

GNSS FOTA User Guide

GNSS Module Series

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About the Document

History

Revision	Date	Author	Description
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1 Introduction

Quectel GNSS modules support FOTA function, which allows customers to upgrade the firmware of the modules over the air. This document introduces the detailed firmware upgrade procedures. Following the procedures, customers can download the built image to target side modules via UART.

The document is applicable to Quectel L26, L76, L76B, L76L, L86 and L96 modules.

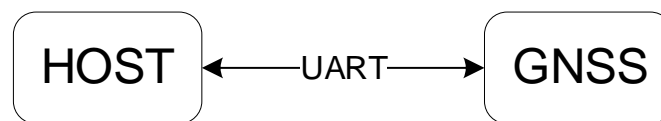


Figure 1: Firmware Update Connection

1.1. Introduction to Download Agent

Download Agent (DA) is a target side agent. After DA is successfully downloaded and running on target modules, it will be standby and passively waiting for the host to issue firmware upgrade commands via UART.

2 Firmware Upgrade Procedures

The whole procedures can be divided into two stages:

Stage 1: Download DA to the internal SRAM, and then jump to DA start address to execute DA in the internal SRAM.

Stage 2: Download BIN file to the flash, then jump to the flash start address to execute the file.

2.1. CMD_Start (Start Upgrade Procedure)

After the GNSS module is powered on, the host will sequentially set 7 baud rates for serial communication and send the NMEA_START_CMD "\$PMTK180*3B\r\n" at each baud rate to force the module to reset. Then the host will settle at the right baud rate to establish communication and the module will start the upgrade procedure.

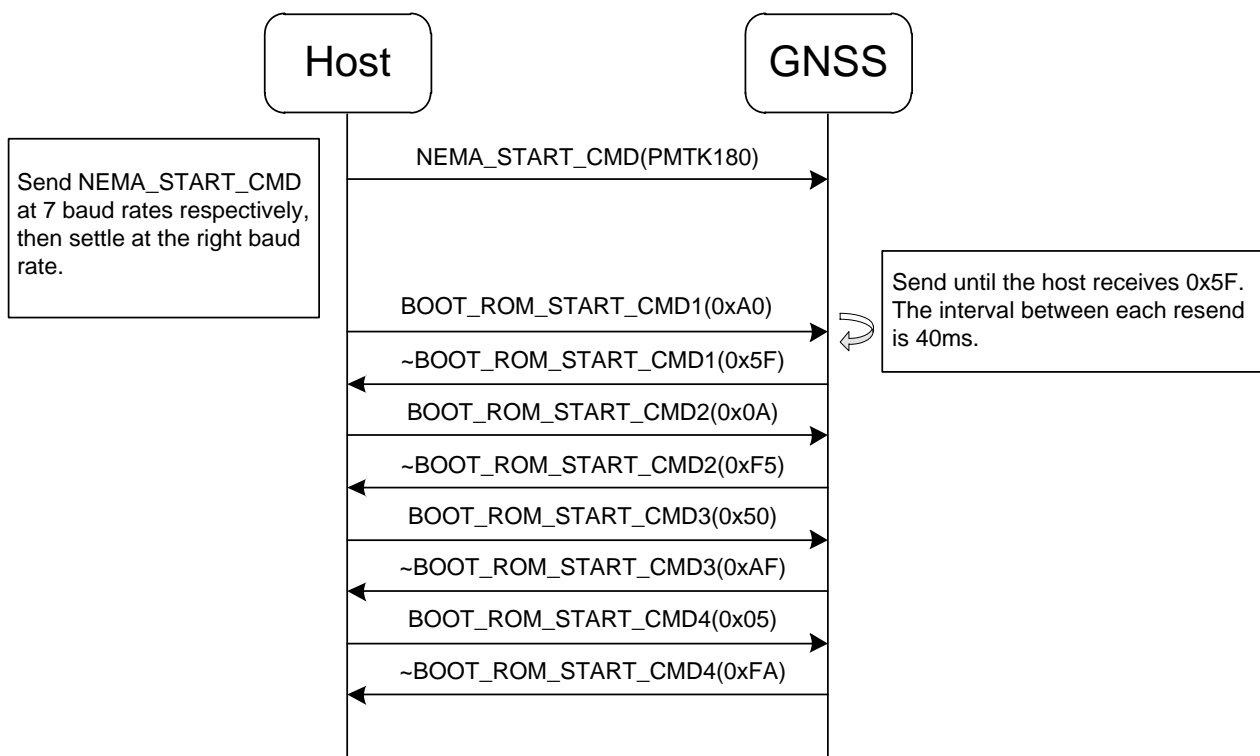


Figure 2: Flow of CMD_Start

2.2. CMD_Write (Write DA to SRAM)

During this procedure, DA will be written to SRAM.

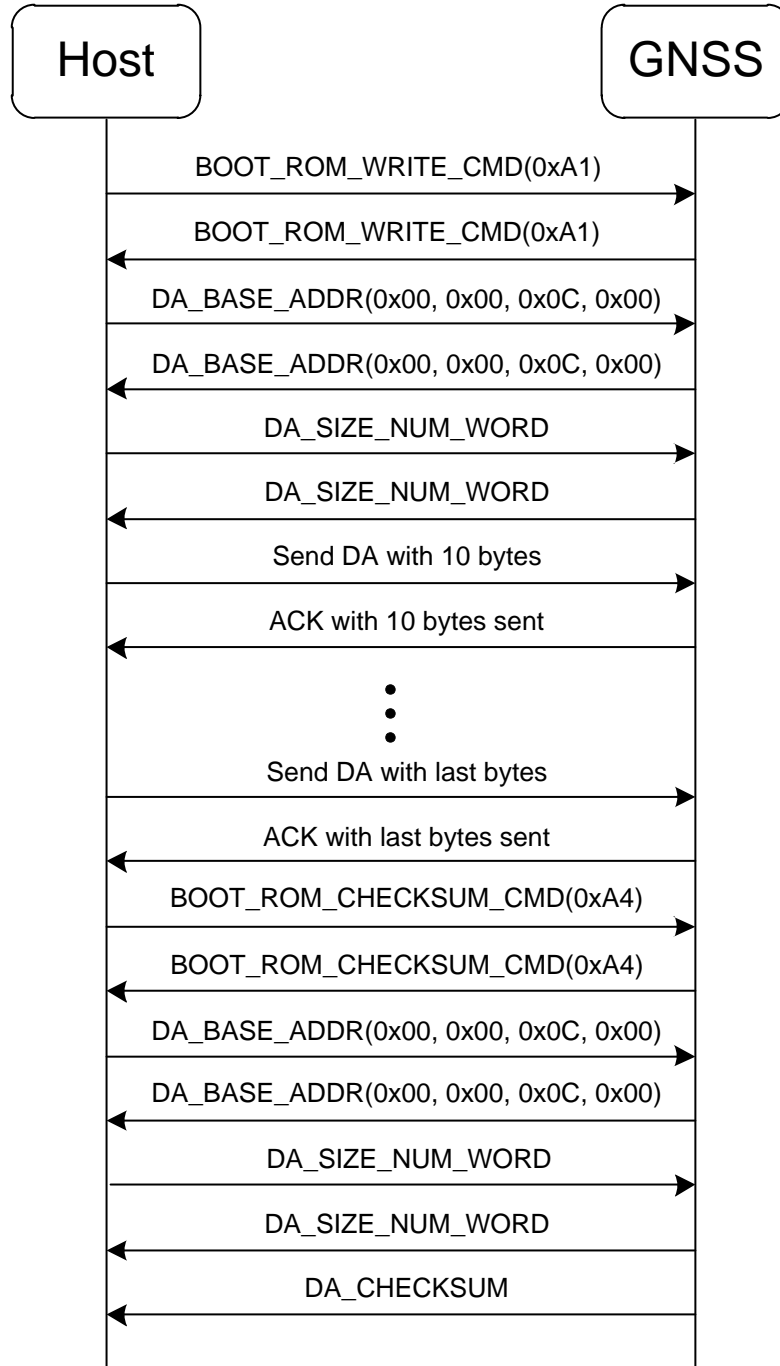


Figure 3: Flow of CMD_Write

2.3. CMD_Jump (Jump to DA Start Address)

During this procedure, the modules will jump to DA start address and execute DA.

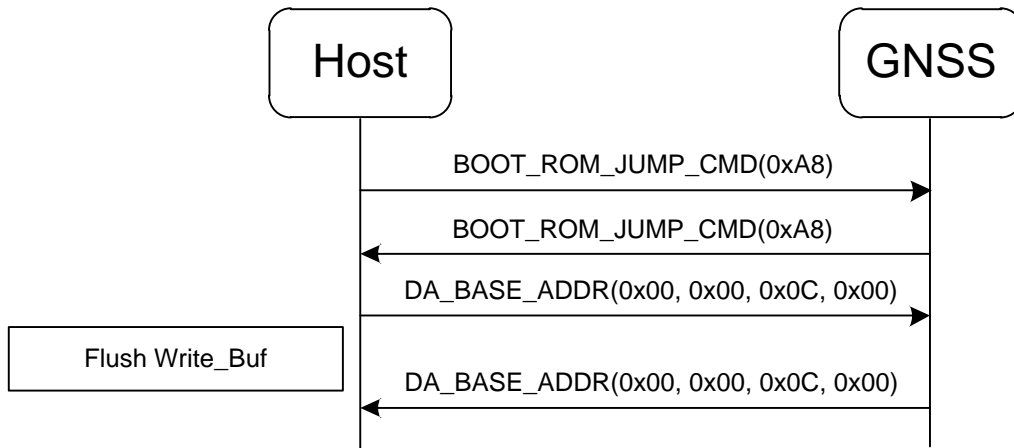


Figure 4: Flow of CMD_Jump

2.4. CMD_Sync (Report Flash Information)

When DA is downloaded and executed, it will actively report one byte **SYNC_CHAR**, two-byte **DA_VERSION**, one byte **FLASH_DEVICE_ID**, four-byte **FLASH_SIZE**, eight-byte **FLASH_HW_ID** and four-byte **EXT_SRAM_SIZE**.

- **SYNC_CHAR**

After DA is executed, it will return **SYNC_CHAR** (0xC0). If the returned byte is not **SYNC_CHAR**, then the downloaded DA is probably wrong.

- **DA_VERSION**

After returning **SYNC_CHAR**, DA will return its version number. The version number contains two bytes, which are major version and minor version respectively. The relevant program in the host should check whether it supports this DA.

- **FLASH_DEVICE_ID**

After reporting the DA version, DA will automatically detect the flash type on target.

- **FLASH_SIZE**

Four bytes flash size. For example, 128Mbits flash will be 0x01000000 bytes, and DA will send 0x01, 0x00, 0x00, and 0x00.

- **FLASH_MANUFACTURE_CODE**
Two bytes flash manufacture code.
- **FLASH_DEVICE_CODE**
Two bytes flash device code.
- **FLASH_EXT_DEVICE_CODE1**
Two bytes flash extended device code 1.
- **FLASH_EXT_DEVICE_CODE2**
Two bytes flash extended device code 2.
- **EXT_SRAM_SIZE**
Four bytes external SRAM size. For example, 64Mbits external SRAM will be 0x00800000 bytes, and DA will send 0x00, 0x80, 0x00 and 0x00.

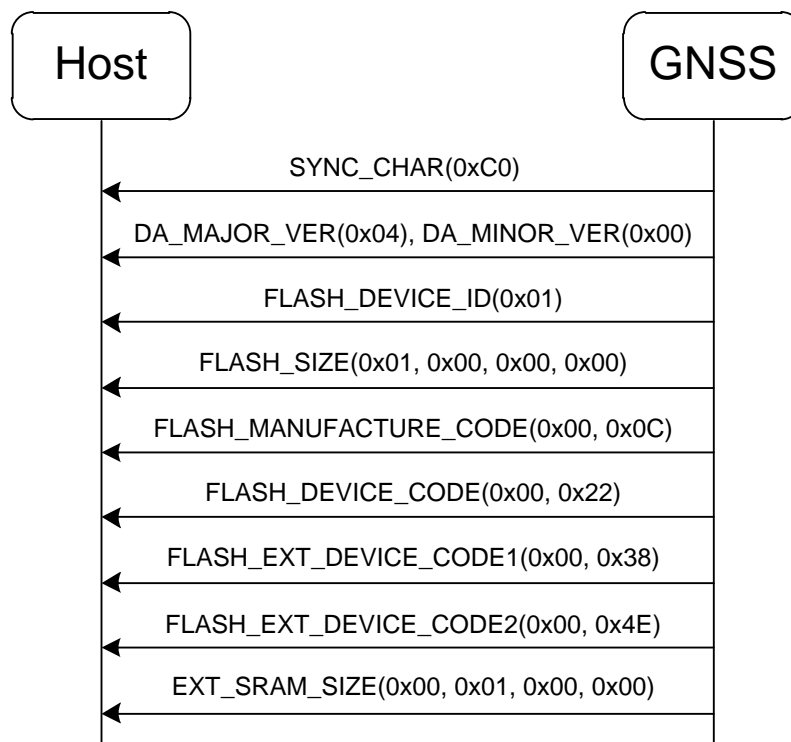


Figure 5: Flow of CMD_Sync

NOTE

The flash related information is fixed for handshake authorization, not real flash information.

2.5. CMD_SetMemBlock (Set Memory Block)

The commands are used to notify DA the total memory block count and the range for each block. The block information indicates how many BIN files will be downloaded and the range of each BIN file.

If any memory block exceeds the flash size, DA will return **NACK** (0xA5) to indicate the **DA_MEM_CMD** command is failed. If all the download memory blocks are valid, DA will return **ACK** (0x5A) and **UNCHANGED_BLOCK_COUNT**.

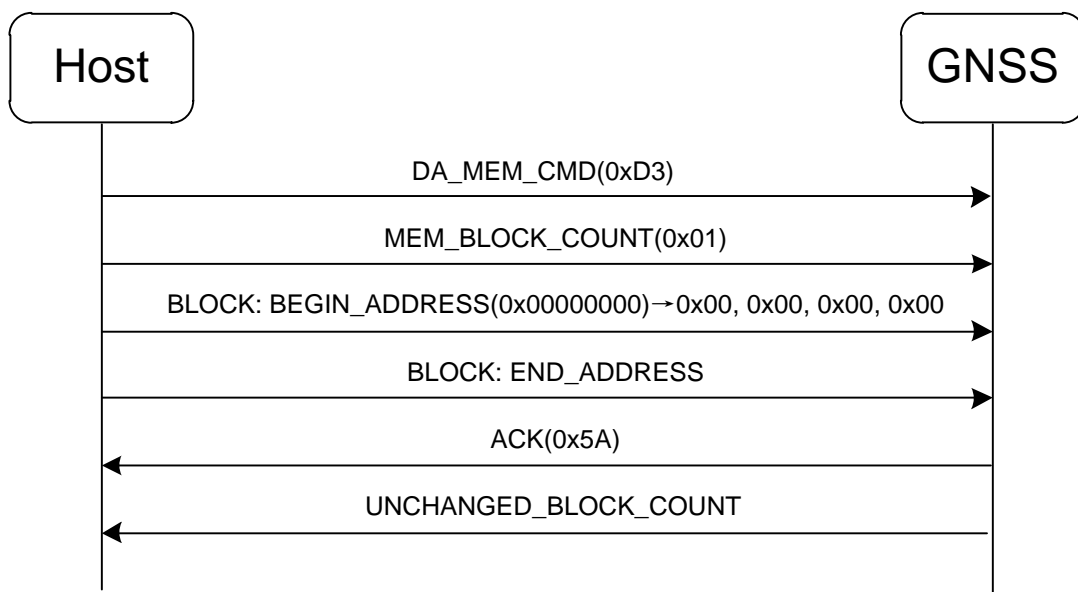


Figure 6: Flow of CMD_SetMemBlock

NOTE

$END_ADDRESS = BEGIN_ADDRESS + GNSS\ BIN\ File\ Size - 1$

2.6. CMD_WriteData (Write BIN File to Target Side Flash)

The commands are used to write all the data of BIN file to target side flash. Every packet has a fixed length, that is **PACKET_LENGTH** plus two bytes checksum. As the last packet is usually not enough for **PACKET_LENGTH**, the relevant program in the host should send the actual data length plus two bytes checksum.

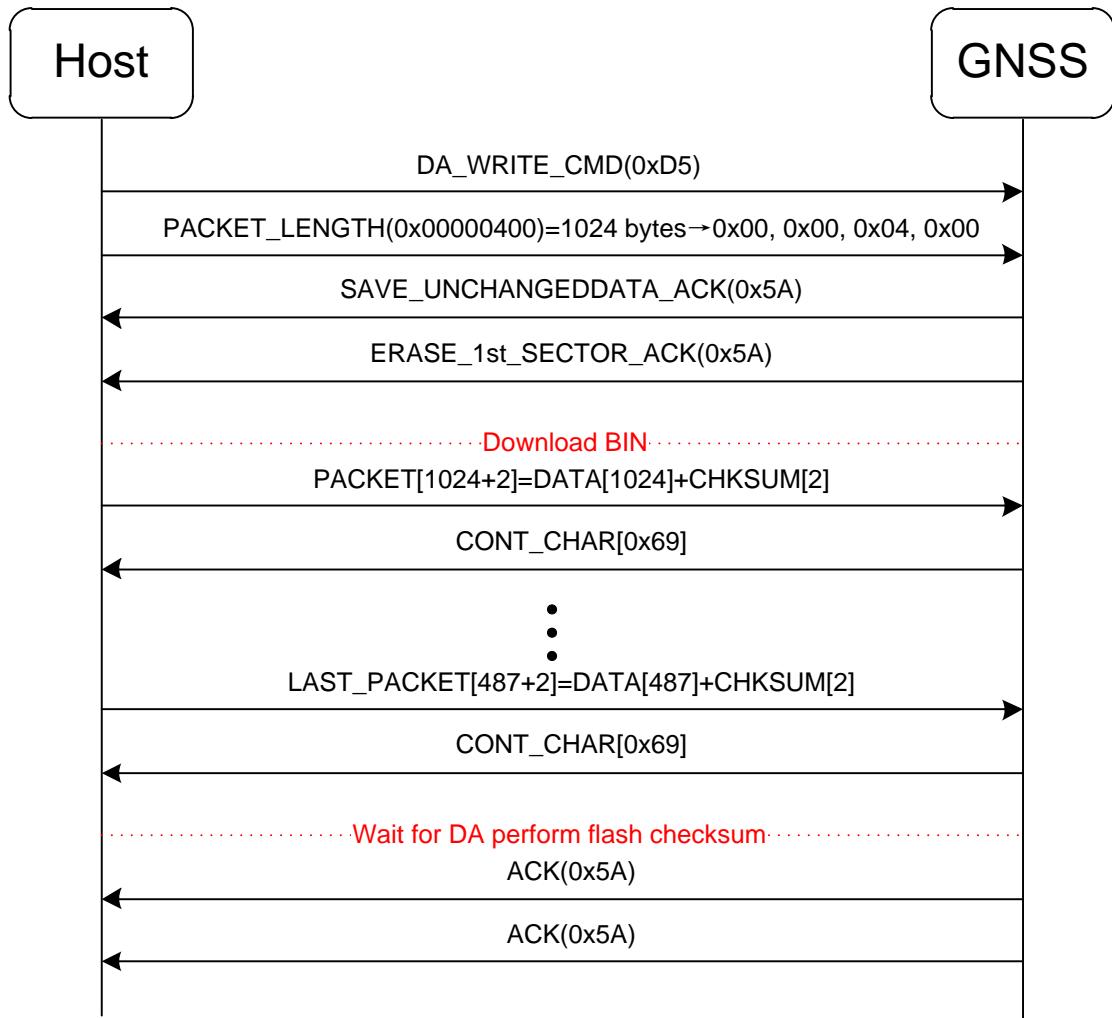


Figure 7: Flow of CMD_WriteData

2.7. CMD_Finish (Finish Upgrade Procedure)

The command is used to make the module restart and output NMEA sentences. Then the firmware upgrade procedure is thus finished.

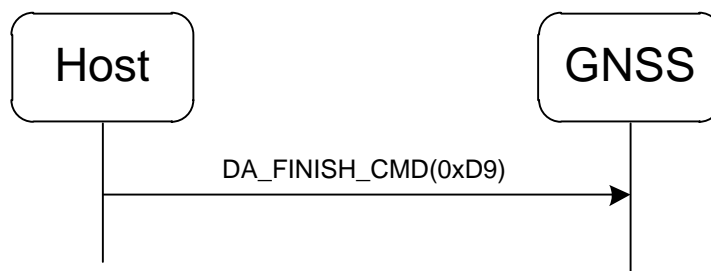


Figure 8: Flow of CMD_Finish

3 Appendix A References

Table 1: Terms and Abbreviations

Abbreviation	Description
ACK	Acknowledge
DA	Download Agent
FOTA	Firmware Over The Air
NACK	Negative Acknowledge
SRAM	Static Random-access Memory