



SIM7028 Series_LWM2M Application Note

LPWA Module

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Document Title:	SIM7028 Series_LWM2M_Application Note
Version:	1.03
Date:	2022.12.08
Status:	Released

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About Document

Version History

Revision	Date	Chapter	Description
V1.00	2022.5.12	All	New version
V1.01	2022.05.31	All	Update file
V1.02	2022.7.5	All	Update some description
V1.03	2022.10.25	All	Update file

Scope

This document could be applied to following products:

Name	Type	Size(mm)	Comments
SIM7028	NB2	17.6*15.7	Band 1/2/3/4/5/8/12/13/14/17/18/19/20/25/26/28/66/70/85

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1 Introduction

1.1 Purpose of the document

Based on module AT command manual, this document will introduce LWM2M application process on SIM7028 series of module, developers could understand and develop application quickly and efficiently based on this document.

1.2 Related documents

[1] SIM7028 Series_AT Command Manual

1.3 Conventions and abbreviations

In this document, the GSM engines are referred to as following term:

- ME (Mobile Equipment);
- MS (Mobile Station);
- TA (Terminal Adapter);
- DCE (Data Communication Equipment) or facsimile DCE (FAX modem, FAX board);

In application, controlling device controls the GSM engine by sending AT Command via its serial interface.

The controlling device at the other end of the serial line is referred to as following term:

- TE (Terminal Equipment);
- DTE (Data Terminal Equipment) or plainly "the application" which is running on an embedded system;

Other Conventions:

- LWM2M(Lightweight Machine-To-Machine);
- SSL(Secure Sockets Layer);
- PDP(Packet Data Protocol);

2AT Commands for LWM2M

2.1 Overview

Command	Description
AT+LWSTART	Start LWM2M service
AT+LWSTOP	Stop LWM2M Service
AT+LWCNF	Config the LWM2M
AT+LWOPEN	Register to a LWM2M server
AT+LWCLOSE	Deregister to LWM2M server
AT+LWADDOBJ	Add a LWM2M object
AT+LWDELOBJ	Delete a LWM2M object
AT+LWREADRSP	Send read response to LWM2M server
AT+LWWRITERSP	Send write response to LWM2M server
AT+LWEXECUTERSP	Send execute response to LWM2M server

2.2 Detailed Description of AT Commands for LWM2M

2.2.1 AT+LWSTART Start LWM2M service

AT+LWSTART is used to start LWM2M service by activating PDP context. You must execute AT+LWSTART before any other LWM2M related operations.

AT+LWSTART Start LWM2M service	
Test Command	Response
AT+LWSTART=?	OK
Execution Command	Response
AT+LWSTART	1) OK 2)

	ERROR
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Examples

```
AT+LWSTART  
OK
```

2.2.2 AT+LWSTOP Stop LWM2M Service

AT+LWSTOP is used to stop LWM2M service by deactivating PDP context When you are no longer using the LWM2M service, use this command.

AT+LWSTOP Stop LWM2M Service	
Test Command	Response
AT+LWSTOP=?	OK
Execution Command	Response
AT+LWSTOP	1) OK 2) ERROR
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Examples

```
AT+LWSTOP  
OK
```

2.2.3 AT+LWCNF Config the LWM2M

AT+LWCNF is used to config the LWM2M.

AT+LWCNF Config the LWM2M

Test Command

AT+LWCNF=?

Response

+LWCNF: "server",<ipaddress>
 +LWCNF: "serverport",<serverport>
 +LWCNF: "endpointname",<endpointname>
 +LWCNF: "connecttype",,(4,6)
 +LWCNF: "lifetime",<lifetime>
 +LWCNF: "localport",<localport>

OK

Write Command

AT+LWCNF="server",<ipaddress>
AT+LWCNF="serverport",<serverport>
AT+LWCNF="endpointname",< endpointname>
AT+LWCNF="connectiontype",4 or 6
AT+LWCNF="lifetime",<lifetime>
AT+LWCNF="localport",<localport>

Response

1)
OK
 2)
ERROR

Parameter Saving Mode

NO_SAVE

Max Response Time

9000ms

Reference

Defined Values

<server>	The LWM2M server address URL or ipaddress.
<serverport>	The LWM2M server port,the range is from 0 to 65535.
<endpointname>	The LWM2M client device name.
<connecttype>	The type of LWM2M server address IPV4 or IPV6.
<lifetime>	The connection life time.the max value is 65535.
<localport>	The LWM2M client device local port. The range is from 0 to 65535.

Examples

AT+LWCNF="server","leshan.eclipseprojects.io"

OK

AT+LWCNF="serverport","5683"

OK

AT+LWCNF="endpointname","simcom"

OK

AT+LWCNF="connectiontype","4"

OK

AT+LWCNF="lifetime","800"

OK

AT+LWCNF="localport","56833"

OK

2.2.4 AT+LWOPEN Register to a LWM2M server

AT+LWOPEN is used to register to a LWM2M sever, make sure you register to a LWM2M sever before you execute AT+LWCLOSE command.

AT+LWOPEN Register to a LWM2M server

Test Command

AT+LWOPEN=?

Response

OK

Response

1)

OK

Execute Command

AT+LWOPEN

+LMOPEN:<lwm2mId>

2)

ERROR

Parameter Saving Mode

NO_SAVE

Max Response Time

9000ms

Reference

Defined Values

<lwm2mId>

The LWM2M session ID.the range is from 0 to 1.

Examples

AT+LWOPEN=?

OK

AT+LWOPEN

OK

+LMOPEN:0

2.2.5 AT+LWCLOSE Deregister to a LWM2M server

This command is used to Deregister to a LWM2M server.

AT+LWCLOSE Deregister to a LWM2M server

Test Command	Response +LWCLOSE: <lwm2mId>
AT+LWCLOSE=?	OK
Write Command	Response 1) OK 2) ERROR
AT+LWCLOSE=<lwm2mId>	
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Defined Values

<lwm2mId>	AT+LWOPEN return the LWM2M session ID.the range is from 0 to 1.
------------------------	---

Examples

```
AT+LWCLOSE=0  
OK
```

2.2.6 AT+LWADDOBJ Add a LWM2M object

AT+LWADDOBJ is used to add a LWM2M object.

AT+LWADDOBJ Add a LWM2M object

Test Command	Response +LWADDOBJ:
AT+LWADDOBJ=?	<lwm2mId>,<objectId>,<instanceId>,<resourceCnt>,<resourceId>[,<resourceId>...]

	OK
Write Command	Response
AT+LWADDOBJ=<lwm2mId>,<objectId>,<instanceId>,<resourceCnt>,<resourceId>,<resourceId>,...	1) OK 2) ERROR
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Defined Values

<lwm2mId>	AT+LWOPEN return the LWM2M session ID.the range is from 0 to 1.
<objectId>	The LWM2M object ID you want to add.the range is from 0 to 65535, But 0-7 has already used.
<instanceId>	The LWM2M object instance ID. The range is from 0 to 65535.
<resourceCnt>	The LWM2M resource count. The range is from 1 to 15.
<resourceId>	The LWM2M resource ID. The range is from 0 to 65535.

Examples

```
AT+LWADDOBJ=?
+LWADDOBJ:
<lwm2mId>,<objectId>,<instanceId>,<resourceCnt>,<resourceId>[,<resourceId>...]

OK
AT+LWADDOBJ=0,3303,0,6,5518,5601,5602,5603,5604,5605
OK
```

2.2.7 AT+LWDELOBJ Delete a LWM2M object

AT+LWDELOBJ is used to delete a LWM2M object.

AT+LWDELOBJ Delete a LWM2M object

Test Command AT+LWDELOBJ=?	Response +LWDELOBJ: <lwm2mId>,<objectId>
	OK
Write Command AT+LWDELOBJ=<lwm2mId>,<objectId>	Response 1) OK 2) ERROR
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Defined Values

<lwm2mId>	AT+LWOPEN return the LWM2M session ID.the range is from 0 to 1.
<objectId>	The LWM2M object ID you want to delete.the range is from 0 to 65535.

Examples

```
AT+LWDELOBJ=?
+LWDELOBJ: <lwm2mId>,<objectId>

OK
AT+LWDELOBJ=0,3303
OK
```

2.2.8 AT+LWREADRSP Send read response to LWM2M server

You can use this command to send read response to LWM2M server.

AT+LWREADRSP Send read response to LWM2M server	
Test Command AT+LWREADRSP=?	Response +LWREADRSP: <lwm2mId>,<objectId>,<instanceId>,<resourceCnt>,<resourceId>,<valuetype>,<valueLen>,<value>[,<resourceId>,<valuetype>...]
	OK
Write Command	Response

AT+LWREADRSP=<lwm2mId>,<objectId>,<instanceId>,<resourceCnt>,<resourceId>,<valueType>,<valueLen>,<value>,<resourceId>,<valueType>...	1) OK 2) ERROR
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Defined Values

<lwm2mId>	The LWM2M session ID,according to “+LWREAD” returned.
<objectId>	The LWM2M object ID,according to “+LWREAD” returned.
<instanceId>	The LWM2M object instance ID,according to “+LWREAD” returned.
<resourceCnt>	The LWM2M resource count,according to “+LWREAD” returned.
<resourceId>	The LWM2M resource ID,according to “+LWREAD” returned.
<valueType>	<p>The type of value of reponse.</p> <ul style="list-style-type: none"> ● I Integer ● F Float ● B Boolean ● D UINT8 array data ● S String
<valueLen>	The length of value.
<value>	The reponse value.

Examples

```

AT+LWREADRSP=?
+LWREADRSP:
<lwm2mId>,<objectId>,<instanceId>,<resourceCnt>,<resourceId>,<valueType>,<valueLen>,<value>[,<resourceId>,<valueType>...]

```

OK

```

+LWREAD:0,3303,0,1,5602
AT+LWREADRSP= 0,3303,0,1,5602,"F",5,"15623"
OK

```

NOTE

Must execute the this command after URC “+LWREAD” returned.”+LWREAD” see 10.2.11

2.2.9 AT+LWWRITERSP Send write response to LWM2M server

This command is used to send a response to LWM2M server.

AT+LWWRITERSP Send reponse to a LWM2M server

Test Command	Response +LWWRITERSP: <lwm2mId>,<result>
AT+LWWRITERSP=?	OK
Execute Command	Response 1) OK 2) ERROR
AT+LWWRITERSP=<lwm2mId>,<result>	
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Defined Values

<lwm2mId>	The LWM2M session ID,according to "+LWWRITE" returned.
<result>	According to "+LWWRITE",return the result, see 10.3

Examples

```
+LMWRITE: 0,3335,0,1,5750,S,1,"p"  
AT+LWWRITERSP =0,0  
OK
```

NOTE

Must execute the this command after URC "+LWWRITE" returned."+LWWRITE" see 10.2.12

2.2.10 AT+LWEXECUTERSP Send execute response to LWM2M server

You can use AT+LWEXECUTERSP send response to LWM2M server.

AT+LWEXECUTERSP Send response to LWM2M server

Test Command	Response +LWEXECUTERSP: <lwm2mId>,<result>
AT+LWEXECUTERSP=?	OK
Write Command	Response 1) OK
AT+LWEXECUTERSP=<lwm2mId>,<result>	2) ERROR
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Defined Values

<lwm2mId>	The LWM2M session ID,according to "+LWEXECUTE" returned.
<result>	According to "+LWEXECUTE",return the result, see 10.3

Examples

```
AT+LWEXECUTERSP=?  
OK  
  
+LWEXECUTE: 0,3303,0,5605,1,"0"  
AT+LWEXECUTERSP=0,0  
OK
```

NOTE

Must execute the this command after URC "+LWEXECUTE returned." "+LWEXECUTE" see 10.2.13

1.3 Command Result Codes

<result>	Description
0	No error
1	Ignore
65	Created
66	Deleted
68	Changed
69	Content
95	Continue
128	Bad request
129	Unauthorized
130	Bad option
132	Not found
133	Method no allowed
134	Not acceptable
136	Req entity incomplete
140	Precondition failed
141	Entity too large
160	Internal server error
161	Not implemented
163	Service unavailable

3LWM2M Related URCs

3.1 Description of LWM2M Related URCs

LWM2M client response of LWM2M server operate read.

+LWREAD LWM2M client response of LWM2M server operate read

	Response +LWREAD:<lwm2mId>,<objectId>,<instanceId>,<resourceCnt>,<resourceId>
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Defined Values

<lwm2mId>	The LWM2M session ID the range is from 0 to 1.
<objectId>	The LWM2M object ID you want to add.the range is from 8 to 65535.
<instanceId>	The LWM2M object instance ID. The range is from 0 to 65535.
<resourceCnt>	The LWM2M resource count. The range is from 1 to 15.
<resourceId>	The LWM2M resource ID. The range is from 0 to 65535.

LWM2M client response of LWM2M server operate write.

+LWWRITE LWM2M client response of LWM2M server operate read

	Response +LWWRITE: <lwm2mId>,<objectId>,<instanceId>,<resourceCnt>,<resourceId> <valuetype>,<valuelen>,<value>,<resourceId>,<valuetype>...
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Defined Values

<lwm2mId>	The LWM2M session ID.the range is from 0 to 1.
<objectId>	The LWM2M object ID you want to add.the range is from 8 to 65535.
<instanceId>	The LWM2M object instance ID. The range is from 0 to 65535.
<resourceCnt>	The LWM2M resource count. The range is from 1 to 15.
<resourceId>	The LWM2M resource ID. The range is from 0 to 65535.
<valuetype>	<p>The type of value of reponse.</p> <ul style="list-style-type: none"> ● I Integer ● F Float ● B Boolean ● D UINT8 array data <p>S String</p>
<valuelen>	The length of value.
<value>	The reponse value.

LWM2M client response of LWM2M server operate execute.

+LWEXECUTE LWM2M client response of LWM2M server operate execute

	Response
	1)
	+LWEXECUTE: <lwm2mId>,<objectId>,<instanceId>,<resourceId>,<len>,<buffer>
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	

Defined Values

<lwm2mId>	The LWM2M session ID.the range is from 0 to 1.
<objectId>	The LWM2M object ID.the range is from 8 to 65535.
<instanceId>	The LWM2M object instance ID. The range is from 0 to 65535.
<resourceCnt>	The LWM2M resource count. The range is from 1 to 15.
<len>	The response buffer len.
<buffer>	The response buffer.

4LWM2M Examples

4.1 Access to LWM2M server

Before all FOTA related operations, we should check network status:

AT+CESQ //Query signal quality

+CESQ: 99,99,255,255,22,58

OK

AT+CEREG? //Query network registration status.

+CEREG: 0,1

OK

AT+CGPADDR //Query the allocated IP address for the default PDN

+CGPADDR: 0,"11.102.241.134"

OK

Following commands shows how to connect with a LWM2M server.

AT+LWSTART // start LWM2M service, activate PDP context

OK

AT+LWCNF="server","112.74.93.163" //Set the server address

OK

AT+LWCNF="serverport","5683" //Set the server port

OK

AT+LWCNF="endpointname","simcom" //Set the client device name

OK

AT+LWCNF="lifetime",800 //Set the max connection life time

OK

AT+LWOPEN //Register to the special LWM2M server

OK

```
+LMOPEN: 0
AT+LWADDOBJ=0,3303,0,6,5518,5601,5602,56      //Add a LWM2M object
03,5604,5605
OK

+LWREAD: 0,3200,0,0                           //Receive a READ operation
AT+LWREADRSP=0,3200,0,1,5503,"B",103,"12
3"
OK

+LWWRITE: 0,3200,0,1,5750,0,6,"123456"        //Receive a WRITE operation
AT+LWWRITERSP=0,68                            //Response the WRITE operation
OK

+LWEXECUTE: 0,3200,0,5505,6,"123456"          //Receive a EXECUTE operation
AT+LWEXECUTERSP=0,68                          //Response the EXECUTE operation
OK

AT+LWCLOSE=0                                    //Unregister to the special LWM2M server
OK
```