Android RIL Driver
User Guide

GSM/GPRS/UMTS/HSPA/LTE Module Series

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About the Document

History

Revision	Date	Author	Description
1.0	2015-02-27	Carl YIN	Initial
1.1	2015-03-25	Carl YIN	Updated supported products
1.2	2015-04-07	Kent XU	Added Zero Packet feature in Section 3.3.3.
1.3	2015-07-10	Kent XU	1. Added GSM modules in Supported Products 2. Added Android 5.x in Supported Android Versions
1.4	2016-06-21	Carl YIN/ Neo HOU	1. Added EC21&EC25 in Supported Products 2. Added FAQ
1.5	2016-08-23	Kent XU	Added EC20 R2.0 in Supported Products

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1 Introduction

This document mainly introduces how to integrate RIL Driver into Android OS of your target machine and how to modify the configuration files for starting RIL service and PPP dialling.

1.1. Directory Structure

The file structure of Quectel RIL Driver Package:

```
├────── Android.mk
├────── atchannel.c
├────── atchannel.h
├────── at_tok.c
├────── at_tok.h
├────── misc.c
├────── misc.h
├────── ql-pppd.c
├────── gsm0710muxd_bp.c
├────── quectel_ril_porting_guide.txt
└────── reference-ril.c
```

2 Overview of Android RIL Driver

2.1. Supported Products

Table 1: Supported Products

Product	Support or Not
UC20	YES
UC15	YES
UGxx	YES
EC20/EC21/EC25/EC20 R2.0	YES
Quectel GSM Modules	YES

2.2. Supported Functions

Table 2: Supported Functions

Function	Support or Not
SMS	YES
VOICE CALL	YES
DATA SERVICE	YES
SIM TOOL KIT	NO
PHONEBOOK	YES

2.3. Supported Android Versions

Presently, Quectel RIL driver supports the following Android versions:

Table 3: Supported Android Versions

Versions	Support or not
Android 2.x	YES
Android 3.x	YES
Android 4.x	YES
Android 5.x	YES

3 RIL Integration

The first part describes the RIL driver structure. The following parts introduce how to set up Android system with the RIL driver.

3.1. RIL Driver Structure

Android RIL (Radio Interface Layer) provides the abstract layer between Telephony service and Radio hardware.

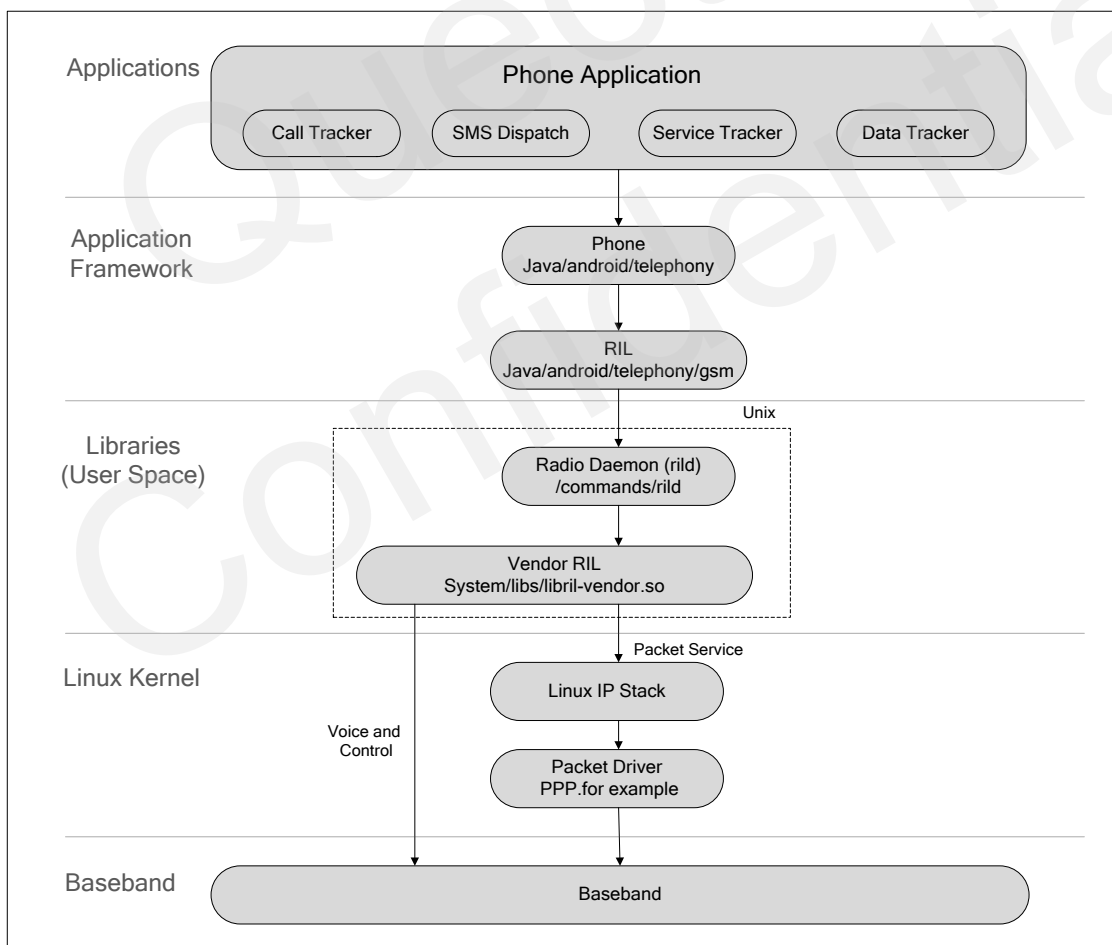The following illustration describes the RIL's position in the Android architecture.

Figure 1: RIL Driver Structure

The RIL in Android is located between Kernel and Application Framework. It is divided into two parts, one is RILD and the other is Vendor RIL.

RILD is responsible for the communication between Socket and Application Framework.

Vendor RIL is responsible for communication with Radio via AT command channel and Packet data channel (PDCH). AT command channel is used for communicating with Radio directly and PDCH is used for data service.

The java framework of RIL is divided into two parts too. One is RIL module and the other is Phone module. The RIL module is used to communicate with the lower RILD. The Phone module directly provides phone function interfaces to application through which you can call to realize the phone functions.

3.2. PPP Configuration in Linux Kernel

You need to configure the kernel to support PPP dial up.

For detailed operation procedures, please refer to chapter 3.6 Configure Kernel to Support PPP in *Quectel WCDMA&LTE Linux USB Driver User Guide*.

3.3. USB Drivers for UC15/UC20/UGxx/EC20/EC21/EC25/EC20 R2.0

If you are using Quectel GSM modules, please skip this section.

You need to configure the kernel to support UC15/UC20/UGxx/EC20/EC21/EC25/EC20 R2.0 modules.

For detailed operation procedures, please refer to the following chapters in *Quectel WCDMA&LTE Linux USB Driver User Guide*:

3.2. USB Serial Driver for UC15/UC20/EC20/EC21/EC25/EC20 R2.0
3.3. CDC ACM Driver for UGxx
3.4. GobiNet Driver for UC20/EC20/EC21/EC25/EC20 R2.0
3.5. QMI WWAN Driver for UC20/EC20/EC21/EC25/EC20 R2.0

3.4. RIL Driver Integration

Presently, Quectel provides RIL driver in the form of source code. You only need to copy the RIL driver source code files to the correct path on your project directory, and then recompile the Android system.

The source path of the RIL driver files in RIL Driver package is:

Driver package/reference-ril

The destination path in Android system is:

($Android_src)/hardware/ril/

Please use following command to update these files' date stamp to make sure they will be compiled.

touch hardware/ril/*

After you recompile the Android system successfully, please make sure the following files exists in folder "out/target/product/($your_board_name)/system".

```
-rwxr-xr-x 1 root root  31852  6月 26 09:43 system/bin/chat
-rwxr-xr-x 1 root root 284436  6月 15 14:03 system/bin/pppd
-rwxr-xr-x 1 root root  11650  6月 15 14:12 system/bin/rild
-rwxr-xr-x 1 root root   6511  6月 26 09:43 system/etc/ppp/ip-down
-rwxr-xr-x 1 root root   6618  6月 26 09:43 system/etc/ppp/ip-up
-rwxr-xr-x 1 root root 172173  6月 26 09:43 system/lib/libreference-ril.so
```

Figure 2: RIL Files

NOTE

Quectel would not give the PPP script, because we have integrated the PPP script in the source code of the RIL driver. And the chat, ip-up and ip-down would be generated when the RIL driver has been compiled.

3.5. System Configuration

In order to use the RIL driver normally, you also have to modify some Android system configuration files.

3.5.1. Configure "init.rc"

Add service "ril-daemon" in "init.rc":

If you are using UC15/UC20/UGxx/EC20/EC21/EC25/EC20 R2.0 modules which are accessed by USB interface, please add the following service in "init.rc":

service ril-daemon /system/bin/rild -l /system/lib/libreference-ril.so
    class main

```
    socket rild stream 660 root radio
    socket rild-debug stream 666 radio system
    user root
    group radio cache inet misc audio sdcard_rw log
```

If you are using GSM modules which are accessed by UART interface, please add the following service in "init.rc":

```
service ril-daemon /system/bin/rild -l /system/lib/libreference-ril.so -- -d <UART port name> –B
<baud rate> –C <hardware flow control>
    class main
    socket rild stream 660 root radio
    socket rild-debug stream 666 radio system
    user root
    group radio cache inet misc audio sdcard_rw log
```

The following parameter needs to be configured:

● **-d <UART port name>**

The name of UART port you are using. For example: /dev/ttyS1

It is optional to configure the following two parameters:

● **-B <baud rate>**

The speed of UART port. For example: 115200, 230400, 460800bps. The default baud rate is 115200bps.

● **-C <hardware flow control>**

1: open hardware flow control
0: close hardware flow control

Hardware flow control is closed by default.

The "init.rc" file may be located in different paths according to different projects, for example:

● system/core/rootdir/init.rc
● device/fsl/imx6/init.rc
● device/ti/am335xevm_sk/init.am335xevm.rc
● device/generic/x86/init.rc
● device/samsung/smdkv210/init.smdkv210_sdmmc.rc

3.5.2. Modify the Right of RILD

RILD (ril-daemon) requires root privilege. So you need to comment out the function *switchUser()* in the file "($Android_src)/hardware/ril/rild/rild.c":

```
OpenLib:
#endif
//switchUser();

dlHandle = dlopen(rilLibPath, RTLD_NOW)
```

4 Debugging Method

4.1. Method of Catching LOG

1) Catch the log of RIL module by typing the following command in window's CMD tool:

adb logcat –b radio –v time

2) Catch the log of Android system by typing the following command in window's CMD tool:

adb logcat –v time

3) Sometimes, you may want to make tests on lots of devices or for a long time, and it is not convenient to connect all devices with PC via USB cables. In this case, you can log file by the following command:

adb shell
logcat –b radio –v time –f <filename> &

The character '&' makes the 'logcat' process running in background, so you can disconnect your devices.

4) When you finish your tests, you can fetch log files from devices to local directory by the following command:

adb pull <filename> <local directory>

4.2. Some Common LOG Tags

RIL	/hardware/ril/reference-ril/refereince-ril.c
AT	/hardware/ril/reference-ril/atchannel.c
RILD	/hardware/ril/rild/rild.c
RILC	/hardware/ril/libril/ril.cpp
RILB	/frameworks/base/telephony/java/com/android/internal/telephony/BaseCommands.java

RILJ	/frameworks/base/telephony/java/com/android/internal/telephony/gsm/RIL.java
GSM	/frameworks/base/telephony/java/com/android/internal/telephony/gsm/GSMPhone.java

5 FAQ

5.1. How to Set APN

If the dialling process cannot go on, it is quite possible that the APN has not been set yet. The APN can be set in Android UI:

Settings → WIRELESS & NETWORKS → More… → Mobile Networks → Access Point Names

If you see nothing in **Access Point Names**, it indicates that the APN has not been set. In such case, you should add a new APN to the system. The following is an example which shows the access point editing interface. Please note that the Access Point Name varies with the operator and SIM card.
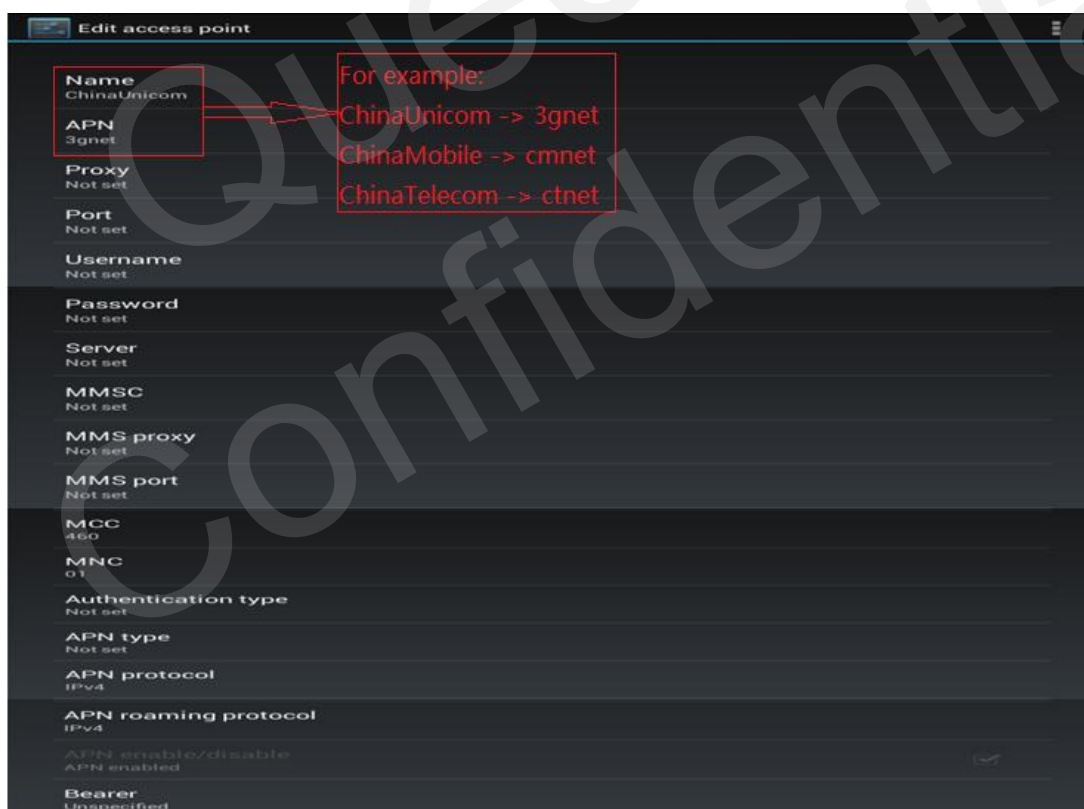

Figure 3: Edit Access Point

5.2. Quectel RIL Does Not Work

There are many reasons why Quectel RIL does not work. The following are some common causes.

1.   RIL daemon is not running

Use command "**getprop init.svc.ril-daemon**" to check RIL daemon status. If non-value, **Stopped** or **Restarting** is returned, it indicates that RIL daemon is not running. The expected return value should be **Running**.

2.   RIL library is not loaded correctly

Check the RIL-daemon service definition in init.rc through command "**cat /init.rc | grep ril-daemon**". The expected result should be "**service ril-daemon /system/bin/rild -l /system/lib/libreference-ril.so**". Check the arguments, word spelling, blank space, etc. to make sure the RIL library is loaded correctly.

3.   Cannot access USB serial port device file
●   Use command "**ls –l /dev/ttyUSB***" to check the access right of the device file.
●   Use command "**getenforce**" to check whether the SELinux has been enabled.
●   Command "**setenforce 0**" can disable the SELinux.

4.   The RIL library is not provided by Quectel

Use command "**getprop gsm.version.ril-impl**" to check Quectel RIL version, and the return value should start with "**Quectel_Android_RIL_SR**". If not, the RIL library is not provided by Quectel.

5.3. Cannot Send or Receive Short Message

Use command "**getprop telephony.sms.receive**" or command "**telephony.sms.send**" to check whether the system has disabled SMS receive/send function.

●   If the return value is false, it indicates that the SMS receive/send function has been disabled.
●   If non-value is returned, you should check frameworks\base\core\res\res\values\config.xml (first check the manufacturer override config file) to see config_sms_capable. If the config_sms_capable config in the config.xml is false just like <bool name="config_sms_capable">false</bool>, change it to true.

6 Appendix

Table 4: Terms and Abbreviations

Abbreviation	Description
GSM	Global System for Mobile Communications
MS	Mobile Station
PID	Product ID
RIL	Radio Interface Layer
TA	Terminal Adapter
VID	Vendor ID
WCDMA	Wideband Code Division Multiple Access