



FG132

Network Registration Application Guide

V1.0

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Safety Instructions

Do not operate wireless communication products in areas where the use of radio is not recommended without proper equipment certification. These areas include environments that may generate radio interference, such as flammable and explosive environments, medical devices, aircraft or any other equipment that may be subject to any form of radio interference.

The driver or operator of any vehicle shall not operate wireless communication products while controlling the vehicle. Doing so will reduce the driver's or operator's control and operation of the vehicle, resulting in safety risks.

Wireless communication devices do not guarantee effective connection under any circumstances, such as when the (U) SIM card is invalid or the device is in arrears. In an emergency, please use the emergency call function when the device is turned on, and ensure that the device is located in an area with sufficient signal strength.

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Applicable Type

No.	Applicable Model	Description
1	All projects of Qualcomm, Unisoc and MTK platforms	For multiple platforms

Change History

V1.0 (2023-04-13)	Initial version.
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1 Foreword

This document provides guidance for Fibocom modules on troubleshooting for network registration and dialing failures. When encountering problems such as network registration failure, you can refer to the relevant steps in this document for preliminary troubleshooting and analysis.

2 Confirmation of Basic Information

2.1 Confirmation of Software Version

Use the AT command ATI to obtain the version information and confirm whether the current software version is correct, for example:

```
ATI
Manufacturer: Fibocom Wireless Inc.
Model: FM160-JK
Revision: 89618.1000.00.01.06.13
SVN: 13
IMEI: 356277820030011
+GCAP: +CGSM
```

2.2 Confirmation of SIM Card Basic Information

To register the module into the network, it is necessary to ensure that the SIM card is inserted normally and the card is identified. If the module supports hot plug, inserting or removing the card will report URC to indicate the status of the SIM card, and SIM Inserted and SIM READY will be reported after the card is inserted. SIM Removed and SIM DROP will be reported after the card is removed.

```
+SIM: Inserted
+SIM READY

+SIM: Removed
+SIM DROP
```

You can also use AT+CPIN? to check whether the card is identified. If the card is identified and unlocked, PIN/PUK will return CPIN: READY, CIMI to check the IMSI and the corresponding PLMN.

```
AT+CPIN?

+CPIN: READY
OK

AT+CIMI

460115428192490
OK
```

If the current SIM card is in lock PIN or PUK state, it cannot be used normally. Using AT+CPIN? to query will return CPIN: SIM PIN or CPIN: SIM PUK. At this time, if you need to use the SIM card, you need to unlock PIN or PUK through AT+CPIN and AT+CLCK commands (refer to the standard AT command manual for the use of AT).

In addition, if you use the current network card to ensure that the card is not overdue, you can do data business and register the network normally.

2.3 Querying Registered Network of the Module

The command AT+COPS? can be used to query whether the device is currently registered or resides on a network. If AT+COPS? returns +COPS:2, the network is not currently registered. If RAT and PLMN can be returned normally, the network is normally registered. In RAT, 6 indicates WCDMA network, 7 indicates LTE, 13 indicates LTE/NSA, and 11 indicates SA.

```
AT+CFUN?
```

```
+CFUN: 1,0
```

```
OK
```

```
AT+COPS?
```

```
+COPS: 0,0,"CHN-CT",11
```

```
OK
```

2.4 Checking Current Network Information

The AT+GTCCINFO? command can be used to query the information of the currently registered cell and some neighboring cells. You can also refer to whether to register network and the currently registered network system. For details about parameters, see the AT manual. It should be noted that the neighboring cell information cannot be returned on the Qualcomm platform currently. You can only view the currently registered cell information.

```
AT+COPS?
```

```
+COPS: 0,0,"CHN-CT",11
```

```
OK
```

```
AT+GTCCINFO?
```

```
+GTCCINFO:
```

```
NR service cell:
```

```
1,9,460,11,BC6011,BC6B33004,99240,1D2,5078,100,57,65,65,62
```

```
OK
```

```
AT+GTACT=2
```

```
OK
```

```
AT+COPS?
```

```
AT+COPS?
```



```
+COPS: 0,0,"CHN-CT",7
```

```
OK
```

```
AT+GTCCINFO?
```

```
+GTCCINFO:
```

```
LTE service cell:
```

```
1,4,460,11,2554,880A90,994,9,105,50,0,51,51,12
```

```
LTE neighbor cell:
```

```
2,4,,,,,0,0,,,141,141,40
```

```
2,4,,,,,0,0,,,141,141,40
```

```
2,4,,,,,0,0,,,141,141,40
```

```
2,4,,,,,0,0,,,141,141,40
```

```
2,4,,,,,0,0,,,141,141,40
```

```
2,4,,,,,994,B,,,43,43,0
```

```
OK
```

3 Basic Operations

3.1 Querying Lock System, BAND and Registered Network of the Module

The AT+GTACT command is used for lock system operations. When searching the network, the corresponding system of the lock only searches the current system network of the current lock, and does not search the network according to the automatic network search process. This helps to save the network search time and enables the module to register the corresponding network more quickly. The specific parameters can be set with reference to the manual.

```
AT+GTACT=2 --Lock LTE
OK

AT+COPS?
+COPS: 0,0,"CHN-CT",7 -- Register LTE

OK
AT+GTACT=10 --AUTO mode by default

OK

AT+COPS?
+COPS: 0,0,"CHN-CT",11 --Register NR

OK
AT+GTACT=14 --Lock NR

OK

AT+GTACT=14,,, 5078 --Lock N78

OK

AT+COPS?
+COPS: 0,0,"CHN-CT",11 --Register NR

OK
```

3.2 IP Type and APN Configuration

Use the AT+CGDCONT command to read and configure IP type and APN. Refer to the manual for specific parameters setting:

```
AT+CGDCONT?
+CGDCONT:
1,"IPV4V6","ctnet","0.0.0.0,0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0,,,,,,,,,"",,,,0
+CGDCONT:
2,"IPV4V6","IMS","0.0.0.0,36.14.5.86.10.0.13.141.23.85.250.71.175.124.27.70",0,0,0,0
,,,,,,,,,"",,,,0
+CGDCONT:
3,"IPV4V6","ctwap","0.0.0.0,0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0,,,,,,,,,"",,,,0
+CGDCONT:
4,"IPV4V6","sos","0.0.0.0,0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,1,,,,,,,,,"",,,,0

OK

AT+CFUN=0
OK

+SIM: Removed

+SIM DROP

AT+CGDCONT=1,"IP","default"
OK

AT+cfun?
+CFUN: 0,0

OK

AT+cfun=1
OK

+SIM: Inserted

+SIM READY

AT+CGDCONT?
```

```
+CGDCONT: 1,"IP","default","0.0.0.0",1,0,0,0,,,,,,,,,"",,,,0
+CGDCONT:
2,"IPV4V6","IMS","0.0.0.0,36.14.5.87.11.32.78.78.23.85.250.122.54.189.88.204",0,0,0,
0,,,,,,,,,"",,,,0
+CGDCONT:
3,"IPV4V6","ctwap","0.0.0.0,0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0,,,,,,,,,"",,,,0
+CGDCONT:
4,"IPV4V6","sos","0.0.0.0,0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,1,,,,,,,,,"",,,,0

OK
```

3.3 Dialing

Dialing can be performed using ECM, RNDIS, RMNET and other dialing methods. ECM dialing method is introduced here. For other dialing methods, you can refer to the process of this document and AT commands. The dialing process is as follows:

```
AT+COPS?
+COPS: 0,0,"CHN-CT",7

OK

AT+GTUSBMODE?
+GTUSBMODE: 38

OK

AT+CGDCONT?
+CGDCONT: 1,"IP","default","10.89.21.96",1,0,0,0,,,,,,,,,"",,,,0
+CGDCONT:
2,"IPV4V6","IMS","0.0.0.0,36.14.5.86.10.17.49.158.23.86.15.128.206.182.117.51",0,0,0,
0,,,,,,,,,"",,,,0
+CGDCONT:
3,"IPV4V6","ctwap","0.0.0.0,0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0,,,,,,,,,"",,,,0
+CGDCONT:
4,"IPV4V6","sos","0.0.0.0,0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,1,,,,,,,,,"",,,,0

OK
```

```
AT+GTRNDIS=1,1
AT+GTRNDIS=1,1

OK

AT+GTRNDIS?
+GTRNDIS: 1,1,"10.89.21.96","61.134.1.6","218.20.19.40"

OK
```

3.4 SMS

There are currently three solutions for SMS service:

1. SMS over SGs, SMS is provided by the existing CS network.
2. SMS over IMS, SMS is provided by the IMS network. The terminal is connected with the SMSC platform through the IMS network to realize the sending and receiving of short messages, and the user experience is basically the same as that of the existing short message service.
3. Use PS to host SMS and process SMS as instant message.

The following introduces the sending and receiving of common IMS short messages. For specific meanings, refer to the AT manual.

```
AT+CMGF=1 //Send SMS in TXT mode.
OK
AT+CNMI=1,1
OK

AT+CMGS="17791612001"
>123
<◆ //Press "CTRL+Z" to send SMS.
+CMGS: 69

OK

+CMTI: "SM",15

AT+CMGL="ALL"
+CMGL: 1,"REC READ","10001",,"23/03/09,10:37:13+32"
```

5C0A656C76847528623760A8597DFF0C9655897F75354FE15DF291CD70B94F1853164E8660A862405728
533A57DF7684624B673A7F517EDCFF0C4E3A63D053474E0A7F514F539A8CFF0C72798D60900100310030
004700426D4191CF5305300262114EEC767E500D52AA529BFF0C53EA4E3A60A8201C003100305206201D
6EE1610F3002

+CMGL: 2, "REC READ", "10001", , "23/03/09,10:40:29+32"

5C0A656C76845BA26237FF0C60A8597DFF01611F8C2260A8957F671F4EE567655BF94E2D56FD75354FE1
76844FE18D56548C652F6301FF0C72794E3A60A8595799105185624B673A8D6090010031003000476D41
91CFFF0867096548671F003100305929FF09FF0C65B94FBF60A84F7F7528FF0C003400385C0F65F65185
5B8C621053D77406

+CMGL: 3, "REC READ", "10001", , "23/03/09,10:40:29+32"

FF0C4EE551774F5352308D2665F695F44E3A51C6300252308D2667E58BE28BF751736CE8201C9655897F
75354FE1201D5FAE4FE1516C4F1753F7002D301081EA52A967E58BE23011002D301059579910752891CF
3011300262114EEC767E500D52AA529BFF0C53EA4E3A60A8201C003100305206201D6EE1610FFF013010
9655897F75354FE1

+CMGL: 4, "REC READ", "10001", , "23/03/09,10:40:29+32"

3011

+CMGL: 5, "REC READ", "106980095566", , "23/03/19,12:38:14+32"

003351438BDD8D39670867089886FF01767B5F55624B673A94F6884C002D70ED95E86D3B52A8002D798F
4ED44E916E388BB0002D798F79845F005956002D9886003351438BDD8D39FF0C53E052A05F5367088BDD
8D395145503C7ACB51CF67004F4E00355143FF0190008BA28BF756DE590D0054004481F3672C53F77801
300230104E2D56FD94F6884C3011

+CMGL: 6, "REC READ", "106980095566", , "23/03/20,09:44:10+32"

003351438BDD8D39670867089886FF01767B5F55624B673A94F6884C002D70ED95E86D3B52A8002D798F
4ED44E916E388BB0002D798F79845F005956002D9886003351438BDD8D39FF0C53E052A05F5367088BDD
8D395145503C7ACB51CF67004F4E00355143FF0190008BA28BF756DE590D0054004481F3672C53F77801
300230104E2D56FD94F6884C3011

+CMGL: 7, "REC READ", "106980095566", , "23/03/31,10:46:14+32"

590D0054004481F3672C53F77801300230104E2D56FD94F6884C3011

+CMGL: 8, "REC READ", "106980095566", , "23/03/31,10:46:14+32"

201C0033002E00310035201D6D888D398005674376CA4FDD62A45BA36559003A201C51717B518BDA4FE1
6D888D3973AF5883002063D0632F91D1878D6D888D394FE15FC3201D4E2D56FD94F6884C63D0793A60A8
9632830391D1878D8BC89A97FF0C4FDD62A491D1878D8D444EA7FF0C51715EFA548C8C10793E4F1A3002
90008BA28BF756DE

+CMGL: 9, "REC READ", "106599366", , "23/04/11,09:25:37+32"

005B4E2D56FD75354FE1005D

+CMGL: 10, "REC READ", "106599366", , "23/04/11,09:25:37+32"

30105B895168670D52A163D09192301100320030003200335E740030003467080031003165E500200030
003965F600320035520660A8670953F778014E3A0031003000310030003000300030768467657535
FF0C8BE553F7780175914F3C4E3A8D376B3E74068D228425950075358BDD300260F377E5

+CMGL: 11, "REC READ", "106599366", , "23/04/11,09:25:37+32"

90536536523076844E0D660E7F51574094FE63A5662F54264E3A6076610F5417FF1F8D765FEB67655173
6CE8201C59297FFC96329A9A6270201D516C4F1753F7FF0C626B90006076610F94FE63A530028BE68BE2
00310030003000300030300256DE590D005400440046005490008BA28BE563D091923002

```
+CMGL: 12,"REC READ","106599366",,"23/04/10,10:50:25+32"
30105B895168670D52A163D09192301100320030003200335E740030003467080031003065E500200031
003065F600350030520660A8670953F778014E3A00310030003100300030003000300030768467657535
FF0C8BE553F7780175914F3C4E3A8D376B3E74068D228425950075358BDD300260F377E5
+CMGL: 13,"REC READ","106599366",,"23/04/10,10:50:25+32"
90536536523076844E0D660E7F51574094FE63A5662F54264E3A6076610F5417FF1F8D765FEB67655173
6CE8201C59297FFC96329A9A6270201D516C4F1753F7FF0C626B90006076610F94FE63A530028BE68BE2
00310030003000300030300256DE590D005400440046005490008BA28BE563D091923002
+CMGL: 14,"REC READ","106599366",,"23/04/10,10:50:25+32"
005B4E2D56FD75354FE1005D
+CMGL: 15,"REC READ","17791612001",,"23/04/15,16:17:10+32"
123

OK

AT+CMGR=15
+CMGR: "REC READ","17791612001",,"23/04/15,16:17:10+32"
123

OK

AT+CMGD=15
OK

AT+CMGR=15
ERROR
```

3.5 Voice

Telephone modes can be divided into CS call, VoLTE, VoNR, etc. This document introduces VoLTE, which is widely used at present. For details, see AT manual. The operation process is as follows:

```
AT+CAVIMS?
+CAVIMS: 1

OK

AT+CGDCONT?
+CGDCONT: 1,"IP","default","10.70.110.136",1,0,0,0,,,,,,,,,"",,,,0
+CGDCONT:
```

```
2, "IPV4V6", "IMS", "0.0.0.0,36.14.5.86.10.33.33.109.23.86.13.31.21.19.5.85",0,0,0,0,,  
,,,,,"",,,,0  
+CGDCONT:  
3, "IPV4V6", "ctwap", "0.0.0.0,0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0,,,,,,,"",,,,0  
+CGDCONT:  
4, "IPV4V6", "sos", "0.0.0.0,0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,1,,,,,,,"",,,,0  
  
OK  
  
AT+COPS?  
+COPS: 0,0,"CHN-CT",7  
  
OK  
  
ATD18158433933;  
OK  
  
◀◆  
OK  
  
ATH  
OK  
  
NO CARRIER  
  
RING  
  
RING  
  
ATA  
OK  
  
ATH  
OK  
  
NO CARRIER
```