



Notes on the Operation of SIMCom M2M Modules Powered On and Down for Search Networks

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1 Introduction

This document is mainly for the description of the abnormal situation of the module caused by the user's unconventional handling operation or the direct power up and down of the module when the module is odd. After communicating with the user's engineers and analysing the problem, it was found that some customers would directly power down or reboot the module when they encountered unsuccessful dial-up or network search, which would increase the probability of damage to the module and reduce its service life. Therefore, in principle, hardware and software design should avoid abnormal power-on and power-down operations on the module as much as possible. Irregular operations on the module may bring certain risks and increase the difficulty of subsequent analysis of abnormalities in the module's function.

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2 Suggestions for operation of the module when searching the network for power on and down anomalies

2.1 When unable to search the network

When the module cannot detect a signal or network, it is not recommended to power off the module directly or perform a hard reset repeatedly to search for the network after restarting. These actions may reduce the module's lifespan and increase the possibility of producing faulty modules. Instead, it is advised to troubleshoot the issue and try alternative solutions to avoid potential damage.

The following operations are recommended:

(1) Check the validity of your SIM card.

For example, verify that the SIM card is inserted correctly and that the network carrier's service is active and not in arrears.

(2) If the SIM card is valid.

Unrecommended practices:

Power off, restart or reset the module directly.

This issue is usually caused by poor network conditions of the local network carrier or a lack of network coverage in the area. Restarting the module will fail to solve the problem and increase the risk of module damage.

Recommended practices:

Retry the search at intervals, for example: 0.5 minutes after the first attempt, 1 minute after the second attempt, 2 minutes after the third attempt, and so on. Users can adjust the duration of the attempts based on experience and industry recommendations. If the connection is not very urgent, the interval time can be appropriately extended. If no available network is found after multiple checks, restarting the module can be attempted. However, it is important to note that the module should not be directly reset or powered off.

When the AT command can still be responded to, the correct approach is to send the command AT+CFUN=0 to turn off the radio frequency. After waiting for 5.5 seconds, send the command AT+CFUN=1 to restore normal mode and allow the module to restart the network registration process. Alternatively, the soft power-off command AT+CPOF can be used, followed by normal power-on to confirm the network quality. The logic mentioned above needs to be integrated and written in code in the host computer.

After restarting the network search or normal power-on, if the network registration cannot be established for a long time, it is recommended to add troubleshooting instructions or guidance for technical problem analysis to the end user's instructions. A comparison check can be performed: if the network condition is still poor and manual troubleshooting is required, the user can use a mobile phone to confirm whether the current operator's network status is good in the current environment. If the mobile phone cannot find the network normally, please get in touch with the operator. If the mobile phone can search for the network normally, contact technical personnel to locate and analyse the problem. In addition, a shutdown process can be performed: before powering off the module, perform a normal shutdown, and wait for 5.5s before powering off the module. Refer to the hardware guide; PWRKEY is pulled low for $\geq 3s$.

※ NOTE

The shutdown time of different modules may be extra. Please refer to the corresponding hardware guide for details.

2.2 When the network registration is successful but the network status is bad

When some users find that they can register to the network normally but the network condition is poor, which often leads to frequent failures of network-related functions, they tend to focus on the module and believe that restarting the module can solve the problem. Indeed, sometimes everything works fine after restarting the module; but it needs to be pointed out that in most cases, this is just a coincidence because the network status happens to be good after the restart. This situation is likely to be caused by the network environment of the local operator where the device is located. Therefore, when encountering this situation, attention should be paid to the following:

Recommended practices:

Periodically check the network status and confirm it. If the network status is consistently poor and the AT command can still respond, try sending the AT+CFUN=0 command (turn off radio frequency) and wait 10 seconds before sending the AT+CFUN=1 command (restore normal mode) to let the module reinitiate the network registration process. Alternatively, use the soft power-off command AT+CPOF and perform a normal power-on start to confirm the network quality. The above logic needs to be integrated and coded on the host computer. If the network cannot be registered generally for a long time, it is recommended to add troubleshooting instructions or guidance for end users to perform technical problem analysis and

confirmation. For comparative troubleshooting, if the network status is still poor and human intervention is required to identify the problem, use a mobile phone to confirm whether the current environment's operator network status is good. If the mobile phone's network status is also poor, contact the operator. If the mobile phone's network status is good, contact technical personnel to locate and analyse the issue. Additionally, it is recommended to perform a shutdown process: before giving power to the module, perform a normal shutdown and wait for 5.5 seconds before providing power to the module. Refer to the hardware manual, and pull PWRKEY low for ≥ 3 s.

※ NOTE

The shutdown time of different modules may be extra. Please refer to the corresponding hardware guide for details.

2.3 When the network is in good but fails to dial successfully

Certain users may observe that despite having good network status and signal, they encounter difficulties establishing a successful dial-up connection. In such instances, as the module functions as an access point, some may attribute the problem to a potential malfunction with the module and proceed to either directly power off or restart it, subsequently repeating network search, registration, and dialling operations. As discussed in section 2.2, from an application perspective, this scenario may be attributed to the advantageous improvement in the operator's network environment following the system restart.

This issue typically arises from resource constraints within the operator's network, whereby the maximum number of connections may have been reached during a particular period, resulting in unsuccessful dial-up attempts. Only in exceedingly exceptional scenarios could it be attributed to the module. If confronted with such a problem:

Recommended practices:

- (1) Check the validity of your SIM card.
- (2) If the SIM card is valid.

Unrecommended practices:

Directly powering off and restarting, or resetting the module, is very likely to be ineffective in solving the problem itself, as it may be due to the operator's connection resources reaching the maximum number of connections. Resetting or restarting the module to redial at this time may not only fail to solve the problem but also cause unforeseen issues to the wireless module.

Recommended practices:

To enhance the rate of success, it is advisable for users to periodically attempt redialing. For instance, the first redialing attempt may be made after a minute, followed by a three-minute interval for the second attempt and a five-minute interval for the third attempt. The user can adjust the time intervals based on their experience, and in case the connection is not pressing, it can be stretched accordingly. If multiple attempts at redialing are unsuccessful, the possibility of a module malfunction should be considered. It is important to note that resetting or directly powering off the module is not recommended. Instead, it is suggested to issue an AT+CFUN=0 command (to deactivate the radio). In contrast, the AT commands are still functional, followed by a 10-second wait and then an AT+CFUN=1 command (to restore standard mode), allowing the module to restart the network search, registration operation, and redialing. Alternatively, the AT+CPOF command may be utilised for a soft power-off, following which a regular power-on must be performed to verify network quality. The logic above must be coded into the upper computer.

If redialing attempts persistently fail following a restart, and if it cannot be dialled for an extended period, it is recommended to guide the user towards troubleshooting or seeking technical support. For instance, the user may use a mobile phone to verify if the current environment permits dial-up and internet access. In the event the mobile phone is unable to access the internet, the operator must be contacted as there could be an issue with their network. If the mobile phone can access the internet normally, a technical expert must be approached for analysis and localisation. Moreover, it is advised to perform a standard shutdown before powering off the module and wait for 5.5 seconds before powering off. As per the hardware guide, the PWRKEY must be pulled down for at least 3 seconds.

※ NOTE

The shutdown time of different modules may be extra. Please refer to the corresponding hardware guide for details.

3 Additional Notes

This document does not cover power failures caused by non-human factors or situations where the design is beyond control. The module has undergone a certain level of non-human factor protection processing for various products, such as power outages caused by the power grid.

Some users consider power-on and off operations inevitable, but in such cases, it is recommended to turn off the device before powering it off. If the MCU is relatively low-end and IO is insufficient, and it is necessary to power off directly, please note that all operations on the module, including network registration, must be terminated before powering off to ensure that the module is non-working. Even in this case, it is essential to avoid frequent operations, and software and hardware design should also strive to prevent abnormal power-off operations.

If users cannot find the information they are looking for or have any questions while reading this document, please get in touch with FAE for consultation and confirmation.

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