RG520N&RG525F&RG5x0F&RM5x0N Series Terminal Device Development Notes and FAQs

5G Module Series

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Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China
Tel: +86 21 5108 6236
Email: info@quectel.com

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About the Document

Revision History

Version	Date	Author	Description
-	2023-04-28	Yosef ZHANG/ Ozzy ANG	Creation of the document
1.0	2025-06-06	Yosef ZHANG/ Amos ZHANG	First official release

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1 Introduction

This document describes the notes of matters needing attention and solutions to frequently asked questions (FAQs) for terminal device development of Quectel 5G RG520N series, RG525F-NA, RG5x0F family, and RM5x0N family modules.

If you encounter problems during the development, you can refer to this document to check whether there are solutions to the same or similar problems and quickly solve the problems to avoid serious problems in development or commercial use, so as to improve the development efficiency.

1.1. Applicable Modules

Table 1: Applicable Modules

Module Family	Module
-	RG520N Series
-	RG525F-NA
RG5x0F	RG520F Series
	RG530F Series
RM5x0N	RM520N Series
	RM530N-GL

2 Notes

During the development of terminal device, it is recommended to read the notes of matters needing attention carefully in the following operations. Due to the limited space of the document, detailed reasons and possible consequences are not described in this chapter. If you have any questions, please contact Quectel Technical Support. For more information about AT commands, please see ***document [1]***, ***document [2]*** or contact Quectel Technical Support.

2.1. Operating Storage Medium

More erasing/writing operations can be performed on FLASH memory through the following operations, so do not cycle the following operations indefinitely.

- Startup/shutdown
- Execute **AT+CFUN=0**/**1**/**4** by turns
- Switch SIM cards
- Activate/deactivate MBN
- The data counter result can be saved to NVM through executing **AT+QGDNRCNT=1**, and then reading and writing operations are performed on FLASH memory after the timeout.

2.2. Operating AT Commands

Do not send AT commands to the module in multi-threading or multi-processing mode. Instead, send AT commands to the module in single-thread or queue mode. And please do not send the next AT command until the response of the last AT command is returned.

2.3. Automatic Selection Feature of MBN

Test SIM card (PLMN 00101) is used for the production line test when the module is in the factory. Automatic selection feature of MBN for most modules is enabled by default, so ROW MBN is activated by default when the module leaves the factory. Therefore, it is strongly recommended that do not modify the default value of the automatic selection feature of MBN. If you want to modify the default value, please contact Quectel Technical Support.

2.4. Operating PDP Context

PDP contexts, indexed by **<cid>**, which are called PDP profile and are stored in the mbn file, is pre-configured by the module. When MBN is activated, the PDP profile is loaded into the working area of the module, and can be added, deleted, modified and queried through **AT+CGDCONT**.

It is strongly recommended that do not delete or modify the PDP profile pre-configured by the module. If none of the pre-configured PDP profiles meets expectations (for example, the required APN is not found), you can create a PDP profile in the order of increasing **<cid>** and use it for data call.

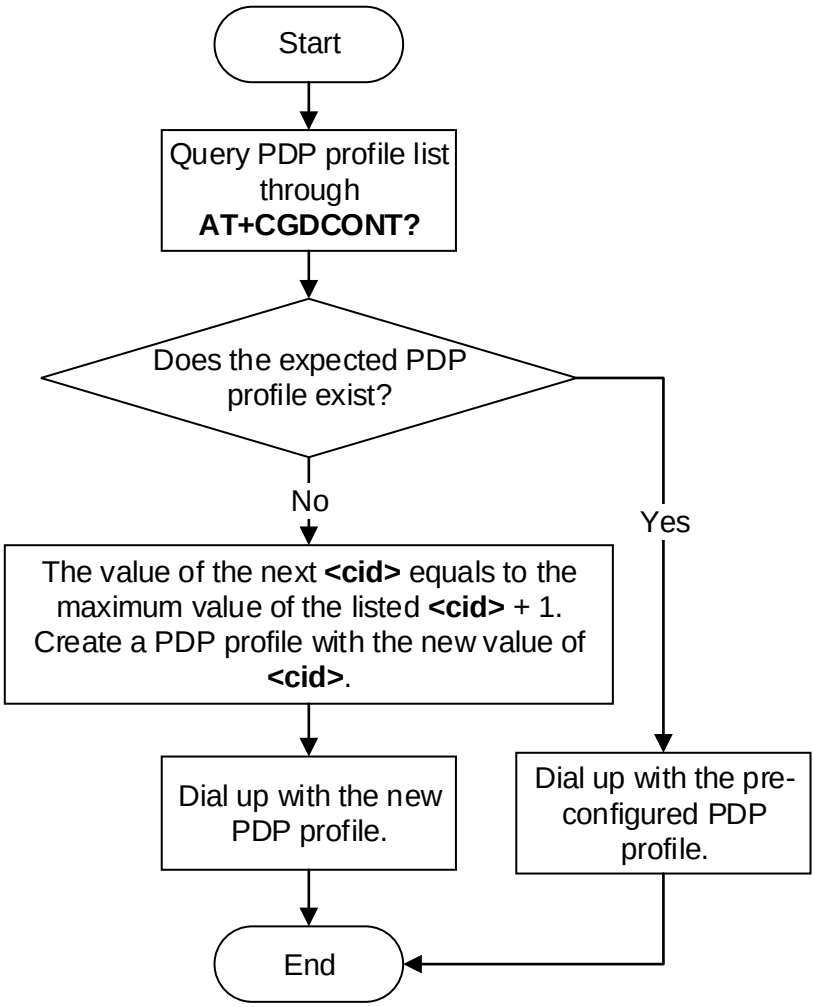

Figure 1: Operation Flowchart of PDP Profile

2.5. Implementing Voice Service Paired with SLIC

If you need to use SLIC to implement the voice service, please note RM5x0N family modules do not support SPI while some modules support Voice over USB or Voice over PCIe. Please contact Quectel Technical Support for details.

2.6. Secure Boot

1. Before enabling Secure Boot, execute **AT+QMBNCFG="Deactivate"** to deactivate MBN and clear all EFS files in the old version of MBN. In addition, please provide the IMEI number and the firmware version for which Secure Boot is to be enabled to Quectel Technical Support to check whether there is any difference in EFS configuration.

2. Secure Boot must be enabled at the factory stage. It is forbidden to enable Secure Boot after upgrading the firmware version to a version that supports Secure Boot, otherwise some functions may be abnormal and cannot be restored. It is not recommended to perform configuration operations on the module before enabling Secure Boot, such as SIMLOCK configuration.

3. Secure Boot can only be enabled through hardware fuse configuration. Once enabled, it cannot be turned off.

4. In PCIe Fuse mode, the image file is also burned in the sec partition, which conflicts with the enabling of Secure Boot. If Secure Boot is enabled first, PCIe Fuse mode cannot be enabled. Therefore, PCIe Fuse mode must be enabled first, and then Secure Boot.

5. After enabling Secure Boot, downgrading to a firmware version that does not support Secure Boot through Firehose or FOTA is not supported, otherwise the module will not start normally.

2.7. Locking the Network

You can lock the network and the cells through AT commands, such as **AT+QNWLOCK**, which can only be used for debugging and testing rather than commercial use.

3 Solutions To FAQs

For more information about the AT commands mentioned in this chapter, please refer to ***document [1]***, ***document*** *错误!未找到引用源。* or contact Quectel Technical Support. For instructions on how to use quectel-CM, please refer to ***document [3]***.

3.1. Network Registration Failure

- **Problem description**

The module fails to register the network after the normal startup.

- **Solution**

Table 2: Solution to Network Registration Failure

No.	Troubleshooting	Solution
1	Check the SIM card status through **AT+CPIN?, AT+QSIMDET?** and **AT+QUIMSLOT?**.	● If **+CPIN: READY** is returned, the SIM card is working normally. ● If the response is not **+CPIN: READY**, you can try to execute **AT+QSIMDET?** to check whether the SIM card hot-swap configuration is correct, or execute **AT+QUIMSLOT?** to check whether the SIM card slot selection is correct. ● If the SIM card slot selection and hot-swap configuration are both correct, you can try to execute **AT+CFUN=0/1** by turns or check the hardware.
2	Check module status through **AT+CFUN?**.	● If **+CFUN: 1** is returned, the module is working normally. ● If the response is not **+CFUN: 1**, you can try to execute **AT+CFUN=1**, and after a successful execution, wait for 5 seconds and execute **AT+CFUN?** again to check the working status of the module. If an **ERROR** is returned after **AT+CFUN=1** is executed, or **+CFUN: 1** is still not returned after 5 seconds when **AT+CFUN?** is executed, the host program should end the module's startup process

		and you can contact Quectel Technical Support for further analysis.
3	Check the cell attachment status and the cell signal strength through **AT+QENG="servingcell"**.	If it fails to attach the cell or the cell signal strength is not within the normal range, you can try to check whether the network search mode configuration and the band configuration are correct.
4	Check the network search mode configuration through **AT+QNWPREFCFG="mode_pref"**.	● If the network search mode configuration is not correct, you can try to reconfigure it and execute **AT+CFUN=0/1** by turns again to re-initiate the network registration. ● If the network search mode configuration is correct, you can check whether the band configuration is correct.
5	Check the band configured in the UE capability through **AT+QNWPREFCFG="ue_capability_band"**.	● If the band configuration is not correct, you can try to reconfigure the band through the following commands: **AT+QNWPREFCFG="gw_band"** **AT+QNWPREFCFG="lte_band"** **AT+QNWPREFCFG="nsa_nr5g_band"** **AT+QNWPREFCFG="nr5g_band"** After reconfiguration, you can try to execute **AT+CFUN=0/1** by turns again to re-initiate the network registration. ● If the band configuration is correct, you can execute **AT+QNWPREFCFG="policy_band"** to check whether the carrier policy band is correct. If it is not correct, then check the MBN configuration.
6	Check whether MBN matches the SIM card through **AT+QMBNCFG="list"**.	If MBN does not match the SIM card, you can try to activate ROW MBN.
7	Check whether PDP profile is abnormal through **AT+CGDCONT?**.	If you are not sure whether the PDP Profile is abnormal, you can try to reactivate MBN to restore the default PDP profile.
8	Enable network registration rejection code URC through **AT+QNETRC=1**.	Record the returned rejection code and provide it to Quectel Technical Support for further analysis.
9	Try to execute **AT+CFUN=0/1** by turns with no more than 3 times and collect log information during the execution process for further analysis.	1. Execute **AT+CFUN=0**. 2. Wait for 120 seconds. 3. Check the network registration status of the module. 4. Execute **AT+CFUN=1**.
10	Reboot the module (no more than 3 times).	1. Execute **AT+CFUN=1,1** or power on the module. 2. Wait for 120 seconds. 3. Check the network registration status of the module. 4. Power off the module.

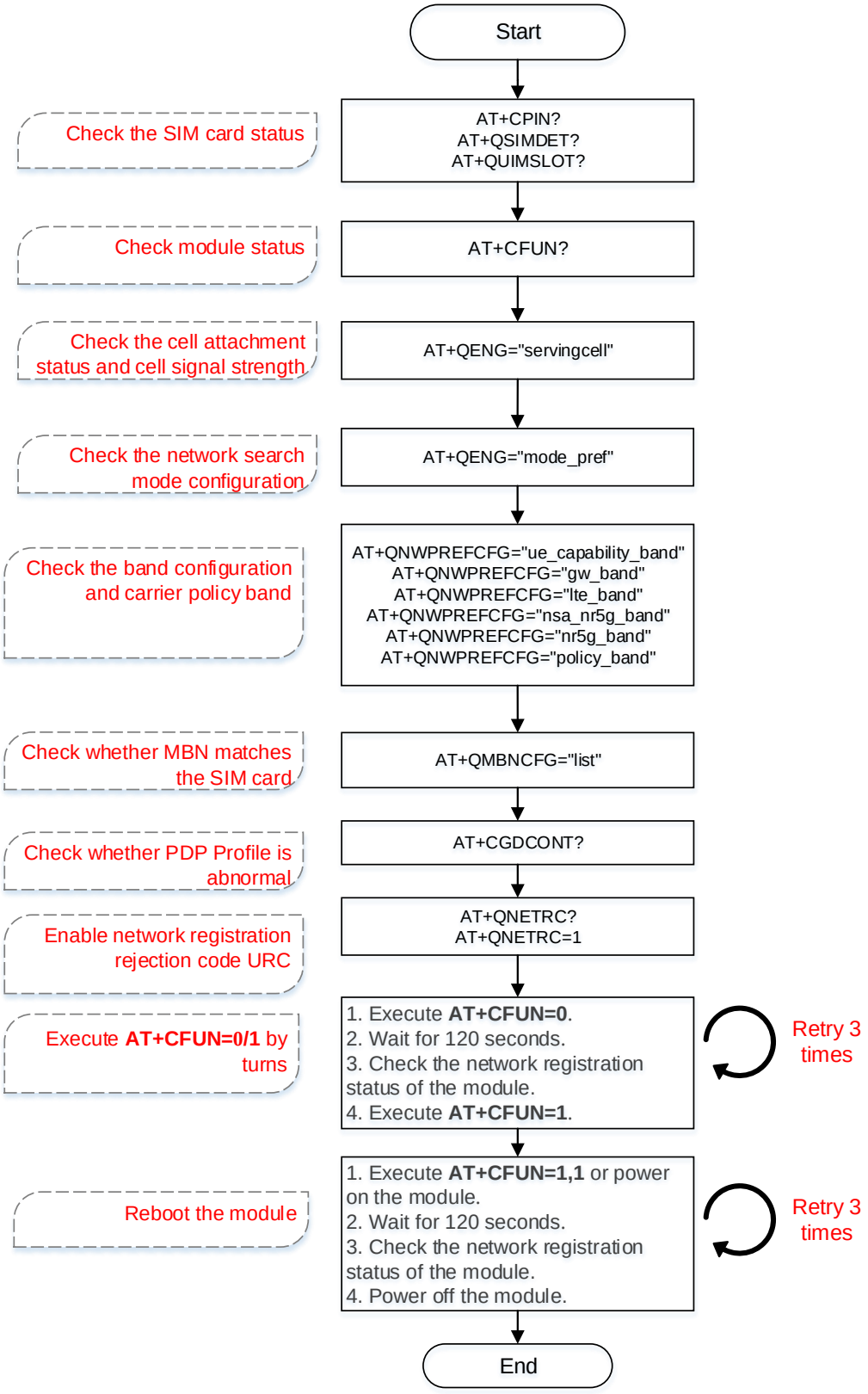

Figure 2: Flowchart of Solutions for Network Registration Failure

3.2. Data Call Failure

- **Problem description**

The module fails to perform RMNet data call after the successful network registration.

- **Solution**

Table 3: Solution to Network Registration Failure

No.	Troubleshooting	Solution
1	Check whether the ioctl error message is reported in quectel-CM.	If this error message is reported, please update the driver version to the latest version provided by Quectel.
2	Check whether the requestSetEthMode error message is reported in quectel-CM.	If this error message is reported: 1. Update the driver version to the latest version provided by Quectel. 2. Execute **AT+QCFG="pcie/mode"** to check whether it is PCIe EP mode. If not, please set it to PCIe EP mode. 3. Execute **AT+QCFG="pcie_mbim"** to check whether it is MBIM mode. If it is MBIM mode, please disable it.
3	Check whether the call_end_reason = 209 error message is reported in quectel-CM.	If this error message is reported, it indicates that the current network is restricted, please perform the data call again later.
4	Check whether the call_end_reason = 2001 error message is reported in quectel-CM.	If this error message is reported, it indicates that the device fails to connect to the network, please check the network connection status.
5	Check whether the call_end_reason = 241 error message is reported in quectel-CM.	If this error message is reported, it indicates that the current APN has been used for data call. 1. Check whether there is the repeated data call. 2. Perform the data call with the other APN. 3. Check whether the data call has been initiated within the module.
6	Check whether the call_end_reason = 219 error message is reported in quectel-CM.	Execute **AT+CFUN?** to check whether CFUN status of the module is normal.
7	Check whether all QMI messages report errors in quectel-CM.	If this error message is reported, it indicates QMI communication failure. Please provide relevant logs to Quectel Technical Support.

3.3. Receiving and Sending Data Failure

- **Problem description**

The module cannot send and receive data after the successful network registration and RMNet data call (PING failure).

- **Solution**

Table 4: Solution to Failure of Receiving and Sending Data

No.	Troubleshooting	Solution
1	Check DNS, default routing and firewall configurations of the host.	If DNS and default routing are not configured correctly, please check the udhcpc program or manually add DNS and default routing configurations. If there is a firewall configuration, you need to modify it by yourself.
2	Check whether the driver provided by Quectel is used.	If it is not, please update the driver version to the latest version provided by Quectel.
3	Check whether the quectel-CM provided by Quectel is used.	If it is not, please update the quectel-CM version to the latest version provided by Quectel.
4	Check whether the requestSetEthMode error message is reported in quectel-CM data call log.	If this error message is reported, please check whether the driver provided by Quectel is used, and check the driver version and quectel-CM version (It is recommended to use the latest version).
5	Check usbmon log of the module.	If -71 error message is reported, it indicates a USB protocol error. Please provide QXDM log, ADPL log, usbmon log, and host-side tcpdump log from the issue reproduction process to Quectel Technical Support. If the exact cause cannot be identified from the above logs, please additionally provide the USB analyzer log captured during the reproduction, the host-side USB driver log, and the module dump log triggered after forcibly generating a dump (the module must be configured in dump mode prior to reproducing the issue) to Quectel Technical Support.
6	Check the physical connectivity of the USB interface.	If no response is returned after sending AT commands, please use the usbmon tool to capture logs from the USB interface and provide them to Quectel Technical Support.

3.4. Automatic Reboot of Modem Subsystem

- **Problem description**

If the modem subsystem automatically reboots during the use of the module, and there is no change to the device node and the port. However, URCs such as RDY and CFUN will be reported, and the module automatically re-registers the network immediately after it is disconnected to the network.

- **Solution**

The automatic reboot of the modem subsystem usually occurs when the modem system crashes, such as the dump, the insufficient memory and the non-existent RF channel. When the above situations occur, the host software monitors and records the number of the occurrences.

In order to protect the FLASH memory, if the modem subsystem automatically reboots several times in a short period of time, you need to execute **AT+CFUN=0**, or power off the module. If the frequency of the automatic reboot is very low, you can wait for observation and continue to use the module. For the convenience of the problem analysis, you can set to capture the dump logs, or arrange the local recurrence.

4 Appendix References

Table 5: Related Documents

Document Name
[1] Quectel_RG520N&RG525F&RG5x0F&RM5x0N_Series_AT_Commands_Manual
[2] Quectel_RG5x&RG6x&RM5x_Series_5G_Network_Application_Note
[3] Quectel_QConnectManager_Linux_User_Guide

Table 6: Terms and Abbreviations

Abbreviation	Description
ADPL	Accelerated Data Protocol Logging
APN	Access Point Name
DNS	Domain Name Server
MBIM	Mobile Broadband Interface Model
MBN	Modem Configuration Binary
NVM	Non-Volatile Memory
OTA	Over-The-Air
PCIe	Peripheral Component Interconnect Express
PDP	Packet Data Protocol
PLMN	Public Land Mobile Network
QMI	Qualcomm Message Interface
QXDM	Qualcomm eXtensible Diagnostic Monitor
RMNet	Remote Network

ROW	Rest of World
SIM	Subscriber Identity Module
URC	Unsolicited Result Code
USB	Universal Serial Bus