CINTERION LOGO, ARE TRADEMARKS OF TELIT CINTERION AND ARE REGISTERED IN CERTAIN COUNTRIES. ALL OTHER REGISTERED TRADEMARKS OR TRADEMARKS MENTIONED IN THIS DOCUMENT ARE THE PROPERTY OF THEIR RESPECTIVE OWNERS AND ARE EXPRESSLY RESERVED BY TELIT CINTERION (AND ITS LICENSORS).

## 3 Operating System Setup

The Telit modules listed in the Applicability Table expose different kinds of devices according to the Product ID (PID) in use.

The table below lists the association between the device type and the kernel driver used:

**Table 2: Device Types and Related Kernel Modules**

| Device Type                                             | Kernel Module                          |
|---------------------------------------------------------|----------------------------------------|
| Serial port following the CDC-ACM standard              | cdc_acm (CONFIG_USB_ACM)               |
| Serial port (reduced ACM)                               | option (CONFIG_USB_SERIAL_OPTION)      |
| Network adapter following the CDC-ECM standard          | cdc_ether (CONFIG_USB_NET_CDCETHER)    |
| Network adapter following the CDC-NCM standard          | cdc_ncm (CONFIG_USB_NET_CDC_NCM)       |
| Network adapter following Microsoft RNDIS specification | rndis_host (CONFIG_USB_NET_RNDIS_HOST) |
| Mobile broadband adapter following CDC-MBIM standard    | cdc_mbim (CONFIG_USB_NET_CDC_MBIM)     |
| Rmnet mobile broadband adapter                          | qmi_wwan (CONFIG_USB_NET_QMI_WWAN)     |
| Android Debug Bridge (ADB)                              | N/A (managed at the userspace level)   |
| Audio device                                            | snd-usb-audio (CONFIG_SND_USB_AUDIO)   |

To use a specific device type, the related module should be included in the kernel build.

**Warning:** Certain kernel modules may only be accessible from a particular kernel version onwards for example, cdc\_mbim is available from 3.8. If the kernel version in use does not support the required driver, consider upgrading the kernel or backporting the needed patches. A simple way to understand if a specific commit (or a set of commit) is available in stable kernels and in which version has been introduced is described in chapter Linux Version Finder

### 3.1 USB Compositions

#### 3.1.1 PIDs and Related Compositions

The following table lists the currently supported USB compositions in Linux according to the PID:

**Note:** A composition could have hidden devices. The description in the following table reports all the devices available in the composition, also the hidden ones.

**Table 3: PIDs and Related Compositions**

| PID    | Composition                                                                                                        |
|--------|--------------------------------------------------------------------------------------------------------------------|
| 0x0021 | 6 CDC-ACM devices                                                                                                  |
| 0x0022 | 3 CDC-ACM devices                                                                                                  |
| 0x0023 | 6 CDC-ACM devices + 1 CDC-ECM network adapter                                                                      |
| 0x0032 | 6 CDC-ACM devices + 1 MBIM adapter                                                                                 |
| 0x0035 | 6 CDC-ACM devices                                                                                                  |
| 0x0036 | 6 CDC-ACM devices + 1 CDC-NCM network adapter                                                                      |
| 0x0100 | 4 CDC-ACM devices + 1 CDC-NCM network adapter                                                                      |
| 0x1003 | 3 reduced ACM devices                                                                                              |
| 0x1004 | 4 reduced ACM devices                                                                                              |
| 0x1005 | 4 reduced ACM devices                                                                                              |
| 0x1006 | 3 reduced ACM devices                                                                                              |
| 0x1010 | 4 reduced ACM devices                                                                                              |
| 0x1012 | 3 reduced ACM devices                                                                                              |
| 0x1031 | 3 reduced ACM devices + 1 rmnet adapter                                                                            |
| 0x1033 | 3 reduced ACM devices + 1 ECM network adapter                                                                      |
| 0x1034 | 2 reduced ACM devices + 1 rmnet adapter                                                                            |
| 0x1035 | 2 reduced ACM devices + 1 ECM network adapter                                                                      |
| 0x1037 | 4 reduced ACM devices + 1 rmnet adapter                                                                            |
| 0x1038 | 3 reduced ACM devices + 1 rmnet adapter                                                                            |
| 0x1040 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB                                                                    |
| 0x1041 | 5 reduced ACM devices + 1 MBIM adapter + 1 ADB                                                                     |
| 0x1042 | 5 reduced ACM devices + 1 RNDIS network adapter + 1 ADB                                                            |
| 0x1043 | 5 reduced ACM devices + 1 ECM network adapter + 1 ADB                                                              |
| 0x1045 | 5 reduced ACM devices + 1 RNDIS network adapter + 1 ADB + 1 audio device                                           |
| 0x1050 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB                                                                    |
| 0x1051 | 5 reduced ACM devices + 1 MBIM adapter + 1 ADB                                                                     |
| 0x1052 | 5 reduced ACM devices + 1 RNDIS network adapter + 1 ADB                                                            |
| 0x1053 | 5 reduced ACM devices + 1 ECM network adapter + 1 ADB                                                              |
| 0x1055 | 5 reduced ACM devices + 1 ADB                                                                                      |
| 0x1056 | Configuration #1: Mass storage device<br>Configuration #2: 5 reduced ACM devices + 1 RNDIS network adapter + 1 ADB |
| 0x1057 | 6 reduced ACM devices + 1 rmnet adapter + 1 ADB                                                                    |
| 0x1058 | 6 reduced ACM devices + 1 ADB                                                                                      |
| 0x1060 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB                                                                    |
| 0x1061 | 5 reduced ACM devices + 1 MBIM adapter + 1 ADB                                                                     |
| 0x1062 | 5 reduced ACM devices + 1 RNDIS network adapter + 1 ADB                                                            |
| 0x1063 | 5 reduced ACM devices + 1 ECM network adapter + 1 ADB                                                              |
| 0x1070 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB                                                                    |
| 0x1071 | 5 reduced ACM devices + 1 MBIM adapter + 1 ADB                                                                     |

| PID    | Composition                                                       |
|--------|-------------------------------------------------------------------|
| 0x1072 | 5 reduced ACM devices + 1 RNDIS network adapter + 1 ADB           |
| 0x1073 | 5 reduced ACM devices + 1 ECM network adapter + 1 ADB             |
| 0x1075 | 1 reduced ACM device + 1 ADB                                      |
| 0x1077 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB + 1 audio device  |
| 0x1080 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB                   |
| 0x1081 | 5 reduced ACM devices + 1 MBIM adapter + 1 ADB                    |
| 0x1082 | 5 reduced ACM devices + 1 RNDIS network adapter + 1 ADB           |
| 0x1083 | 5 reduced ACM devices + 1 ECM network adapter + 1 ADB             |
| 0x1085 | 1 reduced ACM device + 1 ADB                                      |
| 0x10a0 | 3 reduced ACM devices + 1 rmnet adapter                           |
| 0x10a2 | 3 reduced ACM devices + 1 MBIM adapter                            |
| 0x10a4 | 3 reduced ACM devices + 1 rmnet adapter                           |
| 0x10a7 | 3 reduced ACM devices + 1 MBIM adapter                            |
| 0x10a9 | 2 reduced ACM devices + 1 rmnet adapter + 1 ADPL + 1 ADB          |
| 0x10aa | 2 reduced ACM devices + 1 MBIM adapter + 1 ADPL + 1 ADB           |
| 0x10b0 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADPL + 1 QDSS + 1 ADB |
| 0x10b1 | 5 reduced ACM devices + 1 MBIM adapter + 1 ADPL + 1 QDSS + 1 ADB  |
| 0x10b2 | 5 reduced ACM devices + 1 RNDIS adapter + 1 ADPL + 1 QDSS + 1 ADB |
| 0x10b3 | 5 reduced ACM devices + 1 ECM adapter + 1 ADPL + 1 QDSS + 1 ADB   |
| 0x10c0 | 3 reduced ACM devices + 1 rmnet adapter                           |
| 0x10c4 | 3 reduced ACM devices + 1 rmnet adapter                           |
| 0x10c7 | 3 reduced ACM devices + 1 ECM adapter                             |
| 0x10c8 | 2 reduced ACM devices + 1 rmnet adapter + 1 ADPL + 1 ADB          |
| 0x10d0 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADPL + 1 QDSS + 1 ADB |
| 0x10d1 | 5 reduced ACM devices + 1 MBIM adapter + 1 ADPL + 1 QDSS + 1 ADB  |
| 0x10d2 | 5 reduced ACM devices + 1 RNDIS adapter + 1 ADPL + 1 QDSS + 1 ADB |
| 0x10d3 | 5 reduced ACM devices + 1 ECM adapter + 1 ADPL + 1 QDSS + 1 ADB   |
| 0x110b | 3 reduced ACM devices + 1 ECM network adapter                     |
| 0x1200 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB                   |
| 0x1201 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB                   |
| 0x1203 | 5 reduced ACM devices + 1 RNDIS network adapter + 1 ADB           |
| 0x1204 | 5 reduced ACM devices + 1 MBIM adapter + 1 ADB                    |
| 0x1206 | 5 reduced ACM devices + 1 ECM network adapter + 1 ADB             |
| 0x1207 | 2 reduced ACM devices                                             |
| 0x1208 | 3 reduced ACM devices + 1 ADB                                     |
| 0x1211 | 1 reduced ACM device + 1 ECM network adapter + 1 ADB              |
| 0x1212 | 1 reduced ACM device + 1 ADB                                      |
| 0x1213 | 1 reduced ACM device + 1 ECM network adapter                      |
| 0x1214 | 2 reduced ACM devices + 1 ECM network adapter + 1 ADB             |

| PID    | Composition                                                                                                    |
|--------|----------------------------------------------------------------------------------------------------------------|
| 0x1230 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB + 1 audio device                                               |
| 0x1231 | 5 reduced ACM devices + 1 RNDIS network adapter + 1 ADB + 1 audio device                                       |
| 0x1250 | 4 reduced ACM devices + 1 rmnet adapter                                                                        |
| 0x1260 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB                                                                |
| 0x1261 | 5 reduced ACM devices + 1 rmnet adapter + 1 ADB                                                                |
| 0x1900 | 4 reduced ACM devices + 1 rmnet adapter                                                                        |
| 0x1901 | 4 reduced ACM devices + 1 MBIM adapter                                                                         |
| 0x2300 | Config. 1: 3 CDC-ACM devices + 1 RNDIS network adapter<br>Config. 2: 3 CDC-ACM devices + 1 ECM network adapter |
| 0x3000 | 3 reduced ACM devices + 1 rmnet adapter                                                                        |
| 0x3001 | 2 reduced ACM devices + 1 rmnet adapter + 1 ADPL + 1 ADB                                                       |
| 0x7010 | 3 reduced ACM devices + 1 RNDIS network adapter                                                                |
| 0x7011 | 3 reduced ACM devices + 1 ECM network adapter                                                                  |
| 0x701a | 3 reduced ACM devices + 1 RNDIS network adapter                                                                |
| 0x701b | 3 reduced ACM devices + 1 ECM network adapter                                                                  |
| 0x7020 | 3 CDC-ACM devices + 1 RNDIS network adapter                                                                    |
| 0x7021 | 3 CDC-ACM devices + 1 ECM network adapter                                                                      |

For additional details on the compositions, please refer to the software user guide of the module in use.

The command:

```
$ lsusb
```

can be used to display a list of USB devices that are currently connected to the host.

**Warning:** Refer to the modem user guide to understand how to change the USB composition and to identify the scope of the exposed devices.

## 3.2 Multi-configuration Compositions

Certain compositions show multiple configurations (for example, 0x1056). By default, the system will employ the first configuration.

To change the configuration, the desired value must be written to the file:

```
/sys/bus/usb/devices/<device path>/bConfigurationValue
```

For Example,

```
# echo <configuration value> > /sys/bus/usb/devices/<device path>/bConfigurationValue
```

Tool `usb_modeswitch` can also be used to change the configuration, for example:

```
# usb_modeswitch -v 0x1bc7 -p <pid> -u <configuration value>
```

## 3.2.1 Kernel Module Option

When using a supported composition requiring the option kernel module and the serial ports are not available in `/dev` directory, it is possible that the particular composition has been integrated into a newer kernel version than the one that is currently in use.

The solution is to upgrade the kernel version or backport the needed patches among the ones listed in Telit Kernel Commits.

It is possible to add runtime support for the current composition by issuing the following commands with root privileges:

```
# modprobe option
# echo 1bc7 <PID> > /sys/bus/usb-serial/drivers/option1/new_id
```

where `<PID>` is the PID of the composition to be supported.

---

**Warning:** If a network adapter is also available in the composition, make sure it is properly recognized by the kernel before adding runtime support for serial ports. If the ADB device is available in the composition, adding runtime support for serial ports prevents the ADB device from working properly since it is bound to a serial port.

---

For the most up-to-date list of Telit PIDs supported as an option, refer to the source code in mainline, looking for all the device entries with `TELIT_VENDOR_ID` Vendor ID (VID).

---

**Note:** If support for a composition missing in section PIDs and Related Compositions is needed, contact customer support with the request.

---

## 3.2.2 Kernel Module qmi\_wwan

When using a supported composition requiring the `qmi_wwan` kernel module and no modem-related network interface is available in the list provided by the command:

```
$ ip link show
```

it is possible that support for that composition has been added in a newer kernel version than the one in use.

The solution is to upgrade the kernel version or backport the needed patches among the ones listed in chapter Telit Kernel Commits

---

**Warning:** If the kernel in use has commit `cdc-wdm: fix "out-of-sync" due to missing notifications`, it should be reverted as done in commit `USB: Revert "cdc-wdm: fix "out-of-sync" due to missing notifications"`.

---

For the most up-to-date list of Telit PIDs supported as an option, refer to the source code in mainline, looking for all the entries of the device with Vendor ID (VID) 0x1bc7.

---

**Note:** If support for a composition missing in section PIDs and Related Compositions is needed, contact customer support with the request.

---

---

**Warning:** When QMAP is not set, the rx URB size in qmi\_wwan should be greater than 2048 bytes. This setting can be configured at runtime, changing the MTU of the network interface to an allowed value > 2048 (should not be a multiple of the endpoint max packet size) before setting up the data connection, for example, `ip link set <network interface name> mtu 2500`. For a permanent setting, the following line: `dev->rx_urb_size = 2048;` should be added to qmi\_wwan.c function qmi\_wwan\_bind before returning in the successful case.

---

### 3.2.2.1 qmi\_wwan and Internal QMAP

Since kernel version 4.12, qmi\_wwan supports Qualcomm Multiplexing and Aggregation Protocol (QMAP).

QMAP is needed for multiple concurrent PDNs management and to get the most from high-cat modems in terms of throughput.

Kernel side QMAP management is done through qmi\_wwan sysfs files add\_mux/del\_mux: check kernel documentation for further details.

QMAP enablement also requires a special modem configuration executed at the userspace level. The procedure to follow depends on the tools used.

Please check relevant qmi\_wwan QMAP-related fixes in section QMAP Support in qmi\_wwan to get a stable version.

The master netdevice should have its MTU at least as the maximum downlink aggregated size.

For further details on qmi\_wwan internal QMA, refer to “Enabling QMAP in Linux Application Note”.

---

**Warning:** The kernel module rmnet should be used instead of the qmi\_wwan inbox QMAP, check next paragraph.

---

### 3.2.2.2 qmi\_wwan and rmnet

Starting with kernel version 5.12, the qmi\_wwan supports kernel module rmnet for using QMAP (see `commit net: qmi_wwan: Add pass-through mode`). Kernel side QMAP management is done through qmi\_wwan sysfs files `pass_through`.

For more information, refer to kernel documentations.

QMAP enablement also requires a special modem configuration executed at the userspace level. The procedure to follow depends on the tools used.

The qmi\_wwan netdevice should have its MTU at least as the maximum downlink aggregated size.

For more information on rmnet QMAP, refer to “Enabling QMAP in Linux Application Note”.

## 4 Using the Modem

### 4.1 Using the Serial Ports

According to the driver in use, the following devices are created for serial ports:

**Table 4: Device Names and Related Kernel Modules**

| Device Type  | Kernel Module |
|--------------|---------------|
| /dev/ttyACMx | cdc_acm       |
| /dev/ttyUSBx | option        |

These are Linux character devices and support most of the features implemented by the tty layer. For example, a terminal emulator like Minicom can be used to send AT commands.

When writing code for using these devices, please refer to the programming language API related to character devices. For example, C-based applications can use the exported functions in the system header files *fcntl.h* and *unistd.h*.

For more information, refer to the related man page.

---

**Warning:** When sending AT commands, it is mandatory to have the DTR asserted to get the response.

---

#### 4.1.1 Data Connection through Serial Ports

To create dial-up connections through serial ports the software `pppd` can be used.

For more information and updated source code, refer to the [pppd official website](#).

### 4.2 Using the Network Adapter

If a network adapter or mobile broadband device is available and the related kernel module is loaded, a network interface is created by the operating system.

Standard Linux commands (for example `ip`, `ifconfig`) can be used to manage the network interface.

For more information, refer to the man page of the command.

## 4.2.1 Data Connection through the Network Interface

To establish a data connection via the network interface, please follow the instructions listed in the table below, which are specific to the kernel module being used:

**Table 5: Kernel Module In Use for the Network Device and Related Data Connection Procedure**

| Kernel Module | Procedure                                                                                                                                                                                                             |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| qmi_wwan      | The <a href="#">libqmi project</a> can be used.<br>For more information, refer to the project documentation.<br>Telit provides also a proprietary QMI SDK, for more information refer to QMI SDK and TQCM User Guide. |
| cdc_mbim      | The <a href="#">libmbim project</a> can be used.<br>For more information, refer to the project documentation.                                                                                                         |
| cdc_ether     | AT commands should be used.<br>For more information, refer to the modem documentation.                                                                                                                                |
| cdc_ncm       | AT commands should be used.<br>For more information, refer to the modem documentation.                                                                                                                                |
| rndis_host    | AT commands should be used.<br>For more information, refer to the modem documentation.                                                                                                                                |

## 4.3 Using Modem Manager and Network Manager

ModemManager is a DBus-activated daemon that 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 such as freedesktop.org libqmi for QMI-based modems, and libmbim for MBIM-based modems.

ModemManager can be used with *NetworkManager* for easier network connection management.

NetworkManager is the standard Linux network configuration tool suite. It supports a wide 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 status and the details of network interfaces such as current IP addresses or DHCP options. The API can also be used for managing the connections (including creation, activation, and deactivation).

NetworkManager uses *ModemManager* to support mobile broadband devices.

## 5 Flashing Devices

The modems listed in the following table support firmware updates through special flashing devices that may require binding to a kernel module:

**Table 6: Flashing Devices**

| Product                                               | VID:PID       | Kernel Module                  | Device Name  |
|-------------------------------------------------------|---------------|--------------------------------|--------------|
| FD980, FE990, FN980, FN990A, LE910Cx Thread-x, LN920  | 0x1bc7:0x9010 | option                         | /dev/ttyUSBx |
| GE/HE/UE910, UE866, UL865                             | 0x058b:0x0041 | usb-serial-simple              | /dev/ttyUSBx |
| LE910Cx Linux, LM940, LM960                           | 0x18d1:0xd00d | Managed at the userspace level | n/a          |
| LE910 V2                                              | 0x8087:0x0716 | usb-serial-simple              | /dev/ttyUSBx |
| LE866, LE910D1                                        | 0x216F:0x0051 | cdc_acm                        | /dev/ttyACMx |
| LE910Q1, ELS63                                        | 0x1bc7:0x920A | cdc_acm                        | /dev/ttyACMx |
| LE910S1                                               | 0x1bc7:0x9200 | option                         | /dev/ttyUSBx |
| LE910R1                                               | 0x1bc7:0x9201 | option                         | /dev/ttyUSBx |
| FE910C04, FE912C04, FE990B, FN920C04, FN990B, ME910G1 | 0x05c6:0x9008 | qcserial                       | /dev/ttyUSBx |

The Flashing devices available in GE/HE/UE910, UE866, UL865, LE910 V2, LE940B6, and LE866 appear for a few seconds when the modem is turned on. However, if the flashing application is not running, the flashing device disconnects, and the modem continues in normal operative mode.

For flashing device support in kernel versions, refer to Flashing Devices.

### 5.1 Flashing Device 0x18d1:0xd00d

The Flashing device 0x18d1:0xd00d is managed at the userspace level by the Telit firmware update application known as “uxfp”. For more information, refer to uxfp User Guide.

Legacy Telit firmware update application lxfp requires binding the device to the option driver.

This can be permanently done by adding the following line:

```
{ USB_DEVICE(0x18d1, 0xd00d) }
```

to the struct usb\_device\_id option\_ids in the kernel source drivers/usb/serial/option.c

For testing purposes the procedure described in section **Error! Reference source not found.** can be used:

```
$ modprobe option
$ echo 18d1 d00d > /sys/bus/usb-serial/drivers/option1/new_id
```

## 5.2 Flashing Device 0x058b:0x0041

Even though the flashing device 0x058b:0x0041 presents itself as an ACM device, it should be driven by the kernel driver usb-serial-simple. Support for this device is available since kernel version 4.4.

Previous kernel versions require commits [USB: cdc\\_acm Ignore Infineon Flash Loader utility](#) and [USB: serial: Another Infineon Flash loader USB ID](#).

## 5.3 Flashing Device 0x8087:0x0716

Support for flashing device 0x8087:0x0716 is available since kernel version 3.12 with driver usb-serial-simple.

Previous kernel versions require commit USB: serial: move the "simple" drivers into usb-serial-simple.c.

## 5.4 Flashing Device 0x05c6:0x9008

Support for flashing device 0x05c6:0x9008 is available since kernel version 2.6.30 with driver qcserial.

Previous kernel versions require commit USB: qcserial: Add extra device IDs.

## 6 Telit Kernel Commits

Below is a list of kernel commits related to the compositions available for the modems listed in the applicability table. Consider backporting if the required PID is unavailable in the used kernel version.

**Table 7: Kernel Commits Related to Telit Modules**

| Summary                                                                                                     | VID:PID                                                          | Commit                                                   | Availability |
|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------|--------------|
| <a href="#">USB: option driver: adding support for Telit CC864-SINGLE, CC864-DUAL and DE910-DUAL modems</a> | 0x1bc7:0x1005<br>0x1bc7:0x1006<br>0x1bc7:0x1010                  | <a href="#">7204cf584836c24b4b06e4ad4a8e6bb8ea84908e</a> | v3.4-rc1     |
| <a href="#">usb: option driver, add support for Telit UE910v2</a>                                           | 0x1bc7:0x1012                                                    | <a href="#">d6de486bc22255779bd54b0fceb4c240962bf146</a> | v3.15-rc2    |
| <a href="#">USB: option: add support for Telit LE920</a>                                                    | 0x1bc7:0x1200                                                    | <a href="#">03eb466f276ceef9dcf023dc5474db02af68aad9</a> | v3.8-rc7     |
| <a href="#">NET: qmi_wwan: add Telit LE920 support</a>                                                      | 0x1bc7:0x1200                                                    | <a href="#">3d6d7ab5881b1d4431529410b949ba2e946f3b0f</a> | v3.8-rc7     |
| <a href="#">net: qmi_wwan: add Telit LE920 newer firmware support</a>                                       | 0x1bc7:0x1201                                                    | <a href="#">905468fa4d54c3e572ed3045cd47cce37780716e</a> | v3.13-rc1    |
| <a href="#">usb: option: add support for Telit LE910</a>                                                    | 0x1bc7:0x1201                                                    | <a href="#">2d0eb862dd477c3c4f32b201254ca0b40e6f465c</a> | v3.18-rc3    |
| <a href="#">USB: cdc_acm: Ignore Infineon Flash Loader utility</a>                                          | 0x058b:0x0041                                                    | <a href="#">f33a7f72e5fc033daccbb8d4753d7c5c41a4d67b</a> | v4.4-rc5     |
| <a href="#">USB: serial: Another Infineon flash loader USB ID</a>                                           | 0x058b:0x0041                                                    | <a href="#">a0e80fbd56b4573de997c9a088a33abbc1121400</a> | v4.4-rc5     |
| <a href="#">USB: serial: option: Adding support for Telit LE922</a>                                         | 0x1bc7:0x1042<br>0x1bc7:0x1043                                   | <a href="#">ff4e2494dc17b173468e1713fdf6237fd8578bc7</a> | v4.5-rc2     |
| <a href="#">USB: serial: option: add support for Telit LE922 PID 0x1045</a>                                 | 0x1bc7:0x1045                                                    | <a href="#">5deef5551c77e488922cc4bf4bc76df63be650d0</a> | v4.5-rc7     |
| <a href="#">net: usb: cdc_ncm: adding Telit LE910 V2 mobile broadband card</a>                              | 0x1bc7:0x0036                                                    | <a href="#">79f4223257bfef52b0a26d0d7ad4019e764be6ce</a> | v4.6-rc2     |
| <a href="#">USB: serial: option: add support for Telit LE910 PID 0x1206</a>                                 | 0x1bc7:0x1206                                                    | <a href="#">3c0415fa08548e3bc63ef741762664497ab187ed</a> | v4.8-rc1     |
| <a href="#">USB: serial: option: add support for Telit LE920A4</a>                                          | 0x1bc7:0x1207<br>0x1bc7:0x1208<br>0x1bc7:0x1211<br>0x1bc7:0x1212 | <a href="#">01d7956b58e644ea0d2e8d9340c5727a8fc39d70</a> | v4.8-rc3     |

| Summary                                                                                 | VID:PID                        | Commit                                                   | Availability |
|-----------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------|--------------|
|                                                                                         | 0x1bc7:0x1213<br>0x1bc7:0x1214 |                                                          |              |
| <a href="#">NET: usb: qmi_wwan: add support for Telit LE922A PID 0x1040</a>             | 0x1bc7:0x1040                  | <a href="#">9bd813da24cd49d749911d7fdc0e9ae9a673d746</a> | v4.9-rc8     |
| <a href="#">NET: usb: cdc_mbim: add quirk for supporting Telit LE922A</a>               | 0x1bc7:0x1041                  | <a href="#">7b8076ce8a00d553ae9d3b7eb5f0cc3e63cb16f1</a> | v4.9         |
| <a href="#">USB: serial: option: add support for Telit LE922A PIDs 0x1040, 0x1041</a>   | 0x1bc7:0x1040<br>0x1bc7:0x1041 | <a href="#">5b09eff0c379002527ad72ea5ea38f25da8a8650</a> | v4.10-rc1    |
| <a href="#">drivers: net: usb: qmi_wwan: add QMI_QUIRK_SET_DTR for Telit PID 0x1201</a> | 0x1bc7:0x1201                  | <a href="#">14cf4a771b3098e431d2677e3533bdd962e478d8</a> | v4.11-rc7    |
| <a href="#">net: usb: qmi_wwan: add Telit ME910 support</a>                             | 0x1bc7:0x1100                  | <a href="#">4c54dc0277d0d55a9248c43aebd31858f926a056</a> | v4.12-rc1    |
| <a href="#">usb: serial: option: add Telit ME910 support</a>                            | 0x1bc7:0x1100                  | <a href="#">40dd46048c155b8f0683f468c950a1c107f77a7c</a> | v4.12-rc1    |
| <a href="#">net: usb: qmi_wwan: add Telit ME910 PID 0x1101 support</a>                  | 0x1bc7:0x1101                  | <a href="#">c647c0d62c82eb3ddf78a0d8b3d58819d9f552aa</a> | v4.15-rc4    |
| <a href="#">USB: serial: option: add support for Telit ME910 PID 0x1101</a>             | 0x1bc7:0x1101                  | <a href="#">08933099e6404f588f81c2050bfec7313e06eeaf</a> | v4.15-rc6    |
| <a href="#">net: usb: cdc_mbim: add flag FLAG_SEND_ZLP</a>                              | 0x1bc7:0x1041                  | <a href="#">9f7c728332e8966084242fcd951aa46583bc308c</a> | v4.17        |
| <a href="#">USB: serial: option: add Telit LN940 series</a>                             | 0x1bc7:0x1900<br>0x1bc7:0x1901 | <a href="#">28a86092b1753b802ef7e3de8a4c4a69a9c1bb03</a> | v4.20        |
| <a href="#">qmi_wwan: Added support for Telit LN940 series</a>                          | 0x1bc7:0x1900                  | <a href="#">1986af16e8ed355822600c24b3d2f0be46b573df</a> | v4.20        |
| <a href="#">usb: cdc-acm: send ZLP for Telit 3G Intel based modems</a>                  | 0x1bc7:0x0021<br>0x1bc7:0x0023 | <a href="#">34aabf918717dd14e05051896aaecd3b16b53d95</a> | v5.0-rc2     |
| <a href="#">USB: serial: option: add Telit ME910 ECM composition</a>                    | 0x1bc7:0x1102                  | <a href="#">6431866b6707d27151be381252d6eef13025cfce</a> | v5.1-rc1     |
| <a href="#">net: usb: qmi_wwan: add Telit 0x1260 and 0x1261 compositions</a>            | 0x1bc7:0x1260<br>0x1bc7:0x1261 | <a href="#">b4e467c82f8c12af78b6f6fa5730cb7dea7af1b4</a> | v5.2-rc2     |
| <a href="#">USB: serial: option: add Telit 0x1260 and 0x1261 compositions</a>           | 0x1bc7:0x1260<br>0x1bc7:0x1261 | <a href="#">f3dfd4072c3ee6e287f501a18b5718b185d6a940</a> | v5.2-rc5     |

| Summary                                                                              | VID:PID                                                          | Commit                                                   | Availability |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------|--------------|
| <a href="#">USB: serial: option: add Telit FN980 compositions</a>                    | 0x1bc7:0x1050<br>0x1bc7:0x1051<br>0x1bc7:0x1052<br>0x1bc7:0x1053 | <a href="#">5eb3f4b87a0e7e949c976f32f296176a06d1a93b</a> | v5.4-rc3     |
| <a href="#">net: usb: qmi_wwan: add Telit 0x1050 composition</a>                     | 0x1bc7:0x1050                                                    | <a href="#">e0ae2c578d3909e60e9448207f5d83f785f1129f</a> | v5.4-rc4     |
| <a href="#">USB: serial: option: add Telit ME910G1 0x110a composition</a>            | 0x1bc7:0x110a                                                    | <a href="#">0d3010fa442429f8780976758719af05592ff19f</a> | v5.5-rc6     |
| <a href="#">USB: serial: option: add ZLP support for 0x1bc7/0x9010</a>               | 0x1bc7:0x9010                                                    | <a href="#">2438c3a19dec5e98905fd3ffcc2f24716aceda6b</a> | v5.5-rc6     |
| <a href="#">USB: serial: option: add ME910G1 ECM composition 0x110b</a>              | 0x1bc7:0x110b                                                    | <a href="#">8e852a7953be2a6ee371449f7257fe15ace6a1fc</a> | v5.6-rc7     |
| <a href="#">net: usb: qmi_wwan: add Telit LE910C1-EUX composition</a>                | 0x1bc7:0x1031                                                    | <a href="#">591612aa578cd7148b7b9d74869ef40118978389</a> | v5.7         |
| <a href="#">USB: serial: option: add Telit LE910C1-EUX compositions</a>              | 0x1bc7:0x1031<br>0x1bc7:0x1033                                   | <a href="#">399ad9477c523f721f8e51d4f824bdf7267f120c</a> | v5.8-rc1     |
| <a href="#">USB: serial: option: add LE910Cx compositions 0x1203, 0x1230, 0x1231</a> | 0x1bc7:0x1203<br>0x1bc7:0x1230<br>0x1bc7:0x1231                  | <a href="#">489979b4aab490b6b917c11dc02d81b4b742784a</a> | v5.10-rc3    |
| <a href="#">net: usb: qmi_wwan: add Telit LE910Cx 0x1230 composition</a>             | 0x1bc7:0x1230                                                    | <a href="#">5fd8477ed8ca77e64b93d44a6dae4aa70c191396</a> | v5.10-rc3    |
| <a href="#">USB: serial: option: add Telit FN980 composition 0x1055</a>              | 0x1bc7:0x1055                                                    | <a href="#">db0362eeb22992502764e825c79b922d7467e0eb</a> | v5.10-rc3    |
| <a href="#">usb: serial: option: add Telit LE910-S1 compositions 0x7010, 0x7011</a>  | 0x1bc7:0x7010<br>0x1bc7:0x7011                                   | <a href="#">e467714f822b5d167a7fb03d34af91b5b6af1827</a> | v5.13-rc4    |
| <a href="#">usb: serial: option: add Telit FD980 composition 0x1056</a>              | 0x1bc7:0x1056                                                    | <a href="#">5648c073c33d33a0a19d0cb1194a4eb88efe2b71</a> | v5.14-rc5    |
| <a href="#">net: usb: cdc_mbim: avoid altsetting toggling for Telit LN920</a>        | 0x1bc7:0x1061                                                    | <a href="#">aabbdc67f3485b5db27ab4eba01e5fbf1ffea62c</a> | v5.15-rc1    |
| <a href="#">net: usb: qmi_wwan: add Telit 0x1060 composition</a>                     | 0x1bc7:0x1060                                                    | <a href="#">8d17a33b076d24aa4861f336a125c888fb918605</a> | v5.15-rc1    |
| <a href="#">USB: serial: option: add Telit LN920 compositions</a>                    | 0x1bc7:0x1060<br>0x1bc7:0x1061<br>0x1bc7:0x1062<br>0x1bc7:0x1063 | <a href="#">7bb057134d609b9c038a00b6876cf0d37d0118ce</a> | v5.15-rc3    |

| Summary                                                                            | VID:PID                                                          | Commit                                                   | Availability |
|------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------|--------------|
| <a href="#">USB: serial: option: add Telit LE910Cx composition 0x1204</a>          | 0x1bc7:0x1204                                                    | <a href="#">f5a8a07edafed8bede17a95ef8940fe3a57a77d5</a> | v5.15-rc6    |
| <a href="#">USB: serial: option: add Telit LE910S1 0x9200 composition</a>          | 0x1bc7:0x9200                                                    | <a href="#">e353f3e88720300c3d72f49a4bea54f42db1fa5e</a> | v5.16-rc3    |
| <a href="#">USB: serial: option: add Telit FN990 compositions</a>                  | 0x1bc7:0x1070<br>0x1bc7:0x1071<br>0x1bc7:0x1072<br>0x1bc7:0x1073 | <a href="#">2b503c8598d1b232e7fc7526bce9326d92331541</a> | v5.16-rc6    |
| <a href="#">net: usb: qmi_wwan: add Telit 0x1070 composition</a>                   | 0x1bc7:0x1070                                                    | <a href="#">94f2a444f28a649926c410eb9a38afb13a83ebe0</a> | v5.16-rc6    |
| <a href="#">net: usb: cdc_mbim: avoid altsetting toggling for Telit FN990</a>      | 0x1bc7:0x1071                                                    | <a href="#">21e8a96377e6b6debae42164605bf9dcbe5720c5</a> | v5.17-rc5    |
| <a href="#">USB: serial: option: add Telit LE910R1 compositions</a>                | 0x1bc7:0x701a<br>0x1bc7:0x701b<br>0x1bc7:0x9201                  | <a href="#">cfc4442c642d568014474b6718ccf65dc7ca6099</a> | v5.17-rc6    |
| <a href="#">USB: serial: option: add Telit 0x1057, 0x1058, 0x1075 compositions</a> | 0x1bc7:0x1057<br>0x1bc7:0x1058<br>0x1bc7:0x1075                  | <a href="#">f32c5a0423400e01f4d7c607949fa3a1f006e8fa</a> | v5.18-rc5    |
| <a href="#">net: usb: qmi_wwan: add Telit 0x1057 composition</a>                   | 0x1bc7:0x1057                                                    | <a href="#">f01598090048f5f732ea7aa64b2f194131ce60d2</a> | v5.19-rc1    |
| <a href="#">net: usb: qmi_wwan: add Telit 0x1250 composition</a>                   | 0x1bc7:0x1250                                                    | <a href="#">2c262b21de6dc93ac4d8c7a4cea0da4226b451fb</a> | v5.19-rc1    |
| <a href="#">USB: serial: option: add Telit LE910Cx 0x1250 composition</a>          | 0x1bc7:0x1250                                                    | <a href="#">342fc0c3b345525da21112bd0478a0dc741598ea</a> | v5.19-rc4    |
| <a href="#">USB: serial: option: add Telit FE990 compositions</a>                  | 0x1bc7:0x1080<br>0x1bc7:0x1081<br>0x1bc7:0x1082<br>0x1bc7:0x1083 | <a href="#">773e8e7d07b753474b2ccd605ff092faaa9e65b9</a> | V6.3-rc6     |
| <a href="#">net: usb: qmi_wwan: add Telit 0x1080 composition</a>                   | 0x1bc7:0x1081                                                    | <a href="#">382e363d5bed0cec5807b35761d14e55955eee63</a> | V6.3-rc2     |
| <a href="#">net: usb: cdc_mbim: avoid altsetting toggling for Telit FE990</a>      | 0x1bc7:0x1081                                                    | <a href="#">418383e6ed6b4624a54ec05c535f13d184fbf33b</a> | V6.3-rc2     |
| <a href="#">USB: serial: option: add Telit LE910C4-WWX 0x1035 composition</a>      | 0x1bc7:0x1035                                                    | <a href="#">6a7be48e9bd18d309ba25c223a27790ad1bf0fa3</a> | v6.6-rc7     |

| Summary                                                                                         | VID:PID                                                          | Commit                                                    | Availability |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------|--------------|
| <a href="#">USB: serial: option:<br/>add Telit FN920C04<br/>rmnet compositions</a>              | 0x1bc7:0x10a0<br>0x1bc7:0x10a4<br>0x1bc7:0x10a9                  | <a href="#">582ee2f9d268d302595db3e36b985e5cbb93284d</a>  | V6.9-rc5     |
| <a href="#">net: usb: qmi_wwan:<br/>add Telit FN920C04<br/>compositions</a>                     | 0x1bc7:0x10a0<br>0x1bc7:0x10a4<br>0x1bc7:0x10a9                  | <a href="#">0b8fe5bd73249dc20be2e88a12041f8920797b59</a>  | V6.9-rc6     |
| <a href="#">net: usb: qmi_wwan:<br/>add Telit FN912<br/>compositions</a>                        | 0x1bc7:0x3000<br>0x1bc7:0x3001                                   | <a href="#">77453e2b015b5ced5b3f45364dd5a72dfc3bdecbb</a> | v6.10-rc6    |
| <a href="#">USB: serial: option:<br/>add Telit FN912<br/>rmnet compositions</a>                 | 0x1bc7:0x3000<br>0x1bc7:0x3001                                   | <a href="#">9a590ff283421b71560deded2110dbdcbe1f7d1d</a>  | v6.10        |
| <a href="#">USB: serial: option:<br/>add Telit generic<br/>core-dump<br/>composition</a>        | 0x1bc7:0x9000                                                    | <a href="#">4298e400dbdbf259549d69c349e060652ad53611</a>  | v6.10        |
| <a href="#">USB: serial: option:<br/>add Telit FN920C04<br/>MBIM compositions</a>               | 0x1bc7:0x10a2<br>0x1bc7:0x10a7<br>0x1bc7:0x10aa                  | <a href="#">6d951576ee16430822a8dee1e5c54d160e1de87d</a>  | v6.12-rc4    |
| <a href="#">net: usb: qmi_wwan:<br/>add Telit FE910C04<br/>compositions</a>                     | 0x1bc7:0x10c0<br>0x1bc7:0x10c4<br>0x1bc7:0x10c8                  | <a href="#">3b58b53a26598209a7ad8259a5114ce71f7c3d64</a>  | V6.13-rc3    |
| <a href="#">USB: serial: option:<br/>add Telit FE910C04<br/>rmnet compositions</a>              | 0x1bc7:0x10c0<br>0x1bc7:0x10c4<br>0x1bc7:0x10c8                  | <a href="#">8366e64a4454481339e7c56a8ad280161f2e441d</a>  | V6.13-rc4    |
| <a href="#">USB: serial: option:<br/>add Telit Cinterion<br/>FN990B compositions</a>            | 0x1bc7:0x10d0<br>0x1bc7:0x10d1<br>0x1bc7:0x10d2<br>0x1bc7:0x10d3 | <a href="#">c979fb5ece2dc11cc9cc3d5c66f750e210bfdee2</a>  | V6.14-rc3    |
| <a href="#">USB: serial: option:<br/>add Telit Cinterion<br/>FE990B compositions</a>            | 0x1bc7:0x10b0<br>0x1bc7:0x10b1<br>0x1bc7:0x10b2<br>0x1bc7:0x10b3 | <a href="#">4981bb50392b7515b765da28cf8768ce624c2670</a>  | V6.14-rc7    |
| <a href="#">net: usb: qmi_wwan:<br/>add Telit Cinterion<br/>FN990B composition</a>              | 0x1bc7:0x10d0                                                    | <a href="#">9dba9a45f8ca64a7df32aada14c20a3153af1ac8</a>  | V6.15-rc1    |
| <a href="#">net: usb: qmi_wwan:<br/>add Telit Cinterion<br/>FE990B composition</a>              | 0x1bc7:0x10b0                                                    | <a href="#">e8cdd91926aac2c53a23925c538ad4c44be4201f</a>  | V6.15-rc1    |
| <a href="#">USB: serial: option:<br/>add Telit Cinterion<br/>FE910C04 (ECM)<br/>composition</a> | 0x1bc7:0x10c7                                                    | <a href="#">252f4ac08cd2f16ecd20e4c5e41ac2a17dd86942</a>  | V6.16-rc7    |
| <a href="#">net: usb: qmi_wwan:<br/>add Telit Cinterion<br/>FN990A w/audio<br/>composition</a>  | 0x1bc7:0x1077                                                    | <a href="#">61aaca8b89fb98be58b8df19f01181bb983cccff</a>  | V6.17-rc2    |

| Summary                                                                               | VID:PID                                         | Commit                                                   | Availability |
|---------------------------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------|--------------|
| <a href="#">net: usb: qmi_wwan: add Telit Cinterion LE910C4-WWX new compositions</a>  | 0x1bc7:0x1034<br>0x1bc7:0x1037<br>0x1bc7:0x1038 | <a href="#">e81a7f65288c7e2cfb7e7890f648e099fd885ab3</a> | V6.17-rc4    |
| <a href="#">USB: serial: option: add Telit Cinterion FN990A w/audio compositions</a>  | 0x1bc7:0x1077                                   | <a href="#">cba70aff623b104085ab5613fedd21f6ea19095a</a> | V6.17-rc6    |
| <a href="#">USB: serial: option: add Telit Cinterion LE910C4-WWX new compositions</a> | 0x1bc7:0x1034<br>0x1bc7:0x1037<br>0x1bc7:0x1038 | <a href="#">a5a261bea9bf8444300d1067b4a73bedee5b5227</a> | V6.17-rc6    |

## 7 Additional Kernel Commits

### 7.1 Raw-IP Support and Important Fixes for qmi\_wwan

Below is a list of commits for adding Raw-Ip support to qmi\_wwan and addressing important issues.

**Table 8: qmi\_wwan Relevant Kernel Commits**

| Summary                                                                           | Commit                                                   | Availability |
|-----------------------------------------------------------------------------------|----------------------------------------------------------|--------------|
| <a href="#">net: qmi_wwan: MDM9x30 specific power management</a>                  | <a href="#">93725149794d3d418cf1eddcac60c7b536c5faa1</a> | v4.5-rc1     |
| <a href="#">usbnet: allow mini-drivers to consume L2 headers</a>                  | <a href="#">81e0ce79f2919dbd5f025894d29aa806af8695c7</a> | v4.5-rc1     |
| <a href="#">net: qmi_wwan: support "raw IP" mode</a>                              | <a href="#">32f7adf633b9f99ad5089901bc7ebff57704aaa9</a> | v4.5-rc1     |
| <a href="#">net: qmi_wwan: should hold RTNL while changing netdev type</a>        | <a href="#">6c730080e663b1d629f8aa89348291fbc4c46cd9</a> | v4.5-rc1     |
| <a href="#">net: qmi_wwan: ignore bogus CDC Union descriptors</a>                 | <a href="#">34a55d5e858e81a20d33fd9490149d6a1058be0c</a> | v4.5-rc1     |
| <a href="#">qmi_wwan: Add missing skb_reset_mac_header-call</a>                   | <a href="#">0de0add10e587effa880c741c9413c874f16be91</a> | v4.14        |
| <a href="#">usbnet: fix alignment for frames with no ethernet header</a>          | <a href="#">a4abd7a80addb4a9547f7dfc7812566b60ec505c</a> | v4.15-rc3    |
| <a href="#">qmi_wwan: set FLAG_SEND_ZLP to avoid network initiated disconnect</a> | <a href="#">245d21190aec547c0de64f70c0e6de871c185a24</a> | v4.16-rc1    |
| <a href="#">qmi_wwan: Fix out-of-bounds read</a>                                  | <a href="#">904d88d743b0c94092c5117955eab695df8109e8</a> | v5.2-rc7     |

### 7.2 QMAP Support in qmi\_wwan

Below is a list of commits for adding QMAP support to qmi\_wwan.

**Table 9: qmi\_wwan QMAP Relevant Kernel Commits**

| Summary                                                                           | Commit                                                   | Availability |
|-----------------------------------------------------------------------------------|----------------------------------------------------------|--------------|
| <a href="#">net: usb: qmi_wwan: add qmap mux protocol support</a>                 | <a href="#">c6adf77953bcec0ad63d7782479452464e50f7a3</a> | v4.12-rc1    |
| <a href="#">qmi_wwan: fix NULL deref on disconnect</a>                            | <a href="#">bbae08e592706dc32e5c7c97827b13c1c178668b</a> | v4.13-rc5    |
| <a href="#">qmi_wwan: Fix qmap header retrieval in qmimux_rx_fixup</a>            | <a href="#">d667044f49513d55fcfe4fa8f8d96091782901</a>   | v4.20        |
| <a href="#">qmi_wwan: add MTU default to qmap network interface</a>               | <a href="#">f87118d5760f00af7228033fbe783c7f380d2866</a> | v5.0-rc3     |
| <a href="#">qmi_wwan: add support for QMAP padding in the RX path</a>             | <a href="#">61356088ace1866a847a727d4d40da7bf00b67fc</a> | v5.2-rc6     |
| <a href="#">qmi_wwan: add network device usage statistics for qmimux devices</a>  | <a href="#">44f82312fe9113bab6642f4d0eab6b1b7902b6e1</a> | v5.2-rc6     |
| <a href="#">qmi_wwan: avoid RCU stalls on device disconnect when in QMAP mode</a> | <a href="#">a8fdde1cb830e560208af42b6c10750137f53eb3</a> | v5.2-rc6     |
| <a href="#">qmi_wwan: extend permitted QMAP mux_id value range</a>                | <a href="#">36815b416fa48766ac5a98e4b2dc3ebc5887222e</a> | v5.2-rc6     |
| <a href="#">qmi_wwan: Increase headroom for QMAP SKBs</a>                         | <a href="#">2e4233870557ac12387f885756b70fc181cb3806</a> | v5.12        |

| Summary                                                                          | Commit                                                   | Availability      |
|----------------------------------------------------------------------------------|----------------------------------------------------------|-------------------|
| <a href="#">net: usb: qmi_wwan: add qmap id sysfs file for qmimux interfaces</a> | <a href="#">e594ad980ec26fb7351d02c84abaa77ecdb4e522</a> | v5.12-rc1-dontuse |
| <a href="#">net: usb: qmi_wwan: allow qmimux add/del with master up</a>          | <a href="#">6c59cff38e66584ae3ac6c2f0cbd8d039c710ba7</a> | v5.12-rc3         |

## 8 Linux Version Finder

Linux Version Finder is a Python tool for finding Linux kernel versions in which a commit (or a set of commits) is available, searching the Linux kernel stable tree. The tool can be used in conjunction with the commits listed in Flashing Devices to identify the stable versions in which a composition is supported.

Linux Version Finder is available at Telit Github Organization: check the README.md file for instructions about usage.

## 9 Acronyms and Abbreviations

**Table 10: Acronyms and Abbreviations**

| Acronym | Definition                                     |
|---------|------------------------------------------------|
| ACM     | Abstract Control Model                         |
| ADB     | Android Debug Bridge                           |
| CDC     | Communications Class Device                    |
| ECM     | Ethernet Control Model                         |
| MBIM    | Mobile Broadband Interface Model               |
| NCM     | Network Control Model                          |
| PPP     | Point-to-Point Protocol                        |
| QMAP    | Qualcomm Multiplexing and Aggregation Protocol |
| USB     | Universal Serial Bus                           |

## 10 Related Documents

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

**Table 11: Related Documents**

| S.no | Doc Code      | Document Title                                                                     |
|------|---------------|------------------------------------------------------------------------------------|
| 1    | 1VW0301643    | Telit QMI SDK and TQCM User Guide                                                  |
| 2    | 1VW0301613    | uxfp Software User Guide                                                           |
| 3    | 80455NT12007A | Enabling QMAP in Linux Application Note                                            |
| 4    | 1VW0301952    | tfl Software User Guide                                                            |
| 5    | N/A           | AT Commands Reference Guide of Telit modules is listed in the applicability table. |

# 11 Document History

**Table 12: Document History**

| Revision | Date       | Changes                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20       | 2025-09-23 | Updated table 6 with correct module names.<br>Updated table 3 with PIDs 0x10c7, 0x1077, 0x0x1034, 0x1037, 0x1038 and related patches.                                                                                                                                                                                                                                                                                                                                              |
| 19       | 2025-03-28 | Added FN920C04 compositions 0x10a2, 0x10a7, 0x10aa.<br>Added FE910C04 compositions 0x10c0, 0x10c4, 0x10c8.<br>Added FN990B compositions 0x10d0, 0x10d1, 0x10d2, 0x10d3.<br>Added FE990B compositions 0x10b0, 0x10b1, 0x10b2, 0x10b3.<br>Fixed 0x7020 and 0x7021 compositions in Table 3.                                                                                                                                                                                           |
| 18       | 2024-07-15 | Added FE912C04 to the applicability table.<br>Added FE912C04 compositions 0x3000, 0x3001.<br>Added FN920C04 to the applicability table.<br>Added FN920C04 compositions 0x10a0, 0x10a4, 0x10a9.<br>Added LE910Cx Thread-x-based composition 0x1035.<br>Added LE910Q1 and ELS63 to the applicability table.<br>Added LE910Q1/ELS63 compositions 0x7020, 0x7021.<br>Added LE910Q1/ELS63 PID 0x920A to firmware update compositions.<br>Added generic core-dump patch to patches list. |
| 17       | 2023-05-15 | Added FE990 compositions 0x1080, 0x1081, 0x1082, 0x1083<br>Added config symbols in section 2.1<br>Added reference to QMAP document 80455NT12007A<br>Update template                                                                                                                                                                                                                                                                                                                |
| 16       | 2022-09-12 | Added LE910Cx Linux-based composition 0x1250<br>Added Linux Version Finder chapter<br>Updated Table 6 (flashing devices) with ME910G1 device and added related paragraph                                                                                                                                                                                                                                                                                                           |
| 15       | 2022-05-27 | Added FN980 compositions 0x1057, 0x1058<br>Added FN990 composition 0x1075<br>Added rmnet kernel module paragraph<br>Modified applicability table for LE910Cx families<br>Added applicability table disclaimer                                                                                                                                                                                                                                                                      |
| 14       | 2022-03-02 | Added LE910R1 in applicability table<br>Added LE910R1 compositions 0x701A, 0x701B<br>Added LE910R1 composition 0x9201 and related entry in Table 6                                                                                                                                                                                                                                                                                                                                 |
| 13       | 2021-12-13 | Added LE910C1 composition 0x1204<br>Added LE910S1 composition 0x9200 and related entry in Table 6<br>Added FN990 compositions 0x1070, 0x1071, 0x1072, 0x1073                                                                                                                                                                                                                                                                                                                       |
| 12       | 2021-09-24 | Added LN920 in applicability table and related kernel commits                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 11       | 2021-08-09 | Added FD980 composition 0x1056<br>Added FD980 in applicability table<br>Added paragraph "Multi-configuration compositions"                                                                                                                                                                                                                                                                                                                                                         |
| 10       | 2021-06-14 | Changed document template and rewrote some paragraphs                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Revision | Date       | Changes                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          |            | Fixed FN980 kernel version availability in the applicability table<br>Added LE910S1 to applicability table<br>Added LE910S1 0x7010 and 0x7011 composition description and related kernel commits<br>Added QMAP paragraph and related kernel commits<br>Modified flashing device information for 0x18d1:0xd00d and 0x8087:0x0801 (removed)<br>Changed kernel commit references from GitHub to git.kernel.org |
| 9        | 2020-11-09 | Added LE910Cx compositions 0x1203, 0x1230, 0x1231 and FN980 composition 0x1055<br>Removed references to deprecated Modem Manager and Network Manager documents<br>Removed references to deprecated lxfp                                                                                                                                                                                                     |
| 8        | 2020-09-01 | Added LE910C1-EUX support and updated kernel patches list<br>Added LM960 0x1040 qmi_wwan rx urb size note                                                                                                                                                                                                                                                                                                   |
| 7        | 2020-03-27 | Changed ME910G1 to MEx10G1 in applicability table<br>Added ML865C1 and ML865G1 to applicability table<br>Updated kernel patches list for composition 0x110b                                                                                                                                                                                                                                                 |
| 6        | 2020-01-13 | Added ME910G1 0x110a composition<br>Added FN980 0x9010 flashing device composition<br>Updated kernel patches list<br>Updated applicability table                                                                                                                                                                                                                                                            |
| 5        | 2019-10-21 | Added FN980 in applicability table and related kernel commits                                                                                                                                                                                                                                                                                                                                               |
| 4        | 2019-05-24 | Removed automotive modules from applicability table<br>Added LN940 and UE866 in applicability table<br>Added LM940 kernel commit for fixing big data packets issue<br>Added ME910 composition 0x1102, LECx910 compositions 0x1260 and 0x1261<br>Updated kernel patches list                                                                                                                                 |
| 3        | 2018-05-07 | Added LE866 flashing device details<br>Added kernel commit for PID 0x0036<br>Added LE910D1 in applicability table                                                                                                                                                                                                                                                                                           |
| 2        | 2018-02-13 | Added LM960 in applicability table<br>Added ME910 composition 0x1101<br>Added "Additional Kernel Commits" chapter<br>Added "Minimum Kernel Version" in applicability table                                                                                                                                                                                                                                  |
| 1        | 2017-11-24 | Added LE920A4 and LE910C1 composition 0x1201<br>Added LM940 in applicability table<br>Added reference to commit cdc-wdm: fix "out-of-sync" due to missing notifications                                                                                                                                                                                                                                     |
| 0        | 2017-04-28 | First issue                                                                                                                                                                                                                                                                                                                                                                                                 |

From Mod.0809 Rev.13



© Telit Cinterion. All rights reserved.

