Application



# SIM7000 Series_MQTT_Application Note

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# About Document

## Document Information

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## Related Documents

[1] SIM7000 Series AT Command Manual V1.03.pdf

### This document applies to the following products:

| Name | Type | Size (mm) | Comments |
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| SIM7000E/C/A/G | Cat-M1(/NB1/ GSM) | 24*24 | N/A |
| SIM7000E-N SIM7000C-N | NB1 | 24*24 | N/A |

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# 1 Purpose of this document

Based on module AT command manual, this document will introduce MQTT application process.

Developers could understand and develop application quickly and efficiently based on this document.

# 2 AT Commands for MQTT

## 2.1 Overview

| Command | Description |
|---|---|
| AT+SMCONF | Set MQTT Parameter |
| AT+CSSLCFG | SSL Configure |
| AT+SMSSL | Select SSL Configure |
| AT+SMCONN | MQTT Connection |
| AT+SMPUB | Send Packet |
| AT+SMSUB | Subscribe Packet |
| AT+SMUNSUB | Unsubscribe Packet |
| AT+SMSTATE | Inquire MQTT Connection Status |
| AT+SMPUBHEX | Set SMPUB Data Format to Hex |
| AT+SMDISC | Disconnection MQTT |

## 2.2 Detailed Descriptions of Commands

### 2.2.1 AT+SMCONF Set MQTT Parameter

| **AT+SMCONF Set MQTT Parameter** | |
|---|---|
| Test Command<br>**AT+SMCONF=?** | Response<br>**+SMCONF: "MQTTParamTag","MQTTParamValue range"**<br><br>**OK** |

| | |
|---|---|
| Read Command<br>**AT+SMCONF?** | Response<br>**+SMCONF: <MQTTParamTag>,<MQTTParamValue>**<br><br>**OK** |
| Write Command<br>**AT+SMCONF=<MQTTParamTag>,<MQTTParamValue>** | Response<br>**OK**<br>or<br>**ERROR** |
| | Parameters<br>< **MQTTParaTag** ><br>"**CLIENTID**" Client conection id<br>"**URL**" (indispensable parameter) server URL address<br>"server domain",["tcpPort"]<br>"server": Host or IP<br>"tcpPort": Port default is 1883<br>"**KEEPTIME**" Hold connect time. default is 60s<br>"**CLEANSS**" Session cleanin. Default is 0.<br>Range of values:(0-1).<br>"**USERNAME**" User name. default null<br>"**PASSWORD**" Password. default null<br>"**QOS**" Send packet qos level. range of values（0~2）<br>"**TOPIC**" Publish topic name<br>"**MESSAGE**" Publish message details<br>"**RETAIN**" Retain identification. Default is 0.<br>Range of values:(0-1)<br><**MQTTParamValue**> MQTT Parameter value.Type and supported content depend on related < MQTTParaTag>. |
| Example | AT+SMCONF="CLIENTID","id"<br>OK<br>AT+SMCONF="KEEPTIME",60<br>OK<br>AT+SMCONF="URL","test.mosquitto.org","1883"<br>OK<br>AT+SMCONF="CLEANSS",1<br>OK<br>AT+SMCONF="QOS",1<br>OK<br>AT+SMCONF="TOPIC","will topic"<br>OK<br>AT+SMCONF="MESSAGE","will message"<br>OK<br>AT+SMCONF="RETAIN",1<br>OK |

## 2.2.2 AT+CSSLCFG SSL Configure

| AT+CSSLCFG Analysis SSL Configure | |
|---|---|
| Write command<br>**AT+CSSLCFG="convert",<ssltype>,<cname>,[<keyname>[,<passkey>]]** | Response<br>**OK**<br>If failed:<br>**+CME ERROR: <err>** |
| | Parameters<br>**<ssltype>**<br>1 QAPI_NET_SSL_CERTIFICATE_E<br>2 QAPI_NET_SSL_CA_LIST_E<br>3 QAPI_NET_SSL_PSK_TABLE_E<br><**cname**> String type (string should be included in quotation marks): name of cert file<br><**keyname**> String type (string should be included in quotation marks):name of key file<br><**passkey**> String type (string should be included in quotation marks):value of passkey |
| Parameter Saving Mode | - |
| Max Response Time | - |
| Reference | - |

## 2.2.3 AT+SMSSL Select SSL Configure

| AT+SMSSL Select SSL Configure | |
|---|---|
| Read Command<br>**AT+SMSSL?** | Response<br>**+SMSSL:index,ca list,cert name** |
| Write Command<br>**AT+SMSSL=<index>,<calist>,<cert name>** | Response<br>**OK**<br>or<br>**ERROR** |
| | Parameters<br><**index**> SSL status, range: 0-6<br><**ca list**> CA_LIST file name, length 20 byte<br><**cert name**> CERT_NAME file name, length 20 byte |
| Example | AT+SMSSL=1,calist,certname<br>OK |

## 2.2.4 AT+SMCONN MQTT Connection

| AT+SMCONN MQTT Connection | |
|---|---|
| Executive Command<br>**AT+SMCONN** | Response<br>**OK**<br>or<br>**ERROR** |
| Example | AT+SMCONN<br>OK |

## 2.2.5 AT+SMPUB Send Packet

| AT+SMPUB Send Packet | |
|---|---|
| Test Command<br>**AT+SMPUB=?** | Response<br>**+SMPUB: <topic>,< content length>,(0-2),(0-1)** |
| Write Command<br>**AT+SMPUB=<topic>,<content length>,<qos>,<retain>** | Response<br>**OK**<br>or<br>**ERROR** |
| | Parameters<br><**topic**> Subscribe packet<br><**qos**> Send packet QOS level, range: 0~2<br><**content length**> Message length, range: 0~512<br><**retain**> Server hold message range: 0~1 |
| Example | AT+SMPUB="001",10,1, 1<br>OK |

## 2.2.6 AT+SMSUB Subscribe Packet

| AT+SMSUB Subscribe Packet | |
|---|---|
| Read Command<br>**AT+SMSUB=?** | Response<br>**+SMSUB: "topic",qos**<br><br>**OK** |
| Write Command<br>**AT+SMSUB=<topic>,<qos>** | Response<br>**OK**<br>or<br>**ERROR** |

| | |
|---|---|
| | Parameters<br><**topic**> Subscribe packet<br><**qos**> Send packet qos level, range: 0~2 |
| Example | AT+SMSUB="001",1<br>OK |

## 2.2.7 AT+SMUNSUB Unsubscribe Packet

| **AT+SMUNSUB Unsubscribe Packet** | |
|---|---|
| Read Command<br>**AT+SMUNSUB=?** | Response<br>**+SMUNSUB: "topic"**<br><br>**OK** |
| Write Command<br>**AT+SMUNSUB=<topic>** | Response<br>**OK**<br>or<br>**ERROR** |
| | Parameters<br><**topic**> Subscribe subject |
| Example | AT+SMUNSUB="001"<br>OK |

## 2.2.8 AT+SMSTATE Inquire MQTT Connection Status

| **AT+SMSTATE Inquire MQTT Connection Status** | |
|---|---|
| Read Command<br>**AT+SMSTATE?** | Response<br>**+SMSTATE: <status>**<br><br>**OK** |
| | Parameters<br><**status**><br>0 Expression MQTT disconnect state<br>1 Expression MQTT on-line state |
| Example | AT+SMSTATE?<br>+SMSTATE: 1<br><br>OK |

### 2.2.9 AT+SMPUBHEX Set SMPUB Data Format to Hex

| AT+SMPUBHEX Set SMPUB Data Format to Hex | |
|---|---|
| Test Command<br>**AT+SMPUBHEX=?** | Response<br>**+SMSSL: (0-1)** |
| Read Command<br>**AT+ SMPUBHEX?** | Response<br>**+SMSSL: <status>** |
| | PARAMETERS<br>**<status>**<br>0 SMPUB data format is normal<br>1 SMPUB data format is hex |
| Write Command<br>**AT+SMPUBHEX=<status>** | Response<br>**OK**<br>or<br>**ERROR** |
| | Parameters<br>**<status>** SMPUB format status, range: 0~1 |
| Example | AT+SMPUBHEX=1<br>OK |

### 2.2.10 AT+SMDISC Disconnect MQTT

| AT+SMDISC Disconnect MQTT | |
|---|---|
| Read Command<br>**AT+SMDISC?** | Response<br>**OK**<br>or<br>**ERROR** |
| Example | AT+SMDISC<br>OK |

# 3 Bearer Configuration

Usually module will register PS service automatically.

## 3.1 PDN Auto-activation

| AT Command | Response | Description |
|---|---|---|
| AT+CPIN? | +CPIN:READY<br><br>OK | Check SIM card status |
| AT+CSQ | +CSQ: 20,0<br><br>OK | Check RF signal |
| AT+CGREG? | +CGREG: 0,1<br><br>OK | Check PS service |
| AT+CGACT? | +CGACT: 1,1<br><br>OK | Activated automatically |
| AT+COPS? | +COPS: 0,0,"CHN-UNICOM",9<br><br>OK | Check operator info<br>CHN-UNICOM is operator's name<br>9 is NB-IOT network |
| AT+CGCONTRDP | +CGCONTRDP:<br>1,5,"shnbiot","10.250.0.213.255.255.255.0"<br><br>OK | Get APN and IP address from network |

## 3.2 APN Manual configuration

If not attached, could configure correct APN setting.

| AT Command | Response | Description |
|---|---|---|
| AT+CFUN=0 | +CPIN: NOT READY<br><br>OK | Disable RF |
| AT*MCGDEFCONT="IP","3GNET" | OK | Configure new APN |
| AT+CFUN=1 | OK<br><br>+CPIN: READY | Enable RF |
| AT+CGREG? | +CGREG: 0,1<br><br>OK | Inquiry PS service |
| AT+CGCONTRDP | +CGCONTRDP: | Attached PS domain and |

| | | |
|---|---|---|
| | 1,5,"3GNET","10.250.0.253.255.255.255.0" | got IP address automatically |
| | OK | |

## 3.3 MQTT Function

| AT Command | Response | Description |
|---|---|---|
| AT+CNACT=1,"cmnet" | OK<br><br>+APP PDP: ACTIVE | Open wireless connection parameter cmnet is APN,this parameter needs to set different APN values according to different cards |
| AT+CNACT? | +CNACT: 1,"10.181.182.177"<br><br>OK | Get local IP |
| AT+SMCONF="URL","test.mosquitto.org","1883" | OK | Set up server URL |
| AT+SMCONF="KEEPTIME",60 | OK | Set MQTT time to connect server |
| AT+SMCONN | OK | |
| AT+SMSUB="update",1 | OK | Subscription packet |
| AT+SMPUB="update","5",1,1<br>>hello | OK<br>+SMSUB: "update","hello" | Send packet<br>Get data on server |
| | | Get data |
| AT+SMUNSUB="update" | OK | Unsubscription packet |
| AT+SMDISC | OK | Disconnect MQTT |
| AT+CNACT=0 | OK<br><br>+APP PDP: DEACTIVE | Disconnect wireless |
| | OK | |
| | OK | |

## 3.4 MQTTS Function

| AT Command | Response | Description |
|---|---|---|
| AT+CNACT=1,"cmnet" | OK | Open wireless |

| | | |
|---|---|---|
| | +APP PDP: ACTIVE | connection parameter cmnet is APN,this parameter needs to set different APN values according to different cards |
| AT+CNACT? | +CNACT: 1,"10.181.182.177"<br><br>OK | Get local IP |
| AT+SMCONF="URL","test.mosquitto.org","1883" | OK | Set up server URL |
| AT+SMCONF="KEEPTIME",60 | OK | Set MQTT time to connect server |
| AT+CSSLCFG="CONVERT",2,"rootCA.pem" | OK | rootCA.pem is ca certificate |
| AT+CSSLCFG="CONVERT",1,"cert.pem"，"key.pem" | OK | cert.pem is certificate,key.pem is key of cert.pem |
| AT+SMSSL=1,rootCA.pem,cert.pem | OK | Set ca certificate and cert certificate name |
| AT+SMCONN | OK | |
| AT+SMSUB="update",1 | OK | Subscription packet |
| AT+SMPUB="update","5",1,1<br>>hello | OK<br>+SMSUB: "update","hello" | Send packet<br>Get data on server |
| | | Get data |
| AT+SMUNSUB="update" | OK | Unsubscription packet |
| AT+SMDISC | OK | Disconnect MQTT |
| AT+CNACT=0 | OK<br><br>+APP PDP: DEACTIVE | Disconnect wireless |
| | OK | |
| | OK | |

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