

# Android GNSS Driver User Guide

**GNSS/GSM/LTE Module Series**

Rev. Android\_GNSS\_Driver\_User\_Guide\_V1.3

Date: 2019-12-23

Status: Released



**Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:**

**Quectel Wireless Solutions Co., Ltd.**

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

Tel: +86 21 5108 6236

Email: [info@quectel.com](mailto:info@quectel.com)

**Or our local office. For more information, please visit:**

<http://www.quectel.com/support/sales.htm>

**For technical support, or to report documentation errors, please visit:**

<http://www.quectel.com/support/technical.htm>

Or email to: [support@quectel.com](mailto:support@quectel.com)

**GENERAL NOTES**

QUECTEL OFFERS THE INFORMATION AS A SERVICE TO ITS CUSTOMERS. THE INFORMATION PROVIDED IS BASED UPON CUSTOMERS' REQUIREMENTS. QUECTEL MAKES EVERY EFFORT TO ENSURE THE QUALITY OF THE INFORMATION IT MAKES AVAILABLE. QUECTEL DOES NOT MAKE ANY WARRANTY AS TO THE INFORMATION CONTAINED HEREIN, AND DOES NOT ACCEPT ANY LIABILITY FOR ANY INJURY, LOSS OR DAMAGE OF ANY KIND INCURRED BY USE OF OR RELIANCE UPON THE INFORMATION. ALL INFORMATION SUPPLIED HEREIN IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

**COPYRIGHT**

THE INFORMATION CONTAINED HERE IS PROPRIETARY TECHNICAL INFORMATION OF QUECTEL WIRELESS SOLUTIONS CO., LTD. TRANSMITTING, REPRODUCTION, DISSEMINATION AND EDITING OF THIS DOCUMENT AS WELL AS UTILIZATION OF THE CONTENT ARE FORBIDDEN WITHOUT PERMISSION. OFFENDERS WILL BE HELD LIABLE FOR PAYMENT OF DAMAGES. ALL RIGHTS ARE RESERVED IN THE EVENT OF A PATENT GRANT OR REGISTRATION OF A UTILITY MODEL OR DESIGN.

***Copyright © Quectel Wireless Solutions Co., Ltd. 2019. All rights reserved.***

# 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	<ol style="list-style-type: none"><li>1. Modified the procedures of installing GNSS Driver in Chapter 2.2.</li><li>2. Added the description of catching GNSS logs in Chapter 3.2.</li><li>3. Added troubleshooting instructions on GNSS drivers running on Android 8.0 or later versions in Chapter 3.4.</li></ol>
1.3	2019-12-23	Marco GAO	<ol style="list-style-type: none"><li>1. Updated the applicable modules in Table 1.</li><li>2. Added Android 8.x in the supported Android versions in Chapter 2.2.</li><li>3. Updated checking items if failed to get GNSS data in Chapter 5.2.</li></ol>

## Contents

About the Document .....	2
Contents .....	3
Table Index.....	4
Figure Index .....	5
<b>1 Introduction .....</b>	<b>6</b>
<b>2 System Integration.....</b>	<b>7</b>
2.1. The Structure of Android GNSS Driver .....	7
2.2. GNSS Driver Installation .....	8
2.3. Delete Unnecessary GNSS Driver Files .....	8
<b>3 Catch GNSS Log .....</b>	<b>9</b>
<b>4 GNSS Driver Test .....</b>	<b>10</b>
<b>5 Supplementary Instructions .....</b>	<b>11</b>
5.1. Modify GNSS Configuration File .....	11
5.2. Failed to Get GNSS Data.....	12
<b>6 Appendix A References.....</b>	<b>14</b>

## Table Index

TABLE 1: APPLICABLE MODULES.....	6
TABLE 2: RELATED DOCUMENT .....	14
TABLE 3: TERMS AND ABBREVIATIONS .....	14

## Figure Index

FIGURE 1: GNSS DRIVER STRUCTURE (TAKING EC25 AS AN EXAMPLE).....	7
FIGURE 2: GNSS TEST WITH GPS TEST V1.5.4.APK.....	10

# 1 Introduction

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

The applicable modules are shown in the below table.

**Table 1: Applicable Modules**

<b>GNSS Modules</b>	All Quectel GNSS modules
<b>GSM Modules</b>	MCxx: MC60/MC90
<b>LTE Modules</b>	AGxx: AG15/ AG35
	EGxx: EG06/ EG12/ EG18
	EPxx: EP06
	EMxx: EM06/ EM12
	EC2x: EC21/ EC25/ EC20 R2.0/ EC20 R2.1
	EG9x: EG91/ EG95
	EG2x-G: EG25-G/ EG21-G
	EM05
	BGxx: BG96/ BG77/ BG95

## NOTE

This document is not applicable to the EG91-E module and the EG95-E module.

## 2 System Integration

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

### 2.1. The Structure of Android GNSS Driver

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

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

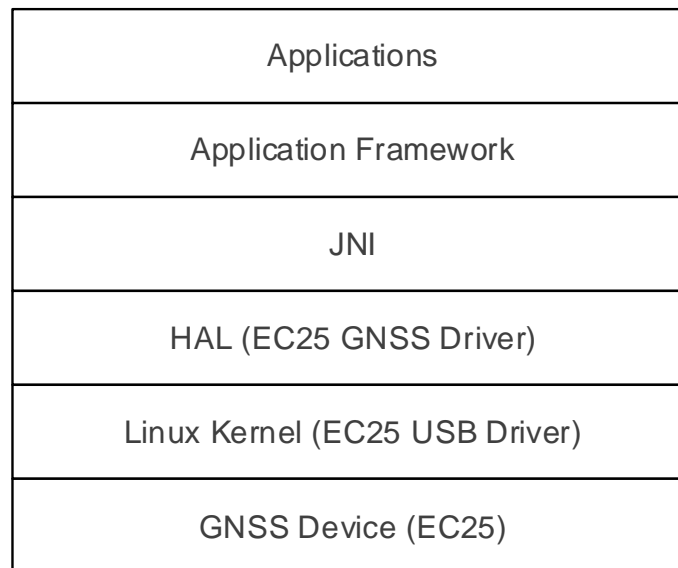


Figure 1: GNSS Driver Structure (Taking EC25 as an Example)



## 2.2. GNSS Driver Installation

Add the following GNSS driver files, *gps\_cfg.inf* and *gps.default.so*, to Android system:

### 1. For Android versions prior to Android 8.0

- 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. For Android 8.0 or later versions

- For 32-bit Android system

```
gps_cfg.inf    → /vendor/etc  
gps.default.so → /vendor/lib/hw
```

- For 64-bit Android system

```
gps_cfg.inf    → /vendor/etc  
gps.default.so → /vendor/lib64/hw
```

## 2.3. Delete Unnecessary GNSS Driver Files

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

# 3 Catch GNSS Log

This chapter mainly introduces how to obtain a GNSS log.

- 1) Catch the GNSS log with ADB tool by executing the following command in Windows/Linux system:

```
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 a case, customers can catch the log files by executing the 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.

After getting the GNSS log, the log files can be fetched from devices to a local directory by executing the following command:

```
adb pull <filename> <local directory>
```

# 4 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 test application, such as *GPS TEST v1.5.4.APK*, can be used to test the performance of the GNSS driver.

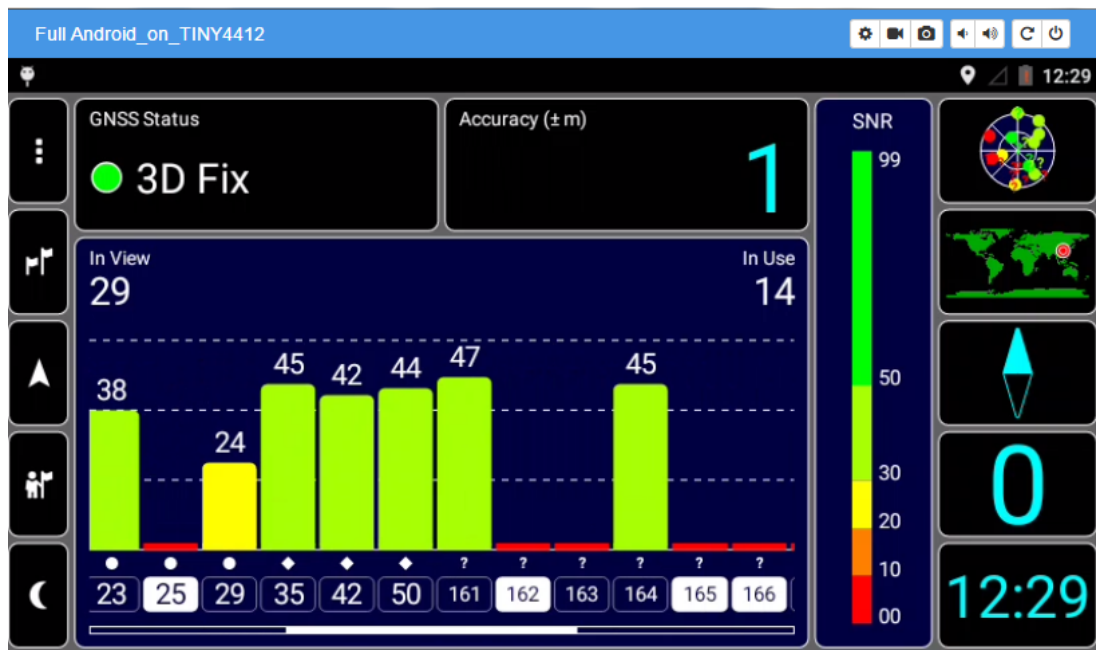


Figure 2: GNSS Test with GPS TEST v1.5.4.APK

**NOTE**

In the above figure, the satellite number larger than 160 is the BeiDou navigation system.

# 5 Supplementary Instructions

## 5.1. Modify GNSS Configuration Files

Quectel GNSS driver has a configuration file named *gps\_cfg.inf*. The file is modifiable, corresponding modification can be done according to the specified modules shown below:

1. Modify NMEA port

- Quectel GNSS modules (for example, L76):

```
NMEA_PORT_PATH=Serial name  
BAUD_RATE=115200
```

- Quectel GSM/LTE modules (for example, MC60, EC21):

```
NMEA_PORT_PATH=rild-nmea
```

2. 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*. And the *Quectel\_Android\_RIL\_Driver\_V2.6.8* or later version is recommended.

## 5.2. Fail to Get GNSS Data

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

- Move the GNSS antenna to the open air, make sure GNSS signals can be fully received.
- Ensure that the directory of `/system/lib/hw`, `/system/lib64/hw`, `/vendor/lib/hw` and `/vendor/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 according to the specified module.

If the GNSS applications with GNSS drivers running on Android 8.0 or later versions fail to get GNSS data, the following files should be checked and confirmed additionally (taking the `rk3399`-based platform as an example).

1. If the following log appears repeatedly:

```
Cannot find entry android.hardware.gnss@1.0::IGnss/default in either framework or device manifest
```

- Check whether the contents in the white-framed box of the following figure are contained in `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>
```

2. If the following log appears repeatedly:

```
Waited one second for android.hardware.gnss@1.0::IGnss/default. Waiting another...
```

- Check whether the contents in the white-framed box of the following figure are contained in *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_DEXPLOPT := true

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

- Check whether the contents in the white-framed box of the following figure are contained in *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
```

- Check whether the contents in the white-framed box of the following figure are contained in *device/rockchip/rk3399/init.rk3399.rc*.

```
--- a/device/rockchip/rk3399/init.rk3399.rc
+++ 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 the problem still exists after checking all the items above, please contact Quectel Technical Supports for assistance.

# 6 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
ADB	Android Debug Bridge
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HAL	Hardware Abstraction Layer
JNI	Java Native Interface
LTE	Long Term Evolution
NMEA	National Marine Electronics Association
PIN	Personal Identification Number
UMTS	Universal Mobile Telecommunications System
USB	Universal Serial Bus