GNSS Android HAL Driver User Guide

GNSS Module Series

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About the Document

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1 Introduction

This document mainly introduces the GNSS driver developed by Quectel for Andorid's HAL (Hardware Abstraction Layer) and how to integrate the GNSS driver into the Android operating system, so that you can quickly use the Quectel modules on the Android operating system to support the GNSS positioning function.

Table 1: Applicable Modules

Module Series	Model
LC26G	LC26G (AB)
LC76G	LC76G (AB, PA, PB)
LC86G	LC86G (AA, AB, LA, PA)
LC29H	LC29H (AA, AI, BA, CA, DA, EA)
LC79H	LC79H (AL)
LG290P	LG290P (03)
LC260Z	LC260Z (00)
L26-DR	L26-DR (AA, ADR, UDR, ADRC)
L26-P	L26-P

2 System Integration

This chapter describes the structure of the Android system and explains how to integrate the GNSS driver into the Android system.

2.1. Android System Structure

The structure of the Android system is shown in figure below. The GNSS device transmits the GNSS data through the USB or UART driver, and then the GNSS driver (compiled as *gps.default.so* file) of HAL transmits the received GNSS data to GNSS applications through JNI (Java Native Interface) and application framework.

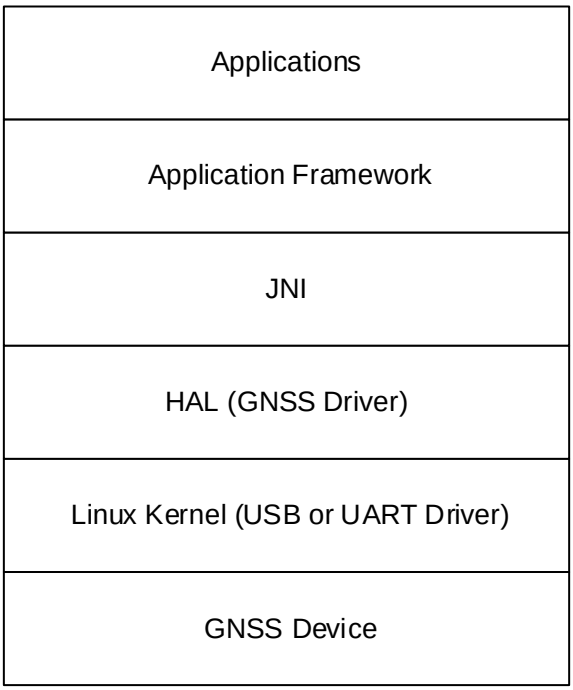

Figure 1: Android System Structure

2.2. Confirm GNSS HAL Version

The GNSS HAL of Android system provides a standardized interface for hardware manufacturers to develop device-specific functionalities. This ensures that lower-level hardware implementations do not interfere with or require changes to the upper-layer software. Note that only one GNSS HAL service operates during system runtime. Thus, you should confirm the GNSS HAL version first according to actual usage.

2.2.1. Use GNSS HAL 1.0

The source code of GNSS HAL 1.0 is contained in the Android codebase. To use GNSS HAL 1.0, simply configure the version to 1.0 in device/xxx/xxx/manifest_xx.xml, as shown in the code below:

```
<manifest version="1.0" type="device">
    <hal format="hidl">
        <name>android.hardware.gnss</name>
        <transport>hwbinder</transport>
        <version>1.0</version>
        <interface>
            <name>IGnss</name>
            <instance>default</instance>
        </interface>
    </hal>
</manifest>
```

NOTE

If the Android codebase lacks GNSS HAL related code, add the entire code shown above to manifest_xx.xml

2.2.2. Use GNSS HAL 2.0

GNSS HAL 2.0 provides the corresponding bin file by Quectel. Extract the driver compressed file to */vendor/quectel/*. Incorporate *quectel.mk* into the compilation process.

Add the following code to the compiled *Android.bp* or *Android.mk*.

```
include vendor/quectel/quectel.mk
```

2.3. Install GNSS Driver

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
```

3 Catch GNSS Log

This chapter mainly introduces how to obtain a GNSS log.

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

```
adb logcat –s gps_ql –v time
```

If you 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, you 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 your 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 Test GNSS Driver

After the GNSS driver is installed, you can verify if the driver has been successfully installed by a GNSS testing application, for example *gnsslite_v1.7.apk*. If the GNSS driver is installed successfully, the data shown in the figure below will be displayed.

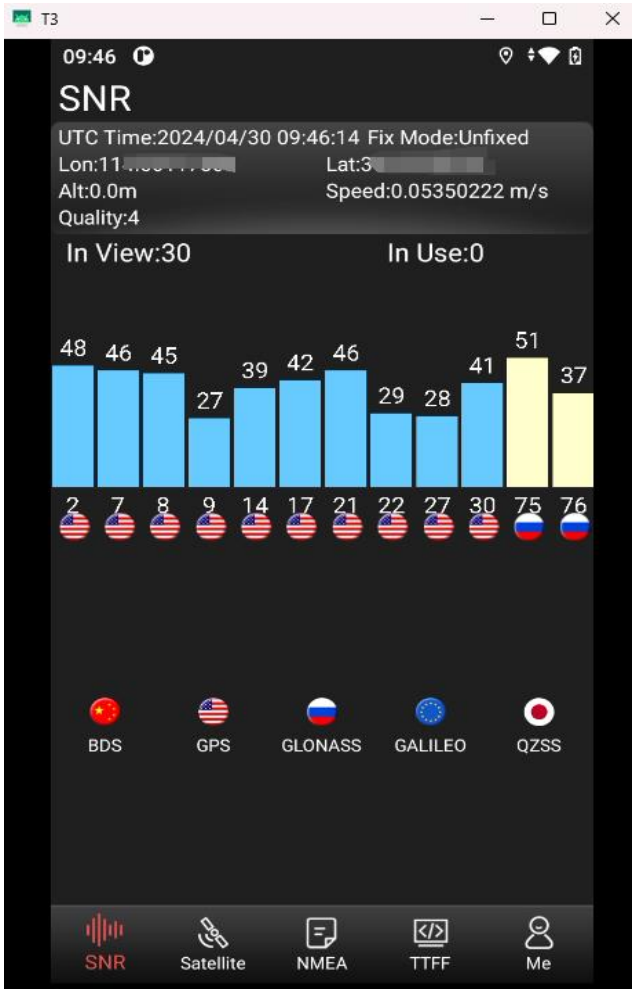

Figure 2: GNSS Driver Testing

NOTE

To acquire *gnsslite_v1.7.apk*, contact Quectel Technical Support (support@quectel.com). You can also acquire other open-source testing applications from the Internet.

5 Supplementary Instructions

5.1. Modify UART Baud Rate

Quectel GNSS driver has a configuration file named *gps_cfg.inf* which is modifiable. You can modify the UART baud rate and other configurations according to the actual situation via *gps_cfg.inf* file. The UART baud rate modification is shown below:

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

NOTE

1. The baud rate of 115200 bps is given as an example, you can configure the baud rate according to the actual situation.
2. You can also use *gps_cfg.inf* file to modify other configurations if necessary. To know details on such modifications, contact Quectel Technical Support (support@quectel.com).

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, and 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 rk3568-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.

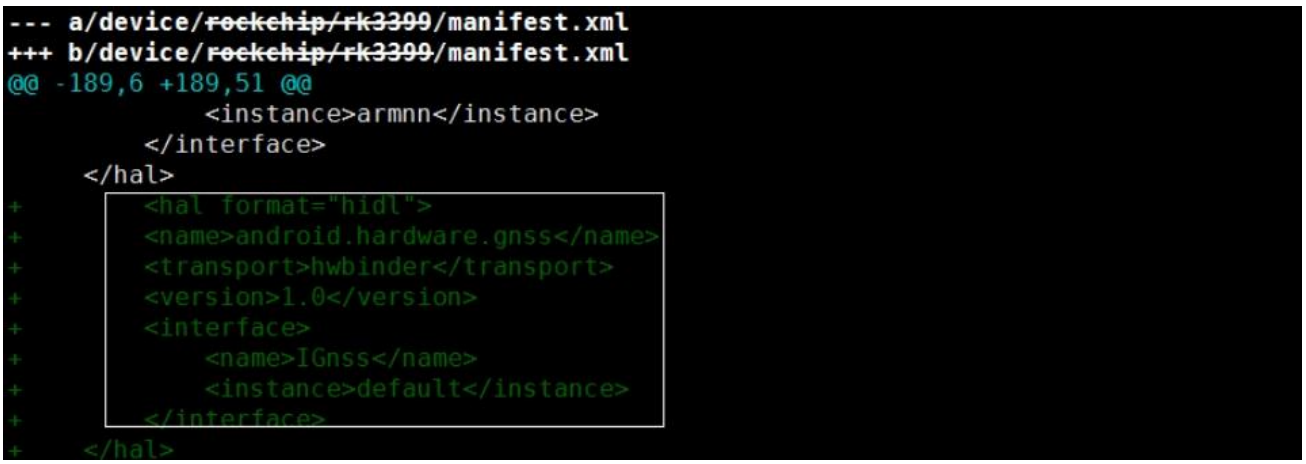

Figure 3: Manifest diff

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.

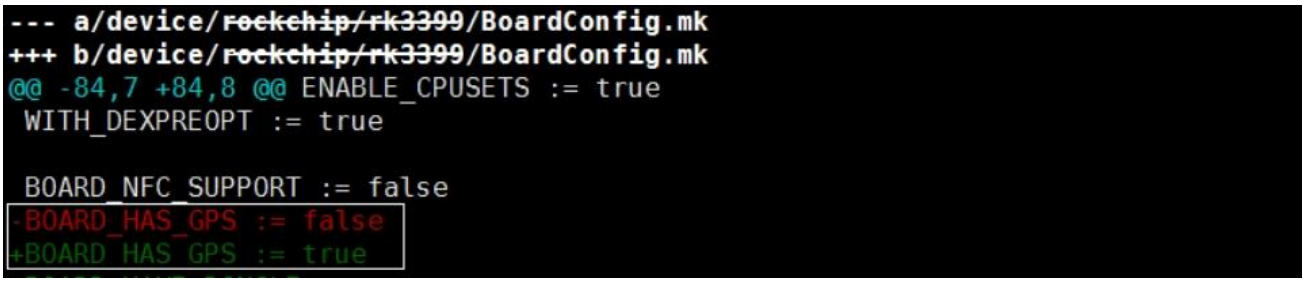

Figure 4: BoardConfig.mk diff

6 Appendix References

Table 2: Terms and Abbreviations

Abbreviation	Description
ADB	Android Debug Bridge
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HAL	Hardware Abstraction Layer
JNI	Java Native Interface
NMEA	NMEA (National Marine Electronics Association) 0183 Interface Standard