Android GNSS Driver

User Guide

GNSS/GSM/UMTS/LTE Module Series

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About the Document

History

Revision	Date	Author	Description
1.0	2014-05-06	Joe WANG	Initial
1.1	2015-04-11	Kent XU	Added applicable modules
1.2	2018-12-03	Marco GAO	1. Modified the procedures of installing GNSS Driver in Chapter 2.2. 2. Added the description of catching GNSS logs in Chapter 3.2. 3. Added troubleshooting instructions on GNSS drivers running on Android 8.0 or later versions in Chapter 3.4.

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1 Introduction

This document mainly introduces how to integrate the Android GNSS (Global Navigation Satellite System) driver into Android OS of Quectel modules supporting GNSS function.

1.1. Applicable Modules

Table 1: Applicable Modules

GNSS Modules	All Quectel GNSS modules
GSM Modules	MCxx: includes MC60/MC90 modules
UMTS Module	UCxx: UC20 module
LTE Modules	AG35 module
	BG96 module
	ECxx: includes EC20/EC21/EC25 modules
	EG9x: includes EG91-NA/EG95-NA/EG91-EC/EG95-EC modules
	EM05 module
	Ex06 module: includes EG06/EP06/EM06 modules

2 System Integration

This chapter describes the structure of Android GNSS driver and explains how to integrate the GNSS driver into Android OS of Quectel modules supporting GNSS function.

2.1. The Structure of Android GNSS Driver

GNSS devices transmit the GNSS data through GNSS hardware driver, and then GNSS HAL driver transmits the received GNSS data to GNSS applications through JNI and Application Framework. The following figure illustrates the structure of GNSS driver.

Quectel GNSS driver works in HAL, and it is compiled as *gps.default.so* file.
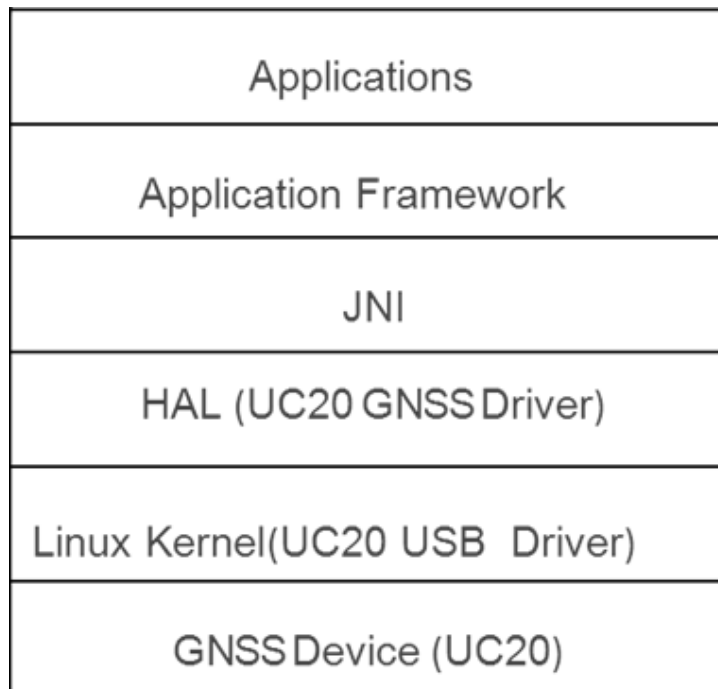

Figure 1: GNSS Driver Structure (Taking UC20 as an Example)

2.2. GNSS Driver Installation

Add the following two GNSS driver files, *gps_cfg.inf* and *gps.default.so*, to Android system.

● For 32-bit Android system

gps_cfg.inf	→	*/system/etc*
gps.default.so	→	*/system/lib/hw*

● For 64-bit Android system

gps_cfg.inf	→	*/system/etc*
gps.default.so	→	*/system/lib64/hw*

2.3. Delete Unnecessary gps.*.so Files

Except for *gps.default.so*, other unnecessary *gps.*.so* files in the directory of */system/lib/hw* or */system/lib64/hw* should be deleted to ensure that the system can identify the correct GNSS driver.

3 Supplementary Instructions

3.1. Modify GNSS Configuration File

Quectel GNSS driver has a configuration file named *gps_cfg.inf*. Customers can modify the configuration file by copying it to */system/etc* in the android system and changing the NMEA port path in it.

NMEA port path to be changed:

1. Quectel GNSS modules (for example, L76):

NMEA_PORT_PATH=Serial name

2. Quectel GSM/UMTS/LTE modules (for example, UC20, MC20, EC20):

NMEA_PORT_PATH=rild-nmea

As for Quectel GSM/UMTS/LTE modules, the Quectel Android RIL driver should be integrated first. For detailed procedures, please refer to *Quectel_Android_RIL_Driver_User_Guide.*

3.2. Catch GNSS Logs

1) Catch the logs of GNSS module by typing the following command in Window's CMD tool:

adb logcat –s gps_ql –v time

2) Sometimes, customers may want to perform 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 such case, customers can catch the log files by following command:

adb shell
logcat –s gps_ql –v time –f <filename> &

The character "&" makes the "logcat" process run in the background, thus customers' devices can be disconnected.

When customers' tests are finished, the log files can be fetched from devices to a local directory by the following command:

adb pull <filename> <local directory>

3.3. GNSS Driver Test

When the module is connected to an Android system, the Android system will identify it first and then read the GNSS driver data. A GNSS application, like *GPS TEST v1.5.4.APK* can be used to test the performance of the GNSS driver.
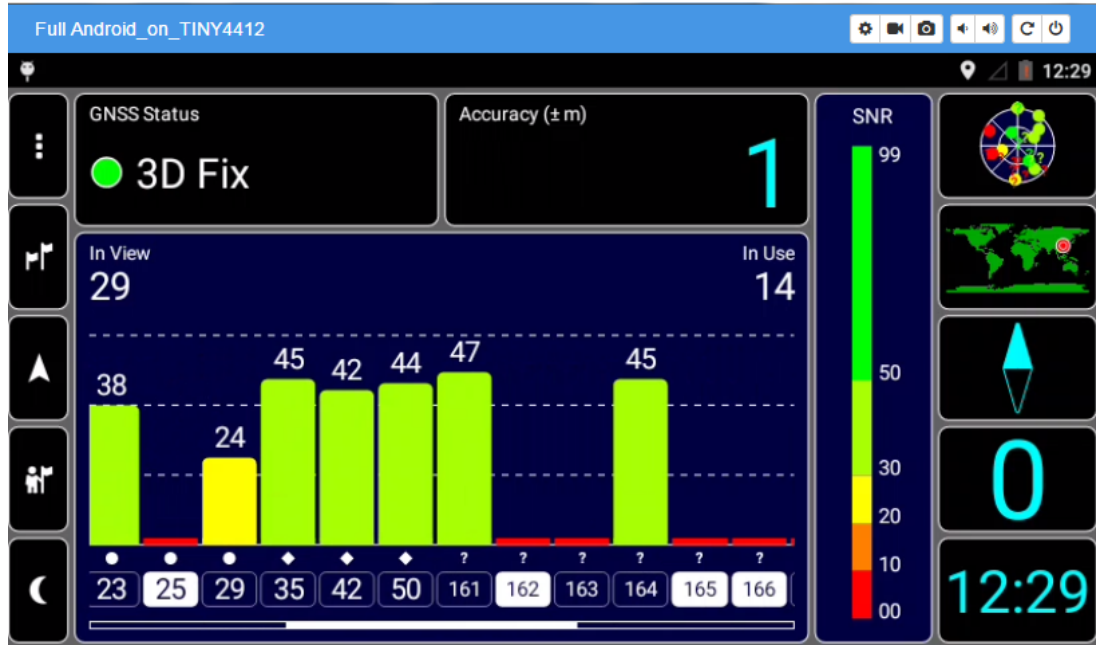

Figure 2: GNSS Test with GPS TEST v1.5.4.APK

In the above figure, the satellite number larger than 160 is China's "BeiDou" navigation system.

3.4. Failed to Get GNSS Data

If customers' GNSS applications fail to get GNSS data, the following items should be checked:

● Move the GNSS antenna to the open air, make sure it can receive GNSS signals.
● Ensure that the directory of */system/lib/hw* or */system/lib64/hw* only contains *gps.default.so*.
● Ensure that *gps_cfg.inf* is in the right directory of the Android system and has been modified correctly.

If customers' GNSS applications with GNSS drivers running on Android 8.0 or later versions fail to get GNSS data, except for the items mentioned above, the following four files should be checked and confirmed (taking the *rk3399*-based platform as an example).

1. *device/rockchip/rk3399/BoardConfig.mk*

```
--- a/device/rockchip/rk3399/BoardConfig.mk
+++ b/device/rockchip/rk3399/BoardConfig.mk
@@ -84,7 +84,8 @@ ENABLE_CPUSETS := true
 WITH_DEXPREOPT := true

 BOARD_NFC_SUPPORT := false
-BOARD_HAS_GPS := false
+BOARD_HAS_GPS := true
```

2. *device/rockchip/rk3399/device.mk*

```
--- a/device/rockchip/rk3399/device.mk
+++ b/device/rockchip/rk3399/device.mk
@@ -75,6 +75,28 @@ PRODUCT_COPY_FILES += \
 PRODUCT_COPY_FILES += \
     $(LOCAL_PATH)/dptx.bin:root/lib/firmware/rockchip/dptx.bin

-PRODUCT_PACKAGES += android.hardware.gnss@1.0-impl android.hardware.gnss@1.0-service
+
```

3. *device/rockchip/rk3399/manifest.xml*

```
--- a/device/rockchip/rk3399/manifest.xml
+++ b/device/rockchip/rk3399/manifest.xml
@@ -189,6 +189,51 @@
            <instance>armnn</instance>
        </interface>
    </hal>
+    <hal format="hidl">
+        <name>android.hardware.gnss</name>
+        <transport>hwbinder</transport>
+        <version>1.0</version>
+        <interface>
+            <name>IGnss</name>
+            <instance>default</instance>
+        </interface>
+    </hal>
```

4.   *device/rockchip/rk3399/init.rk3399.rc*

```
--- a/device/rockchip/rk3399/init.rk3399.rc                                    13 / 14
+++ b/device/rockchip/rk3399/init.rk3399.rc
@@ -40,3 +40,22 @@ on post-fs-data
     chown root system /sys/class/graphics/fb0/cabc
     chmod 0664 /sys/class/graphics/fb0/cabc

+#hardware/interfaces/gnss/1.0/default/android.hardware.gnss@1.0-service.rc
+service gnss_service /vendor/bin/hw/android.hardware.gnss@1.0-service
+    class hal
+    user gps
+    group system gps radio
```

If all the items above have been checked, but the problem still exists, please contact Quectel Technical Supports for assistance.

4 Appendix A References

Table 2: Related Document

SN	Document Name	Remark
[1]	Quectel_Android_RIL_Driver_User_Guide	Android RIL Driver User Guide

Table 3: Terms and Abbreviations

Abbreviation	Description
GNSS	Global Navigation Satellite System
GPS	Global Position System
HAL	Hardware Abstraction Layer
OS	Operating System