Qualcomm Technologies, Inc.

Qualcomm Linux Cellular Guide

80-70018-24 AA

April 8, 2025

Qualcomm
Confidential - May Contain Trade Secrets
2025-06-02 10:41:12 GMT
vuppalas

Confidential - Qualcomm Technologies, Inc. and/or its affiliated companies - May Contain Trade Secrets

NO PUBLIC DISCLOSURE PERMITTED: Please report postings of this document on public servers or websites to: DocCtrlAgent@qualcomm.com.

© Qualcomm Technologies, Inc. and/or its subsidiaries. All rights reserved.

Contents

Qualcomm Confidential - May Contain Trade Secrets 2025-05-02 10:41:12 GMT Suppalas

1 Cellular overview

Cellular technology refers to a network system that allows wireless device communication over land areas composed of cells and transceivers, which are also known as base stations or cell sites. This technology is commonly used in devices such as mobile phones, broadband connectivity devices, and IoT devices.

Cellular technology facilitates various tasks, such as:

- Placing calls
- Transmitting messages using short message service (SMS)
- Transferring data for web browsing and other applications

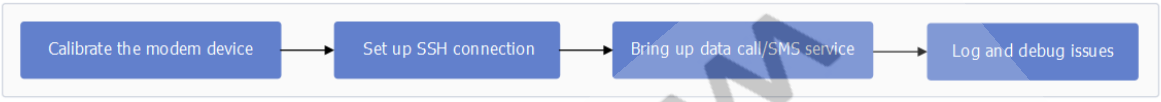
Qualcomm® Linux® provides features, interfaces, and sample applications for cellular (data and SMS) services. The sample applications help in developing custom cellular applications on Qualcomm® RB3 Gen 2 Development Kit. Qualcomm Linux offers capabilities to set up data and SMS functions using sample applications or command-line interface (CLI). Also, it enables logging to debug cellular related issues.

Note: The cellular subsystem is currently unavailable on QCS9075/QCS8275 currently. Cellular functionality will be added in a future release. Cellular documentation is not applicable for QCS9075/QCS8275 and will be updated in a future release.

Qualcomm Confidential - May Contain Trade Secrets 2025-04-02 10:41:12 GMT vuppalap

2 Get started with cellular

The following figure shows the workflow to get started with cellular functions such as data call or SMS services on your device.



To enable data and SMS functionalities, do the following:

1. Calibrate the modem device using calibration methods.

   For more information on calibration, see *MPSS.HI 2G/3G/4G RF Calibration Software Overview* and *MPSS.HI 5G NR Sub-6 RF Calibration Software Overview*.

2. Perform the steps mentioned in Sign in using SSH connection to enable SSH.
3. Connect to the device.

   ```
   ssh root@<device_IP_address>
   ```

   For example:

   ```
   ssh root@10.92.160.222
   ```

4. Enter the following password to connect to SSH.

   ```
   oelinux123
   ```

5. Bring up a data call or an SMS service using sample applications or CLI.

2.1 Next steps

- Sample applications for cellular
- Bring up data call service
- Bring up SMS service

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:21 GMT Vinpalas

- Debug cellular issues

Qualcomm
Confidential - May Contain Trade Secrets
2025-06-02 10:41:12 GMT
vuppalas

3 Cellular features

Cellular technology in Qualcomm Linux provides features such as data call management, data path enablement, and SMS enablement.

Table : Cellular technology features

Features	Description
Data call management	• Allows you to manage the cellular network and perform operations such as connecting and disconnecting wireless wide area network (WWAN) data connections. • The modem manager (MM) manages the data calls.
Data path enablement	• RmNet enables data path over cellular connectivity. It emulates a network interface on the application processor subsystem (APSS) and behaves as a network adapter when attached to a modem. • RmNet relies on a control interface for any control signaling between the APSS and modem processor subsystem (MPSS), for example, initiating a data session on demand or sending any notification. • RmNet supports only the Qualcomm MSMT interface (QMI) as a control channel for signaling between APSS and MPSS. QMI defines the framework and messages for communication between APSS and MPSS.
SMS enablement	The modem manager handles the SMS functions to send, receive, read, and delete messages. To enable SMS functions: • For 2G/3G cellular networks, use circuit switch (CS). • For 4G/5G cellular networks, use SMS over nonaccess stratum (NAS).

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:15 GMT Limited Use

4 Cellular architecture

The QCM6490 chipset supports both MPSS and APSS for data communication and SMS operations.

The following figure shows:

- The cellular architecture and its components involved in performing data and SMS operations.
- The developer interfaces for managing data and SMS services, and the respective path towards MPSS.

Qualcomm
Confidential - May Contain Trade Secrets
2025-06-02 10:41:12 GMT
vuppalas

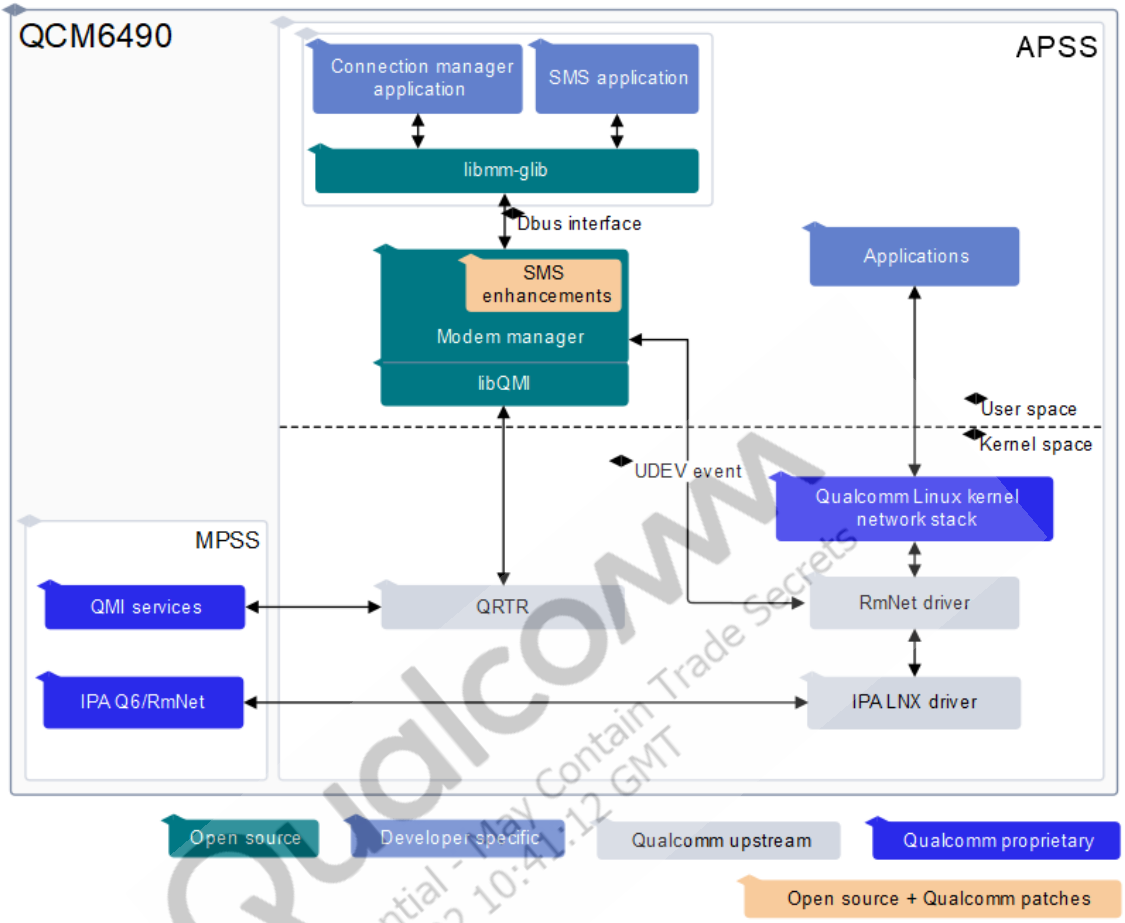


Figure : QCM6490 cellular architecture

The components of the QCM6490 cellular architecture are described as follows.

Table : QCM6490 cellular architecture components

Component	Description
MPSS	Provides cellular radio connectivity (2G/3G/4G/5G) to enable data connection and SMS services.
APSS	Operates on a Linux-based operating system. The software processes in the user space interact with the kernel driver and modem processor for cellular services, both data and SMS.

Component	**Description**
Connection manager	• Original equipment manufacturer (OEM) or developer-specific application that manages data connections. It uses modem manager APIs available through `libmm-glib` library for data call management. • A developer application must link to the `libmm-glib` library to realize the data call functionality. For more information on linking, see Sample applications for cellular.
Modem manager	• DBUS activated daemon that controls mobile broadband (2G/3G/4G/5G) devices and connections. The modem manager signals the modem using QMI. The QMI framework is exposed by the QMI library (LibQMI) and the QMI transactions are transported over a Qualcomm router (QRTR). • `libmm-glib` is a shared library for applications interfacing with modem manager, which provides APIs for underlying services such as data and SMS management. • Based on open-source modem manager version 1.22. For more information, see ModemManager.
LibQMI	The glib-based library is used for interfacing with WWAN modems and devices that use the QMI protocol. For more information, see libqmi-glib and libqrtr-glib.
QRTR	QRTR is a kernel driver that provides a connectionless datagram protocol for interprocessor communication.
RmNet	A kernel module between a physical WWAN network device and a network stack for embedded data calls.
IPA driver	IP accelerator (IPA) is a standalone hardware accelerator block latched to the system network on a chip (NoC). IPA driver is the software that controls the interactions with IPA hardware.
SMS	• The modem manager provides SMS functions to send, receive, read, and delete messages. Enhancements are made to store the messages in a local database in a continuous manner. • A developer application must link to the `libmm-glib` library to realize the SMS function. For more information on linking, see Sample applications for cellular.

May contain U.S. and international export controlled information

5 Modem manager APIs

You can use modem manager APIs to perform the following functions:

- Establish and release a data call.
- Perform SMS operations: Mobile originated (MO) and mobile terminated (MT) SMS.

5.1 Establish and release data call

The Bearer object and MMBearer provides the modem manager APIs for data call establishment and release.

The following figure shows a high-level call flow for data call establishment.

Qualcomm
Confidential - May Contain Trade Secrets
2025-06-02 10:41:12 GMT
vuppalas

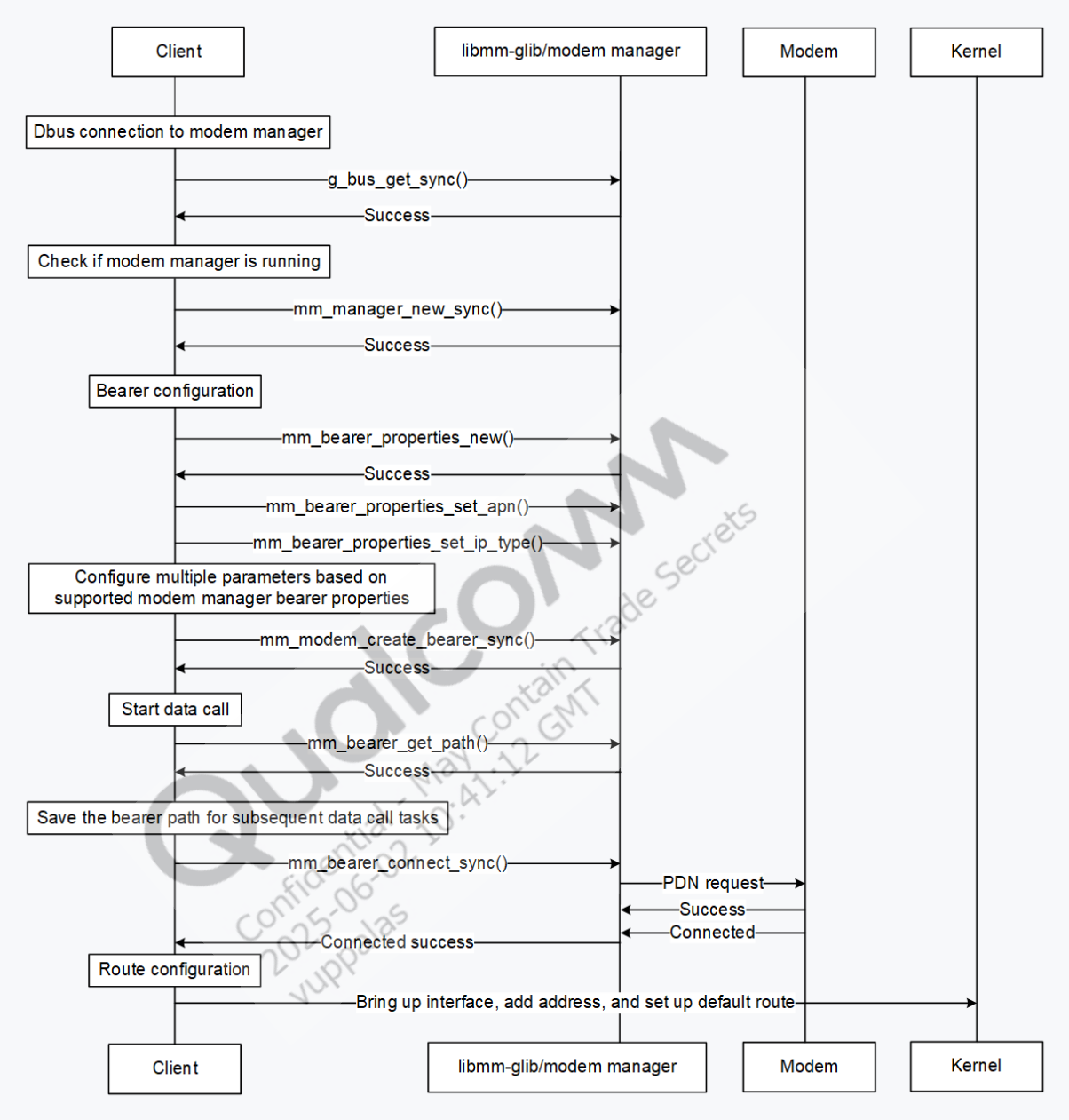


Figure : Call flow for data call establishment

The following figure shows a high-level call flow for data call release.

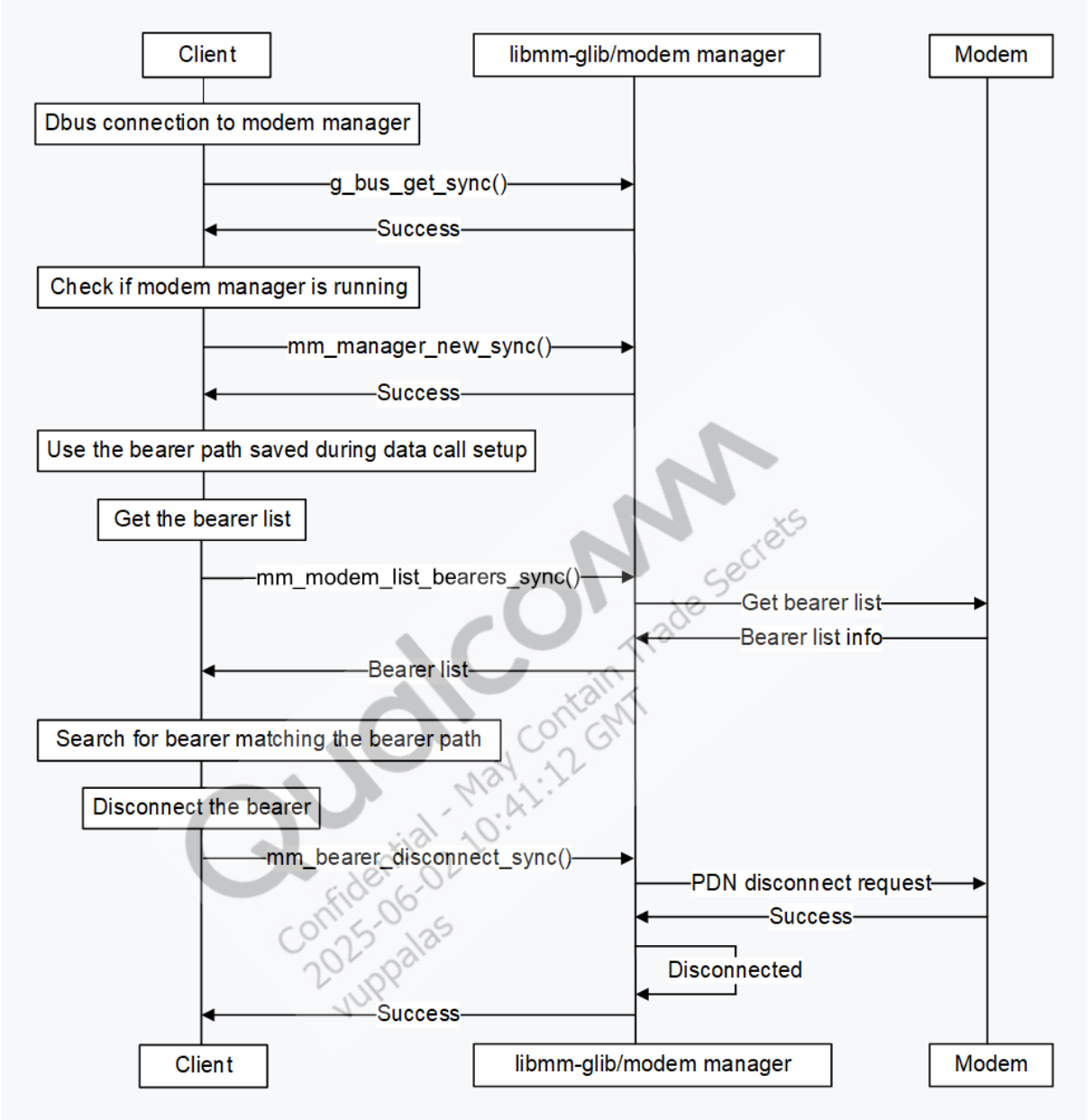


Figure : Call flow for data call release

5.2 Perform SMS operations: MO and MT SMS

The SMS object and MMModemMessaging provides the modem manager APIs for mobile originated SMS and mobile terminated SMS.

The following figure shows a high-level call flow for mobile originated SMS.

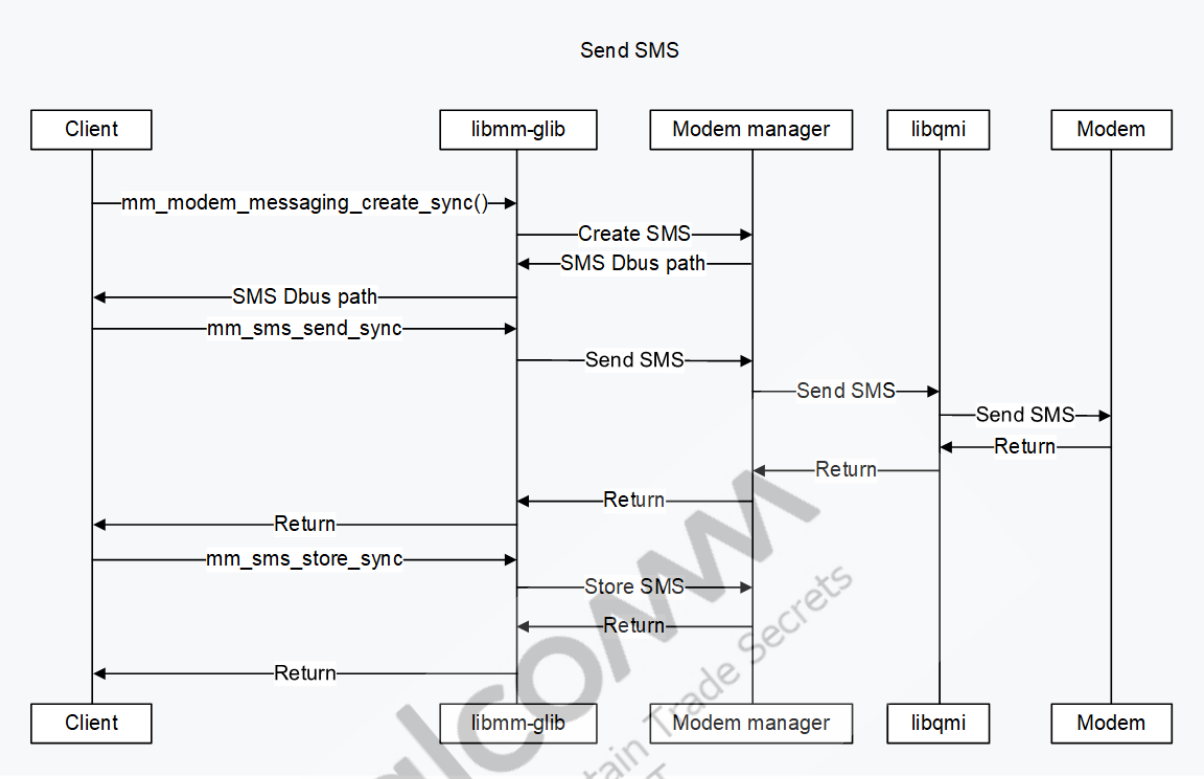


Figure : Call flow for mobile originated SMS

The following figure shows a high-level call flow for mobile terminated SMS.

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:12 GMT vuppalas

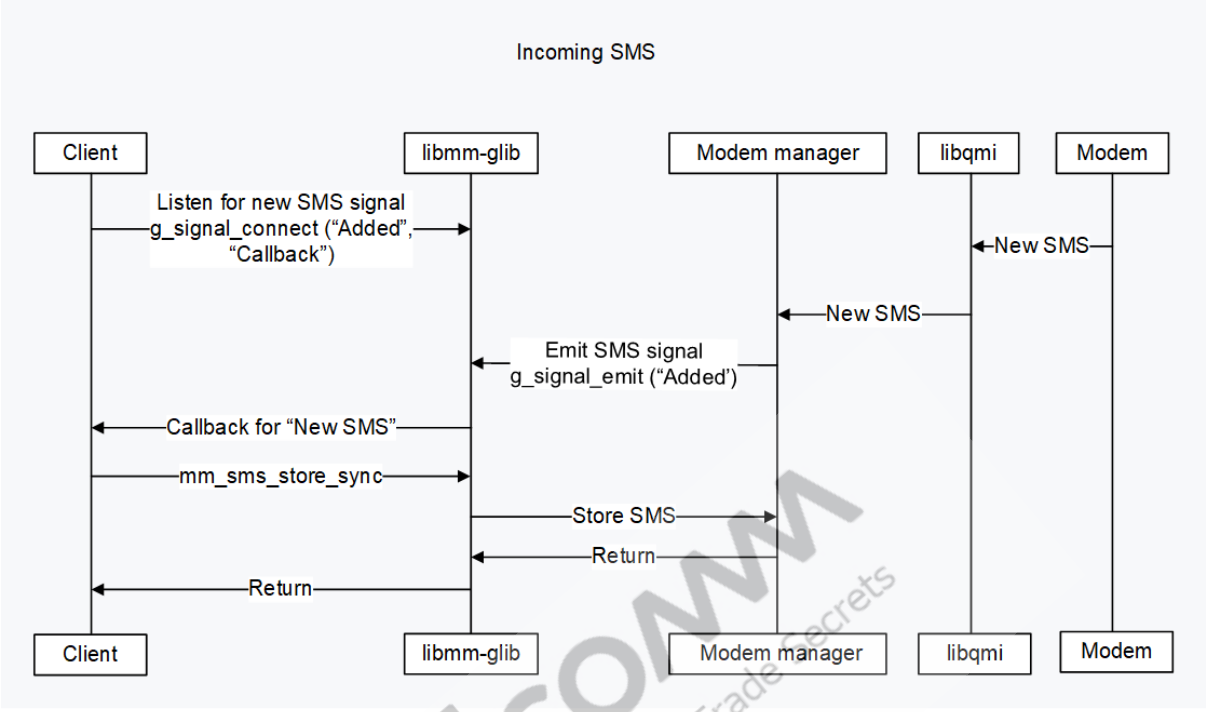


Figure : Call flow for mobile terminated SMS

Qualcomm
Confidential - May Contain Trade Secrets
2025-06-02 10:41:12 GMT
vuppalas

6 Sample applications for cellular

You can use the following sample applications to develop your own applications for data call management. To access modem manager APIs, link your applications into the `libmm-glib` library. For more information, see the `meson.build` file available at `<workspace>/sources/mobile-broadband/ModemManager/gui`.

Note: To compile the software in an application binary, follow the instructions provided in the Software Release Notes.

Table : Features and sample applications

Features	Sample application	Sample application path	Description	Functions
Data call management	`mmcellularrefapp`	`<workspace>/sources/mobile-broadband/ModemManager/mmcellularrefapp/`	Provides functionalities such as bringing up or bringing down a data call.	Bring up data call using sample application

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:12 GMT vuppalas

6.1 Next steps

- Bring up data call using sample application
- Debug WWAN data call bringup

7 Bring up data call service

You can bring up WWAN data call functions using the sample applications or CLI commands.

Note: Before running the commands, you must connect the device using SSH.

7.1 Bring up data call using sample application

To bring up a WWAN data call using the `mmcellularrefapp` sample application, do the following on the default `profile#1` profile:

1. Load the RmNet driver.

```
insmod ./lib/modules/6.6.17/kernel/drivers/net/ethernet/
qualcomm/rmnet/rmnet.ko
```

2. Connect to a WWAN data call.

```
mmCellularRefApp c
```

3. Disconnect a WWAN data call.

```
mmCellularRefApp d
```

7.2 Bring up data call using CLI

You can use the modem manager (MM) CLI to bring up and bring down a WWAN data call. For more information on MM CLI and the relevant parameters used in the commands, see mmcli - Control and monitor the ModemManager.

To bring up a WWAN data call using MM CLI, do the following:

1. Load the RmNet driver.

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:12 GMT vuppalas

```
insmod ./lib/modules/6.6.17/kernel/drivers/net/ethernet/
qualcomm/rmnet/rmnet.ko
```

2. Verify whether the modem you want to use for the data call is detected.

```
mmcli -L
/org/freedesktop/ModemManager1/Modem/0 [QUALCOMM INCORPORATED] 0
mmcli -e -m 0
```

   A `successfully enabled the modem` message appears.

3. Initiate the data call on the bearer and choose an appropriate APN name as defined by your SIM operator.

```
mmcli -m 0 --simple-connect="apn=w1v4v6.com, ip-type=ipv4"
```

   A `successfully connected the modem` message appears.

4. Get the bearer ID for the data call.

```
mmcli -m 0
```

   The following sample output shows that `/Bearer/0` is brought up:

```
3GPP EPS | initial bearer ip type: ipv4v6
————————————————————————
SIM | primary sim path: /org/freedesktop/ModemManager1/SIM/1
      | sim slot paths: slot 1: /org/freedesktop/ModemManager1/SIM/0
            Slot 2: none (active)
————————————————————————
Bearer | paths: /org/freedesktop/ModemManager1/Bearer/0
```

5. Verify the status of bearer connection and get bearer information from the modem.

```
mmcli -b 0
```

   The bearer ID is obtained in step 4, for example, `/Bearer/0`.

   The following sample output shows the details of the network interface and corresponding IP address to be used for this data call connection request:

Qualcomm Confidential - May Contain Trade Secrets 2025-06-10 10:41:12 GMT Venpalas

```
mmcli -b 0
——————————————————————————-
General | path: /org/freedesktop/ModemManager1/Bearer/0
        | type: default
——————————————————————————-
Status | connected: yes
       | suspended: no
       | multiplexed: yes
       | interface: qmapmux0.0
       | ip timeout: 20
——————————————————————————-
Properties | apn: w1v4v6.com
           | roaming: allowed
           | ip type: ipv4
——————————————————————————-
IPv4 configuration| method: static
                  | address: 10.218.247.201
                  | prefix: 30
                  | gateway: 10.218.247.202
                  | dns: 10.242.20.148, 10.242.20.156
                  | mtu: 1500
——————————————————————————-
Statistics | start date: 2022-04-28T18:09:46Z
           | duration: 149
           | bytes tx: 48
           | attempts: 1
           | total-duration: 149
           | total-bytes tx: 48
```

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:12 GMT Yuppalas

6. Configure the IP address that you obtained in step 5, manually bring up the network interface, and set the default route.

```
ip addr add 10.218.247.201/30 dev qmapmux0.0
ifconfig qmapmux0.0 up
ip route add default dev qmapmux0.0
```

7. To test the data connectivity, ping a public IP address and confirm the data path.

   The following sample output shows the status of data connectivity:

```
ping 10.218.225.101 -c 4
PING 10.218.225.101 (10.218.225.101): 56 data bytes
64 bytes from 10.218.225.101: seq=0 ttl=63 time=304.515 ms
64 bytes from 10.218.225.101: seq=1 ttl=63 time=584.544 ms
64 bytes from 10.218.225.101: seq=2 ttl=63 time=532.301 ms
64 bytes from 10.218.225.101: seq=3 ttl=63 time=504.118 ms

— 10.218.225.101 ping statistics —
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 304.515/481.369/584.544 ms
```

8. Verify the throughputs on the link using the `iperf` client/server command.

Next steps:

- Debug WWAN data call bringup

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:12 GMT vuppalas

8 Bring up SMS service

You can bring up SMS functions using the CLI commands.

Note: Before running the commands, you must connect the device using SSH.

8.1 Bring up SMS using CLI

You can bring up SMS using MM CLI. For more information on MM CLI and the parameters used in the commands, see mmcli - Control and monitor the ModemManager.

To bring up SMS using MM CLI, do the following:

1. Verify whether the modem you want to use for SMS operations is detected.

```
mmcli -L
/org/freedesktop/ModemManager1/Modem/0 [QUALCOMM INCORPORATED] 0
mmcli -e -m 0
```

   A `successfully enabled the modem` message appears.

2. Create an SMS object.

```
mmcli -m 0 --messaging-create-sms="text='Hello world',number=
'98xxxxxxxx'"
-------------------------
Messaging | created sms: /org/freedesktop/ModemManager1/SMS/7
```

   An SMS object with an index `7`, a `Hello world` text, and the phone number `98xxxxxxxx` to which the SMS must be sent is created.

3. Send an SMS.

```
mmcli --send -s 7
```

   A `successfully sent the SMS` message appears, and the SMS object created in step 2 is sent to the network.

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:12 GMT yuppalas

4. Store the SMS in a local database.

```
mmcli -m 0 -s 7 --store-in-storage=ta
```

   Here, `ta` refers to terminal adapter storage, that is, device memory. Supported values for `store-in-storage` are `sm`, `me`, and `ta`.

   A `successfully stored the SMS` message appears, and the SMS object sent in step 3 is stored in the local database.

5. List the SMS from storage.

```
mmcli -m 0 --messaging-list-sms
```

   The following sample output shows the list of SMS objects stored in the local database:

```
/org/freedesktop/ModemManager1/SMS/7 (sent)
/org/freedesktop/ModemManager1/SMS/6 (stored)
/org/freedesktop/ModemManager1/SMS/5 (received)
/org/freedesktop/ModemManager1/SMS/4 (received)
```

6. Delete the SMS from storage.

```
mmcli -m 0 --messaging-delete-sms=5
```

   An SMS object with an index `5` is deleted from the local database.

Next steps

- Debug SMS bringup

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:12 GMT vuppalas

9 Debug cellular issues

You can use the following log types to log and debug issues related to data and SMS services:

Table : Types of logs for debugging

Log type	Used for
journaltcl	Debugging issues related to the modem manager.
dmesg	Debugging issues related to the kernel driver.
tcpdump	Checking the packet transfer.
Qualcomm extensible diagnostic monitor (QXDM Professional™)	Debugging issues related to the modem.

9.1 Debug WWAN data call bringup

To debug the issues that may occur during a WWAN data call bringup, do the following:

1. For issues related to the modem manager:
   a. Collect the `journalctl` logs.

```
journalctl -u ModemManager > /var/log/journalctl.txt
```

   b. Enable the `debug` option to debug extensively.

```
systemctl stop ModemManager
/usr/sbin/ModemManager --log-FILE=/VAR/LOG/MMLOG.txt
--LOG-LEVEL=DEBUG --LOG-TIMESTAMPS --LOG-RELATIVE-TIMESTAMPS
```

   c. After the test, retrieve the file from the machine connected to the device.

```
scp root@<SSH-IP-addr>:/var/log/journalctl.txt  journalctl.
txt
```

Note: When prompted for a password, enter `oelinux123` to authenticate the file

transfer through the secure copy protocol (SCP).

For example:

```
scp root@10.92.165.83:/var/log/journalctl.txt journalctl.txt
```

```
scp root@<SSH-IP-addr>:/var/log/MMLOG.txt  MMLOG.txt
```

```
scp root@10.92.165.83:/var/log/MMLOG.txt MMLOG.txt
```

2. For issues related to the kernel driver:
   a. Collect the `dmesg` logs.

```
dmesg > /var/log/dmesg_logs.txt
```

   b. After the test, retrieve the file from the machine connected to the device.

```
scp root@<SSH-IP-addr>:/var/log/dmesg_logs.txt  dmesg_logs.
txt
```

Note: When prompted for a password, enter `oelinux123` to authenticate the file transfer through SCP.

For example:

```
scp root@10.92.165.83:/var/log/dmesg_logs.txt dmesg_logs.txt
```

3. To verify the packet transfer:
   a. Collect the `tcpdump` logs.

```
tcpdump -i any -s 0 -w /var/log/tcpdump.pcap
```

   b. After the test, retrieve the file from the machine connected to the device.

```
scp root@<SSH-IP-addr>:/var/log/tcpdump.pcap  tcpdump.pcap
```

Note: When prompted for a password, enter `oelinux123` to authenticate the file transfer through SCP.

For example:

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:12 GMT yuphalas

```
scp root@10.92.165.83:/var/log/tcpdump.pcap tcpdump.pcap
```

4. For issues related to the modem, collect QXDM Professional logs with the default log mask.

   For more information, see *QXDM Professional Tool v5 for Windows OS*.

9.2 Debug SMS bringup

To debug the issues that may occur during an SMS bringup, do the following:

1. For issues related to the modem manager:
   a. Collect `journalctl` logs.

   ```
   journalctl -u ModemManager > /var/log/journalctl.txt
   ```

   b. Enable the `debug` option to debug extensively.

   ```
   systemctl stop ModemManager
   /usr/sbin/ModemManager --log-FILE=/VAR/LOG/MMLOG.TXT
   --LOG-LEVEL=DEBUG --LOG-TIMESTAMPS --LOG-RELATIVE-TIMESTAMPS
   ```

   c. After the test, retrieve the file from the machine connected to the device.

   ```
   scp root@<SSH-IP-addr>:/var/log/journalctl.txt  journalctl.
   txt
   ```

   Note: When prompted for a password, enter `oelinux123` to authenticate the file transfer through SCP.

   For example:

   ```
   scp root@10.92.165.83:/var/log/journalctl.txt journalctl.txt
   ```

   ```
   scp root@<SSH-IP-addr>:/var/log/MMLOG.txt  MMLOG.txt
   ```

   Note: When prompted for a password, enter `oelinux123` to authenticate the file transfer through SCP.

   ```
   scp root@10.92.165.83:/var/log/MMLOG.TXT MMLOG.txt
   ```

2. For issues related to modem, collect QXDM logs with the default log mask.

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:12 GMT vuppalas

For more information, see *QXDM Professional Tool v5 for Windows OS*.

Qualcomm
Confidential - May Contain Trade Secrets
2025-06-02 10:41:12 GMT
vuppalas

10 References

10.1 Related documents

Title	Number
Qualcomm Technologies, Inc.	
Qualcomm RB3 Gen 2 Development Kit Guide	80-70018-251
Qualcomm Linux Build Guide	80-70018-254
Qualcomm Linux Kernel Guide	80-70018-3
QXDM Professional Tool v5 for Windows OS	80-V1241-25
MPSS.HI 2G/3G/4G RF Calibration Software Overview	80-PM671-5
MPSS.HI 5G NR Sub-6 RF Calibration Software Overview	80-PM669-4
Resources	
Modem Manager Documentation	

Qualcomm Confidential - May Contain Trade Secrets 2025-06-02 10:41:12 GMT vuppalas

10.2 Acronyms and terms

Acronym or term	Definition
APSS	Application processor subsystem
CS	Circuit switch
IPA	Internet protocol accelerator
MM CLI	Modem manager command-line interface
MPSS	Modem processor subsystem
MSM	Mobile station modem
NAS	Nonaccess stratum
NoC	Network on chip
QMI	Qualcomm MSM interface
QRTR	Qualcomm router
QXDM	Qualcomm extensible diagnostic monitor
SIM	Subscriber identity module
SMS	Short messaging service
SoC	System on chip
WWAN	Wireless wide area network

Qualcomm
Confidential - May Contain Trade Secrets
2025-06-02 10:41:12 GMT
vuppalas

LEGAL INFORMATION

Your access to and use of this material, along with any documents, software, specifications, reference board files, drawings, diagnostics and other information contained herein (collectively this "Material"), is subject to your (including the corporation or other legal entity you represent, collectively "You" or "Your") acceptance of the terms and conditions ("Terms of Use") set forth below. If You do not agree to these Terms of Use, you may not use this Material and shall immediately destroy any copy thereof.

1) Legal Notice.

This Material is being made available to You solely for Your internal use with those products and service offerings of Qualcomm Technologies, Inc. ("**Qualcomm Technologies**"), its affiliates and/or licensors described in this Material, and shall not be used for any other purposes. If this Material is marked as "**Qualcomm Internal Use Only**", no license is granted to You herein, and You must immediately (a) destroy or return this Material to Qualcomm Technologies, and (b) report Your receipt of this Material to qualcomm.support@qti.qualcomm.com. This Material may not be altered, edited, or modified in any way without Qualcomm Technologies' prior written approval, nor may it be used for any machine learning or artificial intelligence development purpose which results, whether directly or indirectly, in the creation or development of an automated device, program, tool, algorithm, process, methodology, product and/or other output. Unauthorized use or disclosure of this Material or the information contained herein is strictly prohibited, and You agree to indemnify Qualcomm Technologies, its affiliates and licensors for any damages or losses suffered by Qualcomm Technologies, its affiliates and/or licensors for any such unauthorized uses or disclosures of this Material, in whole or part.

Qualcomm Technologies, its affiliates and/or licensors retain all rights and ownership in and to this Material. No license to any trademark, patent, copyright, mask work protection right or any other intellectual property right is either granted or implied by this Material or any information disclosed herein, including, but not limited to, any license to make, use, import or sell any product, service or technology offering embodying any of the information in this Material.

THIS MATERIAL IS BEING PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESSED, IMPLIED, STATUTORY OR OTHERWISE. TO THE MAXIMUM EXTENT PERMITTED BY LAW, QUALCOMM TECHNOLOGIES, ITS AFFILIATES AND/OR LICENSORS SPECIFICALLY DISCLAIM ALL WARRANTIES OF TITLE, MERCHANTABILITY, NON-INFRINGEMENT, FITNESS FOR A PARTICULAR PURPOSE, SATISFACTORY QUALITY, COMPLETENESS OR ACCURACY, AND ALL WARRANTIES ARISING OUT OF TRADE USAGE OR OUT OF A COURSE OF DEALING OR COURSE OF PERFORMANCE. MOREOVER, NEITHER QUALCOMM TECHNOLOGIES, NOR ANY OF ITS AFFILIATES AND/OR LICENSORS, SHALL BE LIABLE TO YOU OR ANY THIRD PARTY FOR ANY EXPENSES, LOSSES, USE, OR ACTIONS HOWSOEVER INCURRED OR UNDERTAKEN BY YOU IN RELIANCE ON THIS MATERIAL.

Certain product kits, tools and other items referenced in this Material may require You to accept additional terms and conditions before accessing or using those items.

Technical data specified in this Material may be subject to U.S. and other applicable export control laws. Transmission contrary to U.S. and any other applicable law is strictly prohibited.

Nothing in this Material is an offer to sell any of the components or devices referenced herein.

This Material is subject to change without further notification.

In the event of a conflict between these Terms of Use and the *Website Terms of Use* on www.qualcomm.com, the *Qualcomm Privacy Policy* referenced on www.qualcomm.com, or other legal statements or notices found on prior pages of the Material, these Terms of Use will control. In the event of a conflict between these Terms of Use and any other agreement (written or click-through, including, without limitation any non-disclosure agreement) executed by You and Qualcomm Technologies or a Qualcomm Technologies affiliate and/or licensor with respect to Your access to and use of this Material, the other agreement will control.

These Terms of Use shall be governed by and construed and enforced in accordance with the laws of the State of California, excluding the U.N. Convention on International Sale of Goods, without regard to conflict of laws principles. Any dispute, claim or controversy arising out of or relating to these Terms of Use, or the breach or validity hereof, shall be adjudicated only by a court of competent jurisdiction in the county of San Diego, State of California, and You hereby consent to the personal jurisdiction of such courts for that purpose.

2) Trademark and Product Attribution Statements.

Qualcomm is a trademark or registered trademark of Qualcomm Incorporated. Arm is a registered trademark of Arm Limited (or its subsidiaries) in the U.S. and/or elsewhere. The Bluetooth® word mark is a registered trademark owned by Bluetooth SIG, Inc. Other product and brand names referenced in this Material may be trademarks or registered trademarks of their respective owners.

Snapdragon and Qualcomm branded products referenced in this Material are products of Qualcomm Technologies, Inc. and/or its subsidiaries. Qualcomm patented technologies are licensed by Qualcomm Incorporated.

Qualcomm Confidential - May Contain Trade Secrets
2025-06-02 10:41:12 GMT