RGx00U&RM500U Series
Dual SIM Dual Standby Application Note

5G Module Series

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About the Document

Revision History

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-	2023-10-25	Polo YE	Creation of the document
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1 Introduction

Quectel 5G RG200U series, RG500U series, and RM500U series modules support Dual SIM Dual Standby (DSDS) function. The module is equipped with both AT ports and modem ports. This document outlines how to use (U)SIM card 1 and (U)SIM card 2 to realize related functions such as querying network information and performing PDP dial-up.

NOTE

1. The module can only fulfil DSSA (Dual SIM Single Active) function and does not support that two (U)SIM cards perform data service at the same time because it uses only one set of RF. In other words, when one (U)SIM card is on a call, the other one is unable to perform data or voice services but can perform Time Division Multiplexing.
2. Firmware support is needed to enable DSDS. The module cannot enable or disable DSDS through AT commands.

2 Description of Dual SIM Dual Standby Usage

The Dual SIM Dual Standby (DSDS) function cannot be enabled or disabled via AT commands. For AT commands that need to distinguish between (U)SIM card 1 and (U)SIM card 2, the Linux-based main controller can refer to the corresponding mapping table (***Table 1***) to open the appropriate device node and send AT commands. Windows-based main controllers require driver support for dual AT and modem ports, and then use the respective ports to send AT commands. For details about AT commands, refer to ***document [1]***.

Table 1: Mapping Table of (U)SIM Card Slot and AT/Modem Ports

(U)SIM Card Slot	AT Port	Modem Port
(U)SIM 1	/dev/ttyUSB2	/dev/ttyUSB3
(U)SIM 2	/dev/ttyUSB5	/dev/ttyUSB6

3 Example

This chapter takes PDP dial-up as an example to describe how the module uses dual (U)SIM cards for various data services. As the module can only fulfill DSSA (Dual SIM Single Active) function, it does not support that two (U)SIM cards perform data service at the same time. You can not use the same PDP to perform dial-up with (U)SIM 1 and (U)SIM 2 at the same time.

3.1. (U)SIM Card Switch for PDP Dial-up

After using (U)SIM card 1 to perform PDP dial-up, you need to switch to (U)SIM card 2 with one of the following two methods.

Method 1: Two (U)SIM cards do not perform dial-up simultaneously with the same PDP.

The advantage of this method is that it has fewer steps and is simple to operate. However, it needs to disconnect the PDP dial-up of (U)SIM card 1 before initiating the PDP dial-up of (U)SIM card 2, so the switching process takes longer time. This method is suitable for scenarios where there is no time constraint for switching.

Method 2: Two (U)SIM cards use different PDPs to perform PDP dial-up.

(U)SIM card 1 uses the first PDP to perform dial-up, while (U)SIM card 2 uses the second PDP to perform dial-up. In this scenario, dual-SIM dial-up can be conducted initially. After successful dial-up, the host establishes two NICs. When there is a need to switch between the two (U)SIM cards, the host accomplishes (U)SIM card switching by switching the data path of the target (U)SIM card slot and adding the corresponding NIC to the default route in the routing table to facilitate data services with the switched (U)SIM card.

Compared to Method 1, Method 2 has higher operational requirements for the host and is more complex for the user to operate. But it offers a very short switching time since the (U)SIM cards have already performed the PDP dial-up before switching. This method is suitable for scenarios where quick switching is essential.

3.2. Example of PDP Activation/Deactivation

3.2.1. Method 1

```
//(U)SIM card 1 AT port or modem port
AT+COPS?                                    //Query the network registration information of (U)SIM card 1.
+COPS: 0,0,"CHN-UNICOM",11

OK
AT+CGDCONT?                                 //Query the APN information of (U)SIM card 1.
+CGDCONT: 1,"IPV4V6","3gnet","0.0.0.0",0,0,0,0,,,,,,0,,,0,,0,0,0,0
+CGDCONT: 11,"IPV4V6","ims","0.0.0.0",0,0,0,0,,,,,,0,,,0,,0,0,0,0

OK
AT+QENG="servingcell"                       //Query the serving cell information of (U)SIM card 1.
+QENG:  "servingcell","NOCONN","NR5G-SA","TDD",460,01,6909DB083,747,690E0F,633984,78,1
00,-73,-3,17,0,43,1

OK
AT+QNETDEVCTL=1,1,1                         //Activate the first PDP of (U)SIM card 1 to perform dial-up.
OK

+QNETDEVSTATUS: 1,1,"IPV4V6",0              //The first PDP dial-up of (U)SIM card 1 is activated.
AT+QNETDEVSTATUS=1                          //Query the status of first NIC of (U)SIM card 1.
+QNETDEVSTATUS:  10.248.13.149,255.255.255.0,10.248.13.1,,218.104.78.2,58.242.2.2,2408:8444:
0580:273d:0000:0000:0000:0001,,,,2408:8000:c000:0000:0000:0000:0000:8888,2408:8000:c004:00
00:0000:0000:0000:8888

OK
AT+QNETDEVCTL=1,2,0                         //Deactivate the first PDP of (U)SIM card 1.
OK

+QNETDEVSTATUS: 1,0,"IPV4V6",0              //The first PDP dial-up of (U)SIM card 1 is deactivated.
AT+QNETDEVSTATUS=1                          //Query the status of the deactivated first NIC of (U)SIM card
                                              1.
+CME ERROR: 3

//(U)SIM card 2 AT port or modem port
AT+COPS?                                    //Query the network registration information of (U)SIM card 2.
+COPS: 0,0,"CHINA MOBILE",7

OK
AT+CGDCONT?                                 //Query the APN information of (U)SIM card 2.
```

```
+CGDCONT: 1,"IPV4V6","cmnet","0.0.0.0",0,0,0,0,,,,,,0,,,0,,0,0,0,0,0
+CGDCONT: 11,"IPV4V6","ims","0.0.0.0",0,0,0,2,,,,,,0,,,0,,0,0,0,0,0

OK
AT+QENG="servingcell"                    //Query the serving cell information of (U)SIM card 2.
+QENG:  "servingcell","NOCONN","LTE","TDD",460,00,F2D4A52,214,38950,40,5,5,550B,-97,-5,-7
3,9,0,0,28

OK
AT+QNETDEVCTL=1,1,1                      //Activate the first PDP of (U)SIM card 2 to perform dial-up.
OK

+QNETDEVSTATUS: 1,1,"IPV4V6",0           //The first PDP dial-up of (U)SIM card 2 is activated.
AT+QNETDEVSTATUS=1
+QNETDEVSTATUS:  10.201.48.42,255.255.255.0,10.201.48.1,,211.138.180.4,211.138.180.5,2409:89
30:04a3:5627:721a:2314:0a99:e7c9,,,,2409:8030:2000:0000:0000:0000:0000:0003,2409:8030:2000:
0000:0000:0000:0000:0004

OK
AT+QNETDEVCTL=1,2,0                      //Deactivate the first PDP of (U)SIM card 2.
OK

+QNETDEVSTATUS: 1,0,"IPV4V6",0           //The first PDP dial-up of (U)SIM card 2 is deactivated.
AT+QNETDEVSTATUS=1
+CME ERROR: 3
```

3.2.2. Method 2

```
//Configure USBnet multi-NIC
AT+QCFG="nat",0                          //Enable NIC mode.
OK
AT+QCFG="usbnet",5                       //Configure the USBnet call method to NCM.
OK
AT+QCFG="multiusbnet",2,0                //Enable NCM multiple data call.
OK
//Reboot the module to make the configuration take effect.
//(U)SIM card 1 AT port or modem port
AT+COPS?                                 //Query the network registration information of (U)SIM card 1.
+COPS: 0,0,"CHN-UNICOM",11

OK
AT+QENG="servingcell"                    //Query the serving cell information of (U)SIM card 1.
+QENG:  "servingcell","NOCONN","NR5G-SA","TDD",460,01,6909DB083,747,690E0F,633984,78,1
```

```
00,-73,-3,17,0,43,1

OK
AT+QNETDEVCTL=1,1,1                    //Activate the first PDP of (U)SIM card 1 to perform dial-up.
OK

+QNETDEVSTATUS: 1,1,"IPV4V6",0         //The first PDP dial-up of (U)SIM card 1 is activated.
AT+QNETDEVSTATUS=1                     //Query the status of first NIC of (U)SIM card 1.
+QNETDEVSTATUS: 10.163.150.149,255.255.255.0,10.163.150.1,,218.104.78.2,58.242.2.2,2408:8444:0580:273d:0000:0000:0000:0001,,,,2408:8000:c000:0000:0000:0000:0000:8888,2408:8000:c004:0000:0000:0000:0000:8888

OK
//(U)SIM card 2 AT port or modem port
AT+COPS?                               //Query the network registration information of (U)SIM card 2.
+COPS: 0,0,"CHINA MOBILE",7

OK
AT+QENG="servingcell"                  //Query the serving cell information of (U)SIM card 2.
+QENG: "servingcell","NOCONN","LTE","TDD",460,00,F2D4A52,214,38950,40,5,5,550B,-97,-5,-73,9,0,0,28

OK
AT+QNETDEVCTL=2,1,1                    //Activate the second PDP of (U)SIM card 2 to perform dial-up.
OK

+QNETDEVSTATUS: 2,1,"IPV4V6",0         //The second PDP dial-up of (U)SIM card 2 is activated.
AT+QNETDEVSTATUS=2                     //Query the status of second NIC of (U)SIM card 2.
+QNETDEVSTATUS: 10.213.36.7,255.255.255.0,10.213.36.1,,218.104.78.2,58.242.2.2,2409:8930:04a3:5627:721a:2314:0a99:e7c9,,,,2409:8030:2000:0000:0000:0000:0000:0003,2409:8030:2000:0000:0000:0000:0000:0004

OK
```

After completing the above operations, you can execute **ifconfig** on the host computer to view the IP addresses of the current NIC. As shown in the figure below, the host computer has established two NIC dial-up connections.

```
ens160u1  Link encap:Ethernet  HWaddr 92:4e:85:3b:f1:ae
          inet addr:10.163.150.149  Bcast:10.163.150.255  Mask:255.255.255.0
          inet6 addr: fe80::1100:20cb:cfdd:6a5b/64 Scope:Link
          inet6 addr: 2408:8445:5f0:14f9:4923:1272:2c41:2754/64 Scope:Global
          inet6 addr: 2408:8445:5f0:14f9:c0f4:7628:f627:c3f4/64 Scope:Global
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:11 errors:0 dropped:0 overruns:0 frame:0
          TX packets:74 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2264 (2.2 KB)  TX bytes:12539 (12.5 KB)

ens160u1i7 Link encap:Ethernet  HWaddr be:c5:6e:2a:75:98
          inet addr:10.213.36.7  Bcast:10.213.36.255  Mask:255.255.255.0
          inet6 addr: 2408:8444:500:54b7:54ee:8999:3091:1a41/64 Scope:Global
          inet6 addr: fe80::9552:7768:f722:fdf/64 Scope:Link
          inet6 addr: 2408:8444:500:54b7:fb78:117c:9c34:60f1/64 Scope:Global
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:9 errors:0 dropped:0 overruns:0 frame:0
          TX packets:74 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2160 (2.1 KB)  TX bytes:12330 (12.3 KB)
```

If you need to use (U)SIM card 1 for data services, the host can switch the data path of the target (U)SIM card slot by sending **AT+QCFG="datasim"** (see ***document [1]***) to the modem through the /dev/ttyUSB2 node. And you can check whether the default route of the host computer matches the NIC established by (U)SIM card 1 dial-up. If they do match, the host can directly perform data services; if they do not match, you need to first execute **route del defalut** to delete the default route, and then execute **route add default gw 10.163.150.1** to add the default route.

If you need to use (U)SIM card 2 for data services, the host can switch the data path of the target (U)SIM card slot by sending **AT+QCFG="datasim"** (see ***document [1]***) to the modem through the /dev/ttyUSB5 node. And you can check whether the default route of the host computer matches the NIC established by (U)SIM card 2 dial-up. If they do match, the host can directly perform data services; if they do not match, you need to first execute **route del defalut** to delete the default route, and then execute **route add default gw 10.213.36.1** to add the default route.

```
[redacted]:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         10.213.36.1     0.0.0.0         UG    101    0        0 ens160u1i7
0.0.0.0         10.163.150.1    0.0.0.0         UG    102    0        0 ens160u1
10.163.150.0    0.0.0.0         255.255.255.0   U     100    0        0 ens160u1
10.213.36.0     0.0.0.0         255.255.255.0   U     100    0        0 ens160u1i7
```

4 Appendix References

Table 2: Related Documents

Document Name
[1] Quectel_RGx00U&RM500U_Series_AT_Commands_Manual

Table 3: Terms and Abbreviations

Abbreviation	Description
APN	Access Point Name
DSDS	Dual SIM Dual standby
IP	Internet Protocol
LTE	Long-Term Evolution
NIC	Network Interface Card
PDP	Packet Data Protocol
RF	Radio Frequency
(U)SIM	(Universal) Subscriber Identity Module